



ANNUAL REPORT 2022



A word from the director

In 2022, out of nearly 2,500 accidents brought to its attention, the BEA-TT examined 854 before deciding to open 9 investigations. Three of these relate to "emerging" categories: fire involving two

electric buses, loss of control of an electric minibus, major fire on the side of the railway; two deal with incidents at level crossings (the fight continues!) and one with a passenger accident at a station; the others with the fall of a heavy goods vehicle onto a railway track, the derailment of a freight train, and a tourist train accident. This report briefly presents these 9 events.

He then presents the 10 reports and 43 recommendations published in 2022. These concerned the departure of a coach from the road, the striking of a pedestrian by a heavy goods vehicle, the derailments of a TGV, an RER, a TER on metre gauge, a freight train, the striking of railway maintenance workers, the collision by overtaking between two tram trains, the drifting of a tram train, and the striking of two bridges by a river-sea vessel. The first phase of a study on road accidents with immersion has also been published.

By the end of 2022, the BEA-TT had issued 779 recommendations in 19 years, the vast majority of which were followed up and closed. The appendix provides an update on the actions still to be pursued, the vast majority of which correspond to recent recommendations.

In 2022 we also have :

- consolidated our capacities by preparing two recruitments which materialized at the beginning of 2023, and by relaunching the use of non-permanent investigators;

- intensified our exchanges with our counterparts: for France with the other BEAs, and for European railways within the "NIB network" (National Investigation Bodies);

- signed three new cooperation agreements with: the National Gendarmerie Criminal Research Institute (IRCGN), the Tunnel Study Center (CETU), and our Swiss counterpart, the SESE, with which we have started a joint study;

- is updating our website in line with the new ministerial charter. It presents the full and easily accessible content of BEA-TT productions since its inception.¹

The BEA-TT, created by Decree 2004-85 of January 26, 2004, entered its twentieth year in full possession of its resources. Its teams are committed to maintaining their level of excellence in the face of developments, particularly technological ones, in the transport sector.

I thank them for the work accomplished, as well as the partners with whom we cooperate and who support us in monitoring the recommendations.

Jean-Damien PONCET

¹ Recently, the BEA-TT website has also been supporting a procedure under Decree 2022-1284 of October 3, 2022 relating to the procedures for collecting and processing reports issued by whistleblowers and establishing the list of external authorities established by Law No. 2022-401 of March 21, 2022 aimed at improving the protection of whistleblowers. This new function, which is foreign to the Transport Code, is not intended to be the subject of developments in our activity reports.

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1 The missions and organization of the BEA-TT

1.1 Why technical investigations into accidents ?

The human tragedies caused by transport accidents and the damage they can cause remind us that people, equipment, and organizations remain fallible. Technological developments and their adoption by both manufacturers and users are accompanied by new risks.

Drawing independent lessons from the most serious or complex accidents or incidents meets a constant need of public authorities, victims and travelers, as well as operators involved in the construction, maintenance and operation of infrastructure or vehicles.

The BEA-TT covers rail, urban guided modes (metro and tramway), ski lifts, road transport (mainly professional), as well as inland navigation; each of these sectors has its own regulations, its own stakeholders, with their economic, technical, organizational and cultural logic.

The decision to open a technical investigation is taken by the director of the BEA -TT, "on his own initiative or at the request of the Minister responsible for transport." In the railway sector, investigations must be carried out into serious accidents as defined by European Directive (EU) 2016/798 of 11 May 2016 on railway safety.

This technical investigation must remain quite distinct from the judicial investigation, the objectives of which, focused on the search for responsibilities, and the constraints, particularly in terms of time, are not the same.

Following the investigations or studies carried out, the BEA-TT publishes its reports on its website: <u>www.bea-tt.developpement-durable.gouv.fr</u>. It notifies their recipients of the safety recommendations it makes. The latter must inform them within 90 days of the follow-up they plan to give to these recommendations. Their responses are also posted online on the website.

In addition to investigations, the BEA-TT can, in good understanding with its partners, open studies on subjects where it considers itself best placed and able to issue recommendations.

1.2 The organization and the means

The BEA-TT is organized around its main mission: conducting technical investigations into accidents and incidents. To this end, it mobilizes:

- its permanent investigators. Their appointment constitutes a commission to be able to access all useful elements, testimonies and information, even those covered by professional or medical confidentiality, or by the confidentiality of the judicial investigation;
- > non-permanent investigators, commissioned by its director for an investigation;
- > experts mobilized to answer specific questions.

The BEA-TT can also call upon all ministerial services within its field. This is particularly the case for monitoring and reporting accidents. Finally, it can count on the support of partners with whom it has signed agreements.

It has 14 staff: 2 management staff, 10 permanent investigators including two division heads, 1 administrative officer, and 1 publication and communications officer. A doctor is shared with the BEA Civil Aviation Authority. The operating and research budget allocation in 2022 amounted to €60,000. This enabled it to recruit a non-permanent investigator and commission support from Gustave Eiffel University on the subject of human factors in driving accidents.

Consult the BEA-TT organizational chart

2 Accidents of the year 2022

2.1 Sources of information on accidents and incidents

As stipulated in the Transport Code, land transport incidents and accidents are brought to the attention of the BEA-TT as soon as possible after their occurrence. In practice, this information is mainly provided by flashes and reports from the Ministerial Centre for Operational Monitoring and Alerts (CMVOA) of the Ministry of Ecological Transition. and Territorial Cohesion, as well as through daily alerts and reports from major transport operators.

Monitoring involves exploiting this information in real time. After an initial screening, a brief analysis of the selected accidents is carried out to understand the circumstances and assess the appropriateness of opening an investigation. This task, carried out daily, is summarized in the table -below.

It should be remembered that the BEA-TT does not produce statistics, nor is it responsible for conducting accident studies, as its close partners (EPSF, STRMTG, ONISR, etc.) do. The selection of accidents to be investigated is geared solely towards the objective of producing new recommendations. The severity of the accident is not always the overriding criterion.

The BEA-TT is intended to focus primarily on transport "carried out by professionals." Thus, for road transport, the reported events generally involve at least one vehicle transporting goods or passengers.

	Reported events	Events analyzed	Investigations opened
Road, river and national railway transport sector	1222	636	4
Field of rail and guided transport	1268	218	5
Total	2490	854	9

The results of this analysis for 2022 are as follows:

2.2 Investigations opened in 2022

The BEA- TT has therefore initiated 9 investigations in 2022, which concern:

- for the road sector, the fire of an RATP electric bus and the departure from the road of an electric minibus, both events having taken place in Paris;
- for the railway sector, the fall of a heavy goods vehicle onto the tracks, a major fire near the tracks after the passage of a freight train, the collision of passengers on a public crossing of the tracks in a station (TVP), the derailment of a freight train;
- for level crossings, the collision of a heavy goods vehicle with a regional express train and the near collision between a TGV and a coach carrying young athletes;
- ➢ for guided transport, the accident of the tourist train "Le Coni'fer" (Doubs).

2.2.1 Road transport

1) Fire involving two RATP electric buses in Paris on April 4 and 29

On Monday, April 4, 2022, at around 4:00 p.m., an electric bus belonging to the Parisian transport authority (RATP) caught fire on Boulevard Saint-Germain, near the "Maubert-Mutualité" stop. As the driver was about to leave the stop, he was alerted by several drivers of other vehicles to smoke and flames coming from the roof. He immediately requested the rapid evacuation of the vehicle by the fifteen or so people on board, which prevented any human consequences.

A few days later, on April 29, 2022, a second fire affecting an RATP bus of the same series occurred at the "Bibliothèque François Mitterrand" terminus in the 13th arrondissement of Paris, while it was stopped and empty of passengers.

In both cases, the origin of the fires was located in the batteries providing the electrical propulsion energy.

2) Accident involving a "Traverse" minibus in Paris on rue de Vaugirard on July 12

On July 12, 2022, an electric minibus carrying passengers on behalf of Île-de-France Mobilités within Paris on the " La Traverse Brancion-Commerce" line crashed into a shop window on Rue de Vaugirard after suddenly accelerating on a perpendicular street practically to the right of the impact zone. At the intersection of these two streets, the driver steered right but was unable to straighten the vehicle sufficiently. The accident left one person seriously injured and one slightly injured in the shop, and four passengers in the minibus with minor injuries.

2.2.2 Rail transport

1) A dump truck fell onto the railway tracks from a road bridge on June 2 in Saint-Chamond (42)

On Thursday, June 2, 2022, at 8:30 a.m., in Saint-Chamond, a dump truck fell from Boulevard de Fonsala onto the double SNCF track of the Lyon Perrache to Saint-Etienne line, one of the busiest railway lines in France with 120 regional trains per day. After leaving its normal traffic lane just before the road bridge, the truck, in its fall of more than 9 meters, tore off the catenaries, a pole that supports them, and damaged the track and railway installations. No train was running in the area and the metal dump truck activated the track circuits (rail traffic detection devices), which protected against the rapid arrival of possible rail traffic.

The truck driver suffered only minor injuries and was able to escape the crashed vehicle on his own.

Rail traffic was suspended all day Thursday to allow for lifting operations using a 150-ton crane and partial repairs to the railway facilities. Rail traffic resumed at 3:12 a.m. on Friday, June 3.

2) Fire near the tracks on July 14 in Graveson (13)

On July 14, 2022, at around 4:30 p.m., a gasoline train belonging to Entreprise Fret SNCF, traveling between Fos-Coussoul and Gevrey-Triage, was stopped following a "danger" alarm at the brake-on detector in Graveson, at km 744.730 between Barbentane and Avignon. A gasoline wagon traveled with the brakes applied. The following train reported fires breaking out along the track between Arles and Avignon over a distance of approximately 10 km. The fire spread into a virulent blaze thanks to the Mistral wind and the scorching temperatures of the period. The fire, fought by 1,200 firefighters, a helicopter, 2 Dash planes and 2 water bomber planes, covered 1,450 hectares on the site known as "Montagnette", which extends over 4 municipalities: Tarascon, Graveson, Boulbon and

Barbentane. Three homes burned, 300 houses were evacuated, but the disaster caused no casualties. After the fire was brought under control and the fixed railway installations were repaired, rail traffic was restored on the morning of July 17.

The damaged wagon, with its treads and wheels badly damaged by the heat, was taken to a workshop and examined. The railway infrastructure suffered significant damage, including burnt signal cables.

3) Pedestrians collide on a TVP on November 14 in Donchery (08)

The year 2022, with 10 deaths, saw a very sharp increase in accidents involving people crossing tracks for the public at stations across the country compared to.

On Monday, November 14, 2022, at 6:47 p.m., TER train number 840831 arrives at the Donchery stop. A high school student gets off the train and joins her father, who is waiting for her on the platform.

