



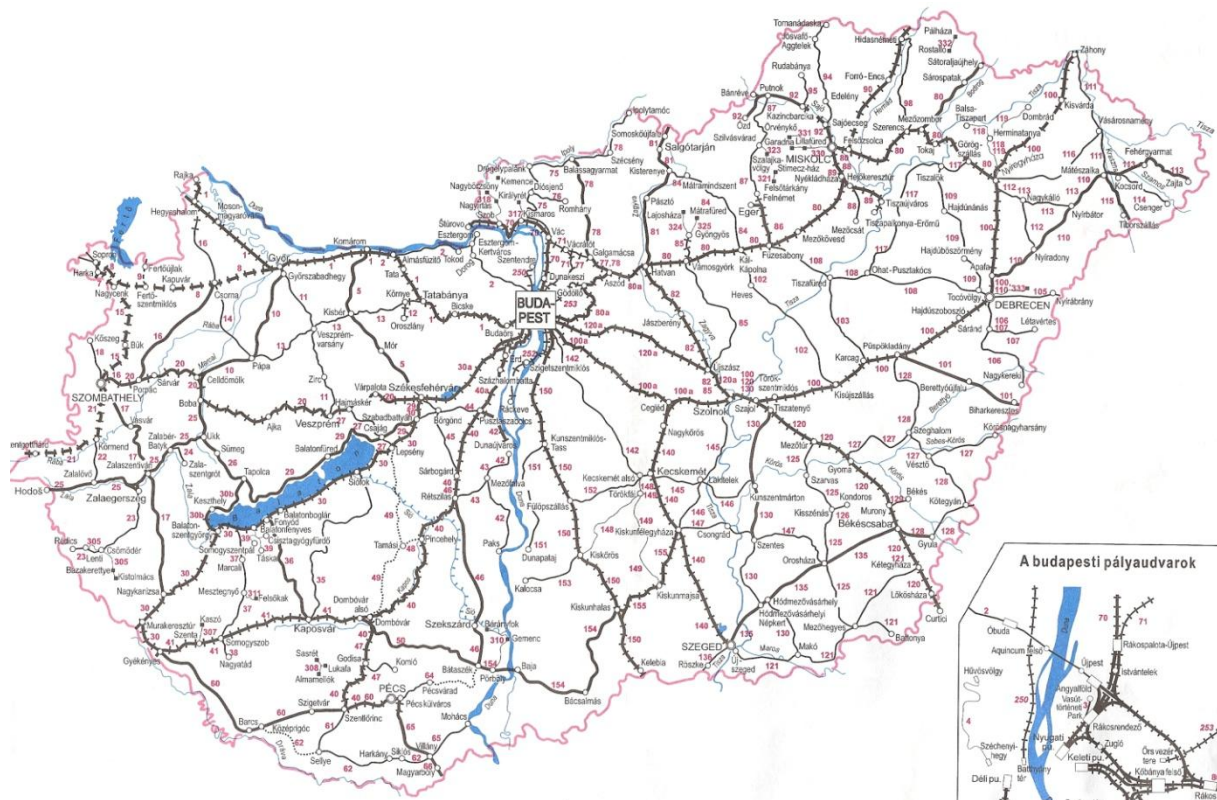
**TRANSPORTATION SAFETY  
BUREAU**

**ANNUAL REPORT 2014**  
**Transportation Safety Bureau**  
**Hungary**

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# RAILWAY NETWORK IN HUNGARY



Basic data of the infrastructure:

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

## SUMMARY

Hungary fully implemented all essential requirements concerning accident investigation of the Railway Safety Directive 2004/49/EC in its national law. Based on previous experiences and preliminary consultation with the Commission, in 2012 provisions of the relevant act had been reviewed, as a result of which an amendment has been made to the act in order to enhance implementation of Railway Safety Directive and transpose to the railway sector good practice applied in aviation. The follow up by the Commission is still running.

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

In 2014, there was no occurrence (serious accident) on the railways which the Railway Department of TSB was, pursuant to the regulations, obliged to investigate.

TSB decided at its own discretion to conduct independent technical investigation into 32 further occurrences. This is 6% less than in the previous year, 18% less than in 2012 with regard to the finding of the ERA Assessment carried out at the TSB.

During year 2014, TSB published 29 final reports, including 18 safety recommendations, 5 of them were already issued during the investigation process. 9 of these recommendations have been implemented, implementation of 6 recommendations is in progress, 1 of them was rejected by the addressee, and in 2 cases we did not get any reply from the addressee. Furthermore, TSB issued 2 safety recommendations prior to the completion of the investigations started in 2014, in which recommended immediate preventive actions. One of these recommendations has been implemented, and the implementation of one is in progress.

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

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

| Abbreviations |  |
|---------------|--|
| IC            | Investigating Committee  |
| LC            | Level crossing   |
| MÁV Co.       | Hungarian State Railways Plc.  |
| NIB           | National Investigation Body  |
| NTA           | National Transport Authority<br>(the National Safety Authority of Hungary) |
| RSD           | Railway Safety Directive (2004/49/EC directive)                            |
| 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 1<sup>st</sup> January 2006.

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

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

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

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

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

Based on previous experiences and preliminary consultation with the Commission, in 2012 provisions of the act had been reviewed and, as a result of this, an amendment has been made to the act in order to enhance implementation of Railway Safety Directive (e.g. the term of railway accident more specifically defined) and also to transpose into the railway sector good practice applied in aviation (e.g. the issuance of intermediate reports for investigations longer than one year). Consultation with the Commission is not finished yet, minor revision in the regulation may be necessary in the future.

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

Act CLXXXIV of 2005 on the technical investigation of aviation, rail and marine accidents and incidents was also amended parallel to this, the amendment

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

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

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

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

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

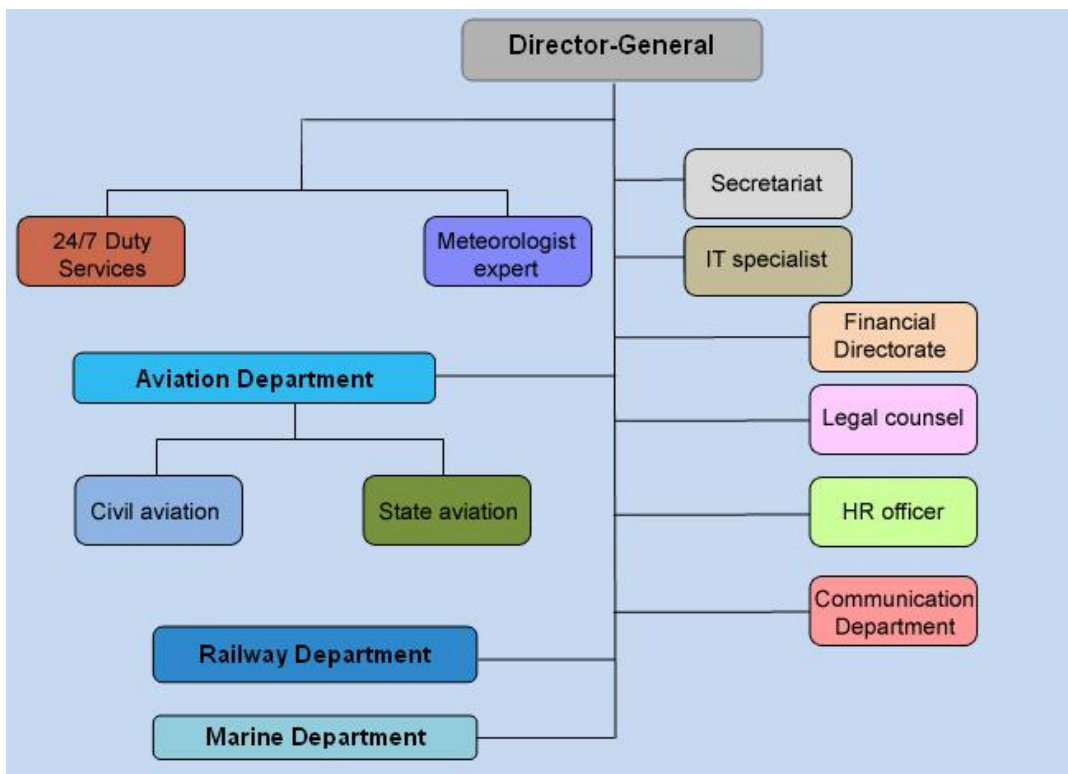
‘The objective of the independent technical investigation is to reveal the causes and circumstances of serious railway accidents, accidents and incidents and to initiate the necessary technical measures and make recommendations in order to prevent similar cases in the future.’ It also states that ‘it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

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

According to the national regulations:

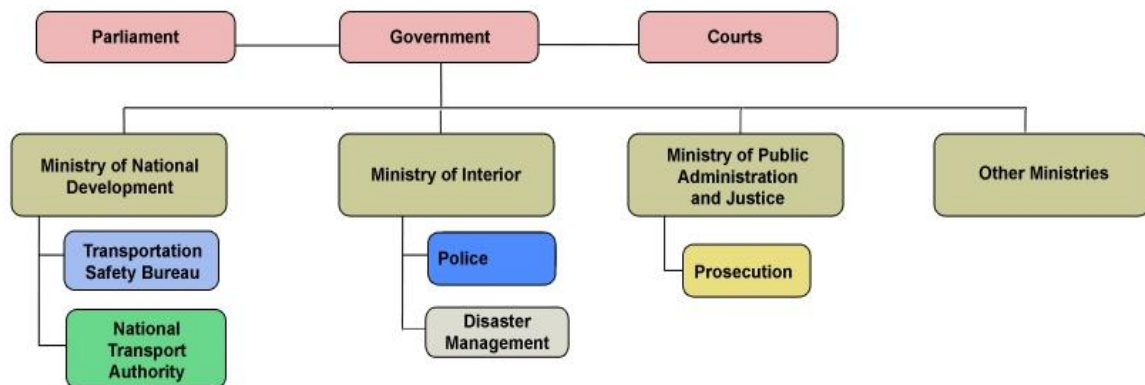
- All aviation, railway and marine occurrences shall be reported to TSB.
- The members of the Investigating Committee of TSB are authorized to be present at the site of any occurrence and to conduct the technical investigation parallel with the police investigation (if there is one).
- Based on the results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

## 1.2 Organisation of TSB Hungary



- TSB regards prevention as the main objective of its activity. TSB endeavours to share the findings, the results and the experiences of the technical investigations with a wide circle of organisations in the profession as well as with the civil sector.
- The predecessor of TSB was the Civil Aviation Safety Bureau which conducted investigations in the field of aviation between 2002 and 2005 in line with Directive 94/56/EC establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.
- TSB was established on 1<sup>st</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 total number of permanent staff was reduced by 3 persons in 2011 in the frame of a general staff reduction of the governmental sector.
- The Railway Department – in accordance with the regulations – began its work on 1<sup>st</sup> March 2006.
- The Railway Department consists of 8 investigators (one less than earlier) and the Head of Department, one of the investigators was retired by the end of 2014,

### 1.3 Organisational flow of TSB Hungary



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



## 1.4 Overview of the last 12 months

### 1.4.1 Trainings

In order to maintain and improve the professional knowledge of the investigators, the trainings organised based on our training plan continued in 2014.

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. This program has been finished with two persons, one of the members got an investigator, and the other left the TSB for a private job.

3 colleagues participated in the Fundamentals of Accident Investigation course, one colleague the Mass Fatality Incidents course and successfully passed the exam in Cranfield University (UK).

One members of the Department attended the SMS Training, and another one the Training course of Derailment Investigation organised by the Agency.

These studies can be utilised effectively in the investigations.

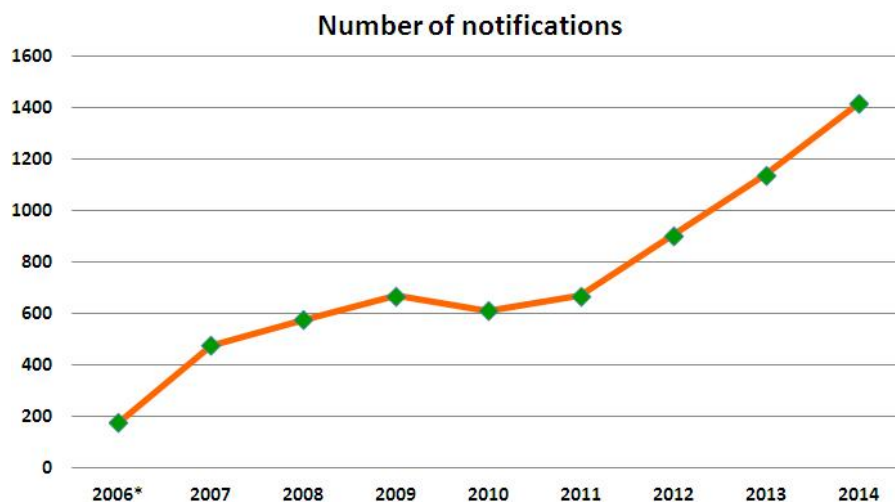
Our colleagues also succeeded in passing the public administration examinations – basic and higher level – obligatory for all civil servants in Hungary.

