TRANSPORTATION SAFETY
BUREAU

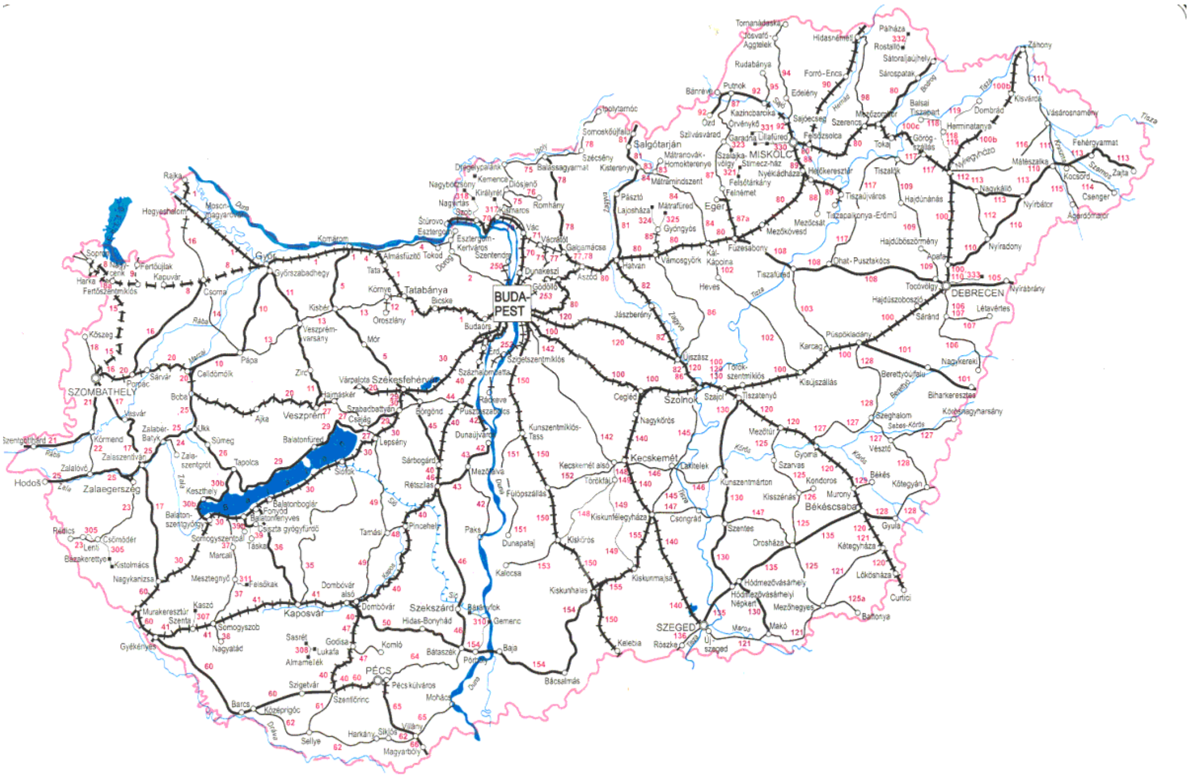
ANNUAL REPORT 2011

Transportation Safety Bureau

Hungary

CONTENTS

RAILWAY NETWORK IN HUNGARY



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 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 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, thus 2011 was the fifth full year of its operation.

In 2011, 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 39 further occurrences.

During year 2011, TSB issued 18 safety recommendations regarding 8 completed investigations. All of these recommendations were accepted by the addressees, 17 have been implemented, implementation of one recommendation is in progress. Furthermore, TSB issued 9 safety recommendations prior to the completion of the investigations, in which recommended immediate preventive actions, these being accepted by the addressees. 8 of these recommendations have been implemented, implementation of one is in progress.

At its own discretion, TSB included in the scope of the technical 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 development of the number of occurrences related to level crossings (LC accidents) and to persons run over by railway vehicles, initiating technical 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 2011 of TSB - in accordance with Article 23/3 of the Railway Safety Directive 2004/49/EC - gives an account on the following:

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

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

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

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

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

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

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

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

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

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.

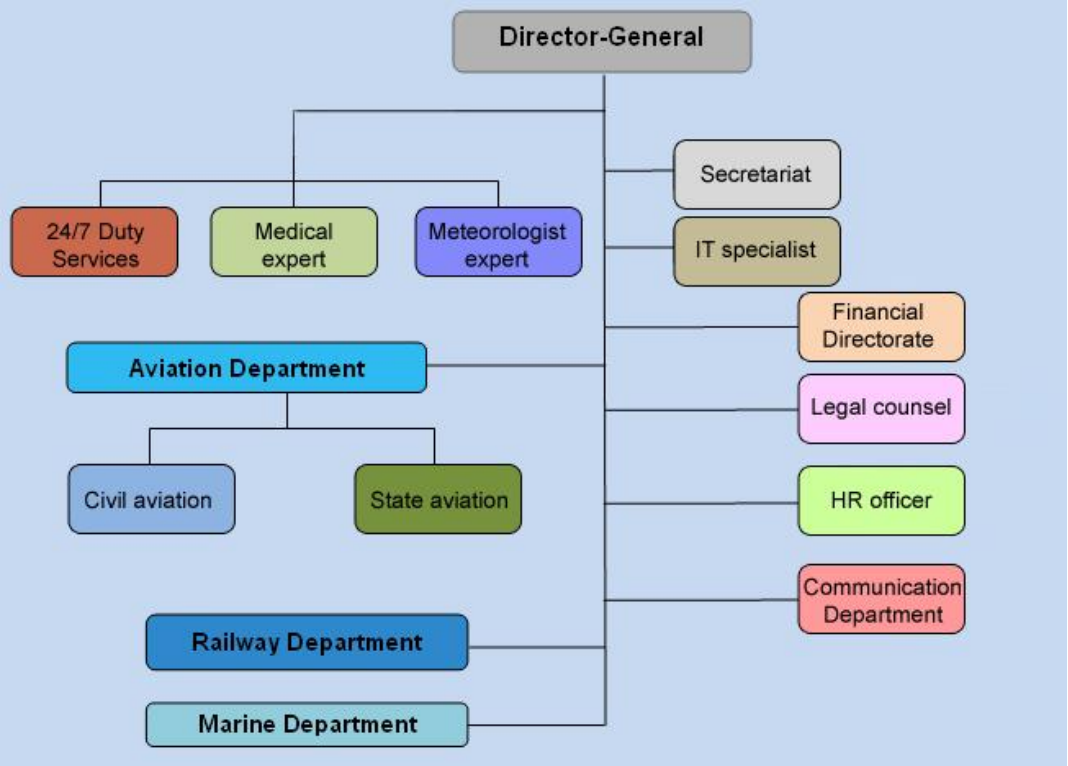
– The members of the Investigating Committee of TSB are authorized to be present at the site of any occurrence and to conduct the technical investigation parallel with the police investigation (if there is one).

– 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.

While the provisions of the Safety Directive are fully implemented regarding the independent technical investigation, the powers of the National Transport Authority are curtailed by the fact that the national safety rules have not yet been issued up to the present. Thus the NTA does not have a right to prepare the rules and regulations, only approves them.

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.

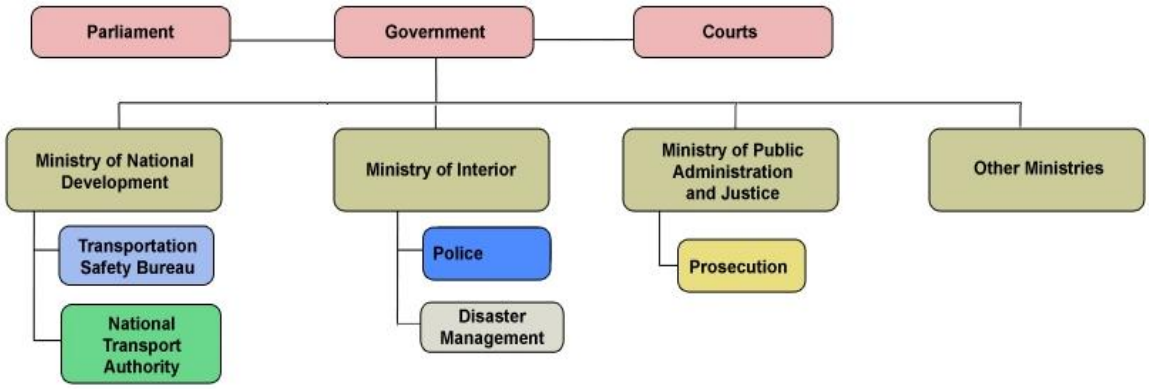
– The predecessor of TSB was the Civil Aviation Safety Bureau which conducted investigations in the field of aviation between 2002 and 2005 in line with Directive 94/56/EC establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.

– 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.

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, however, the addressees 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 accident investigators, the trainings organised based on our training plan continued in 2011.

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.

4 colleagues participated in a course and successfully passed the exam in railway traffic studies. Another 2 colleagues gained suburban train driving licence, 1 colleague acquired safety installation master qualification.

More members of the Department attended on the job trainings on brake-equipment manufacturing, vehicle repair and traffic control. Professional practice was conducted for accident investigators of the Department on download and analysis of data recorded by railway data recorders.

These studies can be utilised effectively in the investigations.

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

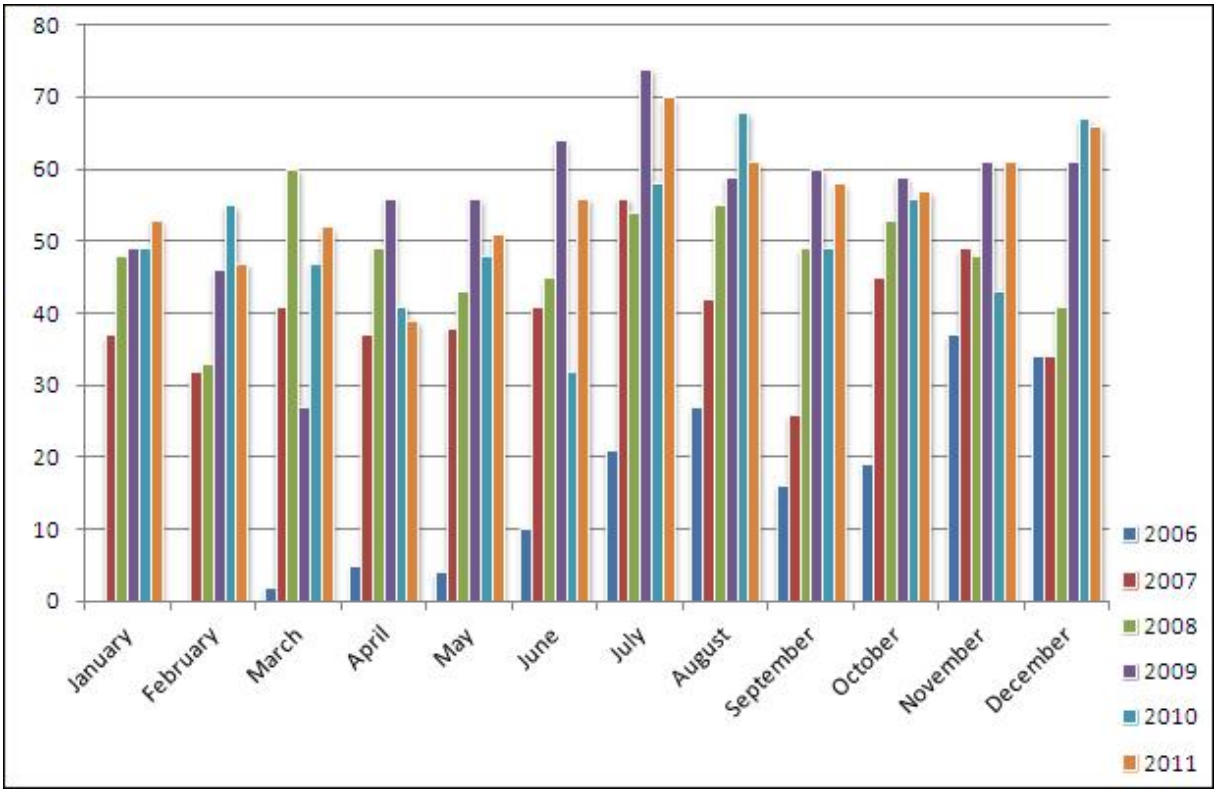
Colleagues who had signed study contracts - studying engineering and law - also fulfilled all requirements stated in their contract.

