# Chapter 4 Railway accident and serious incident investigations

## 1 Railway accidents and serious incidents to be investigated

**<Railway accidents to be investigated>**

◎ **Paragraph 3, Article 2 of the Act for Establishment of the Japan Transport Safety Board**

(Definition of railway accident)

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

◎ **Article 1 of Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board** (Serious accidents prescribed by the Ordinance of Ministry of Land, Infrastructure, Transport and Tourism, stipulated in paragraph 3, Article 2 of the Act for Establishment of the Japan Transport Safety Board)

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

2 From among the accidents specified in items 4 to 6 inclusive of paragraph 1 of Article 3 of the Ordinance, that which falls under any of the following sub-items:

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

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

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

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

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

4 The accidents equivalent to those specified in items 1 to 7 inclusive of paragraph 1, Article 3 of the Ordinance which have occurred relevant to dedicated railways and which are found to be particularly rare and exceptional; and

5 The accidents equivalent to those specified in items 1 to 3 inclusive which have occurred relevant to a tramway, as specified by a public notice issued by the Japan Transport Safety Board.

[Reference] The accidents listed in each of the items of paragraph 1, Article 3 of the

Ordinance on Reporting on Railway Accidents, etc.

Item 1: Train collision
Item 2: Train derailment
Item 3: Train fire
Item 4: Level crossing accident
Item 5: Accident against road traffic
Item 6: Other accidents with casualties
Item 7: Heavy property loss without casualties

◎ **Article 1 of the Public Notice of the Japan Transport Safety Board** (Accidents specified by the public notice stipulated in item 5, Article 1 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board)

1 From among the accidents specified in items 1 to 6 inclusive of paragraph 1 of Article 1 of the Ordinance on Reporting on Tramway Accidents, etc. (the Ordinance), that which falls under any of the following sub-items:

(a) an accident that causes the death of a passenger, crewmember, etc.;
(b) an accident involving five or more casualties (with at least one of the casualties dead);
(c) a fatal accident that occurs at a level crossing with no automatic barrier machine;

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

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

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

Item 1: Vehicle collision
Item 2: Vehicle derailment
Item 3: Vehicle fire
Item 4: Level crossing accident
Item 5: Accidents against road traffic
Item 6: Other accidents with casualties
Item 7: Heavy property loss without casualties

## Railway accidents to be investigated

<table>
<tr><th>Category</th><th>Train collision*2)</th><th>Train derailment*2)</th><th>Train fire*2)</th><th>Level crossing accident</th><th>Accident against road traffic</th><th>Other accidents with casualties</th><th>Heavy property loss without casualties</th></tr>
<tr><td rowspan="2">Railway (including tramway operated as equivalent to railway)<br>[Notice 1-3]</td><td colspan="3" rowspan="2">All accidents*1)<br>(These refer to train accidents and do not include vehicle accidents on railways.<br>[Ordinance 1-1]</td><td colspan="3">・ Accidents involving the death of a passenger, crew member, etc<br>・ Accidents involving five or more casualties with at least one of the casualties dead<br>・ Fatal accidents that occur at level crossings with no automatic barrier machines<br>・ 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<br>[Ordinance 1-2]</td><td></td></tr>
<tr><td colspan="4">Accidents that are particularly rare and exceptional<br>[Ordinance 1-3]</td></tr>
<tr><td>Dedicated railway</td><td colspan="7">Accidents that are particularly rare and exceptional [Ordinance 1-4]</td></tr>
<tr><td rowspan="2">Tramway [Ordinance 1-5]</td><td colspan="6">Accidents involving the death of a passenger, crewmember, etc., accidents involving five or more casualties with at least one of the casualties dead, and fatal accidents that occur at level crossings with no automatic barrier machines.<br>[Notice 1-1]</td><td></td></tr>
<tr><td colspan="7">Accidents that are particularly rare and exceptional [Notice 1-2]</td></tr>
</table>

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

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

(Note) “Ordinance” refers to the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board; “Notice” refers to the Public Notice by the Japan Transport Safety Board; and the numbers refer to the Article and paragraph numbers.

**< Railway serious incidents to be investigated>**

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

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

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

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

1 The situation specified in item 1 of paragraph 1 of Article 4 of the Ordinance on Reporting on 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, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train;

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

5 The situation specified in item 8 of paragraph 1 of Article 4 the Ordinance, which caused malfunction, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train;

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

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

[These are referred to as: item 4 “Main track overrun”; item 5 “Violating closure section for construction”; item 6 “vehicle derailment”; item 9 “Heavy leakage of dangerous object”; and item 10 “others,” respectively.]

7 The situations occurred relevant to the tramway as specified by a public notice of the Japan Transport Safety Board as being equivalent to the situations specified in the 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, damage, destruction, etc., bearing a particularly serious risk of collision, derailment of or fire in a vehicle operating on the main track;

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

3 The situation specified in item 5 of Article 2 of the Ordinance, which caused malfunction, damage, destruction, etc., bearing a particularly serious risk of collision, derailment or fire in a vehicle operating on the main track;

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

4 The situation specified in items 1 to 7 inclusive of Article 2 of the Ordinance which is found to be particularly rare and exceptional; and

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

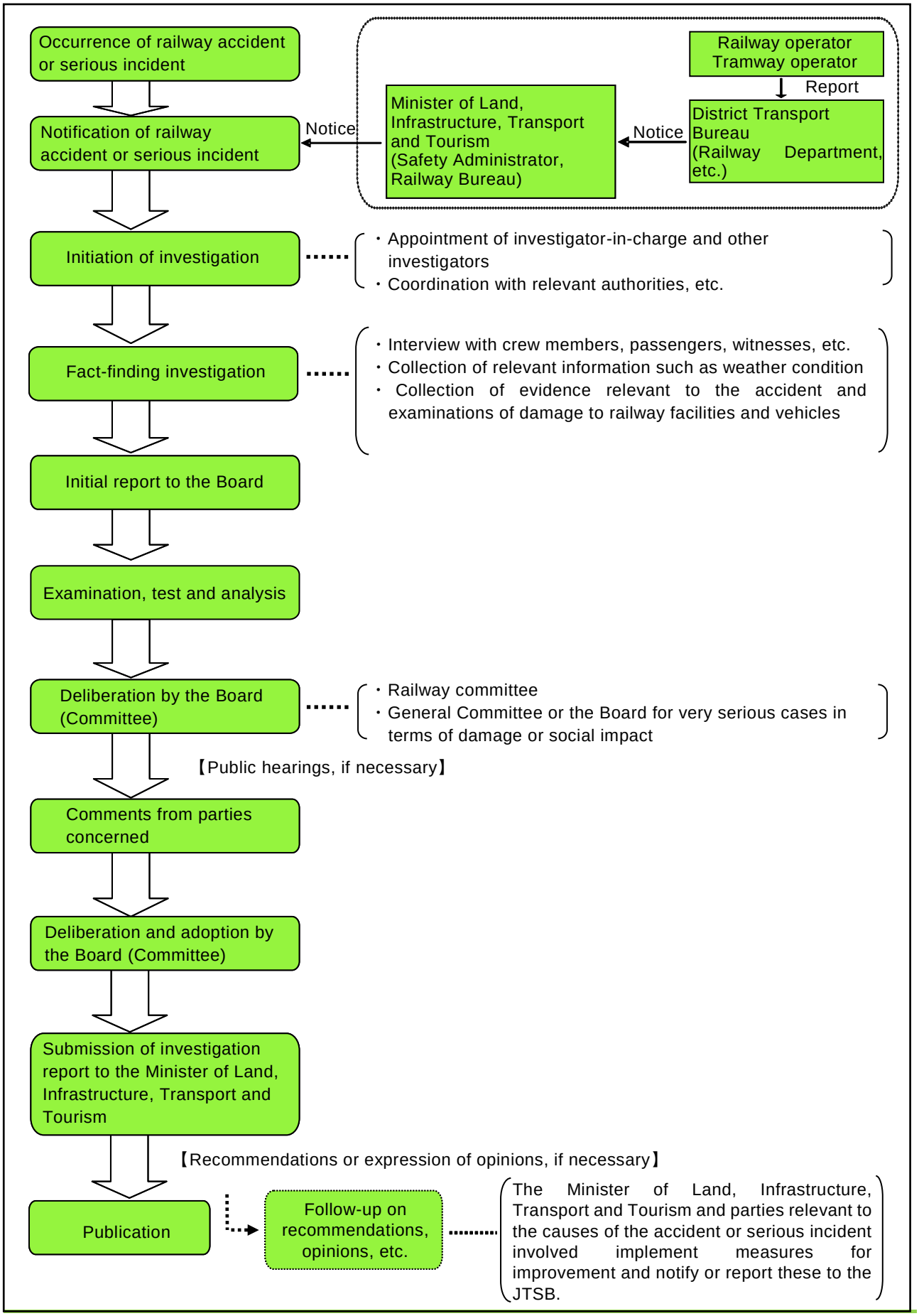
5 From among the situations occurring on a tramway operated under the application of the Ministerial Ordinances to provide Technical Regulatory Standards on Railways mutatis mutandis as specified in paragraph 1 of Article 3 of the Ordinance on Tramway Operations, the situations equivalent to those specified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

