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Transportation Safety Bureau

Hungary

CONTENTS

RAILWAY NETWORK IN HUNGARY 3

SUMMARY 4

1. INTRODUCTION 5

1.1 Legal basis - The implementation of the Safety Directive in the Hungarian law ... 5
1.2 Organisation of TSB Hungary 7
1.3 Organisational flow of TSB Hungary 8
1.4 Overview of the last 12 months 9
1.4.1 Trainings 9
1.4.2 Reports 9

2. INVESTIGATION PROCESS 13

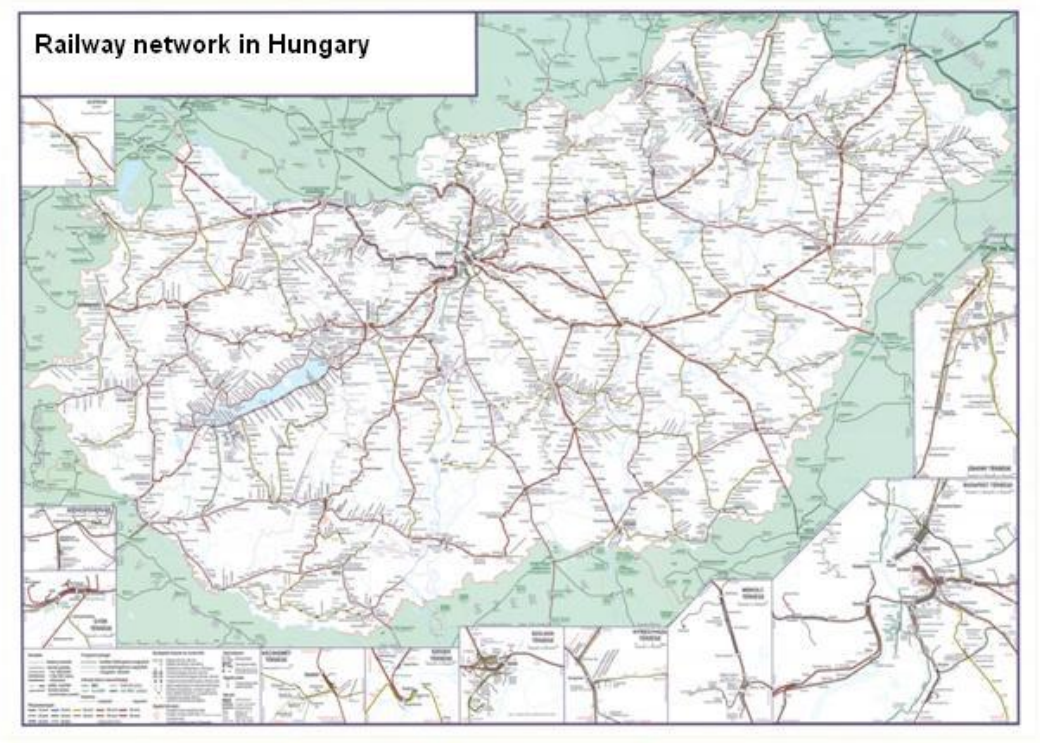
2.1 Independent basis of the investigation 13
2.2 Accident investigation philosophy of TSB Hungary 13
2.3 The investigation process of TSB 14

3. INVESTIGATIONS / RECOMMENDATIONS 15

3.1 Overview of investigations conducted by TSB 15
3.1.1 Overview of investigations by operators 16
3.2 High priority topics in 2013 16
3.3 Investigations commenced in 2013 20
3.4 Investigations completed in 2013 with the issued recommendations 22
3.5 Other recommendations 63
3.6 Experiences of the technical investigations 65
3.7 International cooperation 67

4. SUMMARY OF RECOMMENDATIONS 68

RAILWAY NETWORK IN HUNGARY



Basic data of the infrastructure:

National lines:	7690 km
	IM: MÁV (94%), GySEV (6%)
	Trans-European network: 2830 km (37%)
Regional lines:	480 km (100% narrow gauge)
Suburban lines:	210 km
Local network:	in Budapest, Debrecen, Miskolc, Szeged
Level crossings:	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 2013, 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 32 further occurrences. This is 6% less than in the previous year, 18% less than in 2012 with regard to the finding of the ERA Assessment carried out at the TSB.

During year 2013, TSB published 35 final reports, including 14 safety recommendations, 3 of them were issued during the investigation process. 7 of these recommendations have been implemented, implementation of 5 recommendations is in progress, and 2 of them were rejected by the addressee. Furthermore, TSB issued 4 safety recommendations prior to the completion of the investigations started in 2013, in which recommended immediate preventive actions. 3 of these recommendations have been implemented, and the implementation of one is in progress.

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 of 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). Consultation with the Commission is not finished yet, minor revision in the regulation may be necessary in the future.

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:

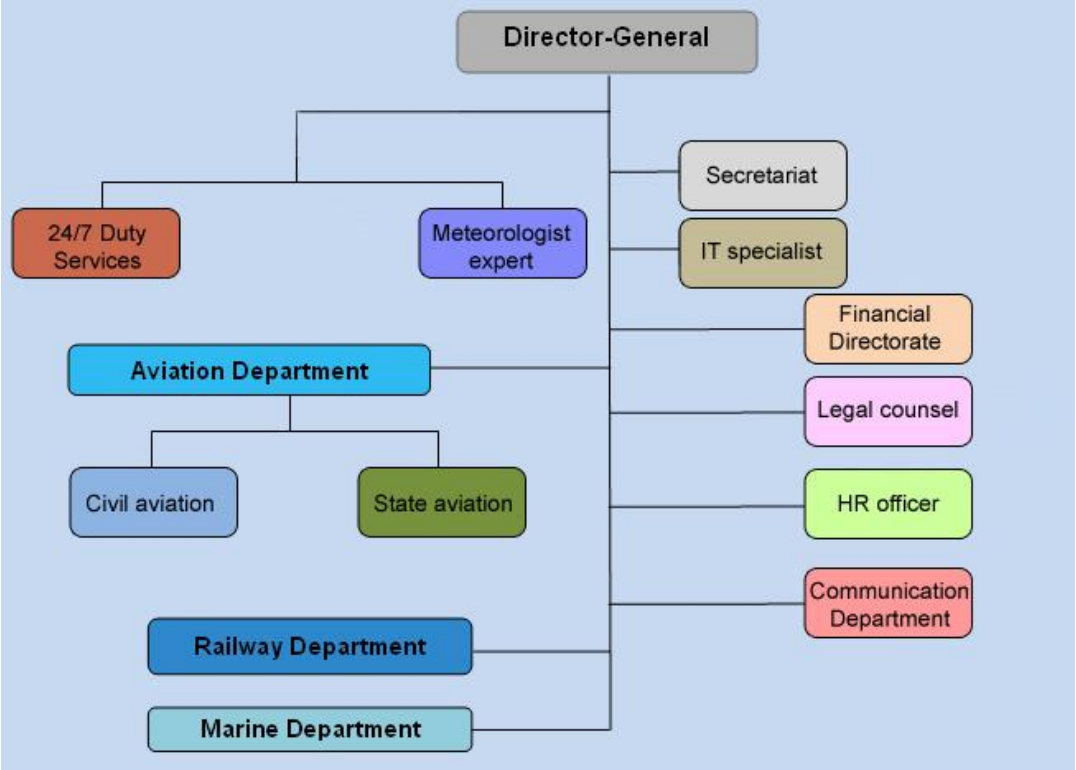
'The objective of the independent technical investigation is to reveal the causes and circumstances of serious railway accidents, accidents and incidents and to initiate the necessary technical measures and make recommendations in order to prevent similar cases in the future.' It also states that 'it 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.

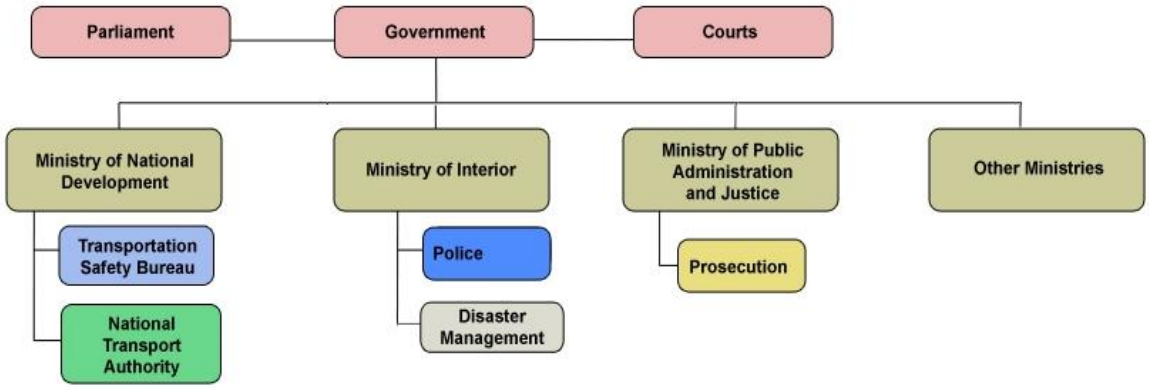
– The predecessor of TSB was the Civil Aviation Safety Bureau which conducted investigations in the field of aviation between 2002 and 2005 in line with Directive 94/56/EC establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.

– 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 2013.

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 in the Fundamentals of Accident Investigation course, 2 colleagues the Applied Rail Accident Investigation course and successfully passed the exam in Cranfield (UK).

Two members of the Department attended on the job trainings on suburban railway systems, 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.

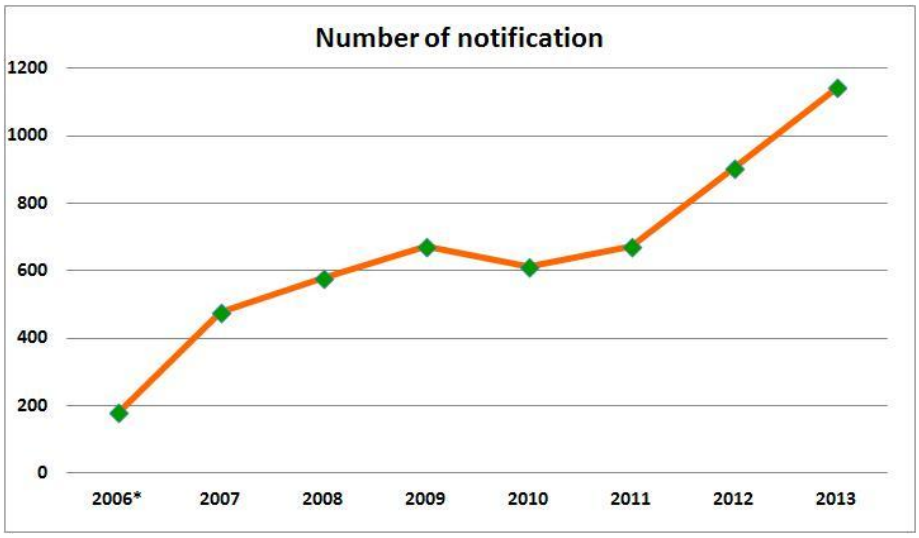
Our colleagues also succeeded in passing the public administration examinations – basic and higher level – obligatory for all civil servants in Hungary.

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 2013 reflect, that the number of notifications of this kind increased continuously (similar to the previous year), considering that the notification practice concerning these railway systems was stabilized during the years.