At the end of 2011, the Ministry allocated separate resources for the trainings that earlier had been planned but cancelled due to the lack of financial support. Organization of these trainings was started in 2011, with their execution planned for the 1st semester of 2012.

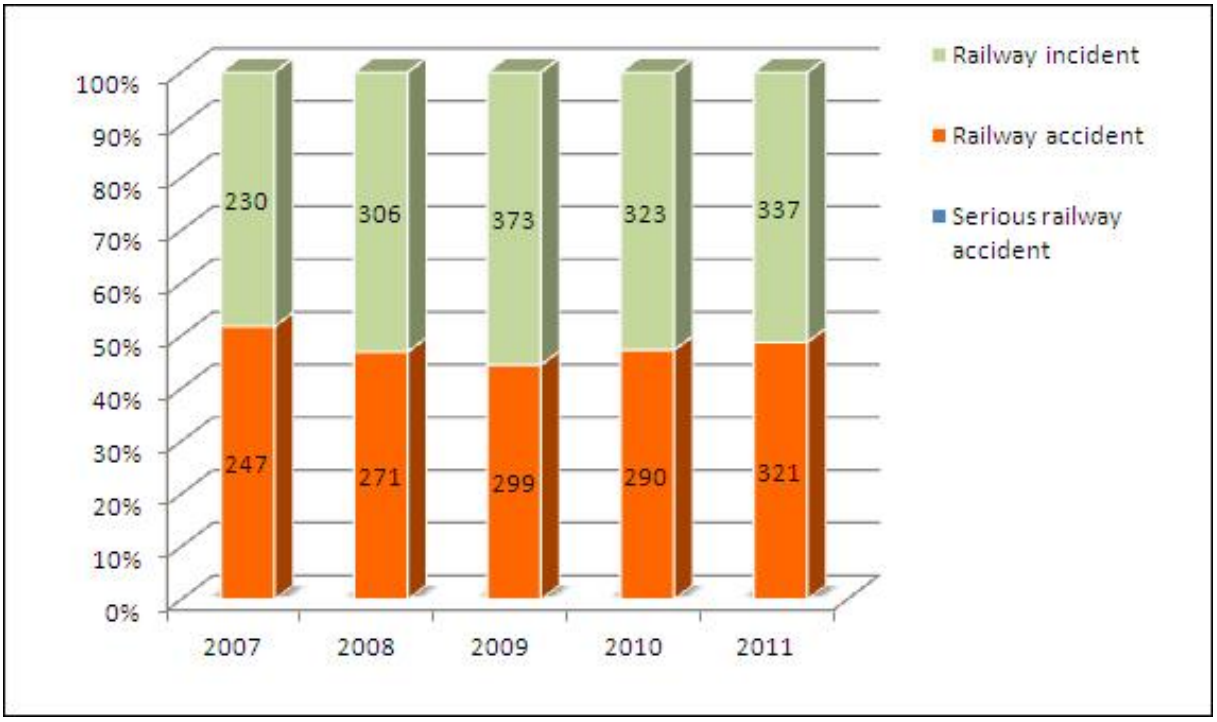
1.4.2 Reports

Data of 2011 reflect that 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). The number of notifications of this kind would probably increase in 2012, considering that the notification practice concerning these railway systems would stabilize by then.

Reported railway occurrences in 2006-2011 by months



Reported railway occurrences in 2006-2011 by category



Reported significant accidents in 2008-2011 by content

SIGNIFICANT RAILWAY ACCIDENTS	TSB			
	2008	2009	2010	2011
	132	165	131	134
- collision	1	-	-	-
- derailment	1	2	-	-
- injuries caused by rolling stock in motion	88	113	89	91
- accident at LC	42	50	42	43
- fire in rolling stock	-	-	-	-

Reported occurrences in 2007-2011 by content

	TSB				
	2007	2008*	2009	2010	2011
NUMBER OF REPORTS	478	578	672	613	671
Serious railway accident	1	1	-	-	-
Railway accident	247	271	299	290	321
- collision	14	29	24	31	46
- derailment	19	19	21	13	14
- accidents at LCs	90	101	95	88	93
- injuries caused by rolling stock in motion	104	108	128	116	107
- fire (in rolling stock)	15	12	24	13	32
- others	5	2	7	29	29
Railway incident	230	306	373	323	350
- trains in opposing direction on the same rail track	2	3	2	-	3
- signalling to occupied rail tracks	1	-	-	-	-
- SPAD	2	4	10	13	23
- overhead contact line fault	57	66	89	75	30
- suicide	73	106	114	104	150
- others**	81	127	158	131	144

* corrected according to the CSI definitions

** data contains the seven security related reports (e.g. bomb alert) in 2009

The number of notifications on signals passed at danger received by TSB over the recent period continues to be relatively high – 23 in 2011. 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 investigations in some of these cases, issued final reports on the results and issued safety recommendations as well.

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 2011, there was no serious railway accident in Hungary which TSB was obliged to investigate. TSB conducted investigations - at its own discretion - on 39 further occasions, based on the fundamental principles listed in 2.3.

Investigations commenced in 2006-2011 by the amount of damages:

Amount of damages	Number of occurrences					
	2006	2007	2008	2009	2010	2011
Over HUF 500 million (Euro 2 million)	-	1	-	-	0	-
HUF 100-500 million	2	2	2	1	1	-
HUF 0-100 million	12	4	11	12	13	23
No damage	2	5	4	6	25	16

Investigated occurrences in 2006-2011 by their presumed cause (based on the reports):

Cause of the occurrence	Number of occurrences*					
	2006	2007	2008	2009	2010	2011
Human factor	**12**	**8**	**12**	**15**	**30**	**34**
- personnel of railway undertaking - other person	5 7	2 6	6 6	10 5	10 20	16 18
Technical factor	**5**	**4**	**5**	**4**	**9**	**5**
- defect in the track - defect of the rolling stock	1 4	2 2	4 1	4 -	5 4	2 3

* data may contain accumulation

Number of investigations lasting longer than one year over 2006-2011:

	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
Railway	0	12	11	7	1	7

3.2 High priority topics in 2011

Having regard to the fact that one third of the accidents on the railways occur on level crossings (collisions with road vehicles, running over people), in 2011 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 accidents occurring at LCs slightly decreased in the period 2009-2010 (50→42), and was constant in 2011 (42→43). However, the number of collisions with cars was dominant. All these accidents can be related to human factors when drivers do not pay sufficient attention or break the rules on purpose. Besides these causes, the design of the LC was also found to be a contributing factor on a few occasions, such as the lack of required visibility to the signals, inadequately placed signposts, etc. to which the Investigating Committees drew the attention in their safety recommendations.

A positive experience in the last two years is that as opposed to the 3 occasions in 2009 when the accidents occurred due to the operation deficiency or fault of the warning lights and barriers, in 2010 and 2011 there were no such occurrences.

Having evaluated data of 2011, it can be established that the number of accidents when road vehicles ran into trains increased significantly. These accidents can almost solely be related to the inattention of LC users.

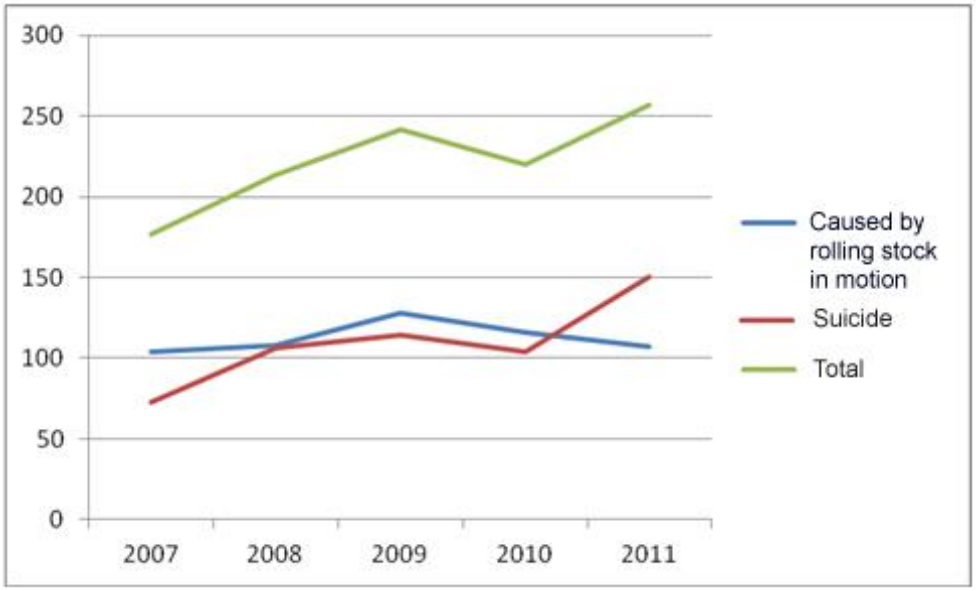
Spatial distribution of accidents occurred last year has not revealed any other level crossings with recurring occurrences. Significant progress can be observed though concerning the structure of LC no. AS 41, located in the urban area of Debrecen, between Tócóvölgy – Balmazújváros stations, considered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

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 practically remained in 2011 on the same level as in 2010, only a slight decrease can be observed: from 116 to 109. The number of suicides on the other hand increased significantly, from the value of 104 in 2010 to 150 in 2011.



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

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

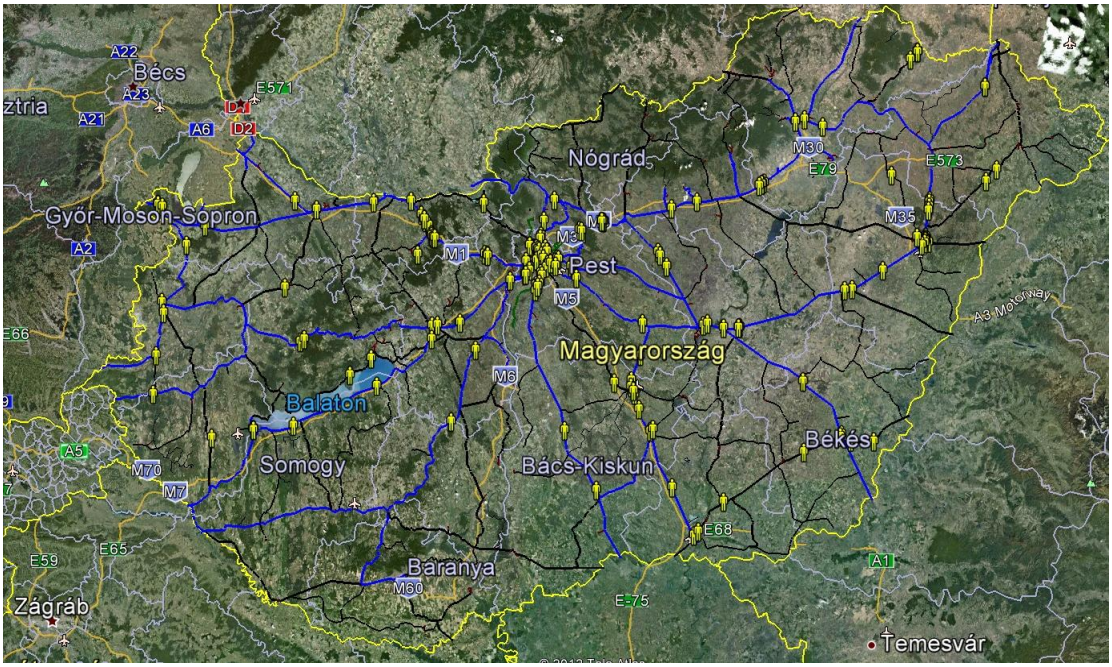
Injuries to persons caused by rolling stock in motion on the railways of Hungary

In connection with injuries to persons caused by rolling stock in motion and suicides, it can be stated that such accidents occur in various parts of Hungary. The purpose of this type of evaluation is to find out whether there are certain points / areas / track sections on the railway network where the number of such accidents is significantly higher. At such places, intervention is advisable by the infrastructure manager or the relevant authorities.

