REPUBLIC OF BULGARIA

MINISTRY OF TRANSPORT, INFORMATION TECHNOLOGY AND COMMUNICATIONS

RAILWAY ACCIDENT INVESTIGATION UNIT

(RAIU)

ANNUAL REPORT

2016

The present Report is published in accordance with:

- Directive 2004/49/EC;
- The Railway Transport Act, 2000, prom., in force as of 26.06.2015;
- Ordinance Nr. 59, 2006, prom., in force as of 31.07.2015.

The normative acts are accessible at:

https://www.mtitc.government.bg/bg/transport/vidove-transport/zhelezoputen-transport/szrpizht/deynost-i-osnovni-zadachi/specializirano-zveno-za-razsledvane-na-proizshestviya-i-incidenti-v-zhelezoputniya-transport

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Introduction

The present Annual Report provides presentation of the investigated railway accidents in the year of 2016, as well as of the activity of the National Investigation Body in the Republic of Bulgaria, in accordance with Art. 23, par. 3 of Directive 2004/49/EC on the safety of railway transport in the Community.

The Report represents the activity of the National Investigation Body, which in the Republic of Bulgaria is the Railway Accident Investigation Unit (RAIU) at the Ministry of Transport, Information Technology and Communications (MTITC). Its statute and functions are stipulated by the Railway Transport Act (RTA), Ordinance Nr. 59 dt. 05.12.2006 on the management of safety in the railway transport, Ordinance Nr. H-32 dt. 19.09.2007 on the concurrence of actions and information exchange upon the investigation of railway accidents and incidents with the pre-court procedural bodies and the Rules of the Railway Accident Investigation Unit.

The Report includes data on the railway accident investigations carried out in 2016, including the causes for their occurrence, and the rendered recommendations for improving safety in railway transport, as well as information on the measures undertaken on the part of the addressed parties for their implementation. The Report provides summarized data on the railway occurrences realized in 2016 and the caused damages, reported by the Manager of the railway infrastructure, respectively the National Railway Infrastructure Company (NRIC) and the railway enterprises.

1. INVESTIGATING AUTHORITY

1.1. Legal basis

In connection with the requirements of Directive 2004/49/EC of the European Parliament and the Council dt. 29.04.2004 on the safety of railway transport in the Community, incorporated in the Railway Transport Act (RTA), and Ordinance Nr. 59/05.12.2006 on the management of safety in the railway transport. In the year of 2006 in the Republic of Bulgaria a National Body for investigation of railway accidents and incidents was established – the Railway Accident Investigation Unit (RAIU) at the Ministry of Transport, Information Technology and Communications (MTITC).

RAIU operates within the structure of the Aircraft, Maritime and Railway Accident Investigation Unit Directorate (AMRAIU Directorate) at the MTITC. The Directorate is a multi-modal body consisting of three independent specialized units for investigation of aviation occurrences, accidents in the marine spaces, and accidents and incidents in the railway transport.

RAIU is a National Investigation Body for the investigation of railway accidents in the Republic of Bulgaria, which in its organization and upon its decision making is independent from the Manager of the railway infrastructure, the railway enterprises/ carriers and the National Safety Authority, which in the Republic of Bulgaria is the “Railway Administration” Executive Agency (RAEA).

1.2. Functions and purposes

The major purpose of RAIU upon the performance of an investigation is establishing the circumstances and causes having lead to the occurrence of railway accidents and incidents and rendering of efficient recommendations for improving safety in the railway transport.

The function and tasks of RAIU are comprehensively stipulated by the national normative acts, where Directive 2004/49/EC of the European Parliament and the Council on the safety of railway transport in the Community is incorporated.

Major functions and responsibilities of RAIU:

- Organization, concurrence and performance of technical investigations of heavy railway accidents and incidents having occurred on the territory and in the boundary transition areas of the Republic of Bulgaria;
- Establishment of the technical causes, the circumstances and facts related with the occurrence of heavy accidents and incidents, including identification of proofs, performance of analyses, including also of the human factor, decision taking, elaboration of technical expertise and documentation;
- Concurrence of the activities on the performance of technical investigations with the competent investigating authorities of the Prosecutor's Office of the Republic of Bulgaria, the National Investigative Service and the Ministry of Interior;
- Elaboration and communication to all interested parties of a draft Final Report upon the investigation of a heavy accident;
- Elaboration and communication to all interested parties and publishing of a Final Report from Investigations, providing rendered safety recommendations, aimed at preventing further accidents;
- Participation in the Network of the national investigation bodies of the EU member states, which is coordinated by the European Railway Agency (ERA);
- Participation in working groups for harmonization of the national normative regulations with the European legislation related with the investigation of railway accidents and incidents;
- Collecting and analyzing of data on a daily basis on the occurrence of accidents and incidents in the system of railway transport;
- Keeping of archive of accidents and incidents under investigation and maintaining of information data base;
- Elaboration and dissemination of information bulletin on investigated railway accidents and incidents.

1.3. Organization of activity

The major activity of RAIU in its capacity of National Investigation Body is the performance of technical investigation of railway occurrences, qualified in accordance with Art. 19 of Directive 2004/49/EC. In 2016 RAIU has performed investigation of railway occurrences, its members being three inspectors:

- state investigation inspector – Head of RAIU, holder of a Doctor's qualification, Engineer's qualification, with specialty: "Operation and management of the railway transport";
- Chief investigation inspector, holding the qualification of Master Engineer, with specialty: "Rolling stock";
- Investigation inspector, holding the qualification of Master Engineer, with specialty: "Computation equipment and devices – Designing of computation equipment".

The budget of RAIU is planned and provided by the MTITC.

Any decisions on undertaking of an investigation are taken by the Head of RAIU in conformity with the requirements of:

- Directive 2004/49/EC;
- The Railway Transport Act;
- Ordinance Nr. 59/05.12.2006 on the management of safety in the railway transport.

RAIU informs in writing the European Railway Agency (ERA) on each undertaken investigation of a railway occurrence through the ERAIL system. The investigations are completed by the elaboration of a Final Report, which is made available to the public at the Internet site of the MTITC.

RAIU informs in writing ERA for each completed investigation, providing also a copy in electronic format of the original Final Report in the English language. After validation on the part of ERA, the Final Report becomes accessible for the public at the website of the Agency.

International activity in 2016

1. In the period 01 – 02.03.2016 – participation of the Head of RAIU in the 30-th plenary meeting of the independent investigation bodies of the EU member states in Lille – France.

2. In the period 07 – 08.06.2016 – participation of the Head of RAIU in a seminar on the subject of: Introduction of Directive (EC) 2016/798 dt. 11.05.2016 of the European Parliament and the Council in Lille – France.

3. In the period 09 – 10.06.2016 – participation of the Head of RAIU in the 31-st plenary meeting of the independent investigation bodies of the EU member states in Lille – France.

4. In the period 14 – 18.11.2016 – participation of the Head and an investigation inspector of RAIU in an international conference and the 32-nd plenary meeting of the Network of the railway accident investigation bodies from the EU member states in London, Great Britain.

