MINISTRY FOR
INNOVATION AND TECHNOLOGY
TRANSPORTATION SAFETY BUREAU

ANNUAL REPORT 2020

Transportation Safety Bureau

Hungary

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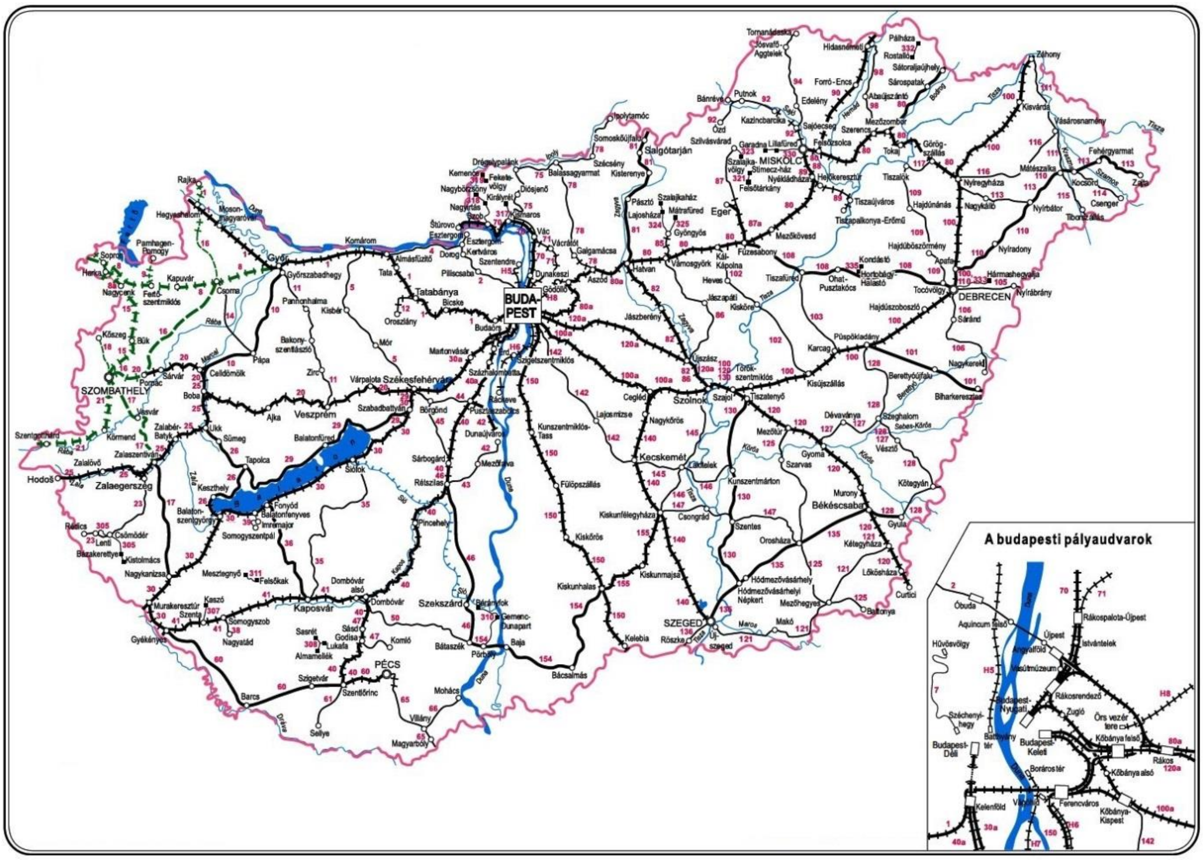
RAILWAY NETWORK IN HUNGARY



Basic data of the infrastructure: 8350 km rail network

National lines:	7685 km IM: MÁV (94%), GySEV (6%) Trans-European network: 2830 km (37%)
Regional lines:	320 km (100% narrow gauge)
Suburban lines:	136 km
Local tramway network:	209 km 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 and 2016/798/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 (what is the predecessor of Ministry for Innovation and Technology) 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 2020, there were no organizational changes at TSB, within the Ministry of Innovation and Technology, TSB operated under the supervision of the Secretary of State responsible for transport politics.

In 2020, 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 30 occurrences.

During year 2020, TSB published 30 final reports closing 31 investigations, including 14 safety recommendations. 7 of these recommendations have been accepted and 1 of these recommendations have been implemented; implementation of 6 more 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 2020, 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 2020, 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 (Directive (EU) 2016/798)
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 2020 of TSB - in accordance with Article 24 (3) of the Railway Safety Directive 2016/798/EC - gives an account on the following:

- the implementation of 2004/49/EC and 2016/798/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 and later 2016/798/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'.

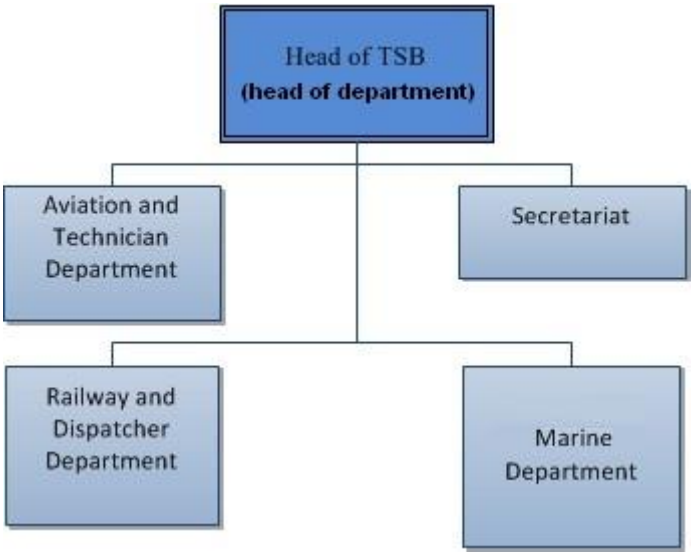
The Act contains the rights and responsibilities of the investigators defined in the Safety Directive.

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 multi-modal NIB is shown in organogram.

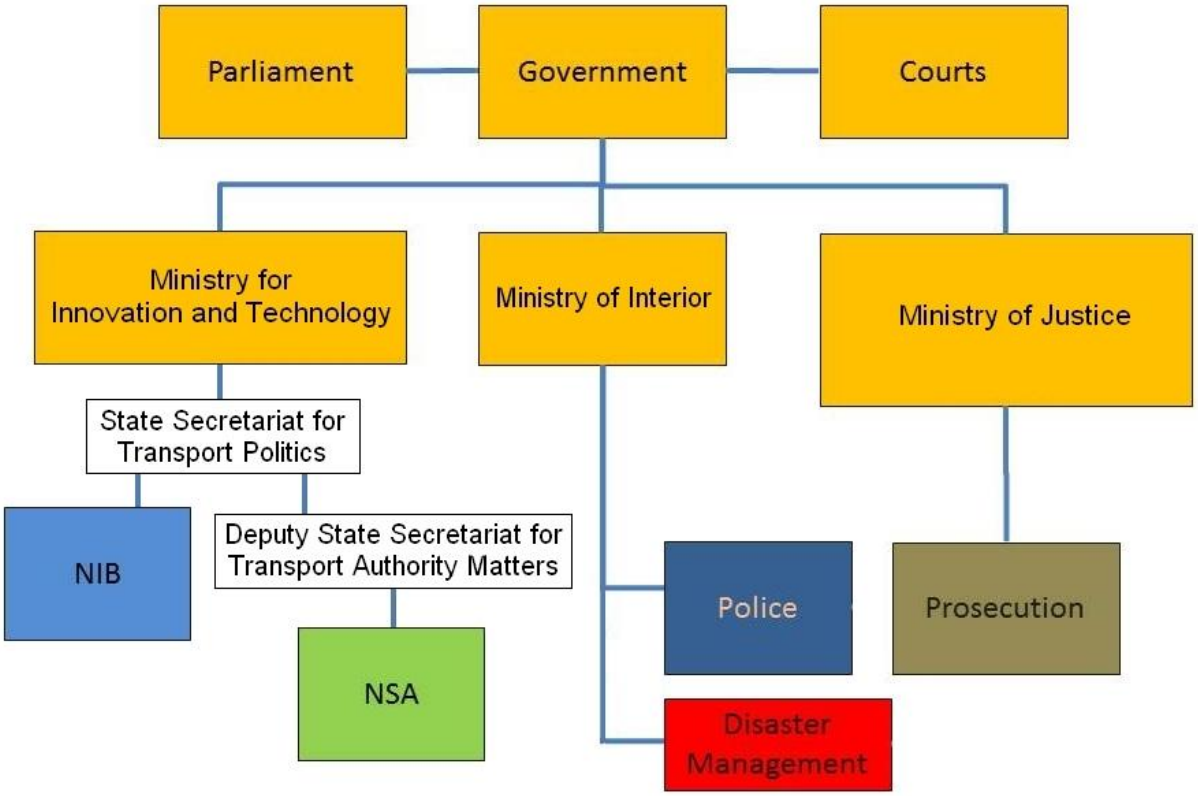


The organisation of the TSB

- 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.
- As the TSB is integrated in Ministry for Innovation and Technology as a division the Head of the TSB is a Head of Dpeartment in the structure of the Ministry.
- The Railway Department consists of 7 investigators 6 dispatchers and the Head of Railway and Dispatcher 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 (the NIB) is a Division. Accordingly, NSA is positioned at another 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 2016/798/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 notifications 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.

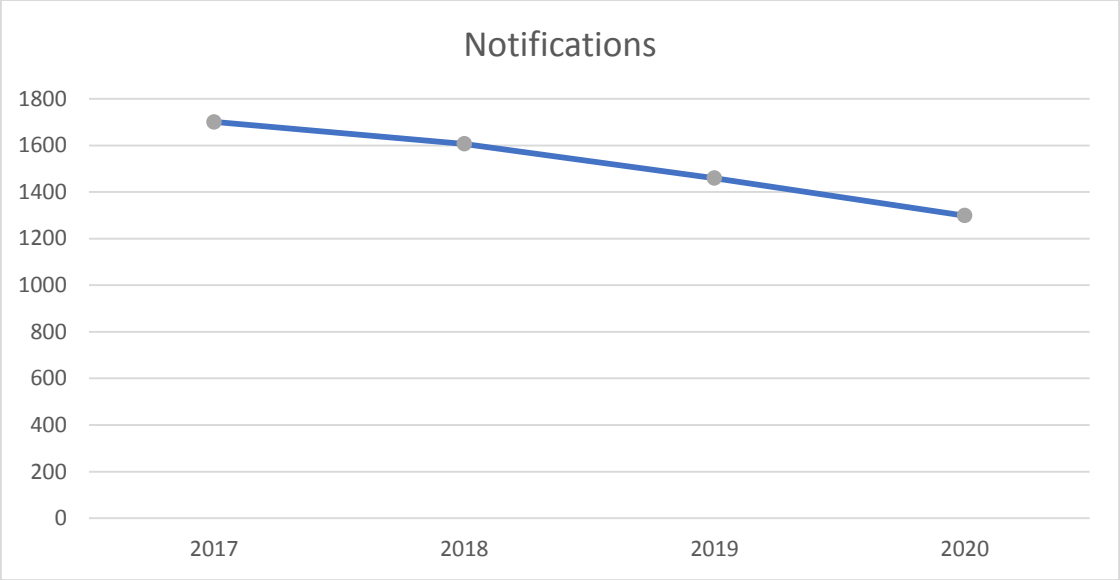
The draft reports on the occurrences are discussed by a board made up of the heads of departments of TSB.

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 2020

3.1 Notifications

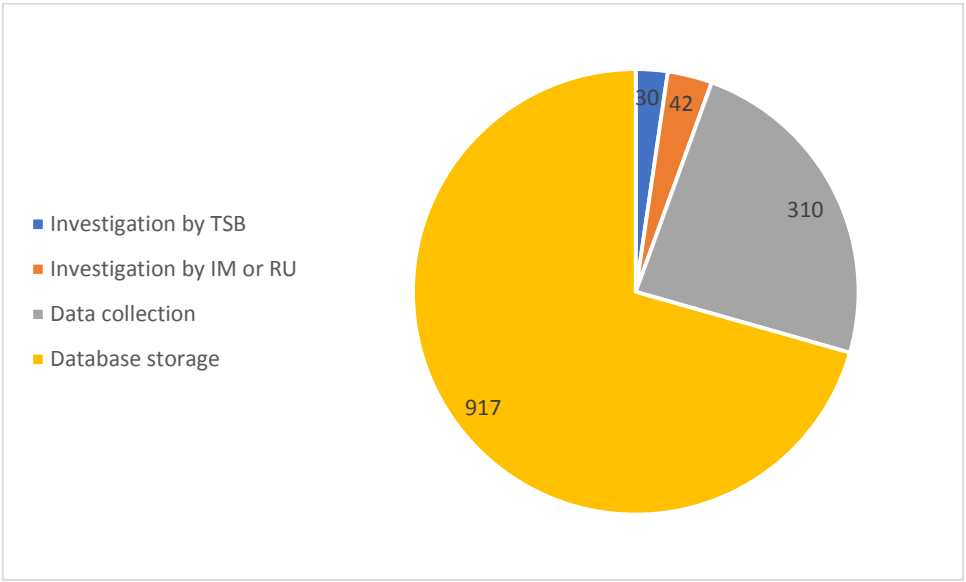


Numbers of notifications

Our dispatcher service received 1299 notifications in total in 2020, which is 11% 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 slight decrease in the total number of notifications. The decrease is significant of notifications arriving from the local tramway network: 713 to 571. The less collision between trams and road vehicles can be explained by the significant decrease of the road traffic performance due to the pandemic closures.

