MINISTRY FOR
INNOVATION AND TECHNOLOGY
TRANSPORTATION SAFETY BUREAU

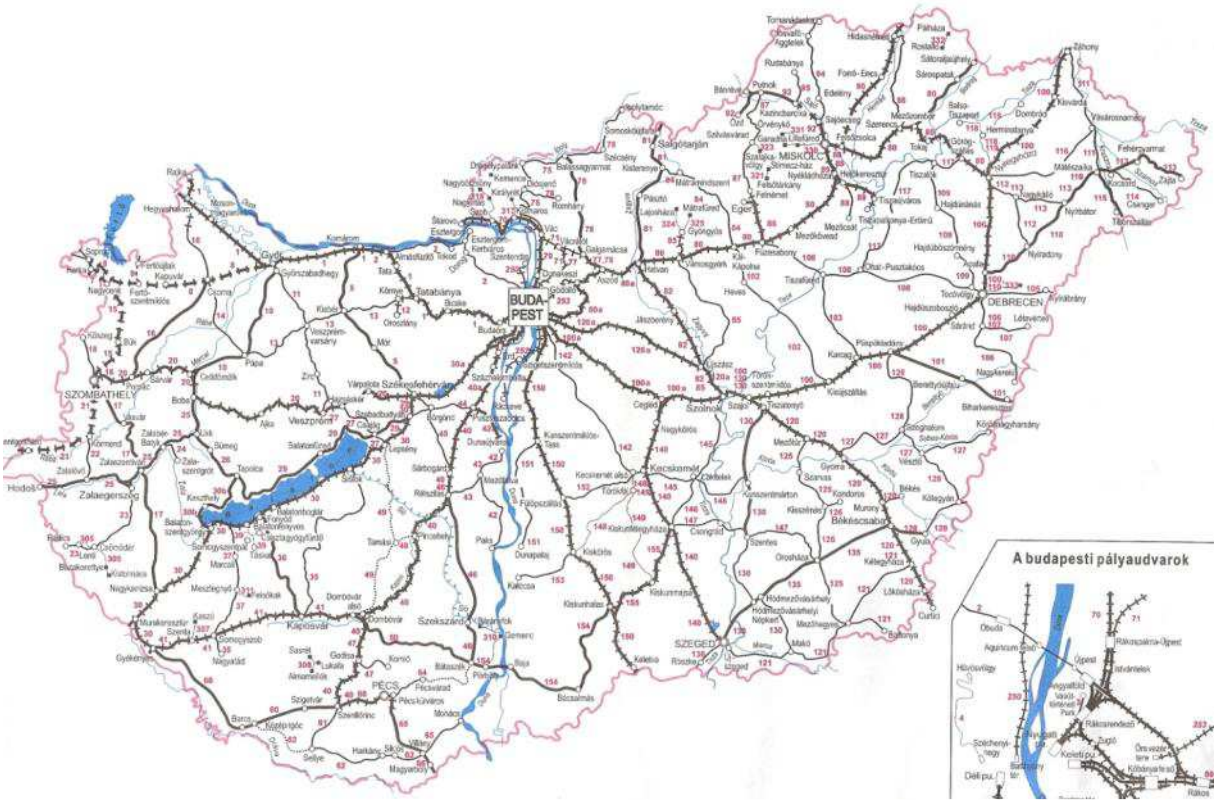
ANNUAL REPORT 2019

Transportation Safety Bureau

Hungary

CONTENTS

RAILWAY NETWORK IN HUNGARY



Basic data of the infrastructure:

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

SUMMARY

Hungary fully implemented all essential requirements concerning accident investigation of the Railway Safety Directive 2004/49/EC in its national law.

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

Pursuant to Government Decree 230/2016. (VII. 29.) on the assignment of a Transportation Safety Body and the termination of Transportation Safety Bureau with legal succession, the independent organisational status (as a central authority) of Transportation Safety Bureau was terminated with an effect of 1 September 2016, and TSB was integrated in Ministry of National Development as a division. As part of this integration, the functions supporting the operation of the organisation (finance, communication, law, IT, HR) were wound up, and their responsibilities were transferred to the Ministry and other entities and units of public administration. As a result of such reorganisation, the Railway Department of TSB, which used to work with a clear professional profile dedicated to railway, became Railway and Dispatcher Department. The year 2017 was the first full year of our operation in the new form of organisation.

In 2019, there were no organizational changes at TSB, within the Ministry of Innovation and Technology, TSB operated under the supervision of the Secretary of State.

In 2019, 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 safety investigation into 27 occurrences.

During year 2019, TSB published 37 final reports closing 41 investigations, including 9 safety recommendations. 3 of these recommendations have been implemented; implementation of 6 recommendations is in progress.

At its own discretion, TSB included in the scope of the 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 safety investigations in cases that appeared to be instructive. In 2019, we laid great emphasis on revealing the root causes of the occurrences, especially in the aspects of human and organisational factors for example fatigue, safety critical communication etc.

In 2019, we also set out the lessons learnt in the area of safety culture if we found it necessary and possible.

Abbreviations	
IC	Investigating Committee
LC	Level crossing
MÁV Co.	Hungarian State Railways Plc.
NIB	National Investigation Body
NSA	National Safety Authority (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 1st January 2006.

The Annual Report 2019 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 safety investigation at TSB,
- the overview of the past 12 months from transport safety point of view,
- the experiences of the independent safety 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.

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 safety investigation of aviation, rail and marine accidents and incidents. Based on the Directive, Transportation Safety Bureau was established on 1st January 2006 and – as a multimodal organisation - is responsible for the independent safety investigation of aviation, railway and marine accidents and incidents.

The detailed regulations of the safety 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 safety investigation of serious railway accidents, railway accidents and incidents (7/2006 GKM) was issued on 27th February 2006.

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, tram – Budapest, Miskolc, Debrecen, Szeged), 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 safety investigations additionally generated being possible by an allocation of minor extra resources.

Act CLXXXIV of 2005 on the safety 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 safety 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 safety investigation of serious railway accidents, railway accidents and incidents (7/2006 GKM) issued on 27th February 2006, the new number of this decree: 24/2012 NFM issued on 8th May 2012.

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

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

'The objective of the independent safety 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'.

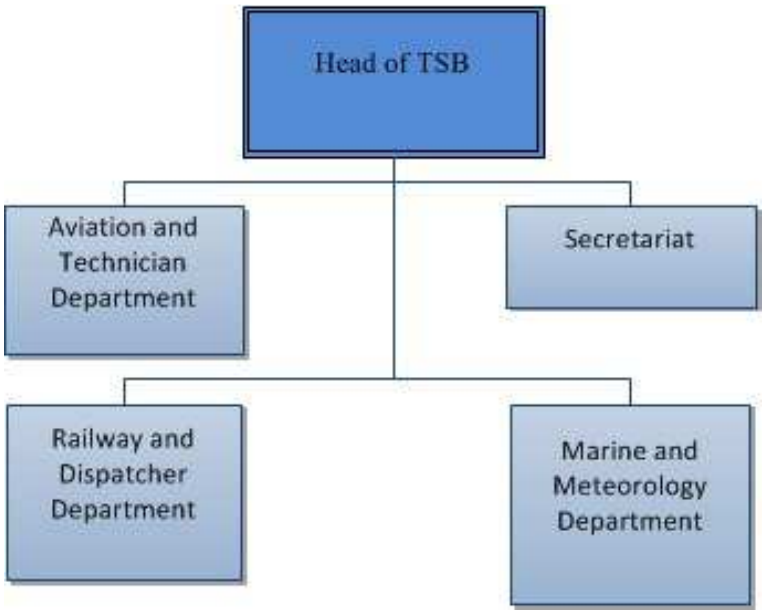
The Act contains the rights and responsibilities of the investigators defined in the Safety Directive.

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 safety 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 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.

1.1 Organisation of TSB Hungary

The organisation and relations of the NIB is shown in organogram.

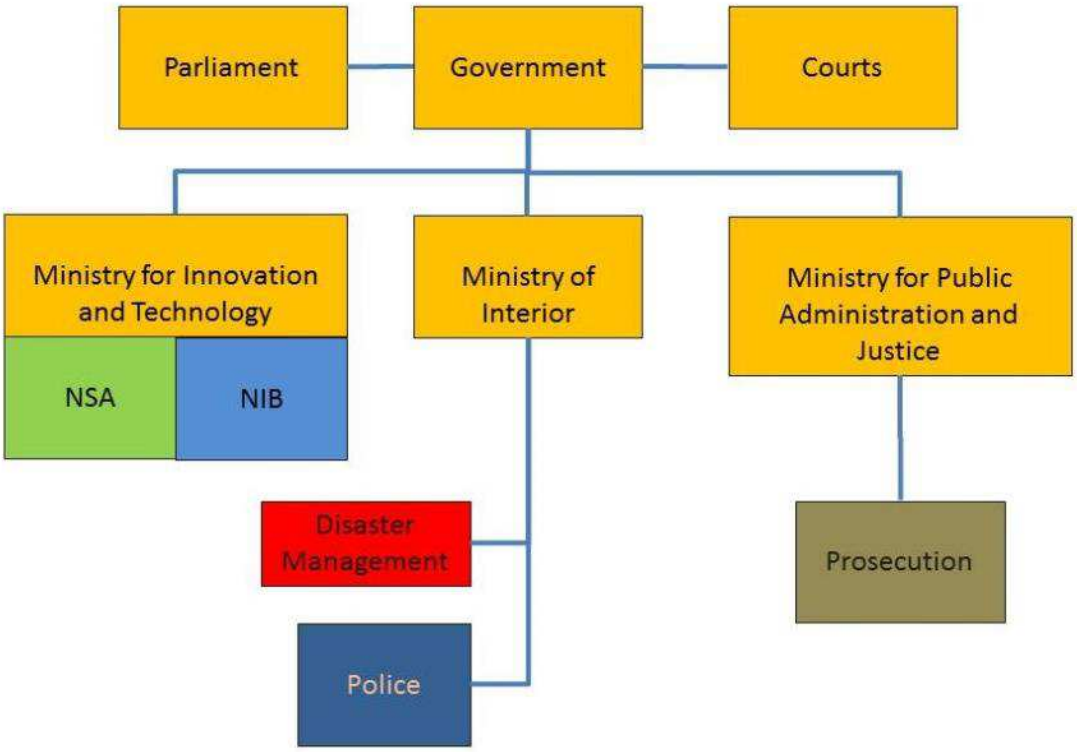


The organisation of the TSB

- TSB regards prevention as the main objective of its activity. TSB endeavours to share the findings, the results and the experiences of the safety investigations with a wide circle of organisations in the profession as well as with the civil sector.
- TSB was established on 1st January 2006. The Aviation Department and the 24/7 Duty Services operated from the beginning of 2006 and the other departments and units grew gradually during the year. The Railway and the Marine Department began to work officially on 1st March 2006.
- The Railway Department consists of 7 investigators and the Head of Department.

1.2 Organisational flow of TSB Hungary

The following chart shows the system of relations of the NIB:



System of relations

- Within Ministry for Innovation and Technology, NSA is ranked Deputy State Secretariat, and TSB is a Division. Accordingly, NSA is positioned at a higher level, the addressee of the safety recommendations is different within the same entity, and supervision is common at the ministerial level.
- The Ministry for Innovation and Technology is the national regulator.
- Based on the outcome of the investigations, TSB may issue safety recommendations to the National Safety Authority (NSA). 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 part of the Ministry for Innovation and Technology. The Head of TSB works under direct supervision of the State Secretary. According to the national law, the Minister shall not instruct TSB in matters concerning the independent investigations, but, according to the organizational rules, the Minister has the power to do so.
- 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 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 Safety Authority only assents to the amendments to the rules.

- 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 on-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.

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 safety investigation.

Functional independence of TSB remained intact during its operation within the Ministry.

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 safety 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 Head of TSB or by his deputy on duty. The IC consists at least two accident investigators. In case of more serious or complicated occurrences, one of the heads of department on duty 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 Head of TSB 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.

Other processes are the same as those specified in the ERA guide relating to technical investigations: collecting of data, investigative interviews, analysis etc.

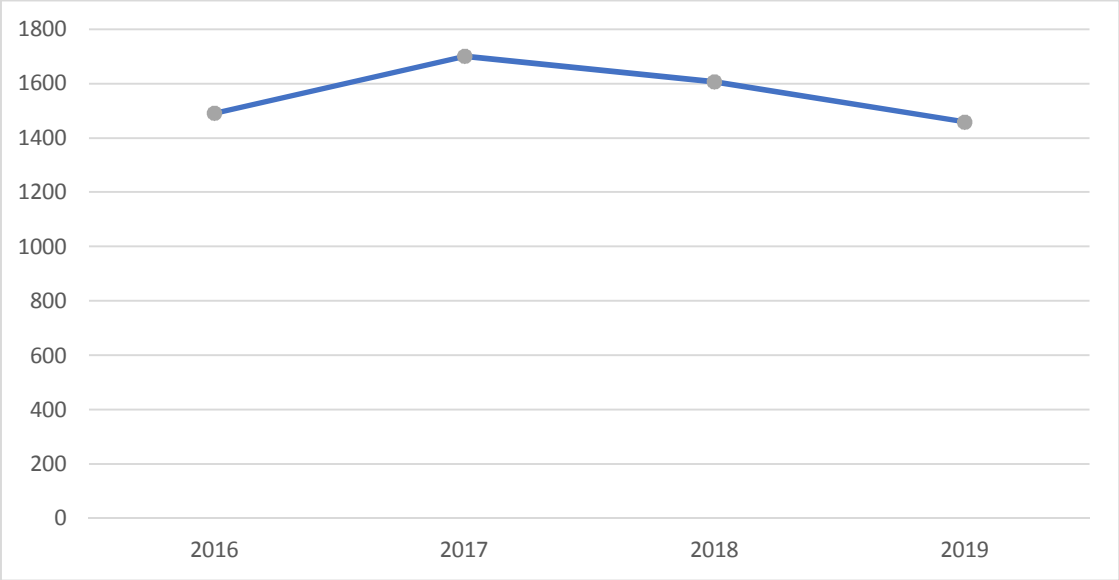
The draft reports on the occurrences are discussed by a board made up of the heads of departments of TSB.

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. OVERVIEW OF THE YEAR 2019

3.1 Notifications

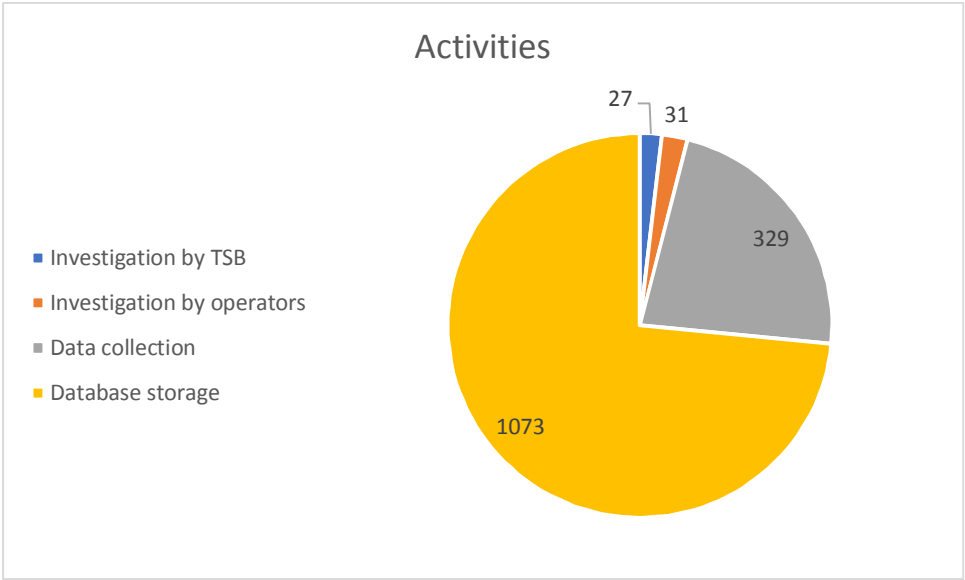


Numbers of notifications

Our duty service received 1460 notifications in total in 2019, which is 9% decrease compared to the previous year. Still no major conclusions can be drawn from the magnitude of the decline, but rather from the stochastic nature of accidents and unexpected rail events.

Breakdown to track networks also reflects a decrease in the total number of notifications. The decrease is significant of notifications arriving from the national railway network: 705 to 597.

3.2 Investigations



Activities following notifications in 2019

In 2019, we decided to perform an immediate *on site survey* (based on data in the notifications) on 47 occasions; such surveys were usually performed by a team of two members. 39 of the 47 site surveys affected locations in the national railway network, which shows that the consequences of the accidents and incidents in such networks are more serious, and that the investigation into such accidents/incidents is more likely to require detailed data collection at the scene.

Detailed data collection was performed on 329 occasions in total. A purpose of detailed data collection was to find out whether the occurrence may offer such lessons to learn which justify the performing of a full investigation by us. In these cases, we asked the railway companies for information and data, and decided on the investigation on the basis of such inputs. Another form of detailed data collection is when we ask the competent authorities for information relating to whether a case where a person by a vehicle was a suicide or an accident caused by rolling stock in motion. This is needed because, pursuant to the relevant EU regulation, classification must be made on the basis of a decision of the authorities.