**Serious incidents to be investigated**

<table>
<tr><td>Category</td><td>・Incorrect management of safety block (Railway)<br>・Incorrect management of safety block (Tramway)</td><td>・Incorrect indication of signal (Railway)<br>・Violating red signal</td><td>Dangerous damage in facilities</td><td>Dangerous trouble in vehicle</td><td>・Main track overrun<br>・Violating closure section for construction (Railway)<br>・Vehicle derailment (Railway)<br>・Heavy leakage of dangerous object<br>・Others</td></tr>
<tr><td rowspan="2">Railway<br>(including tramway operated as equivalent to railway)<br>[Notice 2-5]</td><td colspan="2">Certain conditions such as the presence of another train<br>[Ordinances 2-1, 2-2, and 2-3]</td><td colspan="2">Risk of collision, derailment or fire<br>[Ordinances 2-4 and 2-5]</td><td></td></tr>
<tr><td colspan="5">Incidents that are particularly rare and exceptional [Ordinance 2-6]</td></tr>
<tr><td rowspan="2">Tramway<br>[Ordinance 2-7]</td><td>Certain conditions such as the presence of a vehicle<br>[Notice 2-1]</td><td></td><td colspan="2">Risk of collision, derailment or fire<br>[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 2015, the JTSB carried out investigations of railway accidents and serious incidents. The results are as follows. 18 accident investigations had been carried over from 2014, and 13 accident investigations were newly launched in 2015. 18 investigation reports were published in 2015, and 13 accident investigations were carried over to 2016.

Two railway serious incident investigations had been carried over from 2014, and three railway serious incident investigation were newly launched in 2015. Three investigation reports were published in 2015, and two railway serious incident investigations were carried over to 2016.

Investigations of railway accidents and incidents in 2015

(Cases)

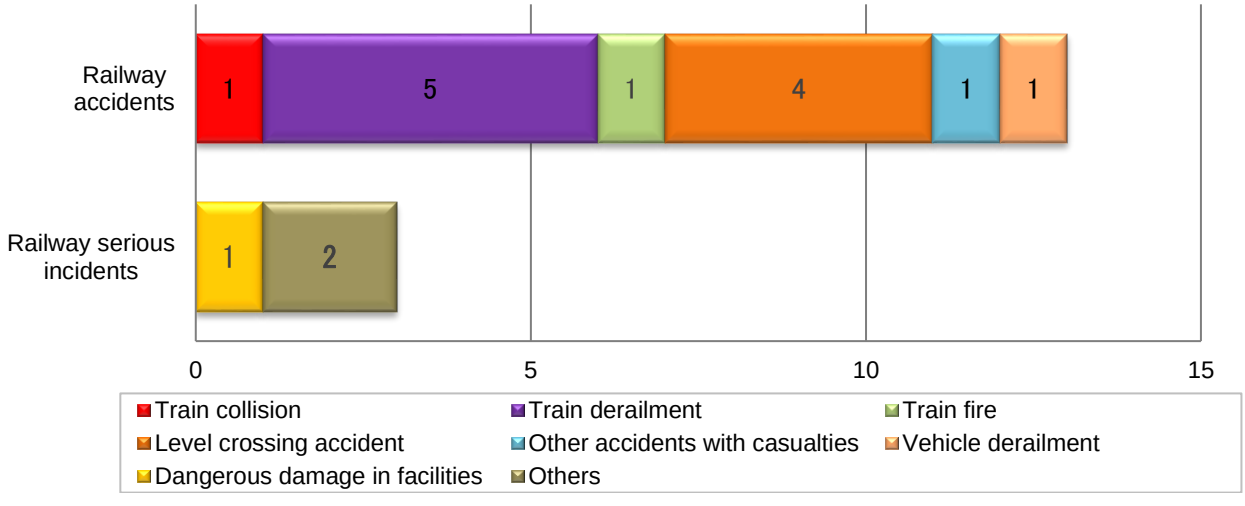
| Category | Carried over from 2014 | Launched in 2015 | Total | Published investigation reports | (Recommendations) | (Opinions) | Carried over to 2016 | (Interim report) |
|---|---|---|---|---|---|---|---|---|
| Railway accident | 18 | 13 | 31 | 18 | (0) | (1) | 13 | (0) |
| Railway serious incident | 2 | 3 | 5 | 3 | (0) | (0) | 2 | (0) |

## 4 Statistics for investigations launched in 2015

The railway accidents and railway serious incidents that were newly investigated in 2015 consisted of 13 railway accidents (down by one from the last year associated with 14 accidents) and three railway serious incidents (Up by two from the last year associated with one incident).

The breakdown by accident categories shows that the railway accidents are comprised of one train collision, five train derailment, one train fire, four level crossing accidents, one other accidents with casualties, one vehicle derailment. The railway serious incident comprised of one dangerous damage in facilities, two others.

Number of investigated railway accidents and serious incidents by type in 2015



The number of casualties was 91 across the 13 accidents. These consisted of six death and 85 injured persons.

The number of casualties (in railway accidents)

(Persons)

| 2015 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Category | Dead | | | Injured | | | Total |
| | Crew | Passenger | Others | Crew | Passenger | Others | |
| Casualties | 0 | 2 | 4 | 4 | 80 | 1 | 91 |
| Total | 6 | | | 85 | | | |

## 5 Summaries of railway accidents and serious incidents that occurred in 2015

The railway accidents and railway serious incidents that occurred in 2015 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)

1

| Date and accident type | Railway operator | Line section (location) |
|---|---|---|
| January 24, 2015<br>Train derailment | East Japan Railway Company | Between Kuwanohara Signal Station and Inariyama Station, Shinonoi Line (Nagano Prefecture) |

Summary

While traveling in the above section, a train collided with a lightweight truck that had entered the railway track, causing all axles in the front bogie of the front EMU to become derailed and causing the train to stop inside the tunnel.

The driver of the lightweight truck was injured.

2

| Date and accident type | Railway operator | Line section (location) |
|---|---|---|
| January 25, 2015<br>Train derailment | East Japan Railway Company | Between Uzen-Numazawa Station and Tenoko Station, Yonesaka Line (Yamagata Prefecture) |

Summary

While travelling in the above section, when the train left from the Utsu Tunnel, a train driver found snow that had accumulated on the tracks and applied an emergency brake, but was not in time, and the train climbed up the snow, causing all of the two axles in the front bogie of the front DMU to be derailed to the right.