3.2 Investigations



Activities following notifications in 2020

In 2020, we decided to perform an immediate *on site survey* (based on data in the notifications) on 45 occasions; such surveys were usually performed by a team of two members. 35 of the 45 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 310 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 2020, we commenced a *full safety investigation* in 30 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 8.5 investigating committees on average in 2020. 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 2020, TSB requested operators to investigate 42 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 2020

Attachment-A

Technical investigations started by TSB in the area of railway transport in 2020

Date	Description of the occurrence	Classification
15.01.	A bearing of a wagon of passenger train no. 3330 caught fire. The train was stopped at Mende station and the fire was extinguished with a fire-extinguisher. No one was injured.	Railway accident
28.01.	The passenger train no. IC952 passed the signal of Jánosháza-elágazás at danger. The train was stopped by the engine driver 149 metres behind the signal. No one was injured.	Railway incident
03.02.	A shunting train crossed the route of an overpassing freight train no. 82901 and collided with it side to side at Pusztaszabolcs station. The two engines were damaged. No one was injured.	Railway accident
04.02.	The passenger train no. 2067 derailed at Rákosrendező station. No one was injured.	Railway accident
11.02.	The freight train no. 82719-2 collided with a car what was stucked at a level crossing between Vecsés and Üllő stations. No one was injured.	Railway accident
16.02.	The passenger train no. IC712 collided with a car at a level crossing at Katonatelep station. Two passengers of the car died, the driver of the car injured slightly.	Railway accident
21.02.	The train no. 27355 (solo engine) passed the signal of Lőkösháza station at danger. Eventually the train was stopped by the engine driver. The passenger train (no. 7504), what was coming from the opposite direction, stopped before the entry signal of the station. No one was injured.	Railway incident
15.03.	For the passenger train no. 32228 the route was set incorrectly from track no. 4b instead from track no. 3b at Vác station. The train left the station: passed the signal at danger and opened up a switch. No one was injured.	Railway incident
21.03.	The freight train no. 55907 passed the signal of Isaszeg station at danger. The train was stopped by the train control system. No one was injured.	Railway incident

22.03.	The freight train no. 47481-2 derailed at Püspökladány station. No one was injured.	Railway accident
07.04.	The freight train no. 68001 passed the signal of Nyírbátor station at danger. Eventually the train was stopped by the engine driver. The passenger train (no. 6316), what was coming from the opposite direction, stopped before the entry signal of the station. No one was injured.	Railway incident
27.04.	The tram no. 14 derailed on the switch of the terminus at Budapest, Lehel tér. No one was injured.	Railway accident
29.04.	The train no. 20348-1 passed the signal at danger at Budapest-Déli station. Eventually the train was stopped by the engine driver. No one was injured.	Railway incident
27.05.	The train no. 14566 (work train) passed the signal of Kaba station at danger and moved on towards the oncoming freight train no. 48911. Eventually the two trains stopped 200 metres away from each other. No one was injured.	Railway incident
02.06.	The freight train no. 45290-1 derailed at Hatvan station. No one was injured.	Railway accident
14.06.	The passenger train no. 6417 could not stop and passed the signal of Püspökladány station at danger. Eventually the train could stop 2,6 kilometres away from the station. No one was injured.	Railway incident
27.06.	The train no. 9694 passed the signal of Uzsa station at danger. Eventually the train was stopped by the engine driver. No one was injured.	Railway incident
24.06. 10.07. 14.07.	Three passenger trains derailed on the network of LÁEV narrow-gauge railway. No one was injured.	Railway accidents
23.07.	The train no. 22425 passed the signal of Budapest-Nyugati station at danger and moved on towards the oncoming passenger train no. 2346. Eventually the two trains stopped 288 metres away from each other. No one was injured.	Railway incident
27.07.	The train no. 2077 passed the signal of Piliscsaba station at danger. Eventually the train was stopped by the engine driver. No one was injured.	Railway incident

14.08.	There was an explosion inside the electric-engine of the freight train no. 92905 and the roof of the engine fell down onto the second track, where the oncoming passenger train no. IC910 collided with the pieces of it. No one was injured.	Railway accident
16.08.	The freight train no. 85811 derailed between Szakály-Hőgyész and Kurd stations. No one was injured.	Railway accident
26.09.	The freight train no. 42338 derailed at Sopron station. No one was injured.	Railway accident
07.10.	The freight train no. 42000-1 passed the section signal ’83a’ at danger and collidied with the end of the freight train no. 47141 which was standing 21 metres behind the signal. The last 2 twin-wagons of the train no. 47141 derailed, the engine of the train no. 42000-1 was damaged. No one was injured.	Railway accident
23.10.	The passenger train no. IC545 arrived onto an occupied track, with a green light on the entry signal due to signalling failure at Budapest Keleti station. No one was injured.	Railway incident
14.11.	The suburban train no. 4015 derailed at Budakalász station. No one was injured.	Railway accident
25.11.	The passenger train no. 2517 opened up a switch at Vácrátót station due to signalling failure: the train was leaving the station during an authorized movement. No one was injured.	Railway incident
28.12.	Two trams were leaving the terminus of Budapest, Közvágóhíd (one from the track no. 1 and one from the track no. 2) towards the same direction at the same time and they collided side to side at the switch. No one was injured.	Railway accident

4. INVESTIGATIONS COMPLETED IN 2020 WITH THE ISSUED RECOMMENDATIONS

In 2020, 30 final reports were compiled and published on the website of TSB, closing 31 investigations**.**

The final reports issued in 2020 analysed occurrences of the following types:

- Derailment 11 occurrences
- Accident at LC 2 occurrences
- SPAD 9 occurrences
- Collision to obstruct 2 occurrences
- Injury caused by rolling stock in motion 2 occurrences
- Fire in rolling stocks 1 occurrence
- Other 4 occurrences

Investigations completed in 2020 by the amount of damages:

In 2020, the damages related to an occurrence exceeded EUR 150,000 in 1 case, and in 1 case was over EUR 2 Million.

Number of investigations lasting longer than one year over 2018-2020

Year	at the end of 2018	at the end of 2019	at the end of 2020
Amount	14 (13)	4 (2)[1]	1 (0)

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

[1] Both investigation were paused because of the expert reports

5. INVESTIGATIONS CLOSED IN 2020

2017-1162-5 Vép (Railway accident / Derailment)

Overview of the accident

A freight train from the direction of Szombathely was approaching through several switches in diverging direction to Track V at Vép station when seven of its tank-cars derailed, two tipped over to the side, and one got back on track. Two tank-cars were damaged to such extent that their consignment (ca. 100 m^3 diesel oil) spilled on the ground.

The track and the derailed tank-cars were badly damaged. A large quantity of top soil had to be replaced due to the damage to the environment.

The investigation found that the poor condition of the track played a direct role in the accident; the track supervision system had known of the problem, but no effective action was taken before the accident.

The derailed wagons and the spilled oil

The investigators revealed no shortcomings of the vehicles' mechanical condition related to the occurrence.

The question whether the loading level of ca. 70% of the tank-cars (the required minimum loading level was 80% according to relevant rules in effect at the time of the occurrence but cancelled subsequently) contributed to the formation of unfavourable forces inside the cars arose during the investigation. The expert opinion obtained related to the question did not support the suspicion but, according to the IC, it did not prove otherwise either.

TSB issued no safety recommendation.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the sleepers and the small fittings could not maintain the track gauge, which made the track open under the moving train.

1.2 Indirect causes

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

a) the rail surface defect of the turnout located just before the location of the derailment might have increased the swaying of the vehicle and its load;

b) although the track supervision were aware of the defect of the track they took no action and the track was used a holding siding;
c) it could not be proved nor excluded that, because of low level of loading, the tank-cars exposed the considerably worn-out track to harmful forces; however, crosswise sloshing of the liquid cargo must have caused measureable forces.

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:

The IC identified no root cause.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) loading rules were not observed, and the railway undertakers failed to identify the mistake although they had the opportunity;
b) inspection of cargo load levels is not incorporated in the IT systems;
c) tank-car type provided for the client actually was not suitable for carrying the given goods on the given route even if they were properly loaded;
d) retaining of the track supervision documents is incomplete;
e) track measurement due in 2017 (prior to the occurrence) was postponed due to wagon storage on the track.

2. ACTIONS TAKEN

Following the accident, GYSEV Zrt. held extraordinary theory and practical training sessions for its employees involved in track maintenance, with data provided by the track inspection coach and interpretation thereof in focus, and started regular (annual) specific training for its track maintenance staff.

In November 2017, after the occurrence, the head of the infrastructure division ordered an extraordinary review of curves of small radius. The works recommended as an outcome of such review were carried out by the track maintenance section in 2018.

GYSEV Zrt. introduced a new position called “track maintenance controller” for the inspection of track supervision activity and maintenance works, thereby completing the existing internal control and expert activities with a new, exclusively technical inspection function. A person in this position must have theoretical and practical knowledge of track maintenance and at least 5 years of relevant experience.

As in the case of curves with low radii (+15 mm gauge widening) the a track gauge deviation dimension limits ‘C2’ and ‘C3’ correspond to the limit ‘D’, the ‘intervention limits’ are missing from between the ‘monitoring limits’ and the ‘shut-down limits’. For that reason, the investigators of GYSEV Zrt. proposed a review of the Instruction № D.54. in this regard.

RCH Zrt. initiated clarification point 1.4 in the UIC Loading Guidelines Working Group. The Investigating Committee took the position that this point of the loading guidelines can be deleted because the RID rules already cover the related issue.

2018-0624-5 Hegyeshalom (Railway accident / Derailment)

Overview of the accident

On 30 May 2018, at 06:42 o'clock, the empty two-axle leading wagon of the freight train № 45198 derailed with both axles between the points № 20 and 28 while the train was approaching the track № R11 at Hegyeshalom station, through a route with track locking.

The Investigating Committee (hereinafter: "IC") found that empty two-axle wagons of light mass had been positioned as buffer wagons in between the locomotive and the four-axle tank-cars in the train. Approaching the station, the locomotive driver controlled the speed of the train in line with the relevant rules. The settings of the adjustable brake release devices of the vehicles in the train deviated from the relevant rules. The adjustable brake release devices of the locomotive and the leading buffer wagon were set to passenger train mode, while the rest of the wagons were set to either passenger train mode or freight train mode. During deceleration of the train, the braking effect took longer to occur in the rear part of the train due to the length of the train, and because of that, the heavier four-axle tank-cars began to push the lighter two-axle wagons. The forces generated caused the leading buffer wagon to derail.

The IC found the following causes:

- a factor related to the composition of the train (light two-axle wagons were inserted as buffer wagons between the locomotive and the loaded (i.e. considerably heavier) four-axle tank-cars, and
- a human factor which had manifested during the braking test carried out in Komárom (the settings of the adjustable brake release devices had not been checked as required in the E.2. Braking Instruction).

1. CONCLUSIONS

1.1 Direct causes

The factor which had direct effect on the occurrence was as follows:

a) due to uneven braking effect, the vehicles at the front of the train began braking earlier than those behind, as a result of which the heavier four-axle tank-cars overran the two light, two-axle wagons situated ahead of them.

1.2 Indirect causes

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

a) During train formation and braking test at Komárom station, the contents of Instructions E.2 and E.12 were disregarded: the settings of the adjustable brake release devices were not checked and the devices were not set in the appropriate position.
b) Data in the Train Data Form (TDF) did not reflect reality. The vehicles in the train did not follow one another in the sequence indicated in the TDF, and the settings of the adjustable brake release devices were also different from those indicated in the TDF.
c) Disregarding (or rather outdoing) the contents of Annexes to Instruction F.2, two empty light, two-axle wagons were inserted as buffer wagons in between the electrical locomotive and the tank-cars.

1.3 Root causes

Causes those 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) IC identified no such causes.

1.4 Other risk factors

The IC identified no other risk factors.

1.5 Lessons learnt

The application of one buffer wagon instead of two (light and empty) wagons as specified in Annex 13 to Train Loading and Running Regulations, and observing the provisions (relating to adjustable brake release devices) in Section 2.3.2 of Braking Instruction E.2 would significantly have lowered the risk of the burst forth of the accumulated forces (which actually occurred at the connection of the two buffer wagons).

2018-1211-5 Center - Ózd (Railway accident / Injury caused by vehicle in motion)

Overview of the accident

On 5 October 2018, at 20:07 o'clock, at Ózd-Alsó passenger stop located between Ózd and Center stations, the door of the trailer vehicle (Bzx series, reg. №: 50 55 24-28 614-1) of the train № 5421 caught the backpack of a passenger who was getting off. The departing train dragged the passenger for several metres. The train crew did not notice the accident. The middle-aged man died as a consequence of the accident, soon after being taken to hospital.

The Investigating Committee (hereinafter: "IC") found during the investigation that the wagons in the train concerned had not yet undergone the process in which the limit switches used in the motor train sets of the Bzmot series and the trailer vehicles of the Bzx series were to be replaced with more up-to-date induction transmitters, and that there was no outdoor lighting at the passenger stop, despite relevant provisions in the MÁVSZ 2950-3:1999 railway technical specification in effect at the time of the occurrence.

Therefore, TSB issues a safety recommendation to Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the maintenance system of MÁV START Zrt. relating to the rolling stock of the series Bz and Bzx from the aspect whether it can provide that the rolling stock participates in railway traffic with serviceable safety installation only, and reviewing the availability and necessity of outdoor lighting at passenger stops and taking necessary action to have such lighting installed where necessary.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) The closing door of the wagon got in between the body of the passenger getting off and his backpack, and the train dragged him for a distance of ca. 13.5 metres.
b) As the train crew did not notice the accident, the ambulance service was called ca. 23 minutes after the accident only therefore medical care for the injured person suffered a delay.

1.2 Indirect causes

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

a) The warning audio signal did not work at the door involved in the accident therefore the closing of the door started without warning the passenger who was just getting off, and the door trapped him.
b) The strap of the passenger's backpack was too thin for the limit switch so it could not detect it and alarm the train crew, but, due to the closing of the door, the strap became too tight for the passenger to get out of it.
c) It made recognition of the injured passenger more difficult that there was no outdoor lighting at Ózd-alsó passenger stop.

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:

a) The project in which the limit switches applied for the doors of the series Bz motor train sets and the series Bzx trailer vehicles were to be replaced with more up-to-date induction transmitters was launched in 2013 (6 years ago), but the related

works were not carried out in the vehicle concerned, and actually the project has not been completed to date.

