



**TRANSPORTATION SAFETY
BUREAU**

ANNUAL REPORT 2012
Transportation Safety Bureau
Hungary

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RAILWAY NETWORK IN HUNGARY



Basic data of the infrastructure:

<u>National lines:</u>	7690 km IM: MÁV (94%), GySEV (6%) Transeuropean network: 2830 km (37%)
<u>Regional lines:</u>	480 km (100% narrow gauge)
<u>Suburban lines:</u>	210 km
<u>Local network:</u>	in Budapest, Debrecen, Miskolc, Szeged
<u>Level crossings:</u>	6041 (48% active, 52% passive)

SUMMARY

Hungary fully implemented all essential requirements concerning accident investigation of the Railway Safety Directive 2004/49/EC in its national law. Based on previous experiences and preliminary consultation with the Commission, provisions of the relevant act had been reviewed, as a result of which an amendment has been made to the act in order to enhance implementation of Railway Safety Directive and transpose to the railway sector good practice applied in aviation. The follow up by the Commission is still running.

The Transportation Safety Bureau was established on 1st January 2006 as the legal successor of the Civil Aviation Safety Bureau (founded in 2002). TSB operates in a multimodal form. Its main duty is the independent technical (safety) investigation of aviation, railway and marine accidents and incidents. Within the organisational framework of TSB, the Railway Department began to operate on 1st March 2006.

In 2012, there was no occurrence (serious accident) on the railways which the Railway Department of TSB was, pursuant to the regulations, obliged to investigate.

TSB decided at its own discretion to conduct independent technical investigation into 34 further occurrences. This is 13% less than in the previous year, with regard to the finding of the ERA Assessment carried out at the TSB.

During year 2012, TSB published 30 final report, including 19 safety recommendations, 8 of them were issued during the investigation process. 12 of these recommendations have been implemented, implementation of 7 recommendations is in progress. Furthermore, TSB issued 5 safety recommendations prior to the completion of the investigations started in 2012, in which recommended immediate preventive actions. 2 of these recommendations have been implemented, implementation of one is in progress, one of them was rejected by the addressee, and in one case we have no formal reply yet.

At its own discretion, TSB included in the scope of the technical (safety) investigation some occurrences of signals passed at danger (SPADs), taking into consideration hazards and high frequency of these cases with an otherwise fortunate outcome.

Based on previous positive experiences, TSB monitored with particular consideration the occurrences related to level crossings (LC accidents) and to persons injured by railway vehicles, initiating technical (safety) investigations in cases that appeared to be instructive.

Abbreviations	
IC	Investigating Committee
LC	Level crossing
Máv Co.	Hungarian State Railways Plc.
NIB	National Investigation Body
NTA	National Transport Authority (the National Safety Authority of Hungary)
TSB	Transportation Safety Bureau

1. INTRODUCTION

The Transportation Safety Bureau of Hungary (TSB) as a multimodal organisation for the investigation of accidents was established on 1st January 2006.

The Annual Report 2012 of TSB - in accordance with Article 23 (3) of the Railway Safety Directive 2004/49/EC - gives an account on the following:

- the implementation of 2004/49/EC Railway Safety Directive into the Hungarian law,
- the relations of TSB with other concerned organisations,
- the philosophy and process of the independent technical investigation at TSB,
- the overview of the past 12 months from transport safety point of view,
- the experiences of the independent technical investigations carried out by TSB,
- the safety recommendations issued by TSB and the provisions made in relation to the recommendations, and
- the participation of TSB in the work of the European Railway Agency.

1.1 Legal basis - The implementation of the Safety Directive in the Hungarian law

Hungary implemented all essential requirements concerning accident investigation of Railway Safety Directive 2004/49/EC in Act CLXXXIV of 2005 on the technical investigation of aviation, rail and marine accidents and incidents. Based on the Directive, Transportation Safety Bureau was established on 1st January 2006 and – as a multimodal organisation - is responsible for the independent technical investigation of aviation, railway and marine accidents and incidents.

The detailed regulations of the technical investigation are included in the decrees of Act CLXXXIV of 2005 which were separately issued for the three modes of transport by the Minister for Economy and Transport. The decree on the regulation of the technical investigation of serious railway accidents, railway accidents and incidents (7/2006 GKM) was issued on 27th February 2006.

Based on previous experiences and preliminary consultation with the Commission, provisions of the act had been reviewed and, as a result of this, an amendment has been made to the act in order to enhance implementation of Railway Safety Directive (e.g. the term of railway accident more specifically defined) and also to transpose into the railway sector good practice applied in aviation (e.g. the issuance of intermediate reports for investigations longer than one year).

Powers of TSB have been extended: previously, the scope of TSB activity had not included investigations of accidents and incidents occurred on local railways. Serious accidents are not frequent on these railways (underground railway, cogwheel railway, funicular, tram – Budapest, Miskolc, Debrecen, Szeged, – cableways, ski-lifts), nevertheless, related hazards are high, considering the high number of passengers transported daily. Extension of the investigation scope by including these railway systems was justified by this hazard, completion of the technical investigations additionally generated being possible by an allocation of minor extra resources.

Act CLXXXIV of 2005 on the technical investigation of aviation, rail and marine accidents and incidents was also amended parallel to this, the amendment concerning TSB activity by introducing the institution of accident investigation of the operator in the railway sector as well. Positive experiences of the accident

investigation system of the operator, well established in the aviation sector, can be effectively applied to enhance safety in the railway sector also. Therefore, according to the new regulation for occurrences not included in the serious accidents category required to be investigated by the National Investigation Body (NIB), in case NIB takes decision on not conducting a technical investigation of the occurrence, the safety unit of the railway undertaking will be requested to conduct the investigation of the operator and inform NIB on the results in a report.

The new regulation does not aim the duplication the safety system, it does not concern investigations required by the safety management system (SMS). Its objective is to ensure that reports, being issued anyway by the accident services of railway undertakings, would be forwarded to NIB, furthermore, authorizes NIB to request additions, when necessary, to these reports – by this, the regulation helps NIB in collecting data on safety issues. Involving organisations already actors of the SMS in the activity of NIB does not require extra resources (HR, etc.) on either side, nevertheless, it broadens significantly the information base of NIB activity and, by this, the enhancement possibilities of railway safety.

These rules were implemented into the decree on the regulation of the technical investigation of serious railway accidents, railway accidents and incidents (7/2006 GKM) issued on 27th February 2006, the new number of this decree: 24/2012 NFM issued on 8th May 2012.

Within the organisational framework of TSB, the Railway Department began to operate on 1st March 2006 pursuant to the regulations.

The national Act guarantees the complete independence of TSB from all other actors of the concerned transport sector. The Act defines the objective of the independent technical investigation as follows:

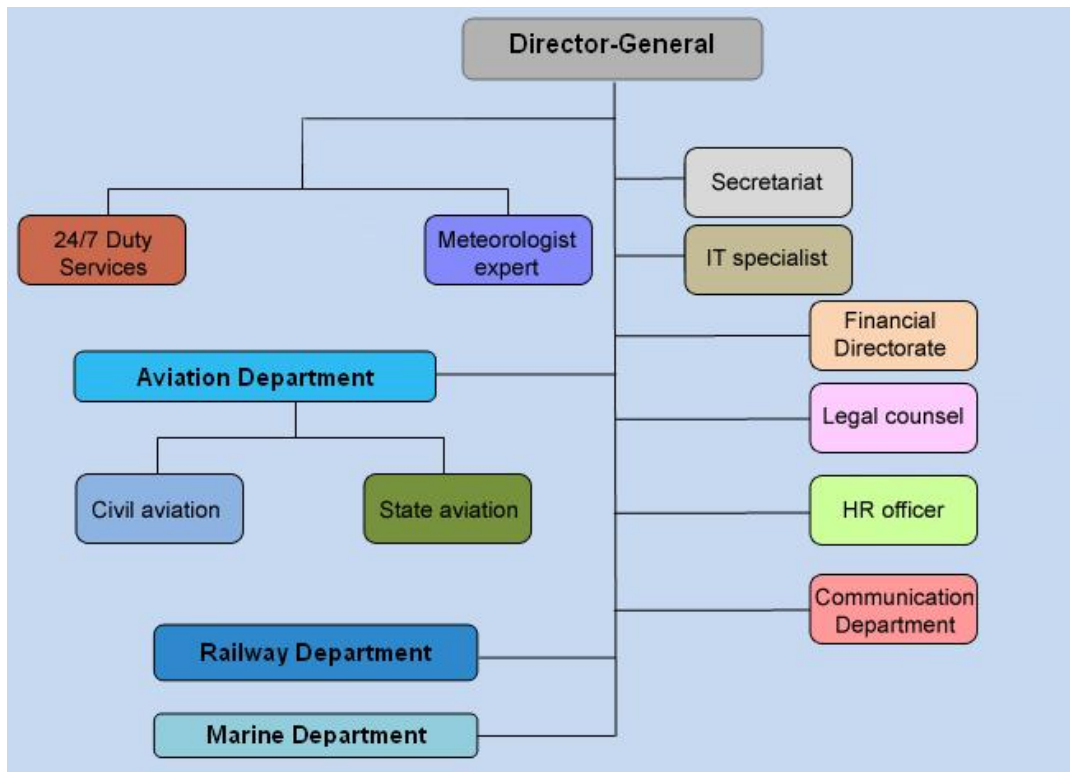
‘The objective of the independent technical investigation is to reveal the causes and circumstances of serious railway accidents, accidents and incidents and to initiate the necessary technical measures and make recommendations in order to prevent similar cases in the future.’ It also states that ‘it is not the purpose of the investigation carried out by TSB to apportion blame or legal liability’.

The Act contains the rights and responsibilities of the investigators defined in the Safety Directive.

According to the national regulations:

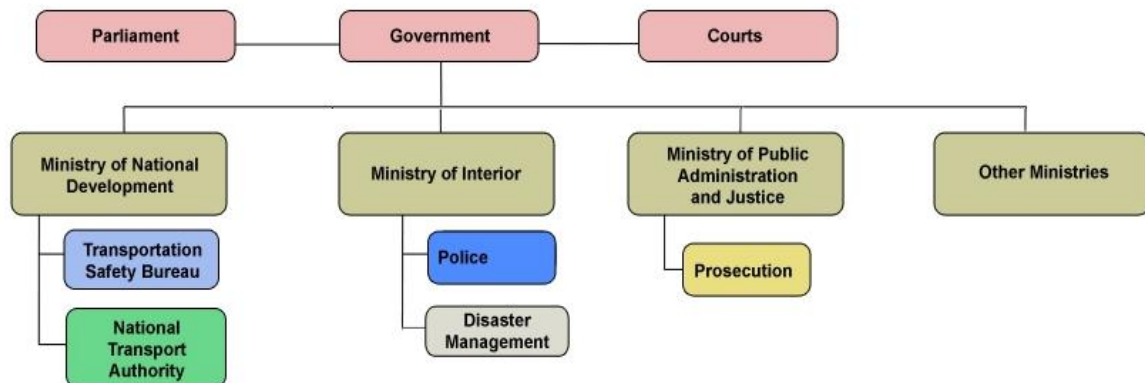
- All aviation, railway and marine occurrences shall be reported to TSB.
- The members of the Investigating Committee of TSB are authorized to be present at the site of any occurrence and to conduct the technical investigation parallel with the police investigation (if there is one).
- Based on the results of the investigation, TSB is entitled to issue safety recommendations and recommend immediate preventive actions before the completion of the investigation, if necessary. The implementation of safety recommendations is not obligatory, however, the addresses must report to TSB once a year whether they have accepted or rejected them. (The addresses must forthwith respond to the recommended immediate preventive actions.)
- The anonymity of the relevant parties is guaranteed. TSB shall make public the final reports on the results of the technical investigation. However, the final report shall not contain data based on which the relevant parties can be identified. The final report shall not be used in criminal procedures.

1.2 Organisation of TSB Hungary



- TSB regards prevention as the main objective of its activity. TSB endeavours to share the findings, the results and the experiences of the technical investigations with a wide circle of organisations in the profession as well as with the civil sector.
- The predecessor of TSB was the Civil Aviation Safety Bureau which conducted investigations in the field of aviation between 2002 and 2005 in line with Directive 94/56/EC establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.
- TSB was established on 1st January 2006. The Aviation Department and the 24/7 Duty Services operated from the beginning of 2006 and the other departments and units grew gradually during the year. The Railway and the Marine Department began to work officially on 1st March 2006. The total number of permanent staff at the end of 2006 was of 50 which increased to 57 by the end of 2007. The reason behind this increase is that since 1st July 2007, the Aviation Department of TSB has been conducting investigations into occurrences involving state (military and police) aircraft as well, which required further human resources.
- The Railway Department – in accordance with the regulations – began its work on 1st March 2006.
- The Railway Department consists of 9 investigators and the Head of Department, one of the investigators was retired by the end of 2011, the new colleague has arrived in 2012.

1.3 Organisational flow of TSB Hungary



- TSB is supervised by the Ministry of National Development. The Director General of TSB works under direct supervision of the Minister. According to the national law, the Minister shall not instruct TSB in matters concerning the independent investigations.
- TSB reports to the government annually on the activities of TSB, the lessons learned from the independent investigations, the processes and trends concerning transportation safety.
- The Ministry of National Development is the national regulator.
- The general rules regarding the operation of the railways are currently defined by the state-owned MÁV Co., the largest infrastructure manager in Hungary. The National Transport Authority only assents to the amendments to the rules.
- Based on the outcome of the investigations, TSB may issue safety recommendations to the National Safety Authority (NTA). The implementation of safety recommendations is not mandatory, the addressees however are obliged to compile an annual report on their response (acceptation, implementation, or refusal).
- TSB is authorized to get access to all data relevant to the occurrence in question (including data stored on data recorders).
- The Investigating Committee of TSB may conduct its site investigation simultaneously with the police investigation.
- TSB and the police may help each other's work with exchange of factual data and results of expert analyses. The IC may withhold information obtained in the course of the investigation from other authorities in occurrences when the owner of the information would have had the right to do so.
- TSB, the police and the disaster management mutually inform each other about the received occurrence reports.

1.4 Overview of the last 12 months

1.4.1 Trainings

In order to maintain and improve the professional knowledge of the investigators, the trainings organised based on our training plan continued in 2012.

Within the framework of on the job trainings, trainee colleagues acquired knowledge under the mentoring of senior investigators on the investigation procedure, special equipment and software applied to read out data from strip chart and other data recorders.

