Federal Ministry of Transport
and Digital Infrastructure

Management of the Federal Railway
Accident Investigation Office

Railway Accident Investigation

ANNUAL REPORT

2013

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[Eisenbahn-Unfalluntersuchungsstelle des Bundes]

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AEG	General Railways Act [*Allgemeines Eisenbahngesetz*]
BMVI	Federal Ministry of Transport and Digital Infrastructure [*Bundesministerium für Verkehr und digitale Infrastruktur*]
BPol	Federal Police [*Bundespolizei*]
BÜ	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 [IM] [*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 [RU] [*Eisenbahnverkehrsunternehmen*]
FBOA	Dragging brake detection equipment [*Festbremsortungsanlage*]
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*]
RB	Regional railway [*Regionalbahn*]
RE	Regional express [a type of train] [*Regionalexpress*]
SB	Safety authority [*Sicherheitsbehörde*]
PZB	Intermittent automatic train control [*Punktförmige Zugbeeinflussung*]
SMS	Safety management system [*Sicherheitsmanagementsystem*]

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 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 of Transport and Digital Infrastructure as the investigation authority.

Seventeen accidents were investigated in accordance with Article 19 of the Railway 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 safety recommendations issued.

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 which inter alia also reformulated Article 5(1)(f) of the General Railways Act (AEG) 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 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 to create the 'Federal Railway Accident Investigation Office' in accordance with Article 5(1)(f) of the General Railways Act of 20.08.2008.

1.2 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.

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 these general arrangements for disposition.

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;
- railway 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 line;
- incidents at railway 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 the 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 2 353 dangerous events were reported to the Federal Railway Accident Investigation Office in report year 2013. Of these 1 629 were accidents and 724 incidents. The diagrams below show their classification into the relevant type of event.

