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|  | Federal Ministry of Transport  and Digital Infrastructure | **Management of the  Federal Railway Accident  Investigation Office** |

Railway

Accident Investigation

**ANNUAL REPORT**

**2015**

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**List of abbreviations**

|  |  |
| --- | --- |
| AEG | General Railways Act [*Allgemeines Eisenbahngesetz*] |
| Betra | Operation and Construction Order [*Betriebs- und Bauanweisung*] |
| BMVI | Federal Ministry of Transport and Digital Infrastructure [*Bundesministerium für Verkehr und digitale Infrastruktur*] |
| BPol | Federal Police [*Bundespolizei*] |
| BÜ | Level crossing [*Bahnübergang*] |
| EBA | Federal Railway Authority [*Eisenbahn-Bundesamt*] |
| EBL | Railway Operating Manager [*Eisenbahnbetriebsleiter*] |
| EBO | Railway Construction and Operation Order [*Eisenbahn- Bau- und Betriebsordnung*] |
| EFR | Electronic journey recorder [*Elektronische Fahrten-Registrierung*] |
| EIU | Infrastructure Manager [*Eisenbahninfrastrukturunternehmen*] |
| ERA | European Railway Agency |
| ESO | Railway Signalling Order [*Eisenbahnsignalordnung*] |
| EUB | Federal Railway Accident Investigation Office [*Eisenbahn*‑*Unfalluntersuchungsstelle des Bundes*] |
| EUV | Railway Accident Investigation Regulation [*Eisenbahn*‑*Unfalluntersuchungsverordnung*] |
| EVU | Railway undertaking [*Eisenbahnverkehrsunternehmen*] |
| FBOA | Dragging brake detection equipment [*Festbremsortungsanlage*] |
| Fdl | Movements controller [*Fahrdienstleiter*] |
| Gbf | Freight yard [*Güterbahnhof*] |
| Hbf | Central station [*Hauptbahnhof*] |
| HOA | Hot box detector [*Heißläuferortungsanlage*] |
| Hp | Stopping point [*Haltepunkt*] |
| NE | Railway not owned by the Federal Republic [*Nichtbundeseigene Eisenbahn*] |
| Nmg | Emergency manager [*Notfallmanager*] |
| PZB | Intermittent automatic train control [*Punktförmige Zugbeeinflussung*] |
| RB | Regional train [*Regionalbahn*] |
| Rbf | Marshalling yard [*Rangierbahnhof*] |
| RE | Regional express [a type of train] [*Regionalexpress*] |
| RL | Guideline [*Richtlinie*] |
| SB | Safety authority [*Sicherheitsbehörde*] |
| SMS | Safety management system |
| Tf | Train driver [*Triebfahrzeugführer*] |
| V | Pre-investigations [*Voruntersuchungen*] |
| VzG | Table of permitted speeds [*Verzeichnis zugelassener Geschwindigkeiten*] |

# Foreword

This annual report gives information on the activities of the Federal Railway Accident Investigation Office [*Eisenbahn-Unfalluntersuchungsstelle des Bundes* (EUB)] as specified in Directive 2004/49/EC (the Railway Safety Directive). The annual report contains information on investigations which were carried out in accordance with Section 5(1f) of the General Railways Act (AEG) by the Federal Ministry of Transport and Digital Infrastructure as the investigating authority.

A total of 36 accidents were investigated in accordance with Article 19 of the Railway Safety Directive in the reporting year.

In addition, the annual report contains information on the safety recommendations issued in the period covered by the report, as well as measures taken by those involved on the basis of safety recommendations issued.

Further information is available on the EUB website under [http://www.eisenbahn-unfalluntersuchung.de](http://www.eisenbahn-unfalluntersuchung.de/).

# Federal Railway Accident Investigation Office (EUB)

## Statutory basis

Directive 2004/49/EC on safety on the Community’s railways (the Railway Safety Directive) obliged EU Member States to establish a safety authority (Article 16) and an independent investigating body (Article 19).

The Railway Safety Directive was incorporated into national law in Germany by the Fifth Amendment to the Statutory Provisions Governing Railways of 16 April 2007, and the Second Regulation Enacting and Amending the Statutory Provisions Governing Railways of 5 July 2007. With the Seventh Amendment to the Statutory Provisions Governing Railways of 27 June 2012, Section 5(1f) of the General Railways Act (AEG) was, inter alia, also finally adapted and worded as follows:

'...

*(1f) It shall be incumbent on the Federal Republic to investigate dangerous events which occur during the operation of railways on railway infrastructure which is subject to its supervision. The Federal Republic shall exercise the task defined in the first sentence through the Federal Ministry of Transport, Building and Urban Development as the investigating authority. The Federal Ministry may entrust the conduct of the investigations to the Federal Railway Authority at any time, while reserving the right to withdraw it. If the Federal Railway Authority is entrusted with this task then it shall have the powers of the investigating authority insofar as those powers are necessary for the conduct of the investigations that are entrusted to it.*

...’

The requirements for the structure and composition of the Federal Railway Accident Investigation Office and the conduct of investigations were set down and fine-tuned by the Federal Ministry of Transport, Building and Urban Development in its organisational decree of 20 August 2008 to create the 'Federal Railway Accident Investigation Office (EUB)' in accordance with Section 5(1f) of the General Railways Act (AEG).

## Aim and purpose of the investigation

The aim and purpose of the investigations is to establish the causes of dangerous events and hence to derive ways of improving safety. Investigations by the Federal Railway Accident Investigation Office are not intended to establish fault or clarify questions of liability or other claims in civil law. They are carried out independently of any judicial investigation.

The investigation involves the collection and analysis of information, the preparation of conclusions including the determination of the causes and, if appropriate, the issuing of safety recommendations. The proposals of the Investigation Office to avoid accidents and improve the safety in railway traffic are sent to the safety authority and, if necessary, to other offices and authorities or other Member States of the EU in the form of safety recommendations.

## Reporting of dangerous events

The obligation to report and the format for reports are specified in the ‘General arrangements for reporting dangerous events in railway operations’ [*Allgemeinverfügung zum Melden von gefährlichen Ereignissen im Eisenbahnbetrieb*] which supplements the second sentence of Section 2(3) of the Railway Accident Investigation Regulation [*Eisenbahn*‑*Unfalluntersuchungsverordnung* (EUV)]. A fundamental distinction is made between accidents and incidents when considering dangerous events within the meaning of this general order.

An accident is generally defined as an unwanted or unintended sudden event in railway operations or a chain of such events which has harmful consequences for people, property or the environment. Accidents are classified into the following types of event:

* collisions
* derailments
* accidents involving people
* level crossing accidents
* rolling stock fires and
* other railway operating accidents.

An incident is generally an occurrence in railway operations which compromises the safe operation of trains, without having immediate harmful consequences for people, property or the environment. Included in these are:

* signals passed at danger
* unauthorised entry into an occupied section of track
* incidents at level crossings
* incidents involving rolling stock
* incidents involving infrastructure and
* incidents caused by operational error.

These events have to be reported by immediate, supplementary and daily reports to the Federal Railway Accident Investigation Office by the Infrastructure Managers depending on the consequences of those events.

### Reports in 2015

A total of 2 451 dangerous events were reported to the Federal Railway Accident Investigation Office in reporting year 2014. Of these, 1 739 were accidents and 712 were incidents. The figures below show the classification into the relevant type of event.