### 1.4.2 Notifications

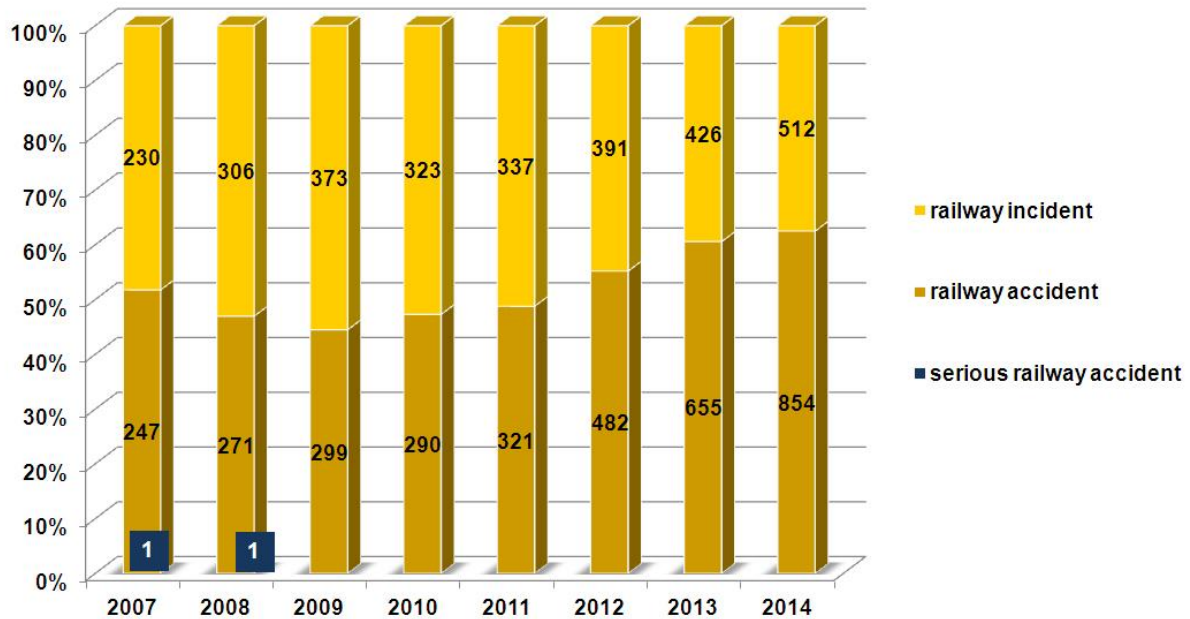
In accordance with the extension of its powers TSB began during the fall of 2011 to receive notifications on occurrences concerning local railways also (underground railway, cogwheel railway, funicular, tram – Budapest, Miskolc, Debrecen, Szeged). Data of 2014 reflect, that the number of notifications of this kind increased continuously (similar to the previous year), considering that the notification practice concerning these railway systems was stabilized during the years.

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

#### Reported railway occurrences in 2006-2014



\* Data collection since 01. 03. 2006 pursuant to Kbv.

**Reported railway occurrences in 2007-2014 by category**

Parallel with the growing number of notifications (1418 occurrences in 2014) there was a change in the former rate of railway accidents and incidents: comparing the total number of reported occurrences in 2011, the accident rate increased by 13%, from 49% up to 62%.

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

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

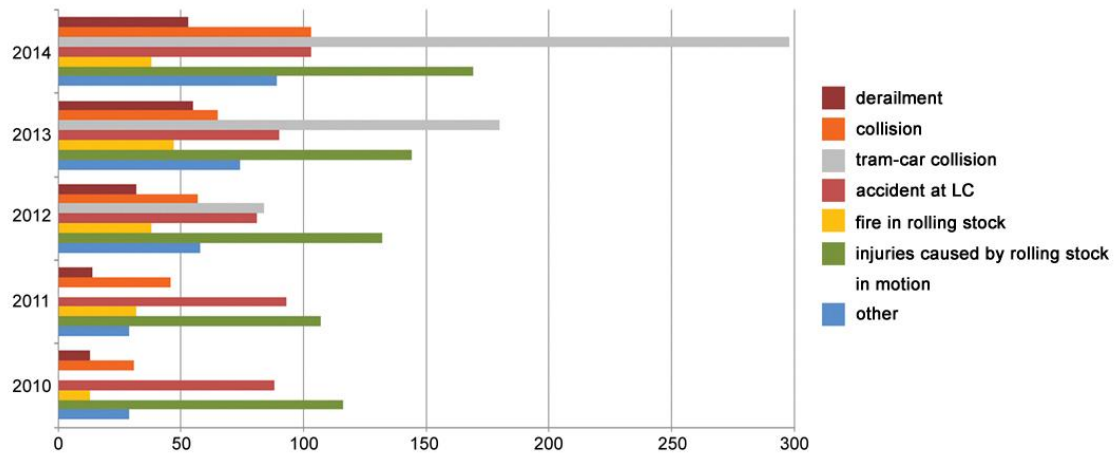
**Reported significant accidents in 2008-2014 by content**

| SIGNIFICANT RAILWAY ACCIDENTS                | TSB               |      |      |      |      |      |      |
|--|-------------------|------|------|------|------|------|------|
|  | 2008              | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|  | 132               | 165  | 131  | 134  | 122  | 107  | 109  |
| - collision                                  | 1                 | -    | -    | -    | 1    | -    | 3*   |
| - derailment                                 | 1                 | 2    | -    | -    | -    | 1    | 2    |
| - injuries caused by rolling stock in motion | 88                | 113  | 89   | 91   | 88   | 71   | 69   |
| - accident at LC                             | 42                | 50   | 42   | 43   | 31   | 33   | 33   |
| - fire in rolling stock                      | -                 | -    | -    | -    | -    | -    | -    |
| - tram-car collision                         | no data available |      |      |      | 2    | 2    | 2    |

\* One of these 3 occurrences is a tram collision with a stop-buffer with significant damage.

There is a remarkable improvement in the number of significant railway accidents. In the last three years it decreased from 134 (2011) to 109 (2014). This is a 19% decrease, even though the influence of some significant railway accidents occurred to local and special railway undertakings have already been included in the data since 2012. The most attractive improvement is in the LC accidents and in the injuries caused by rolling stock in motion.

### **Reported railway accidents in 2010-2014 by content**

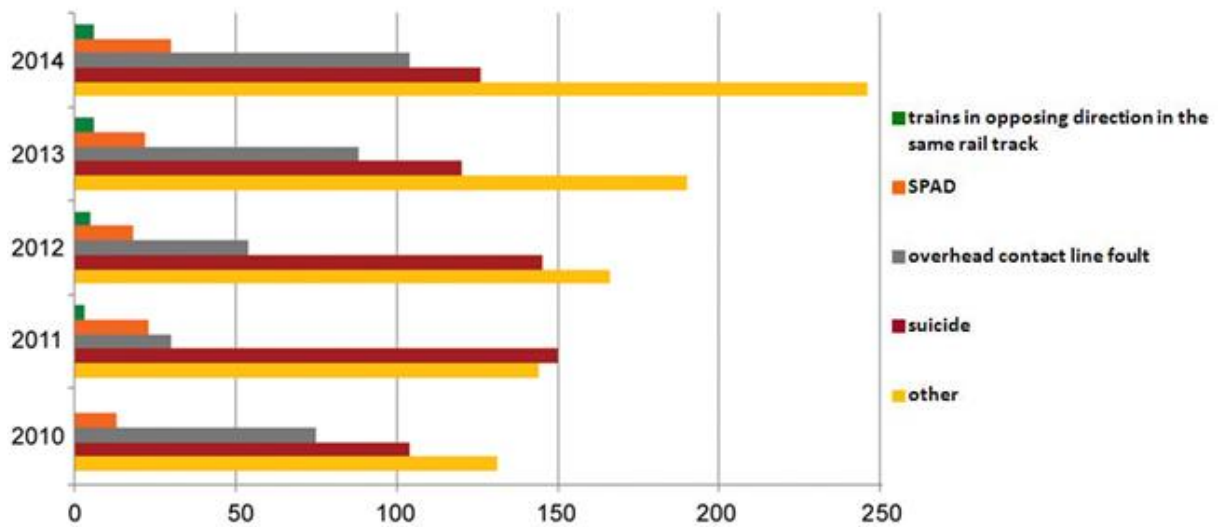


Compared to the previous period, the category of tram vs. road vehicle collisions shows a conspicuous increase, which is the consequence of improving readiness to report as indicated above, i.e. the statistics now include data which used to remain latent before.

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

Following the earlier decrease, in the last two years the number of accidents occurring at level crossings shows increase, while the number of significant accidents in this category is constant, which means, that the number of LC accidents with non-significant consequences is increasing. The injuries caused by rolling stock in motion have decreased significantly. The reason of this tendency is analysed in Chapter 3: Investigations. The increase in accident category 'other' is caused by the emergence of accidents occurring to local and special railway systems that cannot be classified with the traditional method.

### Reported railway incidents in 2010-2014 by content



The number of problems with the overhead contact lines reported to TSB increased from 88 of the previous year over 100. However, this occurrence category may also involve cases from the local railways (e.g. tram) and cases where it turns out later on that the contact line was damaged due to a wilful act (vandalism, theft or attempt of theft). Weather also plays an important role in this occurrence category, as relatively more incidents of this kind occur in short periods of time when the weather is stormy, which has an impact on statistics.

In the category of injuries caused by rolling stock in motion, the increase in the number of accidents (from 132 in 2012 to 174 in 2014) was matched by a decrease in the number of suicides (from 145 in 2012 to 135 in 2014) compared to the previous period. Regarding that such occurrences are beyond the control of the railway system, the cause of the statistical change may also be found outside the railway system, and it also depends on which cases are officially qualified suicides by the police. In the number of injuries caused by rolling stock in motion plays a role the number of occurrences on trams (36 in 2014) with minor injuries.

The number of SPAD incidents reported to TSB shows further increase and its number is relatively high. These occurrences were of fortunate outcome, practically having no consequences to persons or property, nevertheless, each of these represented serious safety risks and in some cases the occurrence of a serious accident was indeed close. For this reason, TSB took decision on conducting technical (safety) investigations in some of these cases, issued final reports on the results and issued safety recommendations as well.

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

An incident of trains in opposing direction on the same track should be highlighted due to its fairly dangerous nature and a lot of media attention in 2014, which happened in Dunakeszi station. It was also a quite dangerous in Szeged, when a tram without driver was running ca. 700 m in the road traffic, crossing more roads.

## 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 is 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.

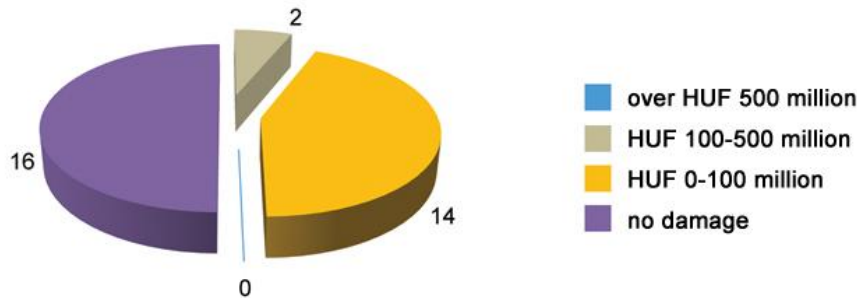
### 3. INVESTIGATIONS / RECOMMENDATIONS

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.

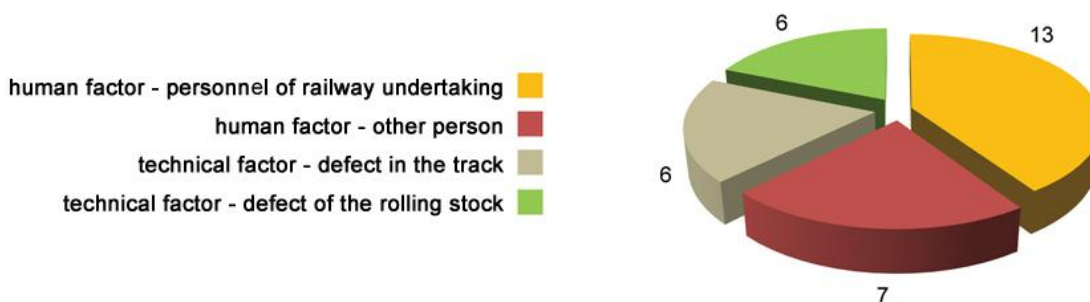
#### 3.1 Overview of investigations conducted by TSB

In 2014, there was no serious railway accident in Hungary which TSB was obliged to investigate. TSB conducted investigations – at its own discretion – on 32 further occasions (26 accidents and 6 incidents), based on the fundamental principles listed in 2.3. This is 18% less than in 2011, with regard to the finding of the ERA Assessment carried out at the TSB.

##### Investigations commenced in 2014 by the amount of damages:



##### Investigated occurrences in 2014 by their presumed cause (based on the reports):



##### Number of investigations lasting longer than one year over 2006-2014

| TSB                |                    |                    |                    |                    |                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| at the end of 2006 | at the end of 2007 | at the end of 2008 | at the end of 2009 | at the end of 2010 | at the end of 2011 | at the end of 2012 | at the end of 2013 | at the end of 2014 |
| 0                  | 12                 | 11                 | 7                  | 1                  | 7                  | 12                 | 14                 | 12*                |

\* In 3 cases the draft report was already sent out.

### 3.1.1 Overview of investigations by operators

**In 2014, TSB invited operators to investigate 81 occurrences.** In the railway sector, since 2012 – similarly to aviation – TSB has the opportunity to request information from operators on the causes of railway occurrences which need no investigation by TSB but may offer a lesson to learn in connection with general safety on rail transport. Today, the conditions of investigation by the operator are given: In 2014, the 160-hour accident investigator training sessions have been finished in order to meet the personal requirement of the performing of investigation by operators. Two training organizations submitted their training syllabuses to TSB, our organization evaluated both, and the first training sessions are running since 2013.

## 3.2 High priority topics in 2014

Having regard to the fact that ca. 30% of the significant accidents on the railways occur on level crossings (collisions with road vehicles, running over people), in 2014 TSB continued to put special emphasis on the investigation of such accidents using the previous years' experiences as well as paying special attention to accidents occurring at other places during which people were run over.

The number of significant accidents occurring at LCs was 32. After a significant decrease in 2012 (-28%), the annual number of these occurrences seems to be constant (31-33) since then. However, the number of collisions with cars and runover of trespassers was dominant, but accidents involving motorcycles, bicycles or agricultural tractors also occur. All these accidents can be related to human factors when drivers do not pay sufficient attention or break the rules on purpose.

It was found during the technical investigation of accidents at level crossings on one occasion in year 2014 that the operation error of the barrier system contributed to the accident. No similar contributing factor occurred among the causes of occurrences between 2010 and 2012, while it occurred twice in 2013.