2 colleagues participated the Fundamentals of Accident Investigation course and successfully passed the exam in Cranfield (UK). Some of our colleagues have attended training courses organised by ERA in topic ERAIL, Accident investigation basic course or Analysis methods.

More members of the Department attended on the job trainings on brake-equipment manufacturing, and urban railway systems (tram, metro, etc.), dangerous goods (RID). Professional practice was conducted for accident investigators of the Department on download and analysis of data recorded by railway data recorders.

These studies can be utilised effectively in the investigations.

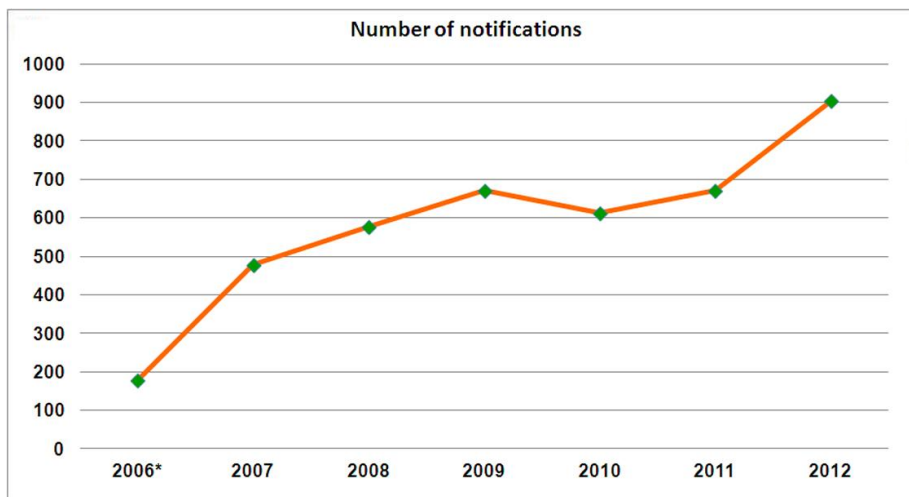
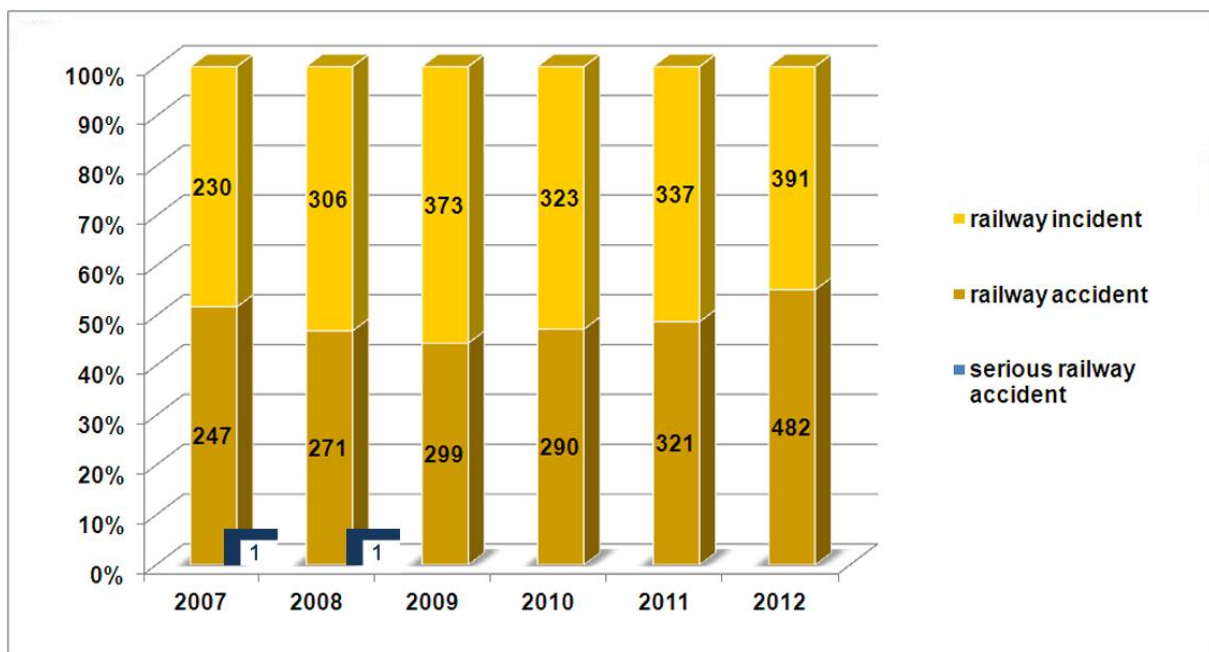
Our colleagues also succeeded in passing the public administration examinations - basic and higher level - obligatory for all civil servants in Hungary.

Colleagues who had signed study contracts - studying engineering and law - also fulfilled all requirements stated in their contract, and they have finished their studies successfully.

1.4.2 Reports

In accordance with the extension of its powers TSB began during the Fall of 2011 to receive notifications on occurrences concerning local railways also (underground railway, cogwheel railway, funicular, tram – Budapest, Miskolc, Debrecen, Szeged, – cableways, ski-lifts). Data of 2012 reflect, that the number of notifications of this kind increased continuously, considering that the notification practice concerning these railway systems was stabilized during the year.

Ignoring the increase due to TSB's extension of power it can be stated that there was no significant change in the number of notifications received from the occurrence fields investigated in the previous period.

Reported railway occurrences in 2006-2012**Reported railway occurrences in 2007-2012 by category**

Paralell with the growing number of notifications there was a change in the former rate of railway accidents and incidents: comparing the total number of reported occurrences to the previous period, the accident rate increased by 6 %, from 49% up to 55 %.

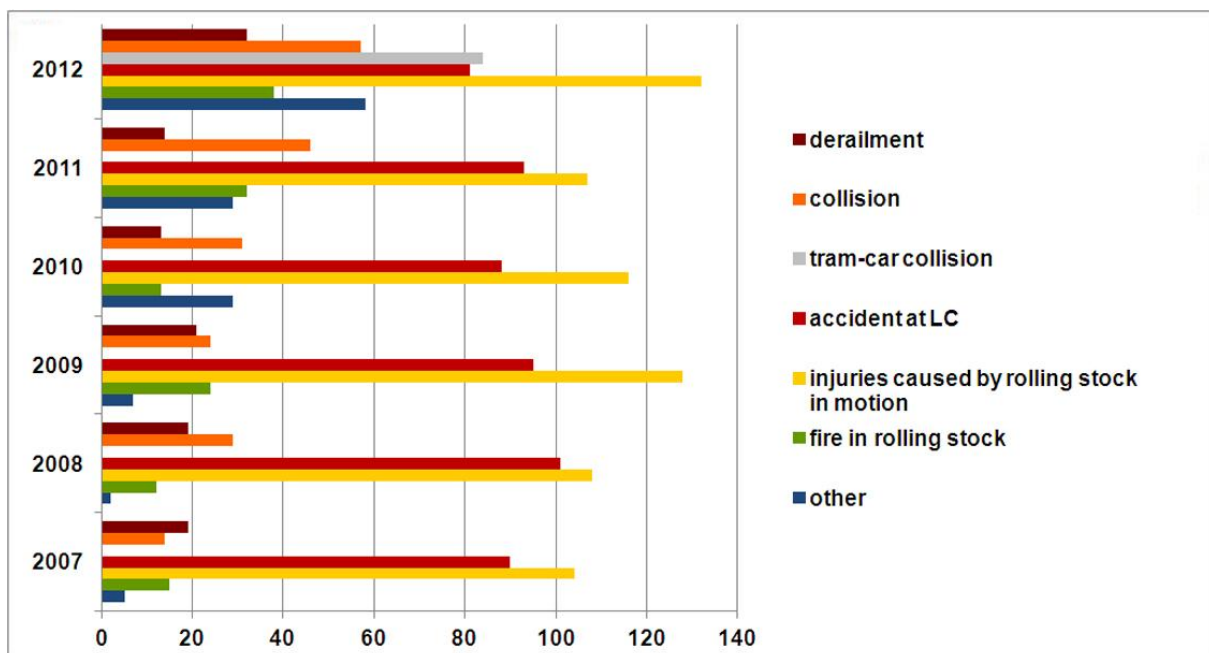
The reason of the higher increase rate of railway accidents is the number of collisions and bumps between trams and road vehicles. These accidents in most cases with minor injuries typically occur in level crossings, gateways and caused by human factor, mainly by the attention disorder of the drivers of road vehicles.

The increase in the accident category with injuries to persons caused by rolling stock in motion (see below) is generally specific to the period under review.

Reported significant accidents in 2008-2012 by content

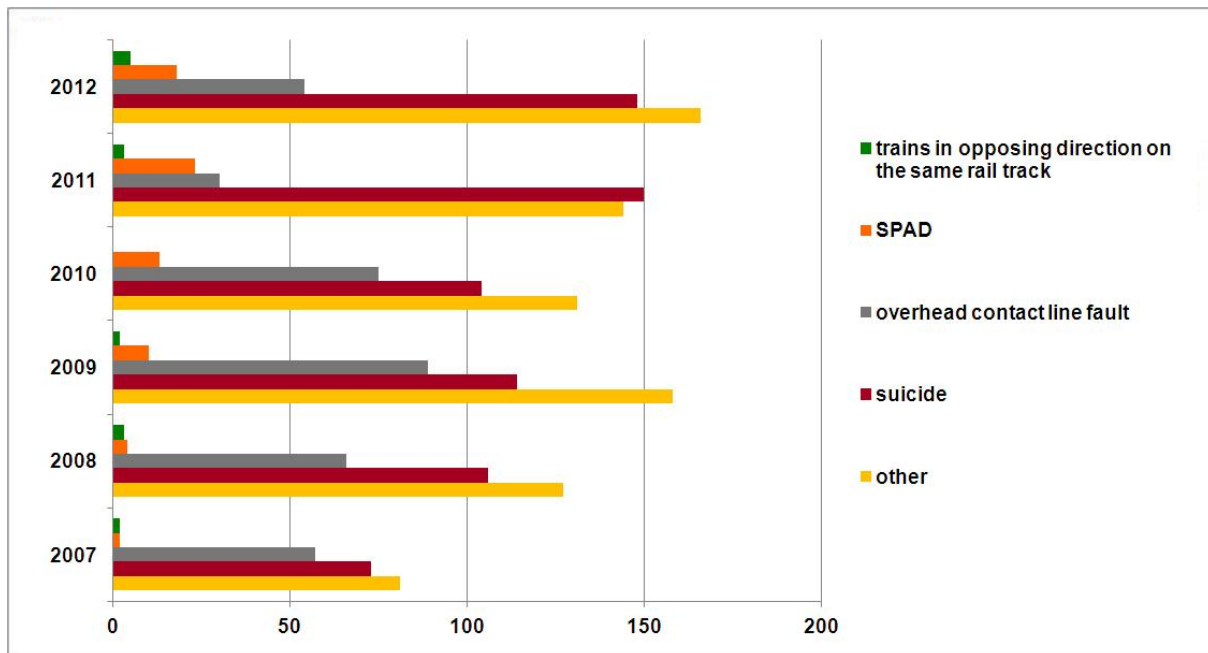
SIGNIFICANT ACCIDENTS	RAILWAY	TSB				
		2008	2009	2010	2011	2012
		132	165	131	134	122
- collision		1	-	-	-	1
- derailment		1	2	-	-	-
- injuries caused by rolling stock in motion		88	113	89	91	88
- accident at LC		42	50	42	43	31
- fire in rolling stock		-	-	-	-	-
- tram-car collision		no data available				2

There is a remarkable improvement in the number of significant railway accidents, it decreased from 134 to 122. This is a 10 % decrease, even though the influence of some significant railway accidents occurred to local and special railway undertakings have already been included in the 2012 figures.

Reported railway accidents in 2007-2012 by content

Comparing to the previous period, in 2012 the number of collisions and derailments increased. The reason is primarily the growing number of notifications due to TSB's extension of power. Typically there are tram derailments, collisions and bumps. Due to the low speed used these accidents cause only minor damage and injuries to persons occurs only in exceptional cases.

There is a remarkable decrease in the number of accidents occurring at LCs, however the number of accidents with injuries to persons caused by rolling stock in motion increased significantly. The reason of this tendency is analyzed in Chapter 3.: Investigations. The increase in accident category 'other' is caused by the emergence of accidents occurring to local and special railway systems that can not be classified with the traditional method.

Reported railway incidents in 2007-2012 by content

The number of notifications on signals passed at danger received by TSB over the recent period shows slight decrease, but still relatively high – 23 in 2011, 18 in 2012. These occurrences were of fortunate outcome, practically having no consequences to persons or property, nevertheless, each of these represented serious safety risks and in some cases the occurrence of a serious accident was indeed close. For this reason, TSB took decision on conducting technical (safety) investigations in some of these cases, issued final reports on the results and issued safety recommendations as well.

The cause of the increasing number of accidents of trains in opposing direction on same track is that in the period under review there were several of this cases occurred in the single-track part of Szeged's tram system. Though due to the low speed used the danger is slight in these accidents but regarding the fact of recurrence, TSB launched technical safety investigations to find out the reasons to prevent similar future occurrences.

2. INVESTIGATION PROCESS

2.1 Independent basis of the investigation

Pursuant to national law, TSB is independent of all persons and organisations whose interests are contrary to the duties of the investigating organisation, in particular:

- authorities granting permission to put vehicles into service,
- authorities granting permission and controlling the operation and the maintenance of the vehicles,
- authorities issuing driving licences,
- the organisation operating the transport infrastructure,
- transport companies,
- railway undertakings
- the organisation determining railway tariffs,
- the organisation distributing routes,
- the safety authority and
- all regulators in the field of railways.

Under the national law, the civil servants of TSB shall not be the owners, senior officials or employees of the above mentioned organisations.

The Director-General and the Investigating Committee of TSB shall not be instructed in their scope of duties concerning the technical investigation.

2.2 Accident investigation philosophy of TSB Hungary

Under the Hungarian regulations, TSB shall investigate serious railway accidents.

The definition of 'serious accident' under the national regulations - in accordance with the Railway Safety Directive 2004/49/EC – is as follows:

'Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment of at least HUF 500 million and any other similar accident with an obvious impact on railway safety regulation or the management of safety.'

