Federal Ministry of Transport, Building and Town Planning

Management of the Federal Railway Accident Investigation Office

Railway Accident Investigation

ANNUAL REPORT

2012

PUBLISHER:

Federal Railway Accident Investigation Office

[*Eisenbahn-Unfalluntersuchungsstelle des Bundes*]

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AEG	General Railway Act [*Allgemeines Eisenbahngesetz*]
BMVBS	Federal Ministry of Transport, Building and Town Planning [*Bundesministerium für Verkehr, Bau und Stadtentwicklung*]
BPol	Federal Police [*Bundespolizei*]
BU	Railway crossing [*Bahnübergang*]
EBA	Federal Railway Authority [*Eisenbahn-Bundesamt*]
EBL	Local operations supervisor [*Eisenbahnbetriebsleiter*]
EBO	Railway Construction and Operation Order [*Eisenbahn- Bau- und Betriebsordnung*]
EFR	Electronic journey registration equipment [*Elektronische Fahrten-Registrierung*]
EBuLa	Electronic book timetable and speed restriction document [*Elektronischer Buchfahrplan und Langsamfahrstellen*]
EIU	Infrastructure Manager [*Eisenbahninfrastrukturunternehmen*]
ERA	European Railway Agency
ESO	Railway Signalling Order [*Eisenbahnsignalordnung*]
EUB	Federal Railway Accident Investigation Office
EUV	Railway Accident Investigation Regulation
RU	Railway undertaking
FBOA	Dragging brake detection equipment [*Festbremsortungsanlage*]
HOA	Hot box detector [*Heißläuferortungsanlage*]
Hp	Stopping point [*Haltepunkt*]
NE	Railway not owned by the Federal Republic [*Nichtbundeseigene Eisenbahn*]
Nmg	Emergency manager [*Notfallmanager*]
RB	Regional Railway
RE	Regional express [a type of train]
SB	Safety authority [*Sicherheitsbehörde*]
PZB	Intermittent automatic train control [*Punktförmige Zugbeeinflussung*]
SMS	Safety management system

Foreword

This annual report gives information on the activities of the Railway Accident Investigation Bureau [*Eisenbahn-Unfalluntersuchungsstelle des Bundes* (EUB)] as specified in Directive 2004/49/EC on safety of the Community's railways (the Railway Safety Directive). The annual report only contains information on investigations which were carried out in accordance with Section 5(1)(f) of the General Railways Act (AEG) by the Federal Ministry for Transport, Building and Urban Development as the investigation authority.

Thirteen accidents were investigated in accordance with Article 19 of the Safety Directive in the report year.

In addition the annual report contains information on the safety recommendations and other measures issued in the period covered by the report, as well as measures taken by the participants as a result of the safety recommendations.

1. Federal Railway Accident Investigation Office (EUB)

1.1 Statutory basis

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

The Railway Safety Directive was transposed 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. The most recent changes were made by the Seventh Railway Regulations Amendment Act of 27 June 2012. The principle change to affect the investigation of accidents was that Article 5(1)(f) of the General Railways Act (AEG) was reformulated 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, 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 in so far as those powers are necessary for the conduct of the investigations.

'

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 to create the 'Federal Railway Accident Investigation Office' in accordance with Article 5(1)(f) of the General Railways Act.

1.2 Aim and purpose of the investigation

The aim and purpose of the investigations is to establish the cause 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 authorities and, if necessary, to other offices and authorities or other Member States of the EU in the form of safety recommendations.

1.3 Reporting, categorising and investigating dangerous events

The obligation to report and the format for reports are specified in the 'General arrangements for disposition on reporting dangerous events in railway operations' [*Allgemeinverfügung zum Melden von gefährlichen Ereignissen im Eisenbahnbetrieb*] which supplements Article 2(3) second sentence of the Railway Accident Investigation Regulation [*Eisenbahn-Unfalluntersuchungsverordnung* (EUV)].

A fundamental distinction between accidents and incidents is made when considering dangerous events within the meaning of this general term.

An accident is defined as an unwanted or unintended sudden event in railway operations or a specific 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.

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An incident is 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 line;
- incidents at level crossings;
- incidents involving rolling stock;
- incidents involving infrastructure;
- incidents caused by operational error.

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

After reception of the reports in question they are categorised. In this process, a distinction is made between three different categories:

- Category A: 'Serious accidents'

These events are defined in Article 5(1)(f) of the General Railways Act. Investigations are conducted exclusively in accordance with principles laid down by the management of the Federal Railway Accident Investigation Office.

- Category B: ‘Other events worthy of investigation’

These are events that must be reported immediately but are not to be placed in category A, together with events for which the cause is unclear or there is a suspicion of systematic failings.
Accidents are investigated directly by the Central Investigation Office of the Federal Railway Accident Investigation Office. Investigation of the facts may take place on site and/or by making appropriate enquiries in accordance with Article 2(4) of the Railway Accident Investigation Regulation.

- Category C: ‘Other dangerous events’

These are events that must be reported but which do not have to be placed in categories A or B.

The Central Investigation Office of the Federal Railway Accident Investigation Office does not investigate ‘other dangerous events’ itself. The reports received are checked for plausibility, in specific individual cases databases are consulted, and subsequently the reports received are added to the accident database.

1.3.1 Reporting dangerous events

A total of 2,405 dangerous events were reported to the Federal Railway Accident Investigation Office in 2012. Of these 1,682 were accidents and 723 incidents. The diagrams below show their classification into the relevant type of accident.