In other cases, the accident is typically attributable to the careless, negligent behaviour of users of the level crossings. Besides this the lack of visibility triangle, lack of required visibility to the signals, inadequately placed signposts, etc. were also contributory factors in few cases to which the Investigating Committees drew the attention in their safety recommendations.

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

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

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

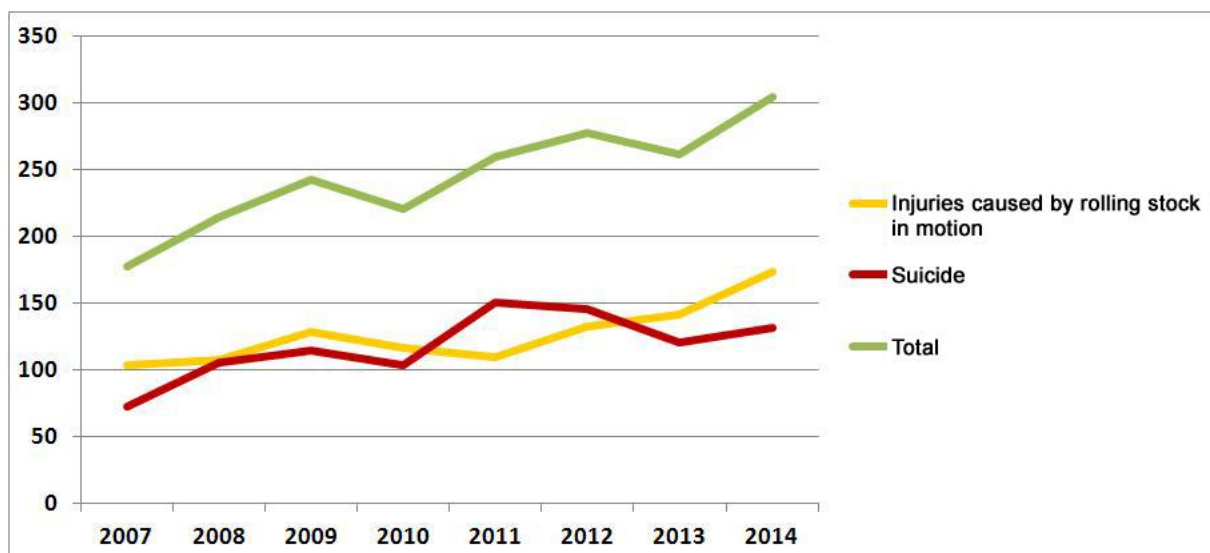


occurrence of accidents on LCs. By closing down unnecessarily operating LCs, there would not be such ideas in drivers' minds that 'signals can sometimes be ignored', which result in bad practice that may lead to accidents on other LCs operating normally.

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

The number of injuries to persons caused by rolling stock in motion increased significantly (22%) in 2014 (141→173). Evaluation should also take into account, however, that the number of significant accidents in this category decreased by 20% in 2013, and there is a further decrease in 2014 by 4%. The underlying cause here is the extreme increase in the number of notifications in the area of tram transport where this kind of occurrence is fairly frequent but rarely has a serious or fatal outcome.

After a significant decrease of the number of suicides in 2013 (145→120), this number increased again to 135 in 2014, i.e. the earlier improvement was preserved partly only.. The causes of such decrease may be found outside the railway sector, in the social-societal area.



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

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

Data of 2014 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: 15 occurrences between 2007 and 2009; 9 occurrences between 2010 and 2012, 6 occurrences in 2013 and 7 occurrences in 2014.

- Section between Kőbánya-Kispest and Monor stations: 23 occurrences between 2007 and 2009; 17 occurrences between 2010 and 2012, 8 occurrences in 2013 and 8 occurrences in 2014.
- In addition to earlier scenes, several similar occurrences took place in the vicinity of Sopron and Győr (4 and 5 occurrences, respectively).
- Of the locations more frequently affected earlier, Városliget junction and Tatabánya area show a significant decrease in the number of such occurrences

The experiences of the reported occurrences and the technical safety investigations of the past year conducted in accident category with injuries to persons caused by rolling stock in motion has drawn the attention to the door operation problems of passenger carriages. There were several technical safety investigations conducted where the passenger got out of the rolling stock in motion through doors that should have been closed and blocked by emergency lock. In many cases the investigations proved that the doors were not opened by the operation of the emergency lock but, due to technical deficiencies, they were open or could be opened by the normal procedure.

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

No similar phenomena were revealed among the occurrences of 2014, but it often occurs on vehicles without centrally locked doors that passengers sustain severe injuries when falling out through the open door or while getting off or on the moving train.

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

A remarkable achievement in the Hungarian railway transport is that there has been no serious railway accident since 2008. However, to maintain this positive tendency, it is essential that all participants of the sector learn from the occurrences whose consequences were close to serious, and more serious outcome was avoided largely by chance.

Therefore, TSB decided on a number of occasions to investigate accidents or incidents which did not have serious consequences but created rather dangerous situations. Such cases occurred, among others, at Dunakeszi station, primarily due to human factors, and on the tram network of Szeged, where in addition to the human factor, the design of the vehicle and its behaviour, unknown in the given special situation, also played an important role.

Of the accidents of 2014, the similar cases of endangering received the greatest interest, besides the tragedies that occurred at level crossings:

A break away tram ran several hundred meters without a driver in Szeged, crossing the largest roundabout in Hungary, but caused no accident, fortunately. Owing to the measures taken on the basis of the causes revealed during the technical investigation, similar incidents may be avoided in the future.

At Dunakeszi Station, a passenger train passed the entry signal without authorisation, at high speed, and travelled towards another train arriving at low speed from the opposite direction on track VIII. The train passing the signal was braked by the train control system, and the engine driver of the other train applied emergency braking after realising the danger situation; thus, the two train were able to stop and prevent collision, with a distance of 38 metres left between them.

### **Cases of SPAD**

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

### **The consequences of reported SPADs**

| Year | Without consequences | Splitting points open | Trains in opposing direction on same track | Running trains to already occupied track | Crossing LCs in open position | Total   |
|------|----------------------|-----------------------|--|--|-------------------------------|---------|
| 2009 | 3                    | 3                     | 3  | 2  | -                             | 12      |
| 2010 | 6                    | 3                     | 2  | 1  | 1                             | 13      |
| 2011 | 12                   | 5                     | 6  | -  | -                             | 23      |
| 2012 | 10(+3)               | 3(+0)                 | 1(+5)                                      | -  | 1(+0)                         | 15(+8)  |
| 2013 | 4(+12)               | 3(+0)                 | 3(+3)                                      | -  | 3(+0)                         | 13(+15) |
| 2014 | 6(+14)               | 3(+1)                 | 2(+0)                                      | 4(+0)                                    | -                             | 30      |

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

### 3.3 Investigations commenced in 2014

| Date<br>2014 | Occurrence   | Category            |
|--------------|--|---------------------|
| 10 02        | The tram No. 69 derailed on the points after departing from the terminal station at Erdőkerülő Street. Nobody was injured.   | Railway<br>accident |
| 23 02        | On 23 February 2014, the locomotive No. 91 81 1116 009-2 hauling the train No. 90556 leaving Hatvan Station derailed with two axles between the turnouts No. 453 and 14.   | Railway<br>accident |
| 27 02        | The tram No. 24 derailed at the crossing of Fiumei Str. and Salgótarjáni Road. Nobody was injured.   | Railway<br>accident |
| 03 03        | The train No. 7245 collided with a semitrailer truck in a level crossing (No. AS19) protected with correctly operating warning lights between Szegvár and Szentes stations. The Bz railcar moving the train derailed; one person had a serious injury and 12 people were injured slightly.                               | Railway<br>accident |
| 05 03        | The train 22239, in section run, entering Track 5 at Rákosrendező marshalling yard derailed with 4 axles after the turnout No. 517. Nobody was injured.  | Railway<br>accident |
| 26 03        | While performing breakdown duty, an underground train jammed in the open line due to a foreign object stuck up under it. Nobody was injured.   | Railway<br>accident |
| 06 04        | The last wagon of the train No. 91759-2 derailed while leaving Ferencváros Station. Nobody was injured.  | Railway<br>accident |
| 16 04        | While approaching Püspökladány Station, the train No. 6160 passed the entry "Signal at Danger", set the points, and ran facing the freight train No. 63251 which was leaving the station. Action was taken to stop the trains, and they stopped leaving a distance of 209 metres between each other. Nobody was injured. | Railway<br>incident |
| 04 05        | The train No. 5108 collided with an automobile at the level crossing protected with warning lights and half-barrier between Rákos and Pécel Stations. The driver of the road vehicle and one passenger were seriously injured.   | Railway<br>accident |
| 05 07        | At Erdőkertes Station, the train No. 2429 collided with an automobile at an unprotected level crossing. The driver of the road vehicle died as a consequence of the collision.   | Railway<br>accident |
| 12 05        | At Keleti Pályaudvar, Budapest, a shunting engine bumped into a load-distributing concrete structure. Nobody was injured.  | Railway<br>accident |
| 07 06        | At the Svábhegy stop of the rack-and-pinion train line the train No. 2-8 started despite the exit signal at danger, and set the point No. 2, and then derailed. Nobody was injured.  | Railway<br>incident |
| 10 06        | Between Mezőkövesd and Füzesabony Stations, 4 wagons of the train No. 53015 derailed. Nobody was injured.  | Railway<br>accident |
| 18 06        | The locomotive moving the train No. 1314 derailed between the stops Papírgyár and Puszkaporos. Nobody was injured.   | Railway<br>accident |
| 21 06        | The train No. 9872 collided with the trailer of an agricultural tractor at an unprotected level crossing between Búcsúszentlászló and Zalaszentmihály-Pacsá Stations. The railcar derailed, and its driver and a passenger were injured slightly.  | Railway<br>accident |
| 18 06        | The locomotive moving the train No. 1314 derailed between the stops Papírgyár and Puszkaporos. Nobody was injured.   | Railway<br>accident |
| 15 07        | The train set running on the left-hand track of the underground  | Railway             |

|       |  |                  |
|-------|--|------------------|
|       | line M3 was emitting smoke at Nyugati square at about 16:59 hours. Nobody was injured.   | accident         |
| 19 07 | At Dunakeszi Station, the train No. 2135 passed the entry signal at danger, set the point No. 7, and entered the route of the train No. 2364 which was leaving the station via Track VIII. The two trains stopped at a distance of about 40 metres from each other.  | Railway incident |
| 08 08 | At Balassagyarmat Station, a machine tool (without permit) moved beyond the limit-of-shunt signal, set the point No. 11, and entered the route of the train No. 33615 which was approaching track No. 2.   | Railway incident |
| 26 08 | A tram broke away at the site of Szeged Transport Company (SZKT). Nobody was injured.  | Railway incident |
| 03 09 | At Százhalombatta Station the machine tool running as train No. 24194 passed the entry signal at danger, entered track No. 2, and then reversed its direction without permit. In the meantime, the train No. 839 was approaching the station. They stopped at a distance of 100 metres from each other.  | Railway incident |
| 03 09 | On 03 September 2014, the railcar of the train No. 36913 collided with the trailer of an agricultural tractor at the unprotected level crossing in railway section No. 35 between the Stations Karcag and Kunmadaras. As a consequence of the collision the railcar derailed, the driver's cabin was damaged, and the engine driver suffered minor injuries. | Railway accident |
| 16 09 | Between Göd and Vác Stations, the locomotive Bdv-012, moving the train No. 3004 caught fire. Nobody was injured.   | Railway accident |
| 20 10 | A train bumped into the rear end of an articulated bus of a bus line at a level crossing protected with (operable) warning lights situated between Tatabánya and Környe Stations.  | Railway accident |
| 21 10 | The passenger train approaching Ostffyasszonyfa Station derailed with 4 wagons on the point No. 1; two of the derailed wagons turned crosswise.  | Railway accident |
| 04 11 | The last three wagons of the freight train leaving Dombóvár Station derailed due to axle journal breakage.   | Railway accident |
| 11 11 | A train bumped into the trailer of a truck at a level crossing (No. AS515) protected with (operable) warning lights situated between Hidas-Bonyhád and Bátaszék Stations. The engine driver died.  | Railway accident |
| 03 12 | At Telekgerendás Station, the train No. 7715 entered (without prior notice) an occupied track where the train No. 76011 was staying. It stopped in front of the obstacle.  | Railway incident |
| 16 12 | At Rákosrendező Station, a train set passed the exit signal K3 at danger, without permit, and set the point No. 16.  | Railway incident |
| 17 12 | In Könyves Kálmán Bld., Budapest, the tram No. 1432 towed the broken down tram No. 1333. The towed tram derailed on the points.  | Railway accident |
| 17 12 | The train No. IC807, while running through the Station Dunai Finomító, bumped into a spike-driver machine staying in the structure clearance.  | Railway accident |
| 22 12 | The train derailed with two axles on the points at the stop Gubacsi Road, Budapest, Gubacsi Road.  | Railway accident |
| 30 12 | In Móricz Zsigmond Circus, Budapest, the train derailed with one axle on the points No. 41/47.   | Railway accident |

### 3.4 Investigations completed in 2014 with the issued recommendations

In 2014, 29 final reports were compiled and published on the website of TSB. Further 6 draft reports were compiled and sent to the relevant parties for reflections. The above investigations were closed and the final reports were published at the beginning of 2015 considering the 60 days provided by law for the relevant parties to reflect on the draft report.

The final reports issued in 2014 analysed occurrences of the following types:

|  |               |
|--|---------------|
| • Collision                                  | 3 occurrences |
| • Derailment                                 | 7 occurrences |
| • Accident at LC                             | 6 occurrences |
| • Injuries caused by rolling stock in motion | 3 occurrences |
| • Fire in rolling stock                      | 2 occurrences |
| • SPAD                                       | 1 occurrences |
| • Movements approaching each other           | 2 occurrences |
| • Runaway of vehicles                        | 1 occurrence  |
| • Other                                      | 4 occurrences |

#### **2012-143-5**

On 24 February 2012, at 16:04 hours, the train No. 3616 departed from Rákoshegy Station via the right hand track, based on a “subsidiary signal”. The handling of the exit signal for the train was excluded by the fact that the direction of travel on the right hand track between Rákoshegy and Maglód Stations was also in the possession of Maglód Station.