In 2019, we commenced a *full safety investigation* in 27 cases. With regard to the nature of the given occurrence, an investigating committee of 2 to 4 members is appointed to perform the investigation. When staffing an investigating committee, we ensure that investigators with relevant professional knowledge and experience be available in each committee for a successful investigation. Such areas of expertise are, for instance: traffic control, mechanics, infrastructure or human and organisational factors. The investigating committee is chaired by a member appointed by the Head of TSB, and such chair is responsible for successful and timely completion of the investigation. Compared to the headcount, it can be seen that an investigator had to chair 5.4 investigating committees on average in 2019, due to changes to the headcount during the year. This number significantly exceeds the quantity of 2 investigations/year specified by the European Union Agency for Railways in its activity assessment report on the operation of Railway Department TSB in 2012.

In 2019, TSB requested operators to investigate 31 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 order to meet the personal requirement of the performing of investigation by operators, accident investigation training sessions are running since 2013. Over 200 people involved in the investigation of occurrences completed the courses.

An advantage of this practice is that we gain more detailed information from the reports made of the investigations performed by the operators, and we are also informed on the preventive safety recommendations of the railway companies.

3.3 Safety Investigations started by TSB in 2019

Attachment-A

Technical investigations started by TSB in the area of railway transport in 2019

Date 2019	Description of the occurrence	Classification
04.01.	At Sárvár station the arriving train no. 29047 (solo engine) ran onto a possessed track and crashed to a scaffold where people were working. One worker was seriously injured.	Railway accident
16.02.	A tram derailed on a switch on the line no. 52 at Budapest, Török Flóris street - Nagysándor József street. No one was injured.	Railway accident
01.03.	The passenger train no. 35425 passed the entry signal of Miskolc-Repülőtér station at danger and stopped 320 metres away from the passenger train no. 5416 which was approaching from the opposite direction. No one was injured.	Railway incident
21.03.	A wagon of the freight train no. 42201-2 derailed with two axles at Soroksár-Rendező station. No one was injured.	Railway accident
11.05.	At the stop of Örvényes in the first section of the second DMU of the train no. 9727 caught fire. No one was injured.	Railway accident
30.05.	The passenger train no. 3028 passed the entry signal of Rákosliget station at danger. The train stopped 114 metres behind the signal. No one was injured.	Railway incident
03.06.	The vehicle of the cogwheel railway (Budapest) derailed with one bogie between the stations of Erdei iskola and Adonis street. No one was injured.	Railway accident
17.06.	At Győrszabadhegy station the passenger train no. 9292 ran over two members of the track maintenance team. One of them suffered serious- and one of them suffered light injuries.	Railway accident
28.06.	At Budapest-Déli pályaudvar station the passenger train no. 247 ran onto an occupied track without preliminary notification. The train eventually stopped before the standing passenger train no. 18608. No one was injured.	Railway incident
02.07.	A wagon of the narrow gauge train no. 30125 derailed with two axles between the stations Szépjuhászné and Jánoshegy. No one was injured.	Railway accident

Date 2019	Description of the occurrence	Classification
08.07.	The train no. 14899 (light engine) passed the exit signal of Érd station at danger, ran onto a dead-end track, crashed to the buffer stop and derailed with all of the 6 axles of the engine. No one was injured.	Railway incident
13.07.	The passenger train no. 2095 passed the exit signal of Esztergom-Kertváros station at danger. The train eventually stopped before the entry signal of Tokod-elágazás. No one was injured.	Railway incident
16.07.	The engine of the narrow gauge train no. 30125 derailed with two axles at Csillebérc station. No one was injured.	Railway accident
23.07.	Two wagons of the departing freight train no. 48238 derailed on a switch at Dunai Finomító station. No one was injured.	Railway accident
01.08.	The vehicle of the cogwheel railway (Budapest) derailed with one bogie between the stations of Erdei iskola and Adonis street. No one was injured.	Railway accident
09.08.	The passenger train no. IC566 which was departing on an unluckoed route next to a subsidiary signal violated the route of the approaching passenger train no. IC505 at Hort-Csány station. No one was injured.	Railway incident
18.08.	At Százhalombatta station two locked down and standing engines (work machines) broke down. Eventually the signaller stopped them with a derailer within the territory of the station. No one was injured.	Railway incident
23.08.	A wagon of the freight train no. 77559-2 derailed with two axles at Vámosgyörk station. No one was injured.	Railway accident
26.08.	A tram going on the line no. 56 was passing by next to the tram depot ’Budafok Kocsiszín’ when it was hit by a falling part of the fence of the depot which was collapsed by a derailing shunting tram. No one was injured.	Railway accident
06.09.	The freight train no. 47285 could not stop and passed the entry signal of Herceghalom station at danger because of techincal issues in connection with the brake system. The train burst opened the switch no. 11 and it was running towards the train no. 45228 which was approaching the station from the opposite direction. Eventually the two trains stopped and the distance was 140 metres between them. No one was injured.	Railway incident

Date 2019	Description of the occurrence	Classification
10.09.	The second bogie of the first wagon of the train no. 22629 derailed on the switch no. 19/a at Budapest-Nyugati pályaudvar station. No one was injured.	Railway accident
11.09.	The passenger train no. 9913 passed the exit signal of Kóny station at danger and was running towards the freight train no. 90982 which was approaching the station from the opposite direction. Eventually when the two trains stopped the distance was 659 metres between them. No one was injured.	Railway incident
13.09.	The passenger train no. 3220 passed the entry signal of Pécel station at danger with ca. 60 metres. The train was stopped by the train control system. The passenger train no. 3089 which was leaving the station at the moment of the occurence stopped before the backfalling exit signal with ca. 30 metres. After stopping the distance between the two trains was 665 metres. No one was injured.	Railway incident
18.09.	The engine and the first wagon of the freight train no. 45233 derailed at Miskolc-Tiszai pályaudvar station. No one was injured.	Railway accident
11.11.	The 29th wagon of the approaching freight train no. 44297-2 derailed on the switch no. 6 at Nyírbátor station. No one was injured.	Railway accident
14.11.	The passenger train no. 2065 passed the entry signal of Angyalföld station at danger with 98 metres. The train was stopped by the locomotive driver. The train stopped ca. 60 metres before the level crossing which was open at the time of the occurrence. No one was injured.	Railway incident
28.11.	The freight train no. 48403-2 passed the exit signal of Szerencs station at danger because of techincal issues in connection with the brake system. Eventually the train stopped 192 metres behind the signal. No one was injured.	Railway incident

4. INVESTIGATIONS COMPLETED IN 2019 WITH THE ISSUED RECOMMENDATIONS

In 2019, 37 final reports were compiled and published on the website of TSB, closing 41 investigations**. Further 2 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 2020 considering the 60 days provided by law for the relevant parties to reflect on the draft report.

The final reports issued in 2019 analysed occurrences of the following types:

- Derailment 16 occurrences
- Accident at LC 4 occurrences
- SPAD 10 occurrences
- Collision of trains 2 occurrences
- Collision to obstruct 2 occurrence
- Injury caused by rolling stock 2 occurrence
- Fire in rolling stocks 1 occurrence
- Other 4 occurrences

Investigations completed in 2019 by the amount of damages:

In 2019, the damages related to an occurrence exceeded EURO 150,000 in 2 cases, and no case over EURO 2 Million.

Number of investigations lasting longer than one year over 2016-2019

Year	at the end of 2017	at the end of 2018	at the end of 2019
Amount	8 (6)	14(13)	4(2[1])

Numbers in brackets show the amount of reports sent to relevant parties until the end of the year.

[1] Both investigation paused because of the expert reports

5. INVESTIGATIONS CLOSED IN 2019.

2017-0661-5 Ács

Railway accident / Derailment

Overview of the occurrence

On 27 May 2017, at 20: 05 local time, two locomotives (working in synchronised arrangement) and 7 freight wagons of the train № 44288 derailed on the track following the switch the № 14 while approaching Track VIII of Ács Station.

Based on investigation of the scene of the accident, the IC found that the accident was caused by technical characteristics relating to the rail track (inadequate transverse strength). Due to cracks in their cross sections, the outdated rail fittings were not able to provide sufficient counterforce to the transverse forces evoked by the arriving train, and thus, breaking out of the fittings, the rails of the track tipped on their sides.

The IC found during the investigation that the track supervision processes used were not always adequate for detecting or identifying outdated, partly or almost fully broken rail spikes therefore the IC issued a safety recommendation relating to a review of such inspection methods.

Figure: A wheel of the derailed vehicle on the rail which had tipped to its side

2.4 CONCLUSIONS

2.4.1 Direct causes

According to the IC, the cause of the accident was the worn-out state of the tack, especially the outdated rail fittings. The mechanical strength of the transversely cracked rail spikes provided no sufficient downforce to the rails which then tipped to their sides under the weight of the arriving train and caused derailment of the rolling stock.

2.4.2 Indirect causes

The inspection and measuring procedures applied during track supervision could not provide data relating to the process of impairment of the rail fittings therefore the wears and cracks of the rail spikes could remain unrevealed for some time.

Although the track defect was identified prior to the accident, but no action was taken (2.2.1.1).

The traffic management crew do not know of the speed values depending on the axle load, neither the axle load data of the locomotive therefore they did not inform the locomotive driver on the speed limit on the given track (2.2.2.

2.4.3 Other risk factors

There is no reliable method for detecting this kind of track defects, i.e. such defects may remain latent until an actual accident (2.2.1.1).

The various records and instructions which affect traffic safety as well do not indicate Track VIII consistently as 'main track' or 'secondary' track.

The available weight values of the locomotives are contradicting and are found at both sides of the limits relating to safety (2.2.3).

3. ACTIONS TAKEN

By the time of the accident, MÁV Zrt. had already started to elaborate the traffic of locomotives with axle loads exceeding 210 kN according to the procedure required for exceptional loads.

4. SAFETY RECOMMENDATION

4.1 Safety recommendations issued during the investigation

BA2017-0661-5-01: *The defect of the track (broken rail spikes) was revealed by track supervision activity 25 days before the derailment, but no action was taken to do repairs or to introduce limitations.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing in the safety management system of MÁV Zrt. why the shortcomings revealed by track supervision are not followed by action, and taking action as necessary.

By acceptance and expected implementation of the safety recommendation, similar accidents could be prevented by eliminating track defects on time or by introducing appropriate limitations.

BA2017-0661-5-02: *Derailment was traced back to corrosion (at places out of sight) of rail spikes in sleepers with plastic inlay, but this kind of defect cannot be identified by the usual track supervision method before actual fracture of the rail spike.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the procedures applied in the track supervision system of MÁV Zrt. to see to what extent such procedures ensure detection of hidden corrosion and thinning of rail spikes, and taking action as necessary for modification of such track supervision procedures.

By acceptance and expected implementation of the safety recommendation, such track defects can be identified before similar accidents, and the track can be repaired or appropriate limitations can be introduced.

In their response to the Draft Report, the addressee agreed with the above safety recommendations.

2017-0857-5 Balatonkenese

Railway accident / Fire in rolling stock

Overview of the occurrence

On 6 July 2017, the locomotive (reg. №: 92 55 0418 327-6) moving the passenger train № 1972 between Budapest-Déli and Tapolca caught fire at Balatonkenese Station.

The fire started in the space between the Diesel engine and the cooling unit. The rubber fittings between the air filters and the turbochargers were destroyed in the flames. The fire affected the auxiliary generator, the cables of the wheel flange lubricating apparatus, the WEBASTO Thermo heating unit, the cables running under the floor, the switch cabinet situated in the engine compartment, and other plastic or rubber elements.

It was not possible to prove how the fire had started, but it is probable that some combustible material sucked into the engine compartment due to leakage of the compartment or some fuel (ethylene-glycol coolant, or maybe Diesel oil) entering the engine compartment due to a sudden malfunction was ignited by the hot exhaust system or another hot part. The IC remarks here that, during reconstruction included in the upgrading of the locomotive, the gaps between the floor plate and the hydraulic transmission were not stopped. Thus, the risk of entry of foreign matter or even ignition source into the engine compartment was not excluded.

The IC found no reason to propose a safety recommendation.

2.5 CONCLUSIONS

2.5.1 Direct causes

Direct causes of the occurrence:

a) the actual cause of the fire remained unidentified,

b) it is probable that some combustible material sucked into the engine compartment due to leakage of the compartment or some fuel (ethylene-glycol coolant, or maybe Diesel oil) entering the engine compartment due to a sudden malfunction was ignited by the hot exhaust system.

2.5.2 Indirect Causes

The IC identified no factors evoking the direct causes of the occurrence.

2.5.3 Root causes

Causes that are distant in time and space which are related to the operation of the system in the regulatory environment and in the safety management system:

a) during the upgrading of the locomotive, the gaps between the floor plate and the hydraulic transmission were not stopped, and thus, cooling air did not only come to the engine compartment through the air filters therefore foreign matter also had the chance to enter the engine compartment.

b) during the upgrading of the locomotive, a “daily Diesel oil tank” was integrated in order to provide the WEBASTO Thermo heating unit with fuel, which increased the risk of fire.

2.5.4 Other risk factors

The IC identified no other risk factors.

2.5.5 Proven procedures, good practices

The following steps helped mitigate the consequences of the occurrence and to avoid a more serious outcome:

a) hearing the alarm signal from the fire detection equipment, the locomotive driver stopped the train and shut the Diesel engine off immediately,

b) he started to put out fire immediately using the fire extinguishing devices available,

c) passengers were evacuated safely.

2.5.6 Lessons learnt

Similar occurrences may be avoided by:

a) making the bottom of engine compartment of the Series 418 vehicles closed.

b) discontinuing the use of a daily fuel tank for the generator and the WEBASTO Thermo heating unit, and providing Diesel oil supply some other way.

3. ACTIONS TAKEN

In order to prevent similar occurrences, the joint investigating committee of MÁV Zrt. and MÁV-START Zrt. proposed the following actions:

Keep the engine compartments of locomotives clean. Prevent the entry of ignition effect into the engine compartment of the locomotive by sealing the gaps between the floor plate and the hydraulic transmission. The proposed actions have been executed partly on the series 418 locomotives.

4. SAFETY RECOMMENDATION

Similar occurrences may be avoided by keeping the riles and by performing the actions proposed by MÁV Zrt. and MÁV-START Zrt. therefore no safety recommendation needs to be issued.

2017-0953-5 Tata

Railway incident / Signal passed at danger

Overview of the occurrence

On 27 July 2017, at 01:29 o'clock, at Tata Station, the freight train with reg. № 43489 was approaching Track V from the right-hand side track when it passed the signal K5 at danger, switched the switch № 8 open, and stopped on the railway barrier № SR4. The passenger train № 4810 (the route of which to Track VI included the switch № 8 as an element) arriving on the right-hand side track finally stopped in front of the entry signal at danger which had not been switched yet.

The IC found that the occurrence was primarily due to human factors, but the lack of detection of the dangerous situation was also facilitated by a malfunction of the safety installation at the railway station (signalling error) as well as by the external light sources which hindered perception of the pre-indication coming from the entry signal. Those sources of danger had not been identified and eliminated in due time.

The IC proposed a safety recommendation to address the management of the extra risk due to the ageing of parts of safety installations for the sake of timely identification of sources of danger.

3. CONCLUSIONS

3.1.1 Direct causes

The locomotive driver incorrectly evaluated the entry authorization given by the entry signal therefore he did not become aware of his obligation to stop in front of the exit signal.

The safety installation failed to support the locomotive driver's activity as expected: it did not detect (probably due to a technical malfunction caused by ageing) that the train was approaching an exit signal at danger, and did not warn the locomotive driver by light and sound signals as usual.

3.1.2 Indirect Causes

The malfunction in the signal system at Tata station had not explored and its reliable operation had not been restored by the time of the occurrence.

The unlawfully installed security lights at the industrial site located at the down side end of the railway station make it difficult to evaluate the light signals used in railway traffic.

That source of danger was not explored during the infrastructure management activity and no action was taken in order to eliminate it.

3.1.3 Root causes

The IC makes no such statement.

3.1.4 Other risk factors

The IC identified no other risk factors during this investigation.

3.1.5 Lessons learnt

The direction and intensity of the security lights installed by the side of the railway track at the down side end of Tata Station may significantly confuse locomotive drivers when they are evaluating the light signals. However, this unfavourable circumstance well-known by locomotive drivers as well as the station crew still has not been eliminated although the operator of the infrastructure has the powers to do so, pursuant to GKM Decree № 103/2003 (XII. 27.) on the interoperability of conventional railway systems (1.9.2).

4. ACTIONS TAKEN

The signalling error of the safety installation was eliminated by the specific service within 24 hours of detection.

In absence of reporting, no action was taken relating to the intense lighting of the industrial site located at the down side end of the railway station, despite its unfavourable effect on safe railway traffic.

5. SAFETY RECOMMENDATION

5.1 Safety recommendations issued during the investigation

BA2017-0953-5-01: The IC found that Instruction № TB.1 of MÁV Zrt. included no requirements for periodical inspection measurements of the timing circuits of the safety installation relating to the cycle times.