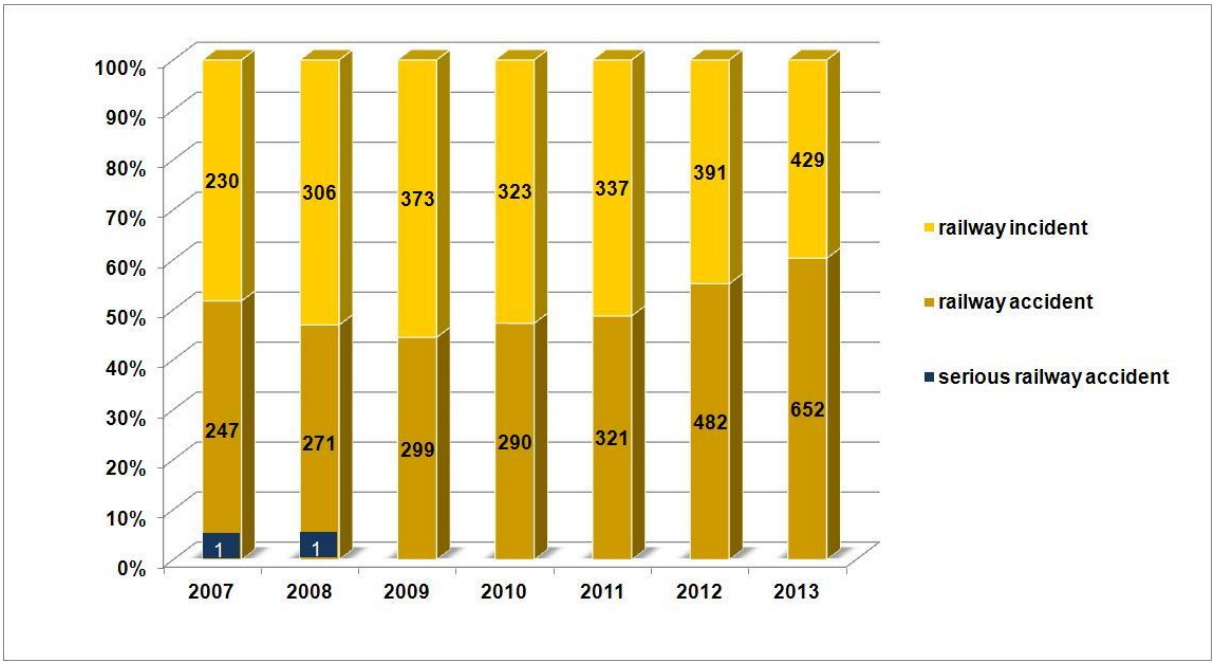
Ignoring the increase due to TSB's extension of power it can be stated that there was no significant change in the number of notifications received from the occurrence fields investigated in the previous period.

Reported railway occurrences in 2006-2013



* Data collection since 01. 03. 2006 pursuant to Kbvt.

Reported railway occurrences in 2007-2013 by category



Parallel 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 two years, the accident rate increased by 11%, from 49% up to 60%.

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 road-tramway crossings and caused by human factor, mainly by the attention disorder of the drivers of road vehicles.

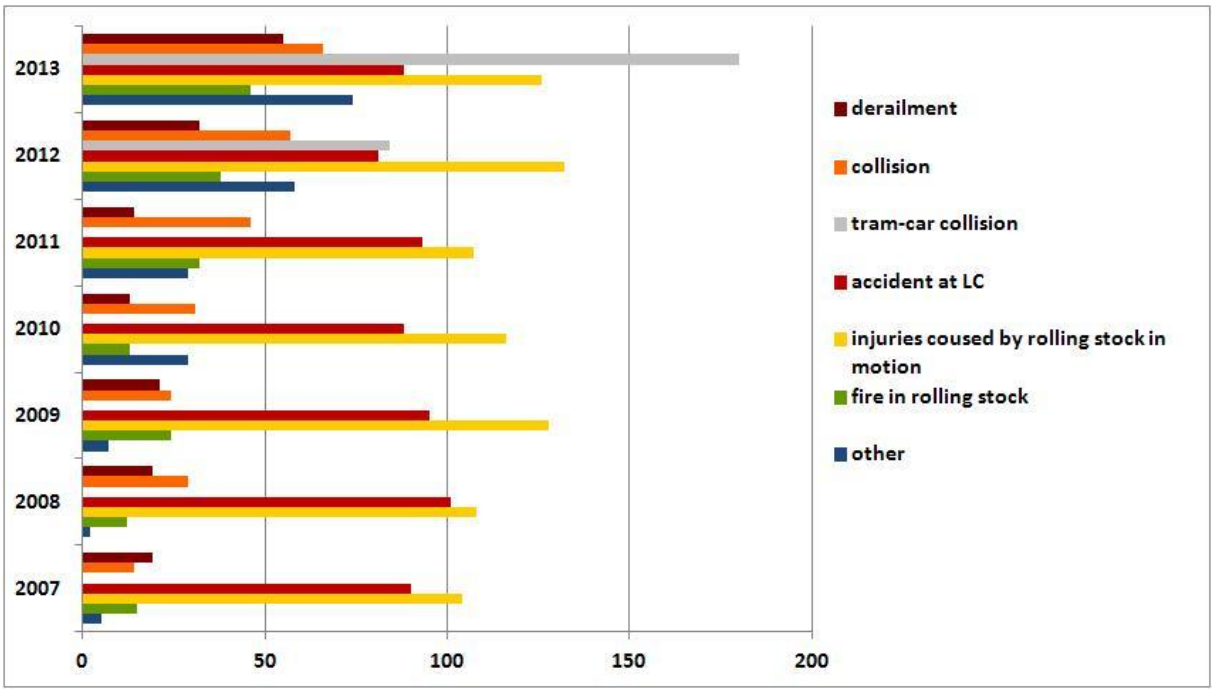
Another characteristic type of railway accidents is where a tram passenger falls over; the cause is usually the standing passenger's failure to use the handhold. Such occurrences are also classified as railway accidents.

Reported significant accidents in 2008-2013 by content

SIGNIFICANT RAILWAY ACCIDENTS	TSB					
	2008	2009	2010	2011	2012	2013
	132	165	131	134	122	107
- collision	1	-	-	-	1	-
- derailment	1	2	-	-	-	1
- injuries caused by rolling stock in motion	88	113	89	91	88	71
- accident at LC	42	50	42	43	31	33
- fire in rolling stock	-	-	-	-	-	-
- tram-car collision	no data available				2	2

There is a remarkable improvement in the number of significant railway accidents. In the last two years it decreased from 134 (2011) to 107 (2013). This is a 20% decrease in two years, even though the influence of some significant railway accidents occurred to local and special railway undertakings have already been included in the 2012 and 2013 figures.

Reported railway accidents in 2007-2013 by content

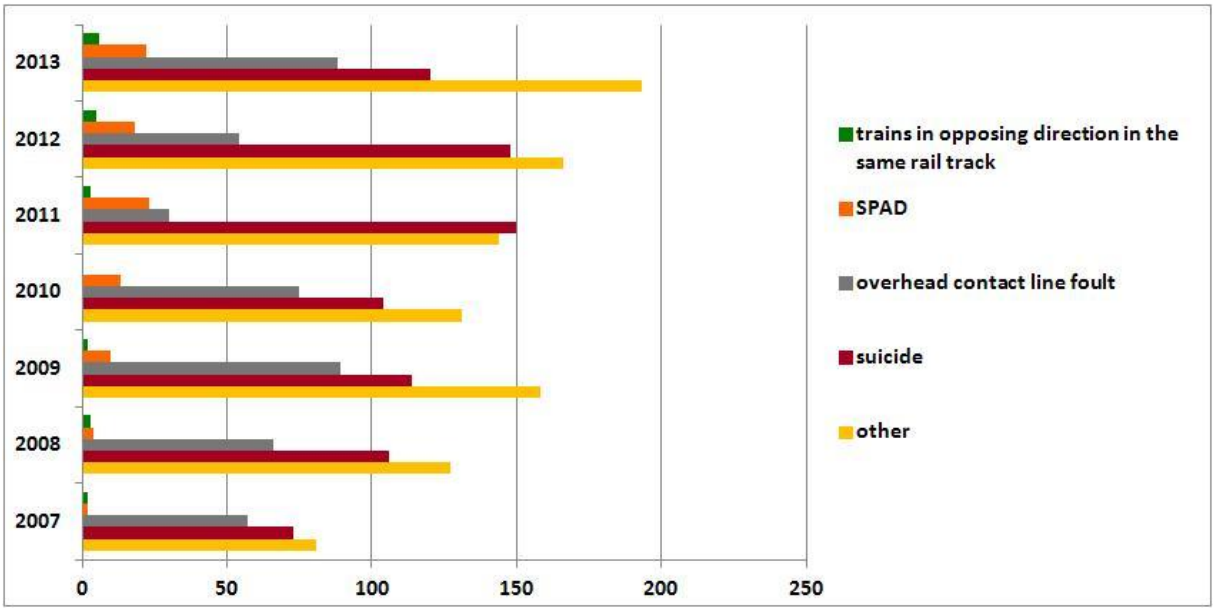


Compared to the previous period, the category of tram vs. road vehicle collisions shows a conspicuous increase, which is the consequence of improving readiness to report as indicated above, i.e. the statistics now include data which used to remain latent before.

The growth in the number of notifications also explains the fact that the number of accidents involving collisions and derailment has increased further. Derailments, minor bumps and collisions typically occur in the area of electric railways running on the roads. Due to the low speeds used, such occurrences usually cause little damage only, and injury to people occurs only exceptionally. In addition, the number of collisions with an object (e.g.: fallen trees, elements of the infrastructure reaching into the structure clearance, etc.) and derailments occurring typically during shunting in heavily worn-out track sections in the major railway system should not be neglected either.

Following a decrease in the previous year, 2013 showed a slight increase in the number of accidents occurring at level crossings, while the number of injuries caused by rolling stock in motion has decreased. 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 cannot be classified with the traditional method.

Reported railway incidents in 2007-2013 by content



The number of problems with the overhead contact lines reported to TSB increased from 54 of the previous year to 88. However, this occurrence category may also involve cases where it turns out later on that the contact line was damaged due to a wilful act (vandalism, theft or attempt of theft). Weather also plays an important role in this occurrence category, as relatively more incidents of this kind occur in short periods of time when the weather is stormy, which has an impact on statistics.

In the category of injuries caused by rolling stock in motion, the slight increase in the number of accidents (from 132 to 141) was matched by a significant decrease in the number of suicides (by 17%: from 145 to 120) compared to the previous period. Regarding that such occurrences are beyond the control of the railway system, the cause of the statistical change may also be found outside the railway system, and it also depends on which cases are officially qualified suicides by the police.

The number of SPAD incidents reported to TSB has slightly increased and is still relatively high. 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 (3 cases). 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.

Two of the incidents of trains in opposing direction on the same track should be highlighted due to their fairly dangerous nature and a lot of media attention in the second half of 2013: the one which occurred at Kelenföld station in September and the other at Vác station in December.

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.

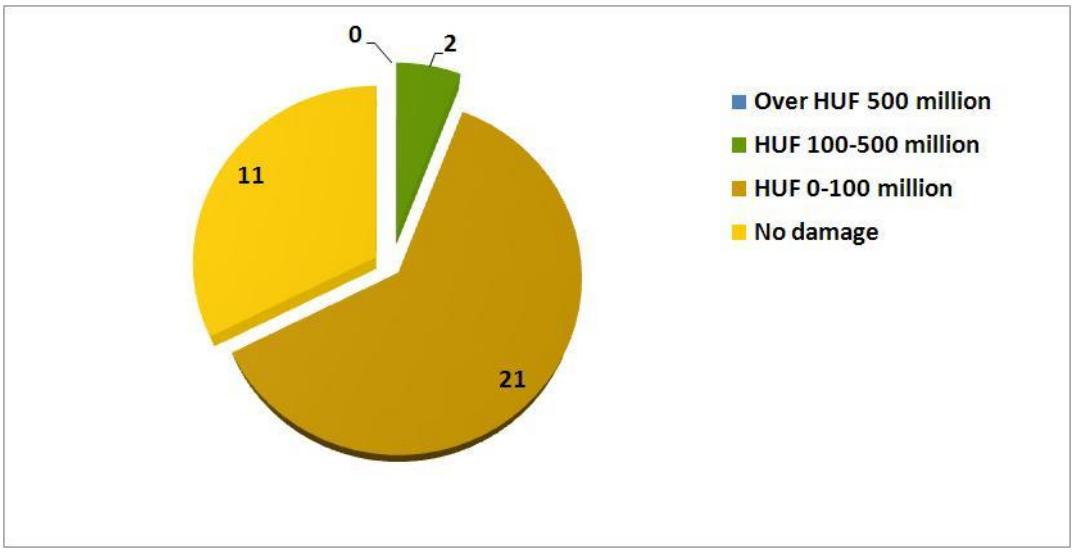
3. INVESTIGATIONS / RECOMMENDATIONS

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.