Data of 2011 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.
- Section between Kőbánya-Kispest and Monor stations: 27 occurrences between 2007 and 2010; 6 occurrences in 2011.
- Section between Dunakeszi and Vác stations: 28 occurrences between 2007 and 2010; 4 occurrences in 2011.

Besides the previous sites, there are 3 stations the areas of which presented a more significant frequency of cases in 2011: Tatabánya, Aszód and Kecskemét. 5 occurrences of this type were notified in 2011 at each of these stations, while no such cases had occurred in any of these areas in the previous years.



Suicides by area

A remarkable achievement in the Hungarian railway transport is that there has been no serious railway accident since 2008. However, to maintain this positive tendency, it is essential that all participants of the sector learn from the occurrences whose consequences were close to serious. Therefore, TSB decided on a number of occasions to investigate accidents which did not have serious consequences but created rather dangerous situations. Such was the incident occurred between Aszód-Tura, as well as Szolnok-Abony stations, at Északi-kitérő station mainly due to human factors, and at Újfehértó and Sopron stations, where construction of the safety installation (continuous signalling) also played a role in the accident besides human factors as main cause.

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

The consequences of reported SPADs:

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

3.3 Investigations commenced in 2011

Date 2011	Occurrence	Category
01.09.	Train no. 2935 collided with a car on an unprotected level crossing located in railway section no. 135 between Pestszentimre and Kispest stations. The driver of the car died at the site, one of his passengers suffered serious and two suffered minor injuries.	Railway accident
01.28	Train no. IC802 collided with a car on the level crossing SR2 (protected with warning lights and half barriers) at Szabadegyháza station. The driver of the car suffered serious and his passenger suffered minor injuries.	Railway accident
02.09.	Locomotive no. V43-1103, while carrying out shunting movement, derailed with four axles on remote-controlled switch no. 14 at Lökösháza station. The wheels of the locomotive were re-railed after the front axle of the locomotive had run on the deflecting switch blade and had broken a 7.35 m piece off it.	Railway accident
03.01.	Train no. 909 passed exit signal KA at danger at Kápolnásnyék station and split switch no. 6 open which had been incorrectly set.	Railway accident
03.06.	Train no. 48081-2 passed exit signal V1 at danger at Ötvös crossover and, having split switch no. 1, it ran on the route set for train 9534. The two trains stopped 400 metres from each other. No one was injured.	Railway accident
03.09.	Train no. 6517 collided with a car on the unprotected level crossing between Hortobágy and Balmazújváros stations, in railway section 352+47. The driver of the car and two of his passengers died at the site.	Railway accident
03.20.	Train no. 4544 crashed a motorcyclist in the level crossing no. AS87 on the right track between Budafok-Háros and Nagytétény-Diósd stations. The motorcyclist died at the site.	Railway accident
03.21.	The shunting foreman suffered serious injuries at Visonta station.	Railway accident
03.29.	Passenger train no. 6346 collided with a car between Mátészalka and Vásárosnamény stations on the level crossing no. AS341 protected with warning lights. The driver of the car died at the site.	Railway accident
04.03.	Train no. 37454 collided with a car between Szentes and Orosháza stations on the level crossing no. AS399 protected with warning lights. As a consequence of the accident, the driver of the car and his passenger were seriously injured. The power car was rendered inoperative and one of the pylons of the warning lights equipment was damaged.	Railway accident
04.20.	Train no. 3528 departing Gyömrő station struck a man who had been attempting to join the train after its departure. The man was seriously injured in the accident.	Railway accident
05.11.	Work train no. 2391 split switch no. 2 open when departing from track II of Őrbottyán station.	Railway incident

05.16.	Train no. IC568 travelled on the right track between Aszód and Tura stations, while another train (no. 5503) travelled on the same track in opposing direction. The latter train was signalled out from track IV of Tura station and passed the exit signal indicating Stop. Having noticed the danger, the two trains stopped 1600 metres from each other.	Railway incident
05.18.	Train no. 36322 collided with a motorcyclist in an unprotected level crossing at Tiborszállás stop. As a consequence of the accident, the motorcyclist lost his life.	Railway accident
05.18.	Train no. 45439 departed from Újfehértó station and passed K5 signal at danger. The train stopped at switch no. 12 and was in the route (set earlier for) train no. 6018 approaching the station. The two trains stopped 238 metres from each other.	Railway incident
05.20.	Train no. 39822 collided with a lorry between Ölbő-Alsószeleste and Porpác stations on level crossing AS24 protected with warning lights. As a consequence of the collision, the train derailed.	Railway accident
05.26.	Train no. 2966 collided with a car between Heténygyháza and Kecskemét-alsó stations on level crossing no. AS24 protected with warning lights. As a consequence of the accident, the driver of the car suffered serious injuries.	Railway accident
06.06.	Train no. 9945 collided with a car between Acsád and Bük stations on the level crossing no. AS743 protected by warning lights. As a consequence of the accident, the driver of the car died at the site.	Railway accident
06.20.	Train no. 5226 collided with a car between Bodrogkeresztúr and Olaszliszka-Tolcsva stations on the level crossing no. AS199 protected by warning lights. As a consequence of the accident, the driver of the car and his passenger died at the site.	Railway accident
07.06.	Train no. 38796 collided with a car between Hidas-Bonyhád and Bátaszék stations on the level crossing no. AS556 protected by warning lights. Of the 5 persons riding in the car 1 person died, 2 persons suffered serious injuries and 1 person suffered minor injuries in the accident.	Railway accident
07.11.	Train no. 7221 carried out an emergency stop before switch no. 41 with the switch being set in the wrong position. No one was injured.	Railway incident
07.22.	Train no. 2529 carried out an emergency stop between Szolnok and Abony stations after the engine driver had noticed train set no. 2573 standing in front of the train in the section between stations. According to the written order delivered to the engine driver train no. 2529 travelled on the section between Szolnok and Abony stations.	Railway incident
08.03.	Train no. 852 struck two bicyclists between Balatonlelle-felső and Balatonboglár stations on the level crossing no. AS1449 protected with warning lights and half-barriers. The two bicyclists died at the site.	Railway accident

08.08.	A woman fell from the train no. 9202 between Tatabánya and Tata stations. After being transported to the hospital the woman succumbed to her injuries suffered in the accident.	Railway accident
08.29.	First two wagons of the freight train no. 45481-2 departing Debrecen station derailed on turnout no. 73. No one was injured.	Railway accident
09.16.	In the process of shunting train no. 9203 at Szombathely station the locomotive collided into the stationary train set. As a consequence of the accident, two of the passengers of the train suffered minor injuries.	Railway accident
09.18.	Train no. 47116 passed without authorisation the V1 exit signal set to stop position at Sopron station, split switch no. 3a open and approached from opposite direction to train no. 85876 travelling from the direction of Sopronkertes (Baumgarten) station. The two trains stopped in the section between stations at approx. 200 m distance from each other. No one was injured.	Railway incident
09.19.	A member of the MOL personnel suffered serious electric shock when climbing on the top of a tank wagon on the track III of Dunai-Finomító station.	Railway incident
09.21.	Train no. 24591 was run from Kápolnásnyék station on the wrong track (right track) without previous notification, with stop indication set on the xit signal, in direction opposite to the registered direction of traffic and travelled so to Martonvásár station.	Railway incident
09.22.	One of the wagons of train no. 45214-1 derailed with four axles at Szolnok station on diamond crossing with slips no. 22. No one was injured.	Railway accident
10.26.	Locomotive no. M41-2324 hauling train no. 526 derailed with one axle between Mezőzombor and Bodrogkeresztúr stations. A 150 m section of the track was damaged. No one was injured.	Railway accident
10.27.	Train no. 56500 passed without authorisation the V1 exit signal set in stop position at Északi kitérő station, split switch no. 11 open and approached from opposite direction to train no. 5129 travelling from the direction of Nyíregyháza station. The two trains stopped approx. 300 metres from each other. No one was injured.	Railway incident
11.07.	Train no. IC622 collided with a car between Nyíregyháza and Sóstóhegy stations on the level crossing no. AS35 protected with warning lights and half-barriers. As a consequence of the accident, the driver of the car died at the site. The hauling locomotive derailed with one axle.	Railway accident
11.17.	Train no. 2926 struck a cycling child between Pestszentimre and Ócsa stations on the level crossing no. AS171 protected with warning lights. As a consequence of the accident, the child was seriously injured.	Railway accident
11.20.	Train no. 1067 collided with a car at Erzsébet park halt, between Gödöllő-Palotakert and Mogyoród stations, on the level crossing no. AS306 protected with warning lights. One of the persons riding in the car suffered serious injuries and two suffered minor injuries in the accident.	Railway accident

12.05.	One car of the tram on line no. 1 derailed at the tram depot in Ferencváros on Könyves Kálmán street in Budapest. No one was injured.	Railway accident
12.07.	Train no. 2378 passed without authorisation the exit signal set in stop position at Göd station and collided with the departing train no. 45502. No one was injured.	Railway accident
12.09.	Train no. 19716 passed without authorisation the exit signal set in stop position at Börgönd station, split switch no. 6 open and approached from opposite direction to train no. 38416. The two trains stopped approx. 400 metres from each other. No one was injured.	Railway incident
12.13.	Train no. 14789-2 passed without authorisation the exit signal set in stop position at Albertfalva station, split switch no. 5 open and approached from opposite direction to passenger train no. 4647. The two trains stopped approx. 1100 metres from each other. No one was injured.	Railway incident

3.4 Investigations completed in 2011 with the issued recommendations

The final reports issued in 2011 analysed occurrences of the following types:

– SPAD,

– collision,

– derailment,

– accident at LC,

– occurrences which do not qualify as serious railway accidents but as a result of which there were fatalities (passenger falling out of the train, member of railway crew run over by railway vehicle).

In 2011, 29 final reports were compiled and published on the website of TSB**. Further 7 draft reports were compiled and sent** to the relevant parties for reflections.

The above investigations were closed and the final reports were published in the beginning of 2012 considering the 60 days provided by law for the relevant parties to reflect on the draft report.

Investigations completed in 2011

2010-074-5

On 11th February 2010 at 12:15 hrs, train no. 1247 passed the signal YH at danger, the locomotive and the first carriage of the train passed the open level crossing protected with warning lights and half-barriers SR4. No one was injured.

Factual statements directly connected to the occurrence of the accident

Based on documents and the analysis of videos and pictures taken on the site, the IC established that the SPAD was caused by the fact that the engine driver had not been able to notice the red light (Stop indication) of the YH in time. When noticing the Stop indication, he immediately applied the emergency brake, but the train, not having enough room to stop, passed the signal and stopped on the open level crossing protected with half-barriers, with its locomotive and first carriage passing over it.