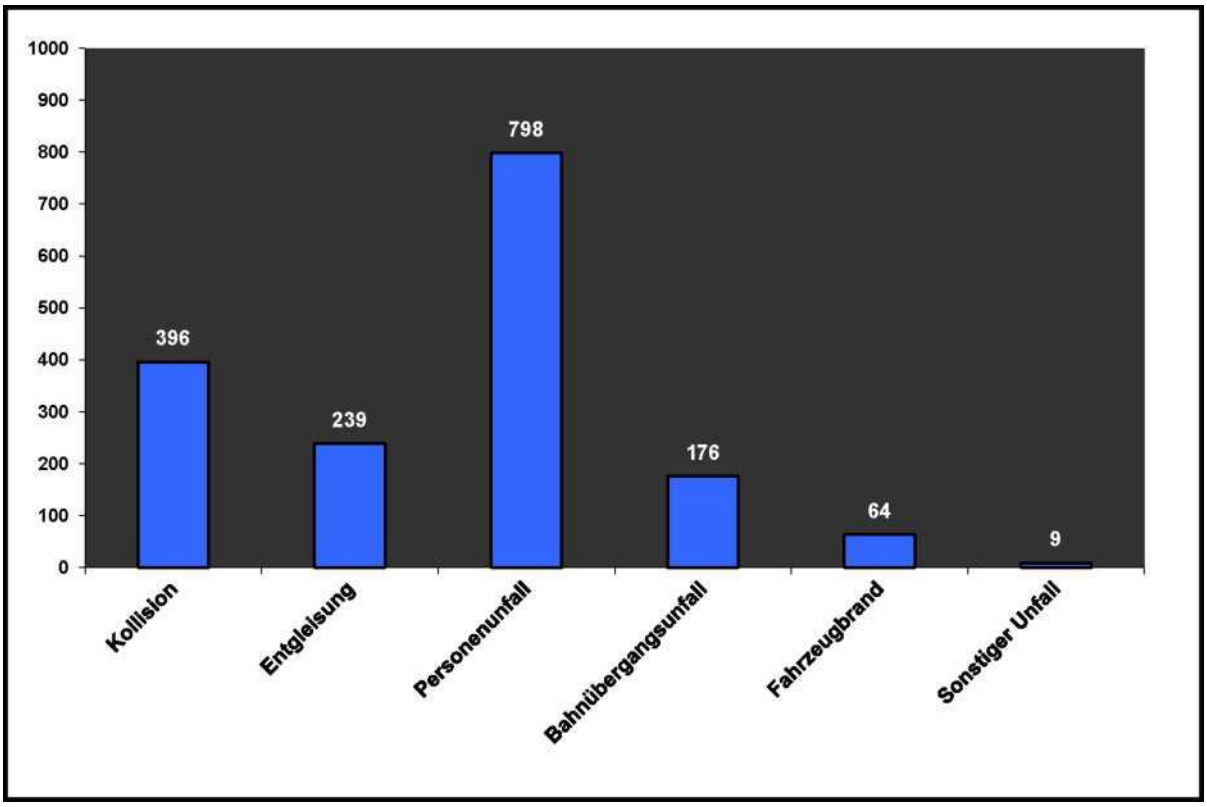

Figure 1: Accidents reported in 2012

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

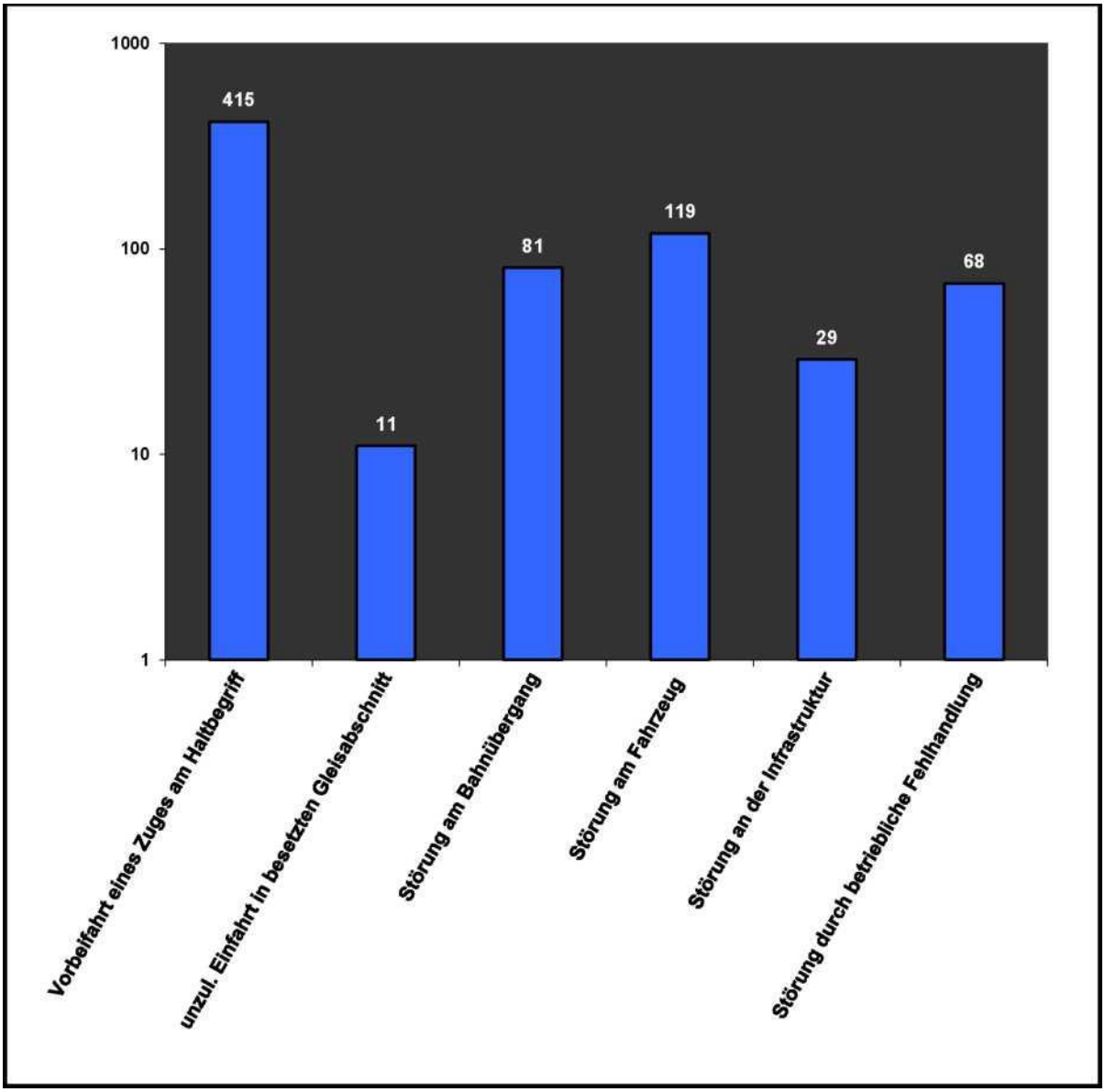

Figure 2: Incidents reported in 2012

Vorbeifahrt eines Zuges am Haltbegriff	Signals passed at danger
Unzul. Einfahrt in besetzten Gleisabschnitt	Unauthorised entry into an occupied section of line
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