Participation of RAIU in other undertakings

1. On a monthly basis, after obtaining of statistical information on the general safety parameters from the Manager of the railway infrastructure and the railway enterprises/ carriers in connection with the requirements of Ordinance Nr. 59/ 05.12.2006, RAIU performs analysis and summarizes data on the safety management in the railway infrastructure and the enterprises. In this relation, in July an analysis of safety management in 2016 was made, through the annual reports provided by the Manager of the railway infrastructure and the railway enterprises/ carriers;

2. RAUI follows on a daily basis the reports on the operational conditions, in connection with the safety requirements;

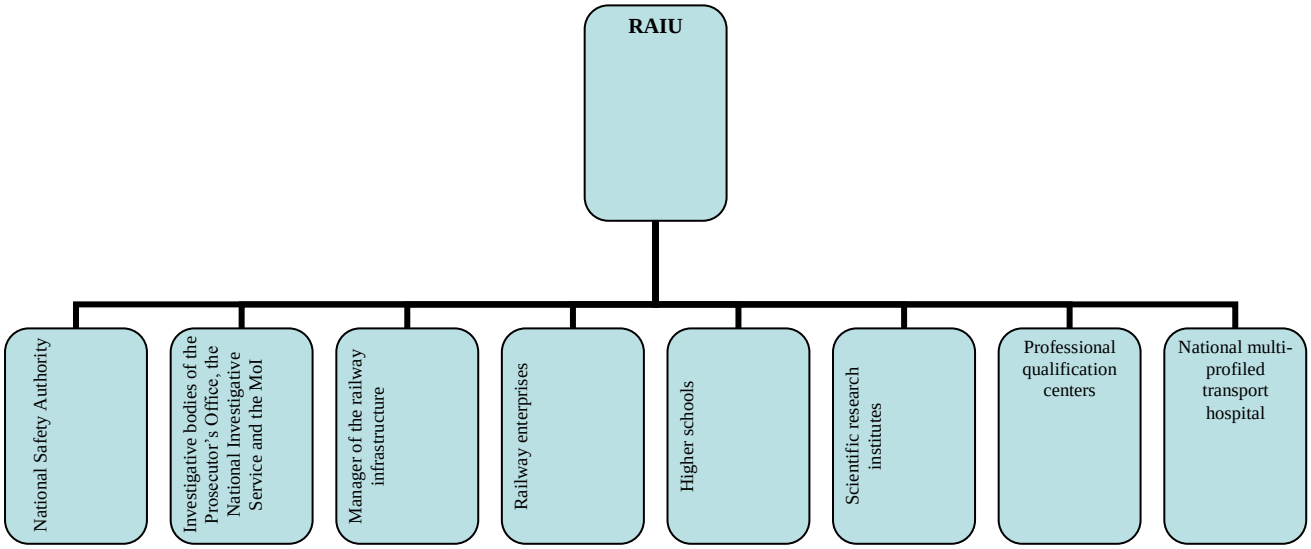
3. Elaboration and publishing of Annual Report on the activity during the preceding year, which is delivered on a timely basis to ERA.

1.4. Organizational chart

For the purpose of establishing the requested conditions and organization for the timely and efficient operative activity, in the process of investigation RAIU concurs its activities with state investigating bodies of the pre-court procedure, the Prosecutor's Office, the National Investigative Service and the Ministry of Interior, which perform parallel pre-court investigations. Upon necessity, regulated information exchange is carried out concerning data acquired by the individual investigative bodies after the order of Ordinance Nr. H–32/19.09.2007 on the concurrence of actions and information exchange upon the investigation of railway accidents and incidents.

In the process of investigation RAIU establishes working contacts and concurs its activities with the Manager of the railway infrastructure, the railway enterprises/ carriers, the National Safety Authority and users of railway services having relevance with the investigated accident or incident, for the provision of information connected with the investigation, as well as with other independent institutions and specialized administrations for the elaboration of specialized expertise.

Connections of RAIU with other investigative bodies and institutions



2. THE INVESTIGATION PROCESS

2.1. Occurrences subject to investigation

All railway occurrences, cited in Directive 2004/49/EC, the Railway Transport Act and Ordinance Nr. 59, may be investigated by RAIU, as follows:

- Heavy railway accidents;
- Accidents and incidents which under different circumstances might have lead to consequences characteristic for the heavy railway accidents;
- Upon its discretion RAIU may investigate also technical failures in the structural subsystems and elements of the operability, taking in consideration their significance.

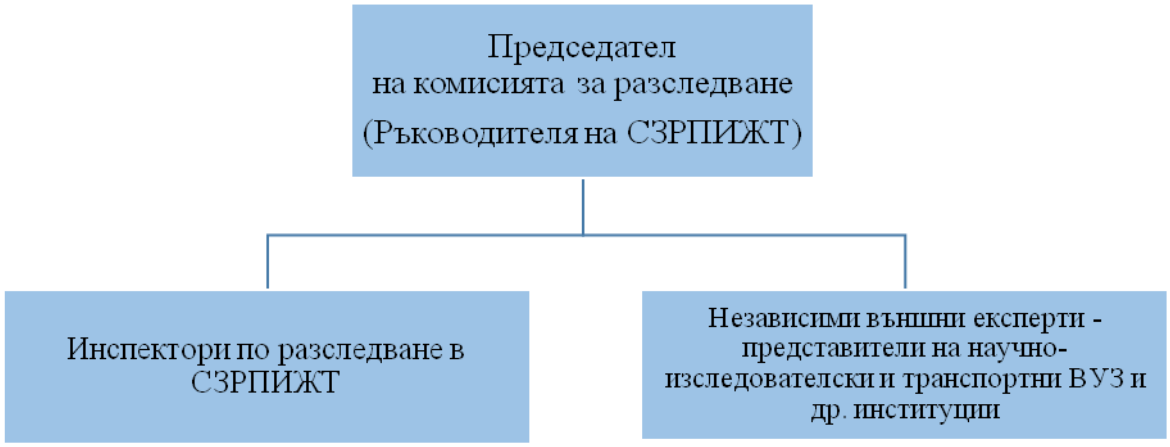
Upon the occurrence of an accident or an incident, the authorized officials of the Manager of the railway infrastructure and the railway enterprises shall inform immediately the Head of RAIU in accordance with the established safety procedures, in accordance with the Railway Transport Act and Ordinance Nr. 59.

2.2. Institutions related with the investigation

After classification of the railway occurrence and taking of decision for undertaking of an investigation by the Head of RAIU, an Investigation Commission is established. The Commission is headed by Chairman (the Head of the Unit) and includes investigation inspectors from the Unit and independent external experts from the scientific community and the higher transport universities, possessing professional specializations of relevance to the investigated occurrence. In the process of and for the purposes of the investigation, the Chairman of the Commission entrusts the performance of technical expertise, requests analyses and opinions from:

- Scientific research institutes of transport;
- The Technical University – Sofia;
- Todor Kableshkov University of Transport;
- Professional centers for training of railway transport staff members;
- The Bulgarian Academy of Sciences (BAS);
- The National multi-profiled transport hospital;
- Other institutions for each particular case.