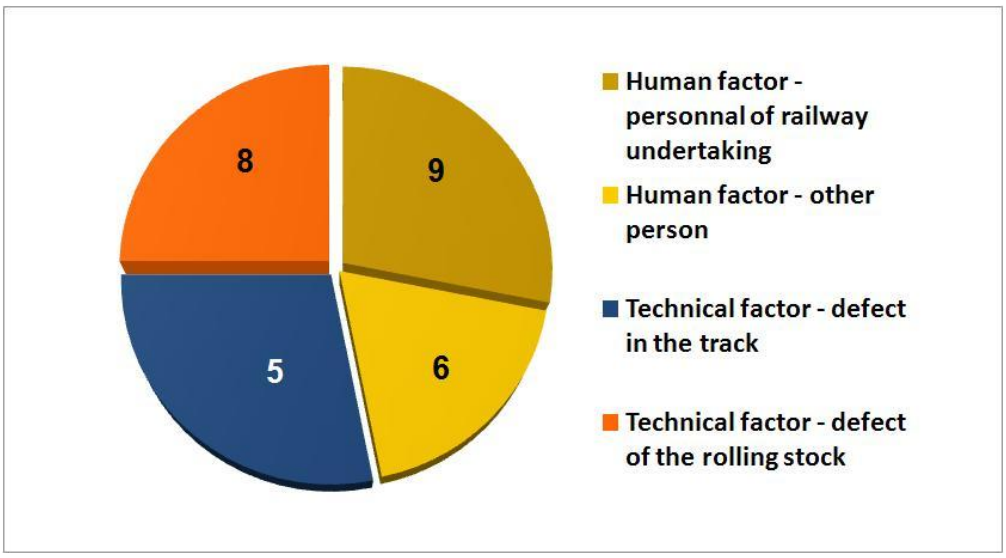
3.1 Overview of investigations conducted by TSB

In 2013, there was no serious railway accident in Hungary which TSB was obliged to investigate. TSB conducted investigations – at its own discretion – on 32 further occasions (26 accidents and 6 incidents), based on the fundamental principles listed in 2.3. This is 20% less than in 2011, with regard to the finding of the ERA Assessment carried out at the TSB.

Investigations commenced in 2013 by the amount of damages:



Investigated occurrences in 2013 by their presumed cause (based on the reports):



Number of investigations lasting longer than one year over 2006-2013:

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	at the end of 2013
0	12	11	7	1	7	12	14*

* In 6 cases the draft report was already sent out.

3.1.1 Overview of investigations by operators

In 2013, TSB invited operators to investigate 69 occurrences. In the railway sector, since 2012 – similarly to aviation – TSB has the opportunity to request information from operators on the causes of railway occurrences which need no investigation by TSB but may offer a lesson to learn in connection with general safety on rail transport. Today, the conditions of investigation by the operator are given: In 2013, the 160-hour accident investigator training sessions have been started in order to meet the personal requirement of the performing of investigation by operators. Two training organizations submitted their training syllabuses to TSB, our organization evaluated both, and the first training sessions were completed in 2013.

3.2 High priority topics in 2013

Having regard to the fact that ca. 30% of the significant accidents on the railways occur on level crossings (collisions with road vehicles, running over people), in 2013 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 2009-2013 (50→42→43→31→33), however, the earlier continuous decrease halted in 2013. However, the number of collisions with cars and runover of trespassers 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 and functionality of the LC was also found to be a contributing factor on a few occasions. The investigations of accidents at level crossings performed in 2013 concluded on two occasions that the malfunction of the level crossing equipment contributed to the accident. This contributing factor was not mentioned among the causes of accidents between 2010 and 2012; it last occurred in 2009, on 3 occasions. Besides this the lack of visibility triangle, lack of required visibility to the signals, inadequately placed signposts, etc. were also contributory factors in few cases to which the Investigating Committees drew the attention in their safety recommendations.

Having evaluated data of last years, it can be established that the number of accidents when road vehicles or pedestrians ran into trains (e.g. into the last wagon of a train) increased. These accidents can almost solely be related to the inattention of LC users.

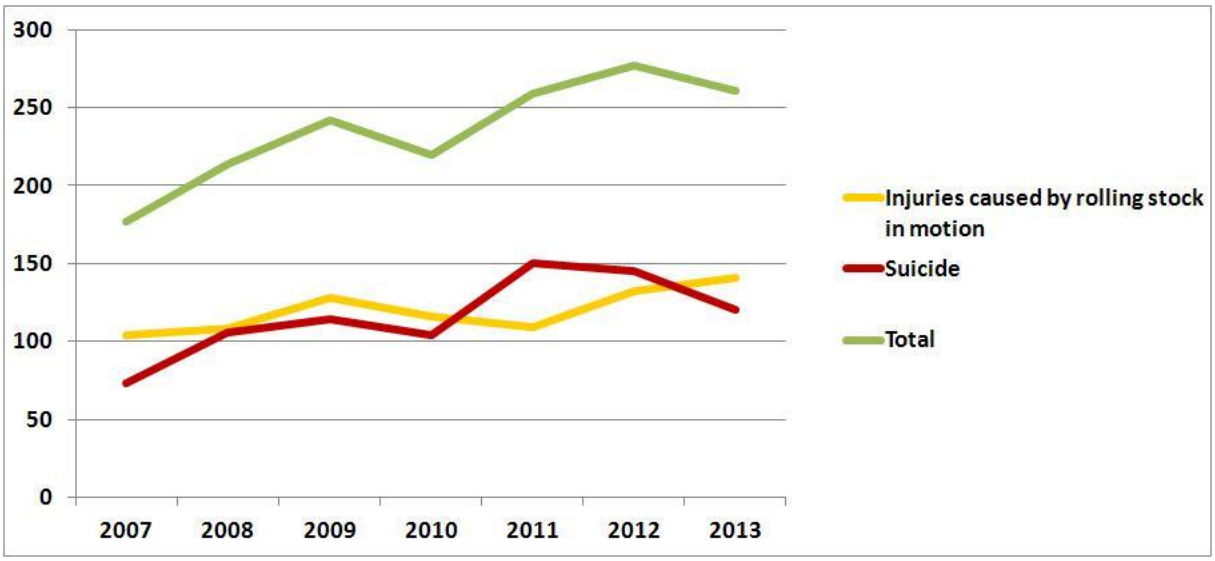
The geographical distribution of the accidents in the last year shows no new level crossing where accidents would repeatedly occur, and there were no new accidents in those level crossings where we found repetitions previously.

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 (7%) in 2013 (132→141). Evaluation should also take into account, however, that the number of serious accidents decreased by 20% in this category. The underlying cause here is the extreme increase in the number of notifications in the area of tram transport where this kind of occurrence is fairly frequent but rarely has a serious or fatal outcome.

The number of suicides, on the other hand, decreased significantly: 17% less cases in 2013. The causes of such decrease may be found outside the railway sector, in the social-societal area.



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 of 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 2013 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, 2 occurrences in 2012 and 6 occurrences in 2013.
- Section between Kőbánya-Kispest and Monor stations: 27 occurrences between 2007 and 2010; 6 occurrences in 2011, 7 occurrences in 2012 and 8 occurrences in 2013.
- The environs of Kecskemét station: 5 cases in 2011, 4 cases in 2012, and 4 cases in 2013 again.
- In addition to earlier locations, an increase was also observed between Soroksár and Taksony stations: 3 cases occurred in 2011, 2 cases in 2012 and as many as 5 such cases in 2013.

Of the locations more frequently affected earlier, Városliget junction and Tatabánya area show a significant decrease in the number of such occurrences.

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 of 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.

The lessons learnt from the occurrences and investigations of 2013 brought another door operation problem into the focus, namely the insensitivity of the doors of the vehicles of the Bz series to pinch injury during the closing movement. Two technical investigations were commenced in this subject: in the first accident, a passenger preparing to get off was pinched inside the door, while in the other case a passenger reaching back for her luggage was pinched outside; fortunately, with no serious consequences in either case. In both cases, the technical investigation explored both design problems and maintenance problems (setting up) which played significant role in the accidents.

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 availability 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, and more serious outcome was avoided largely by chance.

Therefore, TSB decided on a number of occasions to investigate accidents or incidents which did not have serious consequences but created rather dangerous situations. Such cases occurred, among others, at Kelenföld station, primarily due to human factors associated with the inoperability of the safety equipment due to negligent damage, and at Vác station where, in addition to the human factor as the

characteristic root cause, the complicated working environment (due to pending reconstruction of the station) also played a role.

Of the accidents of 2013, two derailments attracted the most attention: 7 wagons of a freight train derailed while departing from Vasvár station; the exploration of the causes and detailed description of the interactions between the track and the vehicle is still underway. The derailment of another train at Szenta station attracted similar attention: the front and the rear part of the train ran onto different tracks, due to a combined effect of human and technical factors. Considerable damage occurred both to the track and to the vehicles in both cases.

Cases of SPAD

The passing of signals at danger in itself belongs to the category of railway incidents. But taking a look at them as latent sources of danger in terms of potential consequences, they call our attention to phenomena which may have a significant effect on transport safety. SPADs may always be attributed to human factors but experiences from the technical investigations show that several other, unusual events/circumstances precede their appearance in most cases.

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)
2013	4(+12)	3(+0)	3(+3)	-	3(+0)	13(+15)

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

3.3 Investigations commenced in 2013

Date 2013	Occurrence	Category
11 02	At Szombathely station, in the course of unauthorised shunting, a locomotive forced a switch open, and crossed the route of the arriving intercity train. Nobody was injured.	Railway incident
14 02	A tram leaving Bp. Ferencváros Shed derailed on a switch. Nobody was injured.	Railway accident
19 02	In Budapest, the number 41 tram derailed due to detachment of a wheel rim. Nobody was injured.	Railway accident
21 02	The train No. 4829 bumped into a slack overhead contact line while arriving at Herceghalom station. Nobody was injured.	Railway accident
26 02	In Miskolc, a No. 2 tram derailed on a switch. Nobody was injured.	Railway accident
09 04	At Vám square in Szeged, a No. 4 tram derailed. Nobody was injured.	Railway accident
11 04	At Budapest-Keleti station, during the shunting of wagons of the train No. 15, a set of three wagons shunted by the locomotive No. 480001 bumped into with the shunting unit which was staying at the beginning of the track. One person had a serious injury and five people were injured lightly in the accident.	Railway accident
18 04	At Kaposvár station, an arriving train derailed on the turnout No. 19. Nobody was injured.	Railway accident
22 04	At Sárosd station, at the level crossing secured with warning lights No. SR2, the train No IC806 collided with a tractor. The driver of the tractor died on the spot as a consequence of the accident. The locomotive of the fire caught fire, and the frontal (according to the direction of travel) driver's cab burned out.	Railway accident
07 05	In Miskolc, a No. 2 tram derailed while arriving at the terminal in Kandó Kálmán square.	Railway accident
13 05	Between Badacsonytomaj and Révfülöp stations, at the level crossing secured with warning lights No. AS981, a train ran over a cyclist who died on the spot.	Railway accident
26 05	At Városföld station, the train passed the individual K1 exit signal at danger, and forced open the switch No. 6 which was in incorrect position for this train. Nobody was injured.	Railway incident
19 06	At Devecser station, five wagons of an arriving train derailed. Nobody was injured.	Railway accident
04 08	In Budapest, at the stop at Kén street, a wagon of a HÉV train derailed. Nobody was injured.	Railway accident
12 08	Between Kápolnásnyék and Gárdony stations, at the level crossing secured with a half-barrier and the warning lights No. AS491, a train collided with an automobile. The driver and the passenger of the automobile were injured lightly in the accident.	Railway accident