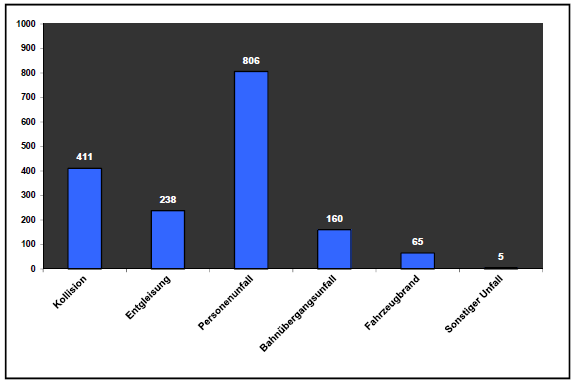


Figure 1: Accidents reported in 2015

|  |  |
| --- | --- |
| Kollision | Collisions |
| Entgleisung | Derailments |
| Personenunfall | Accidents involving people |
| Bahnübergangsunfall | Level crossing accidents |
| Fahrzeugbrand | Rolling stock fires |
| Sonstiger Unfall | Other accidents |

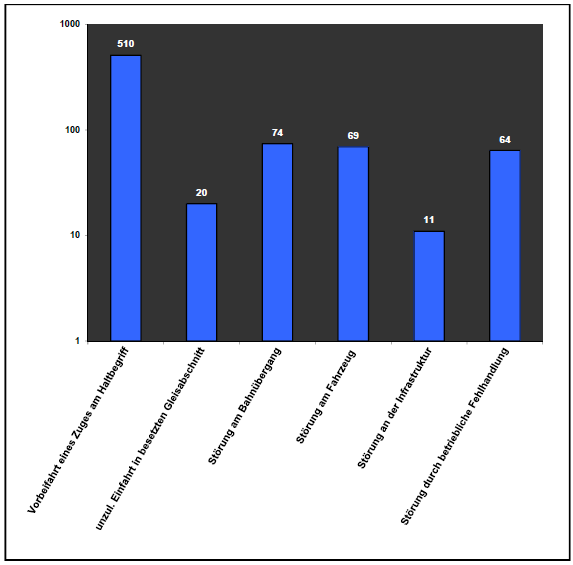


Figure 2: Incidents reported in 2015

|  |  |
| --- | --- |
| Vorbeifahrt eines Zuges am Haltbegriff | Signals passed at danger |
| unzul. Einfahrt in besetzten Gleisabschnitt | Unauthorised entry into an occupied section of track |
| Störung am Bahnübergang | Incidents at level crossings |
| Störung am Fahrzeug | Incidents involving rolling stock |
| Störung an der Infrastruktur | Incidents involving infrastructure |
| Störung durch betriebliche Fehlhandlung | Incidents caused by operational error |

## Classification of dangerous events

Following receipt of each report, the events are classified – in accordance with the European requirements – on the basis of the consequences in connection with the type of event. Serious accidents pursuant to Article 19(1) of Directive 2004/49/EC must be investigated and all other accidents and incidents pursuant to Article 19(2) of Directive 2004/49/EC may be investigated. The basic procedure for the classification of dangerous events can be gathered from the following chart.

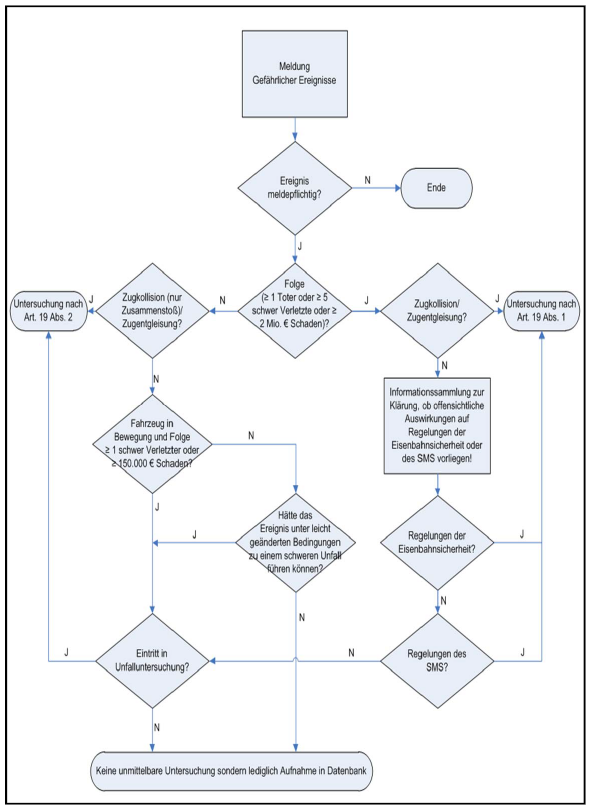


Figure 3: Classification and investigation of dangerous events

|  |  |
| --- | --- |
| Meldung Gefährlicher Ereignisse | Reporting dangerous events |
| Ereignis meldepflichtig? | Is it necessary to report this event? |
| Ende | End |
| Untersuchung nach Art.19 Abs. 2 | Investigation as specified in Article 19(2) |
| Zugkollision (nur Zusammenstoß)/Zugentgleisung? | Train collision (impact only)/train derailment? |
| Folge (≥ 1 Toter oder ≥ 5 schwer Verletzte oder ≥ 2 Mio. € Schaden)? | Consequence (≥ 1 death or ≥ 5 seriously injured people or ≥ EUR 2 million of damage)? |
| Zugkollision/Zugentgleisung? | Train collision/train derailment? |
| Untersuchung nach Art. 19 Abs. 1 | Investigation as specified in Article 19(1) |
| Fahrzeug in Bewegung und Folge ≥ 1 schwer Verletzter oder ≥ 150.000€ Schaden? | Vehicle moving and consequence ≥ 1 seriously injured person or ≥ EUR 150 000 of damage? |
| Hätte das Ereignis unter leicht geänderten Bedingungen zu einem schweren Unfall führen können? | Could the event have resulted in a serious accident under slightly different conditions? |
| Eintritt in Unfalluntersuchung? | Entry into accident investigation? |
| Informationssammlung zur Klärung, ob offensichtliche Auswirkungen auf Regelungen der Eisenbahnsicherheit oder des SMS vorliegen! | Collection of information to clarify whether there are obvious effects for the railway safety or SMS regulations! |
| Regelungen der Eisenbahnsicherheit? | Railway safety regulations? |
| Regelungen des SMS? | SMS regulations? |
| J | Yes |
| N | No |
| Keine unmittelbare Untersuchung sondern lediglich Aufnahme in Datenbank | No immediate investigation but merely put into database |

Since dangerous events cannot always be directly classified on the basis of the reports, the EUB also carries out pre-investigations. These serve, in particular, to clarify whether a serious accident is involved in the individual case and to what extent an overall improvement in rail safety could be achieved as a result of the investigations.

All events that must be reported are statistically recorded internally with the basic data of type of event, place, date and consequences. If separate, independent investigations were carried out, the causes determined are also included. The data is taken into account internally with the classification of dangerous events as specified in Article 19(2) of Directive 2004/49/EC. These inquiries should not, however, be confused with the common safety indicators pursuant to Article 5 and Annex I of Directive 2004/49/EC, which are published annually by the safety authorities in a report in accordance with Article 18 of Directive 2004/49/EC and also contain, inter alia, details regarding the development of railway safety.

### Classifications in 2015

Following receipt of the report, the dangerous events were categorised as follows:

* 4 events as specified in Article 19(1) of Directive 2004/49/EC
* 32 events as specified in Article 19(2) of Directive 2004/49/EC
* 112 pre-investigations

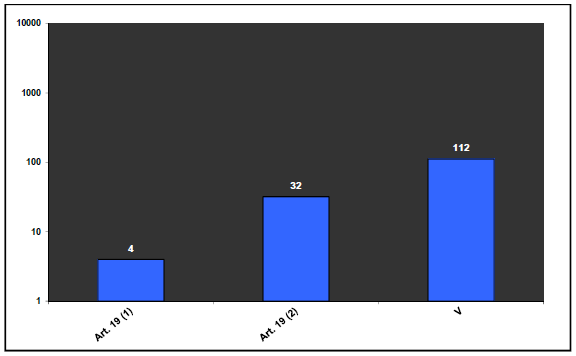


Figure 4: Categorisation of the dangerous events

|  |  |
| --- | --- |
| Art.19 (1) | Article 19(1) |
| Art 19 (2) | Article 19(2) |
| V | Pre-investigations |

The following charts show how the type and number of events are distributed across the various categories.