After analysing the information recorded by the data recorder of train no. 1247, the IC established that the actual speed of the train had been of 68-70 km/h, while in the section concerned speed limit of 60 km/h applied. The higher speed resulted in a longer braking distance.

Factual statements indirectly connected to the occurrence of the accident

The IC established that the traffic direction between Andráshidai junction and Zalaegerszeg station had remained in the control of Zalaegerszeg station, this leading to the fact that the safety installation could not detect the approaching train, therefore, the level crossing remained open.

Other risk factors

- The actual structure of the safety installation at Andráshidai junction allows the possibility of a human factor caused error of directing, without any previous indication on the entry signal, a train travelling at 100 km/h – supposed to be following according to the schedule the straight direction through the Y1 – to the diverging direction of the junction. As a consequence, the train could enter at a speed of as much as 100 km/h the section to which speed limit of 60 km/h applies.
- The protecting signals controlling the barriers and other signals performing similar functions on the line are placed at a 30 m distance before the protected level crossing. The line is not equipped with a train protection system that would assure automatic stop – or at least warning – of trains at Stop indication of a signal. The IC considers that level crossings of this structure present increased risks with no protection system of this kind.
- The IC found regarding applicable speeds inconsistencies between Table 7A from Part II of the Technical Data Tables and the Timetable Reference, this being aggravated by the fact that in certain cases timetables provided for trains define speeds even higher than those specified in the regulations mentioned.
- Infrastructure Business Unit of MÁV Co. issued a resolution regarding protecting signals placed on the line, which redefined and practically amended more of the provisions of the Signalling Regulation no. F.1, although this resolution had not been approved by the authority.
- Signs displayed on the signals in the area of Andráshidai junction do not meet the requirements defined in the Attachment no. 8 of Regulation F. 2.
- Andráshidai junction on railway line no. 25 represents a novel structure in the Hungarian railway network. It is meant to make the connection at Zalaegerszeg-Ola stop, established near to the junction points (Y1), to Zalaegerszeg and through this to Rédics for trains passing through the reversing triangle, but not through Zalaegerszeg station. Based on these, the IC considers that the area concerned presents mixed characteristics of a junction and a station, this not being properly followed by the relevant regulations.

Safety recommendations

BA-2010-0074-5-01

In the course of the investigation, the Investigating Committee (IC) found the different regulations in effect to be inconsistent regarding speed limits applicable on railway lines. The timetable provided for the train concerned by the occurrence defined for certain line segments speeds higher than the values specified in the Timetable Reference or the Table 7A in Part II of the Technical Data Tables.

Therefore, Transportation Safety Bureau (TSB) recommends the National Transport Authority (NTA) to revise, in cooperation with the railway undertakings operating the infrastructure, the regulations in effect and take the necessary measures for the harmonization of these.

Accepted, implemented

BA-2010-0074-5-02

On protecting signals controlling LCs, placed on railway line Bajánsenye oh. – Boba, indications different from those determined in section 5.3.3 of the Signalling Regulation no. F.1 are also displayed.

In the course of the investigation, the IC found the relevant regulation (section 2.4.3.1 of the Signalling Regulation no. F.1) not allowing protecting signals controlling LCs to be applied as subsidiary signals also, although the role in the traffic control of these signals would require it.

Infrastructure Business Unit of MÁV Co. issued a resolution regarding protecting signals placed on the line, amending by this the provisions of sections 5.3.3 and 9.4 of the Signalling Regulation no. F.1.

TSB recommends the NTA to obligate the railway undertaking responsible for the maintenance of the regulation to revise from instruction editing aspect the rules in the Signalling Regulation no. F.1 regarding protecting signals controlling LCs, in order to ensure – by foregoing to keep all signals regarding LCs in the same chapter – that the indications displayed together on protecting signals controlling LCs, capable of sending pre-indications also, would be interpretable as instructions and to eliminate by this the actual regulation deficiency.

Accepted, implemented

BA-2010-0074-5-03

The IC considers that the system of safety installations implemented in the junction concerned differs from that required by the nature of fork / Y junction of the location (e.g. individual exit signals implemented in the junction). The Timetable and Timetable Reference provided for the line consider the location concerned a junction, identifying it as Y1 junction in some cases.

TSB therefore recommends the NTA to revise, in cooperation with MÁV Co., the function of the junction at Andráshida and take the necessary measures to create a uniform regulation regarding the junction concerned and those of similar structure (extant or to be established).

TSB considers that the implementation of the safety recommendation would clarify the role of the junction in the railway traffic, making clear by this which operational rules to be applied at the location.

Accepted, implemented

BA-2010-0074-5-04

Entry signal YE at Andráshidai junction indicates clear sign for the trains proceeding on the turnout Y1 by displaying a green light. This indication presents the risk of an error caused by human factors of directing (without any previous indication on the entry signal) to the diverging direction of the junction a train travelling at 100 km/h, supposed to follow according to schedule the straight direction through the Y1. As a consequence, the train could enter at a speed of as much as 100 km/h the section to which speed limit of 60 km/h applies.

TSB therefore recommends the NTA to examine, in cooperation with the operator of the infrastructure, the system of "Clear" indications distributable to the signal YE by the safety installation in the junction at Andráshida and take the necessary measures according to the findings.

The implementation of the safety recommendation would eliminate the risk of directing (for any reason) a train travelling in the straight direction (at 100 km/h) to the diverging direction of the junction, to which speed limit of 60 km/h applies.

Accepted, implemented

2010-128-5

On 15th March 2010 at 09:30 hrs, 3 wagons of freight train no. 53410 derailed when departing from Miskolc - Rendező station to Bánréve - first the 24th wagon, used for transport of dangerous goods, but empty at the time of the accident, after which the 23rd and 25th wagons derailed. The 24th tank wagon (Zas) had a Polish owner. The rail track and the derailed wagons sustained damage.

The investigation established that the 6th spindle of the wagon had already been faulty, had fallen apart and the bearing box had fallen off the wagon right before the occurrence, which resulted in the derailment of the wagon.

The IC considers that faults of this kind could be revealed and prevented by proper maintenance, on the operating train the fault cannot be detected.

Owing to the Polish involvement the Polish Transportation Safety Bureau investigated on the request of the IC the maintenance system of the wagon and drew the conclusions.

Factual statements directly connected to the occurrence of the accident

The 6th spindle of wagon reg. no. 3155 795 2507-6 broke due to a fault developed earlier (only detectable by an inspection involving disassembly). As the bearing box fell off, the wagon derailed.

Safety recommendations

The Polish transport safety body issued safety recommendations addressing the maintenance company and the owner of the wagon, as follows:

- A more efficient cooperation should be maintained regarding maintenance work, trainings, and the quality of documentations.
- The owner of the wagon should determine, taking relevant laws and technical regulations into consideration, the rules and instructions based on which the repair of bearings should be done.
- The documentation should comply with the regulations of the relevant ministerial decree.
- The owner of the wagon should standardize the documentations of the maintenance work.
- The old bolts should be replaced with new ones in the process of repair and maintenance of bearings.

The IC agrees with these recommendations and does not issue further safety recommendations.

2010-131-5

On 15th March 2010 at 19:53 hrs, at about 10 m distance from the exit signal towards the endpoint on track V at Győr station a shunting unit struck a young woman, who died at the site. The woman was a passenger of train no. 998 that left from track V at 19:40. The IC considers the accident as being the result of human factors and technical deficiencies altogether. The IC investigated at the same time the working methods applied at Győr station, the forming operation of passenger trains and the working schedule of the train crew. Evaluating the information revealed during the investigation the IC issued safety recommendations related to the operation of coaches, formation of passenger trains, display of destinations of trains and organisation of the work at the station.

Factual statements directly connected to the occurrence of the accident

Previously to the accident the woman took on the wrong train and after realizing her mistake she opened the door of the train in motion to get off the vehicle. She was able to open the door because the door locking device was out of order.

Factual statements indirectly connected to the occurrence of the accident

From the routing tables applied on passenger trains the departure and destination stations of trains cannot be considering the direction of traffic unambiguously determined.

Other risk factors

- After the arrival of train no. 9406 to Győr the crew of the train did not deliver the three carriages travelling further to Sopron to the relieving crew, the crew of train no. 9406 did not report in writing or orally to anyone the deficiency of the carriages.
- After revealing the failure of the remote-control door-locking equipment the crew of train no. 998 had not taken the measures provided by the regulations.
- The movements inspector II. did not perform his train reception obligations.
- Before the occurrence the public address system was continuously announcing information, as a result of which it turned into a monotonous sound source.
- While entering the train no. 998 the woman was speaking on the phone, which may have distracted her.

Safety recommendations

BA2010-131-5-1

The IC found frequent failures of remote-control door-locking switches on carriages of series 21-55 (MÁV-START Co.), these occurring due to the position of the switches. In the case of failures of this kind, the remote-control door-locking system is usually disabled in order to make the opening of the doors possible. This, however, makes possible for passengers to open the doors of the train in motion.

> **TSB recommends MÁV-START Co. to relocate the remote-control door-locking switches on carriages of series 21-55 and those belonging to the same product family from their position near the door to another location, accessible by the operator staff, but ensuring protection from impurities and damage.**

By the acceptance and implementation of the safety recommendation, a decrease can be expected in the number of failures of the remote-control door-locking switches. Disabling of the remote-control door-locking system would not be necessary and passengers could open the doors of the train in motion only by using the emergency opener. By this, the unintended opening of doors and accidents resulting from open doors could be prevented.

Accepted, implemented

BA2010-131-5-2

In the course of the investigation, the IC established that regarding handover procedures of vehicles the Train Loading and Running Regulation no. F.2 refers to other regulations. The agreement between MÁV-START Co. and GySEV Zrt. does not include any requirements on this subject. The handover is usually carried out "based on the principle of mutual trust". This, however, does not comply with the requirements of Regulation no. E.12.

> **TSB recommends MÁV-START Co. and GySEV Zrt. to revise the regulations regarding handover procedures of passenger train carriages in order to ensure that actual execution of the handover would be completed according to the rules and that information on faults detected would be forwarded to the right place and also recorded in some wise.**

Acceptance and implementation of the safety recommendation prevents the possibility of the train-crew on duty not being informed on failures of the railway vehicle. Failures affecting the safety of the run would be reported and the crew undertaking duties on the train could take the necessary measures.

Accepted, implementation in progress

BA2010-131-5-3

In the course of the investigation, the IC established that the requirements of Railway Wagon Service Regulation no. E.12 on operation of remote-control doors were not fulfilled regarding carriages of series 21-55. As a consequence, the remote-control door-locking system on carriages of series 21-55 is frequently out of order, this leading to the fact that the train-crew, even when the failure revealed, would not take the necessary measures.

TSB recommends the NTA to control during their inspections the compliance with the rules of the Railway Wagon Service Regulation no. E.12 regarding operation of remote-control doors during the run of carriages and take the necessary measures according to the findings.

Acceptance and implementation of the safety recommendation is meant to ensure that the train-crew would report properly the faults of the carriages revealed during the run and that the necessary reparations would be carried out as soon as possible.

Accepted, implemented

BA2010-131-5-4

In the course of the investigation, the IC established that the departure and destination stations of trains could not be unambiguously determined according to the routing tables applied on passenger trains and the travel direction of the train, this allowing the possibility of misconstructions.

TSB recommends MÁV-START Co. and GySEV Zrt. to apply on passenger trains routing tables from which the departure and destination stations of the train can be, according to the travel direction of the train, unambiguously determined.

Acceptance and implementation of the safety recommendation would ensure the destination station of a train to be clearly interpretable, even with two trains scheduled to travel between the same end-stations but in opposite directions, being in stationary position on adjacent tracks. The risk of accidents resulting from mistakes of passengers of boarding on wrong trains would be decreased by this.