1.3.2 Classification of dangerous events

After the reports were received, the dangerous events they referred to were classified as follows:

- 13 events were placed in Category A
- 192 events were placed in Category B
- 2,200 events were placed in Category C

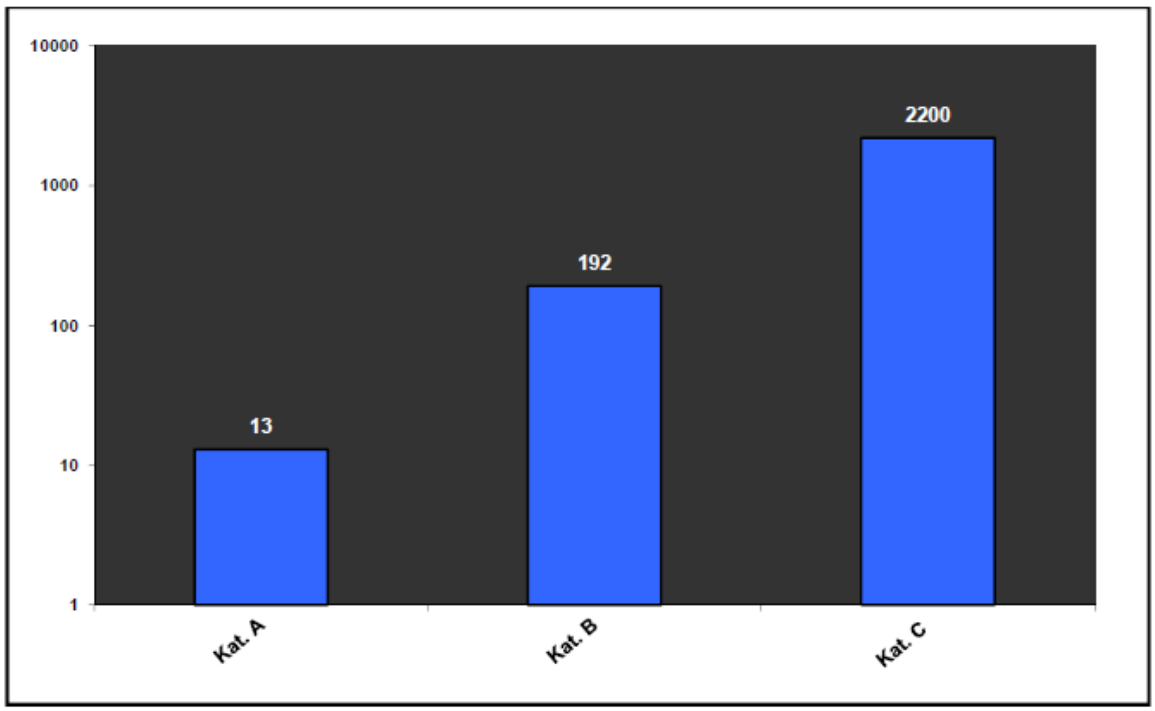

Figure 3: Classification of the dangerous events

Kat. A, B and C	Cat A, B and C

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

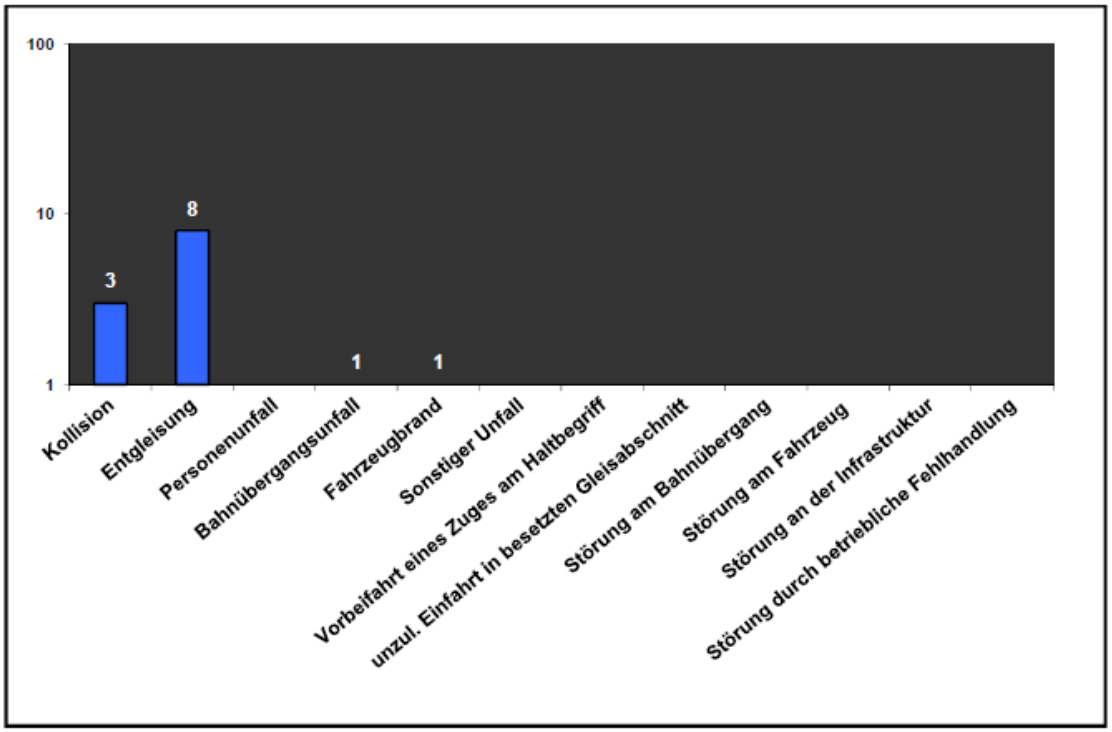

Figure 4: Events in Category A

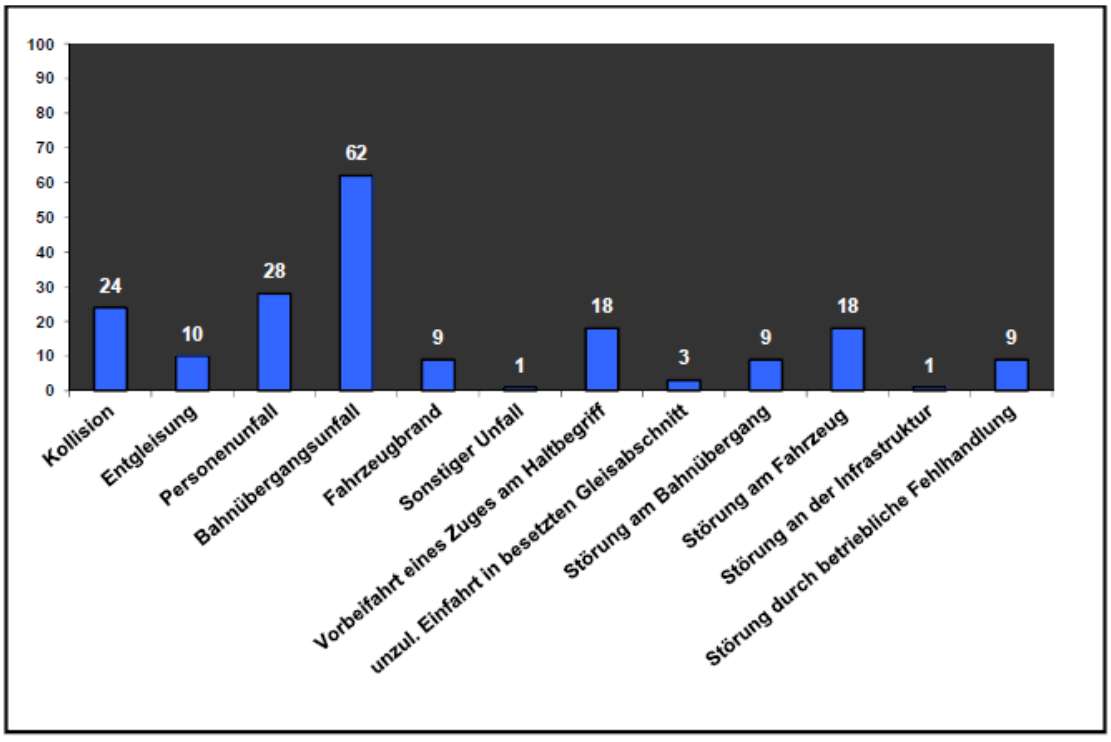

Figure 5: Events in Category B