1.4 Lessons learnt

In the IC's opinion, if the warning audio signal of the closing had worked at the door concerned, the passenger could have avoided being trapped by the closing door as well as the accident. If the limit switches had been replaced at the doors during the 6-year period of the project the system could have detected the trapped passenger. Even if the trapping of the passenger takes place but the passenger platform at Ózd-alsó passenger stop is lighted in compliance with the specification MÁVSZ 2950-3:1999, better visibility would have given the train crew more chance to detect the passenger in emergency, and the accident could have been prevented or its consequences could have been less serious.

1.5 Safety recommendations

BA2018-1211-5-01: *The Investigating Committee of TSB found during the investigation that an indirect cause of the accident was that the warning audio signal did not work at the door involved in the accident, therefore the door closed without warning while the passenger was getting off the train, and the passenger got trapped by the closing door.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the maintenance system of MÁV START Zrt. for the series 95 55 0117 motor train sets and their trailer vehicles from the aspect whether it can provide that the rolling stock participates in railway traffic with serviceable safety installation only.

According to the IC, by acceptance and expected implementation of the safety recommendation, the risk of similar accidents can be reduced.

BA2018-1211-5-02: *The Investigating Committee of TSB found during the investigation that an indirect cause of the accident was that there was no outdoor lighting at the passenger stop, despite relevant provisions in the MÁVSZ 2950-3:1999 railway technical specification in effect at the time of the occurrence.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the availability and necessity of outdoor lighting at passenger stops and taking necessary action to have such lighting installed where necessary.

According to the IC, by acceptance and expected implementation of the safety recommendation, the conditions for passenger traffic would be safer at the passenger stops affected after suitable outdoor lighting is installed, and if relevant rules and regulations are followed, similar accidents will be preventable.

2018-1273-5 Berettyóújfalu (Railway incident)

Overview of the incident

On 18 September 2018, at Berettyóújfalu station, the train № 6433 was guided to an occupied track without prior notice. After passengers got off or on, the train was moved to a free track, and it continued on its way.

No injury to people or damage to property occurred in consequence of the occurrence.

The affected station crew and train crew concealed the incident, i.e. they failed to report it in line with relevant rules.

The IC attributed the occurrence to human factors on the part of the traffic management personnel.

Similar occurrences may be prevented by observing relevant rules and regulations therefore the IC did not propose a safety recommendation, but chose to discuss the lessons learnt from the occurrence (with special emphasis on safety culture and teamwork) in a separate section.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the pointsman failed to check the track route, and
b) the traffic manager selected the arrival track erroneously on the safety installation.

1.2 Indirect causes

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

a) communication was not clear enough during the teamwork, and
b) the team was not tightly knit, e.g. the pointsman did not ask the traffic manager for confirmation when the latter did not assign the same arrival track which he had selected initially.

1.3 Root causes

Causes 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) safety culture is poor; it does not encourage people to report incidents.

1.4 Other risk factors

a) The outdated safety installation does not check track occupation.

1.5 Proven procedures, good practices

The IC identified no such factor.

1.6 Lessons learnt

In the IC’s opinion, three major areas offer lessons to learn in connection with the occurrence:

The first is that, owing to increasingly modern equipment and the analysis of data recorded by them, it is more and more easy to reveal an incident (and more and more difficult to

conceal it). Accident investigation can and should rely more and more on these predominantly IT-based devices.

The second area is the question of safety culture. In cases where it is possible and necessary to learn from an occurrence, it is important for the designated organisations to become aware of such occurrence, but the fear of punishment may get in the way. Building a just culture may help improve safety.

The third area is the importance of the element of a safety critical communication channel.

2019-0003-5 Sárvár (Railway accident / Collision with an object)

Overview of the accident

On 04 January 2019, at 01:27, at Sárvár station, the light engine № 29047, which was scheduled to travel through the main track № III excluded from traffic due to track possession, swept away a temporary scaffold (used for the works of the reconstruction of a pedestrian bridge) situated between the tracks II and III, and amputated a leg of the worker working on the scaffold.

The Investigating Committee (hereinafter: "IC") attributed the direct cause of the occurrence to incorrect selection of the track to receive a train and to the absence of protecting signals at the work area. It contributed to the mishaps, however, that the "Instructions for Track Possession and De-energisation" issued for use by traffic management personnel is complicated, unclear and ambiguous, and that a similar earlier mishap, which had not lead to an accident, remained unidentified.

The IC proposes the issuance of a safety recommendation relating to the review of the structure of the Instructions for Track Possession and De-energisation.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the traffic manager received a train to a track which was possessed;
b) no protecting signals were placed for the area of the works.

1.2 Indirect causes

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

a) both the traffic manager and the line traffic manager thought that the tracks were not in possession, only the movement of electrical locomotives was banned;
b) prior to the movement of the train, the traffic manager failed to directly contact the workers in the vicinity of the tracks ;
c) during his inspection round, the station manager either did not identify or did not respond to the mishap of the previous night;
d) the signalling rules cannot be used unambiguously in the case of works carried out in chains of subcontracting;
e) the people doing the work noticed the train approaching them too late;
f) the locomotive driver was not aware of the track possession.

1.3 Root causes

Causes those 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 Operational Instructions offer a cumbersome definition which is impractical for everyday use;
b) the structure of the Instructions for Track Possession and De-energisation does not help its reader to interpret it correctly and according to the intent of its issuer.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the rules of the 'Work in Progress on Track!' signal contain edition errors;

b) the traffic manager was not aware of the work actually performed in track possession (scaffold, noisy machines);
c) there was no radio communication contact between the traffic manager and the supervisor of the works although it was required by the Instructions for Track Possession and De-energisation.

1.5 Proven procedures, good practices

The IC identified no such factor.

1.6 Lessons learnt

The occurrence highlights that an instruction providing inadequate information may mislead more than one employee, or a dialogue based on misunderstanding of a situation may strengthen some uncertain assumption to become false knowledge.

In addition, the lack of protection of a working area may largely limit the locomotive driver's chances to identify an emergency and to prevent an accident.

The risk of similar accidents may be reduced by informing the locomotive driver that there are possessed tracks at the station.

2. ACTIONS TAKEN

The companies affected informed the IC on the following actions taken:

2.1 The infrastructure manager

The railway safety organisations of MÁV Zrt. made the following proposals which the Director of Traffic and Operations supported as follows:

1. Train crews should mandatorily be informed, by means of a written instruction, on any track possession which affects a main track of a station. Also, in the case of turnouts with large radii, on any track possession affecting a track where trains are allowed to travel at line speed.	According to a planned modification, notification must be sent out on any use of capacity by the infrastructure manager (i.e. track possession) where it affects open line tracks or **main tracks at a railway station**.
2. It should be specified how much time in advance the Track Possession Instructions should be issued prior to the start of the track possession.	According to plans, periods of time will be determined.
3. Consistent requirements should be specified for the editing of the Track Possession Instructions. The tracks in possession should be highlighted and indicated separately, possibly with site diagram indications.	The editing requirements are available, but they do not support site diagram indication because their employees have ÁVU qualification, and the feature would demand considerable IT development.
4. The audio records of the communication equipment should be replayed by the line supervisors on a regular basis.	No substantive response.

5. The booking of the track possession should mandatorily take place in two steps: – after the first entry, only the protecting signals could be placed, and the person responsible for the track possession should indicate that it had taken place; – actual works could only be started after the traffic management service has countersigned the completion of the above first step.	No substantive response.
6. It should not be the task of the traffic manager of Sárvár to issue the notification of completion relating to trains, because it distracts their attention from other tasks. The affected railway undertakings should issue the notification of completion relating to their trains.	At Sárvár station, it is only their task in the case of the odd-numbered trains of MÁV-Start Zrt., but a consultation will be started relating to the process included in the proposal.
7. Prior to the introduction of a track possession, the traffic manager of the station affected should provide detailed information, in the framework of practical training, to the traffic managers on the scheduled activities and the related limitations.	No substantive response.
8. The rules relating to the inspection of the entry permit of the personnel carrying out the works should be reviewed in the F.2. Operational Instructions. The Instructions provide clear instructions relating to works carried out without track possession, while it does not cover that issue in the case of works carried out in track possession.	No substantive response.

The IC did not regard the response substantive where only a reference had been made to existing instructions without argumentation for appropriateness thereof.

2.2 The railway undertaking concerned

In response to the IC's question relating to prevention of similar accidents, MÁV-Start Zrt. wrote *"Due to the nature of the accident concerned, MÁV-START Zrt. has no means to prevent similar accidents.*"

3. SAFETY RECOMMENDATION

In order that the instructions issued (especially by those colleagues who do not write instructions (or even books of orders) as their main activity) reach the goal that their addressees understand and apply properly their contents, the structure and contents of such instructions should be subordinated to that goal. Therefore, we recommend a rethink of the structure and contents of such instructions, which should include not only knowledge of railway technologies but also some aspects of language and typography.

BA2019-0003-5-01: *The IC found that the "Instructions for Track Possession and De-energization" issued was not process- and activity-oriented, and its contents, structure and appearance were not suitable for helping the addressees properly understand and implement it.*

Transportation Safety Bureau recommends MÁV Zrt. to consider reviewing the contents, structure and appearance of their regularly issued instructions (e.g.: Instructions for Track Possession and De-energization) and modifying them with a view to better serving proper understanding and implementation by the addressees.

By acceptance and expected implementation of the safety recommendation, the risk that substantial information appears in an instruction in a hardly noticeable form or with ambiguous wording may be reduced.

BA2019-0003-5-02: *The IC found that the "Instructions for Track Possession and De-energization" issued was not process- and activity-oriented, and its contents, structure and appearance were not suitable for helping the addressees properly understand and implement it.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing (as part of the annual review of the safety management system of MÁV Zrt.) how the lessons learnt from accidents are utilised in the system of internal instructions, with special regard to the implementation of Safety Recommendation № 2019-0003-5-01.

By acceptance and expected implementation of the safety recommendation, the risk that substantial information appears in an instruction in a hardly noticeable form or with ambiguous wording may be reduced.

2019-0235-5 Miskolc-Repülőtér (Railway incident / Signal passed at danger)

Overview of the accident

On 1 March 2019, 14:38, at the down-side end of Miskolc-Repülőtér station, the locomotive driver of the train № 35425 passed the „L" signal at danger without prior authorisation. The locomotive driver realised his passing the signal and applied emergency braking. The pointsman at work at the signal box № 1 also realised the occurrence, so he went out onto the balcony of his work station and, using his flag, he issued a Danger signal to the locomotive driver. Then, in the switching zone of the station, the train № 35425 burst the switch № 15 (which was part of the exit route of the train № 5416 and was in diverging position) open, and finally stopped behind it, on the switch № 21. After the train № 35425 stopped, the pointsman changed the "Clear" signal "G" to "Danger" for the train № 5416, and, went put to the balcony again to issue the necessary signal with his flag. When realising the change of the signal "G", the locomotive driver of the train № 5416 moving across the track № II of the station applied the brake and stopped his train immediately. The two trains stopped facing each other, at a distance of ca. 320 m.

During the investigation, the IC found that, due to the design of the safety installations, the entry signal "L" had indicated "Danger" aspect to the train № 35425, which the train had passed without authorisation. No braking problem was identified in the train.

The IC attributed the occurrence to human factors on the part of the locomotive driver.

1. CONCLUSIONS

1.1 Direct cause

The direct cause of the occurrence was that the locomotive driver had not start to brake his train in due time for stopping the train at the entry signal "L".

1.2 Indirect causes

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

a) the locomotive driver forgot that he had been given a distant signal for a main signal at danger;

b) the locomotive driver erroneously supposed that the entry signal was "Clear";

c) he did not focus his attention on the task.

1.3 Root cause

The locomotive driver's low workload and monotonous work led to his inattention mentioned in the section above.

1.4 Other risk factors

A factor which cannot be related to the occurrence but increases risk is that the rules relating to forbidden simultaneous train movements do not specify the availability of a suitable train control system, which may lead to occurrences with more serious outcome.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome, that the pointsman had realised the dangerous situation and taken appropriate preventive actions (issuing hand signals and setting the exit signal to danger position) in order to prevent collision of the trains.

2019-0305-5 Soroksári út rendező (Railway accident / Derailment)

Overview of the accident

On 21 May 2019, the 7th, empty wagon of a train carrying containers derailed with both axles of the second bogie on the no. 418 turnout of the Soroksári út marshalling yard.

At the location of the derailment, the IC found a gauge change error (intense gauge narrowing), that the track supervision system was unable to reveal. In the point of the vehicle, there was no running safety issue found.

During the investigation process, it came up that the locomotive's control system caused longitudinal surging action of the vehicles in the train while it was passing through a 5 km/h speed-restriction zone, however it is unlikely that it contributed to the derailment.

The IC proposes no new safety recommendations, however it reconfirms the previously issued one, in regard of another incident.

1. CONCLUSIONS

1.1 Direct causes

The direct cause of the occurrence was the intense track gauge narrowing at the spot of the derailment. In addition to some other, unrevealed causes, this led to derailment of the vehicle.

1.2 Indirect causes

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

a) the track supervision system cannot reveal critical gauge changes in points;

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:

a) the track maintenance system was not able to repair the serious track defect within a short time.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the route book of the railway undertaking includes no identification of the track elements;
b) the restricted-speed running record does not provide adequate information to the locomotive driver to become sufficiently aware of the track sections where they should run slow;
c) the gradient ratio is indicated with different data in various documents of the railway infrastructure manager;
d) the flangeway deviation in the turnout concerned considerably exceeds the acceptable limit.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that:

a) the wagon examiner staying nearby took action to stop the derailed train.

2. ACTIONS TAKEN

The safety organisation of MÁV Zrt. drew the attention of Ferencváros Service Unit, PTI Budapest Track Maintenance Directorate, MÁV Zrt. to the necessity to review the safety management system. It is undesirable to have drastic speed limits due to *vis major* track defects at critical points for longer periods of time.

The service unit concerned eliminated the track defect, but they were not able to give information on the safety management system.

3. SAFETY RECOMMENDATION

The IC proposes no new safety recommendation, but maintains the safety recommendation № BA2017-1620-5-01 issued earlier:

"Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology 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."

2019-0488-5 Aszófő és Balatonakali - Dörgicse (Railway accident / Fire in rolling stock)

Overview of the accident

On 11 May 2019, the passenger train № 9727 in service between Tapolca and Székesfehérvár stations consisted of two DESIRO motor cars. Fire started in the engine compartment of Section 'A' of the rear motor car (reg. №: 95 55 1426 020-2) at Örvényes passenger stop.