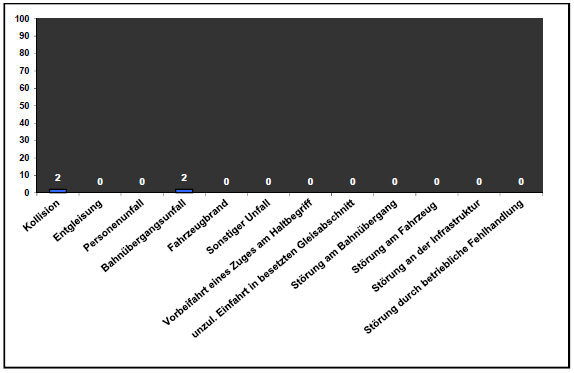


Figure 5: Events as specified in Article 19(1) of Directive 2004/49/EC

|  |  |
| --- | --- |
| Kollision | Collisions |
| Entgleisung | Derailments |
| Personenunfall | Accidents involving people |
| Bahnübergangsunfall | Level crossing accidents |
| Fahrzeugbrand | Rolling stock fires |
| Sonstiger Unfall | Other accidents |
| Vorbeifahrt eines Zuges am Haltbegriff | Signals passed at danger |
| unzul. Einfahrt in besetzten Gleisabschnitt | Unauthorised entry into an occupied section of track |
| Störung an Bahnübergang | Incidents at level crossings |
| Störung am Fahrzeug | Incidents involving rolling stock |
| Störung an der Infrastruktur | Incidents involving infrastructure |
| Störung durch betriebliche Fehlhandlung | Incidents caused by operational error |

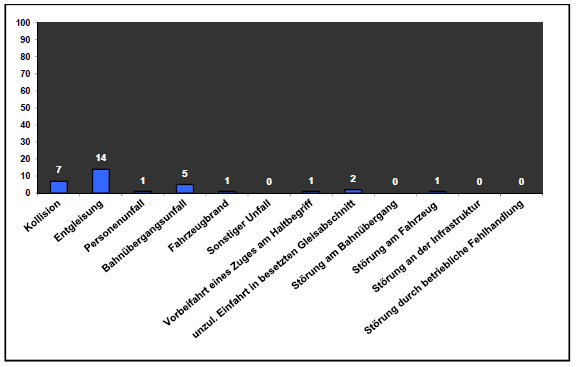


Figure 6: Events as specified in Article 19(2) of Directive 2004/49/EC

|  |  |
| --- | --- |
| Kollision | Collisions |
| Entgleisung | Derailments |
| Personenunfall | Accidents involving people |
| Bahnübergangsunfall | Level crossing accidents |
| Fahrzeugbrand | Rolling stock fires |
| Sonstiger Unfall | Other accidents |
| Vorbeifahrt eines Zuges am Haltbegriff | Signals passed at danger |
| unzul. Einfahrt in besetzten Gleisabschnitt | Unauthorised entry into an occupied section of track |
| Störung an Bahnübergang | Incidents at level crossings |
| Störung am Fahrzeug | Incidents involving rolling stock |
| Störung an der Infrastruktur | Incidents involving infrastructure |
| Störung durch betriebliche Fehlhandlung | Incidents caused by operational error |

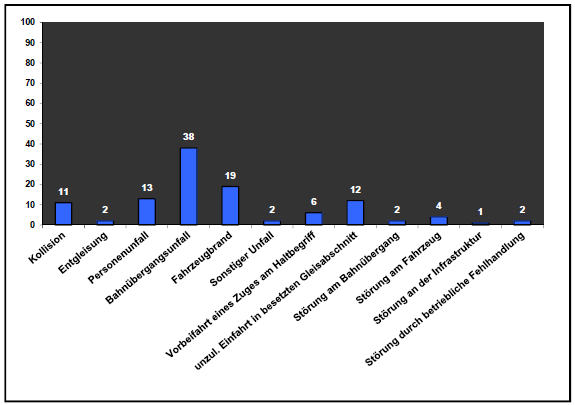


Figure 7: Pre-investigations

|  |  |
| --- | --- |
| Kollision | Collisions |
| Entgleisung | Derailments |
| Personenunfall | Accidents involving people |
| Bahnübergangsunfall | Level crossing accidents |
| Fahrzeugbrand | Rolling stock fires |
| Sonstiger Unfall | Other accidents |
| Vorbeifahrt eines Zuges am Haltbegriff | Signals passed at danger |
| unzul. Einfahrt in besetzten Gleisabschnitt | Unauthorised entry into an occupied section of track |
| Störung an Bahnübergang | Incidents at level crossings |
| Störung am Fahrzeug | Incidents involving rolling stock |
| Störung an der Infrastruktur | Incidents involving infrastructure |
| Störung durch betriebliche Fehlhandlung | Incidents caused by operational error |

## Investigation of dangerous events

Dangerous events as specified in Article 19(1) and (2) of Directive 2004/49/EC are systematically investigated in four steps:

1. First measures,
2. Commencement of the accident investigation,
3. Establishment of the facts,
4. Analysis of the facts.

**First measures** comprise activities and agreements such as, for instance, putting together the investigation team and travelling to the accident site.

**Commencement of the accident investigation** means that first all parties involved are recorded and initial enquires are made at the accident site. Evidence is taken and leads are determined and documented in all disciplines involved. When that is completed, the accident site can, in general, be released if there is internal agreement.

The third step, the **establishment of the facts**, comprises the investigation and assessment of all the evidence, including the statements and opinions obtained. This stage is completed with the reconstruction of the event (actual representation).

In the final step, the **analysis of the facts**, the EUB reproduces the reconstructed event as it should have taken place (target representation) and carries out a target/actual comparison. The findings obtained in this way are assessed, conclusions are drawn and, if necessary, safety recommendations are made.

The result of the investigation is summarised in an investigation report and published on the EUB website.

# Investigation

## General

In the reporting period, 36 events were classified in accordance with Article 19(1) and (2) of Directive 2004/49/EC and investigations were conducted by the investigating authority in accordance with Section 5(1)(f) of the General Railways Act. The findings made to date with regard to these events are briefly described in the following chapters.

### Accident involving people in Feucht on 31 January 2015

|  |  |
| --- | --- |
| At around 19:41 on 31 January 2015, train run S 39661 (loco-hauled) dragged a man along as it departed from Feucht station, track 4. The passenger first fell between the platform edge and the train and was finally run over by the railway vehicle. |  |
| The passenger died at the scene of the accident. | |

### Unauthorised entry into an occupied section of track between Jossa and Burgsinn on 18 February 2015

|  |  |
| --- | --- |
| At around 12:56 on 18 February 2015, train RB 58043 was granted permission to pass signal Zbk 41 by subsidiary signal (Zs1). However, that section of track was still occupied by train DGS 69235. Following an emergency brake application, RB 58043 came to a standstill in good time approximately 80 m from the end of train DGS 69235. |  |
| There was no damage to people or property. | |

### Unauthorised entry into an occupied section of track in Enzisweiler on 3 March 2015

|  |  |
| --- | --- |
| At around 09:09 on 3 March 2015, IRE 4226 was allowed to enter track 2 of Enzisweiler station, which was at that time still occupied by the waiting RE 3245. With emergency braking, IRE 4226 came to a standstill in good time approximately 20 m away from RE 3245 in the entry area. |  |
| There was no damage to people or property. | |

### Level crossing accident between Neustadt (Aisch) and Bad Windsheim on 7 March 2015

|  |  |
| --- | --- |
| At around 21:52 on 7 March 2015, RB 58690 collided with a car coming from the left on the district road (NEA 35) on line 5914 at km 9.290. |  |
| Three people were slightly injured. The damage was estimated at around EUR 22 500. | |

### Train derailment in Eschhofen on 7 April 2015

|  |  |
| --- | --- |
| At around 11:23 on 7 April 2015, RB 15423 derailed as it departed from Eschhofen station with the rear bogie of the traction vehicle in set of points 611. The train came to a standstill at km 66.200. |  |
| One person was slightly injured as the passengers were being evacuated. The derailment caused damage to the infrastructure system, as well as the traction vehicle and the first coaches. | |

### Train collision in Karlsruhe freight yard on 15 April 2015

|  |  |
| --- | --- |
| At around 18:34 on 15 April 2015, DGS 43014 collided with a run-off group of wagons as it entered Karlsruhe freight yard in set of points 41W809 at km 0.780. The run-off group of wagons consisted of five wagons loaded with hazardous material and an empty tank wagon. The empty wagon 33‑80 7933 032-4 at the head of the run-off group of wagons collided with the four wagons at the end of DGS 43014. There was no derailment. |  |
| The collision caused damage to the four wagons at the end of DGS 43014 on the right-hand side in the direction of travel of the train. There was no leak of hazardous material. | |

### Train derailment in Oldenburg (Oldb) Central Station on 19 April 2015

|  |  |
| --- | --- |
| At around 23:16 on 19 April 2015, train run DPN 83387 of Nordwestbahn GmbH derailed in Oldenburg (Oldb) Central Station upon leaving in the direction of Bremen Central Station at set of points 164a/b. |  |
| Nobody was killed or injured as a result of the event. The derailment caused damage to the railway vehicle (ET 440 347) and the permanent way. The damage was estimated at around EUR 200 000.00. | |