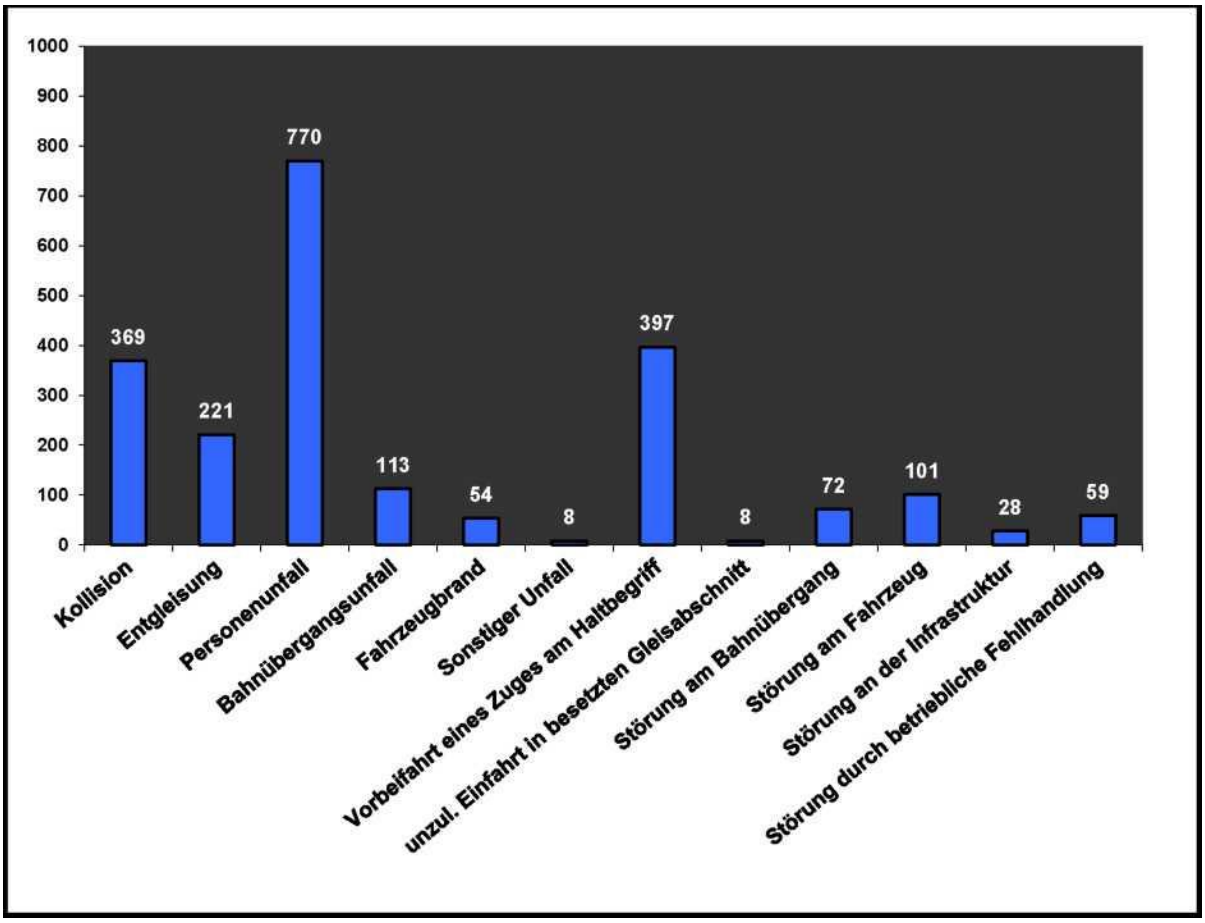

Figure 6: Events in Category C

Kollision	Collisions
Entgleisung	Derailments
Personenunfall	Accidents involving people
Bahnübergang unfall	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 line
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

2 Investigation

2.1 General

In the period under review, 13 events were placed in category A and the appropriate investigations conducted by the investigating body in accordance with Article 5(1)(f) of the General Railways Act. These events are described in detail in Sections 2.1.1-2.1.13 below.