Structure of the Investigation Commission



2.3.Process of investigation and approach of the investigative body

Upon each notification of the Head of RAIU for the occurrence of a railway accident, the Head of RAIU classifies it in conformity with the normative base. After due judgment and taking of decision by the Head of RAIU for commencement of an investigation, immediate actions are undertaken for the organization and notification of all parties interested in the occurrence. The investigation inspectors undertake fast actions for going to the place of the accident. Within up to one week after commencement of the investigation, RAIU informs in writing ERA on the started investigation through the ERAIL system.

The Chairman manages and coordinates the technical investigation activity with the pre-court investigating bodies – the Prosecutor's Office of Republic of Bulgaria, the National Investigative Service, the Ministry of Interior (MoI), Civil Defense, First Medical Aid, Fire Safety and Protection of Population, and other institutions, in view of providing the necessary conditions for the performance of an independent technical investigation. The Manager of the railway infrastructure, the railway enterprise and the other legal entities participating in the occurrence provide to the Investigation Commission any and all records and communications/ talks of the staff members having partaken in the management of trains' trafficking, as well as any other important information and documents, related with the signaling systems, the railway road and the rolling stock. Upon RAIU's request, the National Safety Authority provides any significant information clarifying the accident or incident under investigation. The Commission holds meetings and interviews the staff members having partaken in the occurrence, as well as the witnesses of the occurrence, and requests written evidence from all legal entities and physical persons, directly or indirectly related with the accident. The Commission is fully supported by the competent governmental investigative bodies of the Prosecutor's Office of the Republic of Bulgaria and the Ministry of Interior, which perform parallel investigations of their own, in accordance with the requirements of the Penalty Procedural Code and Ordinance Nr. H–32/19.09.2007 on the concurrence of actions and information exchange upon the investigation of railway accidents and incidents.

The technical investigation carried out by RAIU is maximally open, aiming exchange of opinions at all levels and with all parties having partaken in the occurrence. The Commission analyses the collected documents, materials, elaborated opinions and expertise before, during and after the occurrence, till reaching clarification of the circumstances and the causes having lead to it.

The Chairman of the Commission, depending on the seriousness of the investigated accident, elaborates a draft Final Report which is communicated by him to all participants in the accident, the National Safety Authority, any affected representatives of structures and organizations, as well as the relatives of the persons injured in the accident. Each accident or incident within one year as from the date of its occurrence shall be completed with the elaboration of a Final Report, elsewhere an

Intermediate Report is elaborated describing the measures undertaken as of that time. The Final Report shall expose the chronological order of events, the actions of the staff members; it shall describe the established data on diseased and injured persons and caused property damages, also including an analysis of the occurrence and the circumstances and exposing in a justified way the causes for the occurrence. Upon necessity, recommendations for the improvement of safety are rendered, in view of preventing other accidents of a similar nature in the future; the recommendations are addressed to the National Safety Authority and the direct executors – the Manager of the railway infrastructure and the railway enterprises/ carriers, having partaken in the occurrence, and, where appropriate – to all other interested participants in the occurrence. The addressees of the recommendations are obliged to inform in writing the Chairman of the Investigation Commission on the measures taken in fulfillment of the recommendations within the prescribed time terms.

RAIU informs in writing ERA on the completion of the investigation, by loading the requested data and information, including the rendered recommendations, via the interface and in the form of the ERAIL information system of the European Commission, and encloses a copy of the original Final Report in the English language. The Final Report is made available to the public at the website of RAIU at the Internet portal of MTITC.

2.4. Study of safety from 2016 Reports

RAIU received the Annual Reports from the Manager of the railway infrastructure and the railway enterprises/ carriers for realized 737 railway occurrences in total in the year of 2016, of which:

- 320 accidents, including 178 train crashes, 2 crashes of a train with a railway vehicle, 53 derailing accidents of railway rolling stock, 18 accidents on level crossings, 52 accident with people, and 17 fires in railway rolling stock;

- 47 accidents, including 25 failures of railway roads, 20 missed prohibition signals, and 2 breakings of wheels of railway rolling stock;

- 337 situations being close to incidents.

The total number of the accidents registered as significant by the National Railway Infrastructure Company (NRIC) is 38, including 3 crashes of trains with barriers within the limits of the construction overall dimensions, 6 derailing accidents, 5 accidents on railway level crossings, and 24 accidents involving people, caused by rolling stock upon trafficking, with the exception of committed and attempted suicides.

The summarized data on the railway accidents prove that in the year of 2016 22 is the total number of the diseased, and 32 are the heavily injured persons from the committed accidents with people, caused by railway rolling stock in traffic.

The value of caused property damages to rolling stock and the railway infrastructure as a result from the occurrence of significant railway accidents amounts to BGN 1 423 210 (EUR 889 506).

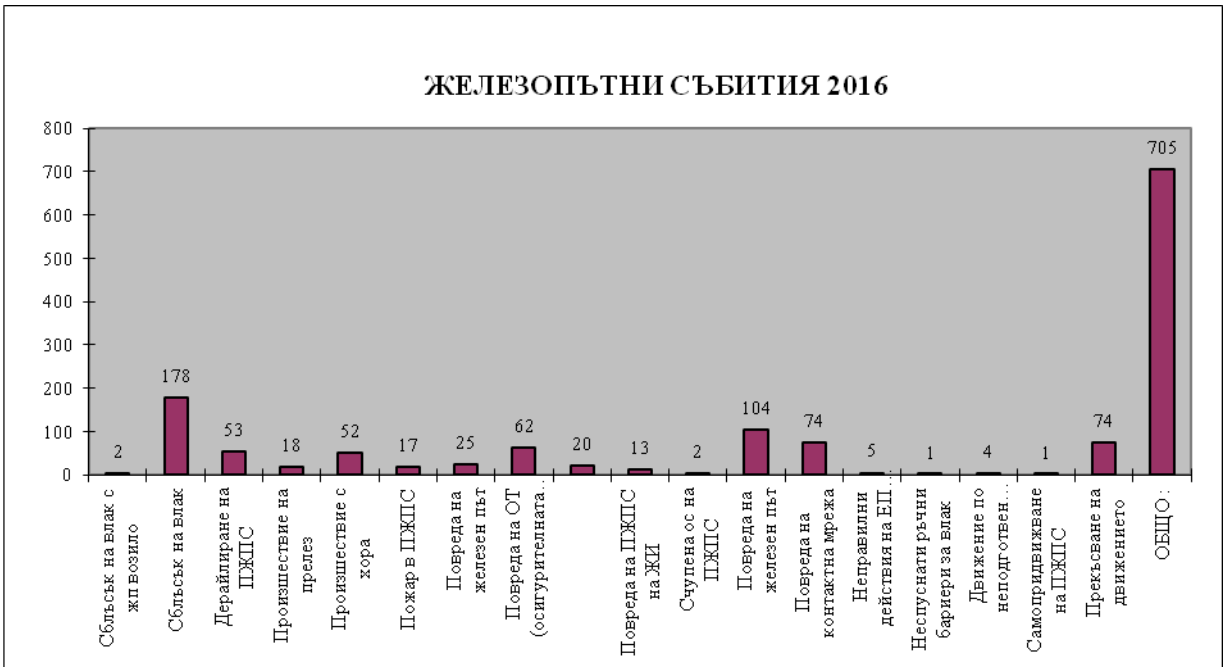
Summarized data on the railway occurrences per type in 2016 is exhibited in Table 1:

Table 1: Railway occurrences in 2016

№	TYPE OF OCCURRENCE	NUMBER
	ACCIDENTS	
1	Crash of a train with a railway vehicle	2
2	Train crash	178
3	Derailing of rolling stock	53

№	TYPE OF OCCURRENCE	NUMBER
4	Accident on a level crossing	18
5	Accident with people	52
6	Fire in rolling stock	17
	Total:	**320**
	INCIDENTS	
1	Failure of railway road	25
2	Failure of safety equipment	0
3	Violation of prohibiting signal	20
4	Breaking of a wheel of rolling stock	2
	Total:	**47**
	SITUATIONS CLOSE TO INCIDENTS	
1	Failure of rolling stock on the railway infrastructure, having caused a delay	13
2	Failure of railway road	104
3	Failure of safety equipment	62
4	Failure of catenary	74
5	Incorrect or non-concurred actions of the railway infrastructure staff	5
6	Missed train	0
7	Accepted train on an occupied platform	1
8	Sent train without consent	0
9	Sent train on an occupied section between stations	0
10	Train not provided with breaking mass weight	0
11	Not dropped manual barriers for a train	1
12	Trafficking on an unprepared route	4
13	Failure of rolling stock on the railway infrastructure, causing derailing	0
14	Self-movement of rolling stock	0
15	Rolling stock left outside distance indicators	0
16	Suspending of traffic	73
	Total :	**337**

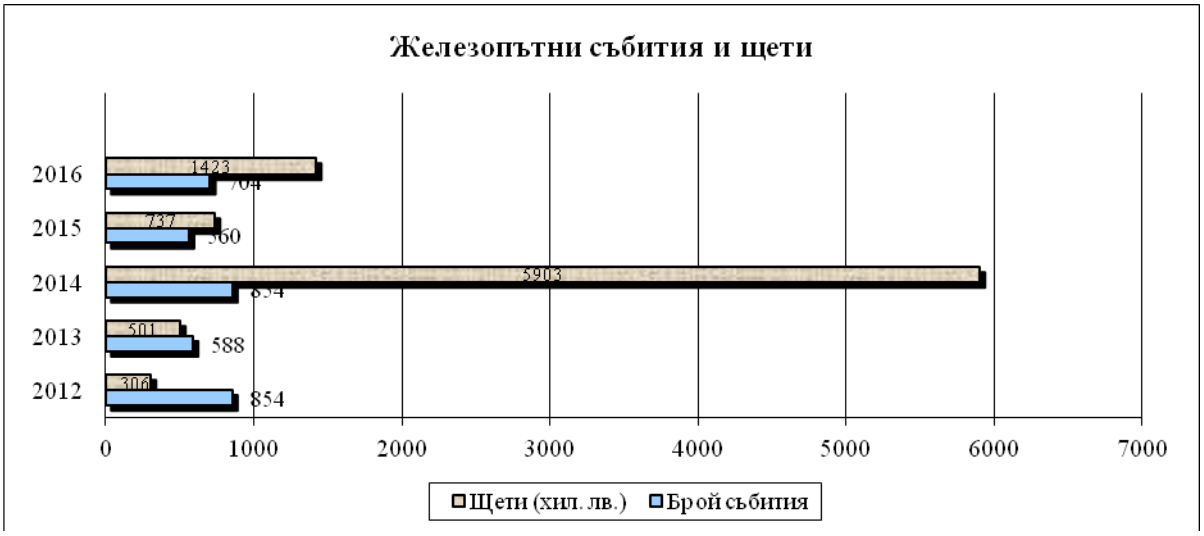
Schedule of railway occurrences on the railway network in 2016



Railway occurrences with caused damages

In 2012 compared with 2011 the deviation damages/ BGN is BGN +192 266 (EUR +98 304)
In 2013 compared with 2012 the deviation damages/ BGN is BGN +206 902 (EUR +105 787)
In 2014 compared with 2013 the deviation damages/ BGN is BGN +5 402 000 (EUR +2 762 000)
In 2015 compared with 2014 the deviation damages/ BGN is BGN -4 842 076 (EUR -2 472 591)
In 2016 compared with 2015 the deviation damages/ BGN is BGN +863 286 (EUR +440 452)

Schedule of railway occurrences and caused damages on the railway network for the period 2012 – 2016



3. INVESTIGATIONS

3.1. Review of completed investigations, including key trends

In the year of 2016 RAIU carried out and completed the investigation of five railway accidents and started investigation of three more accidents, two of which connected with derailing and one heavy railway accident.

Table 2: Investigated accidents and incidents in 2016 .

Type of investigated accidents and incidents	Number of accidents	Number of victims		Damages	
		Death cases	Serious injuries	BGN	EURO
Fire in rolling stock	4	-	-	4 590 600.71	2 342 143.22
Derailing of rolling stock	1	-	-	107 753.21	54 976.13
TOTAL:	**5**	-	-	**4 698 353.92**	**2 397 119.34**

3.2. Investigations, commenced and completed in 2016

Table 3: Investigations, completed in 2016

Date of occurrence	Visit card of the investigation	Legal grounds	Completion date:
23.01.2016	Technical investigation of railway accident – derailing of nine wagons from the composition of freight train Nr. 50601 upon entrance at Dupnica station on point Nr. 10.	Directive 2004/49/EC, Art. 19, par. 2/a, Art. 115и, par. 2 of RTA, Art. 78, par. 1 of Ordinance Nr. 59 and Order of MTITC.	28.04.2016
13.04.2016	Technical investigation of railway accident – firing during trafficking of electric locomotive Nr. 44081.8 having serviced fast train Nr. 8626 in the section between Aytos and Chernograd stations, on road Nr. 2.	Directive 2004/49/EC, Art. 19, par. 2/б, Art. 115и, par. 2 of RTA, Art. 78, par. 1 of Ordinance Nr. 59 and Order of MTITC.	12.07.2016
16.06.2016	Technical investigation of railway accident – firing during trafficking of electric locomotive Nr. 44085.9 having serviced fast train Nr. 3622 at Sahrane station.	Directive 2004/49/EC, Art. 19, par. 2/б, Art. 115и, par. 2 of RTA, Art. 76 of Ordinance Nr. 59 and Order of MTITC.	02.09.2016
14.09.2016	Technical investigation of railway accident – bursting of fire during trafficking in electric locomotive Nr. 44096.6 having serviced passenger train Nr. 80290 in the section between Chernograd and Karnobat stations.	Directive 2004/49/EC, Art. 19, par. 2/a, Art. 115к, par. 2 of RTA, Art. 76 of Ordinance Nr. 59 and Order of MTITC.	23.11.2016
08.07.2016	Technical investigation of railway accident – bursting of fire during trafficking in electric locomotive Nr. 44141.0 having serviced fast train Nr. 4681 in the section between Mihaylovo and Svoboda stations.	Directive 2004/49/EC, Art. 19, par. 2/б, Art. 115и, par. 2 of RTA, Art. 76 of Ordinance Nr. 59 and Order of MTITC.	07.11.2016

3.2.1. Derailing of nine wagons from the composition of freight train Nr. 50601 upon entrance at Dupnica station on point Nr. 10.