Although there were six passengers and a train driver on board the train, there were no injuries.


3

| Date and accident type | Railway operator | Line section (location) |
|---|---|---|
| February 13, 2015<br>Level crossing accident | West Japan Railway Company | Hachininyama level crossing, class one level crossing with automatic barrier machine and road warning device, between Nishiachi Station and Shin-Kurashiki Station, Sanyo Line (Okayama Prefecture) |

Summary

A train driver confirmed that the obstruction warning signal at Hachininyama level crossing was indicating a stop signal, and at the same time confirmed a common freight truck stopped within the level crossing. Immediately, he applied the emergency brake and sounded the whistle but was not in time, and the train collided with the freight truck.

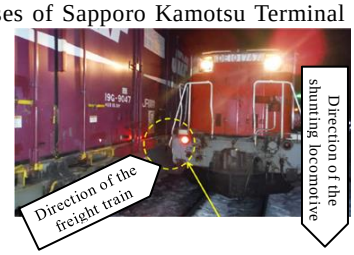
There were about 300 passengers, a train driver, and a conductor on board the train. Of these, 44 passengers and the train driver were injured.

The driver of the freight truck escaped outside of the level crossing at the time of the collision, and was not injured.

The train was damaged at the front part of the front vehicle

| | | |
|---|---|---|
| | | and the right side between the front and second vehicles, but did not become derailed. Although the freight truck was completely demolished, a fire did not break out. |

| 4 | Date and accident type | Railway operator | Line section (location) |
|---|---|---|---|
| | February 17, 2015<br>Train collision | Japan Freight Railway Company | In the premises of Sapporo Kamotsu Terminal Station, Hakodate Line (Hokkaido Prefecture) |
| | Summary | When a shunting locomotive was operating from Shiraishi Passage Line to the So-No. 2 Line of Atsubetsu Station side in the premises of Sapporo Kamotsu Terminal, the locomotive passed the car stop indicator toward Atsubetsu Station on that line, and stopped in a position obstructing adjacent lines.<br>On the other hand, a high-speed freight train entered the premises of Sapporo Kamotsu Terminal Station, and when it passed alongside the shunting locomotive, a freight train driver confirmed a sound indicating contact and immediately applied an emergency brake, causing the train to stop after traveling approximately 50 m.<br>After stopping, the driver got off the train and confirmed the state of the train. As a result, the driver discovered that the side of the front vehicle of the train had collided with the shunting locomotive.<br>Although there was a driver on board the train and a driver on board the shunting locomotive, there were no injuries. |




| 5 | Date and accident type | Railway operator | Line section (location) |
|---|---|---|---|
| | June 19, 2015<br>Level crossing accident | Toyama Chihou Railroad Co., Ltd. | Kitaura level crossing, class four level crossing without automatic barrier nor road warning device, between Chigozuka Station and Tazoe Station, Tateyama Line (Toyama Prefecture) |
| | Summary | While traveling in the above section, a train collided with a pedestrian passing through Kitaura level crossing.<br>The one pedestrian died. | |

| 6 | Date and accident type | Railway operator | Line section (location) |
|---|---|---|---|
| | June 30, 2015<br>Train fire | Central Japan Railway Company | Between Shin-Yokohama Station and Odawara Station, Tokaido Shinkansen (Kanagawa Prefecture) |
| | Summary | While traveling in the above section, the train's emergency buzzer in the second car was activated. Therefore, a train driver applied braking operations, with the train stopping approximately 8 km before Odawara Station.<br>When the driver checked the situation after stopping, he confirmed that there was a passenger on fire in an aisle in the cabin of the first car, and used a fire extinguisher to put out the fire.<br>The conductor also discovered that one female passenger had collapsed on the Tokyo-side deck in the same car.<br>Two passengers died and 26 passengers were injured (one with serious injuries). | |

| 7 | Date and accident type | Railway operator | Line section (location) |
|---|---|---|---|
| | August 8, 2015<br>Other accident with casualties | West Japan Railway Company | In Shiroumaru Tunnel, between Kokura Station and Hakata Station, Sanyo Shinkansen (Fukuoka Prefecture) |
| | Summary | While traveling in the above section, a train driver confirmed a power outage and stopped a train using an emergency brake. After the train had stopped, a cabin crew member was informed by a passenger seated in the left window seat of the fourth row from the front in the third vehicle that her left arm, etc. had been injured due to a strong impact from the left side of the vehicle.<br>The conductor, who rushed to the third vehicle after being contacted by the cabin crew member, confirmed that there was damage near the side window next to the seat of the injured passenger.<br>Also, when the conductor inspected the train from outside, he confirmed that there were multiple damaged areas on the left side of the third vehicle. The train entered a car depot and its condition was checked, and it was found that a side cover plate mounted at the front-most part of the left side of the second vehicle was missing. When employees for power supply section in the company carried out the track patrol, the side cover plate of the train was discovered between the inbound and outbound lines in the Shiroumaru Tunnel.<br>There were about 500 passengers, two crew members (driver, conductor) and two cabin crew members on board the train. Aside from the one injured passenger mentioned above, there were no injuries. | |

| 8 | Date and accident type | Railway operator | Line section (location) |
|---|---|---|---|
| | August 26, 2015<br>Level crossing accident | West Japan Railway Company | Kagiya No. 1 level crossing, class four level crossing without automatic barrier nor road warning device, between Nishitakaya Station and Shiraichi Station, Sanyo Line (Hiroshima |

| | | | |
|---|---|---|---|
| | | | Prefecture) |
| | Summary | While traveling in the above section, a train driver confirmed a lightweight freight truck that had entered the Kagiya No. 1 level crossing and applied an emergency brake, but a train collided with the freight truck.<br>A driver of the freight truck died as a result of this accident. | |
| 9 | Date and accident type | Railway operator | Line section (location) |
| | October 11, 2015<br>Vehicle derailment | Nagasaki Electric Tramway Co., Ltd. | Between Suwa-Jinja-Mae tram stop and Kokaido-Mae tram stop, Sakuramachi branch line (Nagasaki Prefecture) |
| | Summary | While traveling through Kokaido-Mae intersection toward the Nagasaki-Eki-Mae tram stop, two axles in the rear bogie of a tram car became derailed.<br>There were no injuries. | |
| 10 | Date and accident type | Railway operator | Line section (location) |
| | October 29, 2015<br>Train derailment | Minamiaso Railway Co., Ltd. | In the premises of Nakamatsu Station, Takamori Line (Kumamoto Prefecture) |
| | SUMMARY | While entering Nakamatsu Station, near the switching point, all of the two axles in the front bogie of the front vehicle became derailed to the right in the running direction.<br>There were no injuries. | |
| 11 | Date and accident type | Railway operator | Line section (location) |
| | November 14, 2015<br>Level crossing accident | Kyushu Railway Co., Ltd. | Nakata level crossing, class four level crossing without automatic barrier nor road warning device, between Minamikata Station and Kibana Station, Nichinan Line (Miyazaki Prefecture) |
| | Summary | While traveling in the above section, a train driver confirmed a light motor vehicle in the Nakata level crossing and applied an emergency brake immediately. However, the train collided with the light car and stopped after running in a short distance.<br>The driver and one fellow passenger on the light motor vehicle died. | |
| 12 | Date and accident type | Railway operator | Line section (location) |
| | December 11, 2015<br>Train derailment | East Japan Railway Company | Between Hiratsuto Station and Matsukusa Station, Yamada Line (Iwate Prefecture) |
| | Summary | While traveling in the above section, a train climbed up the piled-up soil that had come onto the track, and became derailed.<br>10 passengers were injured. | |
| 13 | Date and accident type | Railway operator | Line section (location) |
| | December 31, 2015<br>Train derailment | Shikoku Railway Company | In the premises of Orange Town Station, Kotoku Line (Kagawa Prefecture) |
| | Summary | In the premises of Orange Town Station, a train passed a starting signal indicating a stop signal, entering the safety siding and causing the front axle in the front bogie to become derailed.<br>There were no injuries. | |