The locomotive driver started to extinguish the fire immediately, and managed to put out the fire, using 7 dry powder extinguishers. The occurrence involved no injury to people.

The IC attributed the fire to malfunction of the injector oil return pipe. The leaked oil got mixed with ambient air, then drifted to the hot exhaust system and caught fire there. Subsequently, the injector oil return pipe was destructed in the fire.

TSB issues no safety recommendation, but discusses the lessons learnt from the occurrence in section 3.6.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the injector oil return pipe leaked, the diesel oil leaked from the system, and flowed into the space of the PowerPack,
b) the escaped oil got mixed with ambient air, the mixture reached the hot exhaust system and caught fire there.

1.2 Indirect causes

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

a) in the absence of insulation or a thermal protection plate, it was easy for escaping oil to reach the exhaust pipe.

1.3 Root causes

The IC makes no such statement.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) DESIRO motor cars are not protected with fire detection and fire alarm systems.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that:

a) the locomotive driver realised the fire at the rear motor car when looking in the rear-view mirror,

b) the locomotive driver stopped the train at the nearby passenger stop where the firefighters had easier access to the fire and where passengers could also leave the train quickly and safely,

c) the locomotive driver started to extinguish the fire immediately, using the fire extinguishers available, and he actually managed to put out the fire.

d) the chief train inspector evacuated the passengers in an orderly manner, and

e) the locomotive driver drove the leading motor car of the train to a safe distance from the location of the fire.

1.6 Lessons learnt

Similar occurrences may be avoided or their consequences may be mitigated by,

a) equipping the series 426 vehicles with fire detecting and fire alarming equipment,

b) installing a thermal protection element for the exhaust pipes.

2019-0560-5 Rákosliget (Railway incident / Signal passed at danger)

Overview of the accident

The train № 3028 passed the entry signal "B" at danger without authorisation, ran forward, and finally stopped at the closed level crossing SR2 protected with half-barriers and warning lights, with the tail of the train still under a de-energised overhead contact line section.

The IC attributed the occurrence to human factors on the part of the locomotive driver, but the locomotive driver's unsteadiness was partly due to:

- the absence of clear rules for the situation concerned (moving in station-to-station mode between a passing point and a station), and
- the fact that he would have had to move, with a subsidiary signal received, that the design of the junction and position of the de-energised section of the overhead contact line prevents the train from keeping the applicable speed limit.

Therefore, the IC proposes that a safety recommendation be issued relating to regulating the moving in station-to-station mode between passing loops and stations, and to the visibility of the entry signal of Rákosliget station.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the locomotive driver did not pay due attention to the entry signal, supposing that it indicated a subsidiary signal, and he did not stop his train as required by a signal at danger.

1.2 Indirect causes

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

a) the technical and traffic situation which existed at the time of the occurrence could not be solved properly by many of the locomotive drivers.

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:

a) the technology to be applied was designed in such manner that it could not be implemented properly with a train comprising a double motor train set, and it was fairly difficult even for a single motor train set;
b) the traffic rules lagged behind the technical development of the network: the technology which actually could be applied at the place concerned is only contained in some additional implementing instructions.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) despite relevant rules, there is no repeating signal before the signal 'B';
b) the use of non-compliant solutions in difficult situations had become a regular practice among the locomotive drivers;

c) a complicated and fragmented system of instructions cannot be expected to assure that work is compliant in all situations.

1.5 Proven procedures, good practices

The IC identified no such procedures or practices.

1.6 Lessons learnt

The occurrence underlines that the designing of a junction (including the insulation of the overhead contact line, among others) and the organising of the traffic through it should include its users' points of view as well, so that traffic could be managed in an orderly way even in the event of degraded operation (e.g. station-to-station mode in the case concerned).

1.7 Safety recommendations

BA2019-0560-5-01: *At the time of the occurrence, the locomotive driver had no adequate information as regards the technology to be used. The IC relates this also to the fact that the situation, which exists in various other points of the railway network as well, is not regulated by the Operational Instructions but only by local implementing instructions.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider expecting clear and sufficiently detailed regulation of the station-to-station mode to be introduced between passing loops and stations from the manager of the Operational Instructions during the review of the Operational Instructions.

By acceptance and expected implementation of the safety recommendation, the procedure to be applied in similar situations will be clear for the personnel involved in traffic management.

BA2019-0560-5-02: *The IC found that the entry signal 'B' of the Rákosliget passing loop can only be seen from a distance of 230 m and no repeating signal is installed despite the fact that the relevant rules require visibility of 400 m or a repeating signal in the case of the speed limit in effect in this track section.*

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider revising the visibility of the entry signal 'B' of the Rákosliget passing loop, and requiring that proper visibility be provided or a repeating signal be installed.

By acceptance and expected implementation of the safety recommendation, the visibility of the entry signal will be improved.

2019-0575-5 and 2019-0840-5 Erdei iskola - Adonisz utca (Railway accident / Derailment)

Overview of the accident

On 03 June 2019, in Budapest, a train actually used for driver training, running on the rack railway line (marked as tram line no. 60) derailed with one bogie. On 01 August, the same train derailed again, at the same location, now with passengers on board.

In addition to the investigation conducted by TSB, the operator's engineers tested the vehicle as well. The occurrence was attributed to track distortion and to low track distortion tolerance of the vehicle.

Tha track distortion at the derailment pont

The IC proposes that safety recommendations be issued relating to:

- rethinking the track dimension specifications and to the examination of the track,
- allocation of resources for track maintenance, and
- providing adequate suspension for the rolling stock.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the track distortion and vertical rail displacement in the track exceeded the limits,
b) due to the design and the current condition of the bogie, the vehicle was sensitive to track distortion.

1.2 Indirect causes

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

a) in the absence of proper maintenance, track distortion worsened by vertical rail displacement developed at the supporting concrete block of the track;
b) the vehicle maintenance system does not assure proper, even adjustment of vehicle suspensions;

c) the track maintenance system includes no process for detecting certain track anomalies (e.g. vertical rail displacement), and not even known track anomalies had been eliminated.

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:

a) the vehicle was manufactured / purchased with bogies which are fairly sensitive to plane distortion;
b) the design of the supporting concrete blocks is unfavourable;
c) no track maintenance personnel is available.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the vehicle has a bogie which tolerates only 21-23 mm track distortion within a base length of 2 m.

1.5 Proven procedures, good practices

The IC identified no factors which would have mitigated the consequences of the occurrence or would have helped avoiding more a serious outcome.

However, the thorough investigation carried out by the operator should be mentioned, because, if its results are implemented in practice, it may significantly facilitate the avoiding of similar occurrences.

1.6 Lessons learnt

As the design of the track and the vehicle could only rectified by full reconstruction or vehicle purchase, prevention of similar occurrences can only be managed at the maintenance side: that requires a rethink of maintenance processes and the availability of necessary resources.

2. ACTIONS TAKEN

In the autumn of 2019, the track was reconstructed: new rails and new racks were installed, and ca. 50% of the sleepers was also replaced (partly with reinforced concrete sleepers), as well as the ballast bed. An air gap of 20 mm was formed between the rail foot and the supporting concrete blocks.

3. SAFETY RECOMMENDATION

BA2019-0575-5-01: *The investigation revealed that significant track distortion and vertical rail displacement had developed in the track of the rack railway vehicle adjacent to the supporting concrete block, which the vehicle had not tolerated, and which had not been detected by the track supervision.*

Transportation Safety Bureau recommends BKV Zrt. to consider revising the track maintenance requirements applicable to the rack railway vehicle and modify it as necessary, with special regard to

- **the connection between the supporting concrete blocks integrated in the subgrade and the superstructure,**
- **track distortion limits, because of the low track distortion tolerance of the vehicles used,**

- **the methods of superstructure examination.**

By acceptance and expected implementation of the safety recommendation, it may be achieved from the regulation side that the track would not develop track distortions that jeopardise the vehicle applied, or such plane distortions could be identified in due time.

BA2019-0575-5-02: *The track structure of the rack railway vehicle has high maintenance needs and requires special expertise from the track supervision and maintenance personnel. However, these are not provided sufficiently for the track maintenance function. This problem was identified during several TSB investigations.*

Transportation Safety Bureau recommends BKV Zrt. to consider providing a sufficient number of appropriately trained railway personnel in its track maintenance system.

By acceptance and expected implementation of the safety recommendation, track anomalies will be easier to identify and properly eliminated in due time.

BA2019-0575-5-03: *The investigation found that the mechanical characteristics of each rubber springs* used in the rack railway vehicles *may significantly differ, which increases the risk of derailment.*

Transportation Safety Bureau recommends BKV Zrt. to consider specifying the rubber spring ratings in the rack railway vehicles' maintenance system in such manner that the stiffness of the rubber springs used should be suitable and uniform.

By acceptance and expected implementation of the safety recommendation, the sensitivity of the vehicles to track anomalies could be reduced.

2019-0637-5 Győrszabadhegy (Railway accident / Injury caused by vehicle in motion)

Overview of the accident

Two safety installations maintenance personnel were working partly within the structure clearance in the down-side end switching zone of Győrszabadhegy station, when a passenger train departing from the station hit them. One of them was injured seriously and the other conceded minor injuries.

The IC attributed the occurrence primarily to human factors on the parts of the workers and the locomotive driver, but it also contributed to the occurrence that the locomotive driver had no information on the works being performed (according to the rules in effect, he did not have to be notified).

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) those performing the works were not aware of the approaching train, and the employee who was responsible for monitoring did not see it either;
b) for some unrevealed reason, the locomotive driver did not realise the people working on the track in time.

1.2 Indirect causes

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

a) the purchased insulated rails had not been drilled, neither at the factory, nor subsequently, at the infrastructure management facility;
b) the rails assigned for work were placed within the structure clearance of a track which was in operation;
c) the works were not timed for periods of time when trains were not present;
d) the works were performed with a noisy machine, but not in track possession;
e) these works should have been performed by three people, but in this case the person responsible for monitoring was doing other tasks as well;
f) the locomotive driver did not know about the works, he had not been notified of it, and the working area was not protected with signals either;
g) the employees doing the works had not notified the traffic manager of their works therefore the traffic manager was not aware of the works either, so he did not notify the workers of the approaching train;
h) the locomotive driver used a low noise level audio signal (in line with the rules) to alarm the workers which they did not hear.

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:

a) according to relevant rules, the locomotive driver does not have to be notified of such works;
b) no protective signals have to be used for the working area either.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the safety installations section cannot fulfil all of their maintenance tasks.

1.5 Proven procedures, good practices

The IC identified no actions which would have mitigated the consequences of the occurrence or would have helped avoiding more a serious outcome.

1.6 Lessons learnt

The fundament of avoiding similar occurrences is safety awareness; more specifically, the workers' need for being safe while working. They must be aware that they are working in a hazardous working area, so they need to monitor the area around them and to keep in touch with the traffic managers affected. At the same time, it is important from the aspect of work organisation as well that preparatory works carried out in a factory or site workshop environment also reduce the workers' exposure to hazards.

2019-0697-5 Budapest-Déli (Railway incident)

Overview of the accident

On 28 June 2019, at Budapest-Déli station, without previous notification, the train № 247 was guided to the occupied Track III; the train stopped in front of the train № 18608 prepared for departure, so the two trains did not collide.

The IC attributed the occurrence to human factors related to the traffic managers, and to the obsolete safety installation. A contributing factor is that the capacities of the railway station are overloaded, the advantages of the motor train sets and clock-face scheduling cannot really be perceived at the station.

The implementation of capacities and safety installation which are adequate for the actual traffic of the station are hindered by the lack of an agreed vision regarding the future role and importance of this station.

The IC proposes that a safety recommendation be issued relating to the design of the technology to be used.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the traffic managers forgot that two trains were prepared for departure on the cs3 track;
b) the station crew failed to check the route;
c) the safety installation did not provide protection against receiving a train onto an occupied track.

1.2 Indirect causes

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

a) there is no reliable, independent device or process for monitoring track occupation;
b) none of the existing devices and processes worked well at the time of the occurrence;
c) the station crew’s workload is rather high;
d) the safety installation of the station cannot manage the actual traffic of the station well anymore.

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:

a) the technology used does not utilise the advantages of the motor train sets and thus overloads the capacities;
b) roster planning cannot rely on reserve assets in proportion to the occurrence of breakdowns;
c) the maintenance facility receives no trains at night;
d) there is no marshalling yard;
e) there is no ready concept for the development of the station.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

f) the infrastructure manager failed to replace the crew involved in the occurrence;
g) managers do not find a link between occurrences due to human factors and the capabilities of the safety installation.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome, that the train approached the occupied track at a low speed therefore the locomotive driver realised the dangerous situation and was able to stop his train by service braking in time.

1.6 Lessons learnt

The direct condition of avoiding similar occurrences is attentive work by fellow crew members, but the company management plays an important role in it because they design the employees' workload which largely affects their attention, and allocation of the necessary technical support also depends on the management.

2. ACTIONS TAKEN

Right after the occurrence, the infrastructure manager took the following actions (according to information received on 10 July):

"In connection with the incident which took place at Budapest-Déli station on 28 June 2019, the head of the junction management has taken the following actions in order to prevent similar occurrences:

- it was ordered to the employees responsible for inspections that they should communicate the circumstances of and lessons learnt from the incident (on the basis of preliminary investigation results) at the railway junctions under their control;
- extraordinary practical operational training was ordered for the employees directly affected by the incident concerned (to be held on Week 27);
- it was ordered that the relevant requirements and general rules in the Operational Instructions should be included in the syllabus of the next scheduled on-site practical operational training session (second half of 2019)."

According to managers of the company, several essential improvements were implemented in the safety installation, e.g. 20-30 point operating (Soulavy) drums, signal wire elements and relays, while cables were repaired and power supply was improved. The control panel received abrasion-resistant coating.

According to information received from the station management, as of 2020, water can be obtained and toilets can be emptied at each track, which may reduce related shunting and delays. According to the station management, the inclusion of each track into the system of track occupancy detection is underway, but the company managers responsible for development have not confirmed that information.