The father and his daughter must cross the tracks via a planked passageway equipped with illuminated signals to reach the only exit of the stop located on the other side of the tracks. They wait for the TER train to leave the station and clear the passageway before crossing.

At that moment, freight train No. 54084, hidden by the TER, arrived on the other track. This train was traveling at a speed of 88 km/h. It fatally struck the two people. A third person, who had also waited and was crossing at a distance, was safe. The proper functioning of the signaling does not appear to be a factor.

4) Derailment of a freight train on November 23 in Carcassonne (11)

On the afternoon of November 23, 2022, freight train No. 50924, hauled by Fret SNCF on behalf of Novatrans, departed Perpignan for Dourges. It comprised 28 wagons, including containers of hazardous materials, for a total length of 672 meters and weighing 1,800 tons.

Leaving Carcassonne station, after a journey of 115 km, the train came to a halt following the derailment of two bogies. The platform bordering track 2 was partially torn away up to the point where the 23rd and 24th cars were immobilized. The track was severely damaged from Trèbes, where the first traces of derailment were visible on the frog of a switch and where wheel marks were visible on the concrete sleepers. Traces of friction on the aluminothermic welds of the two lines of rails were present from Perpignan station.

No one was injured in this accident. Traffic was interrupted between Narbonne and Castelnaudary on both lanes and was partially restored on November 28.

2.2.3 Level crossings

1) Collision between a TER and a heavy goods vehicle on February 24 in Hochfeldent (67)

On Thursday, February 24, 2022, a regional express train traveling at approximately 150 km/h hit a heavy goods vehicle stationary on level crossing No. 22 with four half-barriers.

The impact caused the lead engine to derail, and despite emergency braking, the train traveled approximately 900 meters before coming to a stop. A train passenger, violently struck by a piece of the truck's structure that was torn off and thrown against the side of the train, died from his injuries. Four other passengers and the train driver were injured. The truck driver, who had left his vehicle before the impact, was unharmed.

2) Incident between a TGV and a coach on May 29 in Bizanos (64)

On Sunday, May 29, 2022, in the late afternoon, a coach carrying young athletes and their companions, after taking a narrow road closed to heavy vehicles, stopped on level crossing

No. 238, with two half-barriers, in the commune of Bizanos. The longitudinal profile of the road, with a very steep slope downstream of the level crossing in the direction of travel of the coach, caused the rear of the vehicle to get stuck on the decking and the rear drive axle to lift.

The passengers exited the bus before a high-speed train, traveling on the track whose gauge was not enclosed by the rear of the bus, grazed the rear of the bus. There were no injuries to the passengers on the bus or the train, and no material damage was reported.

2.2.4 Guided transport

Accident of the Coni'fer tourist train on June 4 in La Cluse-et-Mijoux (25)

On Saturday, June 4, 2022, at noon, steam locomotive 150 left the Hôpitaux-Neufs station, towing two cars: a van and a dining car of the Simplon-Orient-Express, carrying around thirty passengers.

Driven by a driver assisted by a driver, the convoy reached Fontaine Ronde station without incident. They performed an uncoupling maneuver in the area near the platform, a slope of 19 per thousand. During this maneuver, the van and the dining car were uncoupled from the locomotive, which set off alone towards the station. Positioned on the slope, the two vehicles gently drifted and collided with the locomotive, which had stopped a little further away, at around 10 km/h.

The collision left 18 people with minor injuries and one with serious injuries. Material damage was very limited.

2.3 Open study

A study on feedback from investigations by other investigation bodies in Europe into ski lift accidents was initiated in 2022. Co-led by SESE (Swiss investigation bureau), BEA-TT is studying a set of investigation reports on ski lift accidents (in Switzerland, Italy, and France). The aim of this study is to identify avenues for recommendations or further development.

The study is structured in three stages: information collection, data analysis, and data processing. A typology of the investigated events was defined based on their causes, identified factors, and recommendations.

3 Reports published in 2022

The investigation and study reports are published on the BEA-TT website: <u>https://www.bea-tt.developpement-durable.gouv.fr</u> and the table of surveys since 2004 can be found at the following address: <u>https://www.bea-tt.developpement-durable.gouv.fr/historique-des-enquetes-realisees-a1187.html</u>

3.1 Road transport

3.1.1 Published surveys

Two reports dealt with road traffic accidents (excluding level crossings and intersections with tram lines).

Date	Nature and location of the accident	Number killed
03/11/2019	Flixbus coach exits the road on the A1 motorway at Estrées-Deniécourt (80)	0
04/05/2021	Pedestrian hit by heavy goods vehicle in Clichy (92)	1

The first investigation highlighted the problem of driver inattention and reduced attention span, which appears to be one of the main causes of accidents on the motorway network, as well as the issue of safety management by public road transport operators.

The second accident resulted from a lack of mutual awareness between the truck driver and the pedestrian who was struck. The investigation identified areas for improvement in reducing blind spots, systems for detecting vulnerable road users, and the layout of the intersection where the accident occurred.

3.1.2 The recommendations issued

In conclusion of these two reports, 6 recommendations were formulated by the BEA-TT

Nature of the recommendations

- 1 concerns the study of the performance of vulnerable user detection systems intended to equip heavy vehicles;
- 1 concerns the development of the crossroads where the accident took place in the commune of Clichy;
- 1 concerns the training of heavy vehicle drivers on the risks associated with listening to music and driving using cruise control;
- 1 concerns the organization of security management and monitoring of contractual requirements;
- 1 concerns the regulatory adaptation of the responsibilities of public road passenger transporters with regard to the status of the driver;
- > 1 concerns the strengthening of signage on approach and at the site of the accident

Recipients

Two of these recommendations were each addressed, with the same wording, to several recipients, so that the total number of recommendations received by recipients amounts to 8, including:

- > 3 to the central directorates of the ministries responsible for regulations;
- \succ 1 to a training organization;
- 2 to road managers.
- > 1 to a road passenger transport organizer
- > 1 to a road passenger transporter

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2022.

Investigation	Recommendations				
Investigation	Number	Accepted	Not accepted	No answer	
Estrées-Deniécourt	4	3	0	1	
Clichy	4	3	0	1	
TOTAL	8	6	0	2	

3.1.3 Monitoring actions

The following table shows the status of monitoring of recommendations addressed to road sector organizations, established from information obtained from these services.

Year of	Number of recommendations addressed and followed up				
publication of the	Total	Fenced	Fenced		
report	Total	Made	Not accepted	in progress	
2013	0	0	0	0	
2014	1	1	0	0	
2015	0	0	0	0	
2016	3	2	0	1	
2017	3	2	0	1	
2018	7	7	0	0	
2019	2	2	0	0	
2020	2	2	0	0	
2021	3	3	0	0	
2022	4	3	0	1	
Total 2013 - 2022	25	22	0	3	

3.1.4 Published investigation reports

Flixbus coach crashed on November 3, 2019 on the A1 motorway in Estrées-Deniécourt (80)



On Sunday, November 3, 2019, a FlixBus coach left the road on exit ramp +13 of the A1 motorway in the direction of Paris towards Lille in the commune of Estrées-Deniécourt.

During this departure from the road, the coach overturned and came to rest on its right side in the grassy embankment bordering the exit ramp.

Passengers were ejected from the bus. One passenger was trapped between the bus and the ground and lost the use of his arms and legs.

Other passengers and the bus driver suffered minor injuries.

The coach's bodywork was severely damaged. The damage to the road infrastructure was moderate; a restraint system (a crash barrier with a motorcycle screen) was destroyed over a few meters.

The direct and immediate cause of the accident was the excessive speed of the coach entering the very tight bend of the exit ramp.

This excessive speed was probably due to the coach driver's lack of attention and hypovigilance, as she was listening to music with earphones in the minutes before the accident. Above all, she had no reason to take this exit ramp.

She then travelled along the start of the slip road, in a straight line for a length of approximately 200 m, at the same speed as that used in the current section (approximately 100 km/h). In the tight bend at the end of the slip road, and despite sudden steering and heavy braking, the coach left the road and overturned.

This accident raises the issue of driver inattention and lack of vigilance, one of the main causes of accidents on the motorway network.

The BEA-TT makes recommendations and invitations on this subject, as well as on the organization of transport companies and their safety management, and another, local one, relating to the reinforcement of the signage of exit ramp no. 13.

To find out more

Pedestrian hit by heavy goods vehicle on May 4, 2021 in Clichy (92)



On Tuesday, May 4, 2021, in Clichy (Hauts-de-Seine), at around 9:20 a.m., a heavy goods vehicle (HGV) turning right from Rue de Neuilly onto Boulevard Jean-Jaurès (RD 911) struck a pedestrian crossing the boulevard. The 90-year-old pedestrian was thrown to the ground. The truck driver, not noticing the collision, continued his movement, and the right front wheel of the HGV rolled over the victim, killing her instantly.

The direct cause of the accident was the lack of mutual awareness, by the driver of the heavy goods vehicle and the pedestrian, of the presence of the other person involved.

The pedestrian, whose hearing was impaired, did not hear the truck. She did not see it approaching from behind her left side.

The driver of the HGV was also not in a position to easily detect the presence of the pedestrian, who was small in stature, due to the limited field of vision offered by the righthand window of his cab, the need to pay attention to other pedestrians crossing the road, and the multiple checks required by the turning maneuver. The pedestrian was probably briefly visible in one of the rear-view mirrors in the very last moments before the collision, but too late to allow the driver to react effectively, even if he had detected her immediately, which was not the case.

The configuration of the intersection may also have contributed to the collision by forcing the HGV to enter the pedestrian crossing from a position parallel to it, which did not facilitate visibility and the gathering of information.

The analysis of the causes and context of the accident led the BEA-TT to formulate two recommendations and two invitations in the following areas:

- the design and equipment of HGVs;
- > the layout of the intersection where the accident occurred;
- the regulatory system governing traffic on rue de Neuilly.

To find out more

3.2 Rail transport

3.2.1 Published surveys

Three accidents involving rail traffic outside level crossings were the subject of an investigation report published in 2022. The nature, dates and locations of these accidents are specified in the table below.

In accordance with Articles L. 1621-1 and L. 1621-2 of the French Transport Code, these three accidents constitute, given their consequences, "serious" accidents for which a technical investigation was mandatory. They are identified in blue in the table below.

Date	Nature and location of the accident	Number killed
05/03/2020	Derailment of a TGV on the East European high-speed line in Ingenheim (67)	0
03/18/2020	Infrastructure maintenance workers collided by a regional express train in Schiltigheim (67)	1
08/26/2021	Derailment of a grain transport train in Saint-Hilaire-au-Temple (51)	0
12/10/2021	People hit by a TER train in Ciboure (64). Closed without report.	3

Both derailments have in common the fact that they were caused by infrastructure and that they occurred on works related to the commissioning of the new East European high-speed rail line a few years ago. However, they are quite different in nature.