(Railway serious incidents)

| | | | |
|---|---|---|---|
| 1 | Date and incident type | Railway operator | Line section (location) |
| | April 12, 2015<br>Dangerous damage in facilities | East Japan Railway Company | Between Kanda Station and Akihabara Station, Yamanote Line and Keihin-Tohoku Line (Tokyo Metropolitan) |
| | Summary | In the above section, a support column (electrification pole) supporting overhead lines scheduled for removal as part of improvement works on overhead line equipment fell and blocked the tracks.<br>A driver of a north-bound Keihin-Tohoku Line train (bound for Omiya Station) saw the fallen electrification pole in the above section, sent an alarm around trains by using the train protection radio, and reported to the dispatcher.<br>For this accident, the operation on Yamanote Line and Keihin-Tohoku Line were suspended.<br>It was confirmed that the fallen electrification pole had been tilting on the night of April 10, and it would be repaired on the night of April 13.<br>There were no injuries. | |
| 2 | Date and incident type | Railway operator | Line section (location) |
| | May 17, 2015<br>Others | Hokkaido Railway Company | In the premises of Yakumo station, Hakodate Line (Hokkaidou Prefecture) |
| | Summary | On May 17, 2015, the conductor in charge of the inbound Extra Passenger Limited Express 8008 train, the Extra Sleeper Limited Express Hokutosei composed of 14 vehicles, starting from Sapporo station bound for Ueno station of Hokkaido Railway Company, patrolled cabins after the train departed from | |

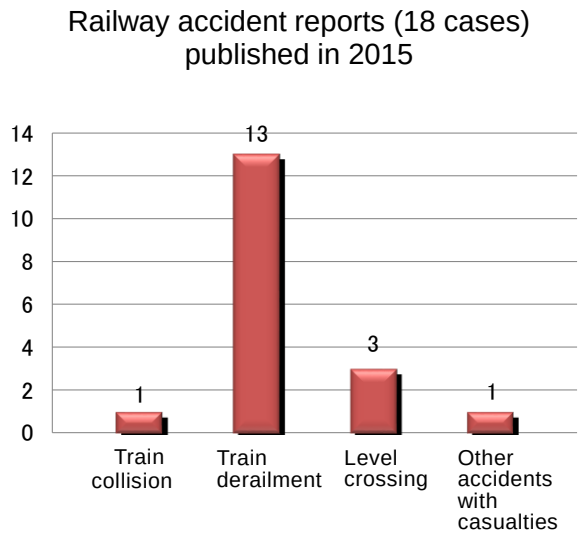
| | | |
|---|---|---|
| | | Yakumo station at 19:51, on schedule, and found the left door for passengers in the deck of the 4th vehicle opened almost completely, and immediately closed the door manually.<br>The train dispatcher, reported about the incident from the conductor in charge, instructed the train driver to stop the train at Otoshibe station temporarily.<br>There were 166 passengers, 3 train crews, i.e., the driver, the conductor in charge, the assistant conductor, and 5 dining car staffs onboard the train, but there was no casualty due to fell from the train etc. |
| 3 | Date and incident type | Railway operator / Line section (location) |
| | May 22, 2015<br>Others | Kyushu Railway Company / In the premises of Hizen-Ryuo Station, Nagasaki Line (Saga Prefecture) |
| | Summary | When an outbound train tried to enter the No. 2 platform of Hizen-Ryuo Station, a driver of outbound train noticed unusual sounds, and applied an emergency brake to stop the train near the home signal of Hizen-Ryuo Station.<br>After stopping at this point, operation of outbound train was resumed. When the outbound train reached a speed of approximately 35 km/h, the driver of the outbound train noticed that the outbound train entered the No.1 platform of Hizen-Ryuo Station, where an inbound train have already stopped. Therefore, the driver of the outbound train applied an emergency brake to avoid the train collision, and the outbound train stopped approximately 93 m before the inbound train.<br>There were no injuries. |

## 6 Publication of investigation reports

The number of investigation reports of railway accidents and serious incidents published in 2015 was 21. These consisted of 18 railway accidents and three serious incidents.

Breaking them down by category, the railway accidents contain one train collision accident, 13 train derailment accidents, three level crossing accidents and one other accidents with casualties. However, the serious railway incidents contain two dangerous trouble in vehicle and one others.

In the 18 accidents, the number of casualties was 98, consisting of four death and 94 injured persons.





Summaries of the investigation reports for railway accidents and serious incidents published in 2015 can be found on JTSB website at:

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

## 7 Actions taken in response to recommendations in 2015

Actions taken in response to recommendations were reported with regard to one serious railway incident in 2015. Summaries of these reports are as follows.

**① Sangi Railway Co., Ltd.: Serious railway incident on the premises of Higashi-Fujiwara Station on the Sangi Line**

(Recommendation issued on October 25, 2013)

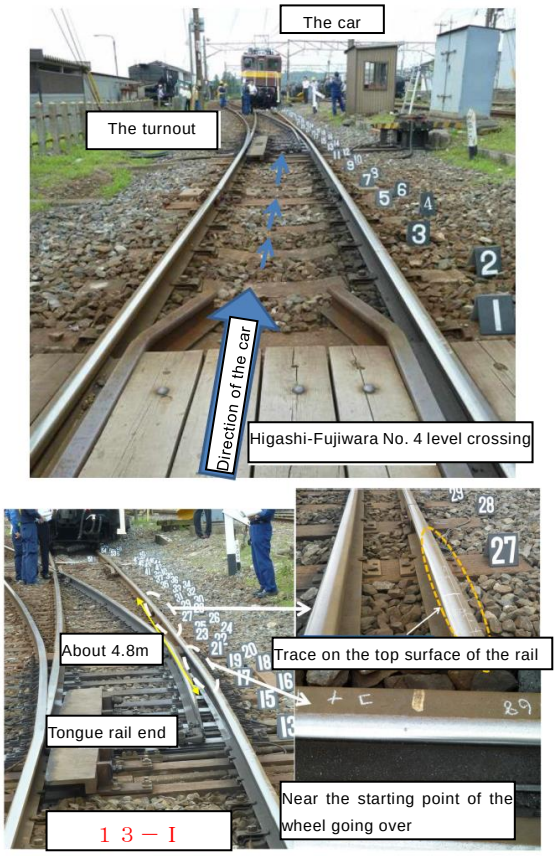
On October 25, 2013, the Japan Transport Safety Board (JTSB) published an investigation report and issued a recommendation to Sangi Railway Co., Ltd. as one of the parties relevant to the cause of the serious incident, regarding the serious railway incident that occurred on the premises of Higashi-Fujiwara Station on the Sangi Line on June 27, 2012. JTSB then received the following report regarding the measures (interim report) taken based on the recommendation.

○ 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.




Derailment site

○ 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.

It is probable that the increase in the derailment coefficient is 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 probable that that the train was running with excess of cant, which was due to its low-speed. It is somewhat likely that the shift of the axle load due to the power running at an ascent was also a contributing factor.

It is probable that the decrease in the threshold derailment coefficient results 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.

It is probable that the rapid shifting of track and the increase in twists 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.