Apart from serious accidents, the national regulations permit TSB to investigate other occurrences - at its own discretion - that may have an impact on the safety of rail transport as well as on the regulations and management of railway safety.

TSB availed itself of the opportunity provided by the regulations to decide which occurrences – apart from serious accidents – are to be investigated. TSB based its decisions regarding which occurrences require investigation on the following fundamental principles:

- **occurrences resulting in serious injuries to persons, extensive material damage and/or hindering railway transport significantly,**
- **the latent danger of the occurrence can be considered significant – irrespective of its actual consequences,**
- **accidents or incidents recurring at the same site or in the same manner**

should be investigated.

When deciding which occurrences to investigate - besides the ones with serious consequences - it helps a great deal that the Railway Department regularly requests information from railway undertakings and relevant authorities on occurrences which are not investigated in details. The collection and evaluation of these data provides the possibility to be able to discover recurrence and certain tendencies in the accidents. These observations can create basis for further investigations.

In order to increase efficiency in decision making, it is necessary to gain as much information as possible. The institution of accident investigation of the operator has been introduced in the railway sector as well. Positive experiences of the accident investigation system of the operator, well established in the aviation sector, can be effectively applied to enhance safety in the railway sector also. Therefore, according to the new regulation for occurrences not included in the serious accidents category required to be investigated by NIB, in case NIB takes decision on not conducting a technical investigation of the occurrence, the safety unit of the railway undertaking will be requested to conduct the investigation of the operator and inform NIB on the results in a report.

2.3 The investigation process of TSB

The Duty Services of TSB (dispatchers) receive the reports of the occurrences 24 hours a day.

The members of the Investigating Committee (IC) are appointed by the Director-General or by his deputy on duty. The IC consists of one field investigator technician and at least one accident investigator. In case of more serious or complicated occurrences, one of the heads of department on duty and/or the spokesperson of TSB may be present on the site.

If an occurrence is not obliged to be investigated under the law, the head of the concerned department advises the Director General to decide whether or not to conduct an investigation.

The Investigating Committee carries out the site survey (parallel with other authorities) and decides on the direction of the investigation, the required technical and technological examinations as well as selecting the organisations and/or experts to be initiated in the investigation if necessary.

The draft reports on the occurrences are discussed by a board made up of the heads of departments of TSB.

The relevant parties of the investigation may make reflections on the draft report within 60 days from the date of receipt which are to be evaluated when compiling the final report. After this 60-day-period, TSB convenes a meeting for a final discussion with the participation of the representatives of the persons and organisations concerned. The purpose of the final discussions is that all concerned parties can hear the comments sent in reflection to the draft report as well as the viewpoint of TSB regarding the comments before the completion and publication of the final report. According to Hungarian law, the investigators may decide whether or not to include the parties' comments in the final report, the comments of an NIB of a Member State have to be included. Subsequently, the final report is made public.

All the three major departments of TSB have a separate 'Investigators' Manual' which lays down the methodological and technical requirements based on which the investigations shall be conducted by the investigators of TSB, taking the special characteristics of the given mode of transport into account.

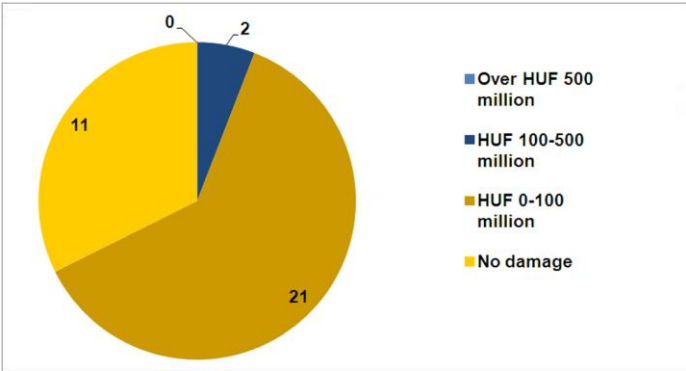
3. INVESTIGATIONS/ RECOMMENDATIONS

For practical reasons, this chapter deals with the closed investigations together with the safety recommendations issued in the course of or after the completion of the investigations.

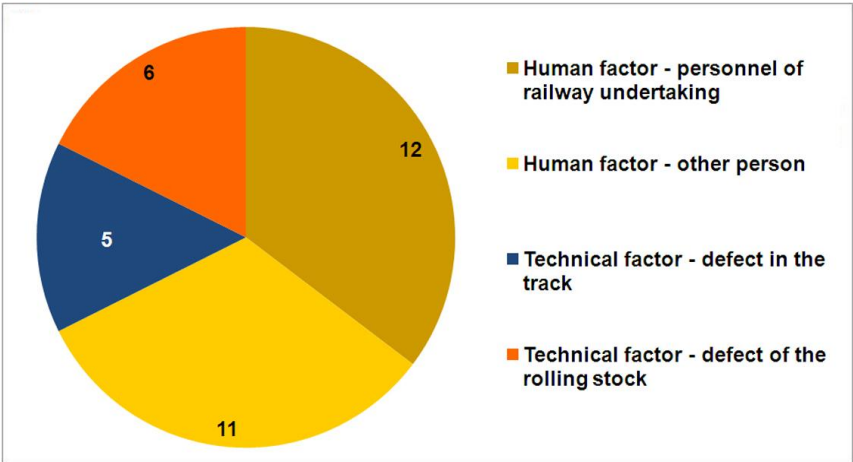
3.1 Overview of investigations conducted by TSB

In 2012, there was no serious railway accident in Hungary which TSB was obliged to investigate. TSB conducted investigations - at its own discretion - on 34 further occasions (25 accidents and 9 incidents), based on the fundamental principles listed in 2.3. This is 13% less than in the previous year, with regard to the finding of the ERA Assessment carried out at the TSB.

Investigations commenced in 2012 by the amount of damages:



Investigated occurrences in 2012 by their presumed cause (based on the reports):



Number of investigations lasting longer than one year over 2006-2012:

	TSB						
	at the end of 2006	at the end of 2007	at the end of 2008	at the end of 2009	at the end of 2010	at the end of 2011	at the end of 2012
Railway	0	12	11	7	1	7	12*

* In 7 cases the draft report was already sent out.

3.2 High priority topics in 2012

Having regard to the fact that ca. 25% of the accidents on the railways occur on level crossings (collisions with road vehicles, running over people), in 2012 TSB continued to put special emphasis on the investigation of such accidents using the previous years' experiences as well as paying special attention to accidents occurring at other places during which people were run over.

The number of significant accidents occurring at LCs significantly decreased in the period 2009-2012 (50→42→43→31). However, the number of collisions with cars was dominant. All these accidents can be related to human factors when drivers do not pay sufficient attention or break the rules on purpose. Besides these causes, the design of the LC was also found to be a contributing factor on a few occasions, such as the lack of required visibility to the signals, inadequately placed signposts, etc. to which the Investigating Committees drew the attention in their safety recommendations.

A positive experience in the last three years is that as opposed to the 3 occasions in 2009 when the accidents occurred due to the operation deficiency or fault of the warning lights and barriers, in 2010-2012 there were no such occurrences.

Having evaluated data of last two years, it can be established that the number of accidents when road vehicles or pedestrians ran into trains increased significantly. These accidents can almost solely be related to the inattention of LC users.

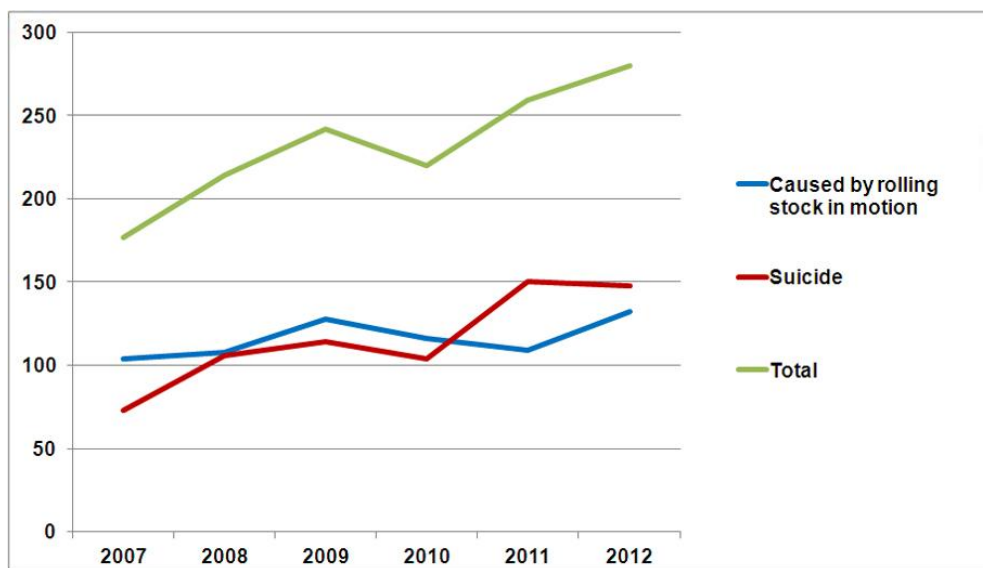
Spatial distribution of accidents occurred last year has not revealed any other level crossings with recurring occurrences. Significant progress can be observed though concerning the structure of LC no. AS 41, located in the urban area of Debrecen, between Tócsóvölgy – Balmazújváros stations, considered according to the investigations conducted in the previous period as being dangerous. Following the 4 accidents occurred in this LC in the period of 2007-2008, further accidents occurred in 2009 and 2010 also. For a longer period traffic control recommended by the IC – accepted by the NTA, the operator of the road and the railway infrastructure manager also – could not be fully implemented due to lack of financial resources, and the measures taken by using the limited resources available could not prevent the repeated occurrence of accidents. Implementation of the recommendations was completed in 2011, road traffic control dependent on the warning lights of the LC has been implemented. No further accident happened in the last two years, since the new system had been implemented.

Learning from the experiences of accident investigations, it may be advisable to complete (in addition to the subject of upgrade of level crossings) future transportation safety campaigns with a survey and related action plan on level crossings that are not safe due to their design (e.g. parallel road nearby, poor visibility conditions, etc.) and could be replaced by neighbouring level crossings with appropriate design. Driving morals could be improved by eliminating these level crossings and also those still operating on inaccessible track sections, abandoned for decades, since these usually constitute one of the factors contributing to the

occurrence of accidents on LCs. By closing down unnecessarily operating LCs, there would not be such ideas in drivers' minds that 'signals can sometimes be ignored', which result in bad practice that may lead to accidents on other LCs operating normally.

When examining accidents involving pedestrians, it is difficult to ascertain whether or not the person wanted to commit suicide. However, only such cases are regarded as suicides in which the relevant authority unambiguously states the fact of intentional self-harm.

The number of injuries to persons caused by rolling stock in motion increased significantly (20%) in 2012 (109→132). The background of this high number is, that the accidents occurring on the urban railways were added since the Fall of 2011. The number of suicides on the other hand stayed on a constant high value (2012: 148, 2011: 150).



The number of injuries to persons caused by rolling stock in motion (indicated with red) and that of suicides (indicated with blue)

According to our experiences, the police still tends to close cases in which persons are run over with the statement that 'no sign criminal act has been found' and wilful self-harm is not mentioned or only mentioned as a possible cause. In statistics, this increases the number of injuries caused by rolling stock in motion and indicates latency with regard to suicides.

Data of 2012 reinforce previous experiences, according to which, the most dangerous areas of the Hungarian railway network from this point of view are the following:

- Section between Debrecen and Apafa stations: 18 occurrences between 2007 and 2010; 4 occurrences in 2011, and 2 occurrences in 2012.
- Section between Kőbánya-Kispest and Monor stations: 27 occurrences between 2007 and 2010; 6 occurrences in 2011, and 7 occurrences in 2012.
- Near to Városligeti-elágazás station (it is in Budapest): 20 occurrences between 2007 and 2010; 4 occurrences in 2011, and 4 occurrences in 2012.

Besides the previous sites, there are two stations the areas of which presented a more significant frequency of cases in 2011/2012: Tatabánya 5/8 cases, and Kecskemét 5/4 cases of this type were notified, while no such high number of cases had occurred in any of these areas in the previous years.

The experiences of the reported occurrences and the technical safety investigations of the past year conducted in accident category with injuries to persons caused by rolling stock in motion has drawn the attention to the door operation problems of passenger carriages. There were several technical safety investigations conducted where the passenger got out from the rolling stock in motion through doors that should have been closed and blocked by emergency lock. In many cases the investigations proved that the doors were not opened by the operation of the emergency lock but due to technical deficiencies they were open or could be opened by the normal procedure. As a result of the detailed technical investigation of the operation, failures and maintenance of the door operation system concerned, it was stated that with a minimal intervention (fuse replacement, adjustment of the doors, etc...) a significant part of the failures could be repaired. However the investigation detected deficiencies in the flow of trouble shooting, work assignment and proper maintenance that can be corrected by the modification of the applied technologies and procedures and by the proper training of the staff. In this accident category the behaviour of the victims also typically contributes to the occurrence but today's door operation and emergency lock systems in proper operation and maintenance are appropriate to prevent such accidents that usually are the results of momentary attention disorder.

Therefore, considering the available resources, efforts should be done to modernize and equip passenger carriages that still have not operated such systems and to check the proper and continuous operation and usage of the systems that have already been operated.

A remarkable achievement in the Hungarian railway transport is that there has been no serious railway accident since 2008. However, to maintain this positive tendency, it is essential that all participants of the sector learn from the occurrences whose consequences were close to serious. Therefore, TSB decided on a number of occasions to investigate accidents or incidents which did not have serious consequences but created rather dangerous situations.

Having evaluated the previous year's information, and looking at the number and the source of danger of the occurrences, the two underlining risk factors seem clear by now; these are SPADs and trains running in opposing directions on the same track.