### Train derailment in Goslar on 21 April 2015

|  |  |
| --- | --- |
| At around 21:36 on 21 April 2015, the last wagon of train EK 53928 derailed in Goslar station as it was departing from track 4 in the area of set of points 9. |  |
| Nobody was killed or injured as a result of the accident. The event caused the last wagon (Rs - wagon No 3180 3914 929-5) to run across two lines, with the first axle of the front bogie derailing. The estimated damage is around EUR 96 000. | |

### Signal passed at danger in Ruhland on 24 April 2015

|  |  |
| --- | --- |
| At around 22:45 on 24 April 2015, the driver of train DGS 95312 passed exit signal F5 at danger without authorisation in Ruhland station. At the same time, service train 63009 coming from Lauchhammer had transit through track 7. |  |
| As a result, double slip 7 a/b was entered by traction vehicle ITL 285 118. Both trains received an emergency stop order and came to a halt approximately 25 m from one another. | |

### Rolling stock fire in Wilhelmshaven on 25 April 2015

|  |  |
| --- | --- |
| At around 08:35 on 25 April 2015, a rolling stock fire broke out on train 82305 on VzG line 1522. The multiple unit consisted of two series 648 units (leading 9580 0648 087-4, led 9580 0648 084-1).  After arriving at Wilhelmshaven station, the entire train was cleared and shunted by the driver to the Luisenstraße level crossing. The fire that had developed in the meantime was fought by the local fire brigade there. |  |
| The event did not cause any damage to people. The damage caused by the rolling stock fire was estimated at around EUR 500 000. | |

### Train derailment in Ruhland on 26 April 2015

|  |  |
| --- | --- |
| At around 18:02 on 26 April 2015, the penultimate bogie of the second multiple unit of train run S 37461 ran across two lines when departing on subsidiary signal Zs 1 from track 4 of Ruhland station on double slip 17. |  |
| After passing double slip 17, the driver of train run S 37461 noticed the incorrect direction of travel and stopped immediately, which meant that there was no further damage to the permanent way or the vehicles. | |

### Train derailment in Eilenburg on 4 May 2015

|  |  |
| --- | --- |
| At around 07:32 on 4 May 2015, DGS 95495 derailed as it travelled into the Lüptitz line connection with the rear axle of the 11th coach. |  |
| Nobody was injured in the train derailment. The permanent way and control and safety equipment were damaged over a length of around 300 m. The damage was estimated at around EUR 94 000. | |

### Train collision between Siegburg/Bonn-Willroth (crossover) on 6 May 2015

|  |  |
| --- | --- |
| At around 11:12 on 6 May 2015, ICE-W 728 collided with parts of the sound-absorbing cover constructed and stuck onto the solid carriageway between Siegburg/Bonn‑Willroth (crossover) at km 29.913. |  |
| The collision caused damage to the vehicle amounting to around EUR 45 000. | |

### Train derailment in Einsiedlerhof on 16 May 2015

|  |  |
| --- | --- |
| At around 09:16 on 16 May 2015, EZ 51904 derailed at km 38.680 when travelling from Mannheim marshalling yard to Saarbrücken marshalling yard in Einsiedlerhof station. Wheel bearing damage to freight wagon 2180 2469 010-7 resulted in the fracture of the shaft journal on the wagon axle to the rear in the direction of travel. |  |
| As a result of the derailment, initial damage could be seen in track section 14 501 of Einsiedlerhof station from around km 36.680. The blades of facing set of points 38 were subsequently bent open by the derailed axle. As a result, the subsequent wagons were directed off to track 2. | |

### Level crossing accident between Cham/Oberpf and Bad Kötzting on 10 June 2015

|  |  |
| --- | --- |
| At around 12:55 on 10 June 2015, train run DPN 74181 travelling from Cham/Oberpfalz to Bad Kötzting collided with a van on the level crossing protected according to Section 11(7) No 2 of the Railway Construction and Operation Order (EBO) (protection on single‑track branch line in the case of moderate road traffic by view of the line together with audible signals from the railway vehicles) at km 5.564. |  |
| The driver of the motor vehicle was slightly injured. The damage was estimated at around EUR 20 000. | |

### Train collision in Halle (Saale) Central Station on 18 June 2015

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| --- | --- |
| At around 15:08 on 18 June 2015, a shunting run collided with RB 26269. The shunting run was supposed to travel from track 35 to track 2w, where RB 26269 was ready to depart. Despite the brakes being applied, the shunting run did not come to a standstill and collided with the regional train. The regional train was moved by around 16 metres. |  |
| Five passengers were slightly injured by the collision. The damage was estimated at around EUR 5 000. | |

### Train collision in Halle (Saale) Central Station on 18 June 2015

|  |  |
| --- | --- |
| At around 21:46 on 29 June 2015, a train derailed in Hoppegarten (Mark) station on the Berlin Ostbahnhof‑Strausberg Nord suburban rail line at set of points 49. The 3rd and 4th quarter trains of train S 5130 derailed upon signalled entry into track 5 of Hoppegarten station in the direction of Mahlsdorf. |  |
| One person was slightly injured as a result of the event. The damage to vehicles, safety equipment and infrastructure was estimated at around EUR 2 300 000. | |

### Train derailment between Mannheim Central Station and Ludwigshafen (Rhein) Central Station on 30 June 2015

|  |  |
| --- | --- |
| At around 12:25 on 30 June 2015, DGS 44676 derailed with the leading bogie of the 24th wagon of the Zags type, loaded with butadine, to the right in the direction of travel at km 107.100. |  |
| Nobody was injured as a result of the event. The derailment caused damage to around 600 metres of the permanent way. Due to the complex construction of the special sleepers damaged, the track had to be closed for several weeks. | |

### Train derailment between Mannheim Central Station and Ludwigshafen (Rhein) Central Station on 30 June 2015

|  |  |
| --- | --- |
| At around 19:20 on 25 July 2015, there was a train collision between Himmelsthür (Jct.) and Hildesheim Central Station. At km 43.200, train DPN 83719 collided with a branch hanging down from the overhead cable. The hanging down branch caused repeated contact between the trolley wire and the vehicle roof, which led to voltage flashovers. This resulted in a rolling stock fire. |  |
| Nobody was injured as a result of the event. The damage was estimated at around EUR 2 500 000. | |

### Train derailment in Blindheim on 2 August 2015

|  |  |
| --- | --- |
| At around 05:06 on 2 August 2015, train run DGS 61970 travelling from Nuremberg East to Tübingen freight yard derailed upon entering Blindheim station on entry set of points 501 at km 66.9 with the last axle of the train (rear bogie - axle 2 of the quick ballast profiling machine). |  |
| Nobody was injured as a result of the event. The damage to vehicles, safety equipment and infrastructure was estimated at around EUR 1 200 000. | |

### Level crossing accident between Ravensburg and Friedrichshafen on 4 August 2015

|  |  |
| --- | --- |
| At around 15:37 on 4 August 2015, DPN 87581 collided with an articulated lorry on the route from Aulendorf to Friedrichshafen port on the technically protected level crossing at km 190.970 at Kehlen stopping point. The technical level crossing protection was in operation. |  |
| Nobody was injured as a result of the event. The railway vehicle and road vehicle incurred only relatively minor bodywork damage. Both vehicles were able to continue their journey under their own power. | |

### Train derailment in Angern-Rogätz on 8 September 2015

|  |  |
| --- | --- |
| At around 23:47 on 8 September 2015, the second bogie of the multiple unit ran across two lines as train RB 17842 pulled out from track 1 to track 3 in Angern-Rogätz station at set of points S3. |  |
| Nobody was injured as a result of the event. The permanent way was severely damaged. The traction vehicle incurred only minor damage. | |

### Train derailment between Duisburg-Wedau and Lintorf on 11 September 2015

|  |  |
| --- | --- |
| At around 22:20 on 11 September 2015, the third wagon of EZ 52075 derailed as a result of an axle journal fracture with the first axle in the direction of travel. The derailed wagon was a vehicle of the Samms type. As the train derailment initially remained undiscovered, the train was able to still cover a distance of around 2 800 m following the derailment. |  |
| Nobody was injured as a result of the event. There was considerable damage to the permanent way, the control and safety equipment and the wagon involved. | |

### Incident caused by operational error between Hoffenheim and Reilsheim on 12 September 2015

|  |  |
| --- | --- |
| At around 13:26 on 12 September 2015, RB 38538 was travelling on line 4114 and 4110 between the Hoffenheim and Reilsheim operating centres. On the way, several traffic stops at which a scheduled stop was provided were passed without stopping. The train driver did not respond to the multiple activation of the passenger intercom units. The pulling of several emergency cords by passengers on the train remained ineffective. The train driver did not respond to passenger alarm signals. |  |
| Passengers were unable to get on or off at the traffic stops passed. | |