Accepted, implemented

BA2010-131-5-5

The IC found in some cases that carriages unfit for the transmission of the remote control were assembled, when forming the passenger trains, between carriages equipped with remote-control door-locking system. The doors cannot be locked from one location in these cases, which should not be allowed on trains with one train inspector on board.

TSB recommends MÁV-START Co. and GySEV Zrt. to ensure, when forming the passenger trains, that carriages assembled between carriages with remote-control door-locking equipment are serviceable for the distribution of the remote control.

Acceptance and implementation of the safety recommendation would ensure the door locking operation on carriages equipped with remote-control door-locking system to be possible from one location.

Accepted, implemented

BA2010-131-5-6

In the course of the investigation, the IC established that the movements inspector was not always able to perform his train reception obligations due to the actual station technology and work organization. As a consequence, no one will observe the departing train in these cases, considering that the main train inspector – being the person in charge with giving indication for departure to the engine-driver – also boards the train.

> **TSB recommends MÁV Co. to determine the activity of the movements inspector in the passenger station of Győr in a way which allows the compliance with the train reception obligations specified in "Train Loading and Running Regulations no. F. 2" as well as in "Station Instructions".**

Acceptance and implementation of the safety recommendation would ensure the trains arriving to, leaving from and running through Győr station to be observed by the movements inspector. By this, any occurrences, failures on the train detectable by observation would be immediately noticed and the necessary measures could be taken as soon as possible.

Accepted, implemented

BA2010-131-5-7

In the course of the investigation, the IC established that the passenger information displays were regularly scribbled. These scribbles are not cleared from the displays and obstruct the visibility of the information displayed.

> **TSB recommends MÁV Co. to make sure that the visual displays are constantly clear in order to ensure the visibility of the information displayed.**

Acceptance and implementation of the safety recommendation would ensure the destination station of trains to be clear, therefore, the risks of accidents resulting from mistakes of passengers of boarding on wrong trains as well as the possibility of misconstructions of information to decrease.

Accepted, implemented

2010-291-5

On 11th July 2010 at 16:10 hrs, when freight train no. 45220-1 (M62-307) was departing from track III. at Búcsúszentlászló station, the last wagon (no. 33 54 496 0992-4) of the train derailed, broke from the train and fell over blocking the track on the last track section before points no. 4. The engine driver, realizing the occurrence of the accident, used the emergency brake, this resulting in the rupture of the screw coupling of wagon no. 83 35 549 6518-2 and the split of the train. The IC established that before the accident a loose to gauge and track alignment error within the allowable error margin were measurable at the location. Frame stability was not assured, sleeper screws were not constraining properly the bottom of the rails. Direct cause of the derailment was the buckling of the rail bellow the moving train, being caused by the high temperature lasting for more days and the bow wave effect.

Factual statements directly connected to the occurrence of the accident

In the course of the investigation the IC established that the derailment was a result of the worn-out state of the track and was caused by a buckling of the rail bellow the moving train, formed due to high temperature and the bow wave effect.

Factual statements indirectly connected to the occurrence of the accident

The IC also relates to the occurrence the effects of the temperature being above 37°C for more days and the water drainage deficiencies of the track and surroundings.

Safety recommendations

Safety recommendation was not issued.

2010-297-5

On 14th July 2010 at 12:26 hrs, on the level crossing SR2 protected with warning lights operating properly a car crashed into the left forefront of train no. 2842 (motor train set no. 95 55 34 2001-2) arriving to Örkény station with all signals operating properly. The car was shoved by the train to the left side of the track.

2 of the 3 persons riding in the car suffered serious, 1 person suffered minor injuries in the accident. No one of the passengers or crew of the train was injured.

The motor train set was rendered inoperative, the car was totalled, the pylon of the light signal fell out.

The IC established:

- the light signal was operating properly at the time of the occurrence,
- signs of the light signal and road traffic signs are clearly visible,
- sight triangle from the travel direction of the road vehicle towards the travel direction of the train no. 2842 was assured,
- the railway vehicle was travelling at a speed not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car.

Factual statements directly connected to the occurrence of the accident

- Light signal no. SR2 was operating properly at the time of the accident.
- From both directions of the road warning traffic signs indicating the level crossing were undamaged and clean.
- The IC has not established speed limit excess in the case of the train.
- The road vehicle entered the level crossing with Stop sign displayed on the signal, therefore human factors related to the driver of the car can be concluded as causing the accident.

Safety recommendations

Safety recommendation was not issued.

2010-303-5

On 16th July 2010 at 10:19 hrs, between Szombathely and Kőszeg stations, power car no. Bz-354 of train no. 39932 collided with a car at Lukácsháza halt on the level crossing protected with warning lights no. AS52 2010 operating properly.

As a consequence of the accident the driver of the car suffered serious injuries that resolve in more than 8 days. No passengers of the train were injured. Power car no. Bz-354 was slightly damaged, but remained operative, the car was seriously damaged. The train delayed 87 minutes as a consequence of the accident.

In the course of the investigation the IC established that the light signal was operating properly at the time of the accident, it was flashing red lights towards the direction of the road. The structure of the level crossing complied with the laws in force, the passenger train was travelling according to the timetable and at a speed not exceeding the speed limit.

Due to effects of the characteristics of the line, the landmarks and the built environment at the location, sight triangles from the direction of Szombathely station are not assured on either side of the track.

The deficiency of the sight triangles had not influenced though the driver of the car in observing the signs of the correctly operating light signal, therefore it cannot be considered as direct cause of the accident. It creates difficulties though in the observation of the surroundings of the level crossing, increasing the risk of the occurrence of an accident – especially with the protection equipment being out of order.

The IC established that human factors related to the driver of the car can be considered as causing the accident.

Factual statements directly connected to the occurrence of the accident

The car driver drove into the level crossing ignoring the properly operating light signal which was flashing red lights toward the road, therefore human factors related to the driver can be considered as causing the accident.

Other risk factors

The IC established in the course of the investigation that the sight triangle from the direction of Szombathely station is not assured due to effects of the characteristics of the line, the landmarks and the built environment at the location.

Safety recommendations

Safety recommendation was not issued.

2010-308-5

On 19th July 2010 at 12:25 hrs, on track III at Pécs station traction engine no. V43-3224 collided into the stationary train set of 3 coaches of train no. 8015. The locomotive and 3 coaches were damaged. 2 of the passengers of the train fell and suffered injuries, but they forewent medical attendance and continued their journey.

MÁV Trakció Co. from Pécs and BIG Regional Railway Safety Department from Pécs of MÁV Co. examined the whole brake system of the of the locomotive on the site after the accident and on 20th July 2010 in the workshop of Pécs KJK.

The IC established that at the time of the occurrence all brake cylinder strokes of the locomotive had exceeded considerably the upper limit prescribed (120 mm) in spite of the fact that almost one third of the daily test cycle had still been left. For this reason, the braking force of the vehicle decreased and its braking distance – when running without any wagons attached – increased significantly.

Factual statements directly connected to the occurrence of the accident

The accident was caused by the fact that the brake cylinder stroke of the locomotive had exceeded considerably the upper limit prescribed (120 mm) in spite of the fact that 7+12 hrs (almost one third) of the daily test cycle had still been left. For this reason, the braking force of the vehicle decreased and its braking distance – when running without any wagons attached – increased significantly.

The brake-adjusting screw of the wheel J2 was broken, leaving this wheel without braking. None of the brake-shoes abutted the running surface of the wheel, the gap (between the wheel and the brake-shoe) being of 20-25 mm.

Factual statements indirectly connected to the occurrence of the accident

The IC established that according to section 5.1.2 of the Regulation no. E.2 “when visually possible” the brake cylinder stroke has to be controlled. To make this possible the engine driver needs to open in the engine-house of the locomotive the covering of the gangway in four different points (using the proper key) and control this way the brake cylinder stroke. Measuring it leads to further difficulties (proper technical equipment, light, measure, time needed). The IC considers – as the undertaking operating the locomotives also – that the engine drivers cannot be expected to execute these operations. In the case of locomotive no. V43-3224 concerned the number of axles was less than 20 for all the trains hauled after the latest daily test, the brake system of the locomotive had to be operated.

Safety recommendations

BA 2010-308-5-01

In the course of the investigation, the IC established that, due to brake cylinder strokes of the locomotive exceeding considerably the upper limit specified (120 mm) as well as due to the rupture of the screw, the braking distance of the locomotive, in spite of having taken all due care, increased significantly. For this reason, the locomotive collided with a train set.

> **TSB therefore recommends the NTA to obligate the undertakings operating the locomotives to ensure for locomotives regularly hauling trains that run with less than 20 braked axles the proper safety of the brake cylinder stroke operation until the end of the test cycle time, by modifying the regulation parameters or by shortening the cycle time.**

TSB expects the implementation of the safety recommendation to ensure a significant reserve in the system and significantly reduce by this the risk of similar occurrences.

Accepted, implemented

BA 2010-308-5-02

The IC established that according to section 5.1.2 of Regulation no. E.2 the brake cylinder stroke has to be controlled "when this may be possible visually". For the engine driver this is possible only by opening the covering of the gangway in the engine-house of the locomotive at four different points (using a proper key) and controlling this way the brake cylinder stroke.

> **TSB therefore recommends MÁV-TRAKCIÓ Co. to equip locomotives of series V43 with brake cylinder stroke display installations (mechanical or electronic).**

TSB expects the implementation of the safety recommendation to ensure that provisions of section 5.1.2 of Regulation no. E.2 could be enforced and engine-drivers would be supported in the elimination of accident sources of this kind.

Accepted, implemented

2010-369-5

On 17th August 2010 at 13:07 hrs, power car Bzmot 168 of train no. 7254 struck a children's bicycle on the rail pedestrian crossing in railway section no. 24+90 at Bereghát halt between Szentes and Szegvár stations. As a consequence of the collision the bicycle was pushed out by the power car to the right (in relation to the travelling direction). The bicycle hit the child causing so serious injuries that the child died at the site. The IC examined the site of the accident, the construction of the rail pedestrian crossing, the visibility conditions and the actions to be taken by the staff of the train in case of an incident or an accident. The IC considered the occurrence of the accident as being caused by human factors relating to the bicyclist boy, but had further findings concerning the notification procedure to be followed in case of the occurrence of an accident. The IC issued a safety recommendation in order to assure that the ambulance would be notified in the shortest time of the occurrence of an accident.

Factual statements directly connected to the occurrence of the accident

The victim of the accident did not make sure before entering the rail pedestrian crossing that there was no danger.

Safety recommendations

BA 2010-369-5-01

The IC considers that the train crew should be made aware of their obligation that notification has to be attempted as soon as possible by all means available when immediate notification of the rescue units is not possible by following the procedure determined by the regulations, in order to protect life and property in case of accidents.

> **TSB therefore recommends the NTA and the railway examination centre to ensure that the following would be included in the training programmes submitted by the registered training organisations for initial or recursive trainings of the personnel directly involved in running of trains: when immediate notification of the rescue units is not possible by following the procedure determined by the regulations, notification shall be, according to legislation in force, attempted by all means available.**

The implementation of the safety recommendation would ensure that the notification of the rescue units and the first-aid operation are not delayed by communication problems.

Accepted, implemented

2010-382-5

On 21st August 2010 at 10:04 hrs, train no. 2422 (power car no. BDV 020) leaving Őrbottyán station with signals operating properly collided with a car entering in front of the train on the unprotected level crossing in railway section no. 235+95. The train pushed the car aside the track.

As a consequence of the accident the driver of the car suffered serious injuries and was transported to the hospital by a rescue helicopter.

The car was totalled and a damage of approx. 1.2 million HUF was caused to the power car. No passengers of the train or members of the train personnel were injured.