The traffic manager failed to explore prior to launching the train that the changing of the direction of travel had not been initiated on the safety installation.

The immediate risk of accident developed when the traffic manager failed to find out that the problem was not at the station but on the open line, and did not shut the barriers in front of the train which was running opposite the travel direction set for it, and when he failed to initiate such action with the traffic manager on duty at Maglód Station either.

The traffic manager identified his mistake while the train was leaving the station: he shut the level crossings by manual control, thus eliminating the danger situation. Then the train had a safe journey between the two stations.

#### **Factual statements directly connected to the occurrence of the case**

The traffic manager failed to ensure the direction of running set in the safety installation, and let the train run in the opposite direction.

#### **Factual statements indirectly connected to the occurrence of the case**

The IC established no findings of this kind.

#### **Other risk factors**

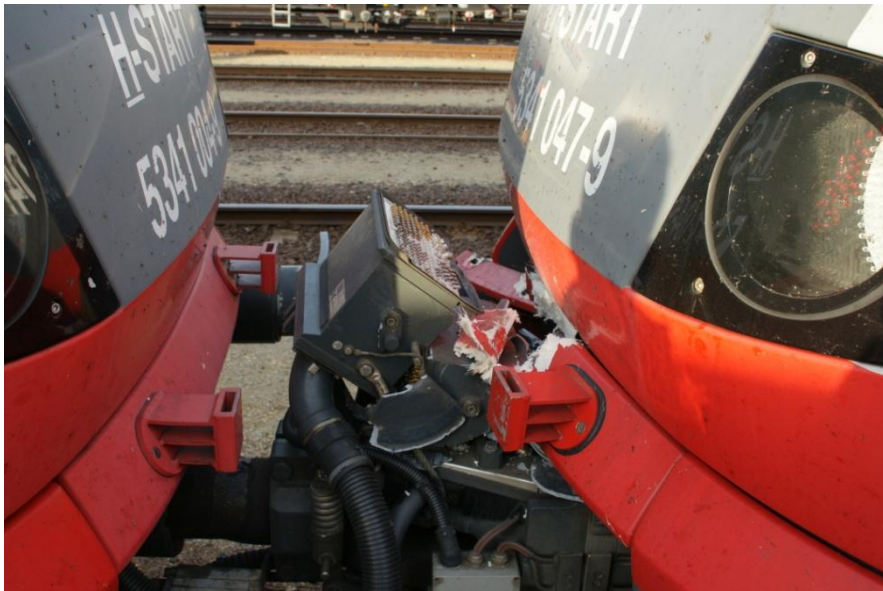
The IC refers to the importance of the human factor in railway transportation systems.

#### **Safety recommendation**

Safety recommendation was not issued.

## **2012-240-5**

The train No. 34429 approaching Tatabánya Station through the occupied track 6 bumped into the train set of the still train No. 4859 at low speed. Two persons travelling on the train has slight injuries, and the central switching systems of both trains were damaged. The IC attributes the occurrence to human factors on the part of the engine driver of the train No. 34429.



### **Factual statements directly connected to the occurrence of the case**

The engine driver of the train No. 34429 fell asleep while the train was approaching the station, so he failed to stop his train in front of another train staying ahead of it.

### **Factual statements indirectly connected to the occurrence of the case**

Due to the low speed (14 to 15 km/h) of the train, the dead-man's vigilance device issued no call for control action due to its design; the engaged automatic speed control device kept the train at a constant speed of 14 km/h.

### **Other risk factors**

The IC makes no statement in this regard.

### **Safety recommendation**

Safety recommendation was not issued.

## **2012-360-5**

On 31 May 2012, a passenger train collided with a motorcycle at the unprotected level crossing between the stations Balatonszentgyörgy and Sávoly. The driver of the motorcycle died on the spot.

The IC concluded that the train was difficult to see due to the flora in the sight triangle, and thus, accidents may only be avoided in lucky circumstances of traffic.

The railway company has no working capacity to keep the sight triangles clear, and the contractor appointed to for that purpose does not perform the job on time, and the deadlines specified in the relevant contract do not require it either.

The IC issued a safety recommendation during the investigation already in order to propose reviewing the sight.

### Factual statements directly connected to the occurrence of the case

With regard to the given track speeds, the sight conditions do not ensure safe crossing at the affected level crossing; however, human factors revealed on the part of the driver of the motorcycle may have also contributed to the occurrence.

### Factual statements indirectly connected to the occurrence of the case

The infrastructure manager has only limited own capacity to keep the sight triangles clear, and they sign contracts with contractors too late, and cannot have them performed the jobs on time either.

Ambrosia control takes precedence over weed control which is necessary for transport safety reasons.

### Other risk factors

Performing the job by their own limited assets interferes with other transport safety-related jobs.

### **Safety recommendation**

Safety recommendation was not issued.



**2012-402-5**

The railcar No. 6341-002 of the train No. a 7807 collided with an automobile at the unprotected level crossing in Section 732 between Baja and Mátéházapuszta Stations. The driver of the automobile died on the spot as a consequence of the crash, and his passenger had severe injuries. The IC attributed the occurrence to human factors on the part of the driver of the automobile. During the technical investigation of the occurrence, the IC found the sight at the level crossing noncompliant, and thus, the TSB issued a safety recommendation to the Bács-Kiskun County Government Office. The Government Office obligated MÁV Zrt. and the adjacent lands in a Ruling to provide the required sight, which the affected parties performed by 4 October 2012.

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

The required reduced sight triangle was not clear from the direction of arrival of the automobile, it was covered with vegetation.

The automobile entered the level crossing despite the fact that driver had no sufficient view on the railway track to check if a railway vehicle was coming.

**Factual statements indirectly connected to the occurrence of the case**

The IC makes no statement in this regard.

**Other risk factors**

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

## **2012-423-5**

On 27 June 2012 at 20:36 hours, the train No. 35228 travelling from Station to Abaújszántó stopped at Rátka Station. The senior ticket inspector thought that the passengers had finished getting off and on, and authorised the engine driver to start the train. The engine driver operated the door shutting switch, and then started the train which travelled as far as Tállya Station.

An elderly female passenger in the last wagon of the train was not able to finish getting off: the shutting door pinched her arm with a bag in her hand which she intended to hand over to someone on the ground. The occurrence was not detected by other passengers or the ticket inspector, and the feedback received by the engine driver indicated that the door was shut. The passenger travelled sitting on the steps as far as Tállya Station where the door was opened and her hand was released. The senior ticket inspector helped her get off and escorted her to the station office.

The elderly lady got into state of strong stress and finally she was taken to hospital.

The IC concluded that the primary cause of the occurrence was a human factor on the part of the senior ticket inspector. An additional important cause is that the safety system used to prevent similar cases was out of order in the affected door of the railcar due to a technical defect.

### **Factual statements directly connected to the occurrence of the case**

The senior ticket inspector did not detect that the passengers have not finished getting on and off at the trailing end of the train.

The system which inspects and gives feedback on the shut position of the door did not work properly: it did not detect the pinched passenger.

### **Factual statements indirectly connected to the occurrence of the case**

Due to the design of the limit position feedback circuit of the door, the existing defect cannot be detected by the current maintenance technology during operation.

The maintenance technology contains no blocking test.

The layout of Rátka station is not suitable for safe changing of trains by passengers in case of trains consisting of more than two units.

### **Other risk factors**

The IC makes no statement in this regard.

### **Safety recommendation**

Safety recommendation was not issued.

**2012-443-5**

On 5<sup>th</sup> July 2012 at 06:32 hours, in Budapest, the train No. 4320 leaving Déli Station through track Cs3 collided with a reserve locomotive staying beyond the limit indicator by track Cs1 of the station. The locomotive and three leading wagons of the passenger train were slightly damaged in the occurrence. No personal injury occurred.

The IC concluded during the technical investigation that the occurrence is primarily attributable to human factors.

The IC concluded that visibility along the track section involved in the occurrence is difficult due to the significant interference by the built environment.

For the sake of preventing similar cases and minimising the time needed to check the track visually, the IC recommended the National Transport Authority to review the rules relevant to the traffic managers' obligation to view the tracks as defined in the Station Instructions for Budapest Déli Station, and thus ensure (by some technical development or work organisation measure) continuous visibility of the switching zone around the tracks Cs1 to Cs3 for the station crew that manage train traffic.

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

The IC concluded during the technical investigation that the occurrence is primarily attributable to human factors.

The IC concluded that the communication within the crew managing the traffic of trains on the day of the occurrence was not efficient enough: it did not indicate that the locomotive had stayed beyond the safety limit indicator of track Cs1 after finishing its shunting movements.

When setting up the track route, several crew members' responsibilities included the task to check if the track route was clear; however, none of them saw the locomotive staying beyond the safety limit indicator.

The locomotive falling in the route of the train was visible to the engine driver of the train continuously from the starting point of the train; however, he detected the obstacle when it was too late already from the point of view of the collision.

Factual statements indirectly connected to the occurrence of the case

The IC concluded that, at Budapest-Déli Station, the parts of the tracks Cs1 toCs3 which fall in the range of the switching zone are difficult to see due to the significant interference by the built environment, and thus, the obligation to view the track route before setting the track routes for the trains entering and leaving that area (as specified in section 2.7.4, Instruction F.2) can only be fulfilled with difficulty.

The IC concluded that the layout of the radio receive areas prevents the shunt masters at work on the tracks in the shed from hearing the orders relevant to the track routes for the trains entering and leaving the station.

Other risk factors

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2012-554-5**

On 14<sup>th</sup> August 2012, at 08:55 hours, the empty four-axle wagon No. 33 56 537 7393-7, of the series Eas, connected as 20<sup>th</sup> wagon in the train No. 45518-1, derailed with two axles on the arched switch tongue of the crossing turnout No. 28/b while moving out from Szolnok Station on a locked route on track 21 to the left track towards Abony. The torsional deflection of the undercarriage frame was perceptible even by visual check during the on-site survey of the derailed vehicle. The performed measurement confirmed this conclusion.

According to the direction of travel of the derailed empty four-axle wagon No. 33 56 537 7393-7, the wheel loads were significantly larger on the right wheels on the axles of the front bogie, as well as on the left wheels on the axles of the rear bogie. On the route of the train (on the left hand side relative to its direction of travel), in the crossing between the turnouts No. 40 and 28, there is a track section which contains a spot of excessive vertical rail displacement.

The local defect in the track added to the technical defect of the affected wagon during its travel at low speed, and such joint effect led to derailment of the vehicle.

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

Based on data available, the IC attributes the occurrence to the interaction of several contributing factors:

- The undercarriage frame of the affected wagon had a torsional deflection perceptible even by visual check.
- Relative to the travel of direction of the derailed empty four-axle wagon No. 33 56 537 7393-7, the wheel loads were significantly larger on the right wheels of the front bogie, as well as on the left wheels of the rear bogie.
- On the route of the train (on the left hand side relative to its direction of travel), in the crossing between the turnouts No. 40 and 28, there is a track section which contains a rail surface defect which requires no immediate intervention.

**Factual statements indirectly connected to the occurrence of the case**

The vehicle was more prone to derailment due to its low speed.

**Other risk factors**

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2012-578-5**

On 27 August 2012 at 21: 45 hours, three trailers got disconnected from the track motor car running as train No 23399 between the stations Tápiószele and Tápiógyörgye. Due to the gradient ratio and their impetus, the trailers followed the pulling vehicle for a short time, then they halted, and rolled back; while rolling back, they collided with the train No. 3341 travelling behind them. The train was already braking, owing to the operation of the block signal and to the crew's perception of the danger situation. The collision caused no personal injury, and the control car of the train No. 3341 was not damaged, owing to the low speed of the collision.

According to conclusions of the IC, the cause of the occurrence was that the track motor car and its trailers had been connected otherwise than specified by the requirements (the pin which fastens the connection was not secured against falling out) at the departure station of the train No. 23399 (Újszász Station). A contributing factor to the occurrence was that the main line hose connection between the track motor car and its front trailer was not connected, which excluded automatic braking in the case of possible accidental disconnection. Another contributing factor was that the brake systems of the (3) trailers were disabled, and thus, the braking of the disconnected train section was impossible.

The IC proposes no safety recommendation because similar accidents can be prevented by following the relevant rules.

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

The occurrence may be attributed to technical and human factors.

**Technical factors:**

the pin used to connect the trailers could not be secured.

**Human factors:**

connection was performed incorrectly (lack of securing),  
the driver of the track motor car failed to ensure compliance of the connection.

Factual statements indirectly connected to the occurrence of the case

Technical cause: the air hose connection was open, and thus, the trailers could not be included in the braking line.

Human factors:

The known defect had not been reported (it had been known for 3 or 4 days)

Despite the rules prohibiting it, the trailers in such state were included in a train and used.

Other risk factors

In the opinion of the IC, it is a risk-increasing factor that the safety management system of the railway undertaking, which is designed to identify and eliminate such danger sources and risks, failed to reveal:

that the driver of the vehicle had no valid driving licence,

the aforesaid technical shortcomings, and

the work performed in a manner which was non-compliant with the instruction.

**Safety recommendation**

Safety recommendation was not issued.

**2012-579-5**

On 28 August 2012, at 16:43 hours, it was perceived at Győr-Rendező marshalling yard that smoke was coming from the vehicle No.95 55 5342 010-5 which was shut in dormant mode on the track T.3. The fire was detected and extinguished by an engine driver who had just arrived at the spot. Based on information from the operating undertaking, preliminary fire investigation found that the fire in the air compressor had been caused by electric short circuit, which suggested that it was not justified to start a technical investigation on the part of the TSB. However, a further, more detailed fire investigation by the operating undertaking excluded electric circuit as a direct cause of the fire, and concluded that a part was missing from the air compressing unit where the fire started, namely: one of the axial fans which transport cooling air.