The first derailment involved a high-speed TGV train. It was the result of a major embankment slide on the new line. The investigation revealed that the embankment was inadequately safe from the time of construction.

The second derailment involved a freight train on a section of track connected to the highspeed line. This derailment was the result of an old rail breaking due to obsolescence, in a context of increasing traffic and difficulty in detecting certain ageing defects.

The other two accidents fall into the category of collisions with people online, called "intrusions", which is the predominant category of deaths recorded each year in all rail accidents.

The first accident involved a team from the SNCF Réseau infrastructure manager who were carrying out a track monitoring operation. In the disruptive context of the start of the first lockdown of the Covid-19 pandemic, deviations from safety instructions were made. The accident highlighted the importance of respecting these instructions and raising awareness of them to mitigate risks.

The second accident involved migrants of Algerian origin asleep on the track. The investigation did not reveal any technical factors that would lead to a recommendation. It was closed without the publication of a report.

3.2.2 The recommendations issued

In these three reports, 14 recommendations were made by the BEA -TT

Nature of the recommendations

- 5 recommendations concern the re-examination or strengthening of the reference framework, in order to improve the safety of the design of installations and their maintenance;
- 4 aim to study and implement innovative solutions facilitated by the evolution of technologies;

- 3 concern the dimension of management of the competence and tasks of operators, a dimension forming an integral part of the safety management system of railway operators, and this through their training, their evaluation, and the organization of their work;
- > 1 relates to the conduct of infrastructure strengthening work;
- > 1 relates to the quality of data supporting maintenance decisions.

Recipients

These recommendations were sent to several recipients:

- > 12 to the main infrastructure manager of the national rail network, SNCF Réseau;
- > 1 to the railway company SNCF Voyageurs;
- 1 to the International Union of Railways (UIC).

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2022.

Investigation	Recommendations					
investigation	Number	Accepted	Not accepted	No answer		
Ingenheim	4	4	0	0		
Schiltigheim	4	4	0	0		
Saint-Hilaire-au-Temple	6	6	0	0		
TOTAL	14	14	0	0		

3.2.3 Action tracking

The Public Railway Safety Establishment (EPSF) monitors actions following the recommendations that the BEA-TT addresses to rail transport stakeholders.

The status of the recommendations transmitted between 2004 and 2022 is as follows:

	Number of recommendations addressed and followed up				
Year of publication	Total	F	Fenced		
	TOLAI	Made	Not Accepted	- in progress	
2004-2016	162	152	7	3	
2017	17	11	0	6	
2018	5	5	0	0	
2019	12	6	0	6	
2020	-	-	-	-	
2021	10	0	3	7	
2022	14	0	0	14	
Total 2004-2022	220	174	10	36	

The follow-up is as follows with regard to the fire which occurred on board a Eurotunnel freight shuttle on 17 January 2015, the latest accident to be investigated.

Year of publication	Nun	Number of recommendations addressed and followed up			
of the report	Total	F	In prograss		
	Total	Made	Not Accepted	in progress	
2016	6	5	0	1	

3.2.4 Summaries of published investigation reports

Derailment of a TGV on the LGV Est Européenne on March 5, 2020 in Ingenheim (67)



On Thursday, March 5, 2020, at 7:32 a.m., TGV 2350 from Colmar to Paris was traveling along the East European high-speed line. Traveling through an area of the line that was being cut near the town of Duntzenheim, it hit a mound of earth covering the track at 284 km/h.

The TGV derailed under the impact. The front power car swerved and crossed the platform. It came to a standstill on the opposite track. The first three trailers also derailed, remaining astride the initial track. The articulated elements of the train remained attached and continued their course without deviating from the railway platform until they came to a complete stop, 1,635 meters after the initial impact, in the municipality of Ingenheim.

The mound of earth struck came from the collapse by sliding, a few minutes before the passage of the TGV, of an excavation embankment adjacent to the track over its entire height and a width of around sixty meters.

The human toll of this accident is one seriously injured, the train driver, and 21 minor injuries among the 307 people on board. The material toll is heavy, both for the train and for the track, the 1,635 meters of which had to be rebuilt after the derailment.

The immediate cause of the TGV derailment was the impact of the mound of material on the track resulting from the sliding of the adjacent embankment.

The cause of the slope slippage is its instability due to the low resistance of a particular geological formation constituting it: Domérien clays. The resistance of this formation had been overestimated during the stability justification at the time of design.

Several factors have been identified as having contributed to this situation:

- the weakness of soil investigations with regard to the determination of geomechanical parameters used for the justification of stability in design;
- the failure to verify the choice of these parameters despite several collapses occurring during the earthworks;
- the non-detection of these two shortcomings by the actors involved in the project, none of whom played, at the level of control concerning it, the role of catch-up loop, which was nevertheless permitted by its intervention.

The BEA-TT issues four recommendations and three invitations to prevent this type of accident, relating to the restoration of safety of the embankment, the rules for the construction and monitoring of such embankments, and the strengthening of the robustness of the radio alert whose operation was affected during the accident.

To find out more

Maintenance workers hit by a TER on March 18, 2020 in Schiltigheim (67)



On Wednesday, March 18, 2020, at 9:37 a.m., three rail infrastructure maintenance workers were struck by a regional express train north of Strasbourg station. The train was traveling at 96 km/h. One of the workers died, another was seriously injured, and the last sustained minor injuries. The three injured workers were crossing the track used by the train to begin an inspection of the track planned as part of infrastructure maintenance. They were crossing in a group and were not paying attention to traffic. They did not notice the train approaching.

The accident occurred because the officers believed they were protected by the presumed absence of traffic on the track they were crossing. The officer in charge of the team had previously exchanged information over the telephone with the signal box about the traffic situation. Due to a misunderstanding, he wrongly concluded that no trains were running.

Two significant deviations from the safety instructions provided to prevent the danger of collisions between workers on the tracks facilitated the accident: on the one hand, the assurance of protection from traffic could not result from a simple informal exchange by telephone, but only from the implementation of a demanding procedure prohibiting all traffic; on the other hand, the crossing of the tracks took place without respecting the safety instruction which prescribes paying attention and not crossing in groups in the absence of a traffic ban.

The technical investigation highlighted several organizational and human factors that contributed to these differences:

- The unique context of March 18, 2020, was the first day to be worked on as part of the first lockdown of the Covid-19 pandemic. Disruptions occurred in the organization of work and traffic, which may have facilitated a reduction in vigilance in the application of the safety measures to be respected.
- The content of the telephone conversation that morning between the maintenance agent and the signal box agent, who did not have the necessary rigor for the exchange of information relating to safety.
- A failure to challenge, by the two agents who accompanied the maintenance manager, the deviations from safety rules due to a training dynamic within the team.
- The absence, in the monitoring and surveillance of the security of agents by management, of detection and correction of distortions relating to security communications and protection practices.
- The usual use of a security procedure sensitive to the gap and the human factor, while more modern and safer protection solutions are applicable.
- > Failure to signal the train to the officers, the driver having preferred applying the emergency brakes to activating the horn.

The BEA-TT issued 4 recommendations and 2 invitations in these areas.

Derailment of a grain transport train on August 26, 2021 in Saint-Hilaire-au-Temple (51)



On Thursday, August 26, 2021, at 10:04 p.m., freight train No. 71 646 of the SNCF Freight Railway Company, traveling from Châlons-en-Champagne to Tergnier, derailed at Saint-Hilaire-au-Temple (Marne). The train was carrying 20 grain wagons. It derailed shortly before a rail bridge allowing passage under the East European high-speed rail line. The locomotive and the last 7 wagons of the train remained on the rails, while 13 wagons lay over and became entangled. Two wagons struck the left support wall of the structure, causing the locomotive to stop abruptly and the following wagons to "accordion" in shape. The train driver was injured and shocked. 150 m of track was destroyed. Traffic between Châlons-en-Champagne and Reims has been suspended for 35 days.

The cause of the derailment was a multiple rail break under the passage of the train, in the low line of the curve. The rail was affected by a longitudinal vertical cracking defect of the head, codified 213, which had existed for several years. The rail in question was reused, low profile, and of old manufacture (1955).

The investigation highlighted the following contributing factors:

- > the operating conditions of this section of track, in terms of speed and load, have intensified, increasing the dynamic stresses on the rails;
- > the rail monitoring policy did not allow the longitudinal vertical cracking defect of the rail head to be detected in time and corrective action to be taken;
- > The train stopped suddenly when two of the train's carriages crashed into a ledge of the railway bridge with the East European high-speed line.

SNCF Réseau immediately implemented an action plan aimed at assessing and resolving this type of fault, both on the Reims to Châlons-en-Champagne line and across the entire national network.

The BEA-TT issues six recommendations in the following areas:

- > Improving the reliability of rail heritage data with regard to the actual condition of the reused rails and reviewing the requirements with a view to guaranteeing the gradual eradication of the oldest rails or their good working order.
- > Adapting the methods for monitoring the actual condition of the rails in order to address the risks linked to the age of old rails.
- > Improving the detection of longitudinal vertical cracking defects by heavy rail inspection equipment using new technical means.
- > Verification that the agents in charge of rail tours are well trained for this mission and have suitable practical support to assist them.
- The revision of UIC leaflet 777-2 to improve the treatment of the risk for rail traffic hitting a clear obstacle constituted by a structure.

To find out more

To find out more

3.3 Level crossings

3.3.1 Published surveys

No investigations were completed in 2022 in the area of level crossings.

3.3.2 Monitoring actions

The Public Railway Safety Establishment (EPSF) monitors actions following the recommendations issued by the BEA-TT.

The status of follow-ups to recommendations submitted between 2016 and 2022 is as follows:

Year of	Number of recommendations addressed and followed up					
publication of the	Total	F	Fenced			
report	TOLAI	Made	Not Accepted	in progress		
2016	5	5	0	0		
2017	-	-	-	-		
2018	-	-	-	-		
2019	7	3	0	4		
2020	7	4	0	3		
2021	7	1	0	6		
2022	-	-	-	-		
Total 2016 - 2022	26	13	0	13		

3.4 Guided transport

3.4.1 Published surveys

Four investigations into guided transport accidents were published in 2022. These accidents did not result in any deaths.

Date	Nature and location of the accident	Number killed
02/12/2019	Collision by catching up between two trams in Montpellier (34)	0
06/24/2020	Derailment of an RER B train in Paris near Denfert-Rochereau station	0
05/11/2020	Derailment of a train on line T4 in Clichy-sous-Bois (93)	0
01/25/2021	Train derailment in Fontpédrouse (66)	0

Three accidents involved braking difficulties, whether related to the grip between the wheel and the rail, caused by a professional action not taken into account by the driver, or resulting from insufficient speed control.

The fourth accident (RER B) concerns a defect in the interface between the rail and the wheel at a point of a track device.

These events firstly remind us of the particular attention that must be paid to the human factor in the operation of guided transport systems, but also of the importance of maintenance and the influence of technical choices, as causal or contributing factors.