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing whether Instruction № TB.1 of MÁV Zrt. includes suitable requirements for performing inspections to prevent safety critical situations caused by worn-out or ageing electronical parts**.**

By acceptance and expected implementation of the safety recommendation, the number of safety installation errors caused by changed circuit characteristics due to aged circuits could be reduced, as well as the number of safety critical situations resulting from such errors.

2017-0980-5 Abony

Railway incident/Other

Overview of the occurrence

On 3 August 2017, at 12:35, the train № 560-1 was approaching Abony Station on the basis of subsidiary signal and stopped in front of the switch № 3 which had been incorrectly set for this train.

After interviewing the people involved in the occurrence and analysing collected data, the IC attributes the cause of the occurrence to human factors related to the traffic manager who did not recognise the cause of the safety installation, did not check the setting of the switch № 1, and did not take appropriate safety actions before sending out the subsidiary signal.

3. CONCLUSIONS

3.1.1 Direct causes

The IC attributes the cause of the occurrence to human factors related to the traffic manager who:

a) identified the cause of the malfunction indicator signal erroneously,

b) Before sending out the subsidiary signal, he failed to check switches and to turn off the small automatic fuse which prevents switch operation.

3.1.2 Indirect Causes

The following circumstances influenced the traffic manager's activity:

c) the weather conditions might have impaired his ability to concentrate,

d) he was under stress, because:

- he had had to reschedule traffic several times,
- the safety installation had produced several malfunctions,

e) the light bulb was missing from that light of the display of the safety installation which indicates the occupied state in the diverging direction of the switch № 1.

3.1.3 Root causes

Causes that are distant in time and space which are related to system operation within the regulatory environment and the safety management system:

f) the traffic managers do not have the knowledge how to make thorough, thoughtful decisions in highly stressful situations.

g) since they initial training, the traffic managers have not had practical training related to the elimination of errors and malfunctions of the safety installation.

3.1.4 Other risk factors

A factor which is not related directly to the occurrence, but increases risk:

h) improper and hazardous practice is used in the process of requesting/giving authorisations.

3.1.5 Proven procedures, good practices

i) It helped mitigate the consequences of the occurrence and avoid a more serious outcome that the locomotive driver duly observed the requirements while approaching the station, and stopped the train in front of the switch № 3 when he realised the straight-line position of that switch, thus he avoided operating the switch and entering a track which was occupied by another train headed in the opposite direction.

3.1.6 Lessons learnt

When malfunction audio indicator is heard, the cause of the malfunction must be identified by evaluating the feedback lights, because it is not sure that the malfunction occurred during the last switch operation, especially when there are several operations in close succession within a short period of time.

The audio records associated to the occurrence show several cases of requesting and giving authorizations at the same time for trains following one another. This suggests that requesting and giving authorizations in a manner deviating from that specified in Train Loading and Running Regulations 2 is regarded an accepted practice by the stations involved in the occurrence. Such practices that are accepted within some groups within an organisation but deviate from the contents of such instructions or requirements may have negative influence on safe operation of an organisation.

The IC reminds those involved of the hazards of irregular requests of authorisation and of the fact that such activity is easy to explore subsequently by replaying the audio records taken by the voice recorders.

4. ACTIONS TAKEN

Prior to the closing meeting of the investigation, MÁV Zrt. sent the following information on the actions taken by them relating to the occurrence

“After the occurrence, the Head of Regional Traffic management Department, Budapest Regional Directorate ordered extraordinary on-site practical traffic management training for all employees that are obliged to operate safety installations, in order to prevent similar occurrences. The employees involved were reminded of the contents of Subsection 2.12 of Train Loading and Running Regulations 2 and of the requirements to be followed in the case of disorder of switch and route setting as specified in the Safety Installation Operation Rules.”

Although the IC find refreshing training useful in general, we think that refreshing training in traffic management is insufficient in itself in this case for managing the problems (loss of situation awareness, stress, etc.) identified during the analysis of causes and effects and for accident prevention.

At the same time, the IC noted with regret that no information had been given to the IC on any action taken to eliminate the improper and unsafe practice of requesting and giving authorization simultaneously.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the rules specified in Train Loading and Running Regulations 2 and in Safety Installation Operation Rules and through reasonably attentive work by the personnel, therefore no safety recommendation needs to be issued.

2017-1055-5 Hegyeshalom

Railway incident / Signal passed at danger

Overview of the occurrence

The train № 44386 approaching the track № IX at Hegyeshalom Station failed to stop at the safety shunting limit signal and, while leaving the track, it split the switch № 447 open and stopped 61 metres beyond its designated stop.

The IC attributes the occurrence to human factors related to the locomotive driver who failed to stop his train at the designated spot because he had started braking too late.

The IC finds it unnecessary to issue a safety recommendation.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the incident were as follows:

a) The braking force initiated for timely braking was insufficient to stop the train, because

b) the locomotive driver had failed to reset the power and brake control of the locomotive to “0” position, so it sent out a traction command.

2.5.2 Indirect Causes

The indirect cause of the incident was as follows:

c) the engine driver did not realise the improper positions of the controls.

2.5.3 Root causes

The root cause of the occurrence was as follows:

d) Although the locomotive driver did not realise, his fatigue had reached a level where the possibility of error became high.

3. ACTIONS TAKEN

No action was taken as a consequence of the occurrence.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the rules and through reasonably attentive work by the personnel therefore no safety recommendation needs to be issued.

2017-1057-5 Bükkösd

Railway incident / Signal passed at danger

Overview of the occurrence

On 21 August 2017, at 16:55, at Bükkösd Station, the approaching freight train № 85345 passed the signal (V4) at danger without prior authorization, burst the switch № 3 open, and entered the open level crossing marked SR1.

According to findings of the investigation, the braking effect was insufficient for stopping the train at the planned spot.

The IC attributed the occurrence to human factors at the side of the train crew who failed to perform a braking test of the train prior to departure according to relevant instructions.

That is the reason why it had not been realised that the braked weight was not available for calculation of the braking effect.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) The braking effect was insufficient for stopping the train at the required spot.

b) The air brake system of the train was not connected to the brake system of the locomotives.

c) The train crew did not detect the error.

2.5.2 Indirect Causes

Indirect causes of the occurrence:

a) The train crew did not perform a brake test;

b) Similar work was regular, everybody accepted it.

2.5.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) The level of safety culture is extremely low with the railway company involved.

2.5.4 Other risk factors

No other risk factor was identified.

2.5.5 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that the traffic manager immediately revoked the authorization of the passenger train № 8603 upon realising the emergency situation.

2.5.6 Lessons learnt

The occurrence highlights that a first step of safety actions is to achieve that employees not only know such actions but they be self-motivated to observe such actions. That kind of attitude to safety can be formed and maintained during employee training, refresher training, inspections, and by example on the part of supervisors and managers.

3. ACTIONS TAKEN

The IC has not got information on any action taken by the railway company.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the rules relating to brake tests therefore no safety recommendation needs to be issued.

2017-1123-5 Délegyháza

Railway incident / Signal passed at danger

Overview of the occurrence

On 5 September 2017, the freight train № 45296-1 running between Kiskőrös (Hungary) and Štúrovo (Slovakia) stations was directed to the main track № III at Délegyháza Station. The exit signal № K3 was not operated for it due to the suburban train № 3734 arriving from the direction of Taksony.

Due to late braking, the freight train № 45296-1 overran the exit signal (marked K3) at danger by ca. 131 metres.

The suburban train stopped before the entry signal, and the distance between the two trains was ca. 735 metres at that time.

The position of the IC is that the occurrence can be attributed primarily to human factors, but the formation of the dangerous situation was facilitated by the fact that signalling takes place only within a short section of the station.

The IC proposes no safety recommendation to be issued.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) the locomotive driver arrived at the station with his train without preparing for stopping,

b) the bright sunshine made it more difficult for him to check the display of the entry signal, so he remained unaware of its meaning, and tried to move across the station according to the timetable,

c) when his train was approaching the exit signal, the train control system gave vigilance warnings more frequently; at that moment, the locomotive driver realised that he was approaching a signal at danger, but the emergency braking applied immediately was insufficient to stop the train on time.

2.5.2 Indirect Causes

This source of hazard has not been revealed during track operation activity yet, and accordingly, no action has been taken to eliminate it.

d) within the station, signalling is not installed in the length necessary for the operation of the EVM-120 equipment therefore no sufficient route length was available for the timely intervention by the train control system, so the front of the train passed the signal (K3) at danger at a speed off 47 km/h despite the fact that the locomotive driver applied emergency braking right after the first extraordinary vigilance warning.

2.5.3 Other risk factors

The IC identified no other risk factors during this investigation.

2.5.4 Lessons learnt

The disconnection of certain sections of signalling installed before (disconnection of the leaky cables in this case) may create a situation where the additional service (a train may pass a signal at danger at a speed of 40 km/h as a maximum) of the train control system (EVM120) cannot work, because the length of signalling actually installed and active at the track side is shorter than necessary for its proper operation.

3. ACTIONS TAKEN

The IC are not aware of any action taken relating to signalling.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and through reasonably attentive work by the personnel therefore no safety recommendation needs to be issued.

2017-1333-5 Budapest, Hűvösvölgy Station

Railway accident / Derailment

Overview of the occurrence

On 19 October 2017, at 08:36, the trailing bogie of the tram № 61 (reg. №: 4019) derailed while the tram was leaving the terminal Hűvösvölgy, and the tram with reg. № 4025 was diverted. The tram with reg. № 4019 and the switch reg. № K2117 were damaged as a result of derailment.

During the investigation at the scene, the IC found that the cause of derailment was the loose state of the straight switch tongue caused by breaking of the pull rod.

Figure: The derailed tram

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) the malfunction of the switch № K2118 was caused by the breaking of the pull rod (which move the switch tongues) under the train passing.

b) as a consequence, the appropriate opening distance between the switch tongue and the stock rail was not provided,

c) in absence of fastening, the straight switch tongue slipped towards the stock rail, so the second tram was diverted in the straight direction, and

d) due to lateral forces acting on the pull apparatus between the two trams, the wheels on the rear bogie of the leading tram derailed.

2.5.2 Indirect Causes

Findings relating to competences, procedures and maintenance which were related to the factors listed above:

The switch mechanic inspects mechanical parts visually when inspecting a switch.

There is no other technological requirement relating to the inspection of the pull rod.

A starting fatigue fracture cannot be revealed by the inspection methods applied; it can only be prevented by replacing the part at appropriate intervals or by crack inspection after dismounting the part.

2.5.3 Other risk factors

The IC identified no other risk factors during this investigation.

3. ACTIONS TAKEN

To the knowledge of the IC, no action has been taken relating to trailable one-way switches.

4. SAFETY RECOMMENDATION

Crack inspection of pull rods would require a disproportionately large amount of resources. Risks to safety remain low in absence of tests, because the speeds of vehicles running over the switches are low. According to statistics, the occurrence of derailments caused by pull rod fracture is very low. Therefore the position of IC is that there is no reason to issue a safety recommendation.

2017-1340-5 Enese - Kóny (AS186)

Railway accident / accident at a level crossing

Overview of the occurrence

On 20 October 2017, at 11:14, at the level crossing № AS 186 (equipped with warning lights and half-barriers) between the Stations Enese and Kóny, the train № 947 hit the rear end a regular coach; as a result, the bus was badly damaged, and two of its passengers had minor injuries.

At the time of the accident, there was thick fog around the location of the level crossing. According to findings of the investigation, the warning lights started to flash red 1 second before the collision and had been displaying white flashing signals towards the road until then, and the half-barriers were in open, vertical position at the time of the accident.

When the train moved over the point of action of the barrier installations it was not detected by the track circuits, and the red signal was displayed on the warning lights when the train reached the terminal release point and caused break-down state, and the “extended red” function of the installation switched the warning lights to flashing red.

The tests performed did not manage to reconstruct such abnormal operation of the warning light installation, and the error has not occurred since then again, and the investigation was not able to reveal its technical cause exactly.

Figure: Damages to the bus

2.8 CONCLUSIONS

2.8.1 Direct causes

The direct causes of the occurrence were as follows:

a) the warning lights at the level crossing indicated no malfunction to those on the road by shutting the lights off but were flashing ‘white’. The bus driver did not realise the approaching train and, seeing the ‘white’ lights, he entered the level crossing, but, he was not able to leave it before the train arrived there;

b) for a reason unknown to the IC, the detecting elements of the protective installation of the level crossing failed to detect the approaching train so the warning lights did not display red flashing light towards the road, but kept flashing white;

c) there was thick fog at the time of the accident, which made it significantly more difficult for vehicle drivers to detect each other.

2.8.2 Indirect Causes

The findings relating to those competences, procedures and maintenance which were related to the factors mentioned above:

d) due to the layout of the system, the locomotive driver has no direct information on the closed state of the level crossing his train is approaching.

2.8.3 Other risks

Factors which are not related directly to the occurrence, but increase risk:

e) the cable locator devices used in cable exploration work can, in certain conditions, "desensitize" train detecting elements; however, the employees using the device are not trained in its proper use.

3. ACTIONS TAKEN

In their Opinion Report on the occurrence, GySEV Zrt. put forward proposals, among others, in the following subject:

"Measuring instruments (e.g.: cable locators, cable fault locators, insulation testers, etc.), which are able to induce alternating voltage in a cable and thus may interfere with the operation of the device (equipment) connected to such cable may only be applied under the conditions specified in the Operation and Maintenance Instructions."

Safety Installations Department TEBF MÁV Zrt. agreed with the nationwide extension of the above regulation.

4. SAFETY RECOMMENDATION

With regard to the actions taken during the investigation, the IC proposes no safety recommendation.

2017-1372-5 Lakitelek - Kecskemét (AS239)

Railway accident / Accident at a level crossing

Overview of the occurrence

At the level crossing marked AS 239 (and protected with warning lights) between the Stations Lakitelek and Kecskemét, a light truck crashed to the side of the motor train set with Reg. № 95 55 1416 028-7 pulling the train № 37116. As a consequence of the accident, the truck driver had minor injuries, the truck was badly damaged, and the motor train set was lightly damaged.

It was confirmed during the investigation that the displays of the warning lights had not worked at the time of the occurrence: neither the white nor the alternating red flashing lights had been displayed.

According to the IC, the cause of the accident was the dark state of the road barrier and a human factor on the part of the driver of the automobile.

The IC proposes a safety recommendation relating to the occurrence so that the locomotive driver approaching a level crossing in break-down state can be notified of a situation which is potentially dangerous for the train and can control the speed of his train accordingly.

Figure: Positions of the vehicles following the collision

3. CONCLUSIONS

3.1.1 Direct causes

The direct causes of the occurrence were as follows:

a) About 1.5 minutes before the occurrence, the warning lights got in break-down state due to a technical malfunction, and, in absence of extension of the red light, the installation displayed nothing (“dark”) towards the road.

b) Although the break-down state of the installation was reported back to the traffic manager of the neighbouring station, such traffic manager did not even attempt to inform the locomotive driver of the affected train on the unexpected situation, as there was no related requirement, so, being unaware of the situation, the locomotive driver did not lower the speed and did not apply audio signal.

c) The driver of the road vehicle started to drive through the level crossing while the warning lights were out ("dark") and did not make sure whether a railway vehicle was approaching the level crossing or not.

3.1.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

d) Visibility of the display on the warning lights was slightly impaired by strong sunshine coming from an adverse direction.

3.1.3 Root causes

e) The IC makes no such statement.

3.1.4 Other risk factors

f) The system of instructions currently in effect regards those trains which are the first to approach such a warning light in break-down state which is not interlocked with the malfunction indicator as "not notifiable train" therefore it does not require any method of warning to the locomotive drivers of such trains, despite the fact that, in the case of availability of the necessary communication system it would be possible technically in certain cases. The existing regulation exclusively transfers the responsibility for crossing to the driver of the road vehicle, notwithstanding the fact that collision with a larger road vehicle represents real danger to the locomotive driver and the passengers of the train as well.

4. SAFETY RECOMMENDATION

4.1 Safety recommendation(s) issued on completion of the investigation

BA2017-1372-5-1: *The Investigation Committee of TSB found that in cases where the level crossing at the open line gets in "breakdown" state while a train is approaching (except where it is interlocked with the signal system and the train crew receive feedback via the signal system), the locomotive driver is not aware that the approaching level crossing is to be regarded as a potential source of danger. The Rules of the railway company in effect contains no procedure for the warning of the locomotive drivers of trains approaching such dangerous points, neither for what to do when they have become aware of such a situation. Therefore*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider ordering railway infrastructure operators to elaborate a procedure for providing information on the danger and the elimination thereof in cases where the locomotive driver is not provided with information on the state of a broken-down level crossing installation by automated means.

In the opinion of the Investigating Committee, by acceptance and expected implementation of the safety recommendation, the locomotive driver's chance to get information on the potential source of danger and to control the speed of the train accordingly could be increased significantly in cases where the train is approaching a broken-down level crossing installation and there is no time left to inform the locomotive driver via Written Order.