On 27 October 2012, at the site (Pusztaszabolcs) of the maintenance organisation affected in the accident, TSB Hungary visually investigated the compressor unit involved in the accident at.

Based on the above facts it was justified to start an investigation in order to explore the occurrence thoroughly.

The records documenting maintenance operations which were checked during the technical investigation contained no operations relevant to the opening or maintenance of the compressor unit, and thus, it cannot be excluded that the missing unit had not been built in during the assembly of the compressor unit.

During the investigation, the IC concluded that, with a probability almost equal to full certainty, the fire was primarily caused by the lack of a compressor component (a fan blade). The IC concluded that it is very likely that the fire would not have occurred if the said fan blade had been present and all the other factors had also been present concurrently.

Several such other factors also contributed to the occurrence which, in themselves, would not have started a fire, but their coincidence led to a fire. In addition to the lack of the fan blade, the weather conditions and some maintenance shortcomings also contributed to the occurrence. The accident caused damage to the vehicle, and implied the possibility of a more serious outcome. Several vehicles of similar type were surveyed during the time of the technical investigation, but no similar shortcomings were found, thus, the case may be regarded individual; accordingly, the IC does not find it necessary to issue a safety recommendation.

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

The IC attributes the direct causes of the accident to a technical defect and maintenance shortcomings:

The lack of the fan blade and the lack of the cooling effect of the apparent wind due to the stationary state ("dormant" mode), the cooling of the equipment became insufficient, and the longer period of high daily mean temperatures increased the temperature of the cooling air of the compressor, which caused overheating of the system.

The compressor contaminated with oil sludge and other combustible materials (paper, tree leaves) caught fire due to overheating.



Factual statements indirectly connected to the occurrence of the case

The lack of the fan blade in the compressor unit and contamination of the same unit was not detected and eliminated during the maintenance of the vehicle, despite the fact that it was inspected during the maintenance due at specified intervals as seen above.

Other risk factors

During the review R1 of the vehicle due after running 750 000 km the compressor unit was not maintained or replaced, so the vehicle was returned to service in such state.

**Safety recommendation**

Safety recommendation was not issued.

## **2012-637-5**

On 19 August 2012, at Kelenföld Station, a relative helped an elderly passenger to get on the train travelling from Budapest-Keleti Station to Szombathely via Sopron. The train started while they were looking for a seat. Then the man escorting the passenger ran out of the passenger cabin and jumped off the moving train. He landed so unfortunately that he fell between the wagon and the platform, right in the way of the wheels of the train, and suffered so severe injuries there that he died on the spot.

The IC primarily attributes the occurrence to the behaviour of the affected person, however, a contributing factor was that the locking of the door did not work, and the crew failed to treat this defect properly.

### **Factual statements directly connected to the occurrence of the case**

The man who suffered the accident left the moving train on purpose, but he lost balance during his jump, and fell under the train in motion.

### **Factual statements indirectly connected to the occurrence of the case**

Due to a technical defect of the wagon, that lockout function of the door which ought to prevent similar unsafe behaviour did not work, and the train crew have no possibility to detect this defect.

The senior ticket inspector failed to take the required measure (locking the door), and was not even aware of the relevant requirement.

### **Other risk factors**

The operability or inoperability of the door lock function in the wagon is not indicated in a manner visible for the train crew.

The training for the train crews do not include the management safety knowledge necessary for each wagon type they serve, and even the trainers do not have the information necessary for adequate training in this area. The training system is very complex, so it would be complicated to add the knowledge of wagon types to the training programs.

## **Safety recommendation**

### **BA2012-637-5-01**

*The Investigation Committee found that the members of the train crew did not receive training for the safety equipment of each wagon type they deal with but they may also serve on wagons they are not familiar with, and thus they should be required to know how to use the safety equipment of such vehicles.*

**Transportation Safety Bureau therefore recommends the minister responsible for transport to include in the regulations that train crew members be obliged to receive training in the knowledge of wagon types in an appropriately organised system, and that they be allowed to serve on wagons corresponding to their qualifications.**

*By implementing the above recommendation, it could be ensured that the train crew know how to manage the wagon and explore safety shortcomings easier and take appropriate measure.*

No response from the addressee; implemented by GySEV

## **2012-685-5**

On 11 October 2012, at about 14:55 hours, on tram line 4 in Szeged, two trams ran in toward each other on the single-track section between Dugonics Square and Vitéz Street because the driver of the tram No. 214 departed from the stop at Dugonics Square without waiting for the opposite tram to arrive.

The affected vehicles did not collide as they were able to stop at a distance of ca. 230 metres from each other. The drivers reported occurrence to the dispatcher service.

The occurrence caused no personal injury or damage to the vehicles. During the period of the site survey following the occurrence, the passengers were transported by replacement buses.

### **Factual statements directly connected to the occurrence of the case**

No technical defect of the vehicles was revealed in connection with the occurrence. The IC attributes the occurrence to human factors on the side of the tram drivers.

### **Factual statements indirectly connected to the occurrence of the case**

In absence of a continuous safety installation on Line 4, the traffic on the single-track section is managed by a service timetable, which requires a constant, elevated attention of the drivers, and there is no protection of the safety of the passengers in the case of a mistake or error.

### **Other risk factors**

The IC makes no statement in this regard.

### **Safety recommendation**

Safety recommendation was not issued.

**2012-705-5**

On 19 October 2012, two wagons of the freight train entering the not-through main track No. VII at Aszód Station derailed on the turnout No. 17 in the switching zone, and then the derailed wagons damaged the receiving track in a length of ca. 300 m.

A speed limit was specified in the track section affected, and the train breached it; however, the speed limit was not indicated.

The IC concluded that the worn-out state of the turnout No. 17 was suitable to cause derailment, and, as a contributing factor, the wheel flange thickness of the wheels was near the lower limit of tolerance.

An investigation of the system of track maintenance showed that the worn-out state of the sleepers (which led to the accident) in the actual turnout were not explored, and the resources and materials necessary for adequate track maintenance are not provided; the performance of maintenance tasks is complicated by complex and slow decision-making processes.

The TSB issues a safety recommendation relevant to making the dimension specifications of the turnouts more precise.

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

There was an increase in the track gauge at the spot of the derailment, and the structure of the track could not resist the impact of the forces which caused further, flexible increase to the track gauge.

The worn-out sleepers of the turnout were not replaced before they became unfit for service, and such replacement was not even scheduled.

The wheel dimensions of the wagon were compliant with the requirements, but very close to the limit value.

Factual statements indirectly connected to the occurrence of the case

The engine driver drove the train at a speed which exceeded the speed limit by 30% to 40%; the speed limit in effect was not indicated.

The intervention by the infrastructure manager (repairing of the turnout) did not take place on a timely basis; the performance of maintenance tasks is complicated by complex and slow decision-making processes.

Other risk factors

There are no specifications relevant to limitations to be ordered in function of dimensional deviations in the turnouts.

In contrary to traffic rules, the train could enter the station with a clear signal (**Hiba! A hivatkozási forrás nem található.**).

Safety recommendation

**BA2012-705-5-01**

*During the investigation, the Investigation Committee found that the system of the rail network operator includes no regulation to determine the degree of limitation (exclusion) to be introduced in function of the deviation of the dimensions of turnouts from the standard dimensions.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to approve the next modification to the track supervision instructions and maintenance rules only if the definitions of procedures and limitations necessary in function of the deviation of the dimensions of turnouts are included in them.**

*In the case of implementing the above recommendation, the personnel responsible for track supervision may have a specification to rely on when determining speed limits at, or exclusion from the traffic of, excessively worn turnouts.*

Rejected

**2012-777-5**

On 18 November 2012, at 01:03 hours, the second wagon No. 50 55 2035 040-4 of the train No. 6008 caught fire at Ebes Station. No one was injured as a consequence of the occurrence. However, the overhead contact wire over track III at Ebes Station broke due to the fire.

Based on data available, the IC attributes the occurrence to a combined effect of several factors:

the heating system of the wagon was overheated, which made it easier for the inflammable materials (typically waste) to catch fire;

the safety elements which control and check proper operation of the heating system were not operable, and thus, were not able to stop the overheated heating system;

due to structural layout of the safety thermal cut-out integrated into the heating system of the passenger wagon, it could be mounted in its fixed, disabled (i.e. inoperable) state as well, which prevented its normal operation;

the procedures (specified in instructions) to be followed after detecting malfunction of the heating system were not followed, and thus, no action was taken to repair the defective rolling stock at the reversing station of the train.

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

The IC attributes the occurrence to a combined effect of several factors:

Due to the design of the safety thermal cut-out, it could be inserted in its fixed state, as a result of which the component was not able to perform its safety function.

The heating system of the wagon was overheated because the safety elements controlling and checking its normal operation were not operable, and thus, they were not able to stop the overheated heating system at the time of the occurrence.

Factual statements indirectly connected to the occurrence of the case

During their activity, the train crew did not follow those requirements which ought to have been followed in the case of malfunction of the heating system of the passenger wagon, and thus, no action was taken to repair the defective vehicle at the reversing station of the train.

Other risk factors

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2013-035-5**

The tram No. 1352 starting leaving Ferencváros Shed to starting its service on Line 17 derailed with 2 axles on set of points No 3 at the Bécsi Street stop. No one was injured in the occurrence, and the tram sustained minor damage.

On the day of the occurrence, the TSB called the manager of Railway Safety, BKV Zrt., pursuant to Section 20 (1) of the to Act CLXXXIV of 2005 on the technical investigation of aviation, railway and marine accidents and incidents (hereinafter referred to as the "Kbvt.", to perform an operator's investigation. Reviewing the Operator's Report of 29 January 2013, the IC identified certain circumstances due to which the IC assigned the investigation of the occurrence to itself, pursuant to Section 18 (4), Decree 24/2012 (V.8.) of the Minister of National Development (hereinafter referred to as "NFM").

Based on the findings of the operator's investigation and its own conclusions, the IC attributed the occurrence to the halfway position of the involved set of points due to intensive snowfall and lack of points heating, to human factors on the part of the control panel operator and the driver of the vehicle, mentioning an indirect cause as well, namely that the current system of tram traffic control in Budapest does not comply with the relevant legal requirements. For this reason the IC is going to issue safety recommendations.

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

As a result of intensive snowfall and lack of heating of the points, there was snow between the stock rail and the switch tongue of the set of points No 3, and thus, the points could not be set to turnout position.

Despite the absence of the end position of the points, the control panel operator did not inspect the points on the spot.

Despite the absence of the end position of the points, the control panel operator displayed a subsidiary signal to the "C" signal.

The driver of the tram drove the tram onto the points despite the fact that the switch tongue did not sit close to the stock rail.

**Factual statements indirectly connected to the occurrence of the case**

The Traffic Rules contain no obligations for the control panel operators in the case of malfunction of centrally handled points, such obligations are only found in the rules of operation of the individual equipment items. The rules of handling worded in such rules of operations are not followed in the practice.

Due to the state of the point operating apparatus and the signals at the terminal station in Bécsi Road, the operating crew applies the special operations as a routine step. Special operations are not recorded case-by-case.

The basic training course of control panel operators provides no sufficient time in the area of signal and safety apparatuses for the acquiring of the necessary competence, and the operation tests required for a licence to work independently are not transacted in compliance with the relevant rules.



Other risk factors

The tram passed the points at a speed exceeding the speed limit.

The traffic rules do not define clearly the jobs included in traffic management or the procedures to be applied in the case of incidents which affect the management of traffic.

Currently, BKV Zrt. does not have an organisational unit for managing tram traffic; due to the current technology, only the traffic managing dispatchers of BKK Zrt. can communicate directly with the tram drivers.

Practically, the tram traffic management and traffic supervision activities are not separated in Budapest. The work of the tram drivers is primarily controlled by the traffic managing dispatchers of BKK Zrt., who do not have the qualification and test specified in Decree 19/2011. (V.10.) of the NFM.

The traffic control activity of the control panel operators is not in accordance with the relevant stipulations of Decree 19/2011. (V.10.) of the NFM.

The system of traffic control in Budapest does not comply with the contents of Point I.d.) Annex 3 to Act CLXXXIII of 2005 on railway transport.