The consequences of reported SPADs:

Year	Without consequences	Splitting points open	Trains in opposing direction on same track	Signalling trains to already occupied track	Crossing LCs in open position	Total
2009	3	3	3	2	-	12
2010	6	3	2	1	1	13
2011	12	5	6	-	-	23
2012	10(+3)	3(+0)	1(+5)	-	1(+0)	15(+8)

The numbers in the brackets show the occurrences of the urban railway systems from 2012

3.3 Investigations commenced in 2012

Date 2012	Occurrence	Category
25.01.	Train no. 857 passed exit signal K3 at danger at Balatonfenyves station and split points no. 4. The train stopped at approx. 500 m from train no. 850 which was standing at the entry signal. No one was injured.	Railway incident
25.01.	Train no. 39825 collided with a car at the level crossing no. AS498 protected with warning lights located between Szil-Sopronnémeti and Csorna stations. As a consequence of the accident the driver of the car and one of his passengers died at the site, one person riding the car suffered serious, another suffered minor injuries.	Railway accident
01.02.	A tram on line no. 3 at Budapest derailed at the intersection of Nagykőrösi and Határ streets. No one was injured.	Railway accident
09.02.	Locomotive no. M41-2174, while shunting at Békéscsaba station, split switches no. 31, 25 and 21/b and approached from the opposite direction to train no. 37025, which was entering the station, with regular signalling, at a speed of approx. 20 km/h. No one was injured.	Railway incident
19.02.	Train set no. IC937, while shunting at Csorna station, collided into train set no. IC917. As a consequence of the accident 11 passengers suffered minor injuries.	Railway accident
24.02.	Train no. 3616 ran between Rákoshegy and Maglód stations on the right track, but in opposite direction to the direction set.	Railway incident
25.02.	The 13th wagon, loaded with iron ore, of train no. 66823-2 entering Rácalmás station, derailed in railway section no. 187+80, causing the derailment of the other 11 loaded wagons behind it in the train set. The derailment resulted in significant damage of the railway track.	Railway accident
06.03.	Train no. IC533 was stopped at Hatvan station due to brake problems. The engine driver had previously asked at Miskolc and Füzesabony stations for extra brake tests, since the braking distance at permitted speed (120 km/h) had significantly increased, the brake force was inefficient. The passengers of the train were redirected to another train at Hatvan station and train no. IC533, completed with two carriages to increase brake force, ran as train set to Budapest-Keleti station.	Railway incident
15.03.	Train no. 42030-1, while shunting from the open track, split points no. 4 and collided into the control trailer in the front of train no. 4511 on track II of Tárnok station. No one was injured and there was no damage to the railway vehicles.	Railway accident
15.03.	Train no. 2859 left without permission Üllő station, passed exit signal K2 at danger and at low speed (15 km/h) moved on to the left track in the direction of Vecsés station.	Railway incident
04.04.	Train no. 34429 entered Tatabánya station from the direction Oroszlány on the track no. V, occupied according to schedule,	Railway accident

	and collided at a speed of approx. 10-15 km/h train no. 4859, stationary on the track. One passenger suffered minor injuries.	
13.04.	Train no. 39924 collided with a bus at the unprotected level crossing in railway section no. 26 between Szombathely and Kőszeg stations. As a consequence of the accident 3 of the persons riding in the car died, 1 person suffered serious, 2 suffered minor injuries.	Railway accident
12.05.	The last 6 wagons of train no. 90552 derailed between Gödöllő and Aszód stations. No one was injured.	Railway accident
26.05.	Train no. 37214 collided with a car at an unprotected level crossing between Lakitelek and Kiskunfélegyháza stations in railway section no. 624+80. As a consequence of the accident the driver of the car died at the site and his passenger died after being transported to the hospital.	Railway accident
31.05.	Train no. 42001-2 collided with a car at the level crossing no. AS417 protected with warning lights located between Győrszemere and Gyömöre stations. The driver of the car died at the site.	Railway accident
31.05.	Train no. 8510 struck a motorcyclist at the unprotected level crossing located in railway section no. 1817+54 between Balatonszentgyörgy and Sávoly stations. The motorcyclist died at the site.	Railway accident
05.06.	Train no. 21661 derailed with 4 axles on points no. 7 while entering Kőbánya-teher station. No one was injured.	Railway accident
21.06.	Train no. 7807 collided with a car at an unprotected level crossing between Mátéházpuszta and Baja stations. As a consequence of the accident the driver of the car died at the site and his passenger was seriously injured.	Railway accident
24.06.	Train no. 34716 collided with a car at the level crossing protected with warning lights no. AS156 between Mezőfalva and Rétszilás stations. As a consequence of the accident, the driver of the car and his passenger died at the site.	Railway accident
27.06.	Train no. IC806 came to a halt after an approx. 1400-1500 meters braking distance at Pincehely station. The train travelled on at a speed of 60 km/h from Pincehely station to Dombóvár station. The locomotive of the train was rendered inoperative at Dombóvár station and the train continued its route after the locomotive had been replaced.	Railway accident
29.06.	At Rátka stop between Mád and Tállya stations, one of the remote controlled doors of train no. 35228 was shut on a passenger intending to get off and the train left and travelled this way to Tállya station.	Railway accident
05.07.	At Budapest-Déli station, train no. 4320 leaving the station from track III collided on track I with the shunting locomotive standing outside the shunting limit signal.	Railway accident
17.07.	A tram on line no. 2 at Budapest derailed with one axle at the crossing of Szalay and Balassi Bálint streets.	Railway accident

18.07.	A tram on line no. 2 at Budapest derailed with one axle at the crossing of Szalay and Balassi Bálint streets.	Railway accident
20.07.	At Tárnok station, the station to station distance train no. 4560 arriving from Érd junction passed without authorisation the entry signal 'F' of the station and split points no. I/14 while entering the station. Train no. 4560 entered the track locked for train no. 19712. No one was injured.	Railway incident
07.08.	Train no. 39917 collided with a railroad machine at an unprotected level crossing located in railway section no. 65-66 between Szombathely and Kőszeg station, before Lukácsháza-alsó halt.	Railway accident
14.08.	20 th wagon of train no. 45518-1 leaving Szolnok station derailed with two axles on points no. 28/b. No one was injured.	Railway accident
27.08.	Three trailer vehicles (loaded with stretches of rails) of train no. 23399 broke from the freight train, rolled back on the slope section of the track and collided at low speed with the control trailer of train no. 3341. No one was injured.	Railway accident
28.08.	There was a fire on board of the closed motor train set no. 95 55 5342 010-5, stationary on the storage siding no. I at Győr station. No one was injured.	Railway accident
19.09.	A passenger jumped off the second carriage of train no. IC922 leaving Kelenföld station from track no. XV. The passenger fell under the train and died at the site.	Railway accident
19.09.	Train no. 7252 collided with a truck at the unprotected level crossing located between Szentés and Szegvár stations. The chief train inspector and 3 passengers suffered minor injuries.	Railway accident
11.10.	Two trams moved approaching each other on single-track line no. 4 at Szeged between Dugonics tér and Vitéz utca stops. The two vehicles stopped at approx. 250 m distance from each other. No one was injured.	Railway incident
19.10.	Wagons 25 and 26 of train no. 55902-1 entering Aszód station on line no. VII derailed with one bogie each on points no. 17. As a consequence of the accident, points no. 17 and 21 and an approx. 300 m length of track no. VII sustained damage.	Railway accident
18.11.	Wagon no. 50 55 2035 040-4 (second wagon) of train no. 6009 (arriving to Ebes station) ignited. As a consequence of the fire, the overhead contact wire above track no. III at Ebes station broke. No one was injured.	Railway accident

3.4 Investigations completed in 2012 with the issued recommendations

The final reports issued in 2012 analysed occurrences of the following types:

- SPAD,
- collision,
- derailment,
- accident at LC,
- fire in rolling stock
- occurrences which do not qualify as serious railway accidents but as a result of which there were fatalities (passenger falling out of the train, member of railway crew hit by electricity on the top of a wagon).

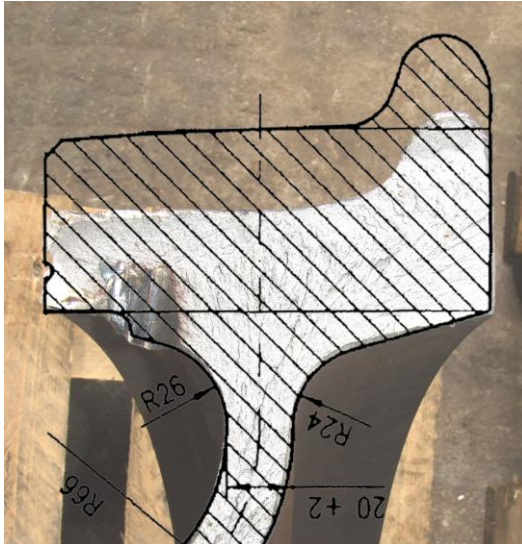
In 2012, 30 final reports were compiled and published on the website of TSB. Further 9 draft reports were compiled and sent to the relevant parties for reflections.

The above investigations were closed and the final reports were published in the beginning of 2013 considering the 60 days provided by law for the relevant parties to reflect on the draft report.

Investigations completed in 2012

2010-186-5

On 19th April 2010, the monobloc wheels of one of the carriages of express train no. 9408 from Budapest-Keleti station to Hegyeshalom station broke between Tatabánya and Tata stations, while the train was running at a speed of near 140 km/h.



As a result, the carriage derailed with one axle. No one was injured. The track and the vehicles were damaged.

The IC established that the applied shoe braking technology has a significant thermal effect on the surface of the wheel, this being increased on points as well by possible slipping movements of the wheels. Due to the thermal and point load effects, a crack was formed in the wheel, this not being revealed in the wheel control process, and the crack turned into fracture during the run.

The composition of the material of the broken wheel complied with the requirements of the standard, but the

actual composition in the temperature interval attainable during operation results in the rigidity of the material.

Factual statements directly connected to the occurrence of the accident

Due to the thermal effect of the braking and the point load effects, a crack was formed in the wheel, this not being revealed in the wheel control process, and the control process did not cover the control of the wheel centre. The crack turned into fracture during the run, the train derailed because of the broken wheel and the train running on the other track also became damaged.

The train was running at the permitted speed.

Factual statements indirectly connected to the occurrence of the accident

The composition of the material of the broken wheel complied with the requirements of the standard, but the actual composition in the temperature interval attainable during operation results in the rigidity of the material. The standard did not specify the lower limit for the alloying addition to decrease this effect, but the actual value was significantly lower than the upper limit.

The applied braking technology (pneumatic brake applied in the full range of speeds, frequent stops and decelerations) has a significant thermal effect on the wheels. Possible slips increase this in points as well, creating the possibility of the wearing in patches.

The carriage was over its general inspection cycle.

Other risk factors

The provisional measure taken as a consequence of the accident, related to the braking technology (brakes of locomotives of long trains must not be released), causes excessive load on the brake structure of locomotives, this presenting accident risks because of the decreased braking efficiency.

The wearing limits contained in the measurement data sheets of the pairs of wheels were not appropriate.

Safety recommendations

Safety recommendation was not issued.

2010-459-5

On 7th October 2010, train no. 71350 passed exit signal K9m at danger at the station Budapest-Ferencváros, and split points no. 32 after this. The locomotive was not equipped with Unified Vigilance Warning and Train Control Device, for this reason the train was not automatically stopped after passing the signal at danger. After splitting the points, the train travelled further to Kőbánya-Kispest station instead of Rákos station. When receiving oral notification, the train stayed at Kőbánya-Kispest station and waited for further instructions.

Factual statements directly connected to the occurrence of the accident

The accident is considered as caused by human factors.

The occurrence of the accident could have been avoided with increased attention, better knowledge on the location and more experience of the personnel.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

Locomotive no. M 44 432 was not equipped with train control device, nevertheless, the train control system would not have avoided the occurrence, as the train was passing the signal at a speed lower than 15 km/h and was travelling between the stations according to the indications of the automatic block signal.

Considering that the run without the operation of a train control system increases the risk of an accident, run with train control system switched off should be very strictly limited. The regulation however uses an unclear concept in the relevant rule, this permitting in the opinion of the IC the possibility of a too wide interpretation of the exceptions. The IC issued therefore a safety recommendation.

Safety recommendations**BA-2010-459-01**

In the course of the investigation, the IC established (although, not as direct cause of the accident) that the definition of 'train for junction- and own services' (section 1.2.13 of Regulation no. F.2) – mentioned in section 12.3.11 as one of the permitted exceptions for running with no train protection system – was not sufficiently accurate. The definition used the term 'train between stations served by the running', but the IC could not find accurate description of this term in the regulation. Where the definition of the term used is not given, a wide range of interpretation and application of the exceptions when running with no train protection system allowed would be possible, circumvention of this important rule being also possible.

Transportation Safety Bureau recommends the National Transport Authority to revise in cooperation with the railway undertakings concerned the rules regarding 'junction freight service running', take effective measures for the accurate determination of stations served by a junction freight service running, in order to ensure that running with no train protection system conforming to the infrastructure requirements would be allowed only in justified cases.

The implementation of the safety recommendation would ensure the accuracy of the rules of running with no train protection system conforming to the infrastructure requirements and the application of these exceptions strictly in justified cases.

Accepted, implementation in progress

2010-493-5

On 22nd October 2010 at 05:25 hrs, the first wagon (four-axled) of train no. 60323-2 leaving Fényeslitke station according to the normal indications of the signals, derailed after the exit signal with both bogies on turnout no. 466.



**Picture 1: The derailed vehicle
(source: VBO)**



**Picture 2: Drag shoe found on the site
(source: VBO)**

Factual statements directly connected to the occurrence of the accident

The coupling operation of the wagons was not carried out by the railway employee specified by the Station Instructions.

After the coupling of the power car to the train, respectively during the brake test, the inspector of Rail Cargo Hungaria did not remove the drag shoe.

After the route reservation for the train, the contracted movements inspector did not check whether the drag shoe was stored or not under his supervision on the designated stand.

Factual statements indirectly connected to the occurrence of the accident

The station inspector accepted the status report of the engine driver on the train being ready to leave.

The station inspector, when ordering the route for the train, reported the takeover of the drag shoe without requesting information from the person in charge with the supervision of the object in question.

Other risk factors

The railway employees performed in some cases extra tasks, other than their functions and responsibilities. The employees, as well as their service superiors, tolerated this situation.

No recording device was operated at Fényeslitke station. The IC considers that the operation of a recording device motivates the staff to communicate in instruction-like form, this supporting the safety of the work.

Safety recommendations

Safety recommendation was not issued.

2010-529-5

On 19th November 2010 at 21:14 hrs, a fire occurred in the case no. 2 in the driver's cabin of the power car no. MX/A 1101, last wagon of train no. 4788 entering Rómaifürdő station. After stopping the train, the engine driver started the evacuation of the passengers and the extinction of the fire immediately. He also took the necessary measures for the forthright notification of the fire department, who, after arriving to the site, extinguished the fire. The driver suffered slight carbon monoxide poisoning and received treatment by the ambulance arrived on site.