Brief description

On 22.01.2016 freight train Nr. 50601 departed from Ilianci station for Dupnica station, following the route of Ilianci – Voluyak – Razmenna – Batanovci – Dupnica. The train was composed of 13 full wagons, 52 axes, 1011 tons and was serviced by electric locomotive Nr. 43552.9. The train departed from Ilianci station at 20:45 h. and arrived at Delyan station at 23:31 h. without any problems during trafficking. At Delyan station (profile station) the train stayed 3 min. more than the regulated time of stay because of the performance of mandatory shortened test "D" of the automatic breaking system of the train. After its departure from Delyan station and going out from tunnel Nr. 1, the locomotive engine driver undertook test hold-up with the crane machine driver, in view of entering of the train in a section of a long descending slope. After the performed test hold-up and the next multiple air release from the main air duct in the atmosphere, no breaking effect was achieved and the speed of traffic started increasing.

The locomotive engine driver informed the traffic controllers on duty at Dyakovo and Dupnica stations by his mobile phone, requesting the provision of a free platform for passing of the non-stopping train.

The train passed transit through Dyakovo station at 23:54 h. on the second main platform, with sparkling axes of the locomotive and of the first few wagons of the train. At Dupnica station the traffic controller on duty had prepared a route on the fourth deviation platform in the direction of Golyamo Selo station. At 00:04 h. the train entered Dupnica station with a speed of about 80 km/h, passed through points Nr. 2 and Nr. 4 and on point Nr. 10 the third wagon in line derailed, inclining on the right and dragging after it the next eight wagons, which derailed afterwards as well.

Consequencesя

As a result from the derailing of the train there are no staff members injured; there are big property damages incurred to the rolling stock, the transported freight and the railway infrastructure.

The damages caused to the railway infrastructure amount to BGN 107 753, including the value of the recovery activities.

Causes

The direct cause for the derailing of nine wagons from the composition of freight train Nr. 50601 upon its entrance in Dupnica station is the insufficient breaking effect of the automatic train break, which has lead to exceeding of the speed permissible for the train upon its entrance on a deviation platform at Dupnica station. The causes for the insufficient breaking effect are the non-fulfillment of the provisions of the acting normative regulations in the railway transport regarding the executed shortened test (test "D") of the automatic train break at Delyan station, and the non-conformity with the technology of management of a freight train at a long descending section at law ambient temperatures.

Status of the investigation

The investigation was completed with a Final Report and recommendations on 28.04.2016.

3.2.2. Firing during trafficking of electric locomotive Nr. 44081.8 having serviced fast train Nr. 8626 in the section between Aytos and Chernograd stations, on road Nr. 2.

Brief description

On 13.04.2016 fast train Nr. 8626, composed of 6 passenger wagons and electric locomotive Nr. 44151.9 in non-operational condition, serviced by electric locomotive Nr. 44081.8, traveled in the direction of Burgas – Plovdiv – Sofia. The train departed on schedule from Aytos station at 23:02 h. During trafficking at the section between Aytos and Chernograd stations on road Nr. 2, the locomotive brigade felt the smell of burned insulation material in the locomotive's cabin. Upon the performance of the examination it was established that the under-car fans had been spraying fire. Undertaken was stopping of the train at a suitable location, in view of providing access to the locomotive. After stopping of the train, the locomotive brigade had activated the fire extinguishing installation and had undertaken fire suppression with the available portable fire extinguishers. The Head of train and the guards organized the evacuation of passengers from the wagons to a safe place and signaled on phone 112.

The fire automobile car arrived at about 23:25 h. and undertook extinguishing of the locomotive. After about 15 – 20 minutes a second car arrived and the fire was suppressed finally at about 02:10 h. on 14.04.2016.

Consequences

There are no diseased or injured persons. The damages caused on the rolling stock and the railway infrastructure amount respectively to BGN 1 274 030.85 and BGN 71 830.45.

The trafficking of trains in the section between Aytos and Chernograd stations was suspended on current road Nr. 2 from 23:02 h. on 13.04.2016 till 19:03 h. on 16.04.2016 because of recovery of the railway infrastructure.

Causes

The major cause for the occurrence of the accident is the unsatisfactory condition of the electric equipment of electric locomotive Nr. 44081.8. The most probable cause for bursting of the fire is mechanical destruction of one of the condensers of the R-C units for suppression of internal over-voltages in the traction el. currency rectifier of the first traction unit as a result of high temperature and exhausted resource. The spread liquid from a failed condenser has ignited upon its touch with the hot elements of the el. current rectifier's cabinet (resistors, condensers, conductors) and has initiated the burning process.

Status of the investigation

The investigation was completed with a Final Report and recommendations on 12.07.2016.

3.2.3. Firing during trafficking of electric locomotive Nr. 44085.9 having serviced fast train Nr. 3622 at Sahrane station on 16.06.2016.

Brief description

On 16.06.2016 fast train Nr. 3622, composed of 4 passenger wagons, serviced by electric locomotive Nr. 44085.9, travelled in the direction of Burgas – Karlovo – Sofia. The train departed according to the Train Trafficking Schedule from Burgas station at 08:55 h., of no technical failures. At Kazanlak station the locomotive brigade performed examination of the running parts and the machine department of the locomotive for any failures having occurred during trafficking. At 12:07 h. the train started from Kazanlak station and passed transit through Dupnica station with a speed of up to 70 km/h.

The traffic controller on duty, following the pass of the train through the station, noticed some smoke emitted from the running parts of the locomotive, for which he informed the train's dispatcher and the traffic controller on duty at Sahrane station.

In the section between Dunavci and Sahrane stations the locomotive brigade felt the smell of smoke in the command cabin and the locomotive engine driver stopped the train for examination in front of the warning signal at Sahrane station. After a stay of 1 min. the train started again and at 12:24 h. stopped on the second platform at Sahrane station. The locomotive brigade separated the locomotive from the wagons and started suppressing the fire with the available fire extinguishers; the Head of train informed about the occurrence on phone 112.

The fire fighting automobiles arrived at the place of the accident at about 13:00 h., and the fire was suppressed at about 14:20 h.

Consequences

There are no accidents amongst the staff members and the passengers. The damages caused to the railway enterprise amount to BGN 2 726 130.42, and the damages caused to the railway infrastructure are minimal.

Causes

The cause for firing of locomotive Nr. 44085.9 is self-ignition of a wooden trunk placed irregularly under the bearing grid of the smoothing reactor of the auxiliary equipment, which is found over the radiator for cooling of oil in the traction transformer. The grid is welded many times at one and the same point due to fatigue of material resulting from vibrations in the grid upon travelling. After the last tearing of the welded seam, it was not recovered, instead a wooden trunk from pine tree material was fixed at the repair workshop, to support the grid during operation.