○ Measures taken based on the recommendation (interim report)

Since specifications of curves have been clarified for curves of our Sangi main line between each station,

we have utilized them for track maintenance. However, some specifications of curves were not clarified in the main line, side lines, and curves with turnouts on the premises of each station. We had depended on the "long experience" and "review" of field workers.

As a result of investigations, we have clarified that stations, in which the specifications of curves were unclear, are 10 stations, including Tomida Station, Oyachi Station, Heizu Station, Hobo Station, Umedoi Station, Misato Station, Nyugawa Station, Ise-Hatta Station, Higashi-Fujiwara Station, and Nishi-Fujiwara Station. We took measurements in order to clarify the specifications in these stations, and performed work to define the specifications of curves one by one by reading the current curves from the survey maps. Of these, we report that work has already been completed in the premises of the 2 stations consisting of Higashi-Fujiwara Station and Umedoi Station (Sangi tetsu No. 64, dated May 28, 2014).

With regard to turnouts in each station, we have also performed work on the 3 locations, including Tomida Station Sa No. 60 turnout, No. 91 turnout, and Higashi-Fujiwara Station No. 60 turnout, which were adjusted on site due to the fact that there are no specifications (hereinafter referred to as "similar turnouts"), and will therefore also report on the completion of work on the Higashi-Fujiwara Station No. 60 turnout and on the status of work progress on the Tomida Station Sa No. 60 turnout and No. 91 turnout.

1. Actions taken for "similar curve locations"

• Tomida Station

We started taking measurements on April 2, 2013, and the field measurements were completed on March 11, 2014.

Based on these measurement results, we have prepared line survey maps for 11 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Oyachi Station

We started taking measurements on January 10, 2014, and the field measurements were completed on January 18.

Based on these measurement results, we have prepared line survey maps for 3 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Heizu Station

We started taking measurements on December 4, 2013, and the field measurements were completed on June 25, 2014.

Based on these measurement results, we have prepared line survey maps for 2 curves, including the specification of curves in accordance with the implementing standards for construction works (completed

on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Hobo Station

We started taking measurements on March 4, 2014, and the field measurements were completed on April 4.

Based on these measurement results, we have prepared line survey maps for 8 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Misato Station

We started taking measurements on April 5, 2014, and the field measurements were completed on April 15.

Based on these measurement results, we have prepared line survey maps for 4 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Nyugawa Station

We started taking measurements on January 20, 2014, and the field measurements were completed on February 10.

Based on these measurement results, we have prepared line survey maps including the specification of curves in accordance with the implementing standards for construction works. We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No.90, dated November 7, 2014) regarding the new track shapes and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No.159, dated November 26, 2014). In response to this, we have implemented the construction to exchange to heavy turnouts with heavy tracks within the station in accordance with the defined track shape (37 kg → 50 kgN) (a total of 4 turnouts, including No. 11-I turnout, No. 11-Ro turnout, No. 12-I turnout, and No. 12-Ro turnout) as well as the curve improvement construction along with it by March 16, 2015. Due to these constructions, all 2 curves have been improved to the new track shapes.

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for

construction works.

• Ise-Hatta Station

We started taking measurements on February 25, 2014, and the field measurements were completed on March 3.

Based on these measurement results, we have prepared line survey maps for 5 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new specifications and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

• Nishi-Fujiwara Station

We started taking measurements on December 4, 2013, and the field measurements were completed on June 25, 2015.

Based on these measurement results, we have prepared line survey maps for 2 curves, including the specification of curves in accordance with the implementing standards for construction works (completed on June 11, 2015). We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 65, dated July 3, 2015) regarding the new track shapes and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 76, dated August 20, 2015) (work indicating the new specifications to the site was completed on August 24, 2015).

We will appropriately store the line survey maps and appropriately maintain and manage the tracks in accordance with the allowances of the maintenance criteria included in the implementing standards for construction works.

2. Actions taken for “similar turnouts”

• Higashi-Fujiwara Station No. 60 turnout

We started taking measurements on May 22, 2012, and the field measurements were completed on August 7, 2012.

Based on these measurement results, we have prepared line survey maps including the specification of curves in accordance with the implementing standards for construction works. We have applied for approval of application for modification of relevant railway facilities (Sangi tetsu No. 76, dated July 3, 2014) regarding the turnout removal and received the approval by the Director-General of the Chubu District Transport Bureau (Chu-untetsugi No. 84, dated July 14, 2014). In response to this, the turnouts were removed and the change to straight tracks was completed by January 27, 2015.

• Tomida Station Sa No. 60 turnout

We started taking measurements on April 2, 2013, and the field measurements were completed on March 11, 2014. From here on we will proceed with the design work and plan the curve improvement work.

• Tomida Station No. 91 turnout

We started taking measurements on April 2, 2013, and the field measurements were completed on March 11, 2014. From here on we will proceed with the design work and plan the curve improvement work.

Regarding the transitional and appropriate maintenance for these Tomida Station Sa No. 60 turnout and

Tomida Station No. 91 turnout until the fundamental improvement construction is completed, we have requested the Railway Technical Research Institute to conduct a field check on December 12, 2013, and give us instructions on the maintenance method. We have decided to conduct the inspections, which are normally conducted once a year, once a month based on the advice regarding the maintenance method by the Railway Technical Research Institute until the major curve improvement is completed. We are promoting the management by using the current management figures as standards, and to this point no problems have been encountered. We will continue to use this method until the work is completed, with the aim of ensuring safety.

* The interim report, including materials, is published on the JTSB website:
http://www.mlit.go.jp/jtsb/railkankoku/railway-kankoku5re-4_20150909.pdf

## 8 Provision of factual information in 2015

There were no cases of provision of factual information in 2015.

Column

## Outreach Lecture: About Railway Accident Investigation

**Railway Accident Investigator**

In order for people to find out more about the duties we are engaged in at the JTSB, and we hold "outreach lectures" to hear the opinions and the fresh voice.

On this occasion, we received a request from Maihama Resort Line Co. Ltd., a company operating monorails that travel around the Tokyo Disney Resort, with windows resembling the face of Mickey Mouse and unique designs for their hanging hand-hold straps and other elements, to dispatch speakers for an outreach lecture with the goal of "further improving the awareness of transportation safety". In response to this, we held an outreach lecture presented by two railway accident investigators on the topic "About Railway Accident Investigation".

In the outreach lecture, we provided explanations that included the duties of the JTSB, what kinds of railway accidents and railway accident indications (e.g. incidents) are investigated, how investigations are advanced when accidents or incidents to be investigated have occurred, key points for reading railway accident investigation reports, and accident case studies based on railway accident investigation reports published by the JTSB.

We also spoke about the scope and concepts of maintaining the condition of an accident or incident investigation site when we have received such requests in prior meetings with business operators.

In the question and answer session following the lecture, we received questions from the attending employees that included: "What were some difficulties in past accident investigations?", "Was the XX accident a subject of investigation?", and "What kinds of materials should be submitted if an accident occurs which is believed to have been caused by a vehicle?" It was a highly valuable opportunity for us to hear the fresh voice.

Although it was also mentioned in the lecture, since investigation results of accidents and incidents are published by the JTSB in the form of railway accident investigation reports, we hope that they can be of use not only to parties relevant to the causes of accidents and incidents, but also to other business operators and those involved with railways, who may use railway accident investigation reports for reference to improve the safety of railways in the future.