Safety recommendation**BA2013-035-5-01**

*During the investigation, the Investigation Committee found that, for the Electric Street Railways, the currently effective Signal and Traffic Management Instruction F.1. – F.2. does not contain exact specification of the traffic managing personnel, their responsibilities relevant to the switches supervised by them, nor the traffic-related rules of the managing and elimination of incidents which affect traffic management.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to initiate consultation, involving the affected railway undertakings, in order to review and modify Signal and Traffic Management Instruction F.1. – F.2.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the revealed shortcomings can be eliminated by collaboration of the railway undertakings interested, the identity and scope of responsibilities of the people participating in the management of tram traffic would be unambiguous, and thus the safety of tram traffic would improve significantly.*

*Accepted, implemented*

**BA2013-035-5-02**

*During the investigation, the Investigation Committee found that, during their activity, the control panel operators working in the tram traffic in Budapest perform traffic management despite the fact that Decree No. 19/2011. (V.10.) of the Minister of National Development does not authorize those working in such position to perform such activity.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to Obligate BKV Zrt. to harmonise the activity and legal status of the employees working as control panel operators and participating in the transaction of tram traffic with the relevant provisions of Decree No. 19/2011. (V.10.) of the Minister of National Development.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the current state of conflict with the regulation could be terminated, and the people employed in control panel operator positions could exclusively perform the activity specified in the relevant regulation, and, after completing the required training and passing the relevant test, the personnel involved in the actual traffic management could perform their duties in possession of appropriate competence.*

Accepted, implementation underway

### **BA2013-035-5-03**

*During the investigation, the Investigation Committee found that the employees in the tram traffic of Budapest who operate the switches, signal systems and (occasionally) the safety installations receive only a 4-hour training in the theory of the safety installations in total, which is insufficient due to the complexity of such systems.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to call upon the Railway Examination Centre to initiate the increasing of the number of the hours of training in the knowledge of safety installations as necessary for participants in the basic training for tram control panel operators and traffic dispatchers when approving the training syllabi.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, those control panel operators and traffic dispatchers who also set the switches and operate signal systems might perform such duties in possession of the relevant competence only, and thus, the number of occurrences originating in the lack of knowledge could be reduced substantially.*

Accepted, implemented

### **BA2013-035-5-04**

*During the investigation, the Investigation Committee found that BKV Zrt. employs no people in the job "Traffic Dispatcher" as specified in Decree 19/2011. (V.10.) of the Minister of National Development: this activity is performed by the train dispatchers of, BKK Zrt. which organises traffic. Accordingly, the traffic management and the supervisory functions cannot be separated from each other, and the qualification, legal status and activity of the employees involved in traffic management does not comply with the provisions in the relevant laws; traffic management tasks are not performed by a railway undertaking which has railway safety license, and the system of tram traffic management in Budapest is not always able to safely manage the operation errors and incidents.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to obligate BKV Zrt. as a railway undertaking to establish, within its on organisation, a competent organisational unit involved with tram traffic management where the employees have the qualification required in Decree 19/2011. (V.10.) of the Minister of National Development for the Traffic Dispatcher job and perform the activities specified in such Decree for such job.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the tram traffic in Budapest would be managed by traffic managing personnel compliant with the relevant regulation, and thus, the traffic managing and supervisory activities would be separable, and traffic management would be performed by representatives of BKV Zrt. as a railway undertaking, without compromising the rights and interests of the traffic organiser.*

Accepted, implementation underway

**BA2013-035-5-05**

*The Investigation Committee found that the personnel of the tram terminal stations in Budapest equipped with signal or safety installations records special operations (call signal, disabling of insulation, etc.) only at the handover of shifts, and thus, the times of operations cannot be traced back i.e. identified.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to obligate the infrastructure manager to ensure the documenting of special operations in each case including the indication of circumstances.**

*In the case of accepting and implementing the above recommendation, the circumstances of applying special operations would be easier to identify and study.*

No response

**2013-116-5**

During the transfer from track one to track four at the Szombathely passenger station, after changing driver's cabs following traction towards the starting point of the station, the engine driver started his locomotive without prior permit, and returned to track one where he stopped within the signal K1. During this manoeuvre, his locomotive burst the points No. 30/B open, and got into the route of the arriving train No. IC916. The pointsman on duty in the shunting signal box No. II signalled the train No. IC916 to stop. The shortest distance between the arriving train No. IC916 and the shunting locomotive was 220 m, which represented an immediate danger situation. No one was injured in the occurrence, and the points burst open sustained minor damage.

During the technical investigation, the IC concluded that the occurrence was primarily due to inattention of the driver of the shunting locomotive, and to the station crew's work non-compliant with the relevant instruction. The IC declared shortcomings of the communication channels as contributing factor.

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

The bursting of the points open and jeopardising the train may be attributed to human factors.

The engine driver started movement without prior authorisation after changing driver's cabs.

He started unauthorised movement because he had misunderstood a signal given to him with the intent to confirm he had to stand still, and he did not know this signal from the instruction.

The engine driver was not instructed about the shunting task or its method prior to his starting of the shunting movement (it would have been possible at this point to tell him to stand still beyond the points No. 24, and wait until the train No. IC 916 arrives).

**Factual statements indirectly connected to the occurrence of the cases**

There is no means of direct communication between the station crew and the locomotives on the lines which could really be used among the given traffic circumstances.

The station crew used such signals to convey information which are not known by the instruction, and this led to misunderstanding.

**Other risk factors**

The marking of the exit mast of the light combined with shunting signal represents a protected main signal, however, the shunting signal function is not provided (which is unique in the Hungarian railway system). The engine drivers may only know this fact if they have valid knowledge of the station.

**Safety recommendation**

Safety recommendation was not issued.

**2013-147-5**

On 21 February 2013, at 05:03 hours, the train No. 4829 arriving at Herceghalom Station bumped into a broken separating insulation which was hanging on a wire and reaching into the structure clearance in the shunting zone.

The engine driver stopped the train immediately after the occurrence. The separating insulation broke the windshield of the motor train set, and the high voltage in the sagging overhead contact wire damaged the casing of the driver's cabin and the control unit of the motor train set. The motor train set became unfit for service as a consequence of the occurrence.

The occurrence caused no personal injury, but the damage caused to the rolling stock is significant. The railway traffic between the stations Herceghalom and Bicske was interrupted on both tracks for several hours due to the occurrence.

During the technical investigation, the IC concluded that the train No. 4829 was allowed to access the station without localising exactly the permanent short circuit in the overhead contact wire network of the station, and without making sure that the structure clearance was maintained.

According to the position of the IC, similar cases can be prevented by following the relevant instructions.

During the technical investigation of the occurrence, the IC found no circumstances which would have justified the issuing of safety recommendations.

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

The IC concluded that the train No. 4829 was allowed to access the station without localising exactly the permanent short circuit in the overhead contact wire network of the station, and without making sure that the structure clearance was maintained.

**Factual statements indirectly connected to the occurrence of the case**

The IC makes no statement in this regard.

**Other risk factors**

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2013-268-5**

After the arrival of the train No. 15 running from Moscow through Záhony to Budapest, its spare locomotive No. III moved to the tail of the train in order to remove the last 3 (foreign) cars of the train from the train and transfer them to their destination track. Following the necessary connecting operations, and with the control panel operating traffic manager's permit, the locomotive started to pull the last three cars, at low speed, towards the exit signal "V7". Then the locomotive of the train No. 15 began to push the three other cars left on the track, and bumped into the shunting unit which had started previously. As a consequence of the occurrence, the 6 people (3 cleaners and 3 sleeping car attendants) staying on the train were injured.

The TSB attributed the occurrence to human factors on the part of the engine driver on duty on the locomotive of the train No. 15.

The basis of this Final Report is the draft final report prepared by the IC and sent to the interested parties (specified in the relevant laws) for review and comments. When sending the draft final report, the Director General, TSB, also notified the interested parties of the time and date of the closing discussion, and invited the relevant people and organisations.

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

The driver of the locomotive No. A 480 001 misunderstood the shunting permit on the radio, and thought it was given to him. After the misunderstood message, he began the backing movement, despite the "Shunting forbidden!" signal of the protecting signal No. K7.

**Factual statements indirectly connected to the occurrence of the case**

The IC makes no statement in this regard.

**Other risk factors**

The cleaning personnel started to clean the cars on track No. VII already, after the arrival of the train, despite the fact that they ought to have done the work with the train on the holding siding.

**Safety recommendation**

Safety recommendation was not issued.

**2013-296-5**

The train No. 8225 accessing the occupied track 1 of Kaposvár Station derailed with 10 axles on the points No. 19 of the station. No one was injured, but the track and the affected vehicles sustained severe damage. The IC attributed the occurrence to breakage of the points wire (block chain) of the points No. 19. With regard to the circumstances revealed during the technical investigation, the IC proposes that a safety recommendation be issued relevant to the modification and detailing of the maintenance rules of the points operated centrally using point wires.

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

The block chain of the A 19 points No. 19 broke in the last phase of the setting of the points, and thus, the structure fastening the switch tongue did not reach its end position. As a consequence of the vibration generated by the arriving train and to the lack of fastening force, the switch tongue moved away from the stock rail, and the wheel of the locomotive ran into the gap thus generated, and the train derailed.

**Factual statements indirectly connected to the occurrence of the case**

The cyclical replacement of the block chain within the framework of preventive maintenance is not required in the relevant policy, it is performed in the case of malfunction only.

The maintenance policies currently in effect contain no detailed technology for the maintenance and checks of the points wire network and the block chains. As a result, it was not detected during the mandatory maintenance that the block chain of the set of points No. 19 had long been fairly worn-out.

**Other risk factors**

The set of points No. 19 were only repaired on 30<sup>th</sup> August, i.e. four and a half months after the accident. In the meantime, the passenger trains running from Gyékényes to Kaposvár were able to use the tracks IV and V only. There is only an emergency platform along track V, and thus, the risk of accidents due to missteps was high for the passengers getting on and off until the repairing of the points affected.

**Safety recommendation****BA2013-296-05-01**

*During the investigation, the Investigation Committee found that the instruction No. TB 1 includes general requirements only in connection with the inspection of the block chains, but it does not require the inspection of the chains by removing them or replacement of them within the framework of preventive maintenance, so certain defects of the block chains are difficult to detect.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to obligate the operators to perform a risk analysis of the maintenance rules of the points operated centrally via point wire and to take actions as necessary to reduce the risks explored.**

*In the case of accepting and implementing the above recommendation, chain breakage occurring due to similar reasons can be avoided, and thus, the risk of similar accidents can be reduced.*

Accepted, implementation underway

**2013-367-5**

On 13 May 2013, at 18:07 hours between the Stations Badacsonytomaj and Révfülöp, the train No. 9711 hit over a cyclist at the level crossing No. AS981 protected with warning lights; the cyclist died on the spot.

The front of the railcar No. 95 55 6342 019-4 hauling the train was slightly damaged as a consequence of the crash. The driver of the railcar was breathalysed by the Tapolca Police Headquarters; the test result was positive.

During the technical investigation, the IC concluded that the train did not violate the speed limit, and the cause of the accident may be attributed to human factors: the cyclist accessed the level crossing despite the stop signal displayed by the warning lights.

During the investigation performed at the scene of the occurrence, the IC identified several shortcomings in connection with the layout of the level crossing and the placement of the signposts. Based on this, the IC issued a preventive safety recommendation, proposing immediate action to the Government Office of Veszprém County.

In its response letter No. VE/ÚT/653/1/2013 of 24 June 2013, the Government Office of Veszprém County informed the TSB that they had reviewed the affected level crossing on 11 June 2013, and, as a result, they obligated the Self-Government of Ábrahámhegy Village, Magyar Közút Nonprofit Zrt., and MÁV Zrt. to comply with the requirements relevant to the level crossing.

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

The cyclist accessed the level crossing, neglecting the stop signal displayed by the warning lights. The cause of the accident may be attributed to human factors.

**Factual statements indirectly connected to the occurrence of the case**

No tour of inspection of the track between the Stations Révfülöp and Badacsonytomaj was performed before the termination of track possession, and the track was opened for traffic without inspection.

Those approaching on the bicycle road can perceive the displays on the mast C of the warning lights with difficulty only: the white light and one of the red lights are covered by the shield of the lights.

**Other risk factors**

The IC found several other risk-increasing factors:

The "Give Way" sign at the end of the bicycle road is entirely faded, thus its warning function does not work.

The task of bypassing the heap of crashed stone left in the area of the level crossing may have distracted the cyclist's attention.

The engine driver's blood alcohol level did not play a role in the occurrence, however, its general safety risk is obvious.

**Safety recommendation**

Safety recommendation was not issued.



**2013-394-5**

On 26 May 2013, at 06:38 hours, at Városföld Station, the train No. 780-1 while departing after a scheduled stop, passed the “K1” individual exit signal at danger, and burst the points No. 6 open. The engine driver of the train detected ca. 25 m in front of the “K1” exit signal that it displayed “Stop!” He applied emergency braking immediately, and concurrently he realised that the points No. 6 were in incorrect position for him, but his train burst the points open, and got into the closed exit route of the train No. IC709.

According to the IC, the occurrence took place because the driver of the train No. 780-1 did not perceive the signals given by the K1 exit signal and the signal in the driver’s cabin, and neglected the call of the more frequent EEVB voice signals.

A contributing factor was that the senior ticket inspector gave a “Ready to start” signal to the engine driver without checking the signal displayed on the K1 exit signal, despite her/his obligation to do so.

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

The IC attributed the cause of the occurrence to human factors related to the driver of the train No. 780-1 who failed to check the position of the K1 exit signal and of the correct position of the set of points No. 6.

**Factual statements indirectly connected to the occurrence of the case**

The senior ticket inspector gave a “Ready to start” signal without checking the signal displayed on the exit signal, thus conveying false information to the engine driver.

The driver of the train No. 780-1 was talking on his mobile phone, which distracted his attention from the driving of the train.

The KÖFI traffic manager could not notify the engine driver of the changed traffic circumstances because the mobile phone was occupied.

**Other risk factors**

The KÖFI traffic manager planned to let the train No. IC709 go through on track II, which is prohibited by the Line Implementation Instruction due to the lack of sweep limits.

**Safety recommendation**

Safety recommendation was not issued.

**2013-621-5**

On 4 August 2013, After departure from the terminal station, beyond the switching zone, a train running from Közvágóhíd to Ráckeve derailed at a cobblestone-paved level crossing. No one was injured, but the bogie of the vehicle was damaged, and the railway infrastructure also sustained minor damage.

The IC concluded that the derailment was caused by a broken spring cover the fastening bolts (probably the same age as the vehicle) of which had broken due to fatigue of the material. The inspection technology used during the periodical maintenance of the vehicle is not able to reveal such defects.

The operating undertaking modified the technology of inspection of the vehicles during the technical investigation, and they also took action to replace the bolts with similar function in all vehicles.

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

A fastening bolt of the cover of a spring bearing the wheel load of the vehicle sustained fatigue breakage which had not been detected before the accident; breakage of the second bolt was not detected either.

The cover fastened only by one bolt was hanging out of its place, and got caught in an external object along the track, and made the vehicle derail.

**Factual statements indirectly connected to the occurrence of the case**

The system of preventive maintenance specified no periodical replacement of the bolts exposed to fatigue.

Due to the fastening solution applied, breakage of the bolts is difficult to detect. Also due to the design, the wearing of the remaining bolts accelerates after breakage of the first bolt.

**Other risk factors**

The data recorder of the vehicle was out of order.

**Safety recommendation**

Safety recommendation was not issued.

**2013-649-5**

An automobile bumped into the right hand side (according to the direction of travel) of the locomotive of the train No. 902 travelling on the right hand track, at the level crossing protected with warning lights and half-barrier No. AS 491 between the Stations Kápolnásnyék and Gárdony. The two people travelling in the automobile were not injured, however, they were taken to hospital for observation. At the moment of the accident the warning lights were in failure state: the lights were out, and the bars of the half-barrier were in vertical position.