The IC established:

- sight triangle from the direction of the approaching car towards the travel direction of train no. 2422 involved was assured,
- the railway vehicle was travelling at a speed not exceeding the speed limit.

The IC considered that the accident was caused by human factors related to the driver of the car.

Factual statements directly connected to the occurrence of the accident

- The road vehicle entered the level crossing while a train was approaching.
- The traffic sign that marks the beginning of the level crossing from the direction of the road was damaged.
- No speed exceeding the speed limit was established by the IC for train no. 2422 involved in the accident.
- The IC considered the occurrence of the accident as being due to human factors relating to the driver of the car.

Factual statements indirectly connected to the occurrence of the accident

There were cracks and potholes in the surface of the road leading to the level crossing, which made circulation of road vehicles more difficult, this being dangerous in itself, but also distracting drivers of the road vehicles from observing the railway vehicles.

Safety recommendations

BA 2010-382-5-01

In the course of the investigation, the IC found the following: there were cracks and potholes in the surface of the road near the unprotected level crossing (LC) on line no. 71, in railway section no. 235+95 between Órbottyán and Vácrátót stations – this could distract the drivers road vehicles when approaching the LC; the traffic sign marking the LC was broken; the sight triangle from the direction of Rákóczi Ferencz Street was not assured due to the bushy vegetation by the track.

> **Therefore, TSB recommends the Inspectorate of Transport of the Government Office for Pest County to examine the structure of the LC concerned and take the necessary measures, according to the findings, to eliminate the deficiencies.**

Where the safety recommendation implemented, the traffic sign marking the LC, the clear sight triangle and the proper condition of the surface of the road would ensure a safer circulation on the LC.

Accepted, implemented

2010-383-5

On 21st August 2010 at 16:50 hrs, between Hajmáskér and Pétfürdő stations near settlement Öskü, passenger train no. 9053 struck a cyclist on the level crossing protected with warning lights no. AS316 operating properly. The cyclist died at the site. No one of the passengers or personnel of the train was injured.

The IC established:

- warning lights were operating properly at the time of the occurrence,
- signs of the warning lights and the road traffic signs are clearly visible,
- sight triangle from the direction of the approaching car towards the travel direction of train no. 9053 involved in the accident was not assured,
- the railway vehicle was travelling at a speed not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the cyclist.

Factual statements directly connected to the occurrence of the accident

- The cyclist entered the level crossing ignoring the „Stop" sign indicated by the properly operating warning lights no. AS316.
- Traffic signs from both directions of the road were clearly visible, intact and clean.
- The IC has not established speed exceeding the speed limit for train no. 9053 concerned.
- The IC considers that human factors related to the cyclist caused the accident.

Factual statements indirectly connected to the occurrence of the accident

The IC established sight triangles as being obstructed from more directions in the level crossing due to the line of the railway and features of the relief.

Other risk factors

Sight triangles are not assured in any of the directions in the level crossing, due to features of the line and the landscape, but these did not affect the visibility of the level crossing.

Safety recommendations

Safety recommendation was not issued.

2010-386-5

On 23rd August 2010 at 14:06 hrs, locomotive no. V43-1093 of train no. 6203 collided with a horse-drawn carriage between Hajdúhadház and Apafa stations on the level crossing protected with properly operating warning lights no. AS2382. The rider of the carriage and his passenger died at the site. The two horses pulling the carriage died, the carriage was seriously damaged, the locomotive was rendered inoperative.

The IC established that sight triangles from the direction of either of the approaching vehicles were not assured, but the warning lights were operating properly at the time of the accident, its flashing light were clearly visible. The display of the “Stop” sign by the warning lights signal is supported by the statement of a witness also.

The IC considers – based on medical expert opinion also – that the accident was caused by human factors related to the rider of the carriage.

Factual statements directly connected to the occurrence of the accident

The driver of the carriage entered the level crossing ignoring the flashing red lights of the light signal.

Factual statements indirectly connected to the occurrence of the accident

The service building near the level crossing obstructs the visibility of an approaching train, on a certain section of the road even makes it impossible to be seen. Nevertheless, this does not affect the visibility of the warning lights signal.

Safety recommendations

Safety recommendation was not issued.

2010-410-5

On 4th September 2010 at 10:54 hrs, train no. 9912, scheduled to stop at Ikrény station, ran unauthorized through the station, passed exit signal V1 at danger, split points no. 1 and stopped as a result of the operation of the train protection system.

No one was injured in the occurrence.

The IC established during the investigation that the occurrence was caused by human factors.

The IC considers that these kind of occurrences can be prevented by the proper application of the relevant rules, therefore no safety recommendation was issued.

Factual statements directly connected to the occurrence of the accident

Train no. 9912 passed exit signal no. V1 because when the routine braking was started, the throttle handle of the electric power car hauling the train remained in traction position and for this reason parallel to the braking operation the engine was exerting a tractive force also.

Factual statements indirectly connected to the occurrence of the accident

Concerning the fact that after passing the exit signal at danger and splitting the points train no. 9912 approached the open level crossing no. SR1 protected with warning lights, the IC draws the attention to the following:

- The warning lights indicate the level crossing as being open even after a train passed the exit signal, the warning lights displaying white light sign. Safety installation, due to its construction, does not alert road traffic of the danger in situations of this kind.
- Train protection systems applied on traction units (with the exception of certain types) start to operate only after the train had passed the signal. In case a train passes the signal at a speed near the speed limit applicable on the track, it would pass the level crossing located within emergency braking distance and this would endanger both road and railway traffic.

Safety recommendations

Safety recommendation was not issued.

2010-443-5

On 27th September 2010 at 03:40 hrs, 2nd wagon (a 4-axle wagon) of freight train no. 68215-2 arriving to Adony station with signals operating properly, derailed with 2 axles in the curve before the enter signal. The wagon derailed was hauled by the train on a further 500 m distance.

A 500 m length of the track was damaged because of the accident.

The IC established:

- the speed of the train was not exceeding the speed limit,
- the load of the vehicle was not evenly distributed,
- the condition of the track contributed to the occurrence of the accident.

The IC considers that the accident was caused mainly by the not evenly distributed load of the wagon and in a lesser degree by the condition of the track.

Factual statements directly connected to the occurrence of the accident

- By derogation from rules on loading the wagons were loaded asymmetrically.
- Technical inspection of the wagons had not revealed the impropriate load.
- The effect of the impropriate load was multiplied by the fault of the track.
- The IC considers that the accident was caused by the facts mentioned above and by the dynamic forces formed on the site during the run of the train.

Factual statements indirectly connected to the occurrence of the accident

No proper equipment being available at Eperjeske loading station to support proper visual control of loaded vehicles, the inspectors can only complete an indirect control of the load of the wagons and conclude this way a possible inconsistency.

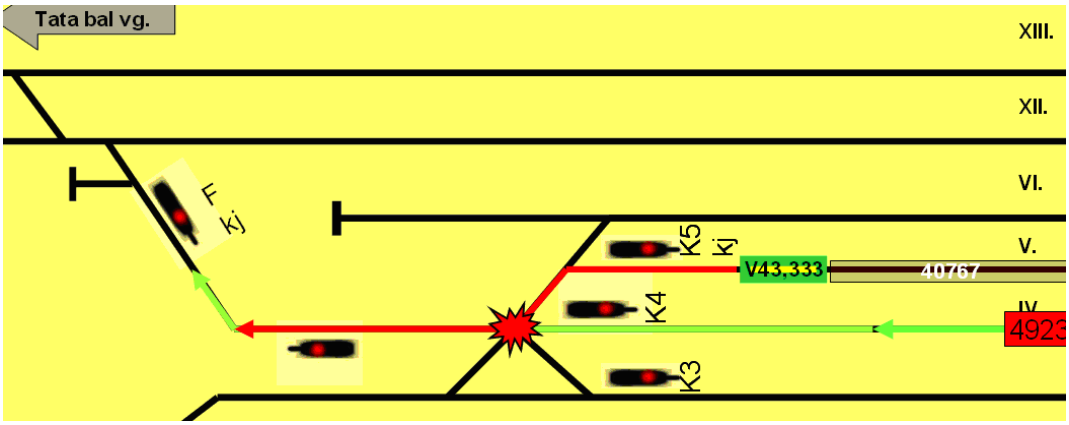
Safety recommendations

Safety recommendation was not issued.

2010-448-5

On 1st October 2010 at 19:16 hrs, freight train no. 40767 passed unauthorized from track V at Almásfüzítő station the exit signal at danger and split points no. 12a. After a notification received on train radio on the unauthorized movement the train stopped. No one was injured. During a later test a technical failure was established, namely that the signal on the track used by the train displayed even in the case of a "Stop" indication on the exit signal a different, misleading indication. Causes of the technical failure determined during the test had been detected by the safety installation inspection services, repair was completed and the inadequate operation was eliminated.

The IC considers that the occurrence was caused by the appearance due to technical failure of a misleading indication and also by human factors manifested in the fact that the engine driver had not been monitoring the indications of the exit signal and had not interpreted properly the contradictory indications received. Since the technical failure was eliminated during the investigation the IC does not consider issuance of safety recommendations necessary.



Factual statements directly connected to the occurrence of the accident

The IC considers that the occurrence was caused by the combined effect of human factors and technical failure:

Technical failure: Due to construction of the safety installation different from the design, misleading indications – mixed sequence of "1" and "2" signs – had been displayed. This was the reason of the short appearance of the "Clear" indication, after which that of 3 horizontal lines meaning "No valid indication".

Human factors: The engine driver had not noted the "Stop" indication of the exit signal, considered only the cab signal in the locomotive, had not question the inconsistent indications received simultaneously and in his actions he had not follow the safest solution.

Safety recommendations

The operator of the infrastructure eliminated during the technical investigation the technical failure, therefore, no safety recommendation was needed.

2010-455-5

On 5th October 2010 at 11:00 hrs, train of locomotive no. 6381 collided with a car of type Opel Corsa on the non-protected level crossing between Nyírgelse and Nyíradony stations in railway section no. 313+59. The driver of the car was seriously injured and transported to the hospital by an emergency helicopter. There were minor damages to the locomotive, no one of the personnel of the train was injured.

The IC established during the investigation that road traffic signs indicate the approach to the level crossing, the sight triangle is not assured and that the train had not exceeded the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car and by the fact that the sight triangle was not assured.

Factual statements directly connected to the occurrence of the accident

The driver of the car ignored the approaching train and entered the level crossing, therefore the cause of the accident was human factor related to the driver of the car.

Factual statements indirectly connected to the occurrence of the accident

Sight triangles from the direction of Fürdő Street towards Nyírbátor station, and from Kossuth Street towards Nyíradony station are obstructed by the vegetation, but in the case of this accident the visibility of the approaching train was not affected by this.

Safety recommendations

BA 2010-455-5-01

The IC established during the site survey the location of traffic signs indicating the LC located on railway line no.110 in railway section no. 313+59 within the municipality boundaries of Nyírmihálydi not being in accordance with the relevant requirements of the Rules of the Road, furthermore, the sight triangles from more directions being obstructed by the high and dense vegetation.

> **TSB therefore recommends the NTA to examine the traffic order on the streets leading to the LC and on those connected to them, the presence or absence of traffic signs as well as the adequacy of sight triangles – with particular attention to the low crossing angle – and take the necessary measures according to the investigation conducted.**

Traffic signs placed as required by the relevant regulation indicate in time for road vehicle drivers the proximity of a LC, decreasing the risk of accidents by this.

Accepted, implemented

2010-464-5

On 10th October 2010, two passenger trains moved approaching each other and collided near Hártókút station on the narrow-gauge railway line of Királyrét Forest Rail. Two passengers of the trains suffered serious, one suffered minor injuries.