3.4.2 The recommendations issued

Twenty recommendations were made by the BEA-TT.

Nature of the recommendations

Of these 20 recommendations:

- > 8 relate to the maintenance of the track and/or rolling stock ;
- 2 deal with track monitoring processes;
- 3 relate to a technical improvement of the system ;
- 4 concern the improvement of driver training;
- 2 relate to professional driving gestures;
- 1 concerns the front cameras of trams.

The recipients

Two of these recommendations were each addressed, with the same wording, to several recipients, so that the total number of recommendations received by recipients amounts to 22, including:

- \succ 15 to the system operator;
- ➤ 3 to the network manager;
- 3 to State bodies: the Directorate of Public Liberties and Legal Affairs (DLPAJ), the General Directorate of Infrastructure, Transport and the Sea (DGITM), and its technical service for ski lifts and guided transport (STRMTG);
- > 1 to the rolling stock manufacturer.

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2022.

	Recommendations				
Investigation	Number	Accepted	Not accepted	No answer	
Montpellier	7	7	0	0	
Denfert-Rochereau	2	2	0	0	
Clichy-sous-Bois	6	4	2	0	
Fontpedrouse	7	7	0	0	
TOTAL	22	20	2	0	

3.4.3 Monitoring actions

Based on the monitoring carried out by the technical service for guided transport and ski lifts (STRMTG), the progress of actions following the recommendations made between 2016 and 2022 following guided transport accidents is as follows:

Year of publication	Number of recommendations addressed and followed up				
of the report	Total	Fe	enced	In progress	
	TOTAL	Made	Not accepted		
2016	7	6	0	1	
2017	17	17	0	0	
2018	6	6	0	0	
2019	3	2	0	1	
2020	13	8	0	5	
2021	7	5	0	2	
2022	22	12	2	8	
Total 2016-2022	75	56	2	17	

3.4.4 Summaries of published investigation reports

Collision by catching up two tram trains on December 2, 2019 in Montpellier (34)



On December 2, 2019, in the early afternoon, a tram breakdown on line 1 of the Montpellier network caused several trams to pile up in the Château d'Ô area. In this situation, tram number 2012 stopped in line, about a hundred meters before the Hôpital Lapeyronie station. Four minutes later, traveling behind it, the driver of tram number 2028 left the Universités des Sciences et des Lettres station: alongside the CHU Lapeyronie, he saw tram number 2012 in front of him. He braked, applied the magnetic brake pads, then two seconds later engaged emergency braking. The tram slowed down, but not enough. Despite exceeding the speed limit, when the driver applied the emergency brake, the distance in front of him was sufficient for him to be able to stop before the rear of tram number 2012 in a normal situation. However, he hit it at an estimated speed of between 15 and 20 km/h.

The collision left 41 passengers on both trams with minor injuries, an estimated 200 people. Material damage was reported on both trams.

Tram No. 2028's braking performance, when encountered with a skid, was lower than expected, causing the collision. The complexity of the vehicle-track interaction required a systemic analysis to investigate the causes of the skid. Several contributing factors were identified:

- the driving behaviour of the driver of tram no. 2028, placing heavy demands on the rolling stock, in the context of unfavourable operating conditions;
- reduced grip in the presence of a rail that has not been recently cleaned and probably greased;
- > probably faulty sandblasting on part of the motor bogies at the ends of the tramway.

These factors combined, but given the complexity of the case, it is not possible to determine the exact contribution of each. However, to explain the deep jam observed during the accident, additional factors are necessary. Two complementary hypotheses are therefore put forward, without being able to exclude or validate one or the other, nor to validate a combination of the two:

- > a fatty lump fell from a tram in the braking zone,
- the braking correction by the anti-skid device would possibly not have been adapted whereas the state of adhesion of the rail should have allowed it to remain within its operating limit.

The BEA-TT issues 7 recommendations and 3 invitations, relating to the training and monitoring of tram drivers; to improving the traceability of maintenance actions, whether on the track or on the trains; and to the anti- -skid function for future tram rolling stock

Derailment of an RER B train on June 24, 2020 near Denfert-Rochereau station (75)



On June 24, 2020, shortly before 7 p.m., an MI79 RER B train departed from platform 3 of Denfert-Rochereau station.

Less than two minutes later, during a track change, the train derailed as it passed the tip of a switch on the right: the first axle of the front bogie of the 6th car derailed by the wheel climbing onto the left switch point of the switch; the second axle derailed before the frog tip of the switch.

Further on, when crossing the switch of the next device, and this switch being arranged on the left, the derailed left wheels destroy the switch motor with undoubtedly an action on the linkage: the switch translates to the right.

The following axles then went to the right, causing four other axles to derail due to skidding. Seven axles were ultimately off the rails.

The derailment was caused by a defect in the rail-wheel interface at the track device where the wheel lift occurred.

Analysis of causes and recommendations

A significant number of observations, investigations, and measurements have been carried out. However, it is not possible to describe with certainty the phenomena that led to the derailment. At most, the main contributing factors have been listed, the concomitance of which is undoubtedly the cause of the wheel-lift derailment:

the profile of the derailed wheel (presence of a bead);

- needle geometry and wear;
- > an empty train.

In the absence of further explanation, a preventive approach aimed at avoiding the recurrence of such an event has been implemented by the RATP and consists of:

to monitor the profile of the wheels and the appearance of bulges in particular, on the wheels of the bogies of the RER B trains;

> and to carry out corrective maintenance according to dimension criteria to be defined.

The procedures for checking and maintaining points must also be enhanced: as soon as wheel track marks are detected before the mathematical point of the point (PMA), a diagnosis must be established and measures to eliminate wheel/rail contacts in this area implemented.

At the same time, the RATP could continue its investigations to understand how the bulges form on the wheels of RER MI79 trains.

To find out more

Line T4 tram train derailed on November 8, 2020 in Clichy-sous-Bois (93)



On November 8, 2020, on the Ile-de-France T4 tram line operated by SNCF Voyageurs, a train in commercial traffic traveled along a 7% gradient between Maurice Audin and Clichysous-Bois-Mairie stations. At the top of the gradient, the tram driver reduced speed to stop in front of a tram road sign prohibiting it from crossing an intersection. The train then rolled backwards, in the downhill direction, reaching speeds of 63 km/h. The train was finally stopped by the driver using emergency braking, after 430 meters of drift.

The consequences could have been serious. Fortunately, no one among the forty passengers on board was injured and there was no material damage.

The cause of the drift was the combination of maintaining traction and the driver's inappropriate professional action, namely moving the direction selector to the "zero" position when stopping in front of the tram road signal. This action led to the deactivation of the antidrift safety device. Prescribed for stopping in front of a rail route signal, the action was not appropriate for tram road signals. In addition, during the initial stop at the top of the ramp, the driver left the joystick in the "traction" position. The parking brakes, which could have held the train, were therefore not activated.

This event was aggravated by the driver's handling of the drift, who, under stress, applied several brakes over short but insufficient periods for the equipment to be able to correctly apply a braking force.

The investigation revealed that various technical, organizational and human factors contributed to this situation:

- the operation of the Dualis anti-drift system, inactive when the direction selector is in the "zero" position, and the lack of awareness of this feature by drivers and management;
- the existence of a "professional" gesture using the direction of travel selector to compensate for a possible lack of vigilance on the part of drivers, without the risks induced by this action being understood;
- driver training during which, on the one hand, the language used is confusing, and on the other hand, the drift situation consists of passively observing the recovery of the train by an automatic mechanism;
- > the lack of training preparing for complex, emergency and stressful situations.

The BEA-TT issues **5 recommendations** and **5 invitations** concerning the use of professional gestures with regard to the specific features of the rolling stock supplied, the language used, driver training and the recording of frontal videos.

To find out more

Train derailment on January 25, 2021 in Fontpédrouse (66)



On January 25, 2021, at the end of the day, Regional Express Train No. 23006 was traveling from Latour-de-Carol station toward its terminus station at Villefranche-Vernet-les-Bains on a single, metre-gauge track. This Z150-type railcar, although in commercial service, did not carry passengers. Only the driver and the conductor were on board.

From the Gisclard Bridge, on the descent of the Têt Gorges, an intense fog enveloped the train. It suffered several skids, which the driver managed by applying electric braking and then by using the -sanding and traction control push buttons. The train's speed exceeded the authorized speed limit of 30 km/h and continued to increase. A final skid occurred at high speed. The driver was unable to regain traction by applying the same actions as before and did not use the air brakes. The convoy arrived at the entrance to the La Castagnal tunnel (right-hand curve) at a speed of 56 km/h.

The train suffered a wheel shedding on the right side, tipped over, struck parts of the infrastructure and touched the tunnel wall on the upper left. It derailed and then landed on its wheels, in a vertical position, before the end of the tunnel. The driver applied emergency braking in the tunnel. The train came to a stop on the track 99 meters after exiting the La Castagnal tunnel, due to the combined effect of the emergency braking and the skidding on the ballast of the derailed axles. The driver and the conductor were not injured but were shocked.

The primary cause of the derailment was the overspeeding of train Z152 on a curve, resulting from the driver's difficulty controlling the speed following several slippages on a steep slope. These slippages were triggered by wet weather conditions and the greasy condition of the rail.

The investigations identified several contributing factors: inappropriate driving behaviour by the driver, excess grease on the rail running surface over a significant length of the line and poor management of the risk of jamming due to a lack of feedback on line incidents resulting from slippage and jamming.

The BEA-TT issues **6 recommendations** and **3 invitations** relating to driver training, the reporting of information to infrastructure and rolling stock maintainers by drivers and line managers, the lubrication system, the speed value triggering emergency braking on Z150s and the monitoring and maintenance of rail condition.

To find out more

3.5 River transport

3.5.1 Published surveys

A survey was published in 2022. A joint report was written with BEAmer

Date	Nature and location of the accident	Number killed
02/10/2021	Collision of two bridges by the river-sea vessel ANDRE MICHEL 1 on the Rhône diversion canal at Donzère (26)	1

This investigation follows the one published in 2021 concerning the ARAMIS SHIP ACCIDENT which occurred in 2019, at the same location and in similar circumstances.

It deepens the analysis of the difficulties of crossing bridges and the search for directions to make navigation in this sector more secure.

She points out that the current regulatory principle, which requires that a vessel with valid maritime safety certificates be authorized to navigate inland waterways, may result in some vessels operating on rivers without complying with some of the essential technical requirements applicable to vessels. She also points out that the more specifically river-related equipment with which these vessels are equipped escapes periodic regulatory inspections.

3.5.2 The recommendations issued

Three recommendations were made by the BEA-TT.

Nature of the recommendations

- 2 deal with the possibilities of improving navigation safety in the sector, by means of signage and marking, and by verifying that the reversal of the direction of navigation in the sector remains relevant.
- 1 aims to develop the European regulatory framework so that the technical requirements applicable to boats are partly extended to vessels operating inland waterways, as is already the case on the Rhine.