During the technical investigation, the IC concluded that the occurrence was primarily attributable to human factors on the part of the driver of the road vehicle; however, the failure state of the protection system (black-out of the lights, bars in vertical position) contributed significantly to the erroneous judgement of the situation. Further, the IC concluded that the level crossing No. AS491 had been in failure state extraordinarily frequently (56 times) during the month preceding the accident, and probably the cause of that had not been found until the accident.

The number of failure states has decreased significantly since the accident; On 8 December 2013, a new barrier installation was put into operation within the framework of line reconstruction. The new system does not allow the train to access the level crossing at speeds exceeding 15 km/h in the case of failure state.

As the railway infrastructure operator repaired the installation after the accident, and the errors have not recurred, thus it is not necessary to issue a safety recommendation.

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

The warning lights and the half-barrier were in failure state, i.e. unfit for their function. The operation of the protection system had been uncertain during the month preceding the accident as well, the cause of which was not revealed during that period. The driver of the automobile drove his car as a routine, checking the vertical state of the half-barrier bars only, but neglecting the warning lights.

Factual statements indirectly connected to the occurrence of the cases

The traffic managing personnel did not regard the protecting system in failure state as a condition jeopardising the traffic of trains, so they did not set the block signals to "Stop!" position.

Other risk factors

The IC makes no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2013-666-5**

On 15 August 2013, a train travelling from Győr towards Bakonyszentlászló crashed with an automobile at an unprotected level crossing at Bakonygyirót Station. The driver of the automobile died on the spot.

The IC concluded that the accident is attributable to human factors on the part of the driver of the automobile, but the sight triangle associated to the speed limit is not provided due to the vegetation.

The TSB issued a safety recommendation, on the basis of which the competent government office organised a tour of inspection in order to review the safety of the level crossing. Relying on the minutes of the tour of inspection, the government office will obligate the railway infrastructure operator to introduce a speed limit corresponding to the actual sight triangle.

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

The IC attributes the accident to human factors on the part of the driver of the automobile.

**Factual statements indirectly connected to the occurrence of the case**

The reduced sight triangle associated to the given speed limit was not clear at the level crossing.

The system of the railway company specifies no conditions for the safe operation of level crossings (keeping the sight triangles clear): the lack sufficient own capacity, and have no effective contracts with external companies in a part of the year; at the same time, the necessary reduction of the speed limit was not introduced.

**Other risk factors**

The completion of the review sheets of level crossings does not reflect reality as far as the shortcomings of sight triangles are concerned.

**Safety recommendation****BA2013-666-5-01A**

*The technical investigation established that the required sight is insufficient due to the vegetation along the railway track at the level crossing in Section No. 323: the minimal sight triangles are insufficient, and thus the level crossing does not comply with the Annex to KM Decree 20/1984 (XII. 21.). In addition, the placement of the road signs near the level crossing is not compliant either.*

**TSB Hungary recommends the Inspectorate of Transport of Győr-Moson-Sopron County Government Office to obligate the upkeeper of the infrastructure (MÁV Ltd.) to provide the triangle required by the regulation according to the relevant speed limit, and to obligate the upkeeper of the road to place the road signs properly.**

*In the case of accepting and implementing the above recommendations, the risk of accidents occurring due to similar causes may be reduced significantly.*

Accepted, implemented

**BA2013-666-5-02**

*In a part of the year, the upkeeper of the railway network does not have the necessary capacity to keep the sight triangles clear at the level crossings (and/or perform other safety-related vegetation maintenance works). In addition, in this actual case no suitable speed limit was introduced in comparison with the actual sight triangle.*

**TSB Hungary recommends National Transport Authority to examine in its safety management system the procedure of providing the assets required for keeping the sight triangles clear as well as the actual provision of such assets.**

*In the case of accepting and implementing the above recommendations, the sight triangles will be in accordance with the actually used speed, and thus the risk of situations leading to accidents in unprotected level crossings can be reduced significantly at the network level as well.*

Accepted, implemented

**BA2013-666-5-03**

*The technical investigation established that maintaining the sight triangles does not have the necessary priority in the system of the upkeeper of the railway network, often such triangles are not kept clear, and even alternative safety measures (e.g. speed limitation) are not taken either.*

**TSB Hungary recommends the inspectorates of transport of the county government offices to check also the sight triangles at the level crossings during their inspections, and, if necessary, to take actions to have such triangles cleared or alternative safety measures taken.**

*In the case of accepting and implementing the above recommendations, it will be more likely that the procedures in the safety management system can be performed in full.*

No response

## **2013-667-5**

On 15 August 2013, at Rátka Station, an elderly lady, who just had got off the train travelling from Szerencs to Abaújszántó, reached back to the train for her baggage, when the engine driver closed the door operated by remote control, and the door caught the passenger's arm, and the train departed. When hearing the cries of the people running to help the passenger, the other engine driver staying in the trailing motor car of the train stopped the train.

With her pulled by the train, the passenger fell, and suffered slight injuries in her legs and right arm.

The IC concluded that, due to the layout of the station, neither the train crew, nor the engine driver could see that the lady had reached back to the train. The end position feedback installed on the train did not work properly, and it is unfit for reliable detection of a caught arm due to its design.

The maintenance and operator personnel are also aware of the fact that the inspection of the end position is not non-compliant.

### **Factual statements directly connected to the occurrence of the case**

After the passenger got off, the train crew did not suppose that she had baggage for which she would reach back into the vehicle. Due to the geometry of the station, the train crew could not detect that the passenger's arm was caught by the door.

The end position feedback system of the door did not indicate the catching of the arm, or, with regard to the normalisation of the defect, the engine driver evaluated the feedback incorrectly.

### **Factual statements indirectly connected to the occurrence of the case**

Due to their design, the limit switches built into the vehicle doors which control the closed state of the doors are unfit for reliable control of the closed state.

The function which could prevent the vehicle from starting in the case of a problem with door closing (e.g.: catching a part of someone's body) was removed, and no substitute solution was provided.

### **Other risk factors**

The precision of closing of the mechanical structure of the door is so low that, in the case of catching of minor objects (e.g. human fingers) the monitoring the end position of the door is insufficient to decide whether closing is complete (but larger objects, e.g. a human arm, are detectable).

The train was longer than the platform of the station.

**Safety recommendation**

**BA2013-0667-5-01**

*Although the doors of the Bz motor train sets operated in Hungary have integrated automatic feedback of the open/closed position, but the design of the inspection of the end positions of the doors does not allow reliable inspection. Due to that, false feedback is given on a regular basis, and, for instance, it is not necessarily detected that a part of the body is pinched by the door.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to examine the design and reliability of the inspection of the door end position feedback and require modifications as necessary.**

*In the case of accepting and implementing the above recommendation, the pinching of parts of the body by the door may become detectable.*

Accepted, implementation underway



**2013-685-5**

On 21 August 2013, During shunting, the loaded wagons No. 56855547 and 56826415 derailed with two axles, and the loaded wagons No. 56853302, 56822075, 5683553, 59961524 and 56822067 derailed with 4 axles on the broad-gauge track (No. 19) at Eperjeske intermodal station. Each derailed wagon was carrying bloom-steel.

A 96-metre-long section of the railway track was damaged.

During the site survey, the IC sampled several replaced the wooden sleepers at the scene of the derailment, and sent the samples to Testing Laboratory for Forestry and Wood Industries, Faculty of Wood Sciences, University of West Hungary, and ordered a special expert test of the samples.

In the opinion of the IC:

The cause of the accident was a track defect, namely the increase of track gauge due to the decreased strength of bind of the sleepers of inadequate quality, which

may be traced back to the quality of the wooden sleepers installed during the restoration works after an earlier accident (in 2008); those sleepers were not suitable to provide the strength of the framework.

The fast impairment of the quality of the wooden sleepers was attributable to a non-compliant saturation procedure.

Doubts emerged in connection with the validity of the documents of the pre-installation qualification of the wooden sleepers; the quality inspection (if there was any) did not indicate adequate saturation.

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

The direct cause of derailment was the inadequate stability of the wooden sleepers which did not provide a constant track gauge, i.e. was not able to maintain the framework strength.

The cause of this is the damaged, worn-out state of the sleepers.

The cause of the relatively fast impairment of the sleepers was the application of a non-compliant saturation procedure.

The application of the non-compliant saturation procedure was not revealed during the qualification or quality control. The validity of the relevant documentation raised doubts.

The track supervision staff detected the problem late or not at all, actions were commenced, however, the full elimination of the defect had not been done until the accident.

Factual statements indirectly connected to the occurrence of the case

The IC made no statement in this regard.

Other risk factors

The IC made no statement in this regard.

**Safety recommendation**

Safety recommendation was not issued.

**2013-764-5**

The train No. 20216, providing service on the line between the Stations Budapest-Nyugati – Rákosrendező – Istvántelek, derailed with 4 axles on the set of points No. 507 (turnout direction) of Rákosrendező, running opposite the switch tongue. No one was injured, but the railcar of the train set sustained minor damage. The IC attributed the occurrence to breakage of the point wire of the points No. 507, but stated at the same time that the layout of the points and the safety installation do not comply with the requirements specified in the relevant standard. Accordingly, the IC proposes that a safety recommendation be issued in which the construction of an end position control and reconstruction of the technology of the railway station would be recommended.

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

During the operation of the points No. 507 the point wire broke, and thus the points did not reach the end position. However, the switch positioning lever clicked to place, so the safety installation allowed the operation of the exit signal. The train rolled onto the “open” points, and derailed.

The operation distance of the points is 310,1 m. The relevant rule requires the application of a two-way lock in such cases, but this is not installed for the points No. 507; the risk of similar occurrences can be reduced significantly if this mechanism is installed.

**Factual statements indirectly connected to the occurrence of the case**

The IC makes no statement in this regard.

**Other risk factors**

Due to the layout of the station and to the technology currently used, the trains with even number arriving at the track AB VI do not stop at the point specified in the Train Loading and Running regulations F.2 (at the shunting limit signal of the fixed points No. 515) but beyond it, in front of the signal “V AB”.

The Train Loading and Running regulations F.2 contains no rule for the method of the inspection of the operability at the fixed points, but does not release the obligation to do these activities either.

Currently, the group exit signal "V AB" is only affected by the train departing from the track AB VI, thus, both the traffic managing crew and the train crews regard it as an individual exit signal despite the fact that it is a group exit signal.

The authorisation mode (preliminary signal operation and use of a train dispatch indicators) specified relevant to group exit signals cannot be applied properly due to the location of the signal "V AB" and to the headcount available for train dispatching on the basis of the technology of the railway station.

### **Safety recommendation**

#### **BA2013-764-5-01**

*During the technical investigation, the Investigation Committee of TSB found that the distance of the setting of the point No. 507 at Rákostendző is 310.1 m. In the case of such distance, the relevant standard requires the application of a bidirectional latch, but the point is only equipped with a unidirectional latch.*

**Transportation Safety Bureau therefore recommends the National Transport Authority to obligate the network infrastructure operator to review the safety installation of Rákostendző station, and to perform risk analysis of continued use of the safety installation.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the risk of similar occurrences can be reduced significantly in the case of the tracks related to the point No. 507.*

Accepted, implemented

#### **BA2013-764-5-02**

*During the investigation, the Investigation Committee of TSB found that, at Rákostendző station, the rules applying to "setting of the track route", "point of stopping of trains" and "authorisation of engine drivers of trains to depart or run through" in Traffic Instruction No. 2 cannot prevail due to the technology used and to the headcount available for the dispatching of trains.*

**Transportation Safety Bureau therefore recommends National Transport Authority to obligate the network infrastructure operator to perform risk evaluation relevant to the applicable rules and the infrastructure, and, based on the results, to take actions as necessary (e.g.: changing the role of the signal or applying "indirect" authorisation).**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the work processes of the station would comply with the relevant requirements.*

Accepted, implemented

## **2013-892-5**

On 18 October 2013, the international train No. IC72-1 providing service between the Stations Curtici (Kürtös) and Budapest Keleti collided with an automobile at the level crossing No. AS118 protected with waning lights and half-barrier.

The road vehicle tumbled and fell into the trench along the rail track; the driver, who was the only person travelling in the automobile sustained minor injuries.

At the moment of the collision, the warning lights and half-barrier were in failure state (the lights were out, and the bars of the half-barrier were in vertical position). The reduced sight triangle was not provided from the direction of arrival of the road vehicle towards the train.

The IC attributes the occurrence to human factors on the part of the driver of the automobile. A factor contributing to the occurrence was that the train significantly exceeded the speed (max. 15 km/h) that would have been appropriate in the actual traffic situation.

### **Factual statements directly connected to the occurrence of the case**

The IC attributes the occurrence to the following factors:

The warning lights turned into failure state because the train stayed in the open line too long.

No order was issued relevant to the setting of the block signals to "Stop!" position and to a procedure to be followed subsequently.

The train significantly exceeded the speed limit applicable in such cases.

The reduced sight triangle as not available from the given direction.

The driver of the road vehicle accessed the level crossing without stopping at the marked spot and making sure that crossing would be safe.

### **Factual statements indirectly connected to the occurrence of the case**

The IC makes no statement in this regard.

### **Other risk factors**

In a given case, the train running on the other track may approach the warning lights in failure mode at full speed.

### **Safety recommendation**

Safety recommendation was not issued.

**2013-938-5**

On 04 November 2013, at 02:02 hours, eight wagons of the train No. 65822-1 leaving Hatvan Station for Tura Station through track VII of the marshalling yard to the left-hand track derailed on the turnout No. 412.

The technical investigation found that the set of points No. 411 returned the derailed vehicles to the track. The train continued its travel to Ferencváros Station without stopping as the engine driver did not notice the derailment.

Following the inspection of the train at Ferencváros Station, the train left for Dunaújváros Station at 13:15 hours, at the speed (60 km/h) permitted to it.

The scene of the accident had to be excluded from traffic until restoration of the track, but it caused no traffic problem. No one was injured in the occurrence.