2.1 Safety recommendations

BA2019-0697-5-01*: According to the conclusion of the investigation, the human error was determined by the workload at the station, which is partly due to the fact that the potential advantages of the motor train sets and clock-face scheduling are not utilised.*

Transportation Safety Bureau recommends MÁV-Start Zrt. to consider reviewing (involving MÁV Zrt. as necessary) the motor train set technology (organisation of maintenance, parameters of clock-face scheduling of traffic, etc.) in order to make use of the advantages offered by motor train sets, thus reducing the amount of motor train set related shunting at terminal stations.

By acceptance and expected implementation of the safety recommendation, the amount of shunting at the station can be reduced, which implies a narrowing of the margin of error, and the mental load leading to human error will also decrease.

2019-0712-5 Jánoshegy - Szépjuhászné (Railway accident / Derailment)

Overview of the accident

The leading bogie of the first passenger wagon of the train № 30125, coming from Hűvösvölgy and heading to Széchenyi-hegy station, derailed with two axles. No one was injured in the accident.

The IC attributed the occurrence to the running safety (zero sliding plate gap) of the derailed wagon.

Although there would be explanations to the reduction of the gaps, no cause has been clearly evidenced during the investigation. In any event, it is justified to check the gap on a regular basis, and the operator has modified its vehicle supervision procedures accordingly.

No safety recommendation needs to be issued, owing to the actions taken.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the sliding plate gap values of the wagon were zero.

1.2 Indirect causes

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

a) presumably, the rubber elements of the wagon got compressed following their installation therefore the adjusted sliding plate gaps disappeared, although the IC also experienced the opposite to be true;
b) due to the aforesaid, the track distortion measured (and found to be within the limit) in the track also contributed to the derailment.

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:

a) the sliding plate gaps were not measured and documented on a regular basis before.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the train was travelling at a speed exceeding the low speed limit before the location of the derailment.

1.5 Proven procedures, good practices

The IC identified no factors which would have mitigated the consequences of the occurrence or would have helped avoiding more a serious outcome.

1.6 Lessons learnt

The occurrence was attributed to a feature of the vehicle which may remain constant for a longer period of time, but may as well change soon after the vehicle is put into service. Accordingly, it stands to reason to pay attention to the transport safety characteristics of vehicles after putting them into service.

In addition, although does not relate directly to the occurrence, speeding implies a safety risk in other circumstances.

2019-0748-5 Érd (Railway incident / Signal passed at danger)

Overview of the accident

On 08 July 2019, a trainee was at work under supervision of an instructor on an electric locomotive which was in service as a light engine. The locomotive passed the K1 exit signal at Érd station without authorisation, then ran onto a safety dead-end track, broke through the buffer stop, derailed with all axles, and halted.

The IC attributed the occurrence to human factors on the part of the locomotive crew: the crew had not recognised the danger aspect of the exit signal. It contributed to their mistake that:

- the spare red light bulb was on in the exit signal, and it is less bright than that of the usually active main bulb;
- the instructor's line knowledge relating to the layout of the line was not up-to-date;

During the investigation, doubts emerged in connection with the reliability of the train control system, even the possibility of its deactivation was raised, but, neither the tests nor data from the data recorder confirmed any error or erroneous management which would have affected the occurrence.

It is not related to the occurrence, but the IC found erroneous data in the locomotive's licence from the transport authority related to the brake type of the locomotive, and such error affects the method of operation of the brake as well.

The final stop point above the road

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the locomotive crew did not realise that the exit signal K1 was at danger;
b) the locomotive crew collectively came to the erroneous conclusion that the signal changed to green during the approach.

1.2 Indirect causes

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

a) the less visible spare red light bulb was on in the signal K1;
b) the locomotive drivers' line knowledge was outdated in terms of contents because of reconstruction of the railway line;
c) the special competences necessary for locomotive driving instructors are not sufficiently focussed on during their selection/training.

1.3 Root causes

The investigation did not reveal such causes in the regulatory environment or safety management system which would be related to the functioning of the system.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the locomotive's licence from the transport authority indicates a distributor valve the operating principle of which is fundamentally different from the type actually used in the locomotive;
b) the locks of the train control system are fairly loose therefore possible deactivation of the equipment cannot be checked.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that:

a) having realised the emergency situation, but not aware of real consequences yet, the traffic manager took action to stop traffic and to start rescue on the basis of assuming a worst-case scenario, and only authorised new train movements and cancelled rescue activity after he made sure that the outcome was less serious.

1.6 Lessons learnt

Importantly, the locomotive drivers' practice should include conscious observation of the signal aspect which gives clearance to move on and, in the case of any doubt, the locomotive driver should suppose that the aspect was Danger, which could also be supported by the driver's cabin's signal monitoring and evaluation.

The occurrence also highlights that it is fairly risky to move on tracks under reconstruction based on just routine and assumptions.

2. ACTIONS TAKEN

The railway undertaking informed the IC on having taken of several new actions:

a) the company has adopted a monthly roster for locomotive drivers, paying more attention to the rules related to the working hours;

b) rest areas were created at 3 railway stations and a 0-24 "taxi" (automobile) service was introduced for carrying the train crews;

c) continuous data service for Railway Authority Division, Ministry for Innovation and Technology in various topics;

d) a smart phone based waybill was introduced on a trial basis;

e) the headcount of locomotive drivers and locomotive driver instructors is being increased;

f) there is continuous training for locomotive drivers in line knowledge and in type knowledge regarding two other locomotive types;

g) the inspection of locomotives has been increased (lead-coated parts, daily checks);

h) stricter rules apply in order to assure sufficient level of communication between train crews and dispatchers;

i) more incentive wages were introduced for train crews in order to assure those above.

The IC's position is that the actions taken are useful, but only the item g) can be related to the shortcomings identified in the occurrence concerned (but not directly related to it).

2019-0765-5 Esztergom-Kertváros (Railway incident / Signal passed at danger)

Overview of the accident

At Esztergom-Kertváros station, the train № 2095 started after receiving authorisation from the chief train inspector and passed the exit signal K1 at danger without prior authorisation, passed the (open) level crossing SR2 protected with lights and half-barriers, and finally stopped in front of the entry signal of Tokodi-elágazás (junction).

After stopping the train, the locomotive driver had a short consultation with a traffic manager of KÖFI (Central Traffic Control and Management), during which he received no clear instruction as to what to do next, and actually the traffic manager of KÖFI quitted the consultation.

In the meantime, the train (№ 2204) arriving from the opposite direction stopped in front of the entry signal of Tokodi-elágazás; the distance between the two trains staying in front of the respective signals at danger was 376 metres at that time.

The locomotive driver, who worried about the danger of collision with the train arriving from the opposite direction and mentioned by the traffic manager of KÖFI, changed driver's cabs on the stationary train and drove it back to Esztergom-Kertváros without authorisation.

The IC attributed the occurrence to human factors on the part of the train crew who had departed with the train without observing the aspect of the exit signal.

TSB issues no safety recommendation, but notes (in the Lessons learnt section) the rather poor level of safety critical communication and the incomplete line knowledge of the chief train inspectors as well as to the lack of related requirements.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the locomotive driver failed to observe the aspect of the exit signal and passed the exit signal in danger;
b) the chief train inspector authorised the locomotive driver to depart without observing the exit signal;
c) the locomotive driver started a return without authorisation.

1.2 Indirect causes

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

a) the exit signal cannot be seen from the chief train inspector's usual place;
b) the traffic manager of KÖFI did not give clear instruction to the locomotive driver of the train № 2095 relating to what to do.

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:

a) no train control system was installed on the line during the reconstruction;
b) communication on that line is possible only by mobile phone which is not suitable for safety critical communication;

c) the crew training system does not cover the suitable contents and form of safety critical communication.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

Both the locomotive driver and the chief train inspector had worked last on the line concerned several weeks before the occurrence.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that the traffic manager of KÖFI closed the protective lighting and half-barriers at the level crossing (SR2) of the station via manual remote control.

1.6 Lessons learnt

The most important lesson learnt from the occurrence is related to the existing shortcomings of safety critical communication. Though the following items would not have been suitable for preventing the occurrence concerned, but clarification and management of the situation would have been more successful if:

- communication equipment suitable for safety critical communication had been available, and
- the person responsible for traffic management had been aware of the rules of communication in emergency situations.

No technical shortcomings played any role in the course of events in the case concerned, the causes only included human and organisational factors. TSB has investigated into a number of occurrences recently where the same may be stated, however, the railway undertakings do not seem to be taking preventive actions in response to these problems.

Owing to a favourable combination of circumstances, there was no collision or direct endangerment on this occasion, but that was not due to the personnel or to the railway systems.

The chief train inspectors' adequate line knowledge is an important element from the aspect of the management of train movements on the one hand, and from the aspect of passenger safety on the other. In the IC's opinion, formalisation of the custom-based procedural regime seen in Cegléd station during the investigation would support the uniform procedure, i.e. provide adequate level of the chief train inspectors' line knowledge.

2019-0775-5 Csillebérc (Railway accident / Derailment)

Overview of the accident

On 16 July 2019, at 11:25, the rear bogie of the locomotive of the train № 30125 (in service between Hűvösvölgy and Széchenyihegy) derailed with two axles between Csillebérc and Széchenyihegy stations. No one was injured.

On the basis of data available, the IC thinks the direct cause of derailment was that the locomotive concerned is sensitive to minor track defects which may lead to derailment in the case of unfortunate combination of circumstances.

The revealed indirect cause was that the series Mk45 locomotive with reg. № 002 reaches higher amplitude of swinging while running than other models in identical ambient conditions. In the series Mk45 locomotives, the bearing suspension is not completed with shock absorbers which would absorb these swings and mitigate their negative effects on the running safety of the vehicle.

Derailment was facilitated by the fact that the extent of cant of the track at the occurrence location is lower than required, which increases the likelihood of such derailment and, in addition, the cant values are uneven, which increases the amplitudes of swings, and the vehicle concerned is rather sensitive to that.

The speedometer of the vehicle concerned indicates 10-12% lower speed than the actual speed therefore the vehicle runs at higher speed (which is worse from the aspect of swings, according to measurements) even when, according to the speedometer, the locomotive driver does not exceed the speed limit.

The operator initiated the integration of shock absorbers in addition to the bearing suspension of the series Mk45 locomotives. The locomotive concerned is out of service due to malfunction of a component therefore the inaccuracy of the speedometer will be eliminated later on.

Due to the actions taken and underway, the IC does not find it necessary to issue a safety recommendation.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) unfavourable interaction between the track and the locomotive (2,2.1, 2.2.2).

1.2 Indirect causes

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

a) the locomotive with reg. № 002 produces more extensive swinging while running than other types;
b) the speedometer of the locomotive is inaccurate therefore the locomotive runs at higher speed than intended by the locomotive driver;

c) the extent of cant of the track is lower than required, and the cant values fluctuate in excess of the relevant limits.

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:

a) the IC found no root cause.

1.4 Other risk factors

a) the specifications relating to railway construction and maintenance are outdated.

2. ACTIONS TAKEN

The operator initiated the integration of shock absorbers in addition to the bearing suspension of the series Mk45 locomotives. That is a very important step towards the elimination of anomalous vehicle swings and the improvement of running safety.

The locomotive concerned is out of service due to malfunction of a component therefore the inaccuracy of the speedometer will be eliminated later on.

2019-0806-5 Dunai Finomító station (Railway accident / Derailment)

Overview of the accident

On 23 July 2019, at Dunai Finomító station, the two leading wagons of the freight train № 48238-1 derailed on the switch № 28 while the train was leaving the station on Track III. The wagon situated right after the locomotive derailed with one axle, the second wagon derailed with 4 axles, the train came apart and stopped. The second wheel of the third wagon (according to heading of the train) on the right hand side stopped on the top of a drag shoe left on the rail.

The drag shoe was not removed by the employee who coupled the locomotive and the leading wagon, and it was not detected by the person who carried out the braking test and train inspection subsequently.

The IC found that the direct cause of the derailment had been a drag shoe left under a train.

The IC attributed the occurrence to human factors on the parts of the locomotive driver and the wagon examiner.

3. CONCLUSIONS

3.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the train started with a drag shoe left under the leading wagon, and the drag shoe got stuck in the crossing part of the switch, and the two leading wagons of the train derailed on it.

3.2 Indirect causes

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

a) the wagon examiner failed to check with the traffic manager the number, markings and locations of the drag shoes used with the train,
b) after connection of the rolling stock, the locomotive driver did not look for and did not remove the drag shoe placed under the leading wagon, because he did not think it was his task to remove it,
c) the wagon examiner did not realise the drag shoe under the leading wagon, so he only removed the shoe he had found under the tail wagon,
d) due to a practice developed at the station, the drag shoes were not returned to the traffic manager’s supervision (i.e. their storage) after use therefore they were not monitored anymore, so the traffic manager could not make sure that all the drag shoes had been removed from under the train,
e) such a practice had developed at the station in the area of returning the drag shoes which deviated from the relevant instruction and compromised some of the safety guarantees integrated in the relevant process, and the management audits and other inspections failed to reveal it.

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 Station Instructions contained no rule for the case, i.e. what to do if the drag shoe is removed from under the train by the wagon examiner or the locomotive driver who carries out train coupling .

3.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

3.5 Lessons learnt

The Station Instructions do not cover the situations where, typically in the case of preparation of trains of smaller railway undertakings, the drag shoes are removed by the locomotive driver carrying out the train coupling or by the wagon examiner carrying out the braking test.

Either the application or the removal of drag shoes from under the rolling stock may be carried out by different employees at various points of time therefore one may easily think erroneously that the other responsible person has surely carried it out already. Accordingly, it is very important for the traffic manager to have adequate information on the drag shoes applied on the given track before, and on the removal thereof, and that he can compare the numbers of the drag shoes issued by him and returned to him, thus making sure that all drag shoes have been removed from under the train which is to be authorised to depart.

4. ACTIONS TAKEN

MÁV Zrt. Dunai Finomító station has modified their Station Instructions. They have modified the process of issue and returning of drag shoes to make it more specific. The traffic manager records (in the track occupancy log) the method of securing the vehicles and trains staying on a track against brake-away, the application of manual or stop brakes, as well as the location, number and serial number of the drag shoes applied on the tracks.