Status of the investigation

The investigation was completed with a Final Report and recommendations on 02.09.2016.

3.2.4. Bursting of fire during trafficking in electric locomotive Nr. 44096.6 having serviced passenger train Nr. 80290 in the section between Chernograd and Karnobat stations.

Brief description

On 14.09.2016 passenger train Nr. 80290, composed of 2 passenger wagons, serviced by electric locomotive Nr. 44096.6, travelled in the direction of Burgas – Karnobat. The train departed from Burgas station at 13:58 h. with 11 min. delay and arrived at Chernograd station at 14:57 h., staying there for 1 min. and thereafter departing for Karnobat station.

During trafficking in the section between Karnobat and Chernograd stations the locomotive brigade felt the smell of smoke in the command cabin. The locomotive engine driver looked in the machine compartment, found that the compartment is full of smoke, and undertook fast stopping of the train. The train was stopped at km 240+530 at 15:01 h. and after examination of the locomotive the locomotive engine driver established that fire had burst in the area of the under-car fans.

The locomotive brigade separated the locomotive from the wagons and started extinguishing of fire with the available fire extinguishers. The Head of train signaled on phone 112.

At 15:28 h. a fire brigade automobile arrived at the place of the accident from the Fire Fighting Station at Karnobat, and at about 18:56 h. the fire was suppressed.

Consequences

There are no accidents amongst the staff members and the passengers. There are property damages caused to the locomotive and the railway infrastructure amounting respectively to BGN 72 352.66 and BGN 238.49.

Causes

The cause for firing of locomotive Nr. 44096.6 is breaking of the rubber connection realizing the circulation of oil from the automatic transformer switch to the transformer, located above the oil cooling radiator in the transformer.

Status of the investigation

The investigation was completed with a Final Report and recommendations on 12.07.2016.

3.2.5. Bursting of fire during trafficking in electric locomotive Nr. 44141.0 having serviced fast train Nr. 4681 in the section between Mihaylovo and Svoboda stations.

Brief description

On 08.07.2016 fast train Nr. 4681, composed of 3 passenger wagons, serviced by electric locomotive Nr. 44141.0, travelled on the direction of Varna – Gorna Oryahovica – Stara Zagora – Plovdiv. The train departed at 04:40 h. from Varna station as per the Train Trafficking Schedule and arrived at 08:20 h. at Gorna Oryahovica station. During the stay at Gorna Oryahovica station, the locomotive brigade of the new shift performed examination of the locomotive and obtained information from the previous shift that the locomotive was of decreased power because of isolated third traction engine.

Upon entrance at Mihaylovo station, the locomotive driver heart a stroke and after stopping at the station, together with the assistant locomotive driver, performed examination of the locomotive.

During trafficking in the section between Mihaylovo and Svoboda stations after Samuilovo stop the assistant locomotive driver looked through the locomotive's window and saw smoke released under the locomotive's car, for which he informed the locomotive driver. The locomotive driver looked through the window at his side and also saw smoke under the locomotive; thereafter he undertook fast stopping of the train. After stopping of the train the locomotive brigade started immediate fire suppression, the Head of train evacuated the passengers and signaled on phone 112. Because of spreading of the fire, the locomotive was separated from the wagons.

The first fire fighting automobile arrived at the place of the accident about 1 hour after the ignition of fire, later a second fire fighting automobile arrived there and the fire was suppressed at about 17:00 h.

Consequences

There are no accidents amongst the staff members and the passengers as a result from the fire burst. There are property damages caused to the locomotive and the railway infrastructure, amounting respectively to BGN 438 062,64 and BGN 6241,03.

Causes

The cause for bursting of fire in electric locomotive Nr. 44141.0 during trafficking is breaking in the body of the automatic transformer switch, caused by the occurrence of a voltage arch between the stationary power points and the rolls of the switch at stages, because of violation of the apparatus switching diagram.

Status of the investigation

The investigation was completed with a Final Report and recommendations on 07.11.2016.

In fulfillment of Art. 23, paragraph 2 of Directive 2004/49/EC of the European Parliament and of the Council, the data and the Final Reports from all above mentioned investigations are logged in the English language in the ERAIL information system of the European Railway Agency.

3.3. Investigations commenced in 2016 and continued in 2017

Table 4: Investigations commenced in 2016 and continued in 2017

Date of occurrence	Visit card of the investigation	Legal grounds	Stage
28.08.2016	Technical investigation of railway accident – derailing of seven full wagons from the composition of freight train Nr. 50505 upon transit pass through Petarch station.	Directive 2004/49/EC, Art. 19, par. 2/a, Art. 115k, par. 1, item 2 of RTA, Art. 78, par. 1 of Ordinance Nr. 59 and Order of MTITC.	The investigation is continued in 2017.
03.09.2016	Technical investigation of railway accident – derailing of six full wagons from the composition of freight train Nr. 50501 in the section between Voluyak and Hrabarsko stations.	Directive 2004/49/EC, Art. 19, par. 2/a, Art. 115k, par. 1, item 2 of RTA, Art. 78, par. 1 of Ordinance Nr. 59 and Order of MTITC.	The investigation is continued in 2017.
10.12.2016	Technical investigation of heavy railway accident – derailing of twelve wagon cisterns from the composition of freight train Nr. 90570 upon entrance in Hitrino station on third platform at point Nr. 5.	Directive 2004/49/EC, Art. 19, par. 1, Art. 115k, par. 1, item 1 of RTA, Art. 78, par. 1 of Ordinance Nr. 59 and Order of MTITC.	The investigation is continued in 2017.

3.3.1. Derailing of seven full wagons from the composition of freight train Nr. 50505 upon transit pass through Petarch station.

Brief description Кратко описание

On 28.08.2016 from Stanyanci maneuvering region at 12:24 h., 92 minutes earlier than the scheduled time, departed freight train Nr. 50505 following the route of: Stanyanci – Voluyak – Razmenna – Batanovci – Dupnica. The train was composed of 12 full wagons (coal), 48 axes, 924 tons gross weight. Up to Kalotina station the train was serviced by diesel locomotive Nr. 06108. At Kalotina station the train arrived at 13:08 h., stayed there for 109 minutes because of replacement of the diesel locomotive with an electric locomotive.

At Dragoman station the train arrived at 15:10 h., stayed there for 37 minutes because of meeting with train Nr. 10994. After performed shortened test "D" the train departed at 15:47 h. and passed transit through the stations of Aldomirovci at 15:56 h. and Slivnica at 16:04 h.

Through Petarch station the train passed at 16:10 h. with a speed of 70 km/h, the maximum permissible speed for the section being 75 km/h. Upon its travel on the third main platform, the train passed near the reception building of the station, passed through point Nr. 2, thereafter a strong crash was hurt and the train stopped. After the performed field examination it was established that seven wagons – from the fourth to the tenth wagon included, from the train's composition had derailed.

Status of the investigation

In 2017 the investigation is still in progress.

3.3.2. Derailing of six full wagons from the composition of freight train Nr. 50501 in the section between Voluyak and Hrabarsko stations.