### Level crossing accident between Kirn and Bad Sobernheim on 12 September 2015

|  |  |
| --- | --- |
| At around 06:06 on 12 September 2015, DPN 29503 travelling from Saarbrücken Central Station to Frankfurt (Main) Central Station collided with a car on the technically protected level crossing at km 43.119 of the Bingen (Rh.)‑Saarbrücken line at the Monzingen stopping point. |  |
| Five people in the car died as a result of the collision. The damage to vehicles, safety equipment and infrastructure was estimated at around EUR 260 000. | |

### Level crossing accident between Buxtehude and Horneburg on 16 September 2015

|  |  |
| --- | --- |
| At around 07:43 on 16 September 2015, local train DPN 83467 travelling from Hamburg Central Station to Cuxhaven collided with an articulated bus between the Buxtehude and Horneburg operating centres at the technically protected level crossing at km 195.138. The bus driver managed to evacuate the approximately 60 passengers from the bus before the collision. |  |
| Three people were slightly injured. The damage to vehicles, safety equipment and infrastructure was estimated at around EUR 1 000 000. | |

### Level crossing accident between Buxtehude and Horneburg on 16 September 2015

|  |  |
| --- | --- |
| At around 12:10 on 9 October 2015, there was an overriding of buffers on the first wagon of IRE 4270 as it departed from Gengenbach station at crossover W802/W801. The train came to a halt at km 7.800. The regular track was closed in order to eliminate a rail defect at the time of the event. The journey from Gengenbach took place on the opposite track. |  |
| Seven people were slightly injured as a result of the event. The front buffers of the second wagon and the rear buffers of the driving trailer were damaged as a result of the overriding. | |

### Train derailment in Hamm marshalling yard on 23 October 2015

|  |  |
| --- | --- |
| At around 02:37 on 23 October 2015, DGS 75828 (Rheinhausen‑Pirna) travelling through Hamm marshalling yard derailed at set of points 135 with three car transporter wagons (empty Laaeks) in the middle of the train. |  |
| Nobody was injured. The damage was estimated at around EUR 150 000. | |

### Train derailment in Hamm marshalling yard on 23 October 2015

|  |  |
| --- | --- |
| At around 05:32 on 28 October 2015, train DPN 25409, upon aberrantly entering Bonn freight yard following track 205 at set of points 51, collided with a rail-road excavator coming from track 126. The rail-road excavator derailed during the collision. |  |
| Nobody was injured. The damage was estimated at around EUR 60 000. | |

### Level crossing accident between Vilseck and Freihung on 5 November 2015

|  |  |
| --- | --- |
| At around 22:00 on 5 November 2015, RE 3535 collided with a broken down low‑loader articulated lorry on the level crossing at Freihung at km 27.132. | Source: State Police |
| The train driver and the driver of the articulated lorry were killed in the accident. One passenger was seriously injured and 21 people were slightly injured. The leading railcar part 612 060-3 was destroyed at the front, partially burnt out and derailed with the leading bogie. The permanent way of the line was damaged over a length of around 460 m and contaminated by leaking operating materials. The damage was estimated at around EUR 3 200 000. | |

### Level crossing accident between Jübek and Flensburg Weiche on 7 November 2015

|  |  |
| --- | --- |
| At around 17:58 on 7 November 2015, KT 40549 collided with two cars on the 1040 Neumünster-Flensburg line at the Tarp level crossing at km 162.054. The level crossing was protected by a level crossing keeper at the time of the accident. |  |
| Both car drivers were seriously injured. The train driver suffered from shock. Damage was caused to the road vehicles, the traction vehicle of KT 40549 and the infrastructure. | |

### Train derailment in Treben-Lehma on 11 November 2015

|  |  |
| --- | --- |
| At around 23:35 on 11 November 2015, train GA 52805 derailed while travelling on the opposite track in accordance with Betra F 44160515 from Regis-Breitingen to Treben-Lehma on set of points 20 at km 33.140. |  |
| Nobody was injured. Wagons 11 and 12 as well as tracks and points of the Treben-Lehma crossover were damaged as a result of the derailment. | |

### Train collision in Wustermark marshalling yard on 16 November 2015

|  |  |
| --- | --- |
| At around 17:01 on 16 November 2015, traction vehicle 186 423 collided with multiple unit ET 445 109 (DPN 79473) between signal So 12 and set of points 220 upon moving to track 58. |  |
| Nobody was injured. Traction vehicle 186 423 derailed with an axle and was damaged. Three wagon parts of the four-part double-decker multiple unit were damaged. | |

### Train collision in Schleswig on 17 November 2015

|  |  |
| --- | --- |
| At around 22:34 on 17 November 2015, RE‑D 69552 collided with a rail-mounted construction machine at set of points 816 upon departing from track 803 of Schleswig station. Work (Betra F 240867) was taking place at Schleswig station at that time. Track 801 between sets of points 801 and 816 was affected thereby. This area was closed off and declared to be construction track. |  |
| Nobody was injured. The collision caused damage of around EUR 10 000. | |

### Train collision in Emden marshalling yard on 20 November 2015

|  |  |
| --- | --- |
| At around 13:44 on 20 November 2015, train GA 52835 travelling from Emden Central Station, VW factory to Fallersleben collided while entering track 144 with a traction vehicle 294 761 which had stopped there. |  |
| Nobody was injured. The damage caused is estimated at around EUR 65 000. | |

### Train collision in Bremerhaven Speckenbüttel on 28 November 2015

|  |  |
| --- | --- |
| At around 02:07 on 28 November 2015, a pushed shunting unit, consisting of a track working vehicle (GAF) and a trailer of DB Netz AG, collided with the arriving freight train GA 52828 (Bremerhaven-Seehafen‑Fallersleben route) on track 282 Bremerhaven-Speckenbüttel. |  |
| An employee of DB Netz AG working as a welder was killed in the accident. Damage was also incurred by the vehicles involved, which was estimated at around EUR 122 000. | |

# Safety recommendations

In accordance with Section 6 of the Railway Accident Investigation Regulation, the body responsible for the investigation of serious accidents can issue safety recommendations at any time. These are sent to the safety authority and, if required, to other bodies or authorities or to other EU Member States. These are obliged to advise the investigating authority of the measures they have taken or plan to take as a consequence of safety recommendations. An assessment of these measures by the investigating authority is not required and does not take place.

In Chapter 3.1 'Safety recommendations 2015', the safety recommendations issued on dangerous events in 2015 are listed and supplemented as applicable with information on the measures already taken. The following Chapter 3.2 'Safety recommendations 2006-2014' contains a summary of all safety recommendations, as well as current information on the measures taken. This information is arranged in order of the dates on which the dangerous events took place.

As of September 2016, the safety authority has provided information on measures taken regarding the following events:

* Train collision in Mannheim Central Station on 1 August 2014
* Level crossing accident between Düsseldorf-Rath and Düsseldorf Eller on 19 December 2012
* Train derailments in Stuttgart Central Station on 24 July and 29 September 2012
* Train derailment between Gröbers and Großkugel on 11 February 2011

## Safety recommendations 2015

**Train collision in Mannheim Central Station on 1 August 2014**

**Safety recommendations:** (as of 23 September 2015)

1. Continuously strengthen the awareness and competence of traction vehicle crews when dealing with PZB (intermittent automatic train control) emergency braking of any kind by targeted training measures.
2. As a safety objective, check the retrofitting of the train control devices in the vehicles in order to ‘initiate contact after PZB emergency braking operations before starting up again’, and develop this further depending on the outcome.

**Measures:** (as of September 2016)

In relation to point 1: The EBA has set corresponding priorities on risk-oriented monitoring. Back in 2014, a priority check was instigated in the weeks following the accident in which over 200 train drivers were questioned regarding the correct conduct in the event of PZB emergency braking operations. This did not show up any structural shortcomings with regard to the knowledge of the operational staff.

In order to achieve the greatest possible effect and an awareness of dangers in the sector, in 2016, further monitoring is being targeted directly at the approximately 280 railway undertakings with safety certification. Carrying out and intensifying simulator training sessions for train drivers is covered by the regular audits of the undertakings. A further subject of the audits is the undertakings’ internal monitoring of staff on the basis of targeted evaluations of the PZB travel data storage devices. In this regard, there is also procedural consistency for travel data that can be used for this purpose in hired locomotives; this data should still be available to the undertaking after the deployment of the vehicle.