2.1.1 Train collision between Stedesand and Langenhorn on 13 January 2012

Brief description:

At about 17.40 on 13 January 2012, DPN 81817 travelling from Westerland to Hamburg collided with a herd of cattle at km 188.300, in spite of an emergency brake application.

Consequence:

In the collision 1 person was killed and 4 were slightly injured.

14 cattle were killed in the collision. The driving trailer overturned and came to rest at the side of the track, the second coach also derailed. The cost of the damage is estimated at about EUR 2 million.

Figure 7: Collision between Stedesand and Langenhorn

Causes:

The herd of cattle escaped from a cowshed and immediately got onto the track in the vicinity of the Sande railway crossing at km 189.076. They then moved along the track in the direction of Hamburg. Because of the darkness the animals were not seen by the driver at the right

time and in spite of an emergency brake application a collision with the herd of cattle could not be avoided.

2.1.2 Train collision between Langenselbold and Hailer-Meerholz on 21 January 2012

Brief description:

At about 16.15 on 21 January 2012 the sixth and seventh wagons of KT 41969 derailed on the journey from Maasvlakte to Wels between Langenselbold and Hailer-Meerholz at km 36.020. The train came to a stand in Hailer-Meerholz at km 42.000.

Consequences:

A loaded container (11.375 t) from the sixth wagon fell onto the track. There were no dangerous goods in the train. There was considerable damage to the vehicles, the track and the signalling equipment.

Figure 8: Train derailment between Langenselbold and Hailer-Meerholz

Causes:

The derailment of KT 41969 occurred because of a defective axle bearing on the fourth axle of wagon number 21 81 4361 075-4.

2.1.3 Train collision between Mühlheim (Main) and Hanau Central Station on 13 April 2012

Brief description:

At about 00.58 on 13 April 2012, RB 15640 running from Frankfurt/Main Central Station to Wächtersbach on the main line between the Mühlheim Ost and Hanau Central Station cross-over collided with a road-rail vehicle at km 18.420. The RB pushed the road-rail excavator about 405 m towards Hanau after the collision to km 18.825. The driving trailer of RB 15640 which was leading and the road-rail vehicle both derailed.

Consequences:

The train driver of RB 15640, the driver of the road-rail vehicle and the assistant driver were fatally injured. 14 passengers in the train were slightly injured. There was considerable damage to the vehicles, track and safety equipment. Both the driving trailer and the road-rail vehicle were write-offs.

Figure 9: Train collision between Mühlheim (Main) and Hanau Central Station

Causes:

Because of a mix up over the track the road-rail vehicle was put into the section of track of the crossover Mühltheim Ost - Hanau Hbf that had not been blocked. RB 15640 running on this track collided at km 18.420 with the road-rail vehicle.

2.1.4 Train derailment at Bebra on 16 April 2012

Brief description:

At about 21.23 on 16 April 2012, the last five car carrying vehicles (Laes) of DGS 75731 derailed on the journey from Bremen Marshalling Yard to Regensburg Ost after correctly observing signals when entering Bebra Station.

Consequences:

The track, light masts and overhead lines were severely damaged by the derailment. The damage caused to the overhead lines, track, lighting and safety equipment was estimated at EUR 3 million.

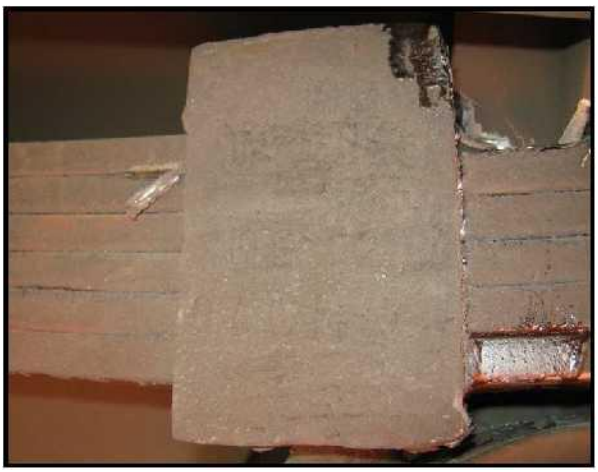

Figure 10: Train derailment at Bebra

Cause:

The present stage of the investigation suggests that the derailment was due to the fracture of a leaf spring on the last freight wagon (wagon number 23 80 2911 925-8).

2.1.5 Fire on a vehicle in Aachen-Rothe Erde on 25 June 2012

Brief description:

At about 10.30 on 25 June 2012, there was a fire with a lot of smoke on the rear power car (two car set VT 643) of RB 11958 between Stolberg (Rhdl) Central Station and Aachen-Rothe Erde.

Consequences:

Five people required medical attention and two of these were taken to a nearby hospital due to suspected slight smoke poisoning.

The power car was more or less burnt out and the overhead line was also seriously damaged by the fire.

The cost of the damage was estimated at about EUR 1.2 million.

Figure 11: Fire on a vehicle at Aachen-Rothe Erde

Cause:

The cause of the fire was two demonstrable electrical insulation defects which had not been previously identified. The fire started in the vehicle coupling due to high currents in the components and cables which were not designed for them.

2.1.6 Train derailment in Stuttgart Central Station on 24 July 2012

Brief description:

At about 11.38 on 24 July 2012, IC 2312 (Stuttgart Central Station - Hamburg) was derailed while leaving platform 10 before point 227. Both bogies of the last and last but one passenger coaches, as well as the power car at the end of the train, were derailed.

Consequences:

Nobody was injured. The derailment caused damage to vehicles (power car and the last two wagons) and the infrastructure.