**Photographs provided by: Maihama Resort Line Co., Ltd.**

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

# Tracks were not maintained properly, so lateral force occurring while a train was traveling caused the tracks to continue expanding until the train became derailed

## Japan Freight Railway Company; Train derailment accident in the premises of Onuma station, Hakodate Line

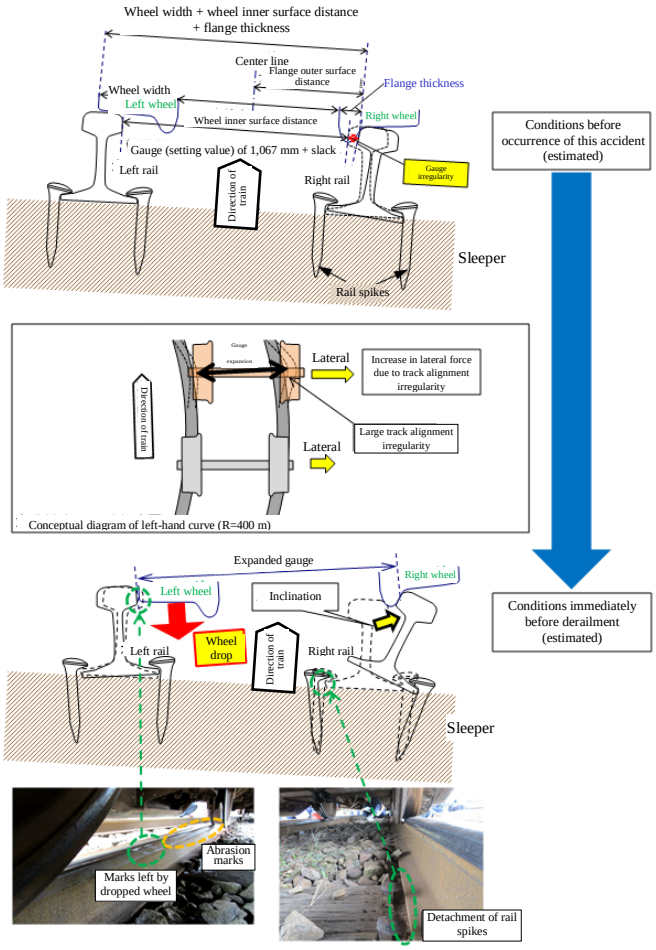
**Summary:** On September 19, 2013, the freight rain, composed of 18 vehicles, departed from Higashi-Muroran yard on schedule and arrived at No.2 track, passing track for up line, of Onuma station at 17:15, 2 minutes behind schedule. After that, the train driver started the train on schedule. While the train was running in powering operation at the velocity of about 20 km/h, the train driver felt the drag force from the rear and found reduction of the brake pipe pressure and increase of the brake cylinder pressure by the pressure gauges on the operator console, and immediately switched off the master controller handle. Then the train stopped just after that. After the train had stopped, the train driver got off the train and inspected the situation, and found that the all 2 axles in the rear bogie of the 6th vehicle, the all 2 axles in the front bogie of the 7th vehicle, the all 4 axles of the 8th vehicle and the all 2 axles in the front bogie of the 9th vehicle were derailed. There was the train driver alone onboard the train, but he was not injured.

### Findings

It is probable that the lateral force toward the outer rail increased and made the gauge easily expand because the alignment and gauge track irregularities exceeded the maintenance standard values near the accident site. In records of track maintenance near the accident site, there were no records of maintenance on the tracks for at least 3 years prior to the occurrence of the accident and so it is probable that the required track maintenance had not been performed for an extended period of time.

It is probable that there was a lack of basic awareness in the entire Track Maintenance Management Office responsible for regular inspections of track irregularities near the accident site and maintenance based on inspection results, as a party engaging in track maintenance, and it is also probable that at the Track Maintenance Station of the Track Maintenance Management Office, which serves to supervise track maintenance management, the duties involving maintenance of the tracks by the Track Maintenance Management Office were not properly supervised, and therefore the actual conditions had not been fully understood.

It is somewhat likely that at the Track Maintenance Division of the Head Office's Engineering Department, which is responsible for planning and management so that the Track Maintenance Management Office and Track Maintenance Station reliably implement track maintenance management duties, the status of duties implemented by site organizations required for track maintenance management had not been properly confirmed, and that the actual status of duties involving track maintenance themselves had not been sufficiently confirmed as well.




*In this accident, when inspection data regarding track maintenance management was obtained from JR Hokkaido, certain portions of the data had been altered, but since data prior to the alteration was obtained and the altered portions were not directly related to the causes of the accident, the alteration had no effects on the analysis of the accident causes.

**Probable causes (Excerpt):** It is highly probable that the accident had occurred as the left wheels in the rear bogie of the 6th vehicle derailed to inside of the track by the lateral motion and tilting of the rail due to large lateral force generated while the train passed around the accident site, where the track was in the states that the gauge was easily widened due to the effects of the alignment extremely exceeding the maintenance standard values, by the lateral force caused by the passing trains, because the maintenance works were not implemented properly although the alignment and the irregularity of gauge exceeded the maintenance standard values extremely.

For details, please refer to the investigation report. (Published on January 29, 2015)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2015-1-4.pdf

# Collision caused when required brake force could not be obtained due to materials adhering to brake shoes

## Tokyu Corporation; Train collision accident in the premises of Motosumiyoshi station, Toyoko Line

**Summary:** On February 15, 2014, the train, composed of 8 vehicles, was running between Musashi-Kosugi station and Motosumiyoshi station, where snow were stacked on the track. The driver of the train received the instruction from the train dispatcher, to stop the train immediately to keep an interval with the preceding train, composed of 8 vehicles, which was preparing backward operation to correct the stopped position at Motoshumiyoshi station. The driver applied an emergency brake to stop the train but the train collided with the rear end of the preceding train, stopped in No. 2 track of Motosumiyoshi station, at about 00:30.

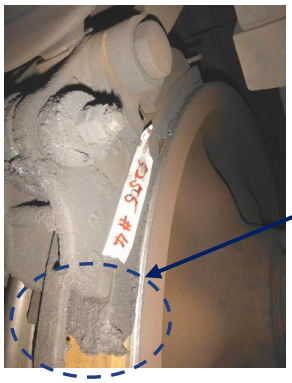
There were about 140 passengers and 4 train crews onboard the both trains and 72 passengers were injured.

### Findings

There were no abnormalities confirmed in the operation of the emergency brake of the following train involved in the collision, and so it is probable that the brake shoe had pressed against the wheels, but there were accumulated deposits (hereinafter referred to as "brake shoe deposits") composed of solid matter primarily containing iron, combined with oil and other substances, on half of the brake shoes of the following train, and there was also oil adhering to the bases of the wheel flanges.

It is probable that the brake shoe deposits were a mixture of friction adjusting material (*) and oil applied to the rails (*) remaining on the treads of the wheels and the wheel flanges, that had accumulated around the brake shoes, together with abrasion powder and dust from the wheels, rails, and brake shoes, and since cleaning had not been performed on the following train after replacement of its brake shoes, it is somewhat likely that the accumulation of brake shoe deposits had progressed in association with the duration of use of each brake shoe.

Example with no deposits
Brake shoe of wheel #1 of seventh vehicle
Brake shoe replacement date: January 30, 2014



Example of accumulated brake shoe deposits
Brake shoe of wheel #4 of seventh vehicle
Brake shoe replacement date: April 10, 2013

A heavy snow warning was issued in Kawasaki City at 16:44 on the 15th, and from the conditions of accumulated snow recorded at an inspection depot near the accident site, it is probable that from around 23:00 on the same day, the snow accumulated near the accident site was at a height where it would reach the top surface of the rails, and therefore it is somewhat likely that the wheel flange tops of the following train came into contact with the accumulated snow, and the snow was caught up in the flanges together with the oil remaining in the wheel flange components, mixing with the brake shoe deposits into a liquid state which was continuously supplied into the gap between the surface of the brake shoe lining and the treads of the wheels.