The recipients

These recommendations were sent to the following recipients:

- > 2 to the operator of the waterway concerned;
- > 1 to the general directorate of the ministry responsible for transport (DGITM).

They complement those sent to these recipients during the previous survey.

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients

	Recommendations					
Investigation	Number	Accepted	Not accepted	No answer		
Donzère ANDRE MICHEL 1	3	3	0	0		

3.5.3 Monitoring of actions

The following table shows the progress report established by the BEA-TT based on information obtained from the various stakeholders concerned.

Year of publication	Number of recommendations addressed and followed up						
of the report	Total	Fe	enced				
	TOLAT	Made	Not accepted	in progress			
2020	2	1	0	1			
2021	8	3	0	5			
2022	3	0	0	3			
Total 2020-2022	13	4	0	9			

3.5.4 Summary of the published investigation report

Collision of two bridges by the river-sea vessel ANDRE MICHEL1 on October 2, 2021 on the Rhône diversion canal at Donzère (26)



On Saturday, October 2, 2021, the river-sea vessel² ANDRE-MICHEL 1, flying the Maltese flag, is going up the Rhône, on ballast, from Torre Annunziata in Italy and bound for Saint-Usage (21) where it will load wheat.

The maritime crew consists of seven Ukrainian sailors. The 68-year-old river driver, a resident of France, boarded the ship at 7:00 a.m. in Port-Saint-Louis-du-Rhône, where he took command of the vessel.

At around 8:15 p.m., on the Rhône diversion canal near the commune of Donzère (26), the ship's wheelhouse struck the deck of the RN7 bridge located at PK 174.5 and then that of the railway bridge located 150 m further on.

The wheelhouse was crushed in its upper part by the impact, it was torn off and tilted backwards, deforming, trapping the driver who lost his life. The captain, who was also on the bridge, was slightly injured.

After these shocks, the crew managed to immobilize the ship a little further away.

The FRELON, another river-sea vessel, arrived in the area mid-morning on October 3. It took alongside the damaged vessel and brought it to a jetty located 2 km further upstream. River navigation, which had been suspended since the accident, resumed shortly before noon.

The bridges affected were damaged, including the road bridge, but there was no major damage.

The BEA-TT and the BEAmer draw five lessons from this technical investigation and make three recommendations.

- bring to the European framework the approach aimed at ensuring that the provisions applicable to vessels operating on the Rhine (Art 25.01 ES-TRIN) are extended, for the most relevant, to vessels operating in inland waters and, moreover, are supplemented so as to include certain of the specific rules for height-adjustable wheelhouses which apply to boats.
- study the possibilities of improving navigation safety in the area of the two Donzère bridges, during poor visibility conditions, by means of signaling and beacons (alignment of lights or other devices to mark the direction of the channel, spars topped with radar reflectors and lights, bridge lighting, reflective materials).
- carry out, in conjunction with Voies Navigables de France and the Departmental Directorate of Territories of the Rhône department (both responsible for supporting prefects in matters of navigation policing), a trajectory study, in order to ensure that the reversal of the direction of navigation in the area of the two Donzère bridges remains relevant in view of the current and the strong wind on this section.

² A river-sea vessel has technical characteristics enabling it to navigate both at sea and on waterways. To find out more

3.6 Ski lifts

3.6.1 Published surveys

No survey was published in 2022 in the field of ski lifts.

3.6.2 Monitoring actions

Based on the monitoring carried out by the technical service for guided transport and ski lifts (STRMTG), the operational implementation of the recommendations made between 2016 and 2022 following ski lift accidents, and which received a response, is as follows:

Year of publication of	Number of recommendations addressed and followed up					
the report	Total	F				
	Total	Made	Made Not accepted			
2016	0	0	0	0		
2017	8	8	0	0		
2018	5	2	0	3		
2019	3	2	0	1		
2020	0	0	0	0		
2021	0	0	0	0		
2022	0	0	0	0		
Total 2016-2022	16	12	0	4		

4 Studies and progress notes published in 2022

Study

The BEA-TT has launched a study on road accidents involving the immersion of a vehicle in a waterway or body of water to improve knowledge of the issues and circumstances of this type of accident, which has a very high mortality rate. The study, published in 2022, aims to estimate the number of road accidents resulting in the immersion of a vehicle in a waterway or body of water, to assess their severity and to describe their circumstances in order to identify the most frequent characteristics. A second phase planned for 2023 should make it possible to identify avenues for preventive recommendations.

Stage notes

Depending on the nature of the accidents and when the time required to conclude the investigation exceeds one year, the publication of progress reports to inform stakeholders and the public of the progress of the investigations and to announce the first preventive guidelines to the entities concerned is mandatory for serious rail accidents. The BEA-TT has decided to generalize this practice to all modes of land transport.

In 2022, eight progress notes were published, concerning:

- > The derailment of a freight train on August 19, 2020 in Villeneuve-sur-Yonne (89)
- The derailment of a train on the Villefranche Latour-de-Carol line, on January 25, 2021 in Fontpédrouse (66)
- The collision between a TER and a light vehicle, on January 15, 2021, on the LC44 in Péronnas (01)
- The collision between a coach and a heavy goods vehicle on May 27, 2021 in Masd'Agennais (47)
- > The fire of a works train, May 28, 2021, in Saint-Hilaire-Bonneval (87)
- The collision between a freight train and a road train, on June 16, 2021 on the LC17 in Rumigny (08)
- The collision between a minibus and a heavy goods vehicle, August 6, 2021 in Saint-Poncy (15)
- The collision of two cabins of the La Saulire cable car against the structures of their respective stations, on September 29, 2021, in Courchevel (73)
- The collision between a light vehicle and a salt spreader from the Centre-Ouest Interdepartmental Roads Directorate, on December 12, 2021 in Nespouls (19)

These notes are available on the BEA-TT website until the final reports are published.

5 Summary of recommendations

5.1 Overall assessment

Ten investigations were completed in 2022, including one conducted with the Maritime Events Investigation Bureau (BEAmer). It should be noted that none of these involved a level crossing accident.

The accidents handled cost the lives of 6 people and caused 4 serious injuries.

These investigations concluded with the issue of recommendations and invitations to the attention of stakeholders: operators, managers, infrastructure, regulatory and standards authorities, recommendations aimed at preventing disasters with the same causes.

5.2 Nature of the recommendations

In conclusion of the 10 reports, the BEA-TT made 43 separate recommendations.

For road transport :

- > A recommendation aims at training heavy vehicle drivers;
- > Two are aimed at network managers to strengthen signaling and develop existing infrastructure;
- > Two require the organization and definition of responsibilities in terms of security for public road transport operations, internally within an operator, and on a regulatory level;
- A final recommendation aims to study and evaluate the performance of systems for detecting vulnerable users on board heavy vehicles.

The fourteen recommendations issued for **rail transport** cover three main subjects:

- High embankments:
 - The design rules, the tests which lead to the choice of geotechnical parameters of the materials in place;
 - Reinforcing the slopes of a high-speed line sector: geotechnical analysis and reinforcement work;
 - Monitoring the behavior of large spoils by radar interferometry;
 - Methods for monitoring internal drainage devices of large embankments.

> Technical maintenance of the rails:

- Four recommendations concern the technical elements of rail maintenance: the reliability of data relating to the age, condition and deterioration of the rails, monitoring and replacement methods;
- One questions the human and organizational factors of the rail network surveillance tours.
- > Four concern the safety of agents on foot on the road:
 - Training in safety communications between maintenance agents and signal boxes,
 - The implementation of a security watch,
 - o Modernization of the lane closure request system,
 - Automatic activation of an audible alert when an emergency brake is triggered.
- A request to the UIC requests an assessment of the relevance of a study on the scenario of a train hitting a clear obstacle.

For **guided transport**, four accidents were analyzed, the causes of which led to the issuing of twenty recommendations:

- > Five on driver training: gestures and emergency braking, route signs, etc.
- Five on the rules for greasing and cleaning wheel flanges and rails, of: process, monitoring, traceability;
- Four on the maintenance of infrastructure and rolling stock: monitoring, fault handling, auditing of all these procedures;
- > One on the emergency braking trigger thresholds;
- > One on reporting and handling of cases of jamming;
- > One on managing the direction selector;
- One on the necessary analysis of the professional gestures practiced on a particular tram line;
- One on the possibilities of developing regulations in order to have recordings of the tram driving environment in order to facilitate the analysis of accidents and incidents;
- > One on the prescription of braking performance of rolling stock when purchasing equipment.

The investigation into the **river accident** resulted in three recommendations being issued: one on navigation rules, one on signalling and buoyage in the area where the accident occurred, and the last on the necessary trajectory studies in the same area.

5.1 The follow-ups planned by the recipients

Article R. 1621-9 of the French Transport Code specifies that the recipients of the recommendations must inform the director of the BEA-TT, within 90 days, of the follow-up they intend to give them and, where appropriate, the time required for their implementation. Their responses are made public, as are the recommendations themselves -.

Of the 43 recommendations issued in 2021:

- > 36 have been accepted, of which 12 have already been implemented;
- ➤ 4 have not yet received a response from the recipient concerned.
- ➤ 3 were refused

Beyond the simple collection of the intentions of the recipients, carried out by the BEA-TT, the control of the operational follow-ups actually given to its recommendations is, by law or in fact, taken care of by other organizations.

These keep the tables in the appendices up to date.

SUMMARY OF APPENDICES

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- Appendix 5: Table of the Technical Service for Ski Lifts and Guided Transport (STRMTG) presenting the monitoring of the implementation of the BEA-TT recommendations in the field of guided transport (trams and tram-trains). 67

Annexe 1 : Table of the Public Railway Establishment (EPSF) presenting the monitoring of the implementation of the recommendations issued by the BEA-TT in the field of rail transport

This document presents the progress as of 12/31/2022 of the implementation of actions following the recommendations issued by the BEA -TT for the attention of stakeholders in the railway sector.

The update of the status of actions concerning the 2022 financial year appears in bold.