The trains were scheduled to cross at Hártókút station, but the train travelling in the pair direction – arriving earlier to the station – had not waited for the other and leaving the station collided with it on the curve with poor visibility near the station.

The IC established that traffic control procedures were not applied, train crossings were completely based on the knowledge of schedule of the train crew. There had already been a similar occurrence in 2009 on the same railway line – with no collision that time – related to which TSB also established traffic control deficiencies.

The colour of the vehicles that fades into the environment could also have contributed to the occurrence of the accident and its consequences.

TSB issued safety recommendations for the amendment of the content of official control.

Factual statements directly connected to the occurrence of the accident

The accident was caused by human factors related to the personnel of train no. 6310 (engine driver, conductor), they forgot about the train running in opposite direction. Furthermore, the requirements on the traffic control procedure are not satisfied, necessary conditions (e.g. telephones) are not assured.

Factual statements indirectly connected to the occurrence of the accident

Emergency stop of the traction can be effectuated with a too complicated method on the power car concerned by the accident, which method probably had not even function at the time of the accident.

Other risk factors

Regulations and controls focused on processes other than operation result in orientation of the checks towards the documentation only and cause distraction from railway safety.

In case of an accident the wooden benches in the passenger compartment might increase the injuries of the passengers.

Safety recommendations

BA 2010-464-5-01

The IC experienced for the second time on the railway line concerned deficiencies of basic operation procedures leading to dangerous situations. Conditions for operation in accordance with the relevant rules are not ensured and these rules are not applied by the personnel involved.

Official controls, however, focus mainly on checking the existence of necessary documentation and licences, paying less attention to actual operation procedures.

> **TSB therefore recommends the NTA to focus their control programme on the compliance of procedures followed with the relevant operational rules as well as on the conditions meant to support the application of these rules.**

The safety recommendation is intended to ensure that the emphasis would be placed on operation procedures primarily influencing railway safety.

Accepted, implemented

2010-474-5

On 13th October 2010 at 12:27 hrs, between Kiskunfélegyháza and Petőfiszállás stations locomotive no. V43-1010 of intercity train no. IC705 collided with a car on the level crossing AS628 protected with properly operating warning lights indicating red lights toward the road.

The driver of the car died at the site. Locomotive no. V43-1010 sustained minor damages, the car was totalled. No one of the passengers of the train was injured.

The railway track was blocked until 14:52. As a consequence of the accident 7 trains delayed 695 minutes in total.

The IC established during the investigation that the warning lights were flashing red lights toward the road, the structure of the level crossing complied with the relevant regulations and the speed of the train was not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the level crossing ignoring the “Stop” sign displayed by the warning lights. The IC considers that human factors related to the car driver caused the accident.

The driver of the car was talking on his cellular telephone, fact that, by distracting the driver, also contributed to the occurrence of the accident.

Safety recommendations

Safety recommendation was not issued.

2010-482-5

On 15th October 2010, the signalman in charge at signal box no.1, while returning from a shunting locomotive to his post, was struck by another shunting locomotive when crossing its track. The signalman died at the site of the occurrence.

According to the investigation the accident was caused by human factors related to the signalman, but the constrained visibility from the driver's cab of the shunting locomotive that struck him also contributed to the occurrence.

Factual statements directly connected to the occurrence of the accident

The IC considers that the accident occurred due to human factors related to the signalman.

Factual statements indirectly connected to the occurrence of the accident

The long front part of the locomotive of series M44 obstructs the field of view of the engine driver. In case only one person is in charge on the locomotive – like was the case of the occurrence – this area is not visible, therefore no reaction will be given for an emergency situation.

Other risk factors

Controls and regulations focusing on other than operation procedures detract considerably the attention of the personnel from the safety of the operation in the favour of that of documentation compliance.

The wooden seats in the passenger compartment could increase the injuries of the passengers.

Safety recommendations

Safety recommendation was not issued.

2010-490-5

On 20th October 2010, freight train no. 40760-1 collided with a lorry loaded with sand between Kiskunlacháza and Délegyháza stations on the level crossing AS322 protected with properly operating warning lights. The locomotive and the first 2 wagons of the train derailed, the locomotive fell over to the embankment, the track and the overhead contact line was damaged in a 250 m length, the lorry was totalled. The engine driver died at the site, the driver of the truck was seriously injured. The traffic on the damaged track was started on 21th October 2010 at 12:33 hrs, at the reduced speed of 10 km/h.

The IC established during the investigation that the warning lights were flashing red lights toward the road at the time of the accident, the train was not exceeding the speed limit. The IC considers that the accident was caused by human factors related to the driver of the lorry. The IC issued immediate safety recommendations concerning the structure of the level crossing.

Factual statements directly connected to the occurrence of the accident

A driver of the lorry entered the level crossing ignoring the “Stop” sign displayed by the warning lights, therefore human factors related to the lorry driver are considered as cause of the accident.

Factual statements indirectly connected to the occurrence of the accident

The visibility of the warning lights was from the direction of the approaching lorry obstructed by the dense vegetation and the line of the road (rising, tight bend). Sight triangles in the level crossing are obstructed from more directions by the high and dense vegetation.

Safety recommendations

BA 2010-490-5-01

The IC found during the site survey that, from the direction of the approaching road vehicle involved in the accident, the visibility of the indication on the warning lights protecting the LC located on railway line no. 150, in railway section 322+85 between Délegyháza and Kiskunlacháza stations, was obstructed by the line of the road (tight curve uphill) and the dense vegetation.

TSB recommends the NTA to examine the LC, including the visibility of the warning lights, with particular attention to heavy lorries that take up most of the traffic in the LC, and take the necessary actions according to the findings.

The implementation of the safety recommendation would ensure the indicator of the warning lights protecting the LC concerned to be visible for longer and the driver of the road vehicle would be able to stop, when necessary, before the LC in a location optimal for departure.

Accepted, implemented

BA 2010-490-5-02

The IC found during the site survey that the sight triangles from more directions in the LC protected by warning lights located on railway line no. 150, in railway section 322+85 between Délegyháza and Kiskunlacháza stations, were not assured due to the high and dense vegetation.

TSB therefore recommends the NTA to examine the structure of the LC with regard to sight triangles, and take the necessary actions according to the findings.

By assuring the required sight triangles, the visibility of approaching road and railway vehicles can be increased significantly and this would decrease the risk of accidents at the location.

Accepted, implemented

2010-504-5

On 4th November 2010, a ballast compactor running from Jászkisér to Godisa passed exit signal at danger on track II at Újszász station, split points no. 11 and approached from opposite direction to passenger train no. 3315. The two trains stopped at a 100-200 m distance from each other.

The IC established during the investigation that the occurrence was caused by lack of attention and incorrect application and interpretation of hand signals. Beyond that some of the statements of the involved crew revealed deficiencies of their knowledge on traffic operation nevertheless, the present regulatory system does not provide the possibility of officially obligating the employees concerned to take extra exams. The problem will be solved by the foreseen legislation, therefore, the IC did not issue any safety recommendations.

Factual statements directly connected to the occurrence of the accident

The IC considers that the occurrence was caused by human factors related to the crew of the ballast compactor, this consisting in the lack of proper attention and technical knowledge.

Factual statements indirectly connected to the occurrence of the accident

The ballast compactor stopped at a not permitted location. The movement of the ballast compactor – while this travelling as a train – was intended to be controlled by application of hand signals applicable for shunting movements.

Other risk factors

Regulation of hand signals is too complex and inconsistent in the signal code, signals for the same notion slightly differing in case of shunting movements and running of trains.

Piloting documentation of the tamper crew was unclear and not precise, for certain routes the actual lines not being identifiable. During the investigation the railway company eliminated this inconsistency.

Safety recommendations

Safety recommendation was not issued.

2010-520-5

On 15th November 2010 at 11:01 hrs, train no. 6200 collided with a car between Sóstóhegy and Kemecse stations on the level crossing no. AS105 protected with properly operating warning lights and half-barriers. The driver of the car died at the site and the locomotive was rendered inoperative. The IC established during the on-site inspection following the accident that the structure and indication of the level crossing, toward the road traffic and railway traffic as well, were complying with the regulations. Train no. 6200 was travelling at the speed specified in the schedule and the engine driver took every action possible in order to avoid the collision.

The IC considers that the driver of the car was not approaching the level crossing with due foresight and entered it ignoring the "Stop" indication of the warning lights and the closed position of the half-barriers. He could not exit the level crossing before the train arrived and this resulted in the collision of the vehicles. The IC considers that accidents of this kind and similar ones can be avoided by the compliance with traffic rules on how to approach and go through level crossings, therefore no safety recommendations were issued.

Factual statements directly connected to the occurrence of the accident

Based on analysis and evaluation of findings of the on-site inspection, documents procured and photos available the IC established the following:

- The driver of the car entered the level crossing ignoring the "Stop" sign of the warning lights and the completely closed position of the half-barriers.
- The car broke the bar of the half-barrier and got into the structure gauge, not being able to leave it before the arrival of the train, which resulted in the collision of the vehicles.
- Train no. 6200 was not exceeding the speed limit specified in the schedule, the engine driver took every action possible in order to avoid the collision.

Safety recommendations

Safety recommendation was not issued.

2010-533-5

On 23rd November 2010, passenger train no. 9626 collided with a car between Tapolca and Lesencetomaj station on the level crossing AS438 protected with properly operating warning lights. The car driver entered the level crossing ignoring the “Stop” indication of the warning lights. The driver of the car and the passenger travelling of the front seat of the car suffered serious injuries.

The warning lights were operating properly and clearly visible, the train was travelling at a speed not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car and also established that the status of health and psychological status of the driver at the time of the accident increased the risks of and accident. The IC did not issue any safety recommendations.

Factual statements directly connected to the occurrence of the accident

The IC considers that human factors related to the signalman caused the accident.

Factual statements indirectly connected to the occurrence of the accident

Previous state of health of the car driver may have contributed to the occurrence of the accident.

Safety recommendations

Safety recommendation was not issued.

2010-564-5

On 8th December 2010 at 23:38 hrs, at Lökösháza station train set collected from track no. VIII of 4 carriages of train no. 7348, shunting with locomotive no. V43-1115, collided with the train set of 5 carriages on track no. I. As a consequence of the collision the screw coupling at the endpoint of carriage no. 61 54 1970 015-3 broke, the carriage rolled away and the heating cable broke. An employee of the cleaning company responsible for the cleaning of carriage no. 61 54 1970 015-3, working at the time of the occurrence in the carriage without permission, suffered head injuries and was transported to the hospital. The engine driver had no proper knowledge on the line section between Békéscsaba and Lökösháza stations. The IC established durint the investigation that the occurrence was caused by human factors and considers that accidents of this kind could be prevented by the proper application of the rules, therefore no safety recommendations were issued.

Factual statements directly connected to the occurrence of the accident

Based on the analysis and evaluation of findings of the on-site inspection, documents procured, photos and video recordings available the IC established that the accident was caused by the fact that due to span of the line the engine driver did not perceive the distance between the train and the standing train set and not braking in time collided at a speed of 13-15 km/h to the stationary train set.

The personal injuries occurred due to the fact that the carriage cleaner was in the carriage without permission during the shunting movement, no one noticing his presence.

Factual statements indirectly connected to the occurrence of the accident

Since qualifying for the locomotive type concerned in the occurrence, the engine driver had not driven locomotive of type V43 for a long period of time and the service on the day of the occurrence was his 3rd independent service on a locomotive of this type.

The engine driver and the assistant shunter had not clarified the braking method to be applied during the shunting movement.

Though a clear regulation was in effect concerning carriage cleaning activity for station staff and for employees of the cleaning company, the rules were not applied and the application of these was not controlled. With the application of these rules the collision would still have occurred, but the occurrence of personal injuries could have been prevented.