Figure 12: Train derailment in Stuttgart Central Station on 24 July 2012

Cause:

The investigations carried out initially showed that the permissible compressive forces generated in the rake of coaches, when leaving the station, was exceeded and consequently could have made a major contribution to the derailment. After a similar train derailment occurred on 29 September 2012, in which the permissible compressive forces were not exceeded, investigations were again focussed in the vehicle technology and infrastructure areas. It was found that the areas process control and safety technique could be excluded as the cause of the derailment.

2.1.7 Train derailment at Winterhausen on 25 July 2012

Brief description:

At about 09.15 on 25 July 2012 the tenth wagon of freight train DGS 43101 (Wanne Eickel - Verona) derailed whilst running through track 404 at km 126.623 in Winterhausen Station. This wagon derailed with both axles of the leading bogie and came to a stand at km 125.960.

Consequences:

The track was seriously damaged. The load of the semi-trailer transported on the derailed wagon was displaced by the transverse force set up during the derailment.

Figure 13: Train derailment at Winterhausen

Cause:

On the basis of the investigations carried out it was concluded that the derailment was the result of a wheel centre fracture on wheelset No 129 627 (AAE) of wagon 33 68 4956 309-1. The wheel centre fracture occurred at km 126.623 - the place where the larger piece of the fractured wheel centre was found immediately after the bogie derailed with both axles. The results of the material investigation carried out indicated that the production of cracks was due to thermal overloading.

2.1.8 Train collision at Hosena on 26 July 2012

Brief description:

At about 20.18 on 26 July 2012, freight train DGS 49325 ran into the side of the rear wagon rake of freight train DGS 92505 that was running into track 1W in Hosena Station

Consequences:

Due to the side movement of DGS 49325 several freight wagons and the locomotive DGS 49325 derailed. Some of the derailed freight wagons collided with the pointsman's signal box W3 and caused it to collapse. Several wagons piled up on the ruins of the signal box. The pointsman in signal box W3 was fatally injured. The locomotive driver of DGS 49325 was seriously injured after jumping from the moving train. The locomotive driver of DGS 92505 and the movements inspector suffered a shock.

There was considerable damage to vehicles and the infrastructure. The pointsman's signal box was destroyed.

Figure 14: Train collision at Hosena

Cause:

DGS 49325 ran past the entry signal A at danger due to defective brake equipment. Previous experience suggests that the defective brake equipment was due to a closed air shut-off cock on the first freight wagon immediately behind the locomotive.

2.1.9 Train derailment in Berlin Tegel on 21 August 2012

Brief description:

At about 11.42 on 21 August 2012, there was a derailment on line 630 Berlin-Schönholz - Berlin Tegel - Hennigsdorf in Berlin Tegel Station in the direction of Hennigsdorf of S-Bahn train S 25068. The two coaches in the centre of the train derailed in track 1 in point 74.

Consequences:

Six people were slightly injured by the derailment and taken to hospitals for further examination.

Of the six coaches in the train, coaches 3 and 4 derailed. The track was damaged in the area around the derailment.

Figure 15: Train derailment in Berlin Tegel

Cause:

The cause of the derailment in track 1 of Berlin Tegel Station was the movement of the point 74 under the S Bahn train. This inopportune movement of the point was due to mishandling by the signal box staff.

2.1.10 Train derailment in Stuttgart Central Station on 29 September 2012

Brief description:

At about 11.42 on 29 September 2012, the last three coaches and the propelling power car of IC 2312 derailed before point 227 while leaving Platform 10.

Consequences:

All axles of the propelling power car were derailed as well as coaches 61 80 1895 413-0 and 61 80 1991 185-7 with both bogies. The rear bogie of coach 61 80 8890 510-3, running in ninth position, also derailed.

As a result of the derailment there was considerable damage to the vehicles as well as to the infrastructure.

Figure 16: Train derailment in Stuttgart Hbf on 29 September 2012

Cause:

See Section 2.1 6

2.1.11 Train derailment in Hanover Central Station on 1 December 2012

Brief description:

At about 02.31 on 1 December 2012 the 21st wagon of freight train EZ 51648, running from Nuremberg Marshalling Yard to Seelze, derailed when entering Hanover Central Station (track 43).

Consequences:

Nobody was injured. Besides the 21st wagon the two following wagons derailed further on. There was considerable damage to the vehicles as well as to the infrastructure. The wagons in the train carrying dangerous goods were not involved in the collision.

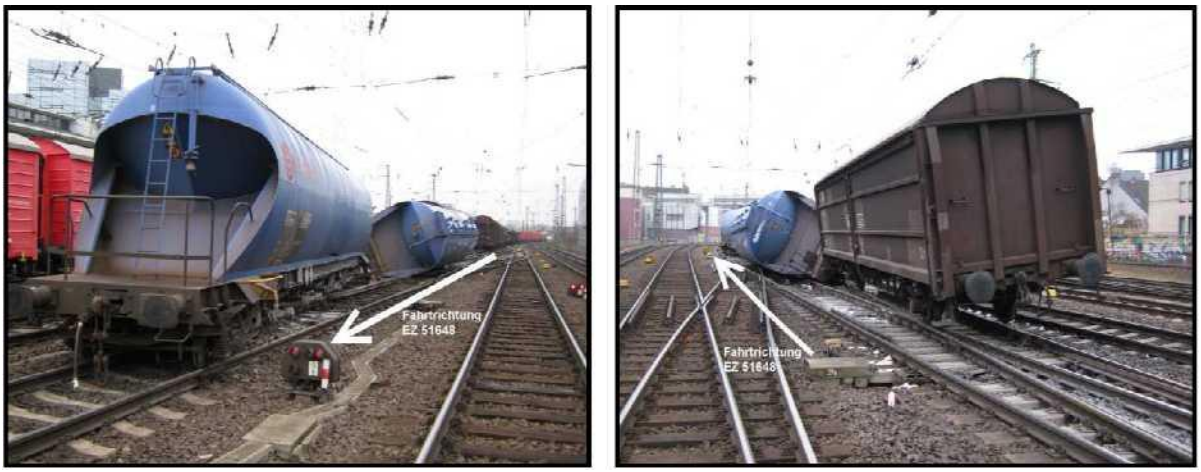

Figure 17: Train derailment in Hanover Central Station

Cause:

The derailment of the 21st wagon was due to the fracture of the axle journal on the right of the first axle of the leading bogie in the direction of travel. The fracture was due to a thermal overload of the axle journal in the axle bearing (hot box).