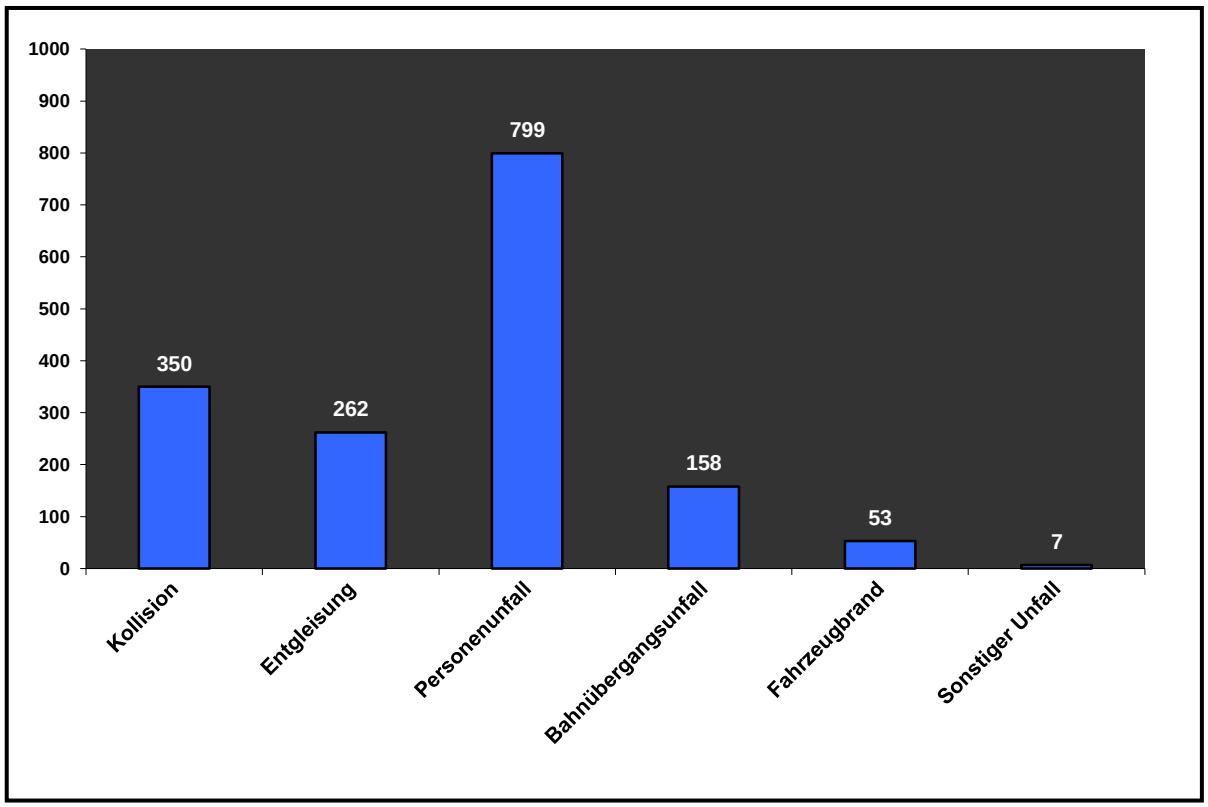

Figure 1: Accidents reported in 2013

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

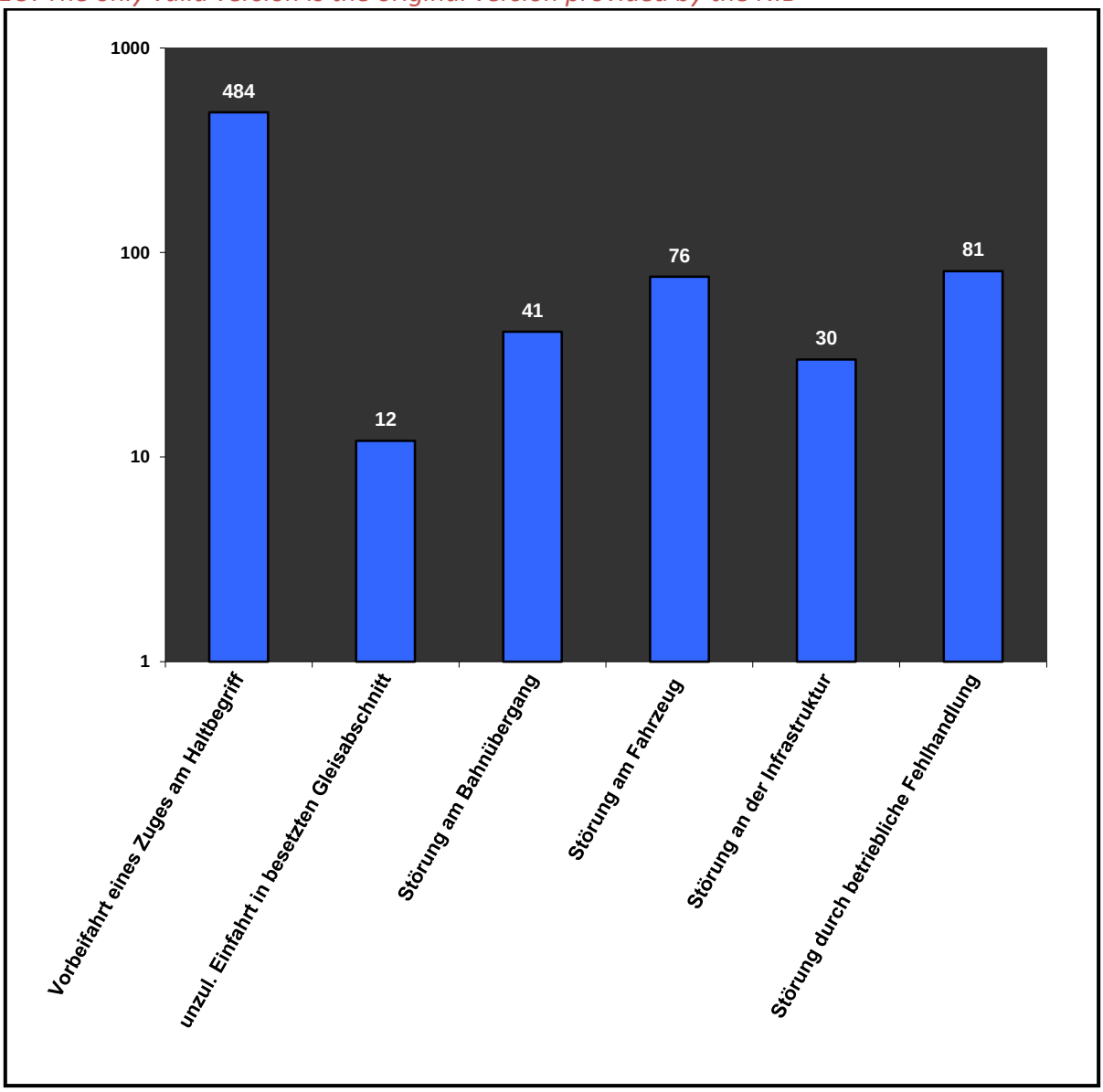

Figure 2: Incidents reported in 2013

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 railway 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:

- 17 events were placed in Category A
- 40 events were placed in Category B
- 2 296 events were placed in Category C