Brief description

By order of BDZ Freight Transport EOOD, on 03.09.2016 freight train Nr. 10690 is designated, composed of 18 full wagons (coal), 72 axes and 1348 gross mass weight, serviced by electric locomotive Nr. 46033.7. The train followed the route of: Plovdiv-razpredelitelna – Plovdiv - Sofia - Voluyak. At Iskar station the train arrived at 05:00 h., and after change of the locomotive brigades the train departed at 05:20 h. to Voluyak station. At Voluyak station the train stayed 6 minutes because of changing the number of the train and amending the face side of the breaking mass weight certificate (model form ВП-11) and performing of shortened test "D" of the automatic train break. From Voluyak station the train departed under Nr. 50501 at the direction of Voluyak – Razmenna – Batanovci – Dupnica. During trafficking of the train at the section between Voluyak and Hrabarsko stations at km 14^{+055} wagon Nr. 31 52 665 1221-1 derailed – the twelfth one in line in the composition of the train, with the first wheel axis on the right in the direction of trafficking, and continued its movement, later the second wheel axis of the first cart of the wagon, also on the right, derailed too. Upon such condition (with derailed first cart) the train continued travelling, the locomotive brigade not noticing or feeling anything irregular. Upon entrance of the train in a bend of the railway road with radius R-500 m from km 23^{+164} to km 24^{+830}, after the twelfth wagon other five wagons derailed from the train – from the thirteenth to the seventeenth wagon included, and at the same time the train broke up between the fifth and the sixth wagons and between the eleventh and the twelfth wagons.

Status of the investigation

In 2017, the investigation is still in progress.

3.3.3. Derailing of twelve wagon cisterns from the composition of freight train Nr. 90570 upon entrance in Hitrino station on third platform at point Nr. 5.

Brief description

On 10.12.2016 freight train Nr. 90570 departed from Druzhba station for Ruse North station. It was composed of two electric locomotives pulling the train and 26 wagon cisterns, of which 23 full and 3 empty ones. The train followed the route of: Druzhba station – Karnobat station – Sindel razpredelitelna station – Ruse North station. Upon its trafficking the train changed its direction of movement twice, at Karnobat station and at Sindel-razpredelitelna station respectively. After departing from Sindel razpredelitelna station the train passed transit through the next stations, without the station staff noticing any peculiarities. At 05:35 h. the traffic controller on duty at Hitrino station went away in front of the reception building of the station to meet freight train Nr. 90570.

At 05:37 h. train Nr. 90570 entered Hitrino station and upon passing through the level crossing, located at the neck side, Pliska station, the traffic controller on duty saw sparkles emitted from the wheels. Shortly after the lighting of the level crossing switched off and only a part of the train continued moving towards the station.

The bigger part of the train stopped at the neck of points, close to post Nr. 2. The post switchman at post Nr. 2 called the traffic controller on duty to inform him that train Nr. 90570 had derailed. During the call the post switchman felt strong suffocating smell, followed by a powerful explosion, as a result of which a large fire burst out, covering a significant area of the village (Figure 1).

As a result from derailing of the train, the body of the tenth wagon cistern Nr. 33877915652-4 was punctured, from where the transported good (gas propylene) flew off, ignited and exploded.

Status of the investigation

In 2017, the investigation is still in progress.

3.4. Accidents and incidents investigated during the last five years

Table 5: Investigated accidents and incidents in the period 2012 – 2016

Investigated occurrences	2012	2013	2014	2015	2016	Total
Crash	-	-	-	1	-	**1**
Crash with barrier	-	-	-	-	-	**0**
Derailing of train	-	1	2	1	4	**8**
Accident on level crossing	-	-	2	-	-	**2**
Accident with a man caused by trafficking rolling stock	-	-	-	-	-	**0**
Fire in rolling stock	1	2	2	1	4	**10**
Accidents connected with hazardous freights	-	-	-	-	1	-
Incidents	-	-	-	-	-	**0**
Total:	**1**	**3**	**6**	**3**	**8**	**21**

Diagram of investigated accidents and incidents in the period 2012 – 2016

4. SAFETY RECOMMENDATIONS

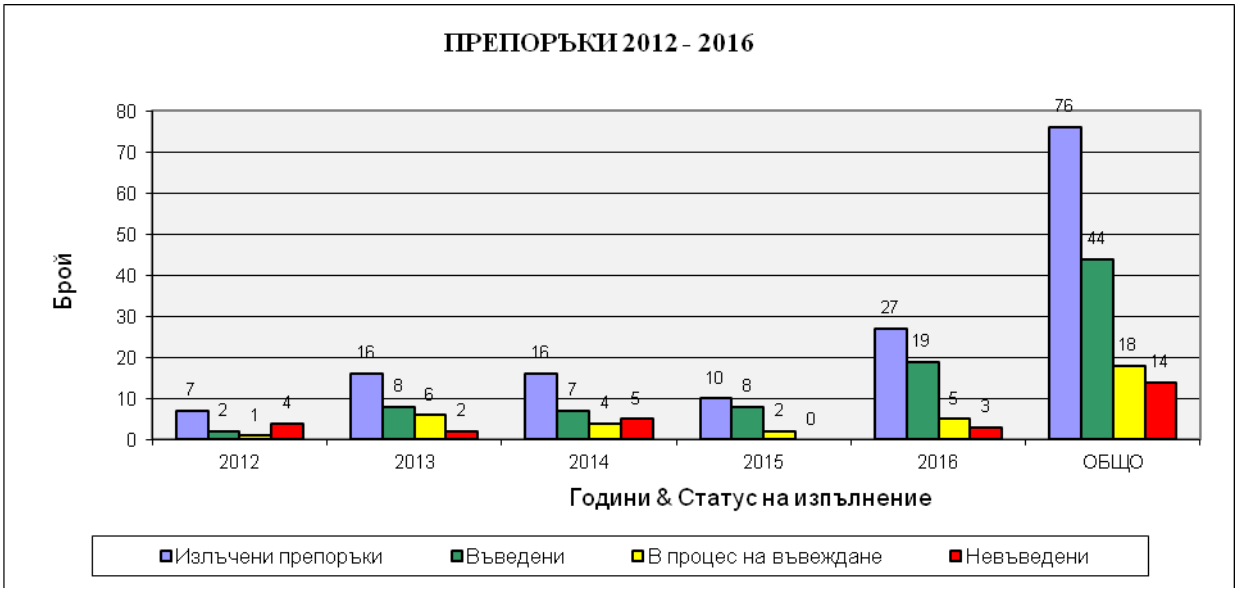
The safety recommendations, rendered by RAIU, are aimed at improving safety and prevention of other railway accidents. The recommendations are addressed to the National Safety Authority, the Manager of the railway infrastructure, the railway enterprises/ carriers and other persons with their own railway transport and/or takeover activity, for undertaking measures and actions on the provision of safety.