Factual statements directly connected to the occurrence of the accident

The spring tensioning screw of the unit switch no. 6 in the case no. 2 of power car no. 1101 broke. The broken piece fell on the high voltage contact block of the reverser, causing short circuit and, as a consequence, a fire.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-044-5

On 28th January 2011 at 08:47 hrs, passenger train no. IC802 of MÁV Co., travelling on railway line no. 40 on the route Budapest-Pécs, collided with a car at the level crossing protected with warning lights and half-barrier SR2 at Szabadegyháza station.

As a consequence of the accident, the driver of the car and the passenger sitting next to the driver were seriously injured and transported to the hospital by the ambulance.

The locomotive of the passenger train was slightly damaged, the car was totalled, the gate and motor of the half-barriers were damaged.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the LC after breaking the barrier, ignoring the correctly functioning warning lights indicating red lights towards the road. The accident therefore was caused by human factors related to the driver of the car.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

At the time of the accident, minor nebulæ could be detected in the surroundings of the level crossing, which worsened visibility, but did not make impossible the early detection of the level crossing and of the indications on the warning lights.

Safety recommendations

Safety recommendation was not issued.

2011-106-5

On 6th March 2011 at 13:13 hrs, freight train no. 42001-2/48081-2 passed without permission exit signal V1 at danger on Ötvös turnout, left the station in the straight direction, split points no. 1 and entered the closed level crossing protected with warning lights SR1.



At the same time, passenger train no. 9534 was approaching the direction of station Zalabér-Batyk. The engine driver of the train noticed the train approaching from the opposite direction, applied emergency braking and gave visual warning signals using the lights of the locomotive. The driver of the train approaching from the opposite direction noticed the signals and stopped the train. No one was injured.

Factual statements directly connected to the occurrence of the accident

The passing of exit signal V1 at danger at Ötvös turnout was caused by human factors. The engine driver of the freight train did not observe the indication of the entry signal and was not prepared for the interpretation and execution of the instruction received by the signal, this being: **'Free at maximum speed applicable for the train. On the next signal 'Stop!' indication to be expected.'**

Factual statements indirectly connected to the occurrence of the accident

Due to local constraints, crossing of trains at Ötvös turnout shall be carried out, as 3 b) of section 15.18.10 of 'Train Loading and Running Regulation no. F2' determines, with the following condition: **'in case of trains from opposite directions, both trains shall have a scheduled stop according to the timetable and no exceptional passing through can be scheduled'**. In this case, both trains were passing through according to timetable, so the crossing of trains was carried out without the above condition being fulfilled.

With no diverging possibilities available, fulfilment of more conditions is necessary for simultaneous entry of trains arriving from opposite directions under exceptional circumstances, among others the following: **'for both trains at least 50 m distance is necessary between the exit signal and the shunting limit signal of the next connection point or crossing'**. According to the on-site measurements of the IC, the distance between the exit signal V1 and the shunting limit signal was in this case of 49 m.

Other risk factors

Due to local constraints, 'Train Loading and Running Regulation no. F2' lays down for the station inspector at Ötvös turnout the unlimited far distance visibility as a condition of simultaneous entry of trains from opposite directions. Although in this case far distance visibility was not limited, the station inspector did not dispose of the technical means or local staff to be involved in order to check far distance visibility.

The Station Instructions issued for Zalaszentiván station and the area controlled from there did not contain special provisions related to measures to be taken for traffic management in case of far distance visibility becoming limited.

When the railway line section was renewed, no block system was implemented and neither station lines, nor open lines were equipped to support continuous signalling. With continuous signalling not supported, in locomotives otherwise equipped with train control devices were no technical constraints operating that with vigilance signals would attract the attention of the driver to signals indicating danger or in case of a SPAD would automatically stop the train by applying emergency braking.

There was no second person, also experienced in stopping the train when necessary, to assist the engine driver in observing the signals along the line.

Safety recommendations**BA2011-106-05-01**

The IC established that the station inspector (as traffic controller) of Zalaszentiván station used Ötvös turnout to intersect the routes of the trains involved in the occurrence. The section referred of regulation no. F2 lays the condition: 'when far distance visibility not being limited'. In the investigated case, although the visibility was not limited, the traffic controller was not in the position to check this.

TSB recommends the National Transport Authority to have the rules regarding restricted visibility in the Train loading and running regulations no. F.2 revised on those KÖFI lines on which no station inspectors are in charge of ensuring for traffic controllers the availability of the necessary information regarding the occurrence of certain ambient conditions affecting – in some cases considerably – the train service.

With the implementation of the safety recommendation, the IC expects the relevant rules to become applicable on the Hungarian railways under the changed technical and technology conditions as well. The introduction of service stations with no crew resulted in the situation that no railway employees are on duty for train reception on the line to fulfil the observation, information and notification obligations provided by section 15.1.12 of Regulation no. F.2. Only the engine driver would be available in the position to discern and report on the far distance visibility conditions for approaching trains, for whom the regulation provides no such obligations.

Accepted, implemented

BA2011-106-05-02

The IC established that the station inspector (as traffic controller) of Zalaszentiván station used Ötvös turnout to intersect the routes of the trains involved in the occurrence. Train loading and running regulations no. F.2 allows this operation (in case of no diverging possibilities, parallel runs are allowed – taking into consideration local conditions). Entering of trains from opposite directions presents high risks for transportation safety therefore conformity with the relevant rules is of high importance. Further risk factor derives from the fact that no continuous signalling has

been implemented on the line therefore it is not capable of controlling the run of locomotives equipped with train control device.

In order to reduce safety risks, TSB recommends MÁV Co. to specify for Boba-Bajánsenye oh. railway line (like in the case of other railway lines of similar structure) that train crossings shall not be carried out with parallel movements, i.e. 'Clear' indication for the train travelling from the opposite direction shall not appear on the entry signal before the station inspector at the traffic control station receives information that the trains had stopped.

The implementation of the safety recommendation would ensure that only after receiving information on the stop of the train gives the station inspector clear indication for the train from the opposite direction. This would decrease considerably the risk of accidents in case of intersecting routes of trains.

Accepted, implementation in progress

2011-109-5

Locomotive no. M41-2170 of train no. 6517 collided with a car at the unprotected level crossing in railway section no. 352, between Hortobágy and Balmazújváros stations. The three men travelling in the car died at the site.

Factual statements directly connected to the occurrence of the accident

The driver of the car noticed the approaching train too late and although he was braking, the car entered the LC.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The traffic sign marking the LC towards the direction of the approaching car was not of the height required by the relevant regulation.

Safety recommendations

Safety recommendation was not issued.

2011-124-5

On 20th March 2011 at 15:08 hrs, power car no. 5341-001-5 of train no. 4544 collided with a motorcyclist between Háros and Nagytétény-Diósd stations at the level crossing protected with warning lights and half-barriers no. AS87.

The motorcyclist died at the site. The power car was slightly damaged and the supply lines of the half-barrier were damaged. The motorcycle was totalled.

Factual statements directly connected to the occurrence of the accident

The driver of the motorcycle entered the LC ignoring the 'Stop!' indication of the warning lights and the completely closed status of the half-barriers.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC considers unsafe the footpath and the bikeway in the LC no. AS87.

Safety recommendations**BA2011-124-5-01A**

During the site survey after the occurrence, the IC established that the footpath and the bikeway in the LC did not meet the requirements stipulated in chapter VIII, sections 26.6 and 27.2 of Decree 20/1984. (XII. 21) of the Minister of Transportation, considering that the LC had no protection together with the road parallel to the track, furthermore, the barriers placed in the LC could not perform their function due to their poor condition.

Therefore, TSB recommends the Government Office of the Capital City Budapest to examine the structure of the LC in the railway section no. 87+68 between Háros and Nagytétény-Diósd stations, with particular attention to the crossing with the footpath and bikeway parallel to the road (pedestrian gate – 'labyrinth barrier', visibility of the warning light signal) and take the necessary measures according to the investigation conducted.

By implementing the safety recommendation, deficiencies of the LC concerned can be eliminated and conditions of the safe crossing of pedestrians and cyclists can be ensured.

Accepted, implemented

2011-153-5

On 3rd April 2011, a passenger train collided with a car at the level crossing protected with warning lights AS 399 between Szentes and Gádos stations. The car entered the LC ignoring the 'Stop!' indication of the warning lights. The driver of the car and his passenger were injured.

The IC established that the warning lights were operating properly, the train was running at the permitted speed, the accident was caused by human factors related to the driver of

the car.

Factual statements directly connected to the occurrence of the accident

The IC considers human factors related to the driver of the car as the cause of the accident.

The warning lights were operating correctly, the train was running at the permitted speed.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The road traffic signs marking the LC were not placed at the required distances and sight triangles were obstructed as well.

Safety recommendations**BA-2011-153-5-01**

Three of the sight triangles in the Level Crossing concerned are obstructed and the placement of the road traffic signs marking the LC does not meet the requirements.

TSB recommends the Inspectorate of Transport of the Government Office for Csongrád County to examine the design of the level crossing and take the necessary measures according to the findings.

The implementation of the safety recommendation would decrease the risk of accidents deriving from the present design of the level crossing.

Accepted, implemented

2011-203-5

On 10th May 2011 at 23:52 hrs, contact line maintenance machine no. 2391 running from Vác to Csomád station passed at Órbottyán station the exit signal K at danger, split points no. 2, ran out to Órbottyán-Veresegyház line section and travelled without permission up to Veresegyház station.



The splitting of the points was not signalled to KÖFI-fszt. (Central Traffic Management) on the panel ILTIS of the safety installation because the gear broke out from the timber sleepers and for this reason the safety installation did not detect the points splitting.

During the unauthorized run of the maintenance machine, train no. 2458 was authorized by KÖFI-fszt (Central Traffic Management Service) to depart from Veresegyház station, after being notified in

written form about the unserviceable status of the exit signal. The train could not depart though due to a problem with its doors and the Central Traffic Management Service gave 'Stop!' indication to the train with hand-signals. This way the train departed only after the arrival of the maintenance machine to Veresegyház station.

Factual statements directly connected to the occurrence of the accident

The IC considers that human factors related to the crew of the maintenance machine, the lack of due attention caused the occurrence.

Factual statements indirectly connected to the occurrence of the accident

Concerning departure schedule from Órbottyán station of train no. 2391, the latest departure time of the train had been incorrectly determined, for which reason the timing of the train passing in opposite direction had to be modified, the passing program set on the safety installation had to be cancelled, and an emergency release of the routes was necessary.

The switch timber for locking the points at turnout no. 2 at Órbottyán station was damaged inside, the fixing bolts could not counterweight the forces created when the train split the points and the locking of the points broke. The drive therefore moved with the switch blades of the points split and the safety installation did not signal the splitting of the points, it permitted the run through the points at maximum permitted speed.

Cancellation of the passing program set earlier on the safety installation and the emergency release of the route on the entry side result in the display of a 'Clear' indication on the exit signal. This indication of the signal is not a transmission of the instruction initiated by the station inspector for clear pass of the train, for this reason it bears a high accident risk. TSB issues safety recommendation.

Other risk factors

No proper measures had been taken for hours for the transportation of the passengers retained on the train. Those passengers that decided on leaving the train opened the doors with the emergency lockers and left the train by foot on the high ballast, in a curved line segment, in darkness, this also bearing a high accident risk.

Safety recommendations

BA2011-203-5-01

In the course of the investigation, the IC established that at Órbottyán station, after the cancellation of the passing program and parallel to the emergency release of the entry route, the route on the exit side closes and 'Clear' indication is displayed on the exit signal, not depending on the decision of the station inspector.

TSB therefore recommends the National Transport Authority to examine the operating logic of the safety installation and take the necessary measures according to the findings.

The IC considers that the acceptance and implementation of the safety recommendation would ensure the exit signal displaying 'Clear' indication only on the decision of the station inspector.

2011-211-5

On 16th May 2011 at 16:43 hrs, the line manager – consulting with the signal dispatcher – classified the automatic block system unusable and ordered running on distance between stations. At 18:16 hrs, train no. 5503 left Tura station on the right track towards Aszód station and approached train no. IC568 from the opposite direction. Station inspector of Tura station noticed shortly after the departure that train no. 5503 ran to the right track instead of the scheduled left track. He reported this to the line manager, who notified on radio the engine driver of train no. IC568 and ordered him to stop the train immediately. After stopping the train, the engine driver gave light signals (using the lights of the locomotive) towards train no. 5503, and the chief train inspector hurried by foot towards the train approaching from the opposite direction to warn the engine driver of the other train, who noticed the warning signals and stopped the train. The two trains stopped at a 1630 m distance from each other.

Factual statements directly connected to the occurrence of the accident

The IC established that the accident was caused by the following:

- Points at Tura station had not been set to the correct (left) track direction for train no. 5503. The inspection of the points and of the route did not reveal this.
- The crew of train no. 5503 did not interpret correctly the written order, passed exit signal at danger at a speed higher than permitted.
- Train no. 5503 did not stop before the points set in the incorrect position.
- Train no. 5503 ran to the wrong (right) track and continued to travel on the track.
- The chief train inspector did not warn the engine driver to stop immediately.

Factual statements indirectly connected to the occurrence of the accident

No radio tests had been initiated in the case of train no. 5503. The attempt of the line manager to eliminate the danger was ineffective. Since no log has been found in the operation logbook of the locomotive on the failure of the radio and no oral notification stated this either, the IC considers that the reason of the failure of the radio communication had been the inappropriate channel set.

Other risk factors

The IC considers that the 2-hour long railway traffic trainings provided for the chief train inspectors quarterly are not in proportion with their activity and responsibility in the railway traffic.

The IC also considers as further risk factor the test-system examination method applied in the case of engine drivers. The introduction and application of this for a longer period also contributes to the fact that the practical knowledge of engine drivers on rules applied relatively rarely does not achieve the required level.

Safety recommendations**BA2011-211-5-01A**

Points at the exit from Tura station for train no. 5503 leaving the station were not in the position required for the direction given by the station inspector. The engine driver as well as the crew-member appointed for observation did not notice this. On the line segment concerned, manual closure required in situations of this kind of the light barriers reported back to the station was also neglected. Therefore, TSB issues the following safety recommendation:

MÁV Co., GYSEV Zrt. as well as BKV Zrt. – being the main railway infrastructure operators in Hungary – should implement at every location equipped with safety installations the application of a checklist accessible for the whole traffic management crew, listing related to each field of activity the special tasks, different from the general routines, to be completed in case of certain not ordinary traffic situations.