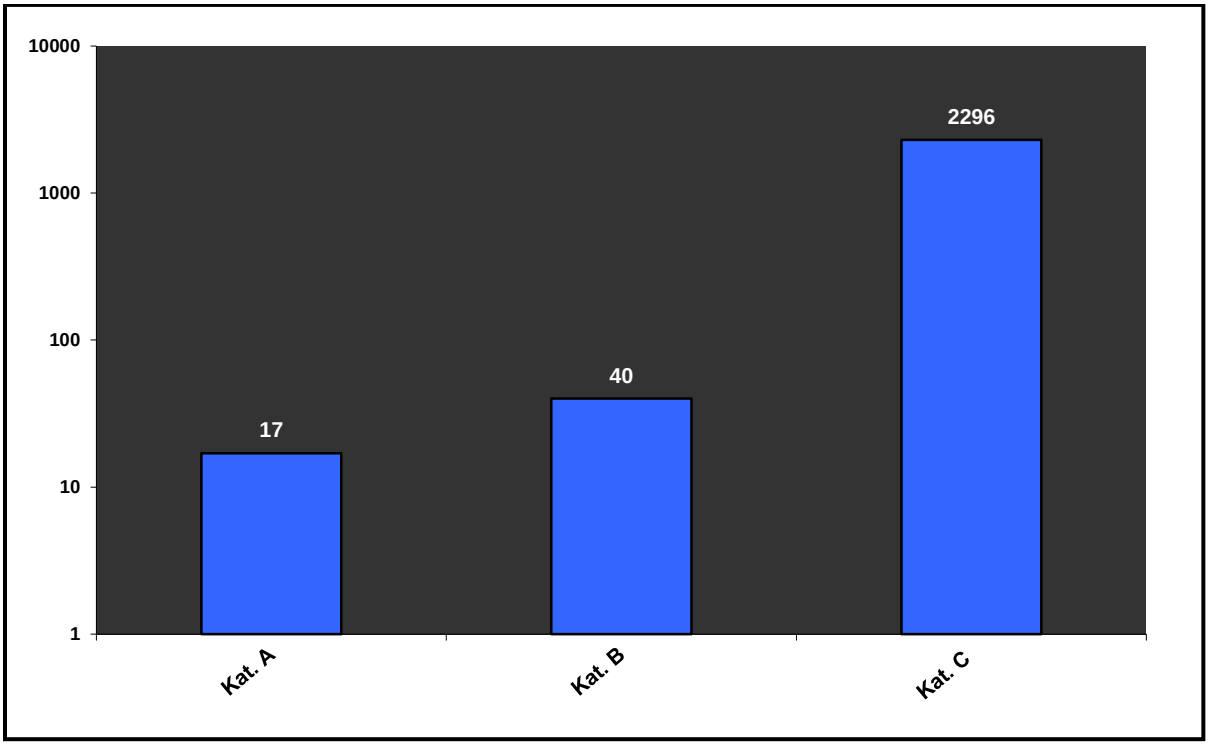

Figure 3: Classification of the dangerous events

Kat. A	Cat. A
Kat. B	Cat. B
Kat. C	Cat. C

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

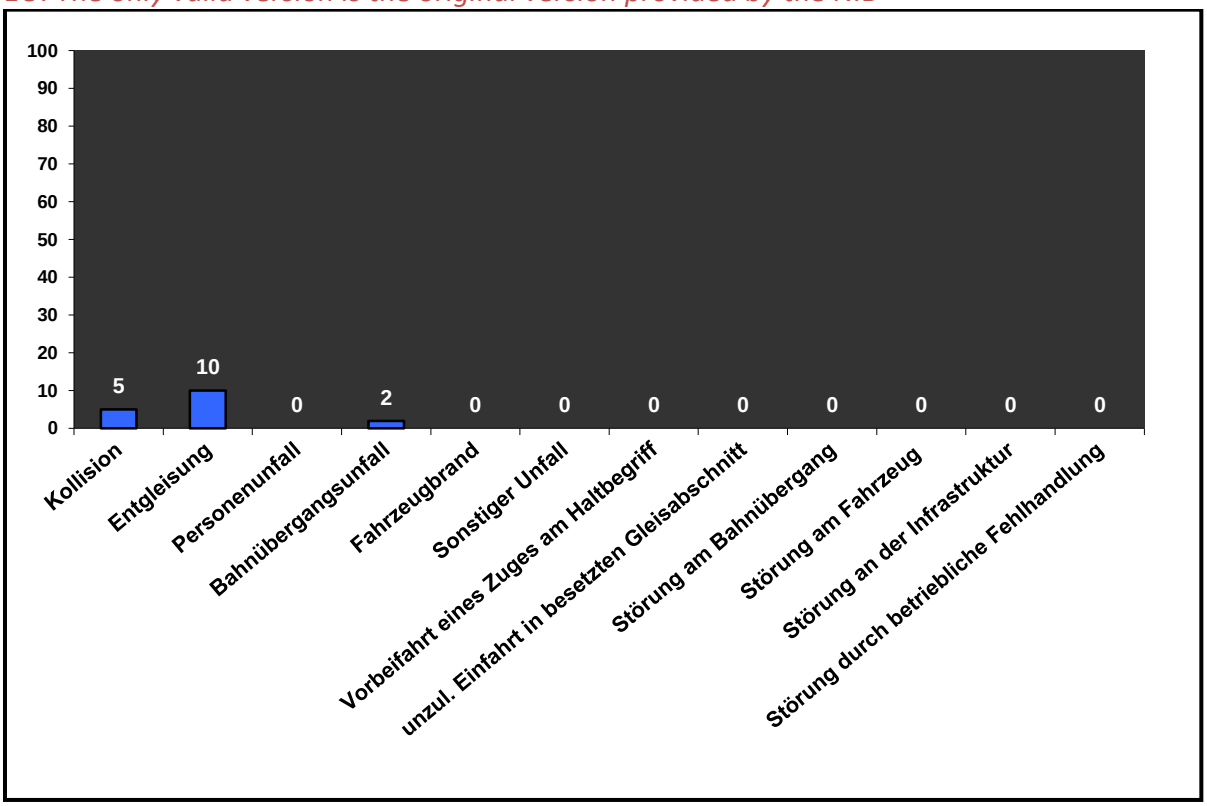

Figure 4: Events in Category A

Kollision	Collisions
Entgleisung	Derailments
Personenunfall	Accidents involving people
Bahnübergangsunfall	Railway 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 railway crossings
Störung am Fahrzeug	Incidents involving rolling stock
Störung an der Infrastruktur	Incidents involving infrastructure
Störung durch betriebliche Fehlhandlung	Incidents caused by operational error