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code *
11/2012	Two freight trains caught up in Maillé (37) on 01/02/2012	R1	Ensure the recording and traceability of safety communications from regulators and traffic officers from their service landline phones.	SNCF Network	The progress as of 10/11/2022 of the deployment of recorders in the stations was 56% of the scheduled operator stations. The action is closed given the overall progress and the provision of a schedule for the equipment of the remaining positions by 2025. Action closed.	С

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code *
	Collision					
	between a train				The progress as of 10/11/2022 of the deployment of recorders in the stations	
	and a				was 56% of the scheduled operator stations.	
07/2013 construction machine in Lachapelle- Auzac (46) on R3 Ensure the recording of all operational communications made from traffic officers' service telephones. SNCF Network The action is closed given the overall progr schedule for the equipment of the remaining program	The action is closed given the overall progress and the provision of a	C				
	made from traffic officers' service telephones.	SINCE MELWOIK	schedule for the equipment of the remaining positions by 2025.	C		
	Lachapelle-					
	Auzac (46) on				Action closed.	
	07/04/2012					

Railway: Recommendations issued in 2013

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
04/2014	Collision between a TER and a mobile crane in Marseille (13) on 04/13/2013	R1	Prohibit heavy vehicles coming from Rue Albert Cohen from crossing level crossing No. 1 on the Miramas to Marseille railway line via the Côte Bleue if the vehicles have characteristics that prevent them from easily moving downstream of the railway right-of-way. Signpost this prohibition at the intersection of Chemin du Passet and Rue Albert Cohen.	Prefecture of Bouches-du- Rhône City of Marseille	Signs announcing the ban have been put in place from the intersection of Chemin du Passet and Rue Albert Cohen. The mid-February 2023 questioning of the Departmental Directorate of Territories and the Sea of Bouches du Rhône by the DGITM made it possible to confirm the installation of the signage in question and therefore to close the action. Action closed.	С

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code *
05/2015	R1 Collision following a drift		Tighten and clarify the maintenance rule aimed at finding and eliminating, on the fleet of wagons for which you are the entity responsible for maintenance, coupling tensioners not bearing the marks of conformity to the European standard or to recognized national standards.	ERMEWA	ERMEWA responded with a commitment to take action on the inspection of its fleet's towing hitches. By the end of 2021, 46% of the wagon fleet affected by this recommendation had been treated. The EPSF is awaiting a provisional schedule for completing the action plan. No information on the progress of the implementation of actions was communicated to the EPSF in 2022.	0
	in Modane (73) on 01/24/2013	R3	As soon as the modification covered by recommendation R2 is finalized, apply it during revisions of the distributors concerned on the wagons for which you are the entity responsible for maintenance.	SNCF Passengers Materials Department	Faiveley plans to supply SNCF with prototypes of so-called "-50°C" membranes in September 2020. The first type is currently being revised. The other type of membranes planned, after acceptance and inspection, will be applied from June 2021. Since June 2021, membranes from the manufacturer Faiveley have been used in Level 4 maintenance. SNCF Voyageurs was unable to provide EPSF with information on the progress of the implementation of this action in 2022.	0

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
05/2016	A TER train parked at the platform was struck by an infrastructure monitoring train in Saint-Germain- des-fossés (03) on 12/15/2014	R1	Ensure the recording and traceability of telephone exchanges between train drivers and agents of the traffic and circulation management service whose telephone numbers appear in the technical records of the national rail network lines.	SNCF Network	The progress as of 10/11/2022 of the deployment of recorders in the stations was 56% of the scheduled operator stations. The action is closed given the overall progress and the provision of a schedule for the equipment of the remaining positions by 2025. Action closed.	С
11/2016	A TER train drifted after a collision with cattle in Serqueux (76) on 10/20/2015	R2	Positioning of the obstacle clearer and protection of sensitive components under the body By involving the railway sector and after determining the form most appropriate to the European context: ➤ explain how to calculate and use the construction gauge of the rolling stock in order to optimize the positioning of the obstacle clearer with regard to the risk of overlapping an obstacle located on the track; ➤ formulate useful prescriptions for the identification of sensitive organs under the body, their protection and their positioning in height in relation to the obstacle clearer.	EPSF	The standard concerning passive safety (EN 15227) was published in 2020 with a new wording responding to the BEA-TT recommendation. Regarding the rolling stock gauge standard (EN 15273-2), publication is not expected before the beginning of 2024. In 2022, the revision of the rolling stock gauge standard (EN 15273-2) was at the working subject stage. In March 2023, it moved to the technical investigation stage with a deadline for comments before June. At the end of this phase, the comments are expected to be processed and published in 2024. Action in progress	O
Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
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01/2017	Derailment of a TER train on the entrance	R1	 Launch studies or investigations useful for improving knowledge of the phenomenon of wheel fouling. Without delay, take into account this phenomenon and the possibility of de-shunting on clean rail in the discussions relating to the risk linked to de-shunting, including on ITE track circuits and examine the relevance of equipping X 73500 with scrubbers (or any other wheel cleaning equipment). Take into account the results of these studies to develop, if necessary, the equipment admission standards on the RFN and at European level, in conjunction with the European railway agency. 	SNCF Network SNCF Passenger S EPSF	Studies have been conducted to better understand the phenomenon of wheel fouling. They provide details on the electrical insulation characteristics. Various wheel cleaning solutions for vehicles not equipped with brake shoes have been tested, particularly on X 73500 vehicles in the Auvergne-Rhône-Alpes region. The use of these solutions on other rolling stock will be based on a risk analysis conducted locally. In 2022, joint work between SNCF Réseau and EPSF resulted in a draft version of SAM004. In 2023, discussions were extended to the entire sector to produce a final version.	ο
	Sainte-Pazanne station (44) on 10/12/2015	R3	Formalize the criteria and process for granting S6A No. 4 exemptions so as to limit them to cases where they correspond to a real need for the operation of the position concerned.	SNCF Network	SNCF Réseau has implemented the principle of risk analyses to address this recommendation. By the end of 2020, two-thirds of the establishments had completed these risk analyses, and this stage is expected to be completed by the third quarter of 2021. The planned next step is to prepare a file presenting the adaptation of measures based on the results of the risk analyses. Three sites are currently implementing the adaptation method, and a report on the lessons learned from these experiments is expected in 2021. In 2022, discussions between EPSF and SNCF Réseau continued in order to generalize the rules for granting exemptions.	0

Railway: Recommendations issued in 2017

Railway: Recommendations issued in 2017 – continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
01/2017	Derailment of a TER train on the entrance switch of Sainte-Pazanne station (44) on 10/12/2015	R4	Conduct a study on the functionalities of modern stations in order to be able to adapt them to the real needs of the stations where they are located and thus limit their vulnerability in the event of dehunting.	SNCF Network	Taking into account the issue of dehunting in the design of signal boxes will be included in the specifications for the preliminary studies of the centralized network controls. No additional information was provided by SNCF Réseau in 2022. At the beginning of 2023, elements were provided demonstrating that the issues raised by this recommendation had been taken into account in the signalling study directive IG 33311 relating to the choice of the type of track circuit. Current actions	0
11/2017	Multiple rail breaks between Beillant and Jonzac stations (17) on 12/13/2016	R3	Develop and then implement a policy for deploying convoy anomaly detectors on the main freight traffic flows. This set of detectors should aim to stop convoys containing vehicles with dangerous wheel defects but also to identify and report to the railway company, the entity in charge of maintenance or the relevant keeper, vehicles with non-critical defects but likely to damage the infrastructure.	SNCF Network	 SNCF Réseau is committed to studying the principles of implementing train anomaly detectors on the national rail network. The progress schedule, which includes technical studies and necessary risk analyses, indicates a deadline of the end of 2022. A feasibility test for alarm reporting in the station was carried out at the end of November 2022. The report of this test proved the technical feasibility of the solution. A deployment plan is underway. A deployment policy will then be developed with a target date now set for the end of 2025. Current actions 	Ο

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
04/2019	Pedestrian struck by a train on a wooden crossing on February 22, 2018 at Écommoy station (72)	R1	Study the technical conditions under which the light signals for public crossings of tracks at level can be equipped with means of recording their proof of operation. Define a modernization plan allowing, within a timeframe to be specified, to equip them with this recording.	SNCF Network	 SNCF Réseau is committed to studying the technical conditions under which TVP light signals can be equipped with means of recording their proof of operation. The target date is set for the end of September 2021. The plan for deploying a technical solution remains without a target date and depends on the completion of the previous action. Technical studies were completed in 2022. For the need for a "local TVP recorder", a technical solution was chosen. 8 construction sites have been defined and the deployment plan will be established subsequently without a target date at this stage. 	0
		R2	Implement the relocation of the Écommoy planked crossing to ensure, for pedestrian crossings during a train stop at the station, visibility of pictograms and, to a certain extent, of passing trains. Identify similar situations across the network where pictograms are hidden when a train stops, and integrate this criterion when prioritizing investments to improve crossings.	SNCF Network	The new pedestrian crossing equipped with a pictogram was put into service in December 2020. The census of similar situations of masking pictograms when a train stops was finalized in June 2020. Integration of the improvement of the situations of masking of the luminous pictograms of the TVP in the investment program from SNCF Network for Crossing improvements are planned for September 2022 when a TVP criticality matrix has been developed and implemented. The criticality classification criteria have been reworked through two available matrices to respond to both types of DVT.	С

Railway: Recommendations issued in 2019

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
	Pedestrian struck by a train on a wooden crossing on February 22, 2018 at Écommoy station (72)	R3	Finalize the tests to improve the warning signs at road crossings by strengthening the road markings showing the danger zone, by improving the ergonomics of the signs and by adding a second mode of perception other than visual. At the end, develop a plan for deploying the improvements.	SNCF Network	SNCF Réseau is committed to testing and defining fixed warning signage for track crossings in stations (signs and floor markings) with improved ergonomics. The deployment of the new fixed signage will be specified once it has been defined. The addition of a second mode of perception other than visual is integrated into its response to recommendation 5. The publication of the new charter is scheduled for the end of December 2022. The EPSF is still awaiting transmission of this charter to close the action. Action in progress	0
04/2019		estrian struck by in on a wooden crossing on ruary 22, 2018 commoy station (72) R4 R4 R4 R4 R4 R4 R4 R4 R4 R4 R4 R4 R4	Study and deploy new awareness-raising solutions aimed at raising the awareness of risks among travellers who have to use railway crossings and encouraging them to	SNCF Network	 SNCF Réseau has developed a national safety campaign on railway risks in stations, which includes risks on TVPs. In 2021, SNCF Réseau will make the materials thus created available to the various railway companies transporting passengers, in order to involve them in the deployment of the campaign. Awareness campaigns are communicated to new entrants through the One-Stop Shop and the dedicated website www.prevention-ferroviaire.fr . In addition, a national communication campaign took place in 2022. 	С
			SNCF Passenger s	In addition to the measures already implemented in situations where stations equipped with TVPs are served (signage in stations, announcements on board and in stations, distribution of flyers in stations, etc.), SNCF Voyageurs will enhance the content of presentations made during school visits. Based on the identification of risky situations in the railway environment of each school, the prevention message will be personalized to the local context to better raise awareness among young people. The EPSF is still awaiting the transmission of evidence to close the action. Action in progress	0	