15 08	At Bakonygyirót stop, at an unsecured level crossing, a train collided with an automobile. The driver of the automobile died on the spot as a consequence of the accident.	Railway accident
15 08	At a stop, a passenger fell over while getting off the train, and had an injury (bruised leg).	Railway accident
21 08	Seven loaded wagons derailed at Eperjeske Reloading Station while shunting. Nobody was injured.	Railway accident
14 09	A train, while leaving Kelenföld station, moved towards the intercity train which was coming from the opposite direction from Háros station. The two trains stopped at a distance of 135 m from each other.	Railway incident
21 09	At Somogyszob station, in a period with no train traffic, a set of wagons, stopped together with their locomotive broke away towards Szenta station. The set of wagons forced the switches No. 11, 7, and 1 of the station open. Nobody was injured.	Railway incident
29 09	At Szenta station, five wagons of a train arriving on track II derailed on the switch No. 3. The rail track and the overhead contact line were damaged in the occurrence. Nobody was injured.	Railway accident
01 10	Between Vasvár and Püspökmolnári stations, a train derailed. Nobody was injured.	Railway accident
17 10	At its stop in Vörösmarty square, a train of the underground (M1) derailed. Nobody was injured.	Railway accident
18 10	Between Maglód and Rákoshegy stations, at the level crossing secured with a half-barrier and the warning lights No. AS118, an intercity train collided with an automobile. The driver of the road vehicle had a light injury.	Railway accident
30 10	At its stop in Vörösmarty square, a train of the underground (M1) derailed. Nobody was injured.	Railway accident
31 10	At its stop in Vörösmarty square, a train of the underground (M1) derailed. Nobody was injured.	Railway accident
04 11	A train leaving the marshalling yard of Hatvan derailed and then returned onto the rails. Nobody was injured.	Railway accident
10 11	Between Mezőkeresztes-Mezőnyárád and Mezőkövesd stations, the wagon of the train caught fire. Nobody was injured.	Railway accident
18 11	At Mád station, a train moved through without authorization, and moved towards another train moving in the opposite direction. After notification by telephone, the trains stopped in the open track at a distance of ca. 2300 metres from each other.	Railway incident
02 12	A train leaving Vác station moved towards the train No. EC278 which was moving from the opposite direction. They stopped at a distance of ca. 300 metres from each other.	Railway incident
23 12	Between Öttevény and Győr stations, at a level crossing secured with properly working half-barrier and the warning lights No. AS1458, a train collided with an automobile. The hauling locomotive and the road vehicle burned out. Nobody was injured.	Railway accident
31 12	At Murony station, a passenger train attached to an intercity train burned out. Nobody was injured.	Railway accident

3.4 Investigations completed in 2013 with the issued recommendations

In 2013, 35 final reports were compiled and published on the website of TSB**. Further 6 draft reports were compiled and sent** to the relevant parties for reflections. The above investigations were closed and the final reports were published at the beginning of 2014 considering the 60 days provided by law for the relevant parties to reflect on the draft report.

The final reports issued in 2013 analysed occurrences of the following types:

- Accident at LC 9 occurrences
- Derailment 7 occurrences
- SPAD 7 occurrences
- Other/Shunting 4 occurrences
- Other 4 occurrences
- Injuries caused by rolling stock in motion 2 occurrences
- Collision 2 occurrences

Investigations completed in 2013

2010-558-, 2011-062

On 6 December 2010 at 06:53 hours, the engine driver of the train No. 87941, approaching Dombóvár station, perceived the break of the clinging switch tongue prior to entering the points No. 17, and stopped the train by emergency braking. In the course of the stopping process, the assisting locomotive and the lead locomotive as well as the first wagon stopped after the points, while the second wagon (No. 31 55 599 3506-1) of the train stopped, in derailed position, on the points. No one was injured in the occurrence.

Occurrence No. 2011-062-5

On 9 February 2011, at 05:45 hours, at Lökösháza station, the engine No. V43-1103 derailed with 4 axles while shunting on track No. 14, and then drifted back onto the track.

In both cases, the IC concluded that the break of the switch tongue caused the occurrence, however, no similarities were found as regards the circumstances which had led to such breaks.

Factual statements directly connected to the occurrence of the case

Occurrence No. 2010-558-5: as a consequence of a previous material defect invisible with the unaided eye, a crack was formed in the left rail of turnout No. 17 at Dombóvár station, which became visible before the arrival of the freight train No. 87941. Despite emergency braking, the engine travelled onto the crack, and broke the rail, and due to its position, the rail broke at one more location, too.

Occurrence No. 2011-062-5: A dynamic height difference was formed, invisible with the unaided eye, between two rail chairs at turnout No. 14 at Lökösháza station. In the cold morning weather, the rigid switch tongue broke due to the weight of the locomotive rolling onto it and the lack of support.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2011-011-5

On 9 January 2011 at 16:54 hours, the train No. 2935 collided with an automobile at the unprotected level crossing in Section 135, between Pestszentimre and Kispest stations. The driver of the automobile died, one of the passengers suffered serious, and two suffered mild injuries in the accident.

Factual statements directly connected to the occurrence of the case

The driver of the automobile entering the level crossing while in a left turn from Vasút street towards Eke street did not ensure that crossing would be safe prior to entering the level crossing; thus, the occurrence of the accident can be attributed directly to human factor relating to the driver.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The motor vehicles coming from the direction of the city centre along Nagykőrösi Road and turning left into the level crossing imply further risk of accident.

Safety recommendation

BA2011-011-5-01A

During the investigation, the Investigation Committee (hereinafter: IC) established that in the level crossing the distance between the right-hand-side rail and the stop point line is 5m, as a result of which there is no room even for one vehicle between the edge of the railway clearance and the stop point. Consequently, the motor vehicles arriving from the direction of Vasút Street can leave the level crossing immediately only if they intend to go on along Nagykőrösi Road, towards Budapest (turning right, into the escape lane). But if they wish to turn left into Nagykőrösi Road or go straight on, crossing Nagykőrösi Road to access Eke Street then they cannot leave the level crossing, due to the right-of-way situation and the fairly busy traffic.

Transportation Safety Bureau recommends the Inspectorate of Transport, Government Office of the Capital City of Budapest to obligate the operator of the

road to change the current traffic order in the unprotected level crossing located in section no. 135+77 in such manner that those arriving from Vasút Street should not be allowed to turn left into Nagykőrösi Road or to cross Nagykőrösi Road but should only be allowed to turn right, with an effect lasting until the introduction of the new traffic technology at the level crossing and its surroundings and the putting into service of the barrier installation.

With the accepting and expected implementation of the safety recommendation, those users of the level crossing who come from the direction of Vasút Street will be able to leave the unprotected level crossing in Section No. 135+77 through the escape lane immediately. This may significantly reduce the risk of accident at this level crossing.

2011-100-5, 2011-471-5

2011-100-5:

On 1 March 2011 at 08:57 hours, while leaving Kápolnásnyék station, the train No. 909 split the points No 6 set open incorrectly for this train.

2011-471-5:

On 21 September 2011 at 05:24 hours, with no previous notice or signal control, the train No. 24591 departing from Kápolnásnyék station started its journey in the direction opposing the scheduled direction, exited to the inappropriate right-hand side track, and travelled as far as Martonvásár station.

Factual statements directly connected to the occurrence of the cases

During the investigation, the IC established that the splitting open of the points No. 6 at Kápolnásnyék station can be attributed to human factors related to the traffic management crew and the train crew.

The inadvertent travel on the inappropriate track took place due to the neglecting of the rules of passing the signal displaying "*Stop!*" by the engine driver, and due to a communication anomaly between the station inspector, the pointsman and the train crew relating to the interpretation of "right-hand track" and "left-hand track".

Factual statements indirectly connected to the occurrence of the cases

During the reconstruction works at Kápolnásnyék station, the "dark operation" of the temporary safety installation was shortened, and thus the employees did not have the time to perform sufficient drill of the necessary skills. They had not had the appropriate practice yet, which led to inadequate identification of the signals of the safety installation, and the available regulation to be used in the case of errors was not used.

The extra shunting and other movements of trains, and track possessions, which occur during a reconstruction, require increased attention and full compliance with the instructions, and thus imply an increased probability of mishaps.

Other risk factors

There were several factors which influenced the station inspector's concentration ability.
– He faced a large number of errors in the new equipment in his first day of live service.
– Such errors were different, and occurred periodically.

Safety recommendation

Safety recommendation was not issued.

2011-128-5

After start of shunting in ME Co.'s own rail network, the foot of the yardman staying at the tail end of the shunting unit got under the last bogie of the last wagon, and suffered a serious mutilating foot injury.

Factual statements directly connected to the occurrence of the case

The yardman tried to remove the brake block of the moving wagon from the wheel by foot. In the course of the operation, his foot slipped off the fastening clamp of the brake block, he lost his balance, and his right foot got under the wheel of the wagon.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The Standing Instructions for Industrial Tracks did not follow the changes in the rules applied in the national rail network, and consequently, the two systems of instructions are not in accordance.

Safety recommendation

BA2011-128-5-1

In the course of the investigation, the Investigation Committee (hereinafter: "IC") established that the Standing Instructions for Industrial Tracks, which were originally made as an excerpt from the rules applied for the national rail network, did not follow the changes of the rules applied for the national rail network, and accordingly, the two sets of rules are not consistent with each other. Consequently, the personnel who perform service on both rail networks need to be familiar with both systems of instructions. The different rules are easy to mix up, which implies a risk of accident.

Transportation Safety Bureau recommends the National Transport Authority to ensure the consistency of the rules applied on privately owned rail networks with the rules of the rail network from which such privately owned networks branch off.

With the implementation of the safety recommendation, the IC expects that the alignment of the rules may reduce the quantity and confusability of the rules to be applied by the personnel, as well as the accompanying risk of accident.

2011-177-5

On 20 April 2011, at Gyömrő station, after handling the emergency opening system, a passenger tried to get on the train No. 3258 at the side opposite the side assigned for passengers to get on. In the meantime, the train started, and the passenger's hand was caught by the automatically closing door. The passenger freed his hand, but, as a consequence of that movement, he fell under the train, and suffered severe injuries.

Factual statements directly connected to the occurrence of the case

The injured person tried to get on the train No. 3258 at the side opposite the side assigned for passengers to get on, after opening the closed and locked door using the emergency opening system, and tried to get on the train when it was already moving.

Factual statements indirectly connected to the occurrence of the case

The safety installation, situated on the locomotive, which is to prevent starting with wagon doors open, was disabled.

Other risk factors

At Gyömrő station, some passengers do not use the pedestrian subway but access to and leave the station through the tracks.

The people operating the door-closing equipment do not know their mutual roles in the operating of the system.

The IC realized during the surveys conducted on several occasions that although the traction disabling switch is equipped with a lead stamp, its string is so long that it does not break when the switch is operated.

Safety recommendation

Safety recommendation was not issued.

2011-203-5

On 10 May 2011 at 23:52 hours, the train No. 2391 passed the joint exit signal at Őrbottyán station, split the points No. 2 open, entered the section between Őrbottyán and Veresegyház, and travelled as far as Veresegyház without run authorization.

Factual statements directly connected to the occurrence of the case

- The IC attributes the occurrence to human factors (inadequate attention paid) related to the crew of the maintenance vehicle.

Factual statements indirectly connected to the occurrence of the case

- The latest departure time of the train No. 2391 was determined incorrectly relevant to its departure from Őrbottyán, that is why the meeting of the two trains had to be relocated and the clearance program set in the safety installation cancelled, and the emergency opening of the tracks became also necessary.
- In the turnout No. 2 of Őrbottyán station, a crossing timber fastening the point operating apparatus was decayed inside, and the fastening bolts were not able to withstand the forces occurring when the points were split open, and so the fastening of the point operating apparatus broke away. Consequently, the point operating apparatus moved together with the switch tongue of the points split open, and the safety installation did not indicate the splitting open of the points, and permitted travel over the points at the highest permitted speed.
- Due to the cancellation of the clearance program set earlier and the starting of the emergency releases at the arrival side, the exit signal displays clearance. This signal image is not the clearance signal the station inspector intended to issue, and thus it implies serious risk of accident. The IC intends to issue a Safety Recommendation.