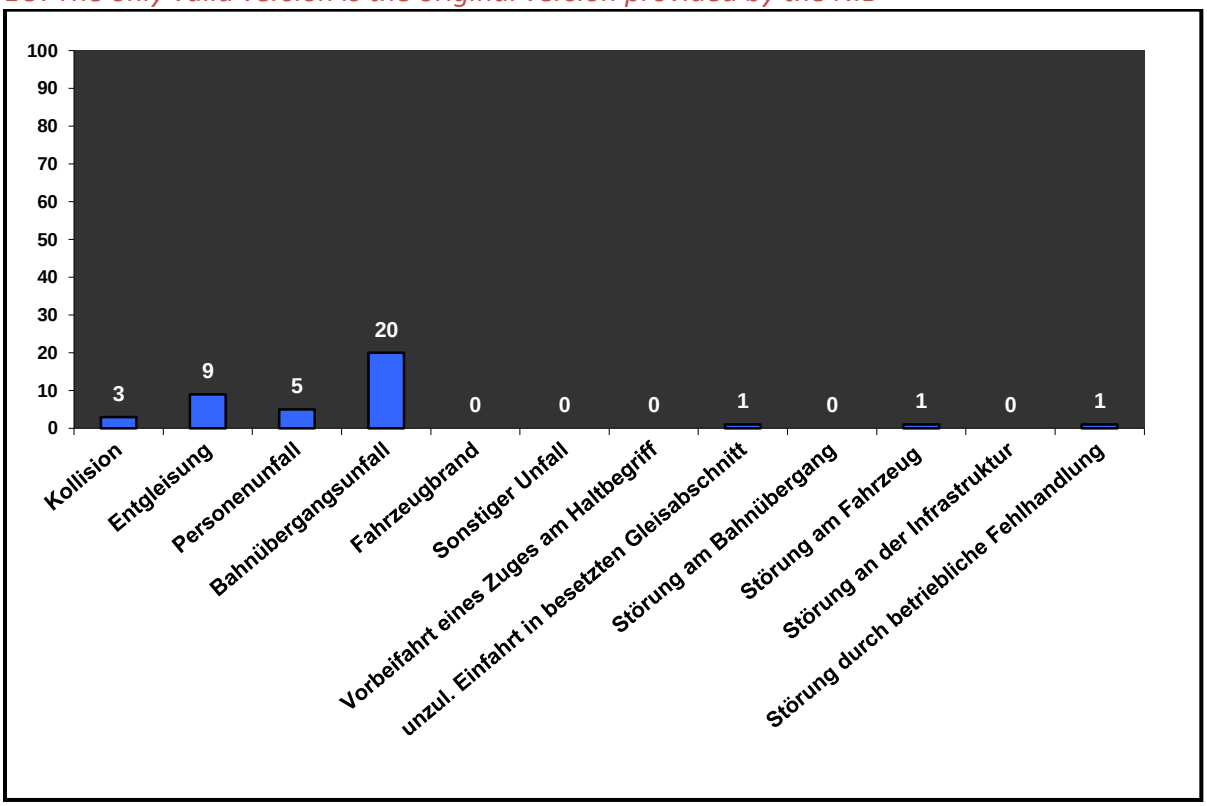

Figure 5: Events in Category B

Kollision	Collisions
Entgleisung	Derailments
Personenunfall	Accidents involving people
Bahnübergangsunfall	Railway 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 railway crossings
Störung am Fahrzeug	Incidents involving rolling stock
Störung an der Infrastruktur	Incidents involving infrastructure
Störung durch betriebliche Fehlhandlung	Incidents caused by operational error

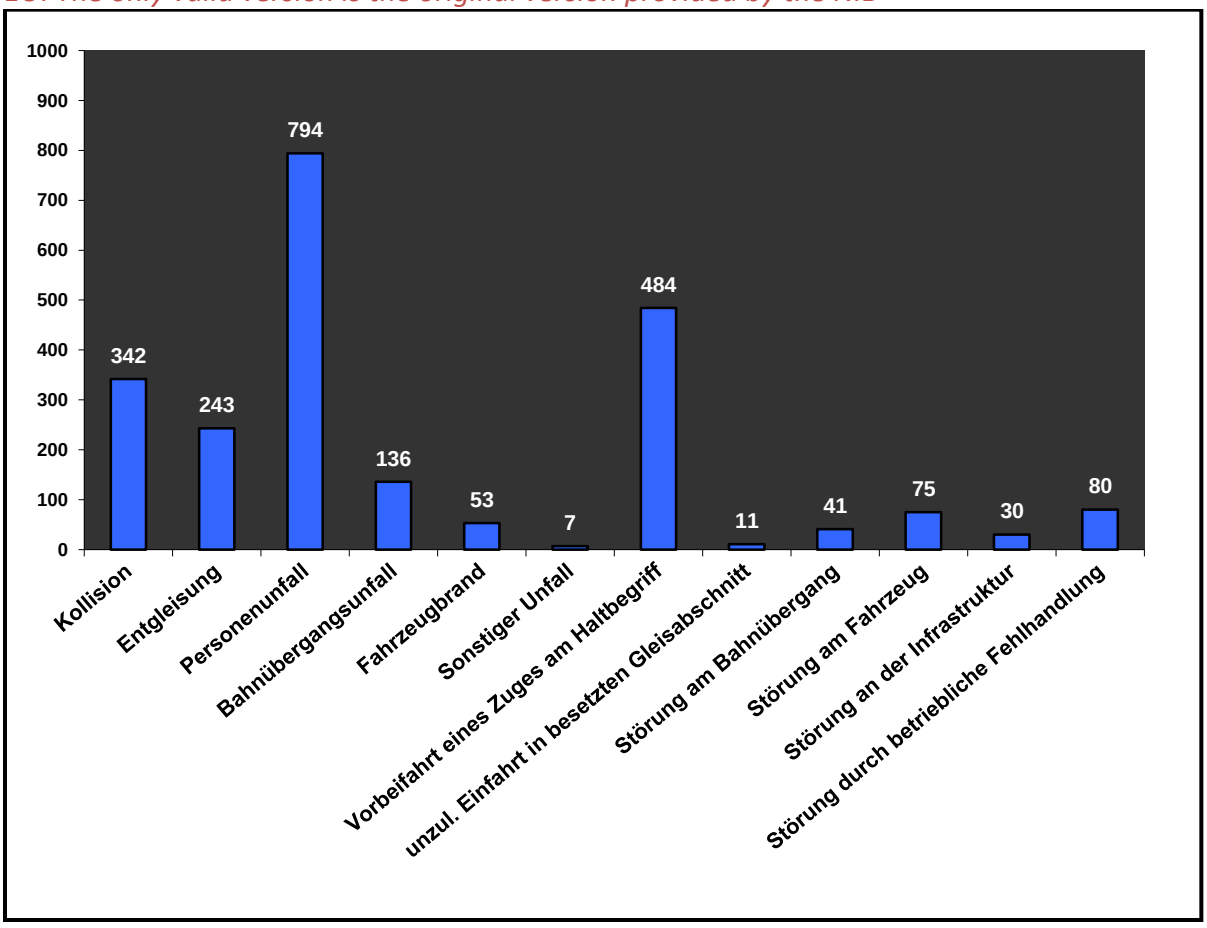

Figure 6: Events in Category C

Kollision	Collisions
Entgleisung	Derailments
Personenunfall	Accidents involving people
Bahnübergangsunfall	Railway 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 railway 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, 17 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. Previous knowledge relating to these events is described in Sections 2.1.1-2.1.17 below.