TSB expects the implementation of the safety recommendation to ensure the availability for the station personnel of a tool clearly determining which tasks in which order should be completed in the case of not ordinary traffic situations (e.g. Automatic Train Protection rendered unusable, introduction of station to station distance trains, etc.). This checklist should remind the personnel involved of measures, procedures to be applied in those not frequent traffic situations that significantly differ from the daily routine, in order to support safe operation under extraordinary circumstances.

Accepted, implemented

BA2011-211-5-02A

Points at the exit from Tura station for train no. 5503 leaving the station were not in the required position for the direction given by the station inspector – i.e. towards the correct track assigned for trains having odd numbers as identification – these were set to diverging direction towards the irregular track. The engine driver, as well as the crew-member appointed for observation, did not consider this an irregularity, in spite of the fact that they had not received any notification on being directed to the irregular track, the train therefore did not stop before the points, but ran out of the station.

TSB therefore issues the following safety recommendation:

The unit responsible for the maintenance of Train Loading and Running Regulation no. F.2, in cooperation with the unit responsible for the maintenance of Regulation no. E.1 concerning staff of locomotives, should develop a checklist available on locomotives that determines for the crew of the locomotive the special procedures, tasks, different from the general routine, to be applied in case of certain not ordinary traffic situations.

TSB expects the implementation of the safety recommendation to ensure the availability for the station personnel of a tool clearly determining which tasks in which order should be completed in the case of not ordinary traffic situations (e.g. Automatic Train Protection rendered unusable, introduction of station to station distance trains, etc.). This checklist should remind the personnel involved of measures, procedures to be applied in those not frequent traffic situations that significantly differ from the daily routine, in order to support safe operation under extraordinary circumstances.

Accepted, implemented

BA2011-211-5-03A

In the case of a few railway incidents investigated by TSB, human factors related to insufficient knowledge of railway regulations and inadequate application of these have been revealed among the causes of accidents. The recently issued Decree 19/2011 (V.10) of the Minister of National Development determines among others the rules regarding the system of basic training and examination as well as recurrent training and examination of the personnel involved in activities that concern railway safety. The regulation adopts a new basis for training and examination, strengthening the role of the NTA in order to enhance the efficiency and uniformity of the system. For a significant part of the jobs involved in railway safety the decree comes into force on 1st January 2013, the experiences of recent occurrences, however, would justify its introduction as soon as possible.

Therefore, TSB recommends the Minister of National Development to examine the possibility of an amendment in section 36 (2) of the abovementioned decree to the provision specifying 1st January 2013 as date of entry in force, so that the regulation included would be – without prejudice to the preparation period necessary – applicable as soon as possible for every activity involved in railway safety.

TSB expects the implementation of the safety recommendation that, by the entry into force as soon as possible of the abovementioned decree, a new basis would be adopted for the system of basic training and examination as well as recurrent training and examination of the personnel in jobs related to railway safety and this would function as a uniform system under the supervision of the NTA, ensuring the high level of training and control of the knowledge of the personnel involved.

Accepted, implemented

BA2011-211-5-04A

Based on experiences and information gathered during investigations in the recent period, related to SPADs as well as occurrences involving trains approaching each other from opposite directions, the IC established that tuition and control of knowledge to be applied in extraordinary traffic situations, different from the daily routine, was extremely important. With regard to the fact that the recently issued Decree 19/2011 (V.10) of the Minister of National Development adopts a new basis for the system of training and examination and the implementation of this system is in progress, TSB issues the following safety recommendation:

During registration phase of the training organization process, the NTA should draw the attention of the parties concerned to include with particular emphasis in the professional content of their recurrent trainings the rules and procedures that differ from the daily routine and are applicable in extraordinary traffic situations.

TSB expects the implementation of the safety recommendation to ensure for the personnel involved the necessary preparedness and know-how for solving not ordinary traffic situations and would support the gaining of a sufficiently sound professional knowledge for the safe handling of these cases.

Accepted, implemented

BA2011-211-5-05A

Based on experiences and information gathered during investigations in the recent period, related to SPAD as well as occurrences involving trains approaching each other from opposite directions, the IC established that tuition and control of knowledge to be applied in extraordinary traffic situations, different from the daily routine, was extremely important. With regard to the fact that the recently issued Decree 19/2011 (V.10) of the Minister of National Development adopts a new basis for the system of training and examination and the implementation of this system is in progress, TSB issues the following safety recommendation:

The NTA should invite the examination centre under its supervision to include with particular emphasis in the basic and recurrent examinations content and regularly check the knowledge on rules and procedures applicable in extraordinary traffic situations.

TSB expects the implementation of the safety recommendation to ensure that the examination centre would check during basic and recurrent examinations the knowledge on rules and procedures applicable in extraordinary traffic situations of the personnel involved in railway traffic management and operation.

Accepted, implemented

BA2011-211-5-06A

Based on experiences and information gathered during investigations in the recent period, related to SPADs as well as occurrences involving trains approaching each other from opposite directions, the IC established that in most of the cases human factors related to insufficient knowledge of railway regulations and inadequate application of these had also been revealed among the causes of the accidents, therefore, TSB issues the following safety recommendation:

The NTA should implement as soon as possible the procedure that ensures the control of professional knowledge of the personnel involved in traffic situations affecting railway safety and should apply, when necessary, the provisions of section 22 (3) of Decree 19/2011 (V.10.) of the Minister of National Development, according to which employees with insufficient knowledge shall be required to take recurrent examinations.

TSB expects the implementation of the safety recommendation to ensure that the employees with incomplete knowledge or insufficient competence in jobs related to railway safety could be filtered out as quickly as possible and obliged to complete their knowledge.

Accepted, implemented

2011-213-5

On 18th May 2011, passenger train formed of power car no. 402 collided with a motorcycle at the unprotected level crossing (unpaved road crossing the railroad) after Tiborszállás mrh. The motorcyclist died at the site.

The IC established that the sight triangle in the LC was not clear, but the visible distance would have been sufficient for observing the approaching train and crossing safely. A load causing instability of the motorcycle also contributed to

the occurrence of the accident.

Factual statements directly connected to the occurrence of the accident

The IC considers that human factors related to the motorcyclist and the instable load of the motorcycle caused the occurrence of the accident.

The train was running at the permitted speed.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The sight triangle concerned in the accident was not clear.

The placement of the signals (V-signs) did not fulfill the requirements.

Safety recommendations**BA2011-213-5-01**

In the course of the investigation, the IC established that due to the dense vegetation the sight triangle was not ensured at the unprotected level crossing located in the area of loading halt Tiborszállás mrh.

Transportation Safety Bureau recommends the Inspectorate of Transport of the Government Office for Szabolcs-Szatmár-Bereg County to examine the design of the level crossing and take the necessary measures according to the findings.

Transportation safety could be improved by the implementation of the safety recommendation, by ensuring the required visibility in the LC in coordination with the speed regulation of trains.

Accepted, implemented

2011-215-5

On 18th May 2011 at 21:03 hrs, freight train no. 45439/56500-1 departed without permission from the track V at Újfehértó station, passed exit signal K5 at danger and approached from opposite direction to passenger train no. 6018 entering the station regularly, according to the signal indications. The freight train applied emergency braking before the first points no. 12 set in incorrect position for the train and stopped without splitting the points at 42 meters past the exit signal K5, in the route of train no. 6018 directed to track IV.

Factual statements directly connected to the occurrence of the accident

The IC considers that the occurrence was caused by human factors. The engine driver departed with the train relying on the sound signals of the digital cab signal.



The engine driver did not observe the digital cab signal or the colour indication on the exit signal K5.

Factual statements indirectly connected to the occurrence of the accident

A modification in the circuit of the continuous signalling of track V was made at a certain time (exact date unknown) after the installation of the device in 1974. The modification had the effect that 11 minutes after the entry route being released and track V becoming occupied,

stage 1 would switch off and subsequently a continuous 75Hz power would be applied.

After stopping, there was a distance of approx. 1 m between the locomotive of train no. 45439/56500-1 and the exit signal K5. Due to the design of the plates of the light signals, the engine driver could not see the indication of the signal and from the infiltrating yellow light he mistakenly presumed that signal K5 was set to 'Clear' status for the train.

No regulation justified the engine driver stopping the train so close to the exit signal. The engine driver had put himself in the position of having difficulties with observing the signal indications.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-279-5

On 20th June 2011 at 18:55 hrs, passenger train no. 5226 collided with a car at the level crossing protected with warning lights no. AS199 on the open line between Bodrogkeresztúr and Olaszliszka-Tolcsva stations.

Locomotive no. M41-2335 pushed the car on a distance of approx. 200 m until the train stopped. The driver of the car and his passenger died at the site. No one was injured on the train, there was minor damage to the locomotive, the car was totalled.

In the course of the investigation, the IC established that at the time of the accident the warning lights were flashing red lights towards the road, the visibility of the warning lights was not obstructed by the vegetation or other visual landmarks. The train was running at the permitted speed. The IC also established that the sight triangle was not ensured in the LC due to the dense vegetation.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the LC ignoring the warning lights indicating stop sign (red lights) towards the road, the accident therefore was caused by human factors related to the driver of the car.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The sight triangle in the LC was obstructed by the dense vegetation.

Safety recommendations

BA2011-279-5-01A

During the site survey on 23rd June 2011 (posterior to the occurrence), the IC established that the road traffic signs placed in the LC did not meet the requirements stipulated by the regulations (number of traffic signs and distance of these from each other), respectively, the required visibility triangle was not ensured due to the dense vegetation (trees, bushes).

Therefore, TSB recommends the Inspectorate of Transport of the Government Office for Borsod-Abaúj-Zemplén County to revise the structure of the LC in railway section no. 199+95 between Bodrogkeresztúr and Olaszliszka-Tolcsva stations, with particular attention to quantitative and qualitative requirements concerning road traffic signs and visibility conditions and take the necessary measures according to the findings of the investigation conducted.

By the implementation of the safety recommendation, deficiencies of the LC concerned can be eliminated and the conditions of safe crossing of the LC can be ensured.

Accepted, implemented

2011-376-5

On 3rd August 2011 at 11:42, train no. 852 struck two bicyclists at the level crossing protected with warning lights and half-barriers no. AS1449 between Balatonlelle felső and Balatonboglár stations. Both bicyclists died at the site. None of the passengers of the train were injured, the train was not damaged.



Traffic sign in wrong position



Parking car near the warning lights

Factual statements directly connected to the occurrence of the accident

Based on the findings of the site survey, the documents procured and the analysis of the photos taken on site, the IC established the following:

- The bicyclists entered the LC in spite of the 'Stop!' indication on the warning lights and the closed status of the half-barriers.
- The second bicyclist fell on the track and could not leave the structure gauge before the train arrived. The other bicyclist, who was trying to help, could not leave either.
- Train no. 852 was running at the permitted speed, and the IC considers that the engine driver made every effort possible to avoid the accident.

In this situation, the prevention of the accident would have been possible only by the proper action of the bicyclists.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The traffic pattern at the level crossing concerned bears a high accident risk because of the design of the LC, the heavy traffic in the crossing and the roads from several directions joining in.

The two aged bicyclists were probably less attentive due to the warm summer weather.

Safety recommendations

BA2011-376-5-01

Concerning the LC between Balatonlelle felső and Balatonboglár stations in railway section no. 1449+95, the IC established the following:

- *no route marks for bicycles were present between the bikeways along Vasút and Köztársaság streets,*
- *cyclists could cross the LC only together with the road traffic,*

- *road vehicles sometimes could not leave the LC because of the pedestrian crossings present in the junction,*
- *cars frequently parked in Hortenzia Street in a way obstructing the visibility of the traffic signs and the warning lights.*

TSB recommends the Inspectorate of Transport of Somogy County Government Office to examine the LC and the traffic order in the junction, as well as traffic habits in the area, and take the necessary measures according to the findings.

The IC considers that the acceptance and implementation of the safety recommendation would increase the safety of crossing the LC for cyclists, pedestrians and road vehicles.

Accepted, implemented

2011-384-5

On 8th August 2011 between Tatabánya and Tata stations, a passenger fell off the last carriage of the train travelling from Budapest-Keleti station to Szombathely and Sopron stations. The passenger died after being transported to the hospital.

Factual statements directly connected to the occurrence of the accident

The speed dependent door locking system of the carriage was not functioning therefore probably even two doors stayed open in the carriage concerned.

The passenger who suffered the accident might have lost his balance and fell off the train through the open door.

Factual statements indirectly connected to the occurrence of the accident

The sliding door of the carriage, when stuck, can be opened only by a dynamic motion. The inclined floor of the lobby of the carriage also could cause someone to lose their balance.

There is no feedback from the operator to the maintenance system of the carriages. In several cases, failures are not revealed during inspections and are not repaired.

Other risk factors

Passing the site of the accident, the train was running at a speed exceeding the permitted speed limit with 13-14%.

Safety recommendations

Safety recommendation was not issued.

2010-563-5, 2010-576-5, 2011-425-5

On 29th August 2011 at 09:38 hrs, first two wagons set directly after the locomotive of freight train no. 45481-2 leaving Debrecen station regularly, according to the signal indications, running on track VI, derailed on the crossing middle blade of turnout 73/b. No one was injured.



In the course of the investigation of the occurrence the IC considered previous occurrences as well, and concluded that the present occurrence and its causes were similar to the mentioned previous cases.

On 9th December 2010 at 09:04 hrs, second axle of the first bogie of the first carriage of train no. 91115 leaving Budapest-Soroksár marshalling yard regularly, according to the signal indications, running on track XIV, derailed on the crossing middle blade of points no. 4.

On 13th December 2010 at 15:30 hrs, first two wagons of a shunting unit derailed in turnout no. 9 at Hódmezővásárhely.

Factual statements directly connected to the occurrence of the accident

In the course of the investigation, the IC established that the investigated accidents occurred due to the fact that the drag shoes to prevent the break away of the train had not been removed.

The IC concluded that the derailment of the vehicles had been caused by the drag shoes stuck under the trains in motion, these causing the bogies to jump off the rails.