Other risk factors

- For several hours, no adequate measure was taken to transfer the passengers trapped on the train. Those passengers who decided to leave the train while waiting opened the doors using the emergency door control, and then left the train in darkness, in a cutting in a curved section of the track, where the track runs on high embankment, which also implies a risk of accident.

Safety recommendation

BA2011-203-5-01

During the investigation, the Investigation Committee (IC) established that, after the cancellation of the program of travelling through Őrbottyán station, and concurrently with the emergency opening of the arrival track, the track at the departure side is closed, and the exit signal displays clear signal despite the intent of the station inspector. Accordingly, the IC proposes that the following safety recommendation be issued:

> **TSB Transportation Safety Bureau recommends the National Transport Authority to review the logical dependencies of the safety installation and take necessary action on the basis of the conclusions of such review.**

In the opinion of the IC, in the case of accepting and implementing the above recommendation it can be ensured that the station inspector be only able to set the exit signal to clear position through a deliberate, focussed act only.

2011-305-5

On 6 July 2011, at the stop Mórágy-Alsónána between Hidas-Bonyhád and Bátaszék, the light engine No. 38796 collided with an automobile at the level crossing No. AS556 protected by a properly working warning light. As a result of the collision, one of the 5 occupants of the automobile died, 2 suffered serious injury, and 2 suffered mild injury.

Factual statements directly connected to the occurrence of the case

- The protective warning light No. AS 556 worked properly at the time of the accident.
- The IC established no excessive speed relevant to the light engine involved in the accident.
- The automobile entered the level crossing, neglecting the operable warning light which was displaying flashing red light in the direction of the road, and thus the cause of the accident can be attributed to human factors related to the driver of the automobile.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2011-316-5

On 11 July 2011 at 22:10 hours, the passenger train No. 7221, approaching Szolnok station pursuant to a subsidiary signal, passed the points No. 29 which was not set to the position to steer this train to the track appointed for it, and finally the train stopped in front of the points No. 41 which was set to a direction inappropriate for it.

Factual statements directly connected to the occurrence of the case

The IC attributes the occurrence to human factor relating to the station inspector who:

- determined the right and left tracks erroneously.
- failed to explore why the entry signal did not display “Clear“.
- failed to inspect the points and tracks.

Factual statements indirectly connected to the occurrence of the case

The station inspector in charge failed to take the necessary actions, i.e.:

- failed to explore why the entry signal did not display “Clear“.
- failed to order the relevant personnel to inspect the points and tracks on-site.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2011-381-5

On 22 July 2011 at 03: 49 hours, the train No. 2529 travelling on the left-hand track from Szolnok station towards Abony station performed an extraordinary stop because the engine driver perceived another train between the two stations, despite the fact that his train was to perform in inter-station service between Szolnok and Abony stations according to the Written Instruction received at Szolnok station, i.e. no other train should have been present in the section between the two stations.

Factual statements directly connected to the occurrence of the case

The outdated written instruction (about succession of trains relevant to inter-station service) issued to the train No. 2529 was not revoked. Consequently, two trains (each informed on inter-station traffic) got into the section between two stations.

The communication between the station inspectors in Szolnok station did not comply with the requirements in the instructions (neither its contents nor its The process), which led to delivering Written Instructions with contents other than expected by the station inspector in charge to the trains.

Factual statements indirectly connected to the occurrence of the case

The station inspector in charge at Szolnok station did not resolve the developed situation by a procedure leading towards increased safety as specified in the Train loading and running regulations, i.e. by stopping the trains, but gave them instructions orally.

Other risk factors

The station inspector in charge at Szolnok station made an unsuccessful effort to report the error of the safety installation because the dispatcher responsible for the safety installations did not answer the telephone, and did not call the station inspector in charge back.

Safety recommendation

Safety recommendation was not issued.

2011-462-5

On 16 September 2011, at Szombathely station, the engine No. V43-1008 collided with the train No. 9203 while bumping to it. As a consequence of the collision, 2 passengers suffered minor injuries, three passenger wagons were damaged, and the engine broke down.

Factual statements directly connected to the occurrence of the case

The brake blocks of the engine No. V43-1008 were worn out, and thus the brake stroke length and the braking distance of the engine significantly increased.

Factual statements indirectly connected to the occurrence of the case

The operation hours count of the series V43 engines does not include those periods of time when the engines are moved in “cold” state, although their brake systems are operated in these movements, too.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2011-608-5

On 5 December 2011 at 19:14 hours, after departure from its stop at Ferencváros railway station, the (last) car, track No. 4220 of the line No 1 (between Rákóczi Bridge and Bécsi Road) derailed with both bogies over the points (in front of the building at 5 Könyves Kálmán Bld., District 5 Budapest) leading to the entry of the Ferencváros Shed, then turned crosswise, and fully blocked road traffic at the right-hand side.

Factual statements directly connected to the occurrence of the case

- In the opinion of the IC, the first element of the sequence of events leading to the accident was the power failure immediately preceding the accident. By that time the tram involved in the accident had already been through (partly) the axle counting (inbound), and the electrical lockout had started, but due to the power failure, the restarting installation “forgot” such axle counting, and thus the lockout was cancelled, and the points became free to set immediately.

- The points routing towards the Ferencváros Shed was set to deflection direction by a person using the points setting button immediately before the last car of the tram rolled onto the points.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC concluded that the points can be set from three locations being at great distances from one another. The control buttons are installed in boxes which are in worn-out condition, some of them even had no cover, and most of them cannot be locked, so they were accessible by anyone.

The currently effective user's manual of the points setting equipment includes no conditions of use relevant to the operating personnel. Points setting by the drivers of the vehicles, as currently done, is against the Train Loading and Running Regulations No. F2.

Safety recommendation

BA2011-608-5-01

During the investigation, the Investigation Committee (hereinafter: IC) established that the points of the branch line of the Ferencváros Shed were switched under a tram in motion. The design of the appliance (electrical lockout) which prevents the switching of the points does not prevent the switching of the points in every case (e.g. after a lockout which failed due to power failure / unintentionally released lockout), despite the fact that a vehicle is rolling on them. Further, the IC concluded that it cannot be established which operating unit the points concerned were actually switched from (there are three).

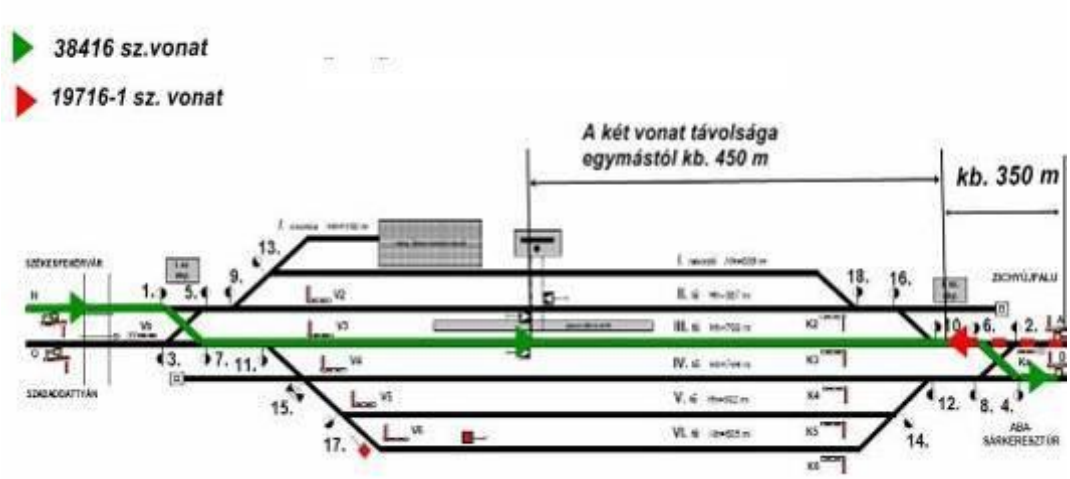
> **Transportation Safety Bureau recommends the National Transport Authority to examine the safety risk of a potential power failure at the current points-operating and train-protecting signal apparatus of the branch line of the Ferencváros Shed, and to ensure the elimination of such risk through appropriate modification of such apparatus.**

In the opinion of the IC, in the case of accepting and implementing the above recommendation, the setting of the branching-off points could be initiated by the vehicle drivers only, and thus the changing of the setting under a rolling vehicle could be minimized even in the case of malfunction of the electrical lockout.

2011-618-5

On 09 December 2011 at 16:13, the train No. 19716-1 passed the entry signal displaying "*Stop!*" at Börgönd station.

At Börgönd station, a track was set for the train No. 38416 running through, the signal was set up for it, when the pointsman in service at the signal box No. 2 realized that the train No. 19716-1 failed to stop at in front of the entry signal. He set the exit signal, which had previously been set to open position for the train No. 38416, to "Stop! "position, and then ran down outside the signal box, and displayed a manual "Stop!" signal to the train No. 19716-1. In the meantime, the station inspector stopped the train No. 38416 at the traffic control office. The driver of the train No. 19716-1 perceived the manual signal and the inappropriate position of the points No. 6, and used the emergency brake, but could not stop before the points No. 6 and split it open, and finally stopped at a distance of approx. 450 m from the other train.



Factual statements directly connected to the occurrence of the case

The case of going past the entry signal A at danger at Börgönd station can be attributed to human factors.

The occurrence took place because the engine driver of the train No. 19716-1 neglected the display of the entry signal. Consequently, his train went past the entry signal at danger, split the points No. 6 of the junction open, entered the track set up for the train No. 38416, and finally stopped.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2011-622-5

On 13 December 2011, at Albertfalva station, the overhead contact wire maintenance vehicle with track No. 99 55 9436100-9, travelling under train No. 14789-2, passed the exit signal displaying "*Stop!*" without permission, split the points No. 5 (which was in the straight position) open, left the station, and entered the single-track open line. As a result, it faced the passenger train No. 4657 which was travelling towards the station. The crew of the train No. 14789-2 recognized the danger situation, stopped in the open line section, and gave light signal towards the driver of the train No. 4647 coming from the opposite direction. The driver of the train No. 4647 perceived the danger situation owing to the change in the displayed image on the block system signal, and the two trains stopped at a distance of 1100m between them.

Factual statements directly connected to the occurrence of the case

- The crew of the train No. 14789-2 did not perceive the "*Stop!*" display of the exit signal V1, the splitting open of the points No. 5 which offered inappropriate direction to them, and their passing of the block signal 92 which was in 'signal out' state.
- Although the crew of the maintenance vehicle had all the required certificates formally, they were not in possession of the competences necessary for the routing of the train in practice.
- The station inspector did not follow the required procedure to ensure the holding of the maintenance vehicle at the exit signal.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

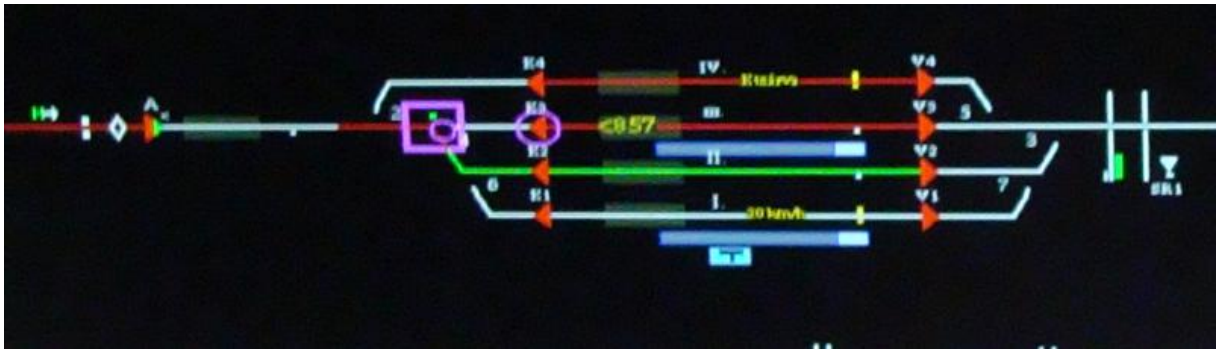
When setting up the arrival track of the train No. 4647, neither the station inspector, nor the pointsman working at the shunting frame No 1 checked whether the track was free or whether the points was operable, and thus they did not realize that a danger situation had developed.