2.1.1 Train derailment on 5 January 2013 in Recklinghausen Ost

Brief description:

At about 16.32 on 5 January 2013, all axles of the sixth and seventh wagons of DGS 95748 derailed upon entering Recklinghausen Ost Station. The derailed wagons were empty, uncleaned tank cars with UN No 3082.

Consequences:

After the DGS 95748 passed the entry signal showing 'line clear' points 58W201, 58W202, 58W204, 58W205, and 58W207 were forced open. There was no leak of hazardous material.

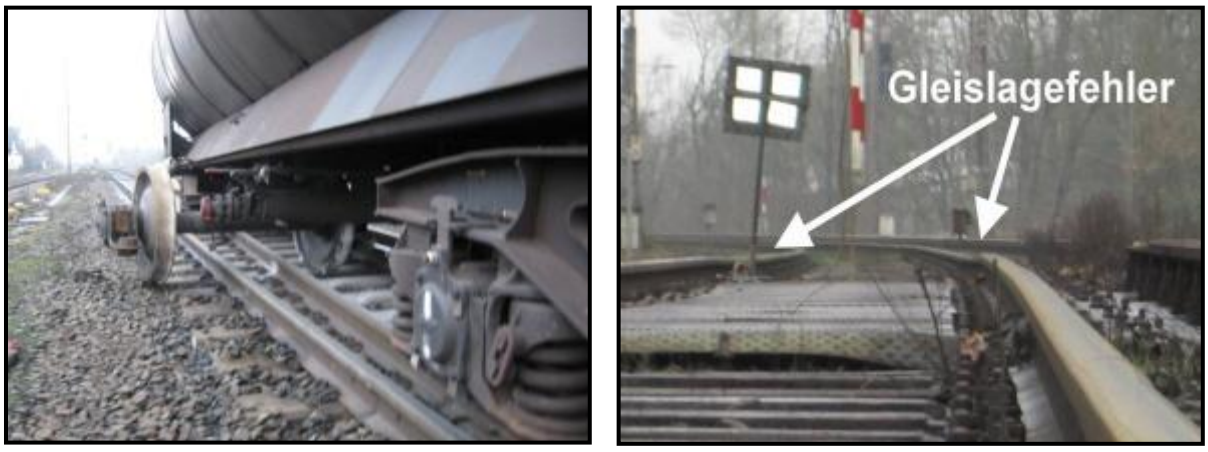

Figure 7: Train derailment in Recklinghausen Ost

Gleislagefehler	Track geometry fault

Cause:

The present stage of the investigation indicates that track geometry faults caused the derailment.

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

Brief description:

At about 17.14 on 9 January 2013, between Lübbecke (Westphalia) and Espelkamp, on the railway crossing secured by attendants, at km 23.873 (Gestringer Straße), regional train DPN 90217 travelling from Rahden / Kr. Lübbecke to Bielefeld collided with a car.

Consequences:

One person was killed and two people seriously injured in the accident. The two employees used as attendants suffered shock. Damage to property estimated at approximately EUR 170 000 was caused.

Figure 8: Railway crossing accident between Lübbecke (Westphalia) and Espelkamp

Cause:

The driver of the car drove over the railway crossing, even though this was secured for the train to pass by attendants by means of barrier tape and a red lamp.

2.1.3 Train collision on 6 February 2013 in Hamburg Bergedorf

Brief description:

At about 09.56 on 6 February 2013, IC 2182 travelling from Hamburg to Stralsund collided with a wagon carrier truck, on which tools for maintenance work were to be transported.

Consequences:

During the collision the tools were thrown through the air. One person was hit by one of the flying implements and sustained fatal injuries.

Figure 9: Train collision in Hamburg Bergedorf

Cause:

The wagon carrier truck was erroneously used on the unblocked track.

2.1.4 Train derailment on 14 February 2013 between Vahr (Jct.) and Bremen Central Station

Brief description:

At about 12.29 on 14 February 2013, the car-carrier wagon in position 16 of the set of freight train DGS 90156 derailed between the Vahr junction and Bremen Central Station.

Consequences:

As a result of the derailment there was severe damage to track, control and safety systems and the overhead line system.

The cost of the damage includes the damage to both the rolling stock and infrastructure. According to the undertakings involved this amounts to approximately EUR 4.2 million.

Figure 10: Train derailment between Vahr (Jct.) and Bremen Central Station

Cause:

The cause was identified as a hand brake being applied in the rear wagon unit. The locking of the wheelsets led to large material loss and deposits on the running surfaces of the wheelsets. As a result the wheelsets were unable to run truly on the rails causing the wagon to derail to the right.

2.1.5 Train derailment on 2 March 2013 in Hannover-Linden

Brief description:

At about 01.37 on 2 March 2013, freight train KT 50528 with 2 container wagons having a total of 6 axles derailed in Hannover-Linden Station upon entering track 6 in the vicinity of point 13.