In relation to point 2: To implement this safety recommendation, in the context of a request for information, selected railway undertakings and the VDV (Association of German Transport Undertakings) were asked to state their views, including all undertakings involved in the accident as well as large state-owned and private railway undertakings and DB Netz AG. The responses were classified and then the results of this request for information were evaluated. In this case, the examination of the safety recommendation revealed that retrofitting of the PZB for behaviour following an emergency braking operation does not make sense in a cost-benefit assessment against the background of the introduction of ETCS.

## Safety recommendations 2006-2014 (sorted by date of event)

**Train collision in Gladbeck West on 26 October 2013**

**Safety recommendations:** (as of 28 November 2014)

1. Reducing use of the current procedure 'Staff authorised to carry out brake tests on trains' as far as possible (in an emergency, e.g. after incident during a train journey, which makes a brake test necessary)
2. In the medium and long term, technical equipment should be used to safely carry out brake tests in freight traffic throughout Europe to minimise the human error rate.

**Measures:** (as of August 2015)

In relation to point 1: There are no legal requirements for this. Actual implementation takes place in the railway sector as part of recognised technical rules (VDV document 757). The safety authority has initiated a further development of the existing approaches with the association. The organisation is now being developed.

In relation to point 2: Technical equipment for carrying out brake tests in freight traffic is not currently available. Such a development in European freight traffic can only be achieved via the corresponding European committees.

Level crossing accident between Lübbecke (Westphalia) and Espelkamp on 9 January 2013

Safety recommendations: (as of 21 June 2013)

1. The crossing keepers' signals to stop the road traffic should also be given after auxiliary equipment is provided. This requirement should be specified in Guideline 456 and the clear use of the term 'auxiliary equipment' revised in the corresponding Annexes 2 and 5.
2. Where level crossing safety equipment is taken out of service for a period that is planned in advance or is relatively lengthy and protection by crossing keepers is put in place, the risk of a safety-relevant operational error by the crossing keeper should be identified in order to determine an acceptable maximum duration for crossing keeper protection and to specify it in future.
3. Where the suspension from service is planned in advance or is relatively lengthy, there should be coordination with the traffic authorities (e.g. special level crossing inspection).
4. Where the suspension from service is planned in advance or is relatively lengthy, mobile barrier equipment with light signals and half barriers (e.g. technical auxiliary equipment for level crossing keepers), for better recognition of crossing keeper protection for road users, should be used more often. In this connection, the rules on the giving of signals should be adjusted.
5. For the purposes of protection and to make them easier to see, crossing keepers should wear high-visibility clothing that is easier to see (Class 3, at least vest and trousers).
6. Invalid light signals should only ever be covered up using means corresponding to the technical notice. The recognisability of the auxiliary equipment should be improved.
7. Where the suspension from service is planned in advance or is relatively lengthy, more mobile lighting should be used when it is dark if this makes the crossing area easier to see, even if the rules have not previously prescribed level crossing lighting.

Measures: (as of August 2015)

In relation to point 1: The Infrastructure Manager concerned has introduced measures for this – as far as is allowed in the context of the road traffic regulations – and made internal specifications. In this way, the visibility of the crossing keeper protection was further improved by improved recognisability of auxiliary equipment giving signals to stop the road traffic.

In relation to point 2: Basically, the measures under 1 are the decisive contribution towards controlling accident causes as in the event described here. On account of other frequently observed incidents in connection with crossing keeper error, an action plan has been developed by the undertaking as a result of the increased monitoring.

In relation to point 3: The road traffic authorities regularly issue invitations to traffic inspections. The crossing partner can, for example where there is lengthy suspension from service, apply for special traffic inspections.

In relation to point 4: The application of mobile safety equipment from an expected use time of more than seven days has in the meantime been internally regulated by the Infrastructure Manager concerned. Further associated operating measures are being introduced from December 2015 in an undertaking guideline.

In relation to point 5: The Infrastructure Manager concerned has introduced appropriate measures. Internal guidelines now regulate the minimum requirements for recognisable and high-visibility work clothing for crossing keeper visibility.

In relation to point 6: The regulation currently agreed with the safety authority on the covering of light signals is contained in an internal specification. An additional auxiliary appliance has in the meantime been developed by the Infrastructure Manager concerned, in the form of a mobile retro-reflecting folding pyramid with red lamp attachment. It should be regularly used in future.

In relation to point 7: The implementation must in each individual case be decided by the organisation responsible for the equipment in discussion with the road maintenance authority.

Level crossing accident between Düsseldorf-Rath and Düsseldorf Eller on 19 December 2012

**Safety recommendations:** (as of 7 April 2014)

As part of the planning and approval of level crossing safety equipment and as a result of a risk assessment, the application of the technical level crossing protection measures as specified in Section 11(6) EBO should be put into specific terms and modified, with the aim of minimising damage caused by broken‑down vehicles in the danger area of the level crossing as far as possible.

**Measures:** (as of September 2016)

In a pilot project, the infrastructure operator has equipped a number of level crossings that are operated by crossing keepers and do not have a technical fallback level with 2 000 Hz magnets (known as 'Schranken-Indusi' [inductive train protection barriers]). In the event that a barrier attendant forgets to close the barriers (at the right time) or opens them at the wrong time, these ‘inductive train protection barriers’ bring about emergency braking of the approaching train. This solution has not met with overall approval, as unnecessary emergency braking operations also initially occurred in the pilot project.

The question of whether such technology could also be used in conjunction with vehicles that have broken down (and need to be detected in some way) in the danger area of a level crossing will have to be discussed and assessed after the completion of the aforementioned pilot project. In addition, the possibilities of detecting vehicles or persons in the danger area by radar or infrared interface are currently being investigated.

Train derailment in Stuttgart Central Station on 24 July and 29 September 2012

**Safety recommendations:** (as of 8 April 2014)

1. Revision and finalisation of Guideline 800.0110 and 800.0120 with the aim of controlling layouts outside of basic values and target values more closely.
2. Further investigations regarding the general examination of the unrestricted suitability of the type of buffer to long passenger coaches that are propelled with particular consideration of the twisting forces that occur and all possible conditions on the network. Should it not be possible to carry out this verification, it is recommended that this type of buffer should no longer be used on long passenger coaches that are propelled.

**Measures:** (as of September 2016)

In relation to point 1: On 1 December 2015, Guideline 800.0110 ‘Line layout’ was republished following an editorial and substantive revision. The recommendation was finally dealt with thereby. In detail: In section 9(4) ‘Avoidance of overriding of buffers’, this content was emphasised and reformulated. For the layout, comparison radii for the new speed ranges 25 km/h and 30 km/h were introduced, with a distinction being made between circular curves, basket curves and s-curves. The comparison radius is a geometric variable for the curvature difference in the case of a sudden discontinuity of curvature. In s-curves, in the case of a comparison radius rw < 90 m, a straight section length of greater than 8 m and, for rw < 110 m, greater than 6 m has to be complied with. The minimum length pursuant to TSI for newly planned stretches is likewise incorporated in the Guideline.

In relation to point 2: The undertaking concerned has, on the basis of the investigation results, checked the suitability of the previously used buffers for the specific scenario with negative results. A technical solution by substitution of the used buffers will be implemented after identification of suitable buffer types. Up to now, safe operation has been guaranteed by operating regulations in connection with the withdrawal of the originally affected vehicles, including for comparable infrastructures. In addition, the EBA, in dialogue with the parties involved, has also started a discussion on the conditions required for safe operation, which also has to consider the permissible use of tolerances, both for vehicles and for infrastructure, for the intended operating system.

**Train collision between Hanau and Mühlheim East Crossover on 13 April 2012**

**Safety recommendations:** (as of 15 July 2014)

Finalising the regulations for the re-railing and re-roading of road-rail vehicles on/off the open track, especially the local induction training of those responsible.

**Measures:** (as of August 2015)

In an administrative procedure that was begun in 2013, an improvement of the local knowledge of the parties involved and the risk-based consideration of local details was picked out as a central theme. The Infrastructure Manager concerned is extrapolating internal procedures therefrom.

**Train collision in Bleicherode on 21 September 2011**

**Safety recommendation:** (as of 17 April 2013)

Checking whether automatic track free reporting equipment should be provided in continuous main tracks of stations.

**Measures:** (as of August 2014)

There is a plan subsequently to equip Bleicherode station with ESTW [electronic control system] technology.