2017-1561-5 Balatonszárszó and 2018-0414-5 Kaposújlak

Railway accident / Injury caused by vehicle in motion

Overview of the occurrence

On 5 December 2017, at 9:15 am, in the switching zone at the down-side end of Balatonszárszó station, a man got off the moving train № 850 after it had departed following a stop at the station. The seriously injured victim was taken to hospital where he died on 14 December, due to his injuries suffered in the accident. The train consisted of ("Halberstadt") wagons with middle numbers 21-55 and 31-55.

On 8 April 2018, at 6:52 am, at Kaposújlak stop, a passenger jumped out of the train № 8259 (on the side opposite the platform of the stop) which had just departed after a stop; the passenger died on the spot. That train also consisted of ("Halberstadt") wagons with middle numbers 21-55 and 31-55.

Neither accident was perceived by the train crew; both trains went on without stopping after the accidents.

The IC identified a human factor – getting off the moving train after departure – as the direct cause of both accidents. In addition, the IC revealed, after analysing the operation of the ("Halberstadt") wagons with middle numbers 21-55 and 31-55, that, although such wagons have a central locking system which prevents the doors from opening while the train is in motion, in some special cases these guard systems may be bypassed either wilfully or inadvertently (due to the design of the system), and the doors can be opened even after departure of the train if the opening process was initiated before the activation of the door locking system.

2.3 CONCLUSIONS

2.3.1 Direct causes

The direct causes of the occurrence were as follows:

a) In both cases, the passengers involved attempted to get off the moving train soon after departure;

b) Due to their design, the doors of the wagons with middle numbers XX-55 allow that, if the door is not fully shut at the moment of the locking, then locking will not take place, so the door can be opened (or kept in fully opened position) even after the locking procedure.

2.3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

c) The "green loop" monitoring the closed position of the doors is not installed in the wagons with the middle numbers "XX-55".

2.3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

d) Although modernised on several occasions, the technical contents and safety installations of the wagons designed almost 40 years ago cannot in each case prevent passengers from attempting to get off the train while it is in motion.

3. SAFETY RECOMMENDATION

The IC proposes no safety recommendation.

2017-1620-5 Kelebia and 2017-1657-5 Ferencváros

Railway accident / Derailment

Overview of the occurrence

On 14 December 2017, the empty wagons №. 8, 9 and 10 of a freight train approaching Kelebia station derailed.

The IC found that there were loaded, heavy wagons behind the empty and light wagons in the train. The locomotive driver applied the brakes intensively just when the wagons were running along an arcing track section of disadvantageous geometry which had already been worn in excess of the relevant dimension limits.

On 21 December 2017, the 11th (2-axle) wagon in the freight train № 98909 approaching Ferencváros station derailed with one axle.

The IC found that there were loaded, heavy wagons behind the empty and light wagon in the train. Before the derailment, the locomotive driver applied the brakes intensively, as a result of which the affected empty wagon suffered a push from the rest of the train.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) the derailed wagons placed in the middle of the train were light-weight (2.2.2);

b) the locomotive drivers applied the brakes intensively while approaching the station (2.2.2);

c) In Kelebia, the track gauge had at the place of the derailment had decreased quickly and in excess of the limit requiring immediate intervention (2.2.1.1).

2.5.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) In Kelebia, the quick change of the track had not been identified during the track supervision activity (2.2.1.2);

b) In Kelebia, the buffers on the wagons were too rigid (2.2.3).

c) the setting of the adjustable brake release device was incorrect, which increased unfavourable longitudinal forces (2.2.2).

2.3.5 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) In Kelebia, it was found that the gauge defects in the turnout can only be detected only incidentally (or not at all) using the turnout measurement rules in effect (2.2.1.2);

b) the IC identified no such cause with the occurrence at Ferencváros station.

2.5.4 Other risk factors

The IC identified no other causes related to the occurrences.

2.5.6 Lessons learnt

In addition to proper maintenance of the track, the operation of the trains may also contribute to the prevention of similar occurrences.

Lighter wagons placed among heavier ones are more sensitive to longitudinal forces awakening in a train, which may be evoked by intensive braking in an arc of small radius. Such use of the brakes may be expressly necessary in emergency, so it cannot be prohibited, although it should preferably be avoided.

3. ACTIONS TAKEN

The railway company informed the operator of the wagons on the results of the examination of the wagons.

No traffic limitation was ordered for the track at the scene of the occurrence, but the track gauge and the rail surface levels were controlled on the day after in order to correct the track deviations revealed.

4. SAFETY RECOMMENDATION

4.1 Safety recommendations issued during the investigation

The IC issued no safety recommendation during the investigation.

4.2 Additional safety recommendations

BA2017-1620-5-01: *During running track supervision measurements, the track gauge is measured on a continuous basis, while only a few points are measured along the turnouts. This method does not provide proper monitoring of the state of turnouts, and the evaluation of certain defects (change of track gauge) is explicitly impossible.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider to consider including such a provision in the track supervision procedures (which constitute part of the safety licence of railway infrastructure managing companies) which requires the application of measurement technologies for turnouts and/or tracks that ensure continuous measurement and evaluation along turnouts, similarly to running tracks.

By acceptance and expected implementation of the safety recommendation, a more reliable picture of the technical condition of a turnout can be obtained, and maintenance works or limitations can be ordered on the basis of better information.

In their comments sent in response to the Draft Report, **Transportation Safety Bureau recommends Railway Authority Division, MIT** agreed with the safety Recommendation; MÁV Zrt. acknowledged it, with the following remark added "*As soon as a request in the case is received by MAV Zrt. from Railway Authority Division, MIT, we will cooperate. As regards Track Supervision Instruction № D.5, a modification process is underway currently, independent of any request from the Transport Authority, and, beforehand, we will consider the possibility of modification(s) according to the Safety Recommendation*".

2018-0004-5 Győrszentiván - Győr

Railway accident / Collision with an object

Overview of the occurrence

On 1 January 2018, the locomotive of the train № 932 providing service between Budapest-Keleti and Sopron stations hit a hanging, broken contact wire-end of the catenary supply of the right hand side track in railway section 1381–1382 between Győrszentiván and Győr stations.

As a result, an electric arc was generated between the contact wire and the middle column of the windscreen of the locomotive, and drops of molten aluminium and glue got in the air in the driver's cab. The hot particles caused burn injuries to the locomotive driver.

The IC proposed no safety recommendation.

Figure: Marks of an electric arc in the driver's cab

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The overhead contact wire broke railway section 1381–1382 between Győrszentiván and Győr stations, and the broken, but still live wire hung into the clearance of the right hand side track,

b) the roof (made of electrically insulating material) of the driver's cab collided with the broken, hanging contact wire,

c) as a result of which, the short circuit of the overhead contact wire was closed through the middle column (made of aluminium) of the windscreen of the driver's cabin, so it was exposed to high voltage,

d) in consequence of the short circuit, the aluminium column and the gasket of the windscreen melted and splashed, and the drops of the molten materials caused burn injuries to the locomotive driver.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

e) the rupture of the overhead contact wire, which led to the accident, was not detected because the system cannot do that if there is no short circuit.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

The IC makes no such statement.

3.4 Other risks

The IC identified no other risk factors during this investigation.

4. ACTIONS TAKEN

To the knowledge of the IC, no action has been taken relating to the layout of the driver's cab in the Series 470 locomotives.

5. SAFETY RECOMMENDATION

Coating the roof of the driver's cab with electrically conducting material would be disproportionately expensive. According to statistics, the frequency of injuries caused by rupture of overhead contact wires is very low. Therefore the IC does not find it justified to issue a safety recommendation.

2018-0009-5 Szentlőrinc

Railway incident/Other

Overview of the occurrence

On 6 January 2018, at 9:32 am, at Szentlőrinc station, the freight train № 85829, which had departed following a clear signal of the group exit signal and authorisation given by train starting sign, burst the switch № 14 (being in incorrect position fort this train) open. The occurrence caused damage of low value only. According to findings of the investigation, the route for the train was set to start from Track VII, but the train departed from track VI.

The IC attributed the occurrence to human factor on the part of the station crew, and found that non-conspicuous marking of the differences in constant, regularly repeated, routine working processes largely increases the likelihood of accident-prone situations.

The IC did not propose a safety recommendation, but discusses the lessons learnt from the occurrence in Section 3.4.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

- Neither the chief traffic manager nor the pointsmen recognised the unusual track position.

- The pointsmen working at the two ends of the station accepted, without any doubt, the route communicated erroneously by the chief traffic manager half an hour before the departure of the train (and assigned erroneously right before its departure).

- The communication relating to the order for the authorisation was not accurate between the outer traffic manager and the chief traffic manager.

3.2 Indirect Causes

- An unexpected deviation from the conventional technology of the station, i.e. starting a train from another track than usual, played an important role in the occurrence.

- The safety installation at the station cannot indicate that a track is occupied.

3.3 Root causes

The IC revealed no such causes.

3.4 Lessons learnt

The IC found that the chief traffic manager had practically ordered the setting up of the exit route of the train № 85829 already when taking over duty. The pointsmen involved in the setting of the route, who were preoccupied by other tasks as well, perhaps were not even aware of the actual track situation at that time yet, and, tacitly accepting the experienced chief traffic manager's order, they started the process of erroneous route setting.

The IC's position is that, in order to eliminate the above risk, it would stand to reason to order the earliest time of route setting in combination with an event related to the approaching of the train concerned.

4. ACTIONS TAKEN

With regard to the finding mentioned in Section 4.3, and being aware of the pending amendment of *Train loading and running regulations F2*, the IC contacted Traffic Supervision Department at the Office of the Deputy Director General of MÁV Zrt., who gave the information that their own organisational units had also detected

the problem, and that the IT system called FOR, which was to be introduced all along the railway network in the near future, would unambiguously specify the earliest time of ordering the route setting for each train, owing to its programmed technology.

5. SAFETY RECOMMENDATION

Due to the contents of the pending amendment of the Instruction, the IC does not find it justified to issue a safety recommendation.

2018-0068-5, 2018-1588-5 and 2019-0170-5, crossing of Török F. u. and Nagysándor József u., Budapest

Railway accident / Derailment

Overview of the occurrence

On 21 January and 23 December 2018, and on 16 February 2019, the tram № 52 (type TW 6000) wished to travel in the turnout direction on the Switch № K1602. While rolling over that switch, two axles of the leading bogie derailed, in each of the three cases.

The IC attributed the occurrences to a technical problem related to the switch, and to carelessness of the tram drivers involved.

The operator of the network corrected the setting of the double tension spring.

We sustain our earlier recommendation relating to clarification of the text of the instruction, and to making the tram drivers aware of the contents implied by the signal.

BA2017-08050-5-01: *The investigation found that the switchpoint light of the switch involved in the occurrence is not suitable for displaying the end position of the switch reliably, although the signal displayed would indicate accurate end position according to the definition of the displayed signal in the instruction.*

Transportation Safety Bureau recommends Budapesti Közlekedési Zrt. to consider reviewing the harmony of the technical solutions and rules of signalling applied with the switchpoint lights along the tram network of the Company, and to take action to reach harmony between the rules and the capabilities of available technical equipment.

By acceptance and expected implementation of the safety recommendation, the switchpoint lights applied may provide true information or can be interpreted with taking their limitations into account.

Figure: The tram which derailed in December 2018

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) the switch was left in an intermediate position,

b) which the tram driver did not realise.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

c) the switchpoint light displayed a pattern which hinted at end-point position even when the switch was in an intermediate position.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

c) the tram drivers report only a few of the malfunctions they detect (2.2.4),

d) the Instruction provides no useful, consistent rules relating to the switchpoint lights or the reliability of the information they display (2.2.3).

3.4 Other risks

The IC makes no such statement.

4. ACTIONS TAKEN

As far as the IC knows, the spring force was corrected. The operator of the network expressed their intent to replace the switch positioning equipment involved in the occurrence.

5. SAFETY RECOMMENDATION

TSB issued no safety recommendation during the investigation. A safety recommendation had been issued earlier, during investigations of similar occurrences, in order to create better match between the switches and the rules relating to them.

2018-0088-5 Ferencváros

Railway accident / Derailment

Overview of the occurrence

On 27 January 2018, the 9th wagon of the freight train № 92719, travelling with empty rail tankers for sulphuric acid from Mosonmagyaróvár to Szolnok derailed with all four axles on the diamond crossing № 9 while approaching Ferencváros station; the train split up and stopped. The cause of derailment was that the rim on the front left wheel of the wagon slipped off, so the wheel pair became unguided.

The cause of the loosening of the wheel rim could not be established clearly, but probably the decrease (approaching the lower limit) of the thickness off the wheel rim largely influenced the loosening of the wheel rim, and the lack of combined marking of the two pieces hindered the detection of the beginning dislocation.

The position of the IC is that loosening of the wheel rim may sometimes occur with the wearing of the wheel rim and can usually be identified by following the relevant inspection methods (combined marking of the wheel rim and the wheel) therefore the IC found no reason to propose a safety recommendation.

Figure: The freight train and the derailed wagon

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) The wheel rim slipped off at the axle pin № 8 on the front right wheel of a wagon, and thus the wagon became unguided and it derailed (1.3),

b) the loosening of the wheel rim was the outcome of a longer process: the wagon covered a longer distance with loose wheel rim, but, due to lack of combined marking of the wheel rim and the wheel, the defect remained undetected during the inspection of the wagons.

2.5.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the thickness of the wheel rim neared the lower limit,

b) the contact pressure between the wheel body and the wheel rim disappeared or became so low that the wheel rim got loose (1.14, 2.2).

2.3.5 Root causes

The IC makes no such statement.

2.5.4 Other risk factors

The IC found no other risk factors.

4. SAFETY RECOMMENDATION

Similar occurrences may be prevented by observing the rules indicated in Sections 1.10.1, 1.10.3 and 1.10.4, and by expectable care by the wagon inspection crew, and a developing wheel rim loosening can be identified long before an accident, therefore no safety recommendation needs to be issued.

2018-0123-5 Budapest, Határ út Station

Railway accident / Derailment

Overview of the occurrence

On 4 February 2018, at 7:15 am, the BM bogey of the tram 50 (reg. № 1592) derailed while the tram was leaving the terminal at Határ út. The tram was damaged in consequence of the derailment.

The IC attributed the occurrence to the poor condition of the switch № K 3901. The switch tongue was displaced abnormally by dynamic forces, which produced a gap (which cannot determined exactly) between the switch tongue and the stock rail of the switch. A wheel of the second bogey of the tram rolled on that gap and derailed on the opened switch.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) malfunction of the switch № K 3901 caused by the loosening of the bolted joints between the rail chair and the stock rail and the dislocation due to the worn-out condition of the track structure.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) there is no technological instruction relating to the inspection of dimensional changes caused by the dynamic forces acting on the switch,

b) due to the worn-out condition of the turnout, the necessity to replace the switch tongues and the cross-ties had been known 7 months before the accident already, but no action was taken for such repair,

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) due to the heavily impaired condition of the track, the maintenance level interventions were not sufficient to keep the condition of the track on the required level.

3.4 Other risks

The IC identified no other risk factors during this investigation.

4. ACTIONS TAKEN

The operator of the track network reconstructed the tracks and related turnouts at Határ Út Station in 2018.

5. SAFETY RECOMMENDATION

The IC found no reason to issue a safety recommendation.

2018-0139-5 Blaha Lujza tér - Astoria (M2)

Railway accident / Collision

Overview of the occurrence

On the night of 6 February 2018, during night-time maintenance of the Budapest Metro lines, a support train crashed to another support train which was staying in the tunnel between the stops Blaha Lujza tér and Astoria.

The IC found that the direct cause of the occurrence was a movement deviating from the authorised pattern, but there were some other contributing factors as well:

- exceeding the speed limit,

- shortcomings of communication pertaining to traffic management,

- lack of marking of the working area.

Many of the shortcomings were not only occasional but regularly occurred in everyday operation as well.

Therefore TSB issues a safety recommendation relating to the practice of managerial inspection of the company involved.

During the investigation, the railway company took action to modernise the data recorders of the vehicles, and to appropriate protection and marking of the people working on the railway lines.

Figure: Scene of the accident (Photo: BKV Zrt.)

2.5 CONCLUSIONS

2.5.4 Direct causes

The direct causes of the occurrence were as follows:

a) the train № 005 exceeded the speed limit significantly (2.2.2.2);

b) the train № 005 failed to stop at Blaha Lujza tér station which was its destination according to its authorisation (2.2.4.1);

c) the sign “Work in progress on the track” was not placed at the time of the occurrence (2.2.3.1).

2.5.5 Indirect causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) due to occupation of other tracks, the train № 005 had been directed to a track where works were underway (2.2.1.2);

b) the dispatchers failed to ensure that works on the track had been suspended before issuing the authorisation to the train № 005 (2.2.1.2);

c) notwithstanding the rules, the crew of the train № 005 failed to report their crossing the station, which was part of the general practice (2.2.2.1);

d) the design of the tunnel is monotonous, and the stations have also looked quite alike since the last reconstruction, which makes orientation more difficult (2.2.4.1);

e) the drivers’ behaviour is not supervised efficiently in the situations investigated, although speeding is a well-known phenomenon (2.2.2.2);

f) due to its design, the “Work in progress on the track” sign cannot even be placed in compliance with the rules, and its use is uncomfortable; the working team did not have this sign in the required number (2.2.3.1);

g) the Work in progress on the track trusted too much in compliance with the rules by others (although they did not keep to the rules themselves either), so they did not realise in the beginning that the (audibly) approaching train could be dangerous for them (2.2.3.2).