Safety recommendation

Safety recommendation was not issued.

2012-047-5

On 25 January 2012 at 10:01 hours at Balatonfenyves station, the train No. 857 passed the exit signal K3 indicating danger along track 3 of the station, and split open the points No. 4 the position of which was inappropriate for this train.



The engine driver perceived the Stop signal on the exit signal K3 from a distance of 20 to 30m. He applied emergency braking immediately, and at the same time, he perceived the points No. 4 the position of which was inappropriate for his train, but his train passed the exit signal K3 and split the points No. 4 open. The train No. 857 stopped at a distance of approx. 490m from the train No. 850 which was staying in front of the arrival signal displaying Stop.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the case to human factors:

- The ticket inspector in charge permitted the engine driver to start without being able to make sure about the image displayed by the He did not see either red or other signal, and yet he did not regard it ‘signal out’.
- After receiving the permit to start, the engine driver started the train without checking the digital display at the driver station or the image on the exit signal K3, and also neglected the instruction to apply increased awareness which he received after the start.

Factual statements indirectly connected to the occurrence of the case

On 25 January 2012 at 09:30 hours, the main red bulb in the exit signal K3 burnt out, and the supplementary red bulb turned on to replace it. The signal image displayed using the supplementary red bulb could only be seen from a distance of 20 to 30m from the signal.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-048-5

On 25 January 2012 at 13:35 hours, the train No. 39825 crashed with an automobile at the level crossing (No. AS 498) protected with warning lights between the stations Szil-Sopronnémeti and Csorna.

As a consequence of the accident, the driver and a passenger of the automobile died at the site of the accident, and another passenger was taken to hospital with life-threatening injuries. The fourth person in the car suffered mild injuries healing within 8 days.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the case to human factors related to the driver of the automobile: the driver entered the level crossing despite the red light shown by the warning lights.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-094-5

On 09 February 2012 at 17:21 hours, at the end of Békéscsaba station at the terminal point, the driver of the locomotive (track no.: M41-2174) which had arrived with the train No. 7726 and was leaving the train was not able to stop the locomotive (due to insufficient brake force) at the point appointed before the starting of shunting. The locomotive left track 7, and split open several points which were in inappropriate position.

Concurrently, the passenger train No. 37025 was arriving with regular signal management, with the locomotive travelling toward it from the opposite direction. Owing to the actions taken by the engine driver and the traffic management crew, the arriving passenger train stopped, and reversed about 5 meters.

After the reversal and the stopping of the vehicles, the locomotive and the train were standing still opposite each other, at a distance of about 3.5m (Figure 3).

The occurrence caused no personal injury, but the points split open were damaged.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the event to human factors related to the engine driver because he had not make sure that the brake equipment of the locomotive is operable: he failed to perform a running brake test after detaching from the train. The place and time of the running brake test could have been determined because after the start, the engine driver had information relevant to the distance limit of the shunting movement.

Factual statements indirectly connected to the occurrence of the case

Section 3.6 (and its subsections) and Section 5.3 of Brake Instruction E.2 include requirements for performing brake test in the case that a hauling device detaches from its train or in the case of bad winter weather. In certain cases, however, such requirements do not regulate clearly the partial rules relevant to the brake test of a locomotive which is detached from its train (e.g.: the method of the test, speed, place of the brake test, etc.); and

in certain cases such rules cannot be applied in the practice (e.g.: the locomotive with train stops at a shunting limit signal).

The unusually hard winter weather also contributed to the occurrence of the incident (snow dust, low temperature, high relative humidity).

After evaluating the occurrence and the subsequent brake test, the IC concluded that several parts and brake systems in the vehicle had been frozen, and ice plugs had formed in the pneumatic system in several places. In the course of the test, the IC was able to achieve the specified pressures after bypassing the brake circuit (equipped with pressure modification) controlled by the triple valve.

The formation of frost defects is partly caused by the practice of defrosting applied, as the surfaces are not dried after defrosting by water, and no anti-frost additive is added to the hot water used for defrosting.

Other risk factors

No official weather forecast is available to the organizational unit of the MÁV Group responsible for operative management, and thus preparation for extraordinary weather conditions may be delayed.

Safety recommendation

BA2012-094-5-01

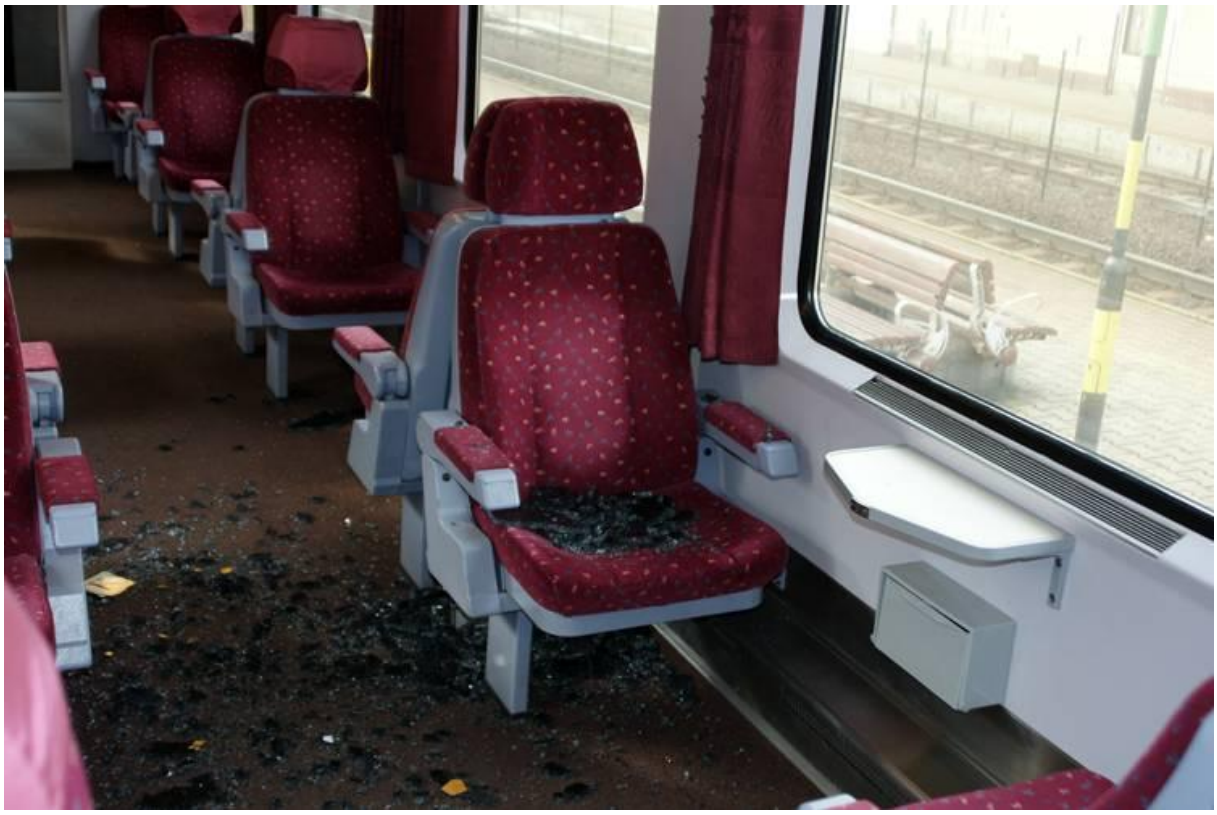
The IC established that Section 3.6 (and its subsections) of Brake Instruction E.2 include *do not clearly specify the rules of the brake test of locomotives departing from their trains (e.g.: the method of the test, speed, place of the brake test, etc.) and in certain cases such rules cannot be applied in the practice (e.g.: the locomotive with train stops at a shunting limit signal).*

> **Transportation Safety Bureau therefore recommends the National Transport Agency to request the railway undertaking responsible for the maintenance of the Brake Inspection E.2 to perform risk assessment relevant to the brake test of hauling vehicles without their trains after starting the first shunting movement, and to initiate a modification of the relevant Instruction if necessary.**

In the case of accepting and implementing the above recommendation, the rules of ensuring the operability of the brake systems of a hauling vehicle which departs from its train will be clear and applicable in the practice, thus providing the prevention of accidents which may occur due to similar causes.

2012-126-5

On 19 February 2012 at 09:57 hours, the train No. IC937 collided with the train No. IC917 saying on track No. 5 at during their joining at Csorna station. As a consequence of the collision, 11 passengers were injured, of whom 8 were given care on-site by the ambulance units, and 3 people were taken to hospital for monitoring.



Factual statements directly connected to the occurrence of the case

The collision which occurred in the course of the joining of IC trains at Csorna station can be attributed to technical and human factors.

1.) Communications over the engine radios type MESA 23 installed on TRAXX engines cannot be heard in certain circumstances of operation.

2.) The personnel which performed shunting did not observe:

- the rules relevant to the issuing of communications prior to starting the first movement,
- the rules relevant to the acknowledging of the communications received,
- the obligation to suspend shunting if the communications sent are not acknowledged, until the situation is clarified.

Factual statements indirectly connected to the occurrence of the case

When arriving next to the platform, the shunter in charge did not control shunting walking on the platform, and thus a speed exceeding the speed of walk could also be applied.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

BA2012-126-5-01

The Investigation Committee established that combining of the IC trains by type TRAXX locomotives at Csoma Station is performed using the type MESA23 engine radio sets installed on these locomotives. In the course of shunting, the communications transmitted were ***not in each case*** *audible on the locomotive. This condition of operation may occur when two radio sets speak on the same channel concurrently, or when the button of a third radio set is depressed in transmission position during a radio exchange. Therefore,*

> **Transportation Safety Bureau recommends the National Transport Authority to examine or have examined the operation of the type MESA 23 radios installed on locomotives, across the entire network, as well as the safety risk of using such radio sets in the course of controlling the shunting movement, and to take any necessary measures in order to reduce such risk.**

The IC considers that in the case of accepting and implementing the above recommendation, the risk of accident that originates in the audibility of radio transmissions transacted using the radio set of the locomotive can be reduced.

2012-135-5

On 25 February 2012 at 10:11 hours, at Rácalmás station, the 13th wagon (loaded with iron ore) of the freight train travelling between Eperjeske and Dunaújváros derailed in front of the level crossing No. SR2 in the railway section 187+70, and rolled on the concrete sleepers as far as the points No. 2 of the station, covering a distance of approx. 500m in this manner.

The derailed wagon was obstructed by the crossing part of the turnout at the points No. 2, and the 11 wagons running behind the derailed wagon jammed. The train was dismembered, and stopped by the brakes automatically.

There was no personal injury.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence to the following direct cause:

- The second axle of the first bogie (in the direction of running) of the wagon No. 33 55 599 3686-1 became unguided because the bearing no. 3 had fallen off the end of the axle.
- The bearing fell off due to the breaking of the locking washer of the axle nut.
- The locking washer broke due to improper mounting, because the locking washer of inappropriate size was forced into the axle nut by blowing it with a hammer. As a result, the internal tensions in the worn washers increased, and they became sensitive to the vibrations due to uneven seating, and in addition, cracks had developed due to the mechanical impacts.

Factual statements indirectly connected to the occurrence of the case

The permission to reuse parts implies the hazard of using locking washers with changed dimensions or shape (due to wear) after potentially improper selection and qualification.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

BA2012-135-5-01A:

In the course of the investigation of the train derailment accident on 25 February 2012 at Rácalmás station, the IC established, as contributing factor to the occurrence of the accident, the breakage of the locking 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 Co. examined another vehicle (a 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.

> **TSB therefore recommends the NTA 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, or deformation of the part, in order to prevent major service failures.