* Friction adjusting material and oil applied to rails: both of these are lubricants used at certain parts of the routes of individual railway operators served by the following train, to reduce lateral force and squeaking noises at curving sections and to prevent rail corrugation, but their composition, designations, and standards for use differ for each railway operator.

**Probable causes:** It is probable that the accident occurred as the train running on the track in the snow fall collided with the rear end of another train which stopped ahead, because the required brake force could not be obtained when the train driver applied an emergency brake to stop the train according to the instruction from the train dispatcher to manage the overrun at the station of another train which operated ahead of the accident train.

It is probable that the reasons why the required brake force could not be obtained in the approaching train, was the significant reduction of the coefficient of friction between the surface of the brake shoe lining and tread of the wheel, when the brake shoes of the air brake were pressed to the tread of wheels according to the operation of the emergency brake. It is somewhat likely that the reduction of the coefficient of friction was related with that the snow stacked in the track, the oils adhered to the wheel flange and the dusts adhered to the brake shoes were mixed in the liquid state and supplied into the gap between the wheel and the brake shoes.

For details, please refer to the investigation report. (Published on May 28, 2015)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2015-3-3.pdf

# Derailment caused by the collapse of a cut slope, causing soil and sand to flow onto the tracks

## Kyushu Railway Company; Train derailment accident between Satsuma Imaizumi station and Nukumi station, Ibusuki Makurazaki Line

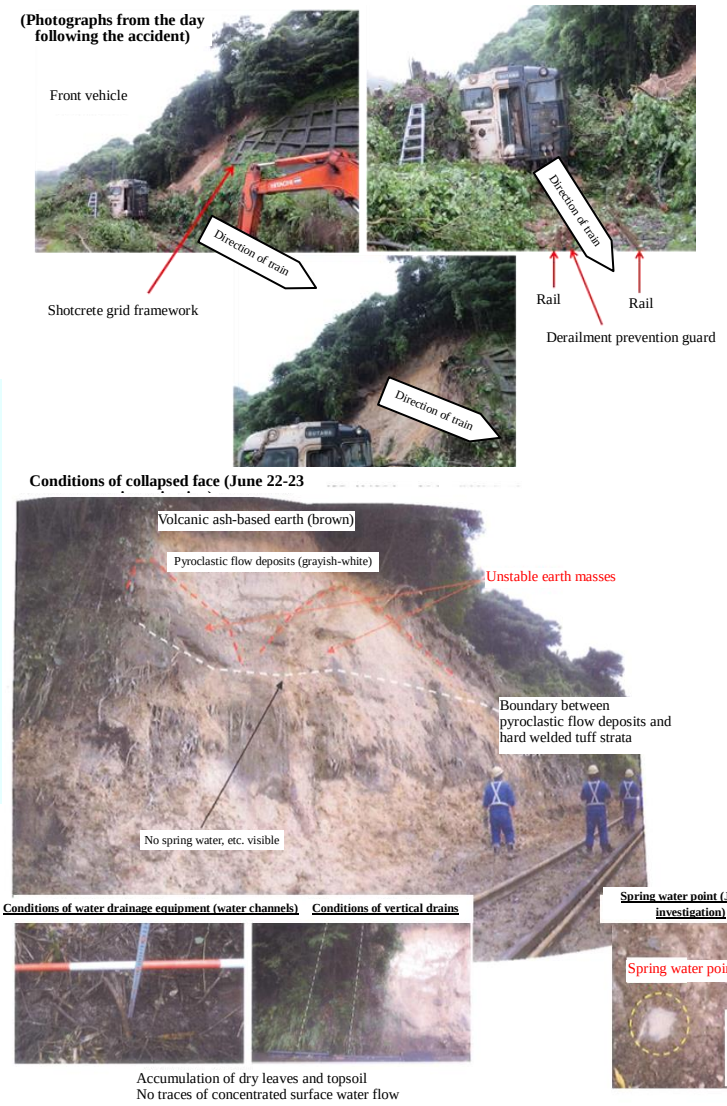
**Summary:** On June 21, 2014, the train, one-man operated and composed 2 vehicles, starting from Ibusuki station bound for Kagoshima Chuo station, Ibusuki Makurazaki Line of Kyushu Railway Company, passed Satsuma Imaizumi station on schedule. The driver of the train, running in powering operation at the velocity of about 50 km/h, noticed the trees disturbing the track about 60 m ahead, and immediately applied an emergency brake, but the train ran onto the trees and the earth and sand, and derailed.
It was found by the inspection implemented after derailed, that all 2 axles in the front bogie of the first vehicle were derailed to right. Here, the rear bogie of the first vehicle and all axles of the second vehicle were not derailed.
There were 44 passengers, the train driver, and two cabin crew members on board the train. Three passengers were seriously injured and 13 were slightly injured, and two cabin crew members were slightly injured.

## Findings

On the day of the accident it had rained in Kagoshima Prefecture since the morning. The maximum rainfall per hour was 39 mm and the total amount of a continuous rainfall of the day was 100 mm. These values were small compared to those values observed when other large slope collapses occurred. Although it is probable that the rainfall was one factor contributing to the collapse of the slope, it is somewhat likely that factors other than the rainfall also had a significant impact.

The slope that collapsed had a steep gradient on its side face due to ridged topography, composed of strata consisting from the lowest layer of welded tuff, pyroclastic flow deposits, weathered pyroclastic flow deposits, loam, and solidified volcanic ash, and it is probable that the main area of the collapse consisted of pyroclastic flow deposit and weathered pyroclastic flow deposit strata. In addition, approximately 80 years had passed since the area surrounding the collapse was cut, and so it is probable that the stability of the slope was in nearly its limit level due to the deterioration of the dynamical firmness by age of the ground of the cut slope, and that this was a factor other than rainfall affecting the accident.

There were no problems with the management of the slope where the collapse occurred, with a standard general inspection performed on January 28, 2013, and no conditions applying to the slope that would make it a location requiring caution based on security plans, and since there was also no outflow of groundwater or clear traces indicating such outflow, it is probable that it was difficult to discover any signs pointing to the collapse of the slope.




**Probable causes:** It is highly probable that the accident occurred as the train collided with the trees and ran onto the trees and the earth and sand stacked on the track, and derailed because the trees and the earth and sand flew into the track from the cut slope in the left side of the track.
It is somewhat likely that the slope collapsed because of the increased weight of earth due to rain of the maximum hourly rainfall of 39 mm and the continuous precipitation of 100 mm, where the stability of the slope was in nearly its limit level due to the deterioration of the dynamical firmness by age of the ground of the cut slope, in addition to the topography and geological conditions of the collapsed slope.

For details, please refer to the investigation report. (Published on July 30, 2015)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2015-5-1.pdf

# Derailment caused by large roll vibrations occurring in freight wagons

## Japan Freight Railway Company; Train derailment accident between Kamaya station and Izumisawa station, Esashi Line

**Summary:** On September 11, 2012, the up line freight train, composed of 21 vehicles, departed from Goryokaku station, 62 minutes behind the scheduled time. As the train stopped by an emergency brake acted automatically at around the up line starting signal in Izumisawa station, the train driver got off the locomotive and check the situation of the train according to the instruction from the train dispatcher, and found that the coupler of the brake pipe hose between the 9th and the 10th vehicle, freight wagons, was decoupled and all two axles in the rear bogie of the 9th vehicle derailed to left.
There were the driver in charge and the other driver scheduled to operate the other train from Aomori signal station to Goryokaku station, but there was no casualty.