2.5.6 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) the means of exact supervision of driver behaviour was not provided on the vehicles involved: the speed recorders (mandatory part of the equipment of the vehicles) had not been working for a longer period already due to lack of the paper discs (2.2.5);

b) the purchasing system of the company failed to provide the necessary data recording discs (2.2.5).

2.5.7 Other risk factors

Factors which are not related directly to the occurrence, but increase risk:

a) the dispatchers had not been aware of the expected duration of the works (duration of track occupation) (2.2.1.2).

2.5.8 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that

a) on the basis of the characteristic layout of the tunnel, the driver of the train № 005 realised that he had run over the specified destination (2.2.4.2).

2.5.9 Lessons learnt

Observing the speed limit, driving with due care and compliance with the authorisation are decisive in avoiding an accident (2.2.2.3). It is much easier to achieve if the necessary data recording discs are available (2.2.5) or electronic data recorders are in place.

By placing the "Work in progress on the track" sign, the distance from where the crew of an approaching train can realise that work is underway on the track (as well as the related hazards) could be increased significantly (2.2.3.1).

3. ACTIONS TAKEN

According to information of 17 December 2018 from BKV Zrt.:

- the company began to introduce a new type of "Work in progress on the track" sign which had its own power source;

- data recording disc supply is provided for the vehicles equipped with electromechanical speed recorders;

- vehicles not equipped with electromechanical speed recorders will be equipped with electronic data recorders; the prototype was to be installed by 31 December 2018 (it was accomplished, according to information received at the closing meeting in January);

- Metro Traffic Chief Engineering assigned a traffic inspection team as of October 2018;

- The review of the Support Trains Enforcement Order was commenced.

4. SAFETY RECOMMENDATION

BA2018-0139-5-01: *The IC found that, although the safety management system of the railway company requires management inspections integrated in the process, such inspections are performed rarely, if ever, in daily practice (in this case: speeds of trains, protection of work stations, notification of passages), and thus it cannot support compliant work of the personnel.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider whether the safety management system of BKV Zrt. contains the system of management inspections in the suitable form, and whether it is implemented in the practice, i.e. if it achieves its objective.

By acceptance and expected implementation of the safety recommendation, the compliance of employee behaviour could largely be improved.

In their response sent relating to the Draft Report, the addressee agreed with the Safety Recommendation.

2018-0317-5 Soroksári út Marshalling Yard

Railway accident / Derailment

Overview of the occurrence

The locomotive with Reg. № 91 55 0450 007-4 of the train № 44281 derailed with one axle while approaching Soroksári út Marshalling Yard via Track X.

The IC attributes the occurrence to the worn-out condition of the track. In addition, the axle load of the locomotive slightly exceeded the limit for the given track, which cannot be directly related as cause to the occurrence, but increases safety risk.

Figure: The locomotive which derailed

3. CONCLUSIONS

3.1.1 Direct causes

The direct causes of the occurrence were as follows:

a) the track is in very poor condition in the whole area of the station; actually the locomotive pushed the rails under itself apart;

b) the train significantly exceeded the speed limit, thus increasing the forces acting on the rails.

3.1.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the train was received on a track which was electrified in a short section only, thus inviting the locomotive driver to exceed the speed limit;

b) the poor quality track is regularly used by locomotives with axle loads above the limit;

c) locomotives with axle loads above the limit exceed the speed limit on a regular basis;

d) The whole track network within the marshalling yard is heavily worn out, allowing a travel speed of 10 km/h as a maximum; half of the tracks are excluded from traffic partly or fully, instead of being properly maintained.

e) Due to contaminated state of the track, track supervision cannot be performed properly.

3.1.3 Root causes

The IC makes no such statement.

3.1.4 Other risk factors

Factors which are not related directly to the occurrence, but increase risk:

a) ÁVU contains false data relating to the length of the track;

b) the type authorisation of the locomotive is inconsistent with its authorisation for placing in service; the latter diverges in a more hazardous direction.

4. ACTIONS TAKEN

The track section involved in the occurrence was excluded from traffic and has not been restored ever since.

5. SAFETY RECOMMENDATION

Similar accidents can be avoided by repairing worn-out rail tracks on time or by excluding them from traffic, and by observing relevant instructions therefore the IC proposes no safety recommendation.

According to information from Railway Authority Division, Ministry for Innovation and Technology, the type authorisation of the locomotive and the authorisations for placing in service will be reviewed, with regard to total weight and the axle load. They are going to start a type authorisation review process, within which the vehicles will be subject to weighing again, and the type authorisations may be modified as necessary in function of the results of measurement.

2018-0424-5 Szépjuhászné

Railway accident / Derailment

Overview of the occurrence

On 10 April 2018, the trailing bogey of the trailing wagon of the train approaching Szépjuhászné station derailed.

During the investigation, the IC found no error or shortcomings which in itself would cause such an occurrence. However, the IC found track defects, and state of motion, as well as shortcomings in the track supervision system, which may be related to the occurrence.

A speed limit of 5 km/h was introduced on the switch involved in the derailment following the occurrence, and subsequently the switch was replaced. For this reason the IC proposed no safety recommendation, but reminded the operator's attention to eliminate the shortcomings of regulation.

3. CONCLUSIONS

3.1 Direct causes

The IC identified no cause which in itself would be responsible for the derailment, but the rail surface defect and the broken switch tongue tip had contributed to the occurrence (2.2.1).

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the track was unilaterally sunken and contained water-pockets (2.2.1);

b) the height difference of the rails significantly exceeded the limit (2.2.1);

c) the railway vehicle had no defect which could be related to the occurrence (2.2.2).

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) there is no proper requirement with maintenance dimensions for narrow-gauged railways; the related earlier safety recommendation was followed by no action (2.2.1.1);

b) the company does not have the operation rules required by the relevant legislation (2.4).

3.4 Other risks

Factors which are not related directly to the occurrence, but increase risk:

a) the railway company is waiting for action by the authority before meeting their obligation required by the law (2.4.1), while

b) the railway authority fails to enforce the upgrading of the outdated instructions (2.4.2).

3.6 Lessons learnt

Although the investigation did not identify a direct cause of the derailment clearly, some shortcomings and obsolescence of the track supervision and maintenance rules can be identified, which may largely contribute to similar occurrences.

A railway company should demonstrate such level of safety awareness which excludes that they wait for an action by the authority before eliminating the shortcomings of regulation (2.2.1.2).

4. ACTIONS TAKEN

The switch involved in the derailment was replaced in the subsequent year.

5. SAFETY RECOMMENDATION

The IC does not find a safety recommendation justified, but calls attention to the performing of the obligation required by legislation.

2018-0610-5 Budapest, Orczy tér

Railway accident / Derailment

Overview of the occurrence

The asphalt pavement of the platform at the Orczy tér stop needed to be opened due to sinkage of the track. Budapest Közút Zrt. was assigned to do the job, which they commenced in the evening of 24 May 2018. At 22:52, the tram № 24 derailed on the debris of the opened pavement.

The IC found that the contractor performing the road opening works had no foreman with railway foreman qualification, neither did the contractor have experience in this field.

BKV had assigned the contractor with regard to a decree (relating to roads) of Budapest General Assembly.

TSB issues a safety recommendation relating to the process of selection of contractors.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) The debris from the opened pavement between the rails significantly overhung into the track gauge, and lifted the tram (2.2.1).

2.5.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the track sank, due to which the pavement overhung into the track gauge by 25 mm at least already before it was opened (2.2.1);

b) neither the construction company nor its employees had the necessary experience or qualification for the works (2.2.2.2);

c) the construction company was selected (and a framework agreement had been signed with it) on the basis of a rule which should not have been applied to the actual place (2.2.3);

d) the railway company did not provide track possession or special supervision for the works, although the expected risk was higher than usual for several reasons (2.2.4).

2.5.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) due to a decision by the Capital (the owner), BKV Zrt. was forced to employ a contractor which was not suitable to perform the works (2.2.2);

b) the signing of subcontracts is complicated and slow, and no suitable subcontractor was available at the time of the occurrence (2.2.3);

2.5.4 Other risk factors

Factors which are not related directly to the occurrence, but increase risk:

a) the regulation relating to training is biased to the traffic approach (2.2.6);

b) part of the passenger platform was occupied as working area without any marking, so the trams were forced to stop at a non-marked area, and neither the passengers nor the tram drivers had been informed on it (2.4.1);

c) works were performed by a potentially dangerous machine along the platform which was also open for passengers (2.4.3).

2.5.5 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that:

a) the tram driver approached the scene carefully, at low speed (2.4.1).

2.5.6 Lessons learnt

Similar occurrences can be avoided by performing such works in track possession or under active supervision of a qualified and experienced foreman or special supervisor.

However, this occurrence provides also a useful lesson in how a decision affecting (or even impairing) transport safety can be made not only within the operation area but also at the financial, legal and top management levels. During the preparation of such decisions, and then within the decision process itself, it is necessary to involve such employees who are aware of the safety hazards implied in such works, and it is important to carefully consider and use their opinions and suggestions.

Appropriate evaluation and recognition of proficiency are important when selecting a company for signing a contract with (2.2.3).

3. ACTIONS TAKEN

The works were suspended with immediate effect, and it may be continued outside the service hours of the tram line and under special supervision. According to plans, an internal instruction will regulate that an external contractor who has no tram traffic examination may only perform works within the live track zone under supervision only.

4. SAFETY RECOMMENDATION

4.1 Safety recommendations issued during the investigation

No safety recommendation was issued during the investigation.

4.2 Further safety recommendations

BA2018-0610-5-01: *During the investigation into the occurrence, the IC found that the subcontractor that worked on the tracks of the railway company had no appropriate practice or qualified staff for the given work, and could not hire a subcontractor with appropriate experience at the time of the occurrence.*

Transportation Safety Bureau recommends Budapesti Közlekedési Zrt. to review the procedure of selection and hiring of subcontractors in order to ensure that appropriately qualified contractors be hired to perform or supervise works.

By acceptance and expected implementation of the safety recommendation, it can be ensured that only suitable work crews perform work on tracks.

In their comments to the Draft Report, BKV Zrt. gave the information that they had commenced implementation of the above recommendation.

2018-0634-5 Pestszentimre - Gyál

Railway incident/Other

Overview of the occurrence

On 29 May 2018, at 17:05, the trains Nos. 2923 and 2936 travelled in the opposite direction on the same track between the stations Pestszentimre and Gyál. Owing to successful notification, the collision of the two trains was prevented: the train № 2936 was stopped soon after its departure, and the train № 2923 was stopped at the stop Gyál-felső. The distance between the two trains was 1.9 km when both of them stopped. No injury to people or damage to property occurred in consequence of the occurrence.

The IC attributed the cause of the occurrence to human factors. The traffic manager at Gyál station dispatched the train № 2923 in the direction of Pestszentimre without authorisation, despite previous agreement, and he only became aware of the risk of collision of trains after the authorisation.

During the investigation of the occurrence, the IC found that, between Pestszentimre and Örkény stations along the line № 142, communications relating to the train traffic (requesting and giving authorisations, feedbacks) take place by radio communication on a continuous basis, therefore the IC proposed that a safety recommendation be issued.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) Despite previous agreement, the traffic manager at Gyál station dispatched the train № 2923 in the direction of Pestszentimre.

2.5.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

b) Due to problems with the safety installations along the railway line № 142, the train traffic did not fully follow the timetable in the period preceding the occurrence.

c) The line traffic manager failed to take over initiation relating to determining the point of meeting of the trains, so the crossing points of trains were negotiated between the traffic managers.

d) Train delays, which are fairly frequent along this line, are not tolerated well by passengers, and they often “blow off steam” caused by discontent on the railwayman (e.g. the traffic manager) available on the spot. According to report of the traffic manager at Gyál station, there was a similar scene in this case as well, which largely increases the stress level and impairs concentration of the affected person.

2.5.3 Other risk factors

Factors which are not related directly to the occurrence, but increase risk:

e) At seven stations along the railway line № 142, the communication relating to the traffic of trains takes place via radio. Often, radio communications of different type, as well as communications related to work performed at other railway lines can also be heard between their own communications. That largely increases the probability of a hazardous situation following a misunderstood message, or of delay (due to system occupancy) of an immediate safety-critical message necessary to resolve an emergency situation.

2.5.4 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that:

f) The traffic manager of Dabas station monitored the train traffic along the line even beyond his scope of responsibility, so he was able to notify, in time, the locomotive driver of the train № 2923 of the dangerous situation ahead. Thus he prevented the train № 2923 from departing from Gyál-felső stop.

3. ACTIONS TAKEN

The IC has no information on any action taken.

4. SAFETY RECOMMENDATION

4.1 Safety recommendations issued during the investigation

BA2018-0634-5-01A: *During the investigation, the IC found that, at seven stations along the railway line № 142, the requesting and granting of authorisations, as well as communication relating to the traffic of trains takes place via radio, which the IC think breaches the safety of communications and increases the probability of hazardous situations.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology, and to Hungarian State Railways as infrastructure operator, to consider reviewing the communication system used along the railway line № 142 and the grounds for using such system, including whether the definition of "emergency situation" complies with the requirements specified in the Safety management System of MÁV Zrt. On the basis of the findings of your review, please take action as necessary.

By acceptance and expected implementation of the safety recommendation, the probability of hazardous situations due to missed or misunderstood information would decrease significantly.

2018-0659-5 Budapest, Újbuda-Központ Station

Railway accident / Derailment

Overview of the occurrence

On 05 June 2018, at 15:27, the type Combino tram number 4 derailed on the switch № K1032 (the first switch on its way) while leaving Újbuda Központ terminal.

No one was injured in consequence of the occurrence, and the damage to property was also low, but the resulting traffic jam was considerable.

The IC attributes the occurrence to a fatigue fracture of the pull rod in the switch, which took place when the tram was rolling over the switch. The fastening of the switch tongue was loosened by such fracture, so the third bogey of the tram went on straight, unlike the others ahead of it, and the vehicle derailed due to the resulting forces of stress.

Possible cracks of the pull rods cannot be identified by visual inspection, and a crack testing would be disproportionately costly. The safety risk caused by the lack of testing is low, i.e. acceptable. A BKV Zrt. intends to prevent similar occurrences by replacing similar switches by modern devices (in which the likelihood of similar defects is lower) in more frequented, heavy-duty areas.

Figure: Fracture of the short pull rod

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) Derailment of the tram was caused by the fracture of the short pull rod of the switch № K 1032 while the tram was rolling over the switch [2.1.2],

b) the fastening of the switch tongue was loosened due to fracture of the pull rod [2.1.2],

c) while the tram was leaving the switch, (with the switch between its second and third bogey), the (already unfastened) switch tongue distanced from the stock rail as an effect of vibration, which made the third bogey of the tram go on straight, unlike other bogeys ahead of it, so the tram was exposed to stress, and it derailed [2.1.2].

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

d) During the inspection of switches, the mechanical parts are inspected visually, but that type of inspection is not suitable for detecting a fatigue fracture which has begun in the pull rod [3.3.1.1].

e) There is no other technological requirement for the inspection of the pull rod.

f) An ongoing fatigue fracture cannot be detected by the inspection methods applied; it could only prevented by replacing the part at regular intervals or possibly by crack testing after removing the part.

3.3 Root causes

The IC identified no root causes related to the occurrence.

3.4 Other risks

The IC identified no other risk factors during this investigation.

4. ACTIONS TAKEN

According to information from BKV Zrt., they have commenced replacement of the trailable one-way switches affected by the occurrence by switches with damped snap back on busier lines.

5. SAFETY RECOMMENDATION

Crack testing of the pull rods would be disproportionately costly. The safety risk caused by the lack of testing is low, i.e. acceptable, because the speed of the trams over the switches is low. According to statistics, the occurrence and expected consequences of derailments caused by pull rod fracture are low, except for possible traffic congestion. Therefore the IC found no reason to issue a safety recommendation.

2018-0662-5 Debrecen, crossing of Piac str. and Kossuth str.

Railway accident / Collision of a tram with a road vehicle

Overview of the occurrence

On 6 June 2018, at 17:23, a № 1 tram (Reg. №: 509) collided with a bus at the intersection of Piac street and Kossuth street. The tram derailed due to the collision. The tram driver suffered rib fracture, 1 passenger of the bus was injured seriously, and 11 passengers of the bus had minor injuries.

The IC attributed the occurrence to human factors on the part of the tram driver and to the phase layout of the traffic lights which control traffic at the crossroads. The IC found that the tram driver did not observe the rules of the Traffic Code and the rules specified in Signalling and Traffic Instructions F.1.-F.2, and departed from the stop and entered the intersection when the signal was NO GO for him, but not later than at the very beginning of the preparatory signal.

The IC also found that the phase layout of the traffic lights did not take into account the technical parameters of the vehicles using the affected intersection.