The procedure has been closed.

**Train collision between Werlau and St. Goar on 11 September 2011**

**Safety recommendations:** (as of 12 June 2013)

1. The probability and the quantity of rainfall to be expected in future (heavy rainfall triggering an event) should be estimated in a risk assessment. After this, gutters/drainage devices together with accompanying catchment areas should be checked in order to identify and implement any further safety measures that may be required.
2. Creation of 'another communication link' as specified in Guideline 408.0581 to provide an emergency stop request by train staff on lines without telephones.

Measures: (as of August 2015)

In relation to point 1: Inspections of the hillside plots by the Infrastructure Manager in accordance with the internal guideline, reports by a subsoil institute, classification of the hillsides into danger classes. Detailed presentation of the measures already introduced in reporting year 2013.

In relation to point 2: The Infrastructure Manager concerned has established a corresponding rule relating to technical network access in the Network Usage Conditions 2014. For the railway undertaking concerned and in the scope of audits at other railway undertakings, the focus was directed at corporate requirements that all staff are able to properly make emergency calls quickly and directly.

Rolling stock fire in Berlin Ostbahnhof on 26 July 2011

Safety recommendations: (as of 25 November 2013)

Checking whether, for traction vehicles of the structurally identical series 112, 114 and 143, measures to increase the fire safety on the current rails and traction motor terminals (especially traction motor terminals 1 and 4) should be provided in order to prevent unacceptably high contact resistances and varying current distribution.

Measures: (as of August 2015)

The vehicle owner has provided several individual measures to improve the fire safety on the series of vehicles involved; these are based on the use of other materials and different precautions in the maintenance procedures.

Train derailment between Gröbers and Großkugel on 11 February 2011

Safety recommendations: (as of 24 June 2013)

Guideline 821.2001 does not specify any value for the standard deviation 's' of the overall signal of the longitudinal level, the mutual altitude and the height of camber calculated over 250 m with an increment of 25 m, which, when reached, indicates that maintenance work needs to be done. A revision should take place so that for the standard deviation, likewise SR 100, SRlim or limit values are specified.

Measures: (as of September 2016)

This safety recommendation was not taken into consideration. According to Guideline 821.2001, 5 (10), the standard deviation merely serves as an additional aid to decision‑making to assess the quality of the track location. The standard deviation makes a statement about the average track location quality and is used for planning maintenance works in larger sections. If the SRA value is exceeded, this must be examined on the basis of the local circumstances and maintenance measures may have to be initiated. An introduction of SR100 or SRlim is not considered to be necessary because, in Germany, the maintenance measures have for a long time depended on individual values and not on average values or the standard deviation. The consideration of the individual values is more important because, even in individual cases where SR100 or SRlim is exceeded, measures have to be taken. In the calculation of the average value or of the standard deviation, such individual cases where measured values exceed the specified limits can no longer be ascertained.

Train collision in Hordorf on 29 January 2011

Safety recommendations: (as of 14 September 2011)

1. Retrofitting of all lines with automatic train control equipment so that a train which passes a signal at danger without authorisation can automatically be brought to a halt. Additionally, an unauthorised start on main lines when the signal is at danger can be automatically prevented.
2. Until the lines are retrofitted with automatic train control equipment as specified in point 1, additional measures should be taken which are capable in each individual case of reducing the likelihood of occurrence and/or the amount of damage caused by an unauthorised passing of a signal at danger.

Measures: (as of August 2015)

In relation to point 1: The sixth regulation amending the Statutory Provisions Governing Railways of 25 July 2012 amended the Railway Construction and Operation Order. The regulation came into force on 1 December 2012. Due to this amendment of the EBO, comprehensive retrofitting obligations are specified which are implemented to the greatest possible extent.

In relation to point 2: Until the retrofitting has been completed, the infrastructure operators have been encouraged by the safety authority to investigate and introduce suitable intermediate risk and operating measures. For this purpose, the infrastructure operators have undertaken various activities in conjunction with the railway undertakings and introduced appropriate measures.

Train derailment in Bacharach on 1 September 2010

**Safety recommendation:** (as of 30 May 2012)

1. As part of their operational responsibility, railway undertakings should ensure that the load limits of freight wagons are not exceeded. In addition, it is necessary to ensure, among other things, that the braking properties of a train and, in particular, the sum of the braked weights are maintained in relation to the total weight of a train (braked weight percentage). An important safety-relevant factor of the total weight of a train is the actual payload weight. This needs to be determined and then put into the brake calculation.
2. The provisions of Guideline 408.0581 3 (5) 'Emergency call' of the Guideline 'Train running and shunting' have the following content:

*A train driver who cannot clearly hear or understand a message initiated by an emergency call must immediately reduce the speed of their train to a maximum of 40 km/h and drive on sight until it becomes clear from a following message that they are not affected or until the cause of the emergency call has been clarified with the movements controller.*

The new text took effect on 31 December 2009 in notification No 8.

The electronic journey recorder of CS 47925 and the train driver's statement verify that the driver of train CS 47925 after receiving the acoustic display with the pictogram 'Emergency call connection' on the GSM-R vehicle device could have brought his train to a halt significantly sooner than actually happened if he had immediately initiated an emergency brake application. As a result, the damage to the infrastructure would have been reduced and the potential danger of a collision with a train running on the opposite track would have been considerably reduced.

Bearing in mind the derailment consequences and also the potential danger to other trains, the provision of Guideline 408.0581 3 (5) amended on 13 December 2009 should be adapted accordingly.

**Measures:** (as of August 2013)

In relation to point 1: The recommendations were only sent to the undertakings involved in each case because it was considered to be a 'one off' case. Separate activities by the safety authority were therefore not provided.

In relation to point 2: The regulation issued is in accordance with a harmonised regulation of the operation and traffic management TSI. A possible amendment was discussed in the relevant expert committee of the European Railway Agency but was not approved.

**Other accident in Bielefeld on 10 July 2010**

**Safety recommendations:** (as of 20 October 2011)

Modify the working of the air-conditioning system, so that if a reset of the heating or cooling part of the air-conditioning system becomes necessary, or if it fails, the fresh air supply and air recirculation in the coach remains in service.

**Measures:** (as of July 2012)

The operator has justified his refusal to immediately implement the safety recommendation and compensated for this by technical and operating measures.

The procedure has been closed.

**Train collision between Leiferde and Braunschweig on 20 January 2010**

**Safety recommendations:** (as of 29 January 2010)

In order to ensure that passengers can be evacuated rapidly and safely in an emergency, the requirements concerning emergency entry and exit windows in component approval EBA 05 G 08A (10/05) as well as structurally identical emergency entry and exit windows regarding their functionality (marking, operation and risk of injury) should be reviewed.

**Measures:** (as of March 2010)

According to available information, the functionality of two emergency entry and exit windows from a series produced by the Scholl company was tested by the safety authority on a VT 628 on 24 March 2010. The impact test using the emergency hammer on both windows was carried out without problems and in both cases the window could be smashed and pushed out in 15‑20 seconds.

Consultation on the need for a new or amended design for the pictogram showing how to use the emergency entry and exit windows has been completed. It was established that there was no need for action.

The procedure has been closed.

**Derailment between Nuremberg-Stein and Nuremberg marshalling yard on 7 August 2009**

**Safety recommendations:** (as of 10 February 2011)

The design tension for the securing fittings is an important criterion for keeping permanent way to gauge and thus preventing derailments. It is recommended that DB Netz AG’s permanent way regulations for the inspection of track and points installations of type K-54-B58 are updated and supplemented in the near term.

1. Lay down a graduated inspection frequency for testing the tension of securing fittings on tracks and points. In deciding this frequency, line speed, traffic density and sensitive locations on the network (for example tight curves, track on timber sleepers that has been laid a long time, permanent way with ‘indirect fastenings’ and other constraints) should be considered.
2. Lay down a method of testing to check the tension of securing fittings and appropriate benchmarks. The measurement of design tension by means of a torque wrench, for example, is considered to be a suitable test.

**Measures:** (as of August 2014)

The matter has been discussed by the safety authority and the Infrastructure Manager concerned. A change to the regulations was seen as an appropriate measure. It is to come into effect in 2013 in the form of a technical civil engineering instruction. This change will set down maintenance periodicity, obligations to replace components and the need for special inspections when damage to fittings securing rails to B55 and B58 sleepers is noted. By the amendment/supplement to the regulations, damage that is gradually increasing can now be recognised and dealt with at an early stage.