Factual statements indirectly connected to the occurrence of the accident

The IC established the following:

- Time log of the completion of reparation tasks of train no. 45481-2 at Debrecen station (train inspection, brake test) was missing from the logbook, as well as the log related to removing of the drag shoe.
- The painting of the drag shoe placed under the wheels of the vehicle was worn off, this decreasing the perceptibility of the object.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations**BA2011-425-5-01**

The IC established based on previous experiences and on the finding of the investigation of the occurrence the inadequate visibility of tools designated to stop railway vehicles from breaking away. Characteristics, the wearing off of the painting and impurity of these tools result in repeated situations when these tools remain under the departing vehicles and cause derailments.

TSB therefore recommends the National Transport Authority to examine in cooperation with the organisations concerned the regulations related to tools designated for stopping railway vehicles from breaking away and to propose the introduction of a tool or signal appropriate for clear

indication, perceptible from a larger distance, of the application of a tool of this kind under a certain vehicle.

The IC considers that by increasing the perceptibility of these tools – different methods being present in the international practice also – the risk of accidents that originate in similar causes would decrease significantly.

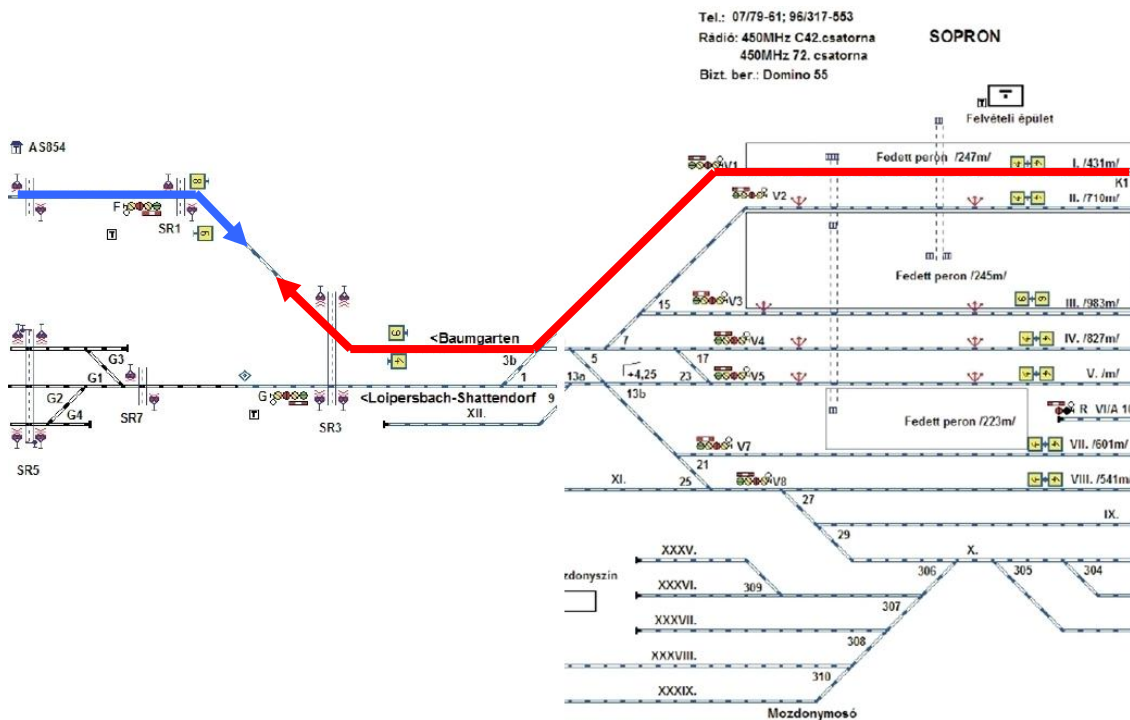
Accepted, implementation in progress

Note: In addition to the safety recommendation TSB would like as well to call the attention of the organisations directly involved in railway operation to the importance of regular controls, with special emphasis on the control of how procedures are followed and on the effort of putting an end to improper practice, as well as of maintaining theoretical and practical knowledge on the required level.

2011-465-5

On 18th September 2011 at 22:54 hrs, train no. 47116 entering Sopron station on track V1 passed the individual exit signal at danger, running further split points no. 3/a, passed through LC protected with warning lights SR3 and entering a curve to the right noticed the light of a locomotive approaching from the opposite direction. The engine driver immediately applied emergency braking, stopped the train and notified the station inspector. The train stopped in railway section no. 848+70.

At this time, train of locomotives no. 85875 was running from Ebenfurth (Austria) station to Sopron station, the station inspector set its route to track V and set 'Clear' indication on the entry signal. The entry signal changed to 'Stop!' indication after the points no. 3/a had been split. The engine driver, when noticing this 'Stop!' indication, applied emergency braking and stopped the train at approx. 180 m distance from the train approaching from the opposite direction. No one was injured.



1. Passing of exit signal V1 at danger at Sopron station was caused by human factors, the reason of the occurrence being the fact that the train did not stop at the 'Stop!' indication of the signal.

2. Sopron station was equipped with EVM train control system, from the border INDUSI train control system was operating. Train no. 47116 was scheduled to run in Austria after leaving Sopron-Rendező station. For this reason the engine driver had set INDUSI operating mode at Sopron-Rendező station, which had the effect that no train control was operating at the time of the occurrence, since the continuous signal transmitted by the equipment of the railway line could not be interpreted by the locomotive.

3. Due to local constraints, crossing of trains at Sopron station shall be carried out, as 3 b) of section 15.18.10 of 'Train Loading and Running Regulation no. F2' determines, with the following condition: ***'in case of trains from opposite directions, both trains shall have a scheduled stop according to the timetable and no exceptional passing through can be scheduled'***. In this case, the freight train was passing through according to timetable, so the crossing of trains was carried out with the above condition not being fulfilled.

Factual statements directly connected to the occurrence of the accident

The IC considers as directly connected to the occurrence the following: no regulation determined where the operation mode switch should be applied in case of different train control systems. No relevant document could be presented to the IC containing regulation of this operation.

Factual statements indirectly connected to the occurrence of the accident

The IC considers as further risk increasing factor the fact that the station inspector directed train no. 47116 to track I, where the engine driver was paying special attention to the right side platform, as he noticed persons approaching in an uncertain manner. This abstracted the attention of the engine driver.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations**BA2011-465-05-01**

The IC established that the train control device of the engine hauling train no. 47116 was set at Sopron marshalling yard to INDUSI operating mode, since the train was scheduled to run in Austria after leaving Sopron-Rendező station marshalling yard. Sopron station is equipped with EVM train control system, for this reason the train control could not be applied due to the different systems, no automatic emergency braking was applied after passing the signal at danger. Considering these facts, the IC initiates the issuance of the following safety recommendation:

TSB recommends the National Transport Authority to examine the Action Plan issued by GYSEV Zrt. and cooperate in its completion in case of conformity. (According to the Action Plan GYSEV Zrt. should install INDUSI signalling equipment, magnets where necessary on tracks at Sopron station to ensure train control being always applied, in order to decrease the consequences of a possible SPAD occurrence.)

Through the implementation of the safety recommendation, the IC expects the conditions that ensure the applicability of the relevant provisions of the train loading and running regulation to be fulfilled, expects regular hauling of trains on the railway line sections to be carried out only with locomotives equipped with train control devices appropriate for train control system of the railway line concerned.

Accepted, implementation in progress

BA2011-465-05-02

The IC established that on the railway lines constituting the route of train no. 47116 different train control systems were implemented. The train control system of type INDUSI was selected at Sopron-Rendező marshalling yard, this having the result that the automatic emergency braking to be applied failed due to the difference of train control system type (EVM) on the next station (Sopron station), when the train passed the signal at danger. The IC also established that the location of switching from one system to the other was not specified.

TSB recommends the National Transport Authority to oblige GYSEV Zrt. to regulate the switch operations of train control systems also – on which segments these operations are allowed – on tracks equipped with different train control systems, with consideration to train protection equipments installed on locomotives of trains concerned.

With the implementation of the safety recommendation, the IC expects the switching of train control devices from one system to the other to be carried out in a regulated way, ensuring by this that hauling of trains on railway lines equipped with train protection system to be carried out by locomotives equipped with train protection devices conforming the train protection system of the line.

Accepted, implementation in progress

2011-470-5



On 19th September 2011 at 20:47 hrs, an employee of MOL Plc climbed on the top of the tank wagon no. 31 53 798 5304-3 of train no. 45111 waiting for departure at Dunai Finomító station, approached the high voltage contact line above the track and suffered serious electric shock.

Factual statements directly connected to the occurrence of the accident

The victim of the accident climbed the tank wagon without permission, having no expertise, and he approached the contact line to an extent that he suffered electric shock and serious burns.

Factual statements indirectly connected to the occurrence of the accident

The victim of the accident and his colleague, at the direction of the operation manager of Felső Vasúti Töltő, attempted without expertise, permission or authorisation the replacement of the lead at Dunai Finomító station.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-474-5

On 22nd September 2011 at 5:00 hrs, the 18th wagon of train no. 45214-1 departing Szolnok station on track V derailed with four axles on the turnout no. 22. The derailed wagon damaged the points no. 22 and 14, as well as the railway track.

**Factual statements directly connected to the occurrence of the accident**

The IC considers that the occurrence of the accident was caused by more factors acting simultaneously, factors that acting alone would not have necessarily lead to an accident.

- The wheel-load difference in diagonal direction on the backward bogie of the derailed four-axle wagon no. 33 53 933 2157-5 loaded with maize was higher than permitted.
- A drain sack could be found in the crossing no. II between turnout no. 34 and 22 on the left side (according to the running direction) of the exit route of the train.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-537-5



On 26th October 2011 at 17:35 hrs, the 3rd axle of the power car no. M41-2324 of train no. 526 broke and the vehicle derailed with one axle between Mezőzombor and Bodrogkeresztúr stations in railway section no. 67+83. By applying emergency braking, the train stopped on a 146 m distance. No one was injured.

Factual statements directly connected to the occurrence of the accident

The IC established that the derailment of the power car no. M41-2324 of train no. 526 was caused by the breakage due to fatigue of the material of the 3rd axle of the vehicle.

The material test revealed that the features of the structure of the axle points to the fact that the heat treatment was not completely impeccable, dendritic structure indicating inadequate forging was found in the texture.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-539-5

On 27th October 2011 at 04:45 hrs, train no. 56500 entering Nyíregyháza-Északi-kitérő to track I passed individual exit signal V1 at danger at a speed of approx. 7 km/h, split points no. 11 and stopped on points no. 9 in railway section no. 466+49. At the same time, train no. 5129 approached Északi-kitérő from Nyíregyháza station and the traffic controller set for the train 'Clear' indication on entry signal B. When train no. 56500 reached the route of

train no. 5129, entry signal B automatically changed into 'Stop!' indication, therefore train no. 5129 applied emergency braking and stopped in railway section no. 469+34 at 04:48 hrs. The two trains were at a 285 m distance from each other.

Factual statements directly connected to the occurrence of the accident

Passing exit signal V1 of Északi-kitérő at danger was caused by human factors, by the fact that the engine driver of the freight train fell asleep and was not prepared to complete the instruction received on the entry signal '**Stop indication on next signal. Prepare to stop**', not stopping the train before the exit signal indicating 'Stop!'.

Factual statements indirectly connected to the occurrence of the accident

At the time of the occurrence, the properly operating safety installation was signalling track occupation. The entry track was released after train no. 56500 had entered the track and the safety installation immediately allowed for the KÖFI traffic controller to set the track for train no. 5129 arriving from the opposite direction and set 'Clear' indication on the entry signal. The KÖFI controller is not in the position to check directly the actual status of the train (whether it stopped or not). As an indirect possibility, the traffic controller may instruct (as in this case) the station inspector on duty at the site concerned to check the situation or to prevent or decrease the danger. Another possibility is the communication (via radio or mobile phone) with the train crew.

The properly operating train control system at Északi-kitérő could not handle and prevent the passing of exit signal at danger because the train was running at a speed lower than 15 km/h (7 km/h). Below this speed limit, the train control system does not apply the vigilance signal or the emergency braking, in this interval vigilance control is operating by the application of the vigilance pedal. The train control system typical in our country is not suitable for the danger prevention of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-560-5



On 7th November 2011, train no. IC 622 collided at the level crossing protected with warning lights and half-barrier no. AS35 with a car that by-passing the closed barrier entered the LC. The driver of the car died at the site, there were no other injuries. The locomotive derailed with one axle.

Factual statements directly connected to the occurrence of the accident

The IC considers that the accident was caused by the behaviour of the driver of the car.

The train was running at the permitted speed.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-584-5

On 17th November 2011, train no. 2926 between Pestszentimre and Ócsa stations struck a bicyclist at the unprotected level crossing near LC protected with warning lights AS171. The bicyclist suffered serious injuries in the accident.

Factual statements directly connected to the occurrence of the accident

The IC considers that the accident was caused by the behaviour of the bicyclist.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2011-588-5

On 20th November 2011 at 10:30 hrs, a passenger train on the H8 Gödöllő HÉV (suburban railways) line of BKV Zrt. collided with a car at the level crossing protected with warning lights no. AS306 at Erzsébet park stop.



One of the three persons in the car suffered serious injuries, the other two persons suffered minor injuries in the accident. The car was totalled.

The IC established that the driver of the car entered the LC and drove on the railway ignoring the 'Stop!' indication of the properly operating warning lights.

Factual statements directly connected to the occurrence of the accident

The driver of the car ignored the indication of the warning lights flashing red lights towards the road, the accident was considered as caused by human factors related to the driver of the car.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The warning lights frequently malfunctioned and these technical failures were not logged regularly in the error log.

Safety recommendations

Safety recommendation was not issued.

2011-610-5

On 7th December 2011 at 06:47 hrs, train no. 2378, when entering Göd station on track III under normal signalling, did not stop in the station, passed individual exit signal V3 at danger at a speed of approx. 7 km/h. Train no. 45502 departed with permission from track IV and collided into the side of train no. 2378. No one was injured. The locomotive of the freight train and the first wagon of the train set derailed.

**Factual statements directly connected to the occurrence of the accident**

The passing of signal V3 at danger and the collision of the trains was caused by human factors, the accident occurring because:

- the train scheduled to stop in the station did not stop,
- the engine driver of train no. 2378 entering track III mistakenly interpreted the

indication of the signal of track IV as relevant and passed signal V3 at danger,

- infringing the rule no. 15.18.10 of Train Loading and Running Regulation no. F.2, individual exit signal of track IV was set to 'Clear' status, even though the train entering track III had not stopped.

Factual statements indirectly connected to the occurrence of the accident

The IC did not establish findings of this kind.