Therefore the IC proposes a safety recommendation for Ministry for Innovation and Technology to initiate modification of GKM Regulation 41/2003. (VI. 20.) GKM in such manner that phase layout of traffic lights should also take into account the parameters of those vehicles which typically participate in traffic.

Figure: The derailed tram (source: Police), and the pulled-over bus

3. CONCLUSIONS

3.1.1 Direct causes

The direct causes of the occurrence were as follows:

a) The tram driver did not observe the rules of the Traffic Code and the rules specified in Signalling and Traffic Instructions F.1.-F.2, and entered the intersection when the signal on the traffic lights was NO GO for him.

3.1.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

b) In the phase layout used at the time of the occurrence, the period of time between two consecutive green lights was shorter than the length specified in the relevant literature.

3.1.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

c) A bus moving at a speed of 50 km/h cannot stop without the risk of accident (avoid entering the crossroads when the light is red and taking the risk of collision with a vehicle coming from another direction or applying the brake too intensively, exposing the passengers to the risk of injury) within the time span of the amber light (intermediate signal).

3.1.4 Other risk factors

The IC identified no other risk factors.

3.1.5 Lessons learnt

Although the GKM Regulation № 41/2003 (VI.20.) allows one and a half times longer time span than the minimum value, this allowance was not applied during the planning of the traffic control of the crossroads affected.

In the case of agreement with the transport company during the planning of the traffic control of the crossroads, and apply the maximum intermediate time span of 4.5 seconds allowed by GKM Regulation № 41/2003 (VI.20.) i.e. a longer “evacuation” time, and the vehicle drivers observe the provisions of the Traffic Code, then the occurrence could have been avoided.

4. ACTIONS TAKEN

Following the accident, Zöldfény Kft. made a new phase layout plan with a corrected intermediate time span for the road junction affected. According to the new phase layout, the affected intermediate time span became 10 seconds.

DKV Zrt. sent the tram driver to a non-scheduled medical fitness evaluation on 17 Aug 2018; rating: fit.

5. SAFETY RECOMMENDATION

5.1 Safety recommendations issued during the investigation

The IC issued no safety recommendation during the investigation.

5.2 Safety recommendation

BA2018-0662-5-01: *The IC of TSB found during its investigation that, pursuant to GKM Regulation № 41/2003 (VI.20.) on the requirements, design, installation and operation requirements for traffic lights, the time pans of leaving and entering shall be calculated on the basis of the geometry of the junction and the speed of its users, but vehicle parameters are not mentioned (e.g. safe deceleration value. taking into account that substantially different results can occur from calculations with the wide-ranging parameters of the vehicles participating in traffic:*

Transportation Safety Bureau recommends Ministry for Innovation and Technology, as the entity responsible for the preparation of the relevant legal rule, to consider making a proposal to amend GKM Regulation № 41/2003 (VI.20.) on the requirements, design, installation and operation requirements for traffic lights in such manner that the planning of the phase layouts of traffic lights should take into account the parameters of the vehicles typically using the road junctions as well as those of the road junctions.

The position of the IC is that, by acceptance and expected implementation of the safety recommendation, the designers of road junctions could design such phase layouts during the planning of traffic lights for road junctions which would allow the users to enter and leave such junctions safely, in compliance with the rules in the Traffic Code.

2018-0679-5 Majláth (Miskolc)

Railway incident / Break-away of vehicles

Overview of the occurrence

At the dawn of 11 June 2018, in Miskolc, two passenger wagons stopped for the night on the night before at Majláth Station of LÁEV broke away and, after rolling 2.4 km, they broke through the buffer stop at the terminal depot in Dorottya street. After the buffer stop, the wagons rolled out towards the tram track, crossed the road, and finally crashed to the side of a tram which was just moving along there. The tram derailed, and its only passenger had minor injuries.

The IC attributed the occurrence to simultaneous absence of several elements of securing the rolling stock against break away. But this was a usual practice within the Railway Operations, and the technical management failed to check and enforce the staff's keeping to relevant procedures.

The shortcomings of the management's activity may be related to overload of the staff as well as to earlier changes to the staff of the railway company, and also to the low level of cooperation within the management.

As the railway company made a number of changes relating to the occurrence, TSB will issue no safety recommendation.

Figure: View of the wrecks at the scene of the collision

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) the crew member in charge failed to apply the handbrakes of the wagons (2.2.1.3);

b) no securing device was put under the wagons (2.2.1.4);

c) the red-white track barrier was left open (2.2.1.4).

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the wagons were left stationary on a track which allows rolling out to the open track (2.2.1.2);

b) the traffic manager delegated his task of closing the track barrier and tolerated its being left open (2.2.1.4);

c) there is no adequate management control in place (2.2.1.4.2);

d) non-compliant practices developed at the Railway Operations are even “handed down” to new colleagues (2.2.1.5).

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) there was no substantial, effective inspection from the part of the Railway Operations management (2.2.1.4.3);

b) Following the renewal of the company management, cooperation between the management of the Railway Operations and the colleagues at the company headquarters was not smooth anymore, which led to partial passivity of the management of the Railway Operations; the top management did not recognise or/and did not manage the newly developed conflicts (2.5.4).

3.4 Other risks

Factors which are not related directly to the occurrence, but increase risk:

a) The Local Annex contains no data of the slope gradients of the railway stations (2.5.1);

b) no double rail skids are in place (2.2.2.1);

c) the traffic manager did not have the qualifications required in relevant legislation (2.5.3.1);

d) the headcount of the Railway Operations is insufficient (2.5.3);

e) sometimes decisions (affecting immediate technical details) which pertain to the responsibility of the Railway Operations, are made at higher level (2.3);

f) as an outcome of the activity of the authority, administrative conformity becomes a stronger criterion than professional conformity (2.5.5).

3.5 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that

a) even in lack of specifications, the staff assess the slope gradients correctly (2.5.1);

3.6 Lessons learnt

Safety-conscious managerial behaviour is necessary to demand that employees conform with basic safety measures – for instance, protection against breakaway in this case (2.2.1.4.2). LÁEV has good chances in this field because the technical conditions are mostly available, and the use of such technical means can easily be fit into the technology currently used (2.2.1.4).

In the case of multi-level company management (which is predominantly typical in railway transport) cooperation between the management levels is essential. It is important for the top management to recognise the lack or obstacles of cooperation and to take action to restore adequate working relationships (2.5.4). This requires special attention if railway operation is not the main activity of the company.

Even a new management can only maintain safe operation if their responsibilities are harmonised with their professional knowledge and workloads, and if their non-safety related tasks and responsibilities do not increase disproportionately either (2.5.4.1).

4. ACTIONS TAKEN

Following the occurrence, the railway company prohibited storage of rolling stock on the tracks № II and № IV at Majláth Station, and took action to enforce compliance with the rules of preventing break-away of rolling stock.

The organisational structure as well as the members of the management of the Railway Operations changed in December 2018: training of new colleagues began.

4.1 Expected actions

It is marginally related to this occurrence that a larger investment project will include:

- expansion of the wagon storage shed, and

- making of a new vehicle repair workshop by reconstruction of an old building.

The latter (if appropriately equipped) may also offer a solution to the vehicle maintenance shortcomings found in connection with the occurrence investigated under number 2014-0605-5:

"The repair workshop of the railway was demolished without providing substitution for it beforehand. There are no organised vehicle maintenance processes (specifications, devices, documentation), and the equipment necessary for vehicle diagnostics is not available."

5. SAFETY RECOMMENDATION

Similar cases can be avoided by observing the rules specified for prevention of break-away of rolling stock, and the railway company has taken action to enforce such rules, and there have also been personnel changes. However, the IC calls attention to those written in the Lessons learnt section.

The IC maintains the safety recommendation issued earlier under number 2010-0464-5-01 relating to the alteration of the practice of control applied by the authority.

2018-0736-5 Iváncsa

Railway accident / Derailment

Overview of the occurrence

On 23 June 2018, at 00:10, the locomotive and 3 empty rail tankers of the freight train № 95817 derailed on the switch № 9 while the train was entering Iváncsa Station with compliant switch handling along a locked route.

The IC attributed the occurrence to human factors on the part of the pointsman who had failed to check the serviceability of the switch by performing a trial set-up, so he did not detect that the switch № 9 had been burst open previously.

The IC analysed the movement of the train № MRN-2 (during which the switch № 9 had been burst open) as other risk factor.

Although TSB issues no safety recommendation, the lessons learnt from the occurrence is discussed in Section 3.6.

Figure: The derailed train

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The switch tongues of the switch № 9 of Iváncsa Station were too far from both stock rails therefore the train № 95817 derailed on them.

b) The pointsman failed to check serviceability of the switch when setting the route, so he did not detect the burst-open state of the switch.

c) The locomotive driver did not have the chance to detect the half-way position of the switch in time from his moving train.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The train № MRN-2 burst open the incorrectly set switch while leaving the station.

b) The station crew did not apply signals to guide the train out along the locked route, so the switch № 9 remained in incorrect setting undetected.

c) The pointsman authorised the departure of the train using the hand signals specified for shunting manoeuvres without checking the switch in advance.

d) The permanent shunting master of the support train did not detect the incorrect setting of the switch.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) The crew had no adequate knowledge of the instructions relating to the movement of support trains.

b) The layout of the leading wagon of the pushed train did not allow the permanent pointsman to stay at a point from where he could have monitored the route from appropriate distance along the way which may be several kilometres even.

c) The pointsman omitted the serviceability check of switch № 9 because of habit.

d) This routine-based error had not been revealed by the controls or had not been rectified sufficiently.

3.4 Other risks

Factors which are not related directly to the occurrence, but increase risk:

3.6 Lessons learnt

In many cases, the functional limitations of mechanical installations need to be substituted by human activity. Where the switch is controlled by point wire, the end position of switch tongues of the switches can be checked electronically by an appropriate device, and the result can be integrated into the interlocking system of the safety installations.

Such an end-point check would significantly reduce the risk of accidents originating in entering a burst-open switch. In view of the continuous renewals, reconstructions and the planned development projects, the infrastructure operating company should decide in which stations it would be optimal to introduce a system like that.

4. ACTIONS TAKEN

The IC has no information on any action taken relating to the occurrence.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and through reasonably attentive work by the personnel, therefore no safety recommendation needs to be issued.

2018-0800-5 Gödöllő

Railway accident / Collision with an object

Overview of the occurrence

On 6 July 2018, at 10:34, the Intercity train № 682-1 just leaving Gödöllő station crashed to the bucket of an excavator which was loading at a temporary level crossing under construction. No one was injured in the accident. The main frame of the locomotive was dented and its paint was damaged, but the vehicle remained serviceable.

The IC found that the operator of the excavator had not been notified adequately (or at all) of the approaching train, and the train had been moving faster than the speed limit past the low-speed stretch signal, which had taken away the chance to avoid the emergency situation.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) the excavator turned into the track clearance in front of the approaching train (2.1.2);

b) the train was moving at a speed in excess of the speed limit (2.2.3).

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the place designated for the excavator was too close to the track in use (2.2.1);

b) no watchman supervised the works (2.2.1);

c) the foreman did not notify the operator of the excavator adequately (or at all) of the approaching train (2.2.1);

d) the working area was unmarked (2.2.1).

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) the infrastructure operator does not efficiently supervise those working in the working areas on the railway (2.2.2).

3.4 Other risks

Factors which are not related directly to the occurrence, but increase risk:

a) the people working around the working area were not instructed about the dangers of work around the overhead contact line (2.4).

3.5 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that

a) when detecting the movement of the excavator, the locomotive driver gave aural signal, and upon that, the operator of the excavator began to turn his machine back (2.1.2),

b) the workers were aware of the dangers of the overhead contact wire, at least at the general knowledge level (2.4).

3.6 Lessons learnt

By proper selection of the speed of the train, even the risk of accidents caused by causes external to the railway systems can be lowered.

4. ACTIONS TAKEN

According to information received from MÁV Zrt.:

“In 2018, several accidents occurred in consequence of disregarding the track clearance. Safety Division, MÁV Zrt. ordered intensified controls in order to prevent similar occurrences. We performed such controls every day for two weeks in August 2018, and twice a week subsequently.

Such controls are still performed on a continuous basis.

Discipline at the workplaces improved, but we had no full powers with such controls because the working area had been transferred to the contractor. Accordingly, we were able to maintain protection of the track clearance only by intensively controlling the accuracy of the work of the railway construction contractor and the traffic manager personnel.

However, an amendment of Act CLXXXIII of 2005 on Railway Transport supports our effort made to maintain safe transport.”

The last sentence cited from MÁV Zrt. refers to a change in legislation mentioned in Chapter 1.10.4 which provides for the rights and obligations of supervision of the infrastructure operator over contractors performing outsourced works.

A result of such obligations is that the infrastructure operator cannot waiver safety tasks on grounds of the outsourcing of the works.

The railway transport authority has not given information relating to the implementation of the earlier safety recommendation mentioned in Section 1.16.1.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by due attention from those performing the works, but, due to human nature, long-sustained attention cannot be guaranteed, therefore the IC maintains the Safety Recommendation № BA2016-0699-5-02 issued earlier.

2018-0808-5 Budapest, Erdei Iskola Station

Railway incident / Signal passed at danger

Railway accident / Derailment

Overview of the occurrence

On 8 July 2018, the switch of Erdei Iskola Station on the rack railway got jammed during setting, and accordingly, the main signal remained in "Danger!" position. However, the train with Reg. № 53-63, which was heading downstream, departed past the signal at danger, entered the switch, and derailed on the middle part of the switch.

The IC found that the occurrence could primarily be attributed to the attention of the driver of the vehicle, but the technical defect of the switch and the traffic dispatcher's failure recognize the disorder of switch setting (and failure to intervene before the derailment took place) also contributed.

2.5 CONCLUSIONS

2.5.1 Direct causes

The direct causes of the occurrence were as follows:

a) The switch № 1 of Erdei iskola Station did not reach its endpoint during the setting up (2.2.1);

b) the driver of the vehicle left the Adonis u. Station past the signal at danger (2.2.2);

c) the traffic dispatcher did not notice the malfunction indication of the switch setting, so he could not intervene in order to eliminate the danger situation (2.2.3).

2.5.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The technical condition of the switch № 1 of Erdei iskola Station is not suitable: the rails do not reach their endpoints even when the safety installations already sense a correct end position (2.2.1).

2.5.3 Root causes

The IC identified no such factor.

2.5.4 Other risk factors

Other risk factors:

a) The FUTÁR device orders departure even if the traffic conditions do not exist (2.2.2).

3. ACTIONS TAKEN

BKV has not given information on any action taken. Soon after the occurrence, reconstruction works commenced on the track, but the turnout involved in the occurrence is not included; however, the Városmajor District Inspector aims at having the deformed switch parts repaired also, simultaneously such reconstruction works, before the end of the track possession period.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and through reasonably attentive work by the personnel, therefore no safety recommendation needs to be issued.

2018-0844-5 Göd

Railway incident / Signal passed at danger

Overview of the occurrence

On 15 July 2018, at Göd Station, the train № EC 272, which was departing after a scheduled stop, travelled past the VR exit signal at danger without authorisation, burst the switch № 7 open, and then stopped within the area of the station. The traffic manager set the entry signal to "danger" for the train № EC 277 coming from the opposite direction, so that train was able to stop in front of the entry signal by normal application of the brakes.

The IC attributed the occurrence to human factors on the part of the locomotive driver who failed to observe the exit signal before departure and during leaving the station.

It contributed to the occurrence that other activities (closing the entry door, sitting down and getting settled) distracted the locomotive driver's attention after departure, and that the senior ticket inspector did not observe the exit signal either before giving authorisation to the locomotive driver to start.

TSB issues no safety recommendation.

Figure: Positions of the two trains relative to each other after the occurrence

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The locomotive driver failed to observe the exit signal before starting and while approaching the signal.

3.2 Indirect Causes

b) Due to malfunction of the rear-view camera, the locomotive driver had to view the senior ticket inspector's signal, and, during the acceleration period, his attention was distracted by closing the door and sitting back down on his seat;

c) The senior ticket inspector failed to observe the exit signal before giving authorisation to the locomotive driver to start.

3.3 Root causes

The IC identified no such cause.

3.4 Other risk factors

Other risk factors:

d) The exit signal was not fastened to the ground properly;

e) Due to malfunction of the rear-view camera, it was not possible to monitor the space besides the moving train, i.e. it would have been impossible to notice someone falling out of or under the train.

3.5 Proven procedures, good practices

It helped mitigate the consequences of the occurrence and avoid a more serious outcome that

f) Taking notice of the emergency situation, the traffic manager set the entry signal to "danger".

4. ACTIONS TAKEN

The IC has no information on any action taken following the occurrence.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and through reasonably attentive work by the personnel, therefore no safety recommendation needs to be issued.

2018-0869-5 Kunszentmárton

Railway accident / Derailment

Overview of the occurrence

On 21 July 2018, at 15:08, 4 axles (2 bogeys) of the passenger train № 7224 derailed on switch № 2 while arriving at Kunszentmárton Station.

No one was injured in consequence of the occurrence.

The IC attributed the occurrence to the technical condition of switch № 2 and to human factors.