Consequences:

As a result of the derailment considerable damage was caused to track, control and safety systems and the overhead line system.

The cost of the damage was estimated at approximately EUR 320 000.

Figure 11: Train derailment in Hannover-Linden

Cause:

Investigations are currently concentrating on the areas of infrastructure and vehicle technology.

2.1.6 Train derailment on 10 May 2013 in Frankfurt South

Brief description:

At about 20.05 on 10 May 2013 cars three and four of the empty passenger train Lr 73543 derailed while travelling through Frankfurt South Station upon entering track 510 in the vicinity of point 252.

Consequences:

Nobody was injured. Damage to vehicles and infrastructure was caused by the derailment.

Figure 12: Train derailment in Frankfurt South

Causes:

Investigations are currently concentrating on the areas of infrastructure and vehicle technology.

2.1.7 Train derailment on 13 May 2013 in Berlin Central Station

Brief description:

At about 11.30 on 13 May 2013 LPF 178 derailed upon leaving Berlin Central Station in point 102. The traction unit and two following passenger coaches derailed with all bogies, and the third following passenger coach with the front bogie.

Consequences:

The train driver was slightly injured (shock). Nobody else was injured.

The cost of the damage was approximately EUR 770 000.

Figure 13: Train derailment in Berlin Central Station

Cause:

LPF 178 derailed as it was passing over point 51W102 while this was changing from the right position to its normal position (left position). This was caused by a premature release of the section of signal 51ZU5 with destination 51LUMA6.

2.1.8 Train derailment on 9 June 2013 between Lorch (Rh.) and Rüdesheim (Rh.)

Brief description:

At about 05.20 on 9 June 2013 DGS 90636 derailed with the car-carrier wagon at the end of the train. The train came to a stop at km 65.300 in track 2 of Rüdesheim (Rh.) Station.

Consequences:

As a result of the derailment the track at Üst Lorch and the entrance to Rüdesheim (Rh.) Station and the signalling equipment, overhead line systems and communication systems were severely damaged over a distance of approximately 11 km. In addition, the next three following vehicles of the DGS 90636 were severely damaged in places. As a result of flying gravel cars parked next to the railway line were also damaged.

Figure 14: Train derailment between Lorch (Rh.) and Rüdesheim (Rh.)

Cause:

Investigations are currently concentrating on the areas of infrastructure and vehicle technology.

2.1.9 Train derailment on 11 June 2013 in Schkeuditz

Brief description:

At about 07.22 on 11 June 2013, RB-D 26225 derailed upon entry to Schkeuditz Station with the driving trailer and the second car, each with one bogie.

Consequences:

Two people were slightly injured. The cost of the damage to the infrastructure and the vehicles was estimated at a total of approximately EUR 505 000.

Figure 15: Train derailment in Schkeuditz

Cause:

The derailment was caused by passing crossover 31W11/31W10 at excessive speed.

2.1.10 Railway crossing accident on 22 June 2013 between Bad Laasphe and Erndtebrück

Brief description:

At about 09.28 on 22 June 2013, regional train (RB) 23156 travelling from Marburg (Lahn) to Erndtebrück collided with a lorry on the technically protected railway crossing at km 47.010.

Consequences:

One person was killed as a result of the collision, with one person seriously and thirty people slightly injured.

RB 23156, a class 628 railcar, derailed with two bogies. The cost of the damage was estimated at approximately EUR 600 000.

Figure 16: Railway crossing accident between Bad Laasphe and Erndtebrück
Source: Federal Police

Cause:

The accident was caused by the driver of the lorry who drove the vehicle over the railway crossing despite the flashing light showing.

2.1.11 Train derailment on 29 June 2013 between Kayhauserfeld and Oldenburg Central Station

Brief description:

At around 0.40 on 26 September 2013 freight train DGS 83799, travelling from Abelitz to Magdeburg-Rothensee derailed between Kayhauserfeld and Oldenburg Central Station before the railway crossing at km 6.466, re-railed shortly before the railway crossing at km 5.8, derailed again shortly after the railway crossing and re-railed itself again in the vicinity of the railway crossing at km 4.0.

Consequences:

As a result of the derailments damage was caused to the track, to the rear axle of the derailed wagon and to its axle box.

Figure 17: Train derailment between Kayhauserfeld and Oldenburg Central Station

Cause:

Investigations are currently concentrating on the areas of infrastructure and vehicle technology.

2.1.12 Train derailment on 2 July 2013 in Düsseldorf-Derendorf

Brief description:

At around 17.24 on 2 July 2013, at Düsseldorf-Derendorf Station, four wagons of freight train DGS 95740 derailed upon departing from track 12 in the direction of the Düsseldorf-Rethel junction.

Consequences:

As a result of the derailment damage was caused to the track systems and the goods wagons. Since one of the tank cars loaded with propene overturned, until this vehicle's contents were transferred and it was placed in the upright position again, there was an increased danger of explosion, resulting in extensive safety measures being taken by the police and fire service in the station and in the surrounding urban area.

The cost of the damage was estimated at approximately EUR 650 000.

Figure 18: Train derailment in Düsseldorf-Derendorf

Cause:

The derailment was caused by an inadmissible gauge widening, triggered by advanced biological decay of the wooden sleepers. As a result the track was no longer able to keep to gauge.

2.1.13 Train derailment on 5 September 2013 in Bremen Central Station

Brief description:

At about 05.51 on 5 September 2013, the leading traction unit and the first wagon of passenger train DPN 81952, comprising a total of five double-decker railway carriages, derailed upon entering Bremen Central Station.