It turned out during the technical surveys following the occurrence that the track in the area of the derailment was not able to bear the load of the moving train and it got deformed.

After the occurrence, the IC initiated a technical inspection of the rolling stock involved (whether derailed or not).

The technical inspection of the wagons was performed partly in Dunaújváros, and partly at the site of TS Hungária Kft. in Miskolc. Each vehicle (with sub-serial numbers 390, 391 or 393) is was a flat wagon, owned by RCH Zrt., and loaded at the time of the occurrence.

In the initial phase of the technical investigation, the IC performed the post-unloading inspection of the wagons, and found that in the cases of the eight derailed wagons the wheel load values measured with empty wagons significantly exceeded the limit specified in MÁV SZ 2894 (Measuring of the wheel loads of hauled rail vehicles).

When measuring the wheel flange profiles, the Investigating Committee found  $q_R$  values below the minimum values of 6.5 mm in two of the eight derailed wagons. (According to Annex 9 to AVV [Annex 12 to RIV] such defects are classified into the Defect Class 5 (damage representing operation hazard).)

Based on the findings, the Investigating Committee decided to inspect some of the wagons (selection took place on a random basis) which had been part of the same train set but did not derail.

The technical survey of the six wagons selected for inspection was performed in Miskolc on 10 December 2013. Five of the six wagons applied as control group received "NON-COMPLIANT" qualification on the basis of the readings of wheel load measurement.

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

On the basis of the data available, the IC attributes the occurrence to the joint effect of several factors:

The worn-out track was not able to bear the impact of the forces from the rolling stock in motion, i.e. the fastenings and the sleepers could not provide adequate framework strength. Due to the dynamic loads, the edges of the railway track were pushed aside, and, due to track geometry, the right wheels (according to the direction of travel) dropped between the rails.

In two of the derailed vehicles the  $q_R$  values measured in workshop environment were below the specified minimum value of 6.5 mm.

Factual statements indirectly connected to the occurrence of the case

The axle load pressure values measured with empty vehicles were significantly higher than the limits in several of the wagons in the train set.

Other risk factors

The IC concluded during the technical investigation that after the sparkles were detected during the departure of the train no resolute action was taken to stop the train in order to identify the causes of sparking.

Being aware of the fact of derailment, and having performed an inspection of the rolling stock, the train left Ferencváros Station for Dunaújváros Station at the speed (60 km/h) permitted for the train.

**Safety recommendation**

Safety recommendation was not issued.

**2014-216-5**

On 3 March 2014, at the level crossing No AS19 protected with warning lights, the passenger train travelling between Szegvár and Szentés collided with a truck which was transporting corn and had broken down at the level crossing.

As a consequence of the crash, the train pushed the road vehicle off the road along the axis of the track. The railway vehicles derailed, and the railcar hauling the train was heavily damaged. The truck driver was injured severely, and eleven of the passengers on the train as well as the driver of the locomotive sustained slighter injuries.

The IC attributed the accident to the disadvantageous geometry of the level crossing and to the lack of the sight triangle. In addition, the IC found that the truck was overloaded, but this did not contribute to the occurrence, due to the technical layout of the truck.

During the technical investigation, the TSB issued a safety recommendation to the Inspectorate of Transport of Csongrád County Government Office. The Inspectorate had taken action to have the level crossing repaired and provide the sight triangle independent of this. The Government Office ordered the affected parties to perform the aforesaid measures.

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

The layout of the road relevant to elevation allows a low structural element of a road vehicle to get caught on it.

The clearance of the landing gears of the semi-trailer was lower than that of a similar motor vehicle with good shock absorption.



Factual statements indirectly connected to the occurrence of the case

Despite an order from the authorities, the height of the road surface had not been corrected by the time of the accident, and truck traffic on the road had not been limited either.

The reduced sight triangle was not available at the level crossing, and thus, the engine driver was only able to detect the obstacle within the braking distance of the train only.

Other risk factors

The total mass of the road vehicle exceeded the limit specified for it when using the public road network.

No specification is available for comparison of the mobility of a truck, namely, the position of the landing gears of the semi-trailer in this case.

**Safety recommendation**

**BA2014-0216-5-01**

*It was found during the investigation that, at the road crossing situated in Railway Section No. 19, the layout of the road (height) is hazardous for long and low road vehicles although such vehicles occur quite frequently here due to certain business sites located nearby.*

**Transportation Safety Bureau therefore recommends the Inspectorate of Transport of Csongrád County Government Office to take action to initiate correction of the layout of the road and temporary limitation of motor vehicle traffic as necessary until completion of such correction.**

*In the case of accepting and implementing the above recommendation, the risk of accidents occurring due to trapping of road vehicles can be reduced significantly.*

Accepted, implemented

### 3.5 Other recommendations

On 2 further occasions, TSB issued 2 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings. One recommendation has been implemented by the addressee and one recommendation was accepted, its implementation is in progress.

#### BA2014-441-5A

*It was found during the investigation that, at the level crossing in Railway Section No. 197 between Veresegyház and Órbottyán Stations, the required visibility is not provided due to the terrain and flora along the track, and the reduced sight triangles are not provided, and thus, the road crossing does not comply with the provisions in point 26.3 g) of the Annex to Decree No. 20/1984. (XII. 21.) of the Minister of Transport. Further, there is a speed control device (speed bump) at each side 4 m before the "Beginning of railway crossing" sign which may distract the attention of the drivers who are approaching the level crossing, and increases the time of driving through in the case of longer vehicles, thus increasing the risk of jam. The "Beginning of railway crossing" sign placed at the eastern side of the level crossing is bent, the "Caution, level crossing" warning signs are shadowed by plants, and the "Level crossing" sign at the terminal point side of the level crossing of is missing.*

**Transportation Safety Bureau therefore recommends the Inspectorate of Transport of Pest County Government Office to review the layout of the level crossing and, as necessary, obligate the interested parties to provide the conditions specified in the relevant regulations.**

*In the opinion of the IC, in the case of accepting and implementing the above recommendation, the risk of accidents occurring due to similar causes can be reduced significantly.*

Accepted, implemented

#### BA2014-617-5A

*The technical investigation established that the required sight is insufficient at the unprotected level crossing in Railway Section No. 1610 between Búcsúszentlászló and Zalaszentmihály-Pacsa stations due to the terrain features and vegetation along the railway; the minimal sight triangles are insufficient, and thus the level crossing does not comply with Section 26.3 g), Annex to KM Decree 20/1984 (XII. 21.).*

**TSB recommends the Inspectorate of Transport of Zala County Government Office to review the design of the level crossing and obligate the responsible entities to provide the conditions required in the relevant rules of law.**

*In the case of accepting and implementing the above recommendations, the risk of accidents occurring due to similar causes may be reduced significantly in the opinion of the IC.*

Accepted, implementation underway

### 3.6 Experiences of the technical investigations

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

- Similarly to the previous years, a typical cause of the occurrences is **human factors** (this trend is the same in other branches of transport – aviation and marine – in which TSB conducts investigations). Among the technical causes, track deficiencies are still dominant. Other causes were faults in vehicles (wheel or axle, bearing fault, fastening failure of engine cover, door operating system, breaking system), questions of visibility, inadequate signposting and insufficient design of LCs.
- It is a new tendency that the effects of the changes necessarily accompanying reconstructions and renovations played a role in several occurrences (e.g.: safety installations providing reduced services, temporary track connections, modified order of traffic, higher workload for the personal, etc.)
- Situations where trains were at risk but the occurrences had no consequence shows quite a high number for years. Such occurrences were **SPADs** and trains running on the same track in opposing direction. These kinds of incidents carry the possibility of more serious consequences; therefore more attention should be drawn to them. The main cause of these incidents is human factors, which highlights the acute need to use modern signal boxes, train control and communication systems. These developments cannot always be executed - due to financial difficulties - and are not done parallel to track reconstructions. Furthermore, railway staff should be well-prepared to deal with unexpected situations in which the signal box fails and the traffic has to be controlled very differently from the normal practice.
- It may be concluded on the basis of the findings of the technical investigation that erroneous human decisions often imply in the background that the specified procedure or technology does not support adequately the making of good decisions. The same person is expected to apply different procedures in similar situations at different points of the network, which makes it easy to make a mistake.
- Regarding injuries caused by rolling stock in motion the experiences of the investigations of previous year's occurrences drew the attention to an operation problem of carriage doors. There were more investigations in the last few years related to cases in which passengers involved in the accident had fallen off (or left) the trains in motion through the doors of carriages with central door operating system – these doors should have been locked and only emergency open should have been possible during travel. Technical investigation established in these cases that no emergency open had been applied to open the doors, the doors had been open or normal opening of these had been possible due to technical deficiencies. In addition, such occurrences have appeared where the centrally operated door pinches the passenger's part of the body (typically a hand or arm), and the system does not detect it. Detailed investigation of the door operation, technical failures and maintenance of the vehicle type concerned revealed that majority of the failures could be repaired by minimal intervention (fuse replacement, setup of the door, etc.). The investigation however revealed deficiencies also in the process of detection of the failure – maintenance – take-over after maintenance, these having been eliminated by the improvement of the relevant technologies and trainings of the personnel involved. Recommendation in this topic was already accepted, the implementation is in progress.

- When resolving the problems detected during the technical safety investigations, adapting the lessons learned to regulations and creating a transparent regulatory structure there is a problem that, in spite of EU commitments, the national railway safety legislation and the basic rules of railway operations have been only partly constituted in Hungary. In practice this means that certain basic rules are not laid down in legislation but only in internal regulations and orders of a railway undertaking or only as a regulation 'adopted' from another railway undertaking. The authority to constitute these rules is laid down in the act on railway transport, but the legislation has been pending for years. In this context the transport authority's role remains, it does not prepare the legislation but only approves it. For this reason there were several feedbacks to TSB's safety recommendations or during the consultations when a recommendation was accepted by the National Transport Authority but there was no possibility to implement it. The maintainer of the rules, the organization recommended the modifications was one of the railway undertakings that should have been the addressee of the recommendation.
- **International cooperation** has become more common in the investigation of railway accidents. TSB provides and receives assistance in the investigation of accidents in which the railway vehicles, their maintenance company, the staff, the railway undertaking or the location of the occurrence are in different countries. The cooperation provides a lot of new opportunities during investigations however it creates challenges as well, primarily in language knowledge aspects.

### 3.7 International cooperation

In 2014, the international practice was similar to 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.), or to discuss any actual topic, and ask for each other assistance.,

In 2014, collaboration with other NIB because of investigation was not necessary. We are proud that NIB, the transport safety organisation of Croatia established contact with us, and paid a working visit to Budapest during the initial building of their organisation and organising their activity. In the course of the cooperation, we shared the developed and planned procedural methods, defined possible interfaces during our activities, which was very informative for both parties, and grounded the efficiency of a potential cooperation in the future.

TSB continued to participate actively in the work of the European Railway Agency (ERA) The cooperation with ERA (with its costs covered by the EU) offers the opportunity for TSB to participate in compiling the system and methodologies of the assessment of National Investigation Bodies, The possibility to participate the Human Factor Network was very useful, because the human factor plays a role in an overwhelming majority of the occurrences but we have the least investigation experience in this area. The meetings of Technical Expert's Network was very important, because we was given the possibility to be informed about the new rules, practices in the EU, and about the practice of other NIBs in special topics.

TSB was the first NIB, which was object of the NIB Assessment program of the Agency in 2012. The assessment had a dual purpose: on the one hand the assessment of the work of the Hungarian accident investigating body, assistance in identifying what should be improved and defining improvement plans, on the other hand the improvement of the methodology of the assessment system and the control of its operation.

Considering the report, TSB has prepared a development and action plan. The follow up meeting of ERA was held in December 2013. Its purpose was to overview the planned and accomplished development efforts, owing to which the actions still pending were given a new impetus. The improvement based on the assessment findings is continuous, it has also long term elements, which will last for years.

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

## 4. SUMMARY OF RECOMMENDATIONS

In 2014, the addressee of the safety recommendations was primarily the National Transport Authority. TSB deviates from this practice only when it issues safety recommendations to organisations which are not under the scope of authority of the NTA (e.g. rescue services), or the supervision rights are at a regional authority (e.g. supervision of level crossings). This way it could be achieved that when the addressee of the recommendation is a railway undertaking, the response would not come from the addressee itself for which the implementation would involve considerable work and/or financial sources but an outside, impartial professional organisation would respond to the recommendation. The other advantage is that when the recommendation suggests eliminating conditions/factors that are unlawful or

pose risks to transport safety, the NTA has the possibility to oblige the relevant parties with deadlines to take action, which would increase efficiency in the implementation of recommendations. Disadvantage of this process – laid down in the RSD – is that it brings delay in the implementation process, and there are some cases, when the NTA has no legal right to take action in topics, which could be solved easily by the IM or RU.

In 2014 the Railway Department of TSB published 29 final reports, including 18 safety recommendations, 5 of them were already issued earlier, during the investigation process. 9 of these recommendations have been implemented, implementation of 6 recommendations is in progress 1 of them were rejected by the addressee, and in 2 cases we did not get any reply.

**On 2 further occasions, TSB issued 2 safety recommendations suggesting immediate preventive actions before the completion of the investigation, based on the initial findings.** One of these recommendations have been implemented and in the other case the implementation is still in progress.

#### **Summary of responses to safety recommendations issued in 2007-2014**

|  | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|------|------|------|------|------|------|------|------|
| Accepted and implemented                   | 4    | 15   | 11   | 3    | 25   | 15   | 9    | 9    |
| Accepted and partially implemented         | 2    | 2    | -    | -    | -    | -    | -    | -    |
| Accepted, implementation in progress       | 7    | 3    | 7    | 17   | 2    | 8    | 4    | 6    |
| Accepted, no information on implementation | -    | 3    | -    | -    | -    | -    | -    | -    |
| Rejected                                   | 2    | 4    | 3    | 1    | -    | 1    | 2    | 1    |
| No answer                                  | -    | 1    | 3    | -    | -    | 0    | 0    | 2    |

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