Other risk factors

The IC did not establish findings of this kind.

Safety recommendations

Safety recommendation was not issued.

2012-067-5

On 1st February 2012, two trams were running after each other when the driver of the second tram did not notice the switching device at the first points on the branch towards Határ út at the Nagykőrösi junction and modified the points while passing it. The first tram derailed, still being in motion on the points. No one was injured, the traffic was obstructed.

**Factual statements directly connected to the occurrence of the accident**

The device supposed to prevent switching under the train was out of order.

The driver of the second vehicle did not notice the points switching device and for this reason did not take the necessary measures to prevent the modification of the points. The second tram was too close to the other vehicle (within the distance of the points switching device), for this reason the first tram could not leave the points in time and the switching under the train could occur.

Factual statements indirectly connected to the occurrence of the accident

The blue light indicating the switching device was not operating, for this reason the location of the device could not be noticed in the early morning dusk by the driver of the second tram – who was not a driver experienced in the daily routine.

Other risk factors

The traffic was obstructed due to theft and damage occurred the previous morning, this causing the congestion of the trams.

The switch signal was out of order.

Safety recommendations

Safety recommendation was not issued.

2012-471-5, 2012-475-5

On 17th July 2012, a tram on line no. 2 derailed while running at low speed in the curve after Szalay utca stop (towards Jászai Mari tér). After restoration, the first tram next morning derailed on the same spot on 18th July 2012.

Factual statements directly connected to the occurrence of the accident

The surface of the outer stretch of rails of the track was deformed (bulged) due to inadequate welding reparation, which contributed to the hog of the wheel while lead not being ensured by the inner stretch of rails either.

This deficiency had not been revealed during the welding operation or in the acceptance procedure and it had not been repaired.

Factual statements indirectly connected to the occurrence of the accident

The side wear of the railway track was repaired at a later time than technically justified, further collateral deficiency being this way formed on the track – this increasing safety risks.

There was no regulation defining the upper limit of the side wear on a railway track in service.

Other risk factors

Tram drivers do not carry their railway driver certificate.

Safety recommendations

BA2012-475-5-01

In the course of the investigation, the IC established that the regulation concerning local railways specified only maintenance and action limits for the depth of the side wear of rails, but the rules did not determine measures to be taken, speed limits to be applied or values that require declaration as unserviceable of the rail.

Transportation Safety Bureau recommends the National Transport Authority to initiate consultations with the operators of local railways in order to discuss improvement of the regulation. As a result, measures to be taken and/or speed limitations to be applied, as well as values requiring declaration of the rail as unserviceable should be included in the regulation in relation with the limits specified on the acceptable wear of the rails.

Implementation of the safety recommendation and application of the improved rules would ensure that supervisors of the railway lines are supported not only by their technical experience, but also by the regulation, this contributing to the improvement of transportation safety.

Accepted, implementation in progress

BA2012-475-5-02

In the course of the investigation, the IC established that safety verifications of works carried out on the tracks (e.g. welding) did not have the required effectiveness.

Transportation Safety Bureau recommends the National Transport Authority to revise work acceptance rules and application of these by the operators of the local railways, in order to assure, by improving and enforcing these rules (when necessary), that only safe tracks are released to service.

The implementation of the safety recommendation and the application of the rules created based on it will support prevention of accidents caused by possible quality deficiencies of works carried out on tracks.

Accepted, implementation in progress

3.5 Other recommendations

On 5 further occasions, TSB issued 5 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. 3 recommendations have been implemented by the addressee, 1 recommendation was accepted, implementation is in progress, 1 recommendation was not accepted.

BA2012-135-5-01A

In the course of the investigation of the train derailment accident on 25th February 2012 at Rácalmás station, the IC established as contributing factor to the occurrence of the accident the breakage of the tightening washer of the axle bearings. The washer applied had been installed at the end of 2006 and the IC concluded from marks visible on its surface that a spent part had been used. The IC found broken, deformed washers forced into the pivots also on other bearings examined of the vehicle concerned. After the accident, RailCargo Hungaria Zrt. examined another vehicle (wagon not concerned by the accident), also equipped with axle head support bearings. The IC examined the records and photos of this verification and established that one of the bearings of the vehicle examined also had a broken washer.

Transportation Safety Bureau therefore recommends the National Transport Authority to obligate the railway undertakings operating and maintaining vehicles of this kind to carry out with special attention and on a priority basis technical inspections of the axle head washers and immediately replace broken or deformed pieces.

The IC expects these measures to exclude within a short period of time from the Hungarian railways the possibility of accidents caused by the breakage, wearing, deformation of the part aimed to prevent major service failures.

Accepted, implemented

BA2012-443-5-01A

The IC established that the area towards the switching zone of tracks I-III was due to the built environment poorly visible. For this reason it was difficult to comply with the requirements set by section no. 2.7.4 of Regulation no. F.2 on visible check obligation for route control of trains entering or leaving the switching zone.

TSB therefore recommends the National Transport Authority to perform a control on priority basis related to Budapest Déli Station on the practical exercise of the visible check obligation required by section no. 2.7.4 of the Train loading and running regulations no. F. 2 and by the Station Instructions and take the necessary measures – either technical (e.g. installing cameras) or work organization – to improve the conditions supporting the compliance with these requirements.

TSB considers that the risk of accidents caused by the obstructed visibility of the tracks could be decreased by the acceptance and implementation of the safety recommendation.

Accepted, implementation in progress

BA2012-483-5-01A

The IC established that the provisional safety installation of Tárnok station was inadequate.

Transportation Safety Bureau recommends the National Transport Authority to obligate the operator of the infrastructure to bring immediately to an end the deficiency of the provisional safety installation at Tárnok station. Until the correction is carried out, MÁV Zrt. should ensure by traffic organization measures the prevention of similar occurrences in the case of station to station distance run.

TSB considers that the risk of the occurrence of accidents with similar causes could be decreased considerably by implementing the safety recommendation.

Not accepted

BA2012-360-5-01A

In the course of the investigation, the IC established that sight triangles at the level crossing located in railway section no. 1817+54 are not assured due to the dense vegetation, the LC does not meet the requirements laid down in Article 26.3 g of the Annex of the Regulation 20/1984. (XII. 21.) of the Minister of Public Supply. Furthermore, the road traffic sign indicating the starting point of the level crossing from the South was faded.

Transportation Safety Bureau recommends the Inspectorate of Transport of the Government Office for Somogy County to obligate the infrastructure manager (MÁV Zrt.) to assure the required sight triangles at the level crossing located between Balatonszentgyörgy and Sávoly stations in railway section no. 1817, as well as the visibility of the traffic sign indicating the starting point of the level crossing from the South.

The IC considers that the acceptance and implementation of the safety recommendation would considerably decrease the risk of accidents caused by poor visibility conditions.

Accepted, implemented

BA2012-402-5-01A

In the course of the investigation, the IC established that sight triangles at the level crossing located between Baja and Mátéházapuszta stations in railway section no. 731+58 are not assured due to the dense vegetation, the LC does not meet the requirements laid down in Article 26.3 g of the Annex of the Regulation 20/1984. (XII. 21) of the Minister of Public Supply. Furthermore, the road traffic sign indicating the starting point of the level crossing from the South was faded.

Transportation Safety Bureau recommends the Inspectorate of Transport of the Government Office for Bács-Kiskun County to examine the design of the level crossing and obligate when necessary the parties concerned to assure the required conditions.

The IC considers that the acceptance and implementation of the safety recommendation would considerably decrease the risk of accidents caused by similar causes.

Accepted, implemented

3.6 Experiences of the technical investigations

The Railway Department has been in operation since March 2006. Based on the experience that have been gathered since then, the following observations can be made:

- Similarly to the previous years, a typical cause of the occurrences is **human factors** (this trend is the same in other branches of transport - aviation and marine - in which TSB conducts investigations). Among the technical causes, track deficiencies are still dominant. Other causes were faults in vehicles (wheel or axle, door operating system, breaking system), questions of visibility, inadequate signposting and insufficient design of LCs.
- In 2012, trains were at risk but the occurrences had no consequence on 23 occasions – 75% more than in 2010. Such occurrences were **SPADs** and trains running on the same track in opposing direction. These kinds of incidents carry the possibility of more serious consequences; therefore more attention should be drawn to them. The main cause of these incidents is human factors, which highlights the acute need to use modern signal boxes, train control and communication systems. These developments cannot always be executed - due to financial difficulties - and are not done parallel to track reconstructions. Furthermore, railway staff should be well-prepared to deal with unexpected situations in which the signal box fails and the traffic has to be controlled very differently from the normal practice.
- Regarding injuries caused by rolling stock in motion the experiences of the investigations of previous year's occurrences drew the attention to an operation problem of carriage doors. There were more investigations in the last few years related to cases in which passengers involved in the accident had fallen off (or left) the trains in motion through the doors of carriages with central door operating system – these doors should have been locked and only emergency open should have been possible during travel. Technical investigation established in these cases that no emergency open had been applied to open the doors, the doors had been open or normal opening of these had been possible due to technical deficiencies. Detailed investigation of the door operation, technical failures and maintenance of the vehicle type concerned revealed that majority of the failures could be repaired by minimal intervention (fuse replacement, setup of the door, etc.). The investigation however revealed deficiencies also in the process of detection of the failure – maintenance – take-over after maintenance, these having been eliminated by the improvement of the relevant technologies and trainings of the personnel involved.
- When resolving the problems detected during the technical safety investigations, adapting the lessons learned to regulations and creating a transparent regulatory structure there is a problem that, in spite of EU commitments, the national railway safety legislation and the basic rules of railway operations have been only partly constituted in Hungary. In practice this means that certain basic rules are not laid down in legislation but only in internal regulations and orders of a railway undertaking or only as a regulation 'adopted' from an other railway undertaking. The authority to constitute these rules is laid down in the act on railway transport, but the legislation has been pending for years. In this context the transport authority's role remains, it does not prepare the legislation but only approves it. For this reason there were several feedbacks to TSB's safety recommendations or during the consultations when a recommendation was accepted by the National Transport Authority but there was no possibility to implement it. The maintainer of the rules, the organization recommended the modifications was one

of the railway undertakings that should have been the addressee of the recommendation.

- **International cooperation** has become more common in the investigation of railway accidents. TSB provides and receives assistance in the investigation of accidents in which the railway vehicles, their maintenance company, the staff, the railway undertaking or the location of the occurrence are in different countries. The cooperation provides a lot of new opportunities during investigations however it creates challenges as well, primarily in language knowledge aspects.

3.7 International cooperation

In 2012, the international practice was no different from the previous years, namely that the investigating bodies contact each other in relation to concrete accidents when more Member States are concerned (from the operator's, manufacturer's, maintenance's side or staff, etc),

TSB continued to participate actively in the work of the European Railway Agency (ERA) in 2012. The cooperation within the ERA extends to the compiling of methodology guidelines as well as to the development and operation of data collecting systems. The cooperation with ERA (with its costs covered by the EU) offers the opportunity for TSB to participate in compiling the system and methodologies of the assessment of National Investigation Bodies. TSB took part in the workgroup working out the assessment system, and offered to be the pilot, the first NIB which will be assessed.

The assessment had a dual purpose: on the one hand the assessment of the work of the Hungarian accident investigating body, assistance in identifying what should be improved and defining improvement plans, on the other hand the improvement of the methodology of the assessment system and the control of its operation.

The preparatory work began in February, all the documentation related to the technical safety investigation: Investigation Manual, other rules, documentation of the on-site investigation, etc... was sent to ERA. Then there was a kick-off meeting, where the on site assessment was prepared. During the on site assessment which took place on 26-31 August, the ERA experts interviewed the employees of the Railway Department and all the related supporting staff and leaders.

The ERA team sum up its findings in a final report in which all the best practices that should be proposed to be studied and adopted by other European investigating bodies and all the fields to be improved were described in detail.

Good practices are among others the strong independence provided by the Hungarian legislation, the employment of on site investigators, the practice of the final consultations with the stakeholders in the end of the technical safety investigation and the system of the professional days held in every half year, where all the stakeholders from the railway undertakings and partner authorities can meet. Fields to be improved are for example the more in depth analysis of the safety management systems, the human factors and the organizational factors in the process of technical safety investigations.

Considering the report, TSB has prepared a development and action plan in which all the actions to be taken and their target dates have been defined. Within this framework it was decided among others to implement the use of accident investigation plans and the reissue of the Investigation Manual.

The follow up meeting of ERA is planned to take place in December 2013.

Outside of the ERA, some of the European investigating bodies (e.g. Germany, Austria, Switzerland, Czech Republic, The Netherlands, Luxemburg, Denmark,

Estonia etc) established a regional cooperation forum whose work TSB also participates in. Within the framework of this forum – besides discussing local problems and making recommendations towards ERA – there is an opportunity to learn about the investigation procedure of certain accidents and gain experience in the investigation of various types of rarely occurring occurrences.

4. SUMMARY OF RECOMMENDATIONS

In 2012, the addressee of the safety recommendations was primarily the National Transport Authority. TSB deviates from this practice only when it issues safety recommendations to organisations which are not under the scope of authority of the NTA (e.g. rescue services), or the supervision rights are at a regional authority (e.g. supervision of level crossings). This way it could be achieved that when the addressee of the recommendation is a railway undertaking, the response would not come from the addressee itself for which the implementation would involve considerable work and/or financial sources but an outside, impartial professional organisation would respond to the recommendation. The other advantage is that when the recommendation suggests eliminating conditions/factors that are unlawful or pose risks to transport safety, the NTA has the possibility to oblige the relevant parties with deadlines to take action, which would increase efficiency in the implementation of recommendations.

In 2012 the Railway Department of TSB published 30 final reports, including 19 safety recommendations, 8 of them were issued earlier, during the investigation process. 12 of these recommendations have been implemented, implementation of 7 recommendations is in progress.

On 5 further occasions, TSB issued 5 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. Three of these recommendations have been implemented, implementation of one is in progress, one of them was rejected by the addressee.

Summary of responses to safety recommendations issued in 2007-2012

	2007	2008	2009	2010	2011	2012
Accepted and implemented	4	15	11	3	25	15
Accepted and partially implemented	2	2	-	-	-	-
Accepted, implementation in progress	7	3	7	17	2	8
Accepted, no information on implementation	-	3	-	-	-	-
Rejected	2	4	3	1	-	1
No answer	-	1	3	-	-	0

Section 3.4 contains a detailed list of the safety recommendations issued.