2019-0871-5 Hort-Csány (Railway incident)

Overview of the accident

On 09 August 2019, at Hort-Csány station, while the train № 566 was leaving the station following a subsidiary signal, it came in touch with the scheduled route of the train № 505 moving in the opposite direction, due to the incorrectly set switch № 3 (facing point) situated in its route.

Upon intervention by the locomotive driver, the train № 566 stopped, with service braking, on the switch № 3, with its locomotive in front of the entry signal of the station, in line with the pre-indication received. After standstill, the distance between the two trains was 204 metres.

The IC attributed the occurrence to human factors on the part of the traffic manager who had failed to apply the rules of use of the signalling system.

TSB issues no safety recommendation, but the IC discusses the lessons learnt from the occurrence in Section 3.6.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the traffic manager inadvertently reversed the switch № 3 in front of the train leaving the station following a subsidiary signal;
b) the traffic manager failed to remove the standing fuses, and there were propped push-buttons on the safety installation.

1.2 Indirect causes

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

a) the traffic manager chose an inappropriate solution to the conflict situation he had identified;
b) the signalling system failed to detect the malfunction of the insulation insert in the switch № 7 on several occasions.

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:

a) a wrong practice was not detected and rectified during the audits.

1.4 Other risk factors

The IC identified no such factor.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that the locomotive driver, while moving at the required speed, detected the inappropriately set switch and, being aware of the relevant rules, stopped his train.

1.6 Lessons learnt

The occurrence highlights that even those inappropriate processes and working methods which have been applied with no problem for a longer period may lead to an incident in the case of a coincidence of certain factors.

Another lesson to learn is that auditors/inspectors should not tolerate inappropriate practices but, via communication during the training or inspection of the personnel, they should prevent the formation of conflicts of goals, and demonstrate the hazards of the inappropriate activities (which are even against the rules sometimes) used.

2. ACTIONS TAKEN

On 22 August 2019, MÁV Zrt. published a compilation on the circumstances of the danger situation the trains, and an out-of-turn training session was ordered for the traffic management personnel affected.

2019-0911-5 Százhalombatta (Railway incident / Runaway of rolling stock)

Overview of the accident

On 17 08 2019, a train arriving from Püspökladány and heading Százhalombatta and containing two mobile machines was received on the dead-end track № V at 03:32 o'clock. Soon after, the train crew left the train which runaway at 04:32, just when a passenger train was departing. The two mobile machines passed the exit signal K5 and stopped ca. half a machine length behind the shunting limit signal, where the traffic manager taking notice of the incident secured the machine against further runaway.

The IC found that the train had not been secured against runaway, which can primarily be attributed to shortcomings of the knowledge of the driver of the vehicle.

In addition, the stop brake of the vehicle had been unserviceable for a longer time, which the driver had been aware of, but the information had not reached the maintenance system of the vehicle.

Therefore, TSB issues a safety recommendation relating to the revision of the maintenance system.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the stopping brake on the mobile machine was not applied, it was unserviceable;
b) the mobile machines were not secured by drag shoes either.

1.2 Indirect causes

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

a) the vehicle was used with a malfunctioned brake;
b) the slope gradient of the track was steep enough to let an unsecured vehicle break away;
c) the vehicle driver's knowledge relating to protection against break-away was inadequate;
d) the traffic manager did not make sure either that the vehicle was protected against break-away;
e) the maintenance personnel had no information on the hazardous technical defects of the mobile machines.

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:

a) the level of safety culture of the railway undertaking is low;
b) the system of examinations in the railway training system is not completely suitable for revealing shortages in the colleagues' technical knowledge.

1.4 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that the traffic manager realised the emergency and attempted to intervene (finally, the

vehicles stopped independent of his intervention, owing to a lucky combination of the circumstances).

1.5 Lessons learnt

Basic conditions of preventing similar occurrences:

- run a maintenance system where information finds its way from the vehicle with malfunctioned brake system to the maintenance organisation, and the repair is actually carried out; and
- run a training and examining system which provides and assesses knowledge that can be used in practice.

2. ACTIONS TAKEN

MÁV Zrt. gave the information that no specific action had been taken in connection with the occurrence, because the instructions clearly covered how to secure the vehicles against break-away in similar cases. The occurrence could have been avoided by fully observing the relevant instructions.

According to information received from MÁV FKG Kft., they took the following actions following the occurrence:

1. For three years now, in addition to mandatory periodical training sessions, they have also been organising training sessions with the title "Days of Protection" in January or February for their personnel employed in areas related to the safety of railway transport, regardless of whether they are subject to mandatory periodical training and examinations pursuant to the relevant NFM decree. The contents of such railway safety training are based on the shortcomings identified by inspections in the previous year, and the incidents that occurred in the previous year.

   Accordingly, protection against vehicle break-away was a key topic this year.

2. The Company accepts and applies the basic principles and guidelines laid down in the MÁV Group risk management policy, and in addition, they are making an effort to introduce the railway quality management standard № MSZ ISO/TS 22163, the use of which will exclude the participation of vehicles in inadequate technical condition in railway transport. The audit required for the introduction of the standard is due for September 2020.

3. SAFETY RECOMMENDATION

Similar occurrences may be avoided by observing the rules of protection against break-away, but the IC recommends that a safety recommendation be issued due to shortcomings of the maintenance system:

BA2019-0911-5-01: *The investigation found that the maintenance system of the railway undertaking was not notified of the vehicle's existing brake malfunction therefore they did not repair it.*

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the practical implementation and operation of the maintenance processes in the safety management system of MÁV-FKG Kft., and taking action as necessary.**

By acceptance and expected implementation of the safety recommendation, it can be provided that the undertaking takes timely action to eliminate defects which endanger transport safety.

2019-0928-5 Vámosgyörk (Railway accident / Derailment)

Overview of the accident

On 23 August 2019, the freight train № 77559-2, comprising 33 empty 4-axle freight wagons was on its way from Békéscsaba to Felsőzsolca. When approaching Vámosgyörk station, the last but one wagon of the train derailed with two axles on the turnout № 14, after which the train came apart and stopped. The reason of derailment was that the wheel rim wedge slipped off the fourth wheel on the left, which made the wheel pair unguided.

The cause of loosening of the rim wedge was not clearly identified, but it was probably influenced by the fact that the thickness of the wheel rim was close to the relevant lower limit.

Wear-out of the wheel rim may lead to loosening of the rim wedge rarely, but it may be identified by following the relevant inspection methods therefore the IC does not find it necessary to issue a safety recommendation.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the rim wedge got loose and slipped off the fourth wheel at the 8th axle journal on the left hand side, as a result of which the wheel pair became unguided and derailed,
b) the loosening of the rim wedge was part of a longer-lasting process, i.e. the wagon had covered a longer distance with loose rim wedge, but the defect (loosening) remained undetected during wagon inspection because of lack of match marks.

1.2 Indirect causes

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

a) the wheel rim thickness was close to the relevant lower limit,
c) the radial pressure between the wheel and the rim wedge disappeared or became so low that the rim wedge got loose.

1.3 Root causes

The IC makes no such statement.

1.4 Other risk factors

A factor which is not related to the occurrence but increases risk is that unrealistic braking effect was found in a freight train which had contained the wagon concerned earlier.

2019-0939-5 Budafok shed (Railway accident / Collision with an object)

Overview of the accident

A tram derailed and knocked down a fence panel of the shed while moving within the site at Budafok shed. The falling fence panel hit the side of the № 56 tram which was just passing by, and caused minor damage to it. No one was injured in the occurrence.

The IC attributes the occurrence to human factors on the part of the tram driver who was moving within the site, but the IC found technical and organisational factors also during the investigation.

For the sake of avoiding similar occurrences, TSB issues a safety recommendation relating to the regulation of the use of built-in automatic speed control systems in those vehicles in which it is applicable.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) too high lateral acceleration occurred in the vehicle while it was travelling along an arc of small radius prior to the spot of the derailment therefore the rear part of the tram began an undesired swinging and oscillation,

b) the tram driver exceeded the speed limit significantly.

1.2 Indirect causes

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

a) speeding may easily become a bad habit and then a wrong practice among tram drivers who move the trams within the site, when they work in time constraint;

b) as regards the vehicle type concerned, a driving technique which disregards the construction design will significantly increase the risk of derailment;

c) the 10 km/h speed limit which the vehicle can provide is not required at the vehicle sheds, and is not a practice among the tram drivers concerned.

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:

a) internal audits and investigations do not typically cover the colleagues employed at the sheds.

2. SAFETY RECOMMENDATION

BA2019-0939-5-01: *The IC found that keeping the low speed limit applied at the tram shed is an obligation of the personnel which largely depends on their individual level of safety awareness. If it is absent or too low, similar occurrences may be avoided by enforcing the speed limit by technical solution which is integrated in the type CAF Urbos vehicles but is not in use.*

Transportation Safety Bureau recommends BKV Zrt. to consider requiring the use of the integrated speed limit function in the vehicles where it is available within the area of the sheds.

By acceptance and expected implementation of the safety recommendation, the risk of similar occurrences may be reduced significantly.

2019-0971-5 Herceghalom (Railway incident / Signal passed at danger)

Overview of the accident

Due to a braking problem, the train № 47285 stopped between Bicske and Herceghalom stations at 01:15 o'clock on 06 September 2019. After finding and eliminating the problem, the train continued its journey at 01:47. At Herceghalom station, the train overran the entry signal at danger, burst the switch № 11 open, and stopped opposite the freight train which had been scheduled to transit there but stopped in the meantime. The distance left between the two stopped trains was 140 metres.

The IC attributes the occurrence to a dramatic brake malfunction occurring in one of the train's wagons and to human factors on the part of the locomotive driver. It was found that, due to the disabling of brakes in order to clear the track, the braking effect in the train decreased to such extent that the train had not been able to stop in front of the entry signal from the speed selected by the locomotive driver. The actions taken by the locomotive driver did not reflect any intent to apply the rules applicable in similar situations.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) a gross malfunction occurred in the pneumatic system of the sixth wagon in the train,
b) the braking effect considerably decreased in the train due to disabled brakes,
c) the speed of the train was too high compared to the actual braking effect,
d) when determining the maximum speed of the train, the locomotive driver disregarded the rules applicable to brake malfunctions.

1.2 Indirect causes

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

a) while the locomotive driver was involved in troubleshooting and elimination with the brakes disabled, he had lots of phone calls which distracted his attention, and the contents of which reflected an urge to clear the track as soon as possible,

b) no gross brake system error should occur only one month after a general technical inspection; it actually hints at inadequate repair work.

1.3 Root causes

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

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the traffic manager could have further reduced the risk of collision considerably in the given situation by setting the exit signal to danger.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that:

a) the locomotive driver notified the traffic manager of the emergency and of the expected signal overrun,
b) the traffic manager stopped the freight train coming from the opposite direction.

1.6 Lessons learnt

Although the locomotive driver did not determine a maximum speed for his train with regard to the disabled brakes, a glimpse at the rules he should have applied offers us an important lesson to learn. A clear and easy-to-use speed limit rule is the one which applies to shunting situations where only the locomotive's airbrake is available; however, the rule seems more "flexible" in situations where at least one more vehicle is involved in the braking system in addition to the locomotive. For the sake of more safety-aware use of the rules applicable to brake problems, the reference to "shunting with the use of the airbrake" should be made more specific to say "shunting with relying on the brakes of the locomotive only" relating to the shunting speed would make the conditions of safe track clearing more unambiguous.

2019-0994-5 Kóny (Railway incident / Signal passed at danger)

Overview of the accident

On 11 September 2019, at Kóny station, the train № 9913 departed after passengers' getting off and on, and passed the exit signal K2 at danger and rolled onto the switch № 2. The freight train № 90982 approaching the station from the opposite direction stopped in front of the entry signal which had fallen back to danger aspect (due to occupation of the switch). Then the traffic manager, supposing that the occupancy of the switch was only apparent, authorised the freight train to continue its approach.

When the traffic manager took notice of the signal overrun he instructed the freight train (by telephone) to stop.

The IC attributed the occurrence to human factors on the part of the train crew and the traffic manager.

As similar occurrences may be avoided by the personnel's due attention, TSB issues no safety recommendation.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the passenger train's locomotive driver did not look at the aspect of the exit signal before departure, and looked at it too late when on the move;
b) the traffic manager misjudged the traffic situation and authorised the freight train to continue its approach.

1.2 Indirect causes

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

a) the chief train inspector issued the 'Ready to start' signal despite the fact that the exit signal showed no free way;
b) there was a door problem with the motor train set, which distracted the locomotive driver's attention;
c) the screen of the safety installation monitor contributed to the traffic manager's mishap.

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:

a) the rules in effect impose the obligation on the chief train inspector who has less and less traffic-related tasks.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the locomotive driver was driving the train without wearing his glasses, which was in breach of a provision in his medical licence.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that, when realising the emergency situation in response to vigilance alerts, the locomotive driver braked the train therefore and, although he overran the exit signal, he managed to stop the train at a safe distance from the freight train.

1.6 Lessons learnt

The above situation of passing a signal at danger without authorisation without offers no other lesson learn than highlighting the importance of the obligation to pay due attention.

2. ACTIONS TAKEN

The railway undertaking issued no proposal and took no specific action relating to the occurrence, because, according to the conclusion of their internal investigation the occurrence was not due to the lack of rules but to failure to observe relevant rules and to human errors.

2019-1000-5 Pécel (Railway incident / Signal passed at danger)

Overview of the accident

On 13 September 2019, at 06:43 am, the train № 3220 approaching Pécel station passed the entry signal A at danger without prior authorisation. The train № 3089 which was leaving the station on a crosswise route in front of the arriving train № 3220 stopped in front of the signal K3 which had just been set to danger aspect by the traffic manager.

The IC attributes the occurrence to human factor related to the locomotive driver, but also found various attention distracting circumstances.

1. CONCLUSIONS

1.1 Direct causes

The factor which had direct effect on the occurrence was as follows:

a) the locomotive driver did not make sure of the entry signal aspect.