After a longer wearing period, the apparatus which moves and secures the switch tongue fell apart during switch positioning. During the positioning of the switch for turnout position, the switch tongue remained in its previous position. When the train rolled on the switch, both switch tongues lay against the stock rail, which resulted in derailment of the train.

While positioning the hand-operated switch, the pointsman did not realise that both the straight and the curved switch tongues were lying against the stock rail.

TSB maintains its Safety Recommendation issued relating to the occurrence of 8 June 2017 at Ferencváros Station and investigated by TSB under № 2017-0720-5: is the reliability of the switch tongue – point rod – control rod connection sufficient or is it necessary to integrate the inspection thereof into the rules of the safety management system. An appropriate addition would considerably improve detection of similar defects and prevention of similar occurrences.

Figure: The derailed motor train set

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) the connection between the straight switch tongue and the tongue attachment was lost due to malfunctioned screwed joints,

b) after positioning the switch, the pointsman failed to check whether the straight switch tongue had the sufficient distance from the stock rail.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) the connection between the straight switch tongue and the tongue attachment might have got loose due to improper installation,

b) the loose and worn state of the screws was not identified during the track supervision activity.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) The inspection of these parts – the malfunction of which may cause derailment – is not part of the technical control process of the switches.

3.4 Other risk factors

The IC identified no other risk factors during this investigation.

4. ACTIONS TAKEN

To the knowledge of the IC, no action has been taken relating to the fastening of switch tongue attachments of switches equipped with stock rail fastening latch-lock yet.

5. SAFETY RECOMMENDATION

TSB maintains its Safety Recommendation issued relating to the occurrence of 8 June 2017 at Ferencváros Station (and investigated by TSB under № 2017-0720-5), because it has only been implemented for diamond crossings only, although similar risks exist with ordinary switches as well. The IC‘s position is that, with appropriate additions, the inspection procedure applied for diamond crossings would provide the identification of similar defects in the case of ordinary switches as well.

2018-0901-5 Debrecen

Railway incident / Signal passed at danger

Overview of the occurrence

On 26 July 2018, at 14:27, the freight train № 45484-1 passed the second signal (H) at danger without prior authorisation while approaching Debrecen station. Realising the inappropriately positioned switch № 7/B, the locomotive driver applied emergency braking, but was not able to stop the train in time, so it burst the switch № 7/B and stopped in the switching zone.

The IC attributed the occurrence to human factors related to the locomotive driver, as direct cause, because he had disregarded the signal H and found its 'Danger' display invalid.

The IC mentioned the unserviceable train control system and the shortcomings of line knowledge as indirect causes.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The locomotive driver disregarded the second entry signal at danger therefore he did not use the brake system in time.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The track part of the train control system was out of order and failed to warn the locomotive driver that he was approaching a signal at danger.

b) The locomotive driver did not realise that he was approaching a second entry signal.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) The structure and practice of line knowledge tours were inappropriate.

b) The route book did not contain appropriate data relating to the locations and quantity of the signals involved by the route of the train.

3.4 Other risk factors

The IC found no other risk factor.

3.6 Lessons learnt

TSB will issue no safety recommendation relating to the line knowledge tours, but points out that, although regulation specifies the number of the tours to perform, railway companies with appropriate safety culture regard those numbers as minimum. Accordingly, they perform risk assessment relating to the various routes and schedule as many training travels for their locomotive drivers as necessary to acquire knowledge of the lines.

In addition, it is also necessary to call attention to special places, situations, particular track and traffic characteristics and to provide accurate route books.

4. ACTIONS TAKEN

The IC has no information on any action taken.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the rules, by accurate preparation of the route book, and by due attention of the personnel therefore no safety recommendation needs to be issued.

2018-0904-5 Tatabánya

Railway incident / Signal passed at danger

Overview of the occurrence

The train № 34494, authorised by the outside movement inspector via manual signal, passed the single exit signal № V5 at danger, burst the switch № 17/a open, and travelled from Tatabánya Station as far as Környe Station. Such signal passed at danger did not jeopardise any other movement, and it did not cause any injury either. According to the locomotive driver's memory, the exit signal cleared him to continue.

During the investigation, the IC found that the safety installation had worked properly, and no clearance to continue had appeared on the exit signal or on the display in the driver's cab.

The IC attributed the occurrence to human factors on the part of the locomotive driver, and to the safety risk of the work practice which had been established at the station.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The traffic manager in charge did not set the exit signal at the scheduled departure time of the train, although there was no obstacle to it;

b) The outside movement inspector received no authorisation from the traffic manager to give authorisation to the locomotive driver of the train involved in the occurrence;

c) Prior to giving authorisation, the outside movement inspector did not ensure that every necessary safety action had been taken for starting the train;

d) The locomotive driver did not check the exit signal, and left the station past the V5 signal at danger without authorisation.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The red image of the V5 signal cannot be seen clearly from the platform of track V/a, neither from the driver's cab of the train departing from there;

b) Due to the design of the safety installation, for those trains which change direction on Track V/a, Phase 1 is fed from the V5 signal to the train control system only after the setting up of the track route therefore the system does not provide train-stopping function for a train which arrives onto the dead-end track or returns from the dead-end track.

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) According to the established practice, communication between the outside movement inspector and the traffic manager in charge takes place only when traffic is organised in a way other than usual.

3.4 Other risk factors

The IC revealed no other risks.

3.5 The lesson learnt

As a result of the design of the continuous (not discrete) signal transmission system, the direction of the movement of the vehicle and the direction of feeding of the track signals must be opposite for correct operation. The direction of signal feeding does not change when the direction of the movement of the train changes: it requires an action by the operator of the system who is independent of the locomotive driver. During the period preceding such action, the train control system works as if it would be on a track section which lacks signal transmission, and the locomotive driver must also be aware of it while driving his train. Here, man must take over the role of the mechanical protection system, and the sources of dangers implied by this can only be eliminated by intensive, conscious attention.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and by paying due attention therefore the IC proposes no safety recommendation.

2018-1019-5 Dömsöd

Railway incident / Signal passed at danger

Overview of the occurrence

At Dömsöd station, the train № 343-2 , which was moving through according to schedule, passed the V3 signal at danger without authorisation, then burst the switch № 1 open, and stopped 62 metres after the switch. The train № 7927, coming from the direction of Kunszentmiklós-Tass and approaching the down-side entry signal of the station stopped before such entry signal; the distance between the two stopped train was 380 metres.

The IC attributed the occurrence to human factors on the part of the locomotive driver, but misleading, attention-diverting circumstances were also found.

Figure: The trains after they stopped

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The locomotive driver did not realise the yellow image on the entry signal, so he did not prepare for stopping according to the displayed signal (2.2.1).

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The organisation of train traffic and the selection of the tracks for receiving the trains proved to be misleading (0);

b) The driving style applied by the locomotive driver to approach the slow track section caused significant distraction of his attention (2.2.1).

3.3 Root causes

The IC revealed no such causes that are distant in time and space but which are related to system operation within the regulatory environment and in the safety management system:

3.4 Other risk factors

Other risk factors:

a) The traffic manager did not receive the train as required by the rules (2.2.2);

b) The Unified Vigilance Warning and Train Control Device (UVWTC) used on the Hungarian railways is not suitable for stopping the train before a signal at danger (2.4);

c) The locations of the signals in site drawing (which constitutes an annex to the Station Instructions) are not consistent with the text of the Station Instructions (1.4.3).

3.6 Lessons learnt

A recurrent problem in the background of signal passed at dangers is the lack of careful observation of the distant signal and the division or distraction of attention, as well as the fact that the traffic management personnel fails to inform the affected locomotive drivers on extraordinary, complex traffic situations (meeting of three trains), so the identification and correct solution of such situations depend solely on the locomotive drivers' attention.

4. ACTIONS TAKEN

No action taken by the railway transport authority is known, they gave no answer to the relevant inquiry of the IC.

The railway company started a disciplinary action related to the locomotive driver involved, and sent him to a non-scheduled medical fitness evaluation as required by the regulation relating to railway medical certification (1.10.5).

Also, they warned locomotive drivers to observe instructions, but they did not inform the IC on any action which would prevent locomotive drivers from making similar mistakes.

5. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and by paying due attention by the locomotive driver therefore the IC proposes no safety recommendation.

2018-1178-5 Rákos - Pécel (AS152)

Railway accident / Accident at a level crossing

Overview of the occurrence

On 28 September 2018, at 14:06, between the stations Rákos and Pécel, the train № IC 514 collided with an automobile at the level crossing № AS152 (protected by barrier and warning lights) at Rákoscsaba – Újtelep stop. Three occupants in the car had serious injuries and one had minor injuries in consequence of the collision. The automobile was damaged so badly that it cannot be repaired economically.

According to findings of the investigation performed by the IC, the lamps of the warning lights of the level crossing did not works, neither white, nor flashing red light could be seen, and the barrier was in vertical (i.e. open) position.

The IC attributed the occurrence to human factors on the part of the driver of the automobile (the driver failed to observe certain provisions of the Traffic Code) and to technical factors related to the safety installation (the system entered break-down state instead of closing the level crossing).

Although TSB issues no safety recommendation, but the lessons learnt from the occurrence are discussed in Section 3.5.

MÁV Zrt. sent the following comment to the Draft Report:

- “Red-light extension in automated open-line level crossing barriers does not guarantee (in itself) that the train will be notified and the accident can be prevented, but it clearly increases safety. Newly-installed systems already contain the necessary electric circuits. The special service responsible for safety installations has no resources available currently to install red-light extension in existing railway crossing systems”.

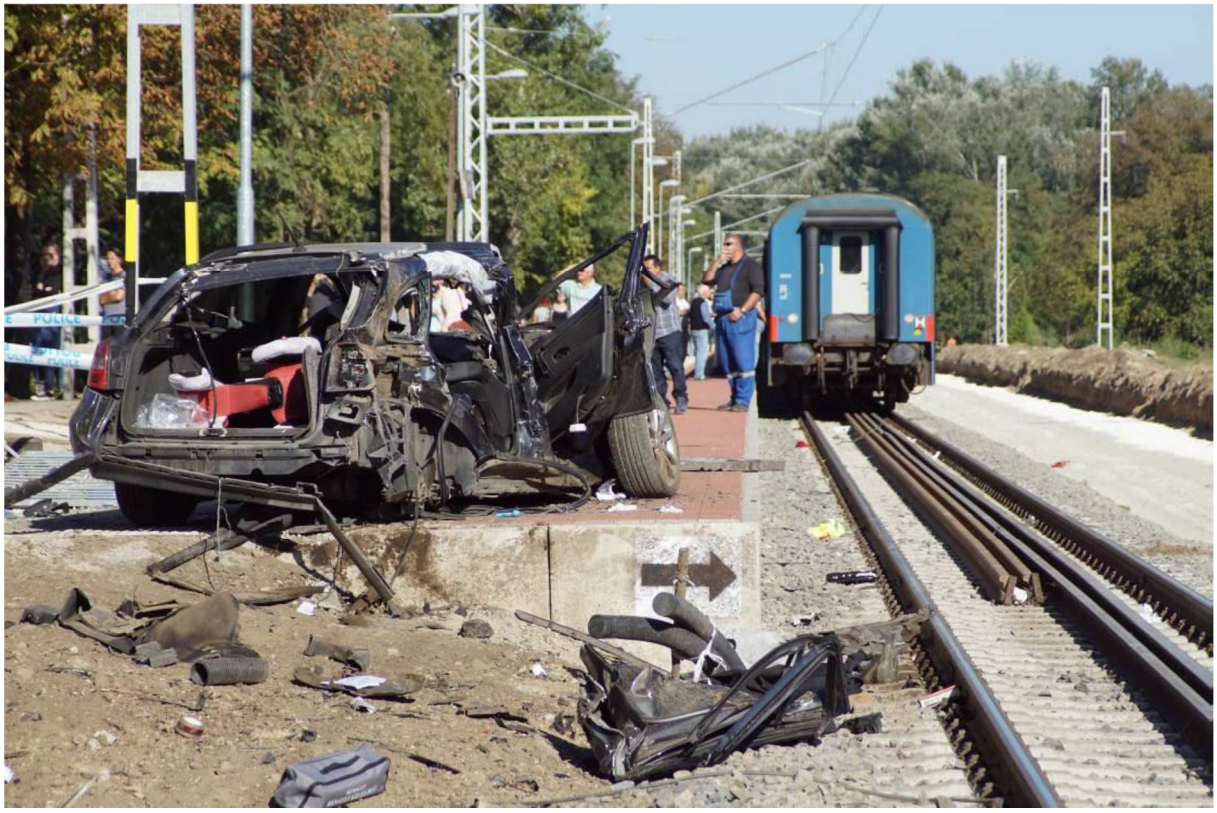


Figure: The wreck of the car with the train in the background

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) Prior to the occurrence, the barrier and warning lights system № AS 152 entered break-down state, of which the locomotive driver of the train № IC 514 was not aware, so he did not lower the speed of the train, and approached the level crossing at a speed of ca. 87 km/h.

b) The driver of the automobile entered the level crossing without stopping and making sure of the possibility of safe crossing

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The operation of the barrier system at the scene of the occurrence does not meet the requirements of OVSZ, because in the case of break-down state following the start of closing, the warning lights go dark, i.e. they give no signals as far as the train leaves the level crossing.

b) In cases where the barrier system of a level crossing enters break-down state, the rules currently in effect (OVSZ, FMSZ, System of Instructions for the National Railway Network) shift responsibility for crossing solely on the driver of the road vehicle for the period of arrival of the first trains (which cannot already be noticed of the breakdown), notwithstanding the fact that the driver of the road vehicle cannot make sure of the possibility of safe crossing in each case.

c) The visibility of the warning lights and the rail track was slightly impaired by the sun which was shining from an unfavourable direction, and the sight of a cyclist just cycling through the level crossing may have given the false impression of safety to the driver of the automobile involved.

3.3 Root causes

c) The IC found no root cause.

3.4 Other risk factors

a) The signposting of the level crossing is inappropriate for the direction from where the automobile arrived on the road.

3.5 Lessons learnt

The lessons learnt from this accident and earlier similar occurrences (1.16.) show that a simple technical improvement (integration of red-light extension), which is not too costly in comparison to preventable consequences, would be sufficient to prevent most of similar accidents. It is the responsibility of the infrastructure operator to analyse the findings of such accident investigations (relying on its Safety Management System), and to develop and implement appropriate measures to increase safety.

4. ACTIONS TAKEN

Red-light extension will be implemented for the level crossing with warning lights and barrier № AS 152 during the reconstruction of the rail track.

5. SAFETY RECOMMENDATION

TSB maintains its safety recommendations issued earlier relating to this topic (1.16), and similar accidents can be prevented by implementation of such recommendations and by observing the relevant rules therefore new safety recommendation is necessary.

2018-1309-5 Székkutas - Orosháza (AS1301)

Railway accident / Railway accident at level crossing

Overview of the occurrence

While travelling according to the timetable, the train № 7706 collided with an automobile at the level crossing № AS 1301 (protected by warning lights and half-barrier) between the stations Székkutas and Orosháza; inconsequence of the collision, all of the four people sitting in the automobile died.

According to the findings of the investigation, both the warning lights and the half-barrier worked correctly at the time of the accident: flashing red light was shown towards the road, and the half-barriers were in horizontal position.

The IC attributed the occurrence to human factors on the part of the driver of the automobile, establishing that the automobile had entered the level crossing despite the red signal of the warning lights, bypassing the half-barrier.

TSB issues no safety recommendation.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The driver of the automobile entered the level crossing bypassing the closed barrier and despite the flashing red light of the warning lights.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The shining of the setting sun blinded the driver of the automobile on the road section preceding the level crossing, and the driver disregarded this fact when selecting the speed of his vehicle.

3.3 Root causes

The IC found no such causes.

3.4 Other risk factors

Other risk factors:

The IC found no such causes.

4. SAFETY RECOMMENDATION

The accident could have been avoided by observing the relevant rules in the Traffic Code therefore no safety recommendation is necessary.

2018-1498-5 Budapest, Határ út Station

Railway accident / Derailment

Overview of the occurrence

The second bogey of the tram approaching the terminal Határ út M, Budapest derailed on the switch № 5.

According to investigation findings, the main signal displayed 'End of movement authority' to the tram before it moved onto the switch. The control panel operator did not notice the unauthorised signal passed at danger, and, during the route setting initiated by him, the switch was changed to turnout direction while the tram was moving over on it.

The IC attributed the occurrence to the design of the signal system at the terminal station and to human factors on the parts of the tram driver and the control panel operator.

Figure: The derailed tram

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) The tram driver entered the switch despite the 'End of movement authority' sign on the main signal (2.2.1);

b) The control panel operator was just positioning the switch when the tram was moving just over it (2.2.2).

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) The switch positioning system does not check directly whether a switch is unoccupied (2.2.3);

b) The attention of the tram driver was presumably distracted by environmental effects (2.2.1).

3.3 Root causes

Causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system:

a) The switch positioning system does not give the operator reliable information on the occupation state of the switches, which may reduce the operator's alertness (2.2.3).

3.4 Other risk factors

The IC identified no other risk factor.