BA2012-135-02A:

In the course of the investigation of the train derailment accident on 25 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 locking washer was of worn condition, it was visible that it had not been new when mounted. The IC found bent, broken or cracked washers forced into the axle end pin also when involving other bearings in the investigation. By analysing standards and technological specifications, as well as by on-site examination of vehicle maintenance, the IC established during further investigation that the rules allow the reuse of used locking washers on condition that the washers are inspected prior to mounting. It was also established that such inspections do not always take place, and for this reason the IC does not regard the reuse of worn locking washers reliable.

> **TSB therefore recommends the NTA to administratively forbid the reuse of the locking washers of the bearings with axle nuts. For this end, a modification of the section 3.2.3 of the standard MÁVSZ 1856-1 and the technological specification of the vehicle maintenance organizations should be initiated.**

The IC considers that in the case of forbidding the reuse of used locking washers and by using new locking washers instead the washer breakages resulting from fatigue or inadequate seating may be eliminated, which will improve transport safety.

2012-157-5, 2012-434-5

On 6 March 2012, after departure from Hidasnémeti station, the driver of the locomotive hauling the train No. IC533 realized during a brake test that train did not slow down in the usual way and as expected. For this reason, a full brake test was performed at Miskolc-Tiszai station, and it was established that the brake equipment in each of the four wagons in the train worked properly according to the brake indicators and the pressure gauges.
After leaving Miskolc-Tiszai station and operating the brake equipment, the engine driver decided to haul the train at a maximum speed of 80 km/h, and a repeated extraordinary brake test was arranged for at Füzesabony station. Such extraordinary brake test showed the same result as the one performed at Miskolc-Tiszai station.

Subsequently, pursuant to the territorially competent Railway Safety & Security Department, the train was only permitted to travel as far as Hatvan station, and its passengers followed their travel on another train.

On 27 June 2012 at 17:20 hours at Pincehely station, the train No. IC806 was able to stop at a significantly larger distance (approx. 1400 to 1500m) than the usual braking distance, due to a braking failure.

Factual statements directly connected to the occurrence of the case

Insufficient brake force was established during the first use of the brake (inspection brake test on the line) in both cases, however, the underlying causes were not explored and eliminated, and thus the trains ran and carried passengers with known brake problems over 177km (between Hidasnémeti and Hatvan) or 164km (between Budapest and Dombóvár), respectively.
The braking (stopping) problems occurred due to technical causes in both cases. In some of the wagons in the train the brake pad was missing or was worn or broken, and thus, braking for the required speed was not available.

Factual statements indirectly connected to the occurrence of the case

The controlling entity was also notified of the problem, but they failed to ensure the application of the relevant sections of the instruction, and thus, their behaviour contributed to the continued travel of the train. Additionally, they ordered the engine driver to haul the train at a speed he regarded safe (which was against the instruction), and the engine driver did not refuse. Due to the braking force lower than required in the timetable, the hauling speed of the train was not determined by the required calculation but empirically (by assessment).
In summary, it may be established that none of those entitled to take action (inspectors, controllers) assumed the decision to forbid any further travel of the train in such circumstances, pursuant to the relevant instructions.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-179-5

On 15 March 2012 at Tárnok station, the freight train No. 42030-1 shunting from the open track without permit split the points No. 4 open, continued its travel at low speed, and collided with the control car of the passenger train No. 4511 which was staying on track 2. There was no personal injury.

Factual statements directly connected to the occurrence of the case

After getting stuck for a second time, the engine driver of the train No. 42030-1 backed from the open track section to Tárnok station without acknowledging and requesting permit from the station inspector of Tárnok station.

The rules in Train loading and running regulations F2 relevant to backing in the open track section need revision as regards travel according to CSM, because on such occasions no one stays on the front vehicle, and accordingly, the obligation to pay attention cannot prevail, which significantly increases the risk of accident.

Factual statements indirectly connected to the occurrence of the case

The person in charge of traction misinterpreted the situation and performed an activity not included in his powers, and his communication was regarded by the engine driver as permit for backing.

In the course of the extraordinary occurrences, the traffic controller failed to require from the engine driver the following of the communication procedure regulated in the relevant instructions, and permitted the starting of movements which were out of his powers.

The driver of the locomotive would have had difficulties with contacting the station inspector of Tárnok station even if he had wanted to, because:

- the connector of the railway line telephone situated at arrival signal ‘A’ at Tárnok station was inoperable,
- The route book issued for the railway line No. 30 does not contain the telephone number of Tárnok station.

The locomotive with track No. 91 55 0630 024-2 is not equipped with a radio set which would provide communication over the radio network installed along the railway line No. 30.

In the case of telephone calls initiated by the traffic controller, the phone number identifying the caller cannot be called back.

Other risk factors

Section 16.2.13 of Train loading and running regulations F.2, allow only the use of the radio set of the locomotive or the mobile phone to request permit to back to the station. The use of the railway line telephone is not allowed, even if it is operable.

Safety recommendation

BA2012-179-5-1

During the investigation, the Investigation Committee (IC) established that, on the basis of the rules set out in Train Loading and Running Regulation no. F.2 for backing movement, nobody stays on the leading vehicle (according to the direction of travel), and thus the obligation to watch as specified in Train Loading and Running Regulation no. F.2 cannot be met, which significantly increases the risk of accidents.

> **Transportation Safety Bureau recommends the National Transport Authority to review the safety risk of the current regulation and take steps to modify it if necessary.**

The IC considers that in the case of accepting and implementing the above recommendation, perception of the signals and the track may be improved significantly, and accordingly, the risk of accident may be reduced.

BA2012-179-5-2

During the investigation, the Investigation Committee established that the contact details of Tárnok Station are not indicated in the route books issued for Line no. 30. Thus, the engine drivers cannot establish direct telephone connection with the movement inspector of Tárnok Station.

> ***Transportation Safety Bureau recommends the National Transport Authority to oblige MÁV Co. to ensure, by using the enforcement procedure, required by Annex 1, point 4.2.1.2.2.1 of Decree 18/2010. (III.12.) of the Minister of Transport, Telecommunications and Energy on the technical requirements relevant to the interoperability of the operation and traffic control subsystems of the Trans-European traditional railway system and established within its safety management system, that the information handed over to the railway companies for the purpose of compilation of the line book should contain the name and contact details (via radio or other means of communication) of each district control office and control office.***

In the case of accepting and implementing the above recommendation, there will be no technical obstruction to the establishing of direct contact between the engine drivers and movement inspectors, and accordingly, the traffic controller will only need to be involved in the communication processes when the rules so require.

BA2012-179-5-3

During the investigation, the Investigation Committee established that, due to damage, the connector of the block telephone located near entry signal A at Tárnok Station cannot be used for the intended purpose, and the inoperability of the connector has not been noticed by the maintenance staff.

> **Transportation Safety Bureau recommends the National Transport Authority to check the integrity and operability of the block telephone network and to take action if necessary.**

In the case of accepting and implementing the above recommendation, such defects will be more likely to be explored, and thus the operability of a channel to be used for communication between the train crews, the line crews and the movements inspector of the stations on the open line can be ensured.

BA2012-179-5-4

During the investigation, the Investigation Committee established that the locomotive no. 91 55 0630 024-2 involved in the occurrence was not equipped with any 450 MHz radio set fit for the block network, and thus the engine driver was only able to establish contact with the traffic controller through mobile phone.

> **Transportation Safety Bureau recommends the National Transport Authority to oblige the railway undertakings apply such radio sets on their tractive units which can be used to connect to the radio network operated by the operator of the rail network.**

In the case of accepting and implementing the above recommendation direct and immediate connection can be established between the engine drivers and the traffic control, as a result of which the communication between the traffic controller and the train staff can be made simpler and its duration shorter.

BA2012-179-5-5

During the investigation, the Investigation Committee established that, in the case of calls started by the traffic controller from the internal telephone network of MÁV Co., the caller's phone number is always the same central phone number which cannot be called back from the public telephone network, and this may mislead the party called.

> **Transportation Safety Bureau recommends the National Transport Authority to examine whether the potentially misleading nature of displaying a non-callable telephone number on telephones used as a communication channel for traffic control purposes represents a safety risk. If yes, please take action to eliminate such risk.**

In the case of accepting and implementing the above recommendation, the telephone set of the called party cannot display potentially misleading information, and thus the called party will not attempt to call back the uncallable number in the case of subsequent need for communication.

2012-180-5

On 15 March, 2012 at 07:08 hours, the train No. 2859, which had been notified of 'one train only' mode between Üllő and Vecsés stations, departed from Üllő station, and despite the danger indicated by the exit signal, left towards Vecsés station at low speed on the left-hand side track. When the train entered the interstation track, there was no other train in the same section.

Factual statements directly connected to the occurrence of the case

During the investigation, the Investigation Committee established that the occurrence of the case can be attributed to human factors related to the crews at the railway station and on the train.

- the train crew failed to use the check lists made for extraordinary situations, and thus those lists could not play their intended role.
- the written instruction No. 19 for the train was not delivered at the place and in the manner indicated in the relevant requirements,
- the train departed from the junction without appropriate authorization,
- the train passed the exit signal at danger and the open station barrier SR2 without receiving a permit in a written instruction or other notification,
- the rules relevant to the obligation to pay attention were not observed,
- despite the fact that the crew members staying at the driver's cab remembered differently the image displayed by the exit signal, the train did not stop to clarify the situation.

Factual statements indirectly connected to the occurrence of the case

The IC established that on the day of the occurrence the train crew were not able to skilfully apply the procedures to be followed in the event of extraordinary situations which occurred.

The railway undertakings involved in the occurrence have no effective orders in place for the actual use and inspection of the checklists compiled in order to prevent similar occurrences.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-257-5

On 13 April 2012 at 12:20 hours on the railway line No. 18, at the unprotected level crossing at the stop at Kőszegfalva, a passenger train collided with an automobile.

As a consequence of the accident, three of the seven occupants of the automobile died, three suffered severe injuries, and one suffered mild injuries. The car was damaged beyond repair.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the case to human factors related to the driver of the automobile.

The train was travelling at a speed within its speed limit, and the reduced sight triangle was unobstructed.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The level crossing is unprotected, however, there is also a protected level crossing in the vicinity (within 1km).

The signposting of the level crossing is not compliant with the requirements.

The layout of the platform forces the passengers to cross the track through a level crossing with lower safety level which is not compliant with the requirements.

The layout of the level crossing was not compliant with the requirements at the time of the accident. Traffic through the level crossing was banned for motor vehicles in the framework of an administrative proceeding by the relevant authority, and thus it was not necessary to issue a safety recommendation.

Safety recommendation

Safety recommendation was not issued.

2012-354-5

On 26 May 2012 at 16:14 hours the railcar (type Bzmot) with track No. 90 55 5429 240-9 of the train No. 37214 collided with an automobile at an unprotected level crossing in the railway section 624+80 between Lakitelek and Kiskunfélegyháza stations. As a result of the collision, the driver of the automobile died on the spot, and the passenger travelling on the front left seat suffered severe injuries healing beyond 8 days. The automobile got stuck under the railcar, and was damaged beyond repair. None of the passengers on the train was injured.

Factual statements directly connected to the occurrence of the case

The driver of the automobile disregarded the approaching railway vehicle when accessing the level crossing, and thus the cause of the accident may be attributed to human factors related to the driver of the automobile.

Factual statements indirectly connected to the occurrence of the case

The warning lights, which had been required as a precondition of the building of the nearby housing estate, were not installed.

Other risk factors

The sight triangles were not fully unobstructed.

Safety recommendation

Safety recommendation was not issued.

2012-361-5

On 31 May 2012 at the level crossing No. AS 175 protected with warning lights between Győrszemere and Gyömöre stations, a freight train collided with an automobile. The driver of the automobile died on the spot.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the accident to human factors related to the driver of the automobile.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-372-5

On 05 June 2012, at about 20:12 hours, the locomotive No. 21661 (track No.: 98 55 0448 426-5) arriving at track 7 of Kőbánya Freight Yard derailed with all four axles at points No.7 set to turnout direction.