2.1.12 Train derailment in Löhne Central Station on 13 December 2012

Brief description:

At about 12.30 on 13 December 2012, the 22nd vehicle of EZ 51229 derailed in Löhne Station at km 85.35 (on Platform 8). The derailed wagon, an empty Laaers wagon, was pulled along beside the track to km 82.80 and damaged the track and the points. The train was brought to a stand by an automatic brake application caused by the train dividing.

Consequences:

Nobody was injured. All four axles of the wagon were derailed and it came to rest in an inclined position. There was considerable damage to the vehicles as well as to the infrastructure.

Figure 18: Train derailment at Löhne

Cause:

The investigations, which are still open in the areas of operation, infrastructure, vehicle technology as well as control and protection technology, are at present concentrated on the infrastructure and vehicle technology.

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

Brief description:

At about 20.14 on 19 December 2012 freight train KT 41953 (Duisberg-Ruhrort Hafen - Wels (A)) collided on the technically protected railway crossing 'Am Hackenbruch' at km 27.754 with an empty bus. Just a few minutes later freight train EZ 45722 (Gremberg - Kijfhoek (NL)) travelling in the opposite direction also collided with the bus.

Consequences:

The locomotive drivers of both trains were slightly injured in the accident. Both locomotive drivers and the passengers, who were all able to get out of the bus in time, suffered from shock. The locomotive and four vehicles of train 41953 derailed. Both the locomotives of train 45722, which was double headed, derailed. There was considerable damage to railway vehicles, railway premises and a neighbouring private property. The bus was completely destroyed. The cost of the damage was estimated at about EUR 5 million.

Figure 19: Railway crossing accident between Düsseldorf-Eller and Düsseldorf-Rath

Cause:

The driver of the bus drove into the crossing area of the level crossing when the railway safety equipment [*Bahnübergangssicherungsanlage*] (BÜSA) was switched off, and because of a technical defect on his vehicle after the switching on of the BÜSA could not move out in time.

3. 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 organisations are obliged to advise the investigation authority on the measures they have taken or plan to take as a consequence of the safety recommendations. An assessment of these measures by the investigation authority is not required and does not take place.

In Chapter 3.1 'Safety recommendations 2012' the safety recommendations issued in 2012 on dangerous events are listed in tabular form and supplemented as applicable with information on the action already taken. The associated Chapter 3.2 'Safety recommendations 2006-2011' contains a summary of all safety recommendations, as well as current information on the measures taken. This information is arranged in date order of the dates on which the dangerous events took place.

3.1 Safety recommendations 2012

2012

Event: Train derailment in Bacharach on 1 September 2010

Safety recommendation: (Situation as at 30 May 2012)

1. As part of their operational responsibility railway undertakings should ensure that the load limit of freight wagons is 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 is 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. New provisions were added to the 'Emergency call' module Ril 408.0581 3 (5) of DB Guideline 'Train running and shunting' in notification No 8:

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

The new text took effect on 13 December 2009. 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 connection' on the GSM-R vehicle equipment could have brought the train to a stand some way before he actually did by an immediate initiation of 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 other track would have been considerably reduced.
Bearing in mind the resulting derailment and the potential danger to other trains the amended regulation Ril 408.0581 3 (5) of 13 December 2009 shall be suitably amended.

Measures: (Situation as at August 2013)

Re 1: The recommendations were only sent to the undertaking involved because it was considered to be a 'one off' case. Special activities by the safety authority were not therefore planned.

Re 2: The regulation issued should be in accordance with a harmonised regulation of the Operating TSI. A possible amendment was discussed in the responsible expert committee of the European Railway Agency but was not approved.

3.2 Safety recommendations 2006 – 2011

2011

Event: Train collision at Hordorf on 29 January 2011

Safety recommendations: (Situation as at 14 September 2011)

1. Fitting of all lines with automatic train control equipment by means of which a train that passes a signal at danger can automatically be brought to a stand. Additionally, an unauthorised start on main lines when the signal is at danger is automatically prevented.

2. Until the lines are fitted with automatic train control as specified in Item No 1 additional measures shall be taken which are suitable in individual cases, to reduce the entry probability and/or the amount of damage caused by an unauthorised passing of a signal at danger.

Measures: (Situation as at August 2013)

The issuer of the regulations has issued an amendment of the Railway Construction and Operation Order [*Eisenbahn Bau- und Betriebsordnung* (EBO)] with obligations to extend the equipment of the lines. The railways of the Federation are already comprehensively upgrading their lines to reduce risks in anticipation of the changes to the EBO.

Until the upgrading has been completed the Infrastructure Manager is encouraged by the safety authority to investigate and introduce suitable intermediate risk and operating measures. The safety authority will monitor the risk assessments of the IM for those lines for which no obligatory requirements will exist even after the amendment of the legal requirements. In addition the effectiveness of operating procedures in subsequent events will form a central theme if there are accidents after the legal requirements have been amended.

Note of the Federal Railway Accident Investigation Office:
Article 1 of the sixth regulation amending the Statutory Provisions Governing Railways of 25 July 2012 amends the Railway Construction and Operation Order. The sixth regulation came into force on 1 December 2012.

2010

Event: Other accident in Bielefeld on 10 July 2010

Safety recommendations: (Situation as at 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: (Situation as at 24 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.

Event: Train collision between Leiferde and Braunschweig on 20 January 2010

Safety recommendations: (Situation as at 29 January 2010)

In order to ensure 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 identical design of emergency entry and exit windows regarding their functionality (marking, operation and risk of injury), should be reviewed.

Measures: (Situation as at 24 March 2010)

According to information received, the functionality of two emergency entry/exit windows from a series produced by the Scholl company was tested by the safety authorities on a class VT 628 diesel multiple unit on 24 March 2010. The impact test using the emergency hammer on both windows was carried out without problem 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/exit window has been completed. It was established that there was no need for action.

The procedure has been closed.