Consequences:

As a result of the derailment, track and control and safety systems were severely damaged in places over a length of approximately 100 m. According to the infrastructure manager the cost of the damage to the route was estimated at approximately EUR 150 000.

The total damage caused to the RU comprised material damage to rolling stock, making good of environmental damage and operational difficulties and was put at approximately EUR 2.5 million by the undertaking.

Figure 19: Train derailment on 5 September 2013 in Bremen Central Station

Cause:

The derailment was caused by the throwing of point W11230 as a result of movement of the train. As a result the first bogie of the traction unit continued on the planned route to track 10. Because of the open switch points the second bogie left the guiding device and was thus in between the two stock rails.

It was possible to pass point W11230 because the route set had previously been released by means of emergency release of the route and because of a programmed default state the point received the instruction to throw to the other position.

2.1.14 Train collision on 5 September 2013 in Saalfeld

Brief description:

At around 11.19 on 5 September 2013 a collision took place between IC 2208 and a shunting movement at point 2554 in Saalfeld station.

Consequences:

Damage was caused as a result of the collision between IC 2208 and the shunting movement. The shunting movement derailed with one bogie.

Figure 20: Train collision on 5 September 2013 in Saalfeld

Cause:

The shunting movement coming from track 2584 passed blocking signal 2574Y showing stop, without authorisation. In the vicinity of point 2554 it collided with the incoming IC 2208.

2.1.15 Train collision on 16 October 2013 in Essen-Werden

Brief description:

At about 0.10 on 16 October 2013, train journey S 31648 upon entering Essen-Werden Station from the opposite track, collided with a work train standing in its route.

Consequences:

The traction unit belonging to the S-Bahn derailed with one bogie. The following wagon derailed completely and ended up in a tilted position. The work train comprising the traction unit and a pushed wagon also derailed. In total the cost of the damage was estimated at approximately EUR 700 000.

Figure 21: Train collision on 16 October 2013 in Essen-Werden

Cause:

The train collision was the consequence of a sequence of operational human errors by the RU employees involved in the movement on the closed track. Other shortcomings discovered in the planning and execution of the construction work contributed to a greater or lesser extent to the occurrence of the event.

2.1.16 Train collision on 26 October 2013 in Gladbeck West

Brief description:

At about 9.37 on 26 October 2013, freight train DGS 89025 collided with the last six wagons of the train XP 63147 entering from the opposite direction. Before this the DGS 89025 overran exit signal 50P2 showing stop in track 2 of Gladbeck West Station.

Consequences:

The driver of train 89025 was seriously injured in the accident. Severe damage was caused to the vehicles of both trains, to railway premises and to the control and safety systems equipment.

The cost of the damage was estimated at approximately EUR 2.2 million.

Figure 22: Train collision on 26 October 2013 in Gladbeck West

Cause:

Due to insufficient application of the brake train DGS 89025 passed exit signal 50P2 when it was showing stop. The insufficient brake application can be attributed to a closed air shut-off cock of the main air pipe. The available braking effort was not enough to stop the train either before the signal or before the actual danger point, the end of the clearance distance at the fouling point of point 3.

2.1.17 Train collision on 11 November 2013 in Hosena

Brief description:

At about 18.30 on 11 November 2013, freight train GM 61649 collided with freight train DGS 90981 standing in track 4. DGS 90981 was standing in track 4 to allow regional express 26057 to overtake it.

Consequences:

The driver of the GM 61649 was slightly injured in the collision. The traction unit of the GM 61649 was destroyed and the following five wagons of the train derailed, toppled over and became wedged to each other.

The cost of the damage was estimated at approximately EUR 1.85 million.

Figure 23: Train collision on 11 November 2013 in Hosena

Cause:

The train collision in track 4 of Hosena Station was caused by the entry of train GM 61649 into the track section still occupied by train DGS 93981. This was the result of serious operational human error by local staff.

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 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 2013’ the safety recommendations issued in 2013 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 2006-2012’ 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.

3.1 Safety recommendations 2013

2013

Event: Railway crossing accident on 9 January 2013 between Lübbecke (Westphalia) and Espelkamp

Safety recommendations: (Situation as at 21 June 2013)

1. The signs shown by the attendants to stop road traffic should also be maintained once the appliance is in place. This requirement should be specified in Ril 456 and clear use of the term “appliance” revised in the corresponding Annexes 2 and 5.
2. During planned or long-term decommissioning of BÜSA [Railway crossing protection system - *Bahnübergangssicherungsanlage*] and when setting up securing by attendants, the risk of a safety-relevant human error by the attendant must be identified in order to determine an acceptable maximum duration of the securing by attendants and specify this for the future.
3. During planned or long-term decommissioning, coordination with the road traffic authorities (e.g. special railway crossing road safety inspections) is required.
4. During planned or long-term decommissioning, mobile barrier systems with light signals and half-barriers (e.g. TH BÜP [Technological Equipment for Railway Crossings - *Technisches Hilfsmittel Bahnübergangs-Posten*]), for better recognition by road users of the securing by attendants must be used to a greater extent. The rules on giving the signals must be adapted accordingly.

5. For protection and to improve recognition attendants should wear warning clothing that is easier to identify (Class 3, jacket and trousers at least).
6. The covering of inoperative light signals should take place in a uniform manner and exclusively with means according to the Technical Note. Recognisability of the appliance should be improved.
7. During planned or long-term decommissioning during hours of darkness mobile lighting systems should be used to a greater extent if this improves visibility of the crossing area, even if the rules for railway crossing lighting have not yet been specified.

Measures: (Situation as at August 2014)

Re 1: To this end the Infrastructure Manager, to the extent permitted by the road traffic regulations, has taken measures and laid down internal rules.