4.1. Brief review and presentation of the recommendations

Table 6: Rendering and implementation of recommendations during the period 2012 – 2016

Year	Recommendations rendered	Status of fulfillment of the recommendations		
		Fulfilled recommendations	Recommendations under process of implementation	Accepted and non-fulfilled recommendations
2012	7	2	1	4
2013	16	8	6	2
2014	16	7	4	5
2015	10	8	2	0
2016	27	19	5	3
Total:	**76**	**44**	**18**	**14**

Diagram of recommendations rendered by RAIU in the period 2012 – 2016



4.2. Safety recommendations rendered in 2016

2016
Occurrence: **Derailing of nine wagons from the composition of freight train Nr. 50601 upon entrance at Dupnica station on point Nr. 10.**

Safety recommendations: (28.04.2016)

1. Holding BDZ EAD, through the Professional Training Center (PTC), shall organize periodical training for refreshing of the knowledge on the acting normative regulations for the staff members directly related with the safety of transport.

2. Holding BDZ EAD shall organize the execution of periodical examinations and tests of the direct and train crane engine drivers and the registering speedometers of the locomotives from all series, as well as regular reading and follow-up of the speedometer tapes (records) of the locomotives, upon strict control for registering of all parameters.

3. Holding BDZ EAD shall undertake actions for the designing, structuring and implementation in operation of electronic stands for testing of breaking apparatus at the major locomotive depots of BDZ EAD.

4. Holding BDZ EAD shall design, structure and implement one new computer stand at each of the two companies for examination and testing of the registering speedometers of the locomotives.

5. Holding BDZ EAD shall organize the implementation in operation of all locomotive devices which shall register in digital form and store all data on the condition of the locomotive.

6. Holding BDZ EAD shall entrust the construction of a simulator for training and testing of the practical skills of the locomotive engine drivers for the management and control of the breaking systems.

7. Proposed hereby to the National Railway Infrastructure Company (NRIC) is to amend and supplement the wordings of the Normative acts in the railway transport, Part II in Art. 334 of the Rules on train's trafficking and maneuvering work in the railway transport, as follows:

1. The existing wording of Art. 334 shall become par. 1.

2. New par. 2 shall be introduced, of the following wording:

„(2) The locomotive engine drivers, upon departure of a freight train from a profile station, shall perform as a must examination of the efficiency of the train breaking system at temperature lower than minus 10°C."

Undertaken measures

Recommendations 1 and 2 are fulfilled;

Recommendation 5 is under process of implementation;

Recommendations 3, 4 and 6 are accepted and are not fulfilled.

Occurrence: **3.2.2. Firing during trafficking of electric locomotive Nr. 44081.8 having serviced fast train Nr. 8626 in the section between Aytos and Chernograd stations, on road Nr. 2.**

Safety recommendations: (12.07.2016)

1. Immediate performance of examination of the fire prevention installations and the major safety systems of all locomotives.

2. Strengthening of control over the operational examinations of locomotives at the major and turnover depots, and at the operational stations.

3. Mounting of additional sensors to the fire signaling installation and spraying nozzles

to the fire suppression installation in the fire hazardous areas.

4. Modernization of the locomotives from Series 44 and 45 by the construction of new fire signaling and fire suppression installations of the locomotives.

5. Strengthening of control over the performed examinations and checks on the condition of electric equipment, in accordance with the Rules on depot's repairing works and maintenance of electric locomotives of BDZ.

6. Strengthening of control over the observance of the norms on permission for operation of electric equipment and apparatus in locomotives, in accordance with the Rules on depot's repairing works and maintenance of electric locomotives of BDZ.

7. Carrying out of periodic training of the locomotive operation staff members on the arrangement and action of the fire prevention installation of the locomotives and on actions in case of fire in the rolling stock during trafficking.

8. Improvement of the coordination upon interaction of the individual operational services at the NRIC with the licensed railway carriers upon the occurrence of accidents and incidents, in accordance with the requirements of Ordinance Nr. 59 and Ordinance Nr. 58.

Undertaken measures

Recommendations 1, 2, 5, 6 and 7 are fulfilled;

Recommendations 3 and 4 are in a process of implementation.

Occurrence: **Firing during trafficking of electric locomotive Nr. 44085.9 having serviced fast train Nr. 3622 at Sahrane station on 16.06.2016.**

Safety recommendations: (02.09.2016)

1. Immediate examination for faultless operation of the fire suppression and the fire signaling installations, as well as of the major safety systems of all locomotives.

2. Strengthening of control over the operational examinations of the locomotives at the major and turnover locomotive depots, and at the operational stations.

3. Carrying out of periodic training of the locomotive operation staff members on the arrangement and action of the fire prevention installation of the locomotives and on actions in case of fire.

4. Modernization of the locomotives from Series 44 and 45 by construction of new fire signaling and fire suppression installations of the locomotives, with automatic action and more efficient fire extinguishing agent.

5. Re-make of the existing fire prevention installation of the locomotives and adding of smoke and flame detection sensors in the hazardous areas.

Undertaken measures

Recommendations 1, 2 and 3 are fulfilled;

Recommendations 4 and 5 are in a process of implementation.

Occurrence: **Bursting of fire during trafficking in electric locomotive Nr. 44096.6 having serviced passenger train Nr. 80290 in the section between Chernograd and Karnobat stations.**

Safety recommendations: (23.11.2016)

1. Carrying out of surveillance over the behavior upon trafficking of the voltage transformer of the electronic electric meters installed in electric locomotives Series 44 and 45. Assessment of the risk from the occurrence of hazards resulting from irregularities and the connection of electric meters.

2. Upon each small periodic repair, performance of examination of the condition and density of the oil cooling contour of the locomotive transformer, paying attention to the rubber connections.

Undertaken measures

The rendered recommendations are fulfilled.

Occurrence: **Bursting of fire during trafficking in electric locomotive Nr. 44141.0 having serviced fast train Nr. 4681 in the section between Mihaylovo and Svoboda stations.**

Safety recommendations: (07.11.2016)

1. The railway carrier BDZ Passenger Transport EOOD shall perform analysis and risk assessment, because of the more frequent fires in the traction rolling stock, and shall elaborate measures for risk mitigation.

2. The railway carrier BDZ Passenger Transport EOOD shall amend and supplement the Methods for analysis and risk assessment of safety, which are an integral part of the safety management systems; included and assessed shall be the probabilities for bursting of fire in the traction rolling stock during trafficking.

3. The railway carrier BDZ Passenger Transport EOOD shall assess the risk of hazards connected with the "subjective factor" (the locomotive brigade and the transport brigade), as well as the hazards in part "technical factor", pertaining to the maintenance and repair of electric locomotives.

4. The railway carrier BDZ Passenger Transport EOOD shall fill in "Register of hazards for the maintenance activities in Application Nr. 2", with assessment of the probable risks, in connection with the respective level of maintenance, from bursting of fire upon operation in individual apparatus and aggregates during the performance of repair in the traction rolling stock.

5. The railway carrier BDZ Passenger Transport EOOD shall provide protection masks to the locomotive brigades.

Undertaken measures

The rendered recommendations are fulfilled.

In fulfillment of Art. 94, par. 4 of Ordinance Nr. 59 dt. 05.12.2006, the addressees of the recommendations are obliged to inform the Head of RAIU on the fulfillment of the rendered recommendations.

D-r Eng. Boycho Skrobanski
Head of RAIU at MTITC