2009

Event: Derailment on the line Nürnberg-Stein - Nürnberg Marshalling Yard on 7 August 2009

Safety recommendations: (Situation as at 10 February 2011)

The design tension for the securing fittings is an important criterion for keeping the permanent way to gauge and thus ensure freedom from derailments. It is recommended that DB Netz AG's permanent way regulations for the inspection of track and switch installations of type K54-B58 are updated and supplemented in the short term.

1. Lay down a graduated inspection frequency for testing the tension of securing fittings on track and switches. In deciding the categories, line speed, traffic density and sensitive locations (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, would be considered as a suitable test.

Measures: (Situation as at August 2013)

The matter was discussed between the safety authority and the IM concerned. A change to the regulations was seen as an appropriate measure. It will probably 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 the fittings securing rails to B55 and B58 sleepers is noted.

The measures taken were to be closed when the change to the regulations came into force.

Event: Derailment on the Bünde (Westphalia) to Bruchmühlen line on 17 July 2009

Safety recommendations: (Situation as at 8 February 2010)

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

1. Replace riveted brass cages by plastic bearing cages.

2. Investigate whether fitting further derailment detectors and/or hot box detectors could make a measurable contribution to preventing derailments.

Measures: (Situation as at 20 July 2012)

1. Evaluation of the measures recommended has revealed that the replacement of riveted brass cages by plastic bearing cages to avoid further axle failures from hot boxes is inappropriate because it is only one of several causes. Independently of that, the issue has been raised in the European Union and at international level.

2. The investigation of the effects of derailment detectors and/or hot box detectors is being carried out at European and international level.

The procedure has been closed.

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

Safety recommendations: (Situation as at 30 June 2009)

At least investigate the following:

1. whether it is necessary to retrofit warning lights within the driver's field of vision which would indicate to him that the straight air 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 straight air 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: (Situation as at 20 July 2012)

Re 1: The modification described in the safety recommendation has been in hand since 2007. The retrofitting of warning lights has not yet been completed.

Re 3: The study on whether the air intake for the air conditioning should be moved to another site has been finished with the outcome that there is no other suitable site.

The procedure has been closed.

Event: Collision in Berlin Karow Station on 16 April 2009

Safety recommendations: (Situation as at 8 December 2010)

1. Clarify the rules for return of signals to danger in (old) signal boxes without automatic means of indicating the track is clear 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: (Situation as at 30 August 2011)

The Infrastructure Manager 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 automatic return of signals to danger in good time. The technical notice has been made valid with immediate effect.
The complete network of the Infrastructure Manager in question is being examined to identify similar cases on the network with the same potential risks. For this, the Infrastructure Manager in question has assembled comprehensive data and used it to make appropriate risk assessments. Local shortcomings are being remedied.

2008

Event: Train collision at Recklinghausen on 25 November 2008

Safety recommendations: (Situation as at 28 November 2008)
Investigate, at least, whether drivers of light engines fitted with disc brakes should notify the movements controller if sanding equipment has been used or initiated automatically and the locomotive has come to a stop so as to avoid wrong side indications by track circuits indicating that the track is clear.

Measures: (Situation as at 27 June 2012)

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

The procedure will be closed when the changes made by the IM come into force.

Event: Derailment in Cologne Central Station on 9 July 2008

Safety recommendations: (Situation as at 4 March 2009)
Safety recommendation for ICE-3 multiple units with axles made of 34CrNiMo6 material is as follows:

Examine initial data for the materials for evidence of its fatigue strength when designing 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 - Prüfung* (BAM)].

Measures: (Situation as at 20 July 2012)

All axles have been and are being tested for internal flaws by non-destructive methods.

A start has been made on considering the speed of crack propagation, techniques include calculations and tests and the results will be used to confirm the test intervals. Neither approach has been carried through completely.

Event: Train collision of ICE 885 in Landrücken tunnel on 26 April 2008

Safety recommendations: (Situation as at 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 methods so as to improve the margin of safety against derailment for high speed trains.

2. Investigate and improve the visibility of escape routes and emergency equipment in coaches.

3. Revise module 123.150 'Rescue by Third Parties' of DB Guideline Ril 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 a herd of animals.

5. Refresh induction training and provide regular instruction for the staff responsible for rescue on local features and safety equipment, in addition, plan and carry out tunnel rescue practice.

Measures: (Situation as at August 2013)

The safety authority has arranged for the IM to look into the following safety measures described in recommendations No 1, 3 and 5:

- checking the effectiveness of the alarm regulations by the emergency management office as part of a practice with the following results: supplementing the emergency folder with a cover sheet from which all required information is recognisable in a simple way - if not available,

- intensifying the training of the alerting process as well as

- carrying out special inspections with regard to the tunnel safety equipment in different tunnels on the high speed lines (v > 200km/h).

In addition the IM has analysed the necessity for the fencing of high speed lines. The final assessment of the necessity for specific fencing measures, as well as, if necessary, their implementation, are not yet completed.

On recommendation No 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 was no requirement for improvement on account of the accident.

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

2007

Event: Derailment in Rotenburg / Wümme on 28 February 2007

Safety recommendations: (Situation as at 7 January 2008)
In view of the findings of 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 improved to be able to respond more effectively to a hot box which is developing relatively quickly.

Measures: (Situation as at 30 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 Manager. A draft for a new functional specification is being drawn up in conjunction with the Infrastructure Manager. The functional specification contains improved requirements for detection, options for evaluation and stability. Hot box and binding brake detectors already in service are being updated and revised requirements are currently being tested or have already been implemented.

2006

Event: Collision in Berlin Südkreuz on 20 November 2006

Safety recommendations: (Situation as at 29 March 2007)
Send the expert's 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 class 480 and 481 S-Bahn trains works reliably and always contains enough sand.

Check the design of the brake system of vehicles of classes 480 and 481 in conjunction with the manufacturer and operator taking the points made by the expert into account. Prepare a risk analysis to combat the probable cause of this accident, the combination of 'dirty rail head and slight dampness' and limit their effects by appropriate operational measures.

Measures: (Situation as at 30 August 2011)

The railway undertaking has not yet completed the process of providing justification for changes to the braking system. In the meantime the service runs with speed restrictions.