Re 2: No information is available on this yet.

Re 3: The road traffic authorities are regularly invited to road safety inspections.

Re 4: The Infrastructure Manager now has a second supplier of mobile barrier systems which should improve availability.

Re 5: The Infrastructure Manager has initiated measures to that effect.

Re 6: The current regulations agreed with the safety authority for light signal coverage can be found in TM2006-158-I.NVT(L). An additional appliance has in the meantime been developed by the Infrastructure Manager, in the form of a mobile retro-reflecting folding pyramid with red lamp attachment, and presented to the BMVI.

Re 7: Implementation must in each individual case be decided by the person responsible for the plant, if necessary in consultation with the road construction authority.

Event: Train collision on 21 September 2011 in Bleicherode

Safety recommendation: (Situation as at 17 April 2013)

Check if in the main lines passing through stations automatic track clear signalling systems should be provided.

Measures: (Situation as at August 2014)

It is envisaged that Bleicherode Station will now be equipped with ESTW [electronic railway control system] technology.

The procedure has been closed.

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

Safety recommendations: (Situation as at 12 June 2013)

1. A risk assessment should estimate the probabilities of occurrence and the volumes of rainfall expected in the future (event-triggering heavy rainfall). Then channels/drainage systems and the associated catchment areas should be subject to a review with the aim of identifying and implementing further necessary safety measures.
2. Create “another communication link” according to Ril 408.0581 for issuing an emergency

stop instruction by train staff on sections without lineside telephone.

Measures: (Situation as at August 2014)

Re 1: To the knowledge of the safety authority all rock fall and mudslide incidents attributable to heavy rainfall events in recent years started on property not owned by DB Netz AG. Nevertheless, (overhanging) properties, bordering the operating installations are also inspected by DB Netz AG in accordance with Ril 836. If defects are discovered the owner is notified and asked to clear these. In case of imminent danger DB Netz AG clears the defect itself. Repeated checks on DB Netz AG by the safety authority in the context of rail supervision have shown that these inspections provided for by Ril 836 are performed regularly. In addition a soil institute has performed and will continue to perform expert appraisals of the hillsides on both sides of the Rhine. On the basis of these expert assessments the hillsides are classified according to their hazard potential. This classification forms a basis for further geological investigations and measures and the inspections by DB Netz AG.

Re 2: In its Network Usage Conditions 2014, the Infrastructure Manager has introduced a corresponding rule relating to technical network access (Ril 810.0300A06, Section 4). Monitoring at the RU of how best to implement this by internal rules – in particular alternative means of communication to avert operational hazards – has not yet been completed.

Event: Vehicle fire on 26 July 2011 in Berlin Ostbahnhof

Safety recommendations: (Situation as at 25 November 2013)
To check if for traction units of identical construction, BR 112, 114 and 143, measures should be envisaged to increase the fire safety of the live rails and traction motor contact points (especially traction motor contact points 1 and 4) to avoid inadmissibly high contact resistances and unequal power distribution.

Event: Train derailment on 11 February 2011 between Gröbers and Großkugel

Safety recommendations: (Situation as at 24 June 2013)
Guideline 821.2001 does not specify any values for the standard deviation s of the complete signal of the longitudinal level, the reciprocal elevation and arrow height calculated over 250 m with an increment of 25 m, upon exceeding of which maintenance measures are mandatory. A revision should take place so that for the standard deviation likewise SR 100, SRlim or limiting values are specified.

Measures: (Situation as at August 2014)
As a result of similar situations (several – “periodic” – longitudinal level errors in each case still within the permissible range) the EUB has appointed an external expert to perform simulations. The findings of this expert report will, as soon as the safety authority has them, form part of the further considerations of necessary changes in the regulations, if appropriate.

3.2 Safety recommendations 2006 – 2012 (sorted by event date)

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 in an unauthorised manner at danger can automatically be brought to a standstill. Additionally, an unauthorised start on main lines when the signal is at danger can automatically be 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 2014)

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, which have to a large extent been implemented.

2010

Event: Train derailment on 1 September 2010 in Bacharach

Safety recommendation: (Situation as at 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 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 the 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 31 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 his train to a stop 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 consequences of derailment and the potential danger to other trains as well the amended regulation Ril 408.0581 3 (5) of 13 December 2009 should be suitably amended.

Measures: (Situation as at August 2013)

Re 1: The recommendations were only sent to the undertaking involved in each case 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.

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 tracks and switches. In deciding the categories, 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 state 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 2014)

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.

As a result of changes/additions to the regulations potential damage can now be detected early and eliminated.

The procedure has been closed.

Event: Derailment on the Bünde (Westphalia) - 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 caused by 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 currently 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: (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 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 region of 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: Train 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 overall 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 have been remedied.

2008

Event: Train collision at Recklinghausen on 25 November 2008

Safety recommendation: (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 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 the RU have been tightened. Furthermore, the topic of “sanding equipment” is being pursued at authority and industry level via the “vehicles steering committee” for future orders on vehicle equipment.
The procedure has been closed.

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 14 July 2014)
All axles are regularly checked by Non-Destructive Testing (NDT) for absence of cracks.
Powered axles made of 34CrNiMo6 are being replaced by axles made of EA4T.
The approval procedure is not yet complete.

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 relation to 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 result: 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 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, is 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 either.

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

2007

Event: Train 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 expert 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 system stability. Hot box and binding brake detectors already in service are also 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 in a preventive manner, the combination of 'dirty rail head and slight dampness' and limit their effects by appropriate operational measures.

Measures: (Situation as at 14 July 2014)
The braking and sanding equipment on the vehicles has been modified.
In terms of vehicle technology the procedure has been closed.