1.2 Indirect causes

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

a) the locomotive driver's attention was distracted by his task (raising the pantograph) to do after the train has passed the insulated catenary section preceding the entry signal;

b) visibility of the track (including the aspect of the entry signal) was impaired by the bright light of the rising sun which blinded the locomotive driver;

c) the locomotive driver's fatigue had a negative effect on his focusing and performance as he approached the end of a long night shift.

1.3 Root causes

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

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the locomotive drivers' work schedule includes frequent changes concerning the timing of their shifts for different times of the day, which imposes high loads on the human organism and may impair performance significantly, especially in a long night shift.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome that:

a) the traffic manager was monitoring the train traffic on the safety installation, and when realising the emergency, he set the exit signal of the train № 3089 to Danger aspect;

b) the locomotive driver of the train № 3089 fulfilled his monitoring obligation (specified in the Operational Instructions F1 and F2) while leaving the station, and he saw that the entry signal aspect had changed in the meantime, and stopped the train.

2019-1026-5 Miskolc-Tiszai (Railway accident / Derailment)

Overview of the accident

On 18 September 2019, at 14:30, the freight train № 45233 was approaching Miskolc-Tiszai station on a locked route, with signal handling. The train would have travelled on a crossing turnout from a main track to a main track, but its locomotive derailed with its two front axles on the turnout and was guided to a secondary track. The leading wagon derailed with 4 axles and was dragged crosswise relative to the track axis. No one was injured.

The IC found at the scene that, at the 'a' end of the crossing turnout, the securing of the pin was missing from the connection of the left switch tongue attachment, the stretcher bar and the control rod. As a result, the pin slipped out, and the switch tongue got critically close to the stock rail, which led to derailment of the train. The IC's position is that the occurrence was due to technical malfunction which may be attributed to human factors.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the connection between the arched switch tongue attachment, the stretcher bar and the control bar was disconnected because the pin had slipped out,
b) the pin was not properly secured after the removal and re-installation of the control rod the night before the occurrence.

1.2 Indirect causes

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

a) the safety installation did not detect the malfunction,
b) the personnel putting the switch into operation did not realise that the pin of the control rod had not been secured,
c) neither the locomotive drivers nor the track maintenance professional who detected the anomaly of the switch did recognise the hazardous nature of the defect therefore they did not intervene immediately but only reported the problem, and the action taken subsequently was too late.
d) after being notified of the defect, the traffic management personnel maintained traffic on the switch concerned, not waiting until the related inspection.

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:

a) the design of the safety installation does not provide for detection of the displacement of the switch tongue in the case of similar defects until the switch position needs to be changed.

1.4 Other risk factors

The IC identified no other risk factor which could be related to the occurrence.

1.5 Lessons learnt

It was known prior to the derailment that something was wrong with the track, but it was not clear whether the defect was hazardous.

Safe action in similar situations would be to suspend or limit traffic after receiving relevant information until the track is checked (and return to normal operation after favourable feedback only), and not to maintain traffic until the inspection and negative feedback as if there is no problem, thus taking the risk of a potential accident.

2019-1245-5 Nyírbátor (Railway accident / Derailment)

Overview of the accident

On 11 November 2019, at 09:25 am, a freight train was approaching Nyírbátor station, on a locked route, with signal handling, in a turnout direction, when the leading bogie of its 29th wagon went to diverging direction and the second bogie went straight on, which caused the wagon to derail, and the 30th wagon separated from the train and went straight on. The derailed wagon knocked down the signal K3.

The IC found during the investigation that the pointsman had changed the (№ 6) switch position under the 29th wagon of the approaching train, to which a technical error of the safety installation also contributed.

Relating to the accident, TSB issues a safety recommendation proposing that the long-known possibility of failure of the type Siemens-Halske safety installations should be presented in the operation manual of the safety installations concerned.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the pointsman did not wait until the whole train entered the station but started the process earlier by handling the safety installation, at the end of which the switch was able to change position under the moving train;
b) the safety installation did not prevent irregular switch handling due to its fault not known by the pointsman.

1.2 Indirect causes

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

a) when receiving the train, the traffic manager failed to check visually whether the train had actually moved in fully but only relied on the information from the safety installation before he released the block indicator of the route, thus making it possible for the pointsman to change the switch position under the moving train;

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:

a) the Operation Manual of the safety installation does not contain a description of the technical error which may lead to a similar accident, neither its risk, nor the procedure to follow in a similar case.

1.4 Other risk factors

Factors which cannot be related to the occurrence but increase risk:

a) the safety installation designed about 100 years ago can only function if its rules of operation are strictly applied; the chances of human error and omission are rather high. Hazardous situations caused by human errors cannot be prevented in all cases.

2. ACTIONS TAKEN

Each safety installation within the area of MÁV Zrt. PTI Debrecen was inspected out of turn following the occurrence, and, pursuant to a newly issued instruction, such installation must be specifically examined during every maintenance session.

No anomaly of operation was detected during the out-of-turn inspections.

On one occasion, a contact problem was detected and fixed during a subsequent monthly maintenance session.

3. SAFETY RECOMMENDATION

BA 2019-1245-5-01: *On 11 November 2019, at Nyírbátor station, a train approaching with signal handling derailed due to changing of switch position under the moving train. The investigation conducted by TSB found that a technical error of the safety installation and the operating personnel's activity contributed to the occurrence.*

> **Transportation safety Bureau recommends MÁV Zrt. to consider completing the operation manual of type Siemens-Halske safety installations with a description of the technical defect which led to this accident, including its risk, detection and the procedure to apply if it occurs.**

By acceptance and expected implementation of the safety recommendation, the relevant personnel will understand the importance of the applicable rules, and have adequate competences to manage critical situations arising from similar technical errors.

2019-1264-5 Angyalföld (Railway incident / Signal passed at danger)

Overview of the accident

The train № 2065 passed the second entry signal H at danger without prior authorisation at Angyalföld station. The train was stopped by a trainee locomotive driver working under supervision 98 metres after the signal, just before it would have entered the unclosed level crossing protected with half-barriers and warning lights SR1. No one was injured in the occurrence. The IC attributed the occurrence to human factors on the part of the locomotive drivers, but certain problems of technical nature were also identified. TSB issues no safety recommendation, but highlights the importance of meeting the requirements of ergonomics for the sake of successful training, because it has implications for transport safety as well.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) the trainee locomotive driver and the instructor did not apply the brake in time;
b) in the absence of line knowledge, the trainee locomotive driver did not know that they were approaching a second entry signal therefore he did not scan for it visually;
c) on the basis of his earlier experience, the instructor expected a clear signal to come, despite a contrary pre-indication.

1.2 Indirect causes

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

a) due to lack of experience, the trainee locomotive driver's situation awareness was impaired temporarily, but the instructor did not realise it and did not manage the situation;
b) the instructor sitting on an extra seat was in a position from which the track was not fully visible and the signals were also out of sight as regards proper scanning;
c) the layout of the driver's cab does not allow the instructor to take a position which would be comfortable for a longer period of time during a training run in such manner that he/she could have an adequate view to the track and also comfortably reach the controls, which hinders his/her intervention in hazardous situations.

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:

a) the locomotive driver training programme does not provide for trainees at the beginning of the practical training to gradually (when they already have experience with the operation and control of the vehicle) acquire the practical experience necessary for driving a train in normal traffic;
b) during the training required for locomotive driving instructors, they are not specifically prepared to identify and manage the safety risks which may arise during the activity of the trainees under their supervision.

1.4 Other risk factors

a) the concerned section of the (earlier) fully reconstructed line is not equipped for continuous signalling, and there is no train control system there.

2019-1330-5 Szerencs (Railway incident / Signal passed at danger)

Overview of the accident

On 28 November 2019, the freight train № 48403-2 composed at Miskolc-Rendező station and heading to Nyírábrány was received on Track IV, Szerencs station, which is accessible through switches in diverging direction, where it should have waited for some time. However, the freight train entered the track at a speed of 54 km/h and could not stop there, and overran the exit signal V4 without authorisation.

The IC found that the main line of the airbrake was not open between the first and the second wagons of the train therefore the brake did not work in 42 wagons of the train.

The IC attributes the cause of the occurrence to an incorrect braking test performed by the wagon examiner and the locomotive driver; in addition, the locomotive driver's failing to perform a running braking test after departure also hindered the detection of the error.

1. CONCLUSIONS

1.1 Direct causes

The factor which had direct effect on the occurrence was as follows:

a) only the locomotive and the leading wagon were connected into the braking circle therefore the braking effect of the train was insufficient.

1.2 Indirect causes

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

a) the wagon examiner responsible for the braking test did not carry it out in line with the requirements therefore he did not realise that only 1 of the 43 wagons were involved in the braking;
b) the locomotive driver did not realise that recharging of the brake system of the train took place within a fraction of the usual time both after connection of the locomotive and during the braking test, and he did not suspect a gross deficiency of the brake system;
c) the locomotive driver failed to carry out a running brake test after departure therefore he did not realise the insufficient braking effect;
d) when realising that the braking effect was insufficient, the locomotive driver did not increase braking into emergency braking, thus he did not even utilise the lower braking effect to the full.

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:

a) the IC found no root causes.

1.4 Other risk factors

The IC found no other factors.

1.5 Proven procedures, good practices

It mitigated the consequences of the occurrence, i.e. helped avoid a more serious outcome and resolved the situation, so it proved to be a good practice that:

a) owing to the track system of Szerencs station, the train ran onto a dead-end track, i.e. did not move towards the main line.
b) the chief traffic manager realised the emergency and manually closed the barrier № SR1 manually as well (it had been closed due to departure of the train № 5258).

1.6 Lessons learnt

Braking test is a type of inspection and examination of the braking systems of trains (to be carried out both before start or during running) which serves detection of such malfunctions of equipment which may endanger transport safety.

Both the locomotive driver and the wagon examiner should be aware that the braking test must not be done superficially or without due care. Both usual and unusual signs must be listened to.

When a wagon examiner is aware that the train to be subjected to a braking test includes wagons of which the brake systems may move slower due to earlier cargo (e.g. salt), then he should carry out the steps of the braking test even more carefully. He should check not only for visible but also for audible signs. In the case that the application or release of the brake is not accompanied by mechanical noises, he should take notice of it.

A locomotive driver should be aware that if the application or release of the brake takes much less time than usual, he must inform the wagon examiner that something is wrong.

A running brake test, to be carried out at a relatively slow speed, serves to finally find out whether the braking effect of the train is sufficient. Omission of that test may lead to similar occurrences or even to accidents.

In summary, the personnel needs to be aware that the braking test must be carried out in line with the rules specified in the Braking Instruction E.2 and, in addition to those rules, they should also check for unusual phenomena, because that may help them detect malfunctions endangering transport safety and prevent accidents.

2020-0169-5 Vecsés - Üllő (Railway accident / Accident at level crossing)

Overview of the accident

The freight train № 82719 collided with an automobile at the level crossing (AS226) protected with serviceable warning lights and half-barriers between Vecsés and Üllő stations. The train pushed the car in front of it until it stopped. The wreck of the car reached into the track clearance of the left hand side track where a passenger train coming from the opposite direction hit it tangentially.

There was nobody in the car at the time of the collision, because it had entered the level crossing with the warning lights blinking white, then it drifted down off the STRAIL panels and became immobile. Its driver got out and left it behind when the half-barriers were closed.

TSB upholds its Safety Recommendation № BA2013-1118-5-01 issued earlier relating to the necessity of placing information signs at level crossings, and issues an additional safety recommendation relating to road markings at the level crossing concerned.

1. CONCLUSIONS

1.1 Direct causes

The factors which had direct effect on the occurrence were as follows:

a) one wheel of the car ran off the road between the two tracks and the car became immobile;
b) the car was not able to leave the level crossing before the arrival of the train;
c) it was not possible to notify the railway personnel in charge of the level crossing, and accordingly, no attempt could be made to stop the train.

1.2 Indirect causes

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

a) The continuous line indicating the centreline of the road is not painted within the level crossing, and the edge of the road is not indicated either.
b) The contact data (telephone number, identification of the level crossing) necessary for quick and effective notification of the railway infrastructure operator is not indicated at the level crossing.

1.3 Root causes

The IC revealed 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.

1.4 Safety recommendation

BA2020-0169-5-01: The level crossing in the railway section № 226 between Vecsés and Üllő stations saw two accidents within half a year where a road vehicle had run off the road and become immobile within the level crossing. The investigation carried out by TSB found that the continuous line indicating the centreline of the road is not painted within the level crossing, and the edge of the road is not indicated either.

Transportation Safety Bureau recommends MÁV Zrt. to arrange for painting a continuous centreline as required by relevant legislation and, if possible, the painting of the lines indicating the edges of the road within the

level crossing situated in the railway section № 226 between Vecsés and Üllő stations.

By acceptance and expected implementation of the safety recommendation, the course of the road will become better visible for its users, thus reducing the risk that road vehicles run over the edge of the road and get stuck in between the tracks where they expose both themselves and railway vehicles to the danger of collision.

2020-0191-5 Katonatelep (Accident at level crossing)

Overview of the accident

On 16 February 2020, the train № 712 collided with an automobile at the level crossing (SR1) protected with serviceable warning lights at Katonatelep station. Two children, as passengers of the automobile died on the spot, and the driver of the car was injured seriously.

The investigation found that the warning lights had worked correctly, showing alternating red warning lights in the direction of the road at the time of the accident.

The IC attributes the occurrence to human factors on the part of the driver of the car, and found that the car had entered the level crossing despite the alternating red signal of the correctly working warning lights (SR1).

1. CONCLUSIONS

1.1 Direct causes

The factor which had direct effect on the occurrence was as follows:

a) the driver of the car entered the level crossing despite the alternating red signal of the warning lights.

1.2 Indirect causes

The IC had no comments related to competences or procedures which could be related to the factors enumerated above.

1.3 Root causes

The IC revealed 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.

6. SAFETY RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

In 2020, 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 2020, in some cases we have already addressed the recommendation to the railway company as the body responsible for application, and at the same time sent it to the NSA as the supervisora body to control the application.

In 2020 the Railway Department of TSB published 31 final reports closing 30 investigations, including 14 safety recommendations. 1 of these recommendations has 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 2020.