Railway: Recommendations issued in 2019 - continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
04/2019	Pedestrian struck by a train on a wooden crossing on February 22, 2018 at Écommoy station (72)	R5	Drawing lessons from the risk study conducted by SNCF Réseau on pedestrian crossings of tracks at level, by testing defenses against the risk of being struck by a train in the station in the event of a lack of attention to light signals, for example the presentation of a physical obstacle. These solutions, once validated, could be proposed in crossing safety projects.	SNCF Network	SNCF Réseau has launched a research project to objectify all the factors involved and build a strategy for improving TVPs. SNCF Réseau is committed to testing the selected devices by the end of 2024 and to integrating them, where appropriate, into the security policy relating to the prevention of the risk of collisions in stations on TVPs. The experiments have been postponed until the end of 2026. The update of the policy on the risk of collisions in stations is planned for June 2025. Action in progress	0
12/2019	Study Fatal accidents by intrusion on the railway domain Analysis of accidents in 2015 and 2016 and prevention policies	R2	Deploy a tool for understanding the fencing assets on the network, describing the installation and condition of the devices, for monitoring purposes by local managers of the risk of online collisions.	SNCF Network	 SNCF Réseau is continuing the deployment and quality improvement of the GAIA tool, designed to ensure the inventory of all its assets and, ultimately, to store data relating to closures. In January 2022, SNCF Réseau indicated the following commitments to EPSF: over a period of 12 months: consolidate the census system, identify the different sources of data available, establish a procedure and a work program, mobilize the necessary resources; over a period of 24 months: carry out an inventory of all heritage elements without carrying out exhaustive field visits, and enter it; over a period of 24 months: carry out the field visits necessary to collect the elements that could not have been obtained previously. Action in progress 	O

Railway: Recommendations issued in 2019 – continued

Railway: Recommendations issued in 2019 – continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
12/2019	Study Fatal accidents by intrusion on the railway domain Analysis of accidents in 2015 and 2016 and prevention policies	R3	Study the advisability of establishing a regulatory requirement requiring the construction of a physical barrier between railway rights-of-way and adjacent land, in and near so-called urban areas within the meaning of the Urban Planning Code.	General Directorate of Infrastructure, Transport and the Sea - DGITM	As part of the feedback meetings organized specifically for infrastructure managers, an ad hoc working group will identify alternatives or complementary devices to fencing that can prevent intrusions. The work of this group will be recorded in a report that will also include a section evaluating their effectiveness from a security perspective in light of the investments to be made. Following this work, the DGITM will consider the possibility of establishing a regulatory requirement. The target date, initially set for December 31, 2021, could not be met. A working group, or some other form of reflection, must be initiated by the DGITM. No target date has been set at this stage.	0

Railway: Recommendations issued in 2021 - continued

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
05/2021	Axle jammed on a freight train between Romilly-sur-Seine and Troyes (10) on 07/26/2019	R4	Review the terms of the approval tests for "LL" pads, taking advantage of feedback on deterioration by digging of the wheel tread, during brake application incidents, on wagons equipped with these pads.	European Union Agency for Railways (ERA) Railway	The Agency responded with a two-step approach. First, the UIC should reconsider the brake application tests defined in its UIC leaflet, taking into account the conclusions of the technical investigation report. When the UIC leaflet is updated, it could then be considered by the appropriate working group in charge of the revision of the TSIs in order to modify the technical document to which Regulation 321/2013 (TSI Wagon) refers. In February 2022, the JNS urgent procedure "Extreme effects of thermal overload in special cases of freight operation" (Joint Network Secretariat) resulted in the dissemination of the group's conclusions regarding the identified risk. The JNS normal procedure "Consequences of unintended brake applications with LL blocks" is still ongoing. Action in progress	Ο
		<i>3/2019</i>		Standardization Bureau (BNF)	No response to this recommendation has been provided by the BNF to the BEA- TT at this stage. Any actions taken are therefore not known. Action in progress	ο
				International Union of Railways (UIC)	The UIC responded to the recommendation by initiating a working process with its members to build funding for a project to review the methods of testing for the approval of "LL" soles. No information on the progress of the implementation of actions was received by the EPSF in 2022. Action in progress	0

Railway: Recommendations issued in 2021 – continued

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
07/2021	Exceeding the authorized speed limit by a TGV on the BPL line at La Milesse (72) on 12/22/2019	R1	Review the "ETCS signaling" production processes to ensure that a verification error is not propagated throughout the rest of the production process.	HITACHI RAIL STS	The process of verifying and validating the configuration has been re-analyzed, taking into account the precursors of each activity, and revised to no longer allow an error to be propagated in the rest of the process. The "Parameter Verification Plan" documentation has been updated on the BPL and SEA projects and is currently being produced on the LGVEE project as part of the N1/N2 transitions, where a transmission of documents from the client was expected for December 2021. The target date for this final action to close the monitoring is set for the first quarter of 2022. The EPSF is still awaiting evidence to complete this action. No information on the progress of the implementation of actions has been received by the EPSF in 2022.	Ο
		R2	Study the implementation of formal method algorithms in the context of proving the safety of signaling systems.	HITACHI RAIL STS	This recommendation will be considered in the context of future HITACHI RAIL STS projects. The ARGOS projects already provide for the implementation of formal proof activities and studies will be carried out in this context. This action remains open pending evidence on studies of the implementation of formal methods. The EPSF is still awaiting evidence to complete this action. No information on the progress of the implementation of actions has been received by the EPSF in 2022. Action in progress	Ο

Railway: Recommendations issued in 2021 – continued

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
	Exceeding the	R3	Formalize a process for exploiting precursors during verification and validation operations in order to research and treat their root causes.	HITACHI RAIL STS	The response from HITACHI RAIL STS is identical to that provided for recommendation R1. The target date is set for the first quarter of 2022 The EPSF is still awaiting evidence to complete this action. No information on the progress of the implementation of actions has been received by the EPSF in 2022. Action in progress	0
07/2021	authorized speed limit by a TGV on the BPL line at La Milesse (72) on 12/22/2019	R4	Review the assessment methodology regarding "system validation" according to CENELEC 50126 and following standards in order to ensure the validity of the assessment.	CERTIFY	CERTIFER has drafted an internal document called RFU, applicable (unless justified) and relating to the "evaluation of the parameterization process". Its objective is to specify and clarify regulatory or normative requirements. This document will be referenced by the RF0015 standard "For the Certification of the safety integrity level of products or systems according to CENELEC standards EN50126, EN50128, EN50129". The application of this RF0015 standard is controlled by COFRAC during these periodic CERTIFER audits. The EPSF is still awaiting evidence to complete this action. No information on the progress of the implementation of actions has been received by the EPSF in 2022.	o

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
01/2022	Derailment of a TGV on the East European high-speed line on March 5, 2020 in Ingenheim (Bas-Rhin)	R1	Strengthen the requirements of the technical reference system for the construction of high- speed lines concerning the supervision of the consistency of tests leading to the choice of geomechanical parameters for verifying the stability of large excavation slopes.	SNCF NETWOR K	SNCF Réseau undertakes to modify, by providing the necessary clarifications to the existing parties concerned, the requirements of the technical reference document dealing with the consistency of the tests to be carried out to define the choice of geomechanical parameters for verifying the stability of large cutting slopes for the construction of High Speed Lines. The target date is set at 12/31/2023 Action in progress	0
		R2	Complete the analyses and the projects for remedial works following the accident, in order to address the risk of embankment slippage on the eastern terminal section of the LGV Est Européenne.	SNCF NETWOR K	In addition to the studies carried out on the structures made up entirely or partly of the same geological formation as the embankment involved, SNCF Réseau will carry out additional analyses on all the structures on section H of the LGV Est. The target date has been set for 12/31/2022. The EPSF is still awaiting evidence. Current actions	0
		R3	Study and decide on the benefit of incorporating radar interferometry analyses, or any other relevant technique, into the monitoring operations of spoil classified as sensitive under the maintenance policy.	SNCF NETWOR K	SNCF Réseau continues to use InSAR interferometry while pursuing the development and implementation of a set of complementary digital tools dedicated to monitoring. These tools are based on technologies from metrology and the geosciences and will improve the detection of early signs of problems in the coming years. A summary will be written on the feedback from the use of InSAR as well as on the prospects for other technologies. The target date for submitting the summary is June 2023. Action in progress	0

Railway: Recommendations issued in 2022

Railway: Recommendations issued in 2022 - continued

Report date	Title of the survey	N 0.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
01/2022	Derailment of a TGV on the East European high-speed line on March 5, 2020 in Ingenheim (Bas-Rhin)	R4	Review the requirements for monitoring internal drainage structures on large embankments with a view to ensuring their inspection by camera and knowledge of their proper working order.	SNCF NETWOR K	SNCF Réseau is committed to modifying existing requirements on the monitoring and maintenance of drainage systems, in particular the reference document which defines the type of maintenance that should be carried out on earthworks and their associated structures such as drainage trenches. The target date for the new version of this standard is set at 12/31/2023. Action in progress	0
Collision of infr maintenance 07/2022 by a TE in Schiltighe on March 18	Collision of infrastructure	R1	Develop specific training and exercises in safety communications between maintenance staff and signal boxes. Develop monitoring of the quality of these exchanges using appropriate means (for example, recordings where available).	SNCF NETWOR K	SNCF Réseau is committed to incorporating a safety communication component into the "new S9" training which is scheduled for 2023 for all maintenance staff and signal box staff. The target date is set at 12/31/2023 Action in progress	0
	by a TER in Schiltigheim (67) on March 18, 2020	R2	Implement a safety watch to verify the adequacy between the walking tours carried out and the construction site insurance actually taken out where prescribed, to anticipate any difficulty that could affect safety	SNCF NETWOR K	SNCF Réseau is committed to studying the provision of information relating to the effective completion of works operations as part of the development of digital tools linked to works within the Maintenance and Works entities. The final results of the study are expected for December 2023 in order to decide whether or not to integrate them into the "IS Travaux" tools currently being developed. Action in progress	0

Railway: Recommendations issued in 2022 - continued

Report date	Title of the survey	N 0.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
07/2022	Collision of infrastructure maintenance workers by a TER in Schiltigheim (67) on March 18, 2020	R3	Ensure the implementation of a modern system less susceptible to human error regarding the safety of personnel working on the roads during regeneration of traffic management systems. Inventory the dense traffic areas covered by the modern systems already implemented to quantify this modernization	SNCF NETWOR K	 SNCF Réseau has committed to three actions: define, by June 2023, the concept of a "dense zone" for the field of personnel security. work, in parallel, on the criteria for characterizing a modern device concerning the safety of personnel working on the tracks in order to make an inventory of it. link modern devices and areas meeting the definition of a "dense zone" with the aim of inventorying those already covered by said modern devices but also those programmed for regeneration. The target date is set for June 30, 2024. 	ο
		R4	To study reasonably practicable means of enabling a train's horn to be triggered automatically when a driver applies the emergency brake of the moving train	SNCF Passenger s	As of 12/31/2022, SNCF Voyageurs' response to the recommendation made by the BEA-TT was not yet available.	0