Other risk factors

The engine driver involved in the accident had been ordered to service not having valid certificate on knowledge of railway line section Békéscsaba - Lökösháza.

Safety recommendations

Safety recommendation was not issued.

2010-597-5

On 19th December 2010, passenger train no. 7245 collided with a car on the level crossing AS319 protected with warning lights between Hódmezővásárhelyi Népkert and Mártély stations. The driver of the car suffered serious injuries. The motor coach train was damaged, the car was totalled.

The IC examined the structure and operation of the level crossing and established that the warning lights were flashing red lights toward the road at the time of the accident. The train was not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car. According to information available from the police the driver of the car was not under the influence of alcohol or drugs of any kind at the time of the accident.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the level crossing ignoring the “Stop” sign displayed by the properly operating warning lights, therefore human factors can be considered as the cause of the accident.

Safety recommendations

Safety recommendation was not issued.

2010-604-5

On 22nd December 2010, passenger train no. 782 collided with a car between Kiskunhalas and Harkakötöny stations on the level crossing AS 423 protected with warning lights. The driver of the car died at the site.

The IC established:

- warning lights were operating properly at the time of the accident,
- road traffic signals were partly missing, but the indications of the warning lights were clearly visible,
- the railway vehicle was travelling at a speed not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car.

Factual statements directly connected to the occurrence of the accident

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

Other risk factors

Traffic signs on the road crossing the railway were incomplete. Validity of the medical certificate in the driving licence of the car driver was expired at the time of the accident.

Safety recommendations

Safety recommendation was not issued.

2011-145-5

On 29th March 2011, passenger train no. 6346 collided with a car between Mátészalka and Vásárosnamény stations on the level crossing AS341 protected with warning lights. The driver of the car died at the site. The power car of the train derailed with one axle.

The IC established:

- warning lights were operating properly at the time of the accident,
- the indications of the warning lights and road traffic signals were clearly visible,
- sight triangle was not assured, but this did not contribute to the occurrence of the accident,
- the railway vehicle was travelling at a speed not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car.

Factual statements directly connected to the occurrence of the accident

The IC considers that the accident was caused by human factors. The train was travelling at permitted speed, the warning lights were operating properly.

Other risk factors

Sight triangle in the level crossing was obstructed.

Safety recommendations

Safety recommendation was not issued.

2011-218-5

On 20th May 2011 at 12:38 hrs, passenger train no. 39822 collided with a lorry on railway line Hegyeshalom-Szombathely, between Ölbö-Alsószeleste and Porpác stations on the level crossing AS24 protected with warning lights located in railway section no. 24+85. The driver of the lorry and his passenger suffered minor injuries, the power car derailed as a consequence of the accident.

The driver of the lorry and his passenger suffered minor injuries and were transported to the hospital. The train was formed of one motor coach of type Bzmot, on which one of the crew suffered minor, another suffered serious, 6 of the passengers suffered minor, one passenger suffered serious injuries. The railway vehicle derailed with both axles and was seriously damaged, the road vehicle was also seriously damaged, its load scattered and the warning lights equipment “a” fell out.

The IC inspected on the site the structure and operation of the level crossing and because of deficiencies of sight triangles considered issuance of immediate safety recommendations necessary. The IC established during the investigation that the warning lights were indicating flashing red lights toward the road, visibility of which not being obstructed by vegetation or other obstacles. The train was travelling at a speed reaching or even exceeding the speed limit. Sight triangle at the level crossing was not properly assured due to the dense vegetation, but this did not obstruct the visibility of the warning lights.

The IC considers that the accident was caused by human factors related to the driver of the lorry.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the level crossing ignoring the “Stop” sign displayed by the properly operating warning lights, therefore human factors can be considered as the cause of the accident.

Other risk factors

Sight triangle in the level crossing was obstructed by the dense vegetation.

Safety recommendations

BA 2011-218-5-01

TSB recommends the Inspectorate of Transport of the Government Office for Vas County to obligate the undertaking operating the infrastructure (MÁV Co.) to ensure the sight triangle obstructed by the dense vegetation (trees, bushes) in the LC protected by light signal no. AS24 between Ölbő-Alsószeleste and Porpác stations in railway section no. 24+97.

Issuance of the safety recommendation is justified by the fact that from the direction of the road vehicle involved in the accident sight triangles toward the direction of the approaching train no. 39822 were not assured, even though the indication of the light signal was visible from the road no. 8485. This adversely affects the visibility of road and railway vehicles approaching the LC and decreases safety by this.

Accepted, implemented

2011-236-5

On 26th May 2011 at 15:56 hrs, passenger train no. 39822 collided with a car between Lajosmizse and Kecskemét-Alsó stations on the level crossing protected with warning lights no. AS24. The driver of the car suffered serious injuries, no one of the passengers of the train was injured. Motor coach of the train was rendered inoperative.

The IC established during the on-site inspection following the accident that the indication of the level crossing for road and railway traffic as well was in accordance with the requirements. Sight triangle from the direction of the approaching car was not assured, but this was not obstructing the visibility of the “Stop” indication on the warning lights.

Train no. 2966 was travelling at the speed specified by the schedule, the IC considers that the engine driver took every action possible in order to avoid the collision.

The IC considers that the driver of the car did not exercise due diligence when approaching the level crossing and entered it ignoring the “Stop” indication on the warning lights.

Factual statements directly connected to the occurrence of the accident

Based on the findings of the on-site inspection, the documents provided and the photos available the IC established the following:

- The driver of the car entered the level crossing with the “Stop” sign being displayed by the warning lights.
- The car stopped in the level crossing and could not leave it before the arrival of the train, which led to the collision of the vehicles.
- The speed of the train no. 2966 had not exceeded the running speed specified, the IC considers that the engine driver had taken all the actions possible to avoid the collision.

Other risk factors

Sight triangle from the direction of the approaching car towards the direction of the approaching train was not assured.

Safety recommendations

Safety recommendation was not issued.

2011-253-5

On 6th June 2011, passenger train no. 9945 collided with a car between Acsád and Bük stations on the level crossing protected with warning lights no. AS743.

The driver of the car died at the site of the accident. Locomotive no. V43-327 was damaged and rendered inoperative. The car was totalled.

The railway track was cleared at 22:25 hrs, passengers of 5 passenger trains had been transported by supplement bus service.

The IC established during the investigation that the warning lights were flashing red lights toward the road at the time of the accident, the train was not exceeding the speed limit.

The IC considers that the accident was caused by human factors related to the driver of the car.

The IC established on the site of the accident that sight triangle from the direction concerned in the accident was assured. For the approaching traffic from direction Csepreg direct vision to the railway track was due to the vegetation of approx. 400-450 m instead of the 600 m required.

The IC considered issuance of safety recommendations not necessary.

Factual statements directly connected to the occurrence of the accident

The driver of the car entered the level crossing ignoring the flashing red lights of the properly operating warning lights, therefore human factors can be considered as the cause of the accident.

Other risk factors

Sight triangle in the level crossing from the direction of Csepreg from the angle opposite to that concerned by the accident was obstructed by the vegetation. Sight triangle from the direction of the approaching car was assured.

Safety recommendations

Safety recommendation was not issued.

3.5 Other recommendations

On 4 further occasions, TSB issued 9 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. 8 recommendations have been implemented by the addressee, 1 recommendation was accepted, its implementation is in progress.

BA2011-011-5-01A

In the course of the investigation, the IC established that the distance between the right stretch of rail and the stop line for road vehicles was of 5 m, this meaning that there was no sufficient space for any road vehicles between the structure gauge and the stop line. Due to this, road vehicles arriving into the LC from the direction of Vasút Street could only leave the LC by turning right to Nagykőrösi Street toward Budapest (using the emergency lane). Leaving the LC by turning left to Nagykőrösi Street or by crossing it toward Eke Street is not possible due to the heavy traffic.

> **TSB recommends the NTA to obligate the manager of the road to modify, with validity until the new traffic technology of the LC and its surroundings would be introduced and the barrier equipment installed, the actual traffic order of the unprotected road-railway LC (in railway section no. 135+77), as follows: forbid left turn and crossing of Nagykőrösi Street for the traffic arriving from the direction of Vasút street, allow only right turn to Nagykőrösi Street.**

By the acceptance and implementation of the safety recommendation, road vehicles arriving in the LC from the direction of Vasút Street can immediately leave the LC using the emergency lane, thus the risk of accidents will be reduced significantly.

Accepted, implemented

BA2011-124-5-01A

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

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

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

Accepted, implemented

BA2011-211-5-01A

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

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

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

Accepted, implemented

BA2011-211-5-02A

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

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

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

Accepted, implemented

BA2011-211-5-03A

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

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

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

Accepted, implementation in progress

BA2011-211-5-04A

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

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

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

Accepted, implemented

BA2011-211-5-05A

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

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

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

Accepted, implemented

BA2011-211-5-06A

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

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

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

Accepted, implemented

BA2011-279-5-01A

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

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

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

Accepted, implemented

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, questions of visibility, inadequate signposting and insufficient design of LCs.

– In 2011, trains were at risk but the occurrences had no consequence on 23 occasions – 75% more than in 2010. 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 two technical investigations related to cases in which passengers involved in the accident had fallen off the trains in motion through the doors of carriages of the same type – these doors should have been locked and only emergency open should have been possible during travel. Technical investigation established in both cases that no emergency open had been applied to open the doors, the doors had been open or normal opening of these had been possible due to technical deficiencies. Detailed investigation of the door operation, technical failures and maintenance of the vehicle type concerned revealed that majority of the failures could be repaired by minimal intervention (fuse replacement, setup of the door, etc.). The investigation however revealed deficiencies also in the process of detection of the failure – maintenance – take-over after maintenance, these having been eliminated by the improvement of the relevant technologies and trainings of the personnel involved.

- **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 2011, the international practice was no different from the previous years, namely that the investigating bodies contact each other in relation to concrete accidents when more Member States are concerned (from the operator's, manufacturer's, maintenance's side or staff, etc),

TSB continued to participate actively in the work of the European Railway Agency (ERA) in 2011. The cooperation within the ERA extends to the compiling of methodology guidelines as well as to the development and operation of data

collecting systems. The cooperation with ERA (with its costs covered by the EU) offers the opportunity for TSB to participate in compiling the system and methodologies of the assessment of National Investigation Bodies. TSB took part in the workgroup working out the assessment system, and offered to be the pilot, the first NIB which will be assessed.

This way TSB can not only learn the system at first hand, but there is also a chance to enforce interests arising from national specialities in this field. Furthermore, we can also learn from the good practices of other Member States.

Outside of the ERA, some of the European investigating bodies (e.g. Germany, Austria, Switzerland, Czech Republic, The Netherlands, Luxemburg, Denmark, Estonia etc) established a regional cooperation forum whose work TSB also participates in. Within the framework of this forum – besides discussing local problems and making recommendations towards ERA – there is an opportunity to learn about the investigation procedure of certain accidents and gain experience in the investigation of various types of rarely occurring occurrences.

4. SUMMARY OF RECOMMENDATIONS

By 2011, the practice that the addressee of the safety recommendations should primarily be the National Transport Authority has become a routine. 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 some cases in 2011 addressees of safety recommendations regarding regulations were still the infrastructure managers, the maintenance of the regulations concerned being under their authority (e.g. development and issuance of amendments). For 2012 however a solution had been implemented concerning this field also in order to ensure that these safety recommendations would also be addressed to the NTA.

In 2011, the Railway Department of TSB closed the investigation of 29 occurrences with final reports and issued 18 safety recommendations to 8 occurrences.

On 4 further occasions, TSB issued 9 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. Majority of these recommendations have been implemented by the addressees or the implementation is in progress.

Summary of responses to safety recommendations issued in 2007-2011

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

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