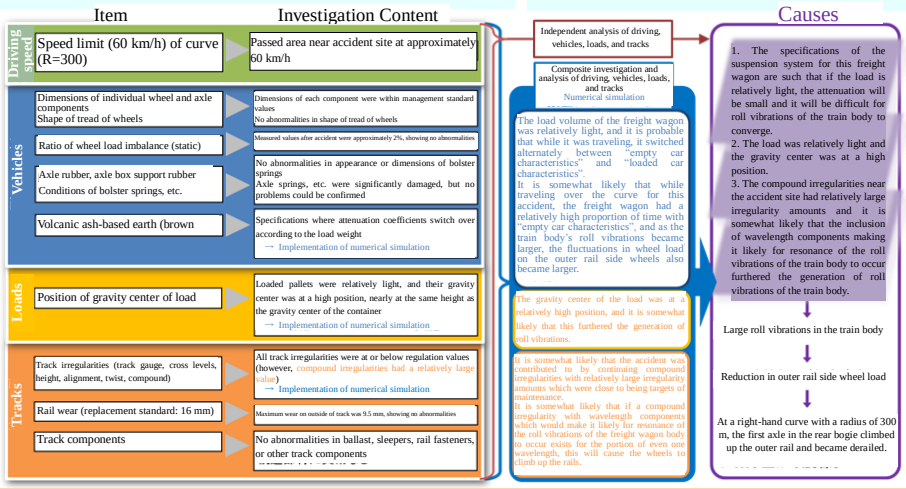
## Findings

The derailed freight wagon (hereinafter referred to as "the freight wagon") was Ko-Ki 106 type, whose damping force of the suspention decrreases when this wagon is empty or light. it is probable that when the load is relatively light, it is difficult for roll vibrations of the train body to converge, and it is probable that as it was traveling, it alternated between its empty car characteristics and loaded car characteristics because the load volume of the freight wagon was relatively light at the time of the accident.
Also, it is somewhat likely that the height of the gravity center of the load, at a relatively high position near the center of the container, furthered the generation of roll vibrations of the freight wagon.

When the train was running under the speed limit near the accident site, it had a relatively high proportion of time with empty car characteristics, and as the train body's roll vibrations became larger, the fluctuations of wheel load on the outer rail side wheels also became larger, greatly contributing to the motion of the wheels to climb up the rails, and it is somewhat likely that when the Ko-Ki 106 type has relatively light load and the gravity center of its load is at a high position, it has a small margin with regard to derailment.

Although the track irregularities near the accident site were within the maintenance standard values, it is somewhat likely that the combination of alignment and cross-level being continuous irregularities with relatively large amounts which were close to maintenance targets, and the inclusion of wavelength components in the travel speed that would increase the roll vibrations of the train body, became causes of the accident, and that they were furthered by the repeated occurrence of roll vibrations of the train body and fluctuations in the wheel loads.

It is somewhat likely that the occurrence of derailment, even though the track irregularities near the accident site were within the maintenance standard values, was affected by combination of alignment and cross-level of track which existed in opposite phases, contributing to the motion of the wheels to climb up the rails. It is also somewhat likely that if a compound irregularity with wavelength components which would produce resonance of the roll vibrations of the freight wagon exists even one wavelength, roll vibration will occur and cause fluctuations in wheel loads, causing the wheels to climb up the rails.




**Probable causes:** It is probable that the accident occurred as the first axle in the rear bogie of the Ko-Ki 106 type freight wagon climbed up the outer rail and derailed, because the wheel load of the outer rail side wheel reduced at the accident site while the train passed the 300 m radius right curved track.
It is probable that the wheel load acting on the outer rail side wheel reduced by a large rolling vibration of the freight wagon running around the accident site.

For details, please refer to the investigation report. (Published on December 17, 2015)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2015-9-2.pdf

There have been 3 accidents including this one on the Esashi Line with the common points of "While freight trains were traveling at speeds near the balancing speed on relatively sharp curves, the wheels of freight wagon climbed up the outer side rails and the wagons became derailed", and the JTSB has stated its opinions on countermeasures of these accidents to the Minister of Land, Infrastructure, Transportation, and Tourism.
For details, refer to "Chapter 1: Summary of Recommendations and Opinions Issued in 2015" (page 7).

# Train was damaged and a fire occurred due to inability to sufficiently address part malfunctions

## Hokkaido Railway Company; Serious incident (vehicle damage) in the premises of Yamasaki station, Hakodate Line

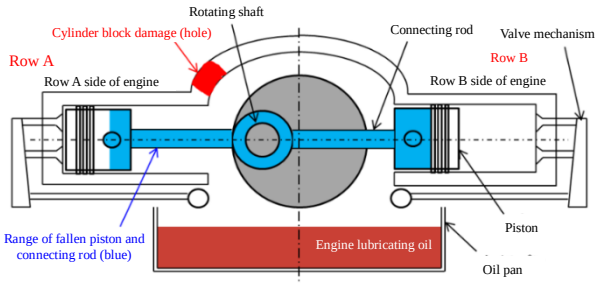
**Summary:** On July 6, 2013, the driver of the train, up line Limited Express composed of 8 vehicles, while operating in coasting at about 130 km/h in the premises of Yamasaki station, found that the engine indicator lamp was off, and stop the train. The driver checked the train and found the smoke emitted from under floor of the 4th vehicle, and found the fire above the engine. It was found that the upper part of the engine was damaged and the paint coated part of the body was partly burnt by the spattered combustible liquid that was considered to spatter from the damaged part of the engine.
There were about 200 passengers and four train crew members, i.e., the driver, the conductor and two cabin crew members, onboard the train, but no one was injured.

### Findings

It is probable that the pin of the sliding block broke in the short term after the simultaneous renewal because the large bending load of about three times the designed maximum value of the manufacturer, acted continuously on the edge of the pin press fitted to the guide arm, and the stopper bolt was not installed in the engine. In addition to the undesirable behaviors in the fuel control device such as “not smooth motion”, which were the phenomena of the vibration of the piston or the instantaneous displacement of the piston to the direction to reduce the fuel injection rate, in the hydraulic servo motor when the notch of the master controller was shifted to the particular position.

It is probable that the reason why the engine was damaged by the over speed operation were related with that the control rack was designed to act to increase fuel injection rate when the pin of the sliding block was damaged, and that there was no mechanism to stop the engine operating in over speed, forcibly.

It is somewhat likely that the backgrounds of occurrence of the serious incident were that the measures were planned by the limited staffs in charge without investigation by the whole company against the frequent damages of the parts related with the sliding block and the fuel control which effected the vehicle etc., seriously, furthermore, these measures were the symptomatic therapy instead of the measures decided by the analyses and investigation based on the data obtained by the sufficient inspection.





Left side of 4th vehicle (around area from engine to radiator)


Left side of 4th vehicle (around area from radiator to rear bogie)


Left side of 4th vehicle (around area from rear bogie to 5th vehicle)

**Probable causes (Excerpt):** It is highly probable that the incident occurred by the following process.

[1] As the pin press fitted into the guide arm of the sliding block, used as the speed governor for the diesel engine installed in the 4th vehicle of the express train, broke by metal fatigue at the edge of press fitted part, then the engine became uncontrollable and over speed operation caused damages of the piston and connecting rod etc., equipped inside of the engine.

[2] The fuel and the lubricating oils for the engine and antifreeze corrosion inhibitor included in the coolant of the engine spouted from the bored holes caught a fire by the spark generated by the broken connecting rod stabbed and destroyed the cylinder block, and these oils etc., stacked on the high temperature surfaces of the exhaust manifold, the turbo charger, the exhaust pipe, etc., and combusted.

[3] As the train ran in high speed at that time, the above mentioned fuel and engine lubrication oil etc., scattered to the rear vehicles of the train and stacked on the side surface of the vehicle body, then the paint on the surface of the vehicle body burned.

For details, please refer to the serious incident investigation report. (Published on April 23, 2015)
http://www.mlit.go.jp/jtsb/railway/rep-inci/RI2015-1-1.pdf