Factual statements directly connected to the occurrence of the case

The IC concluded that the derailment of the locomotive may be attributed to the following causes:

- the points were not in suitable technical condition (lack of cleaning according to specification),

- the points positioning lever clicked in with difficulty, with extra help, after several trials only,

- this click may have led to the (erroneous) conclusion that the points have also got into limit position,

- although it was perceived at the trial positioning of the points No. 7 that it was difficult to position the points, however, the points were invariably regarded as operable, and no action was taken to have them repaired.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2012-412-5

On 24 June 2012 at 18:15 hours, the train No. 34716 collided with an automobile at the level crossing No. AS156 protected with warning lights between Mezőfalva and Rétszilas stations.

Due to the accident, the driver and the passenger of the automobile died on the spot. None of the occupants of the train were injured.

Factual statements directly connected to the occurrence of the case

On the basis of the findings of the site survey and the analysis and evaluation of the documents obtained and the photos available, the IC established the following facts:

- The train No. 34716 was travelling at the speed specified in the timetable, and, in the opinion of the IC, the driver of the railcar made all effort to avoid the collision.
- The warning lights No. AS156 worked properly at the time of the occurrence, and its displayed pattern was perceivable continuously already from the first striped distance signpost placed at the side of the road.
- The driver of the automobile started crossing without due care, and neglected the stop signal of the warning light, and was not able to finish crossing before the train arrived, which resulted in the collision of the vehicles.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

At the time of the accident, the reduced sight triangles were not available due to the vegetation which limited free vision.

The speed limit signpost in front of the level crossing was not placed in the manner specified in the Annex to Decree 20/1984. (XII.21) KM.

Safety recommendation

Safety recommendation was not issued.

2012-538-5

On 07 August 2012, a passenger train travelling Kőszeg to Szombathely collided with a grader at an unprotected level crossing in Lukácsháza village.

As an effect of the collision, the grader turned over into the road-side trench, its grader blade broke off, and caused the train to derail, and the rail tack was also seriously damaged.

The driver of the grader and a passenger of the train suffered severe injuries, and another passenger had milder injuries.

Factual statements directly connected to the occurrence of the case

The IC attributed the occurrence of the accident to human factors related to the driver of the grader.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The distances of the level crossing signposts along the rail track do not meet the relevant requirement.

The pavement road within the level crossing is poorer quality than that of the accessing asphalt road.

Safety recommendation

BA2012-538-5-01

It was established during the investigation that, in the technically unprotected level crossing located in section 64+80 between Kőszeg and Szombathely stations, the quality of the road surface is poorer than that of the asphalt road leading to the level crossing, and thus the level crossing does not comply with the requirements set out in Article 9 (5) of Decree no. 20/1984. (XII. 21.) of the Minister of Transport.

> **Transportation Safety Bureau recommends Inspectorate of Transport, Government Office of Vas County, to examine the layout of that level crossing and oblige the parties concerned to ensure the condition specified in the statute of law mentioned above.**

The IC considers that in the case of accepting and implementing the above recommendation, safe passage through the level crossing as well as compliance with the statute of law can be ensured properly.

2012-638-5

On 19 September 2012, the train No. 7252 collided with a truck at an unprotected level crossing between Szegvár and Szentes stations.
Due to the accident, the ticket inspector in charge and three passengers of the train suffered mild injuries.

Factual statements directly connected to the occurrence of the case

The driver of the road vehicle neglected the 'Stop' sign and accessed the level crossing, and thus he was not able to make sure whether crossing was safe. The cause of the accident may be attributed to human factors related to the truck driver.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The IC established no findings of this kind.

Safety recommendation

Safety recommendation was not issued.

2013-161-5, 2013-162-5, 2013-350-5

On the evening of 25 February 2013, and again on the morning of 26th, the tram type SGP E1 (track No.: 186) derailed, at the same location, in the arrival curve of the Tiszai station, at its terminal station in the Miskolc network; the same incident occurred again on 07 May with another tram (track No. 183).

As the affected track section (which very probably is a unique location according to the investigation) will be reconstructed in the near future, and the affected vehicle type will be withdrawn from service, it is unnecessary to issue a safety recommendation in connection with the occurrence.

Factual statements directly connected to the occurrence of the case

At the location of the derailment, the geometry of the track communicates an adverse effect of force to the wheels of the vehicle, which significantly distorts the resilient structure of the wheels to an extent that may even lead to derailment.

It was established that during the derailment the wheels of the vehicle were deformed (due to the change of shape the built-in rubber springs), and their gauge got loose. The IC investigated the construction and the actual condition of the wheels, and established that the construction or the actual condition do not explain deformation.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

The resilient structure of the wheels of the vehicle involved in the accident is more sensitive to the defects of track geometry in comparison with other vehicles.

Safety recommendation

Safety recommendation was not issued.

2013-309-5

The train No. IC 806, approaching Sárosd station, collided with an agricultural tractor at the correctly working level crossing (No. SR2) of the station. As a result of the collision, the driver of the agricultural tractor died, and the driver of the locomotive of the train suffered mild injuries. The agricultural tractor caught fire and was destroyed, and the fire spread onto the locomotive, and the locomotive was damaged beyond repair. The first four passenger wagons were also damaged.

Factual statements directly connected to the occurrence of the case

The driver of the agricultural tractor accessed the level crossing with his vehicle despite the alternating red lights of the warning lighting, the approaching train, and the audio signal '*Caution!'* emitted by the engine driver, and the vehicle collided with the train No. IC 806.

Factual statements indirectly connected to the occurrence of the case

The IC established no findings of this kind.

Other risk factors

In the direction from which the agricultural tractor arrived, the road sign with two stripes (warning of the level crossing) is missing.

Safety recommendation

Safety recommendation was not issued.

3.5 Other recommendations

On 4 further occasions, TSB issued 4 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 and 1 recommendation was accepted, its implementation is in progress.

BA2013-367-5-01A: *During its site survey following the occurrence, the IC established that the design of the level crossing does not meet the requirements specified in Section 11 (1) of tee Decree No. 20/1984. (XII.21.) of KM, because the displayed signals of the warning lights are not visible sufficiently. The bicycle path running between Main Road 71 and the railway line no. 29 s part of the bicycle route around the Lake Balaton. This path conveys considerable bicycle traffic in the high season of tourism. It would be worth considering a crossing for the bicycle traffic, secured pursuant to Section 5.1 of the technical requirement "Layout of Level Crossings" (ÚT 2-1.225.*

Transportation Safety Bureau recommends the Government Office of Veszprém County to examine the design of the level crossing located in Section 981 between Révfülöp and Badacsonytomaj stations, with special regard to the visibility of the warning lights both from the direction of the road and the bicycle path, and also the regularity of the road signs placed around the level crossing, and, based on such examination, to take appropriate action.

Through the implementation of the Safety Recommendation, the design shortcomings of the level crossing can be eliminated, and, at the same time, the conditions of safe crossing by the cyclists using the level crossing can be provided.

Accepted, implemented

BA2013-666-5-01A: *The technical investigation established that the required sight at the level crossing in Section 323 is not free due to the vegetation along the rail track: the reduced sight triangles are not provided, and thus, this level crossing does not comply with the requirements in the Annex to Decree 20/1984. (XII. 21.) KM. In addition, the placement of the road signs at the sides of the road which crosses the railway is not suitable either.*

Transportation Safety Bureau recommends the Inspectorate of Transport of the Government Office of Győr-Moson-Sopron County to obligate the operator of the infrastructure (MÁV Co.) to provide the sight triangle at the level crossing in Section 323 at the stop at Bakonygyirót, taking into account the highest permitted speed specified in the relevant legal statute, and to obligate the upkeeper of the road to place the road signs properly

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

Accepted, implemented

BA2013-887-5-01A: *The technical investigation established that near the turnouts No. 1 and 2 located in the switching zone of Vörösmarty square, the lubrication system is ineffective due to the location of the turnouts and the operation characteristics of the lubricating equipment installed on the vehicles, and thus no lubricant is provided for the switch tongues of the switches. As a consequence, the friction factor between the wheel flanges of the vehicles and the switch tongues increases, which in turn increases the risk of wheel climb and thus the risk of derailment of the vehicle.*

Transportation Safety Bureau recommends National Transport Authority to review and, if necessary, amend the existing rail lubricating technology in the switching zone of Vörösmarty Square.

According to the IC, the acceptance and implementation of the safety recommendation would considerably decrease the risk of accidents caused by similar causes.

Accepted, implemented

BA2013-938-5-01A: *The Investigation Committee established that each of the eight wagons included in the derailment and five of six other wagons (also part of the train No. 65822-1 which derailed at Hatvan station) selected for inspection on a random basis was qualified "UNFIT" by the wheel load measurement. The measured* q_R *values of two of the derailed wagons indicated such degrees of wear which jeopardise proper operation. The affected vehicles are owned by RailCargoHungaria Co.*

> **Due to those above, Transportation Safety Bureau recommends National Transport Authority to order extraordinary inspection of the flat wagons with the strings 390, 391 or 393 in their serial number owned by Rail Cargo Hungaria Co. in workshop environment, in order to see whether those vehicles can run safely on the basis of their technical parameters.**

According to KBSZ, in the case of acceptance and implementation of this safety recommendation the malfunctions which frequently occur in the above-mentioned vehicles (according to the measurements performed) and jeopardise the running safety of such vehicles can be explored, and by taking appropriate measures, the probability of the occurrence of accidents involving these contributing factors can be reduced.

Accepted, implementation in progress

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. It is a new tendency that the effects of the changes necessarily accompanying reconstructions and renovations played a role in several occurrences (e.g.: safety installations providing reduced services, temporary track connections, modified order of traffic, etc.)
- Situations where trains were at risk but the occurrences had no consequence shows quite a high number (ca. 20) for years. Such occurrences were **SPAD**s 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. In addition, such occurrences have appeared where the centrally operated door pinches the passenger's part of the body (typically a hand or arm), and the system does not detect it. 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 another 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 2013, 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),

In 2013, we collaborated with the Romanian accident investigating body on two occasions. In the first case, there was an exchange of experiences in connection with the derailment of a freight train in Romania; during that, our Bureau gave information on maintenance in Hungary, while the Romanian organization shared with us the experiences of the on-site survey. In the course of this meeting, a mutual notification protocol was also formulated in order to reduce the route and duration of information. In the other case, we contacted the Romanian manufacturer for information in connection with a locomotive fire which occurred in Hungary. On this occasion too, a representative of the Romanian fellow organization helped our work during preparation and the meeting as well.

TSB continued to participate actively in the work of the European Railway Agency (ERA) 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, The possibility to participate the Human Factor Network was very useful, because the human factor plays a role in an overwhelming majority of the occurrences but we have the least investigation experience in this area.

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.

During the assessment process 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.

Considering the report, TSB has prepared a development and action plan. The follow up meeting of ERA was held in December 2013. Its purpose was to overview the planned and accomplished development efforts, owing to which the actions still pending were given a new impetus.

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. Unfortunately, some of the planned meetings were cancelled lately.

The International Rail Accident Investigation Conference was held in London in November, 2013. Dr. János Gincsai, Head of Dept., was requested to give a lecture; his presentation focussed on the complexity of the investigation of accidents at level crossings.

4. SUMMARY OF RECOMMENDATIONS

In 2013, 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 2013 the Railway Department of TSB published 35 final reports, including 14 safety recommendations, 3 of them were issued earlier, during the investigation process. 7 of these recommendations have been implemented, implementation of 5 recommendations is in progress and 2 of them were rejected by the addressee.

On 4 further occasions, TSB issued 4 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. Three of these recommendations have been implemented and the implementation of one is in progress.

Summary of responses to safety recommendations issued in 2007-2013

	2007	2008	2009	2010	2011	2012	2013
Accepted and implemented	4	15	11	3	25	15	9
Accepted and partially implemented	2	2	-	-	-	-	-
Accepted, implementation in progress	7	3	7	17	2	8	4
Accepted, no information on implementation	-	3	-	-	-	-	-
Rejected	2	4	3	1	-	1	2
No answer	-	1	3	-	-	0	0

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