The procedure has been closed.

**Derailment between Bünde (Westphalia) and Bruchmühlen on 17 July 2009**

**Safety recommendations:** (as of 8 February 2010)

The following rolling stock-related measures are currently recommended to avoid further wheelset axle failures caused by hot boxes:

1. replace riveted brass cages with plastic bearing cages;
2. investigate whether fitting further derailment detectors or sensors for hot box detection could make a measurable contribution to preventing derailments.

**Measures:** (as of July 2012)

In relation to point 1: Evaluation of the measure recommended has revealed that the replacement of riveted brass cages with plastic bearing cages to avoid further wheelset axle failures caused by hot boxes is inappropriate because it is only one of several causes. In a separate development, the issue has been dealt with further at European and international level.

In relation to point 2: The investigation of the effectiveness of derailment detectors or sensors for hot box detection is at present being pursued at European and international level. The procedure has been closed.

**Other railway operating accident between Lövenich and Horrem on 27 June 2009**

**Safety recommendations:** (30 June 2009)

At least investigate the following:

1. whether it is necessary to retrofit warning lights within the train driver’s field of vision which would indicate to them that the additional brake on the driving trailer had been applied or that it had not been completely released;
2. whether operational measures going as far as prohibiting the use of the additional brake when running with a driving trailer leading are to be initiated;
3. whether the air intake for the air conditioning should be moved to another suitable site, away from the braking equipment.

**Measures:** (as of July 2012)

In relation to point 1: The modification described in the safety recommendation has been ongoing since 2007. The retrofitting of warning lights has not yet been completed.

In relation to point 3: The study of whether the air intake for the air conditioning should be moved to another site has been finished with the result that there is no other suitable site.

The procedure has been closed.

**Train collision in Berlin Karow station on 16 April 2009**

**Safety recommendations:** (as of 8 December 2010)

1. Clarify the rules for return of signals to danger in (old) signal boxes without automatic means of indicating that the track is clear so as to make signals return to danger as soon as possible.
2. Investigate how the return of signals to danger is organised in similar signal boxes on the existing network.
3. Investigate whether automatic means of indicating the track is clear should be provided in comparable stations.

**Measures:** (as of August 2011)

The infrastructure operator in question has drawn up a technical notice entitled ‘Rules for returning starting signals to danger and for equipping with means of indicating the track is clear’. This document contains clear guidelines for the automatic return of signals to danger in good time. The technical notice was introduced with immediate effect.

The complete network of the infrastructure operator in question was examined in order to identify comparable cases on the overall network with similar potential risks. For this, the infrastructure operator in question assembled comprehensive data and used it to make appropriate risk assessments. Local shortcomings have been remedied.

**Train collision in Recklinghausen on 25 November 2008**

**Safety recommendation:** (as of 28 November 2008)

Investigate, at least, whether drivers of light traction vehicles fitted with disc brakes should notify the movements controller if sanding equipment has been used or initiated automatically and the traction vehicle has come to a halt, so as to avoid 'wrong' side indications by track circuits indicating that the track is clear.

**Measures:** (as of August 2014)

The safety authority has issued instructions to Infrastructure Managers and railway undertakings on the basis of the safety recommendations.

The instructions issued to railway undertakings were tightened. In addition, the subject of 'sanding equipment' was dealt with further at authority and industry level via the 'vehicles steering group' regarding future arrangements on vehicle equipment.

The procedure has been closed.

**Derailment in Cologne Central Station on 9 July 2008**

**Safety recommendations:** (as of 4 March 2009)

Safety recommendation for ICE-3 multiple units with wheelset axles made of 34CrNiMo6 material is as follows:

Examine initial data for the materials for evidence of its fatigue strength when designing wheelset axles to take account of the structural inhomogeneity discovered in the course of the tests done by the Federal Institute for Materials Research and Testing [*Bundesanstalt für Materialforschung und Prüfung* (BAM)].

**Measures:** (as of August 2015)

All wheelset axles are regularly checked for freedom from cracks by non-destructive testing methods.

The powered wheelset axles made of 34CrNiMo6 are being replaced with wheelset axles made of EA4T.

The approval procedure has been closed.

**Train collision of ICE 885 in the Landrücken tunnel on 26 April 2008**

**Safety recommendations:** (as of 14 May 2010)

1. Consider whether it is possible to continue to do without fencing of the line or parts of the line, or whether similar events can in future be prevented by other measures in order to improve the margin of safety against derailment for high speed trains.
2. Investigate and optimise the visibility of escape routes and emergency equipment in coaches.
3. Revise module 123.150 ‘Rescue by Third Parties’ of Guideline 123. In particular, there should be a clear separation of the responsibilities of the Emergency Manager/Emergency Management Office/Incident Officer.
4. Investigate the operating regulations regarding the behaviour of operating staff in the event of a collision with herd animals.
5. Refresh induction training and provide regular instruction of the staff responsible for rescue on local features and safety equipment and plan and carry out tunnel rescue practice.

**Measures:** (as of August 2015)

Regarding recommendation 1: The Infrastructure Manager concerned had already decided in August 2008 to determine the risks for train passengers and train staff arising from collisions with animals using a risk-based approach and to assess the appropriateness of fencing of high speed lines. An engineering company was commissioned to carry out a risk assessment on this matter. The following variants were investigated:

* complete fencing of the high speed lines,
* partial fencing of the high speed lines in critical places, and
* fencing of the high speed lines in the area of the north portal of the Landrücken tunnel. Result of the risk assessment:

1. From the point of view of the individual risk, it is not necessary to build fences along high speed lines or on the remainder of the network.
2. From the point of view of the collective risk, complete fencing either of the high speed lines or of the remainder of the network is not considered to be a proportionate measure.
3. The differentiated investigation of the types of line on the high speed lines has shown that fencing only on the tunnel - tunnel type of line (connecting tunnel in both directions of travel) just about constitutes a proportionate measure.

As a result of the investigation of fencing of local sections of high speed lines on the basis of several risk-increasing factors, the sections of line concerned were identified.

With regard to recommendations 1, 3 and 5, the safety authority worked on getting the Infrastructure Manager to take the safety measures described below:

* checking the effectiveness of the regulations on raising the alarm by the emergency management offices as part of a practice which resulted in the following: the emergency folder was supplemented by a cover sheet on which all the required information can be seen in simple form – if this was not already available,
* intensifying the training in how to raise alarm, and
* carrying out special inspections with regard to the tunnel safety equipment in different tunnels on high speed lines (v > 200 km/h).

In addition, the Infrastructure Manager analysed the need to fence high speed lines. The final assessment of the need for targeted fencing measures as well as, if necessary, their implementation is not yet completed.

With regard to recommendation 2, when requested, the operator of the rolling stock demonstrated that the train in question was equipped in accordance with the rules and furthermore showed that there is no requirement for improvement even on account of the accident.

When the Infrastructure Manager introduced organisational improvements, the safety authority closed the matter.

**Train derailment in Rotenburg / Wümme on 28 February 2007**

**Safety recommendations:** (as of 7 January 2008)

In view of the findings in the accident investigation and the results of the report on the metallurgical tests, ask specialist groups to consider whether and to what extent the distance between hot box detection installations can or must be optimised in order to be able to respond more effectively to a hot box which is developing relatively quickly.

**Measures:** (as of August 2011)

Potential improvements related to the spacing required, options for detection and basic assumptions for the temperature rise have been discussed with the infrastructure operator. A draft of a new specification was produced in conjunction with the infrastructure operator. The specification contains improved requirements for detection, options for evaluation and system stability. Improved requirements are currently being tested or have already been implemented for the further development of hot box and dragging brake detectors already in operation.

**Collision in Berlin Südkreuz on 20 November 2006**

**Safety recommendations:** (as of 29 March 2007)

Send the expert report to S-Bahn Berlin GmbH. Issue a notice to S-Bahn Berlin GmbH which contains the requirement to ensure that the sanding equipment on series 480 and 481 S-Bahn trains works reliably and always contains enough operating materials.

Check the design of the brake system of series 480/481 vehicles in conjunction with the manufacturer and operator taking the points made by the expert into account. Prepare a risk analysis as a means of preventively dealing with the probable cause of this accident, the combination of ‘dirty rail head and slight dampness’, and limiting the effect thereof by appropriate operational measures.

**Measures:** (as of July 2014)

The brake equipment and the sanding equipment of the vehicles were converted.

The procedure is concluded as far as the vehicles are concerned.