3.6 Lessons learnt

Similar occurrences may be avoided predominantly by careful attention of the personnel, but a more reliable occupation-detecting solution would considerably assist their work.

4. ACTIONS TAKEN

The Chief Engineer's Office, BKV Zrt. has taken the following actions:

Education and training

In the meantime, BKV Zrt. modified the scope of training and subjected it to Training Division, KTI (Institute for Transport Sciences Non-profit Ltd.) for approval. The infrastructure related training program concerned is issued centrally, while the training organisation may submit proposals.

Within the time frame of periodical training sessions, movement with main signals and the consequences of bursting switches open are included in the training with more emphasize through new traffic safety posters. The training syllabus is regularly updated by involving recent information leaflets.

As the derailment involved is very similar (both in terms of causes and actual course of events) to the occurrence of 30/08/2018 at the Terminal at Festetics street, the more detailed and better illustrated analysis of that occurrence was involved in the syllabus of the refreshing training held in of spring of 2019, with highlight on the following:

- The risk of switch operation under the vehicle exists due to the design of the equipment, i.e. the lack of detection of the vehicle;

- In each case of switch positioning, the operator must check the actual traffic situation by looking around the switching zone;

- Similar attention must be paid when applying "counted switch operations".

According to information from Traffic Supervision Service, this topic will be dealt with again during the autumn training sessions.

Enforcement order at the terminal station

The Enforcement Order relating to Határ Út Terminal is going to be augmented and other amendments will also be included in it with regard to the lessons learn from the occurrence concerned.

Control

Those entitled to carry out supervision pay more attention to checking whether the rules related to main signals are observed.

5. SAFETY RECOMMENDATION

Similar occurrences may be prevented by due attention of the personnel. Technical development to support work may be justified, but, taking into account that the risk is low due to low speeds, it is not sure that the cost of such development would be proportionate to the risk concerned. Due to the aforesaid, no safety recommendation is necessary.

2018-1521-5 Zalaegerszeg

Railway incident / Signal passed at danger

Overview of the occurrence

Despite the danger indication of the joint exit signal, the outside movement inspector authorised the locomotive driver of the train № 9531 to start from Track V at Zalaegerszeg Station; the train started and burst the switches № 17, 15 and 13 (being in incorrect position for that train) open, and finally stopped between the switches number 13 and 11. The switch № 13 was the switch involved in the route of the train № IC958 already approaching. The train № IC958 stopped before the falling back entry signal. No one was injured. The IC attributed the occurrence to human factors on the part of the outside movement inspector and the locomotive driver.

3. CONCLUSIONS

3.1 Direct causes

The direct causes of the occurrence were as follows:

a) Misunderstanding the instruction received from the traffic manager in charge, the outside movement inspector authorised the locomotive driver to start, despite lack of actual clearance and with the exit signal at danger;

b) After receiving an authorisation, the locomotive driver failed to ensure whether the exit signal invariably displayed a clear signal.

3.2 Indirect Causes

Those findings relating to competences, procedures and maintenance which are related to the factors enumerated above:

a) Although he had passed the independence examination, the outside movement inspector did not have sufficient experience to manage situations which are unusual in normal operation.

3.3 Root causes

The IC identified no causes that are distant in time and space from one another but which are related to system operation within the regulatory environment and in the safety management system

3.4 Other risk factors

Other risk factors:

a) The display of the “Dism” signal of the station cannot be seen clearly on a continuous basis due to obstruction by the support poles of the overhead contact line;

b) The lights along the road near the railway station considerably impair the visibility of the signals;

c) Signal transmission from the track to the train control system is not installed at the station;

d) The traffic manager in charge was aware that the outside movement inspector had little experience, but he paid no sufficient attention to check whether the outside movement inspector really understood the given traffic situation.

4. SAFETY RECOMMENDATION

Similar occurrences can be avoided by observing the relevant rules and through reasonably attentive work by the personnel therefore no safety recommendation needs to be issued.

6. SAFETY RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

In 2019, the addressee of the safety recommendations was primarily the National Transportation Authority, as National Safety Authority (NSA). TSB deviates from this practice only when it issues safety recommendations to organisations which are not under the scope of authority of the NSA (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 NSA 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 NSA has no legal right to take action in topics, which could be solved easily by the IM or RU.

In 2019 the Railway Department of TSB published 37 final reports closing 410 investigations, including 9 safety recommendations. 3 of these recommendations have been implemented, implementation of 6 recommendations is in progress.

Issuance of safety recommendation is usually preceded by consultation with the railway companies involved and National Transport Authority. As a result of such consultations, it is often unnecessary to issue a safety recommendation formally, because the railway companies recognize the anomalies and take action voluntarily to eliminate such anomalies. Therefore no immediate preventive recommendation was issued in 2019.

Response	2017	2018	2019
Accepted and implemented	2	3	5-
Accepted and partially implemented	-	-	-
Accepted, implementation in progress	12	6	3
Accepted, no information on implementation	-	-	-
Rejected	-	-	-
No answer	2	-	1
Total	16	9	9

THE SAFETY RECOMMENDATIONS —2019

Annex B

Safety recommendations issued in 2019

BA2017-0661-5-01: *The defect of the track (broken rail spikes) was revealed by track supervision activity 25 days before the derailment, but no action was taken to do repairs or to introduce limitations.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing in the safety management system of MÁV Zrt. why the shortcomings revealed by track supervision are not followed by action, and taking action as necessary.

By acceptance and expected implementation of the safety recommendation, similar accidents could be prevented by eliminating track defects on time or by introducing appropriate limitations.

BA2017-0661-5-02: *Derailment was traced back to corrosion (at places out of sight) of rail spikes in sleepers with plastic inlay, but this kind of defect cannot be identified by the usual track supervision method before actual fracture of the rail spike.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the procedures applied in the track supervision system of MÁV Zrt. to see to what extent such procedures ensure detection of hidden corrosion and thinning of rail spikes, and taking action as necessary for modification of such track supervision procedures.

By acceptance and expected implementation of the safety recommendation, such track defects can be identified before similar accidents, and the track can be repaired or appropriate limitations can be introduced.

BA2017-0953-5-01: *The IC found that Instruction № TB.1 of MÁV Zrt. included no requirements for periodical inspection measurements of the timing circuits of the safety installation relating to the cycle times.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing whether Instruction № TB.1 of MÁV Zrt. includes suitable requirements for performing inspections to prevent safety critical situations caused by worn-out or ageing electronical parts.

By acceptance and expected implementation of the safety recommendation, the number of safety installation errors caused by changed circuit characteristics due to aged circuits could be reduced, as well as the number of safety critical situations resulting from such errors.

BA2017-1372-5-1: *The Investigation Committee of TSB found that in cases where the level crossing at the open line gets in "breakdown" state while a train is approaching (except where it is interlocked with the signal system and the train crew receive feedback via the signal system), the locomotive driver is not aware that the approaching level crossing is to be regarded as a potential source of danger. The Rules of the railway company in effect contains no procedure for the warning of the locomotive drivers of trains approaching such dangerous points, neither for what to do when they have become aware of such a situation. Therefore*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider ordering railway infrastructure operators to elaborate a procedure for providing information on the danger and the elimination thereof in cases where the locomotive driver is not provided with information on the state of a broken-down level crossing installation by automated means.

In the opinion of the Investigating Committee, by acceptance and expected implementation of the safety recommendation, the locomotive driver's chance to get information on the potential source of danger and to control the speed of the train accordingly could be increased significantly in cases where the train is approaching a broken-down level crossing installation and there is no time left to inform the locomotive driver via Written Order

BA2017-1620-5-01: *During running track supervision measurements, the track gauge is measured on a continuous basis, while only a few points are measured along the turnouts. This method does not provide proper monitoring of the state of turnouts, and the evaluation of certain defects (change of track gauge) is explicitly impossible.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider to consider including such a provision in the track supervision procedures (which constitute part of the safety licence of railway infrastructure managing companies) which requires the application of measurement technologies for turnouts and/or tracks that ensure continuous measurement and evaluation along turnouts, similarly to running tracks.

By acceptance and expected implementation of the safety recommendation, a more reliable picture of the technical condition of a turnout can be obtained, and maintenance works or limitations can be ordered on the basis of better information.

BA2018-0139-5-01: *The IC found that, although the safety management system of the railway company requires management inspections integrated in the process, such inspections are performed rarely, if ever, in daily practice (in this case: speeds of trains, protection of work stations, notification of passages), and thus it cannot support compliant work of the personnel.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider whether the safety management system of BKV Zrt. contains the system of management inspections in the suitable form, and whether it is implemented in the practice, i.e. if it achieves its objective.

By acceptance and expected implementation of the safety recommendation, the compliance of employee behaviour could largely be improved.

BA2018-0610-5-01: *During the investigation into the occurrence, the IC found that the subcontractor that worked on the tracks of the railway company had no appropriate practice or qualified staff for the given work, and could not hire a subcontractor with appropriate experience at the time of the occurrence.*

Transportation Safety Bureau recommends Budapesti Közlekedési Zrt. to review the procedure of selection and hiring of subcontractors in order to ensure that appropriately qualified contractors be hired to perform or supervise works.

By acceptance and expected implementation of the safety recommendation, it can be ensured that only suitable work crews perform work on tracks.

BA2018-0634-5-01A: *During the investigation, the IC found that, at seven stations along the railway line № 142, the requesting and granting of authorisations, as well as communication relating to the traffic of trains takes place via radio, which the IC think breaches the safety of communications and increases the probability of hazardous situations.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology, and to Hungarian State Railways as infrastructure operator, to consider reviewing the communication system used along the railway line № 142 and the grounds for using such system, including whether the definition of "emergency situation" complies with the requirements specified in the Safety management System of MÁV Zrt. On the basis of the findings of your review, please take action as necessary.

By acceptance and expected implementation of the safety recommendation, the probability of hazardous situations due to missed or misunderstood information would decrease significantly

BA2018-0662-5-01: *The IC of TSB found during its investigation that, pursuant to GKM Regulation № 41/2003 (VI.20.) on the requirements, design, installation and operation requirements for traffic lights, the time pans of leaving and entering shall be calculated on the basis of the geometry of the junction and the speed of its users, but vehicle parameters are not mentioned (e.g. safe deceleration value. taking into account that substantially*

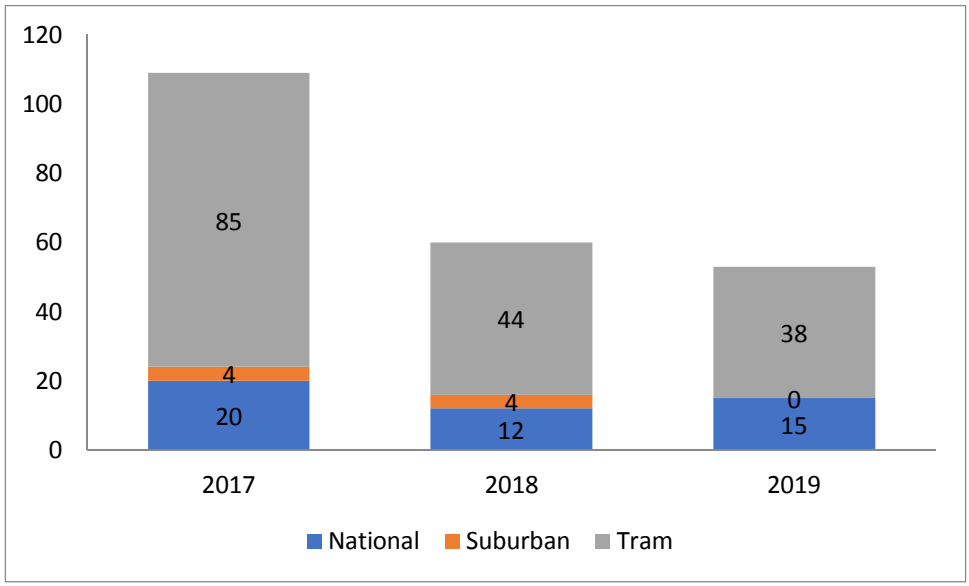
different results can occur from calculations with the wide-ranging parameters of the vehicles participating in traffic:

Transportation Safety Bureau recommends Ministry for Innovation and Technology, as the entity responsible for the preparation of the relevant legal rule, to consider making a proposal to amend GKM Regulation № 41/2003 (VI.20.) on the requirements, design, installation and operation requirements for traffic lights in such manner that the planning of the phase layouts of traffic lights should take into account the parameters of the vehicles typically using the road junctions as well as those of the road junctions.

The position of the IC is that, by acceptance and expected implementation of the safety recommendation, the designers of road junctions could design such phase layouts during the planning of traffic lights for road junctions which would allow the users to enter and leave such junctions safely, in compliance with the rules in the Traffic Code.

7. HIGH PRIORITY TOPICS IN 2019

Signal Passed at Danger (SPAD)



Numbers of SPADs (2017-2019)

Unauthorised passing the signal at danger is one of the most hazardous incidents in railway transport. The number of incidents of passing the signal at danger decreased in comparison to 2018 in tramway and the suburban networks.

High risk events are SPADs on the national network. Unfortunately, their number increased again, of which the TSB included 9 signal exceedances in its own investigation.

Signal passed at dangers were attributed to human factors related to the locomotive drivers in each case; technical factors are rarely involved. For that reason, it would be important to provide training and preparation sessions for the personnel in the related subjects (situation awareness, fatigue, safety critical communication, etc.).

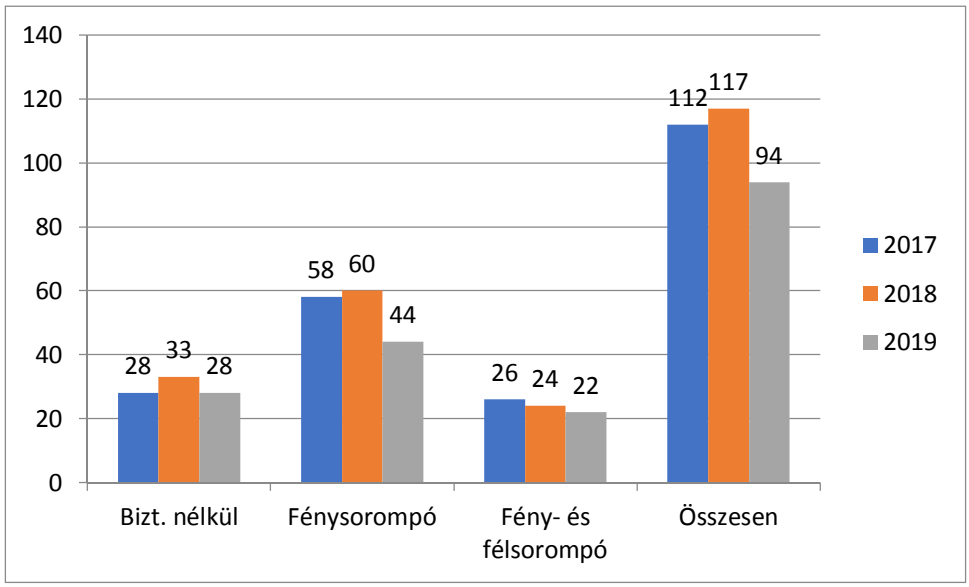
Human and organizational factors

During our investigations performed in 2019, we laid significant emphasis on investigating into human and organizational factors including elements of the Safety Management System.

During our investigations, we identified 54 direct causes in total, of which 36 were human or organizational factors, while 41 of the 26 indirect causes belonged to this category.

Such causes included fatigue, the loss of situational awareness, and dangerously low levels of safety critical communication and many times the poor safety culture.
We do not see any progress despite dedicating a separate chapter to these topics in our reports.

Level crossings



The number of accidents at level crossings decreased by 23 in 2019 compared to 2018.

A closer look at the numbers shows that the most significant decrease can be observed in accidents at level crossings provided with light barriers. However, the increase in the number of accidents at roadways equipped with a more perceptible half-barrier as an additional safety device stopped in 2017, and the slow downward trend that began at that time continued in 2019. The number of incidents at the uninsured crossing has returned to the 2018 level. No conclusion can be drawn in this regard, experience rather attributes such small, opposite changes to the stochastic nature.

8. OTHER ACTIVITIES

International Cooperation

TSB continued to participate actively in the work of the European Railway Agency (ERA) The cooperation with ERA offers the opportunity for TSB to participate in compiling the system and methodologies of the assessment of National Investigation Bodies,

Outside of the ERA, some of the European investigating bodies (e.g. Germany, Austria, Switzerland, Czech Republic, The Netherlands, Luxemburg, Belgium, Estonia, Romania, 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. The head of the department participated on these meetings.

International Activities

The personnel of R&DD took part in various international activities in 2019.

The European Union Agency for Railways (ERA) brings together the national investigating bodies into a working group. The head of Railway and Dispatcher Department attended the plenary session of the working group on three occasions.

The Regional Conference of Central & Eastern European Investigating Bodies is held twice a year; last year the first was held in Germany. On this event and was attended the head of the railway department.

International conferences, meetings and working group sessions offer excellent opportunities to establish good professional contacts, share experiences, and acquire new methods to be used in our own activities.