Response	2018	2019	2020
Accepted and implemented	**3**	**5**	**1**
Accepted and partially implemented	**-**	**-**	**-**
Accepted, implementation in progress	**6**	**3**	**6**
Accepted, no information on implementation	**-**	**-**	**-**
Rejected	**-**	**-**	**2**
No answer	**-**	**1**	**5**
Total	**9**	**9**	**14**

THE SAFETY RECOMMENDATIONS — 2020

Annex B

Safety recommendations issued in 2020

BA2018-1211-5-01: The Investigating Committee of TSB found during the investigation that an indirect cause of the accident was that the warning audio signal did not work at the door involved in the accident, therefore the door closed without warning while the passenger was getting off the train, and the passenger got trapped by the closing door.

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the maintenance system of MÁV START Zrt. for the series 95 55 0117 motor train sets and their trailer vehicles from the aspect whether it can provide that the rolling stock participates in railway traffic with serviceable safety installation only.**

According to the IC, by acceptance and expected implementation of the safety recommendation, the risk of similar accidents can be reduced.

BA2018-1211-5-02: The Investigating Committee of TSB found during the investigation that an indirect cause of the accident was that there was no outdoor lighting at the passenger stop, despite relevant provisions in the MÁVSZ 2950-3:1999 railway technical specification in effect at the time of the occurrence.

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the availability and necessity of outdoor lighting at passenger stops and taking necessary action to have such lighting installed where necessary.**

According to the IC, by acceptance and expected implementation of the safety recommendation, the conditions for passenger traffic would be safer at the passenger stops affected after suitable outdoor lighting is installed, and if relevant rules and regulations are followed, similar accidents will be preventable.

BA2019-0003-5-01: The IC found that the "Instructions for Track Possession and De-energization" issued was not process- and activity-oriented, and its contents, structure and appearance were not suitable for helping the addressees properly understand and implement it.

> **Transportation Safety Bureau recommends MÁV Zrt. to consider reviewing the contents, structure and appearance of their regularly issued instructions (e.g.: Instructions for Track Possession and De-energization) and modifying them with a view to better serving proper understanding and implementation by the addressees.**

By acceptance and expected implementation of the safety recommendation, the risk that substantial information appears in an instruction in a hardly noticeable form or with ambiguous wording may be reduced.

BA2019-0003-5-02: The IC found that the "Instructions for Track Possession and De-energization" issued was not process- and activity-oriented, and its contents, structure and appearance were not suitable for helping the addressees properly understand and implement it.

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing (as part of the annual review of the safety management system of MÁV Zrt.) how the lessons learnt from accidents are utilised in the system of internal instructions, with special regard to the implementation of Safety Recommendation № 2019-0003-5-01.**

By acceptance and expected implementation of the safety recommendation, the risk that substantial information appears in an instruction in a hardly noticeable form or with ambiguous wording may be reduced.

BA2019-0560-5-01: At the time of the occurrence, the locomotive driver had no adequate information as regards the technology to be used. The IC relates this also to the fact that the situation, which exists in various other points of the railway network as well, is not regulated by the Operational Instructions but only by local implementing instructions.

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider expecting clear and sufficiently detailed regulation of the station-to-station mode to be introduced between passing loops and stations from the manager of the Operational Instructions during the review of the Operational Instructions.**

By acceptance and expected implementation of the safety recommendation, the procedure to be applied in similar situations will be clear for the personnel involved in traffic management.

BA2019-0560-5-02: The IC found that the entry signal 'B' of the Rákosliget passing loop can only be seen from a distance of 230 m and no repeating signal is installed despite the fact that the relevant rules require visibility of 400 m or a repeating signal in the case of the speed limit in effect in this track section.

> **Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider revising the visibility of the entry signal 'B' of the Rákosliget passing loop, and requiring that proper visibility be provided or a repeating signal be installed.**

By acceptance and expected implementation of the safety recommendation, the visibility of the entry signal will be improved.

BA2019-0575-5-01: The investigation revealed that significant track distortion and vertical rail displacement had developed in the track of the rack railway vehicle adjacent to the supporting concrete block, which the vehicle had not tolerated, and which had not been detected by the track supervision.

> **Transportation Safety Bureau recommends BKV Zrt. to consider revising the track maintenance requirements applicable to the rack railway vehicle and modify it as necessary, with special regard to**
>
> - **the connection between the supporting concrete blocks integrated in the subgrade and the superstructure,**
> - **track distortion limits, because of the low track distortion tolerance of the vehicles used,**
> - **the methods of superstructure examination.**

By acceptance and expected implementation of the safety recommendation, it may be achieved from the regulation side that the track would not develop track distortions that jeopardise the vehicle applied, or such plane distortions could be identified in due time.

BA2019-0575-5-02: The track structure of the rack railway vehicle has high maintenance needs and requires special expertise from the track supervision and maintenance personnel. However, these are not provided sufficiently for the track maintenance function. This problem was identified during several TSB investigations.

Transportation Safety Bureau recommends BKV Zrt. to consider providing a sufficient number of appropriately trained railway personnel in its track maintenance system.

By acceptance and expected implementation of the safety recommendation, track anomalies will be easier to identify and properly eliminated in due time.

BA2019-0575-5-03: The investigation found that the mechanical characteristics of each rubber springs used in the rack railway vehicles may significantly differ, which increases the risk of derailment.

Transportation Safety Bureau recommends BKV Zrt. to consider specifying the rubber spring ratings in the rack railway vehicles' maintenance system in such manner that the stiffness of the rubber springs used should be suitable and uniform.

By acceptance and expected implementation of the safety recommendation, the sensitivity of the vehicles to track anomalies could be reduced.

BA2019-0697-5-01: According to the conclusion of the investigation, the human error was determined by the workload at the station, which is partly due to the fact that the potential advantages of the motor train sets and clock-face scheduling are not utilised.

Transportation Safety Bureau recommends MÁV-Start Zrt. to consider reviewing (involving MÁV Zrt. as necessary) the motor train set technology (organisation of maintenance, parameters of clock-face scheduling of traffic, etc.) in order to make use of the advantages offered by motor train sets, thus reducing the amount of motor train set related shunting at terminal stations.

By acceptance and expected implementation of the safety recommendation, the amount of shunting at the station can be reduced, which implies a narrowing of the margin of error, and the mental load leading to human error will also decrease.

BA2019-0911-5-01: The investigation found that the maintenance system of the railway undertaking was not notified of the vehicle's existing brake malfunction therefore they did not repair it.

Transportation Safety Bureau recommends Railway Authority Division, Ministry for Innovation and Technology to consider reviewing the practical implementation and operation of the maintenance processes in the safety management system of MÁV-FKG Kft., and taking action as necessary.

By acceptance and expected implementation of the safety recommendation, it can be provided that the undertaking takes timely action to eliminate defects which endanger transport safety.

BA2019-0939-5-01: The IC found that keeping the low speed limit applied at the tram shed is an obligation of the personnel which largely depends on their individual level of safety awareness. If it is absent or too low, similar occurrences may be avoided by enforcing the speed limit by technical solution which is integrated in the type CAF Urbos vehicles but is not in use.

Transportation Safety Bureau recommends BKV Zrt. to consider requiring the use of the integrated speed limit function in the vehicles where it is available within the area of the sheds.

By acceptance and expected implementation of the safety recommendation, the risk of similar occurrences may be reduced significantly.

BA 2019-1245-5-01: On 11 November 2019, at Nyírbátor station, a train approaching with signal handling derailed due to changing of switch position under the moving train. The investigation conducted by TSB found that a technical error of the safety installation and the operating personnel's activity contributed to the occurrence.

> **Transportation safety Bureau recommends MÁV Zrt. to consider completing the operation manual of type Siemens-Halske safety installations with a description of the technical defect which led to this accident, including its risk, detection and the procedure to apply if it occurs.**

By acceptance and expected implementation of the safety recommendation, the relevant personnel will understand the importance of the applicable rules, and have adequate competences to manage critical situations arising from similar technical errors.

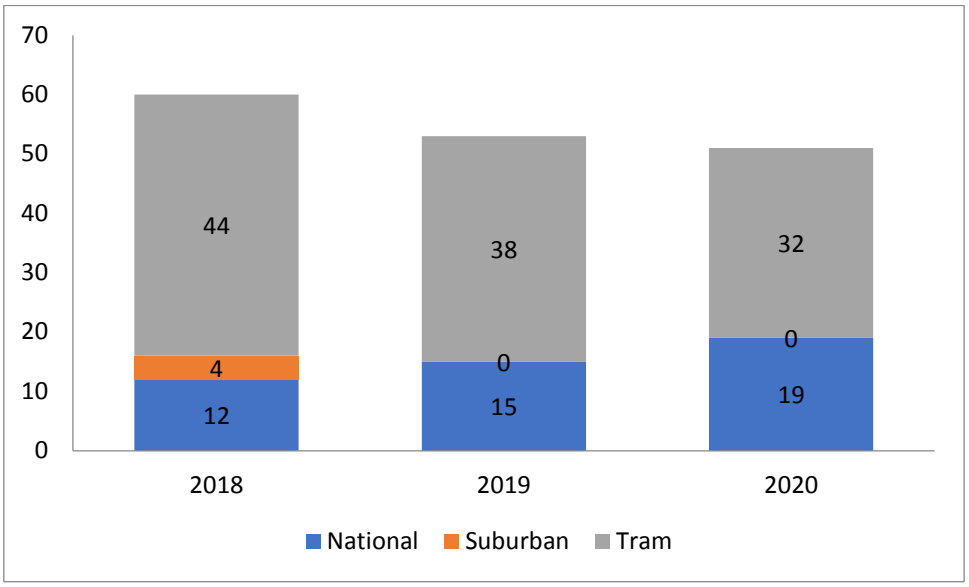
BA2020-0169-5-01: The level crossing in the railway section № 226 between Vecsés and Üllő stations saw two accidents within half a year where a road vehicle had run off the road and become immobile within the level crossing. The investigation carried out by TSB found that the continuous line indicating the centreline of the road is not painted within the level crossing, and the edge of the road is not indicated either.

> **Transportation Safety Bureau recommends MÁV Zrt. to arrange for painting a continuous centreline as required by relevant legislation and, if possible, the painting of the lines indicating the edges of the road within the level crossing situated in the railway section № 226 between Vecsés and Üllő stations.**

By acceptance and expected implementation of the safety recommendation, the course of the road will become better visible for its users, thus reducing the risk that road vehicles run over the edge of the road and get stuck in between the tracks where they expose both themselves and railway vehicles to the danger of collision.

7. HIGH PRIORITY TOPICS IN 2020

Signal Passed at Danger (SPAD)



Numbers of SPADs (2018-2020)

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 2019 in tramway 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

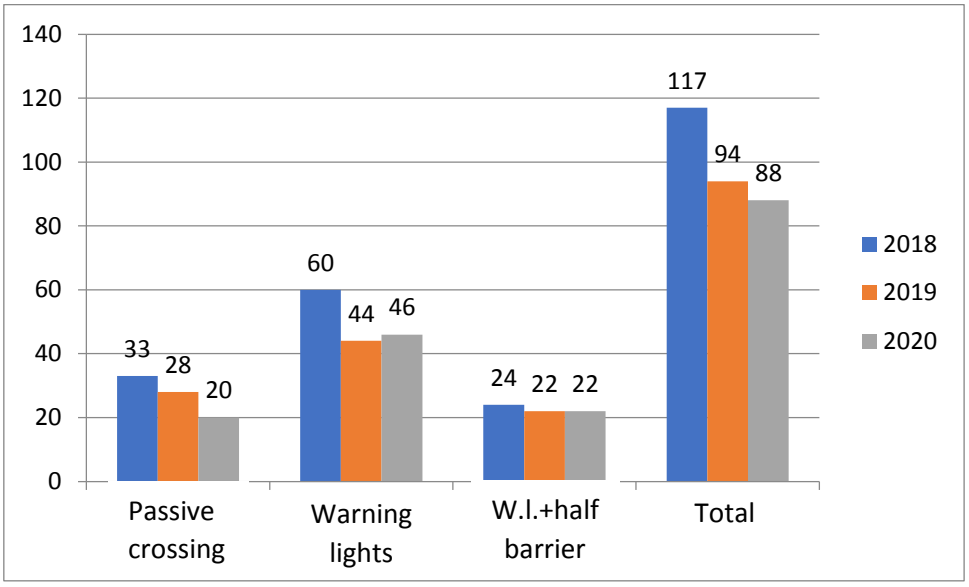
During our investigations performed in 2020, we laid significant emphasis on investigating into human and organizational factors including elements of the Safety Management System.

During our investigations, we identified 48 direct causes in total, of which 33 were human or organizational factors, while 21 of the 105 identified 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 6 in 2020 compared to 2019 and by 29 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 warning lights as active level crossing protection equipments. However, the increase in the number of accidents at roadways equipped with a more perceptible half-barrier as an additional safety device formerly stopped in 2017, but the slow downward trend that began at that time broke in 2020. The decrease of number of incidents at the passive crossings has continued. The declining trend can be explained by the significant decrease of the road traffic performance due to the pandemic closures, but no further conclusion can be drawn regarding to railway safety, 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. Formerly the head of the railway department participated on these meetings, but unfortunately due to the travel restrictions there was no meeting held in 2020.

On 14th August 2020 (as reported above) there was an explosion inside the electric-engine (Type 'Taurus') of the freight train no. 92905 and the roof of the engine fell down onto the second track, where the oncoming passenger train no. IC910 collided with the pieces of it. No one was injured. NIB Austria was involved it the investigation process, as it was about an engine of Rail Cargo Austria. The technical inspection occured in Linz (AT) at ÖBB TS, investigators of NIB HU and NIB AT were present. Teamwork with NIB AT and with ÖBB TS was very smooth. Report about the occurence was published it 2021.

International Activities

Usually 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. Unfortunately the personnel of Railway and Dispatcher Department could limitedly take part in international activities in 2020, because of the pandemic situation.

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 two online occasions.

The Regional Conference of Central & Eastern European Investigating Bodies used to be held twice a year. Unfortunately this event could not be organised in 2020 due to the pandemic situation and the travel restrictions, and still being postponed.