Railway: Recommendations issued in 2022 – continued

Report date	Title of the survey	N 0.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
		R1	Make ARMEN and DEFRAIL data on the state of wear and tear of the rails more reliable in order to identify and locate the oldest and most heavily used rails	SNCF Network	As of 12/31/2022, SNCF Réseau's responses to the recommendations made by the BEA-TT were not yet available.	0
	Derailment of a freight train, August 26, 2021 in Saint-Hilaire-au-temple (51)	R2	Review the requirements for rail cutting and renewal with a view to ensuring the earliest possible removal of the oldest and most stressed rails or their good working order	SNCF Network		ο
11/2022		R3	Complete in the reference documents the strengthening of analyses and methods for monitoring the actual condition of rails in order to address the risks linked to the age of old rails, particularly vertical cracking defects. Include in the general maintenance organization the provisions ensuring that these new measures are taken into account in a reliable and auditable manner.	SNCF Network		0
		R4	Study the feasibility of improving detection quality by strengthening the methods and resources used on heavy ultrasonic rail inspection equipment in order to improve the safe detection rate of rail defects, particularly longitudinal vertical cracking defects in the rail head, using, where appropriate, new available techniques and useful cross- referencing with the national rail network description databases. Pending conclusive results, prescribe that the 113/213 sensors be more systematically operational, that the inspection speed be adapted to the quality of the rail-sensor coupling and that the trigger thresholds be re-instructed, in light of the other actions implemented to minimize the risk of non-recognition			0

Railway: Recommendations issued in 2022 – continued

Report date	Title of the survey	N 0.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
11/2022 ^{tr}	Derailment of a freight	R5	To analyze from the point of view of human and organizational factors the task of carrying out rail tours aimed at detecting defects in order to draw useful lessons from the point of view of the organization of tours, the training of operators and the provision of appropriate practical support.	SNCF Network	As of 12/31/2022, SNCF Réseau's responses to the recommendations made by the BEA-TT were not yet available.	0
	train, August 26, 2021 in Saint-Hilaire-au-temple (51)	R6	Assess the relevance of further studying the scenario of a collision on a clear obstacle that a structure may present, as part of the program of activities of the experts associated with the revision of this UIC leaflet. Depending on the result of this assessment, integrate into the revision work in progress or into a subsequent revision, the objective of improving leaflet 777-2	UIC	As of 12/31/2022, the UIC's response to the recommendation made by the BEA-TT was not yet available.	0

Annexe 2 : Table from the Public Railway Safety Establishment (EPSF) showing the monitoring of the implementation of the recommendations issued by the BEA-TT in the field of level crossings

This document presents the progress as of 12/31/2022 of the implementation of actions following the recommendations issued by the BEA -TT for the attention of stakeholders in the railway sector.

The update of the status of actions concerning the 2022 financial year appears in bold.

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code *
12/2006	Collision between a regional express train and a heavy goods vehicle on a level crossing in Saint-Laurent-Blangy (62) 06/09/2005	R1	Continue the study of solutions (on-site elevation change or new route) to remove this LC, in order to reach a decision and completion as soon as possible.	SNCF Network General Council 62	The technical solution regarding the installation of obstacle detection is an avenue of work. Several steps are underway, including the performance of a reliability review of the obstacle detection function, taking into account the specific situation of this LC, and the study of the electric torch equipment. Monitoring of the actions implemented by SNCF Réseau provides for the commissioning of the obstacle detector solution at the earliest by the end of 2024/beginning of 2025. Despite the request of the General Council 62 by the DGITM in February 2023, no additional information on the progress of the implementation of this action could be obtained. Action in progress	0

LC: Recommendations issued in 2010

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
09/2010	Collision between a coach and a regional train at LC n°4 in Nevers (58) 03/02/2009	R1	Evaluate and study the traffic light regulation system of LC No. 4 (as well as LC No. 5) to seek simple optimization measures (duration of traffic light cycles, possible coordination of upstream and downstream traffic lights, activation time of the upstream traffic light after detection, effectiveness of the detection loop, etc.) in order to reduce the risk of encroachment onto the railway line by a vehicle stopped at the end of the queue downstream of the level crossing.	Municipalit y of Nevers	Despite the request of the Municipality of Nevers by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Action in progress	0

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
04/2014	Collision between a TER and a mobile crane in Marseille (13) 04/13/2013	R1	Prohibit heavy vehicles coming from Rue Albert Cohen from crossing level crossing No. 1 on the Miramas to Marseille railway line via the Côte Bleue if the vehicles have characteristics that prevent them from easily moving downstream of the railway right-of-way. Signpost this prohibition at the intersection of Chemin du Passet and Rue Albert Cohen.	Prefecture of Bouches-du- Rhône City of Marseille	Signs announcing the ban have been put in place from the intersection of Chemin du Passet and Rue Albert Cohen. The mid-February 2023 questioning of the Departmental Directorate of Territories and the Sea of Bouches du Rhône by the DGITM made it possible to confirm the installation of the signage in question and therefore to close the action. Action closed.	С

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
05/2019	Collision between a TER and a coach school transport in Millas (66) 12/14/2017	R1	Establish, in coordination with SNCF Réseau and the road safety delegation (DSR), a technical reference framework setting out the performance and a procedure for assessing the conformity of level crossing equipment, as provided for by road regulations relating to the qualification of road equipment, as well as rules for commissioning and installation based on their characteristics and environmental constraints.	General Directorate of Infrastructure, Transport and the Sea - DGITM	The DGITM has undertaken to set up a working group involving SNCF Réseau and the Road Safety Delegation (DSR), which aims to take stock of the three families of equipment (flashing red lights, barriers and bells). The objective is in particular to identify existing benchmarks and define the benchmarks to be implemented, define the desired performance thresholds, etc. The work will then allow the development of an order including the performance thresholds and certificates of conformity for these three families of equipment, in accordance with Articles R. 119-4 and R. 119-7 of the Highway Code. The working group's work began in 2021. Despite the request for the DSR by the DGITM in April 2023, no additional information on the progress of the implementation of this action could be obtained. Action in progress	ο

LC: Recommendations issued in 2019 - continued

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
05/2019	Collision between a TER and a coach school transport in Millas (66) 12/14/2017	R2	Study equipment enabling the broadcasting of a continuous audible alert signal, from the lowering of barriers until their raising, to all users using level crossings. As part of the development of connected vehicles, study the feasibility of reporting a level crossing closure alert inside vehicles coupled with the GPS system and on-board mapping.	SNCF Network	A study was carried out on equipment enabling the broadcasting of a continuous audible alert signal. With regard to the feasibility of reporting an alert for an active level crossing in a connected vehicle, SNCF Réseau undertakes to regularly inform the National Level Crossing Authority of the progress of the studies, particularly at the European level in which it participates. The study was presented at the National Level Crossing Authority (INPN) on March 17, 2021. Furthermore, SNCF Réseau carried out a project called "smart intersection" which concluded that this type of alert report was technically feasible.	С
		R3	Study the options for widening existing intersections on either side of the LC25 to facilitate turnings depending on the type of heavy vehicle. Failing this, take police measures to prohibit left turns, towards the LC, for these categories of vehicles.	Departmental Council of the Pyrénées- Orientales	The Department has carried out studies on the turning of the intersections located on either side of LC°25, for heavy vehicles traveling on a left turn towards the level crossing. The directional island on the RD46 will be modified, so as to shift the outlet of the RD46 onto the RD612 towards the south, and thus induce a wider turning that allows heavy vehicles to position themselves perpendicular to the lowered half-barrier of the level crossing a few meters upstream of it. Despite the request of the Pyrénées-Orientales Departmental Council by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Current actions	0

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
			Study the feasibility of installing a front camera at the	SNCF Network	The proposal regarding the equipment of level crossings is part of one of the measures of the ministerial action plan to improve the safety of level crossings, launched on May 3, 2019. The feasibility study has been released and the follow-up to the conclusions is now awaited. SNCF Réseau has committed to the experiment on 5 sites. SNCF Réseau has completed work on the 5 identified sites and has established feedback on the equipment of these level crossings.	С
05/2019	Collision between a TER and a coach school transport in Millas (66) 12/14/2017	R5	head of the train, in order to have a recording of events on the infrastructure, usable in the event of an accident, and for a time that can be limited to a few dozen minutes. Study the feasibility of installing video camera equipment at least on certain level crossings, allowing the recording of events during the passage of trains with the aim of improving safety.	SNCF Passengers	Action closed Consideration was already being given to installing front-facing cameras at the head of the train as part of the response to the technical investigation into the derailment of a TGV train in Eckwersheim on 14 November 2015. Two devices from different suppliers have been under test since the end of 2018. Twenty trains are equipped and undergoing testing, including 10 Transilien trains and 10 TGV trains, using the Cabin Video and Audio Recording System (SEVAC). The deployment schedule includes the completion of work on the technical components. The planned route will allow for the first equipment to be installed in 2023. SNCF Voyageurs was unable to provide EPSF with information on the progress of the implementation of this action in 2022.	ο

LC: Recommendations issued in 2019 - continued

LC: Recommendations issued in 2019 – continued

Report date	Title of the survey	N o.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
07/2019	Collision between a regional train and a car at LC N° 8 from Bonneville-sur- Touques (14) 11/02/2017	R1	Install, near level crossing no. 8, located on Chemin de la Libération in Bonneville-sur-Touques, a device prohibiting access to the level crossing to persons other than those entitled to it.	Municipality of Bonneville sur Touques	As of 12/31/2020, the solution initially envisaged to respond to this recommendation consisting of removing LC no. 8 with transfer to LC no. 7 was abandoned in favor of automating the two level crossings. No date has been set regarding the validation and scheduling process for this work. Despite the request of the commune of Bonneville sur Touques by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Action in progress	ο

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
	Collision between a TER and a light vehicle on LC No. 302 in Saint-Etienne (42) 05/07/2019	R1	Study improving the readability of LC No. 302 from the northern approach, particularly by acting on vertical signage and vegetation.	Saint-Etienne Metropolis	Despite the request from Saint-Etienne Métropole by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. The questioning in February 2023 by the DGITM did not provide any additional information regarding the implementation of actions. Current actions	0
05/2020		R2	Study the possibilities of reorganizing the allocation of lanes in the direction of traffic from north to south, or even of modifying the entry flows onto LC No. 302, for example by creating a right-turn lane. Examine the feasibility of assigning a right-turn signal for users traveling on the boulevard and approaching LC 302 from the north. This signal would remain red when the LC is closed.	Saint-Etienne Metropolis		0
		R3 Study th which c Remove signage	Study the removal of advertising elements present on road rights-of-way which could contribute to distracting road users approaching LC No. 302. Remove interference between directional signage and warning or police signage by retaining only the elements most essential for safety.	Saint-Etienne Metropolis		0

LC: Recommendations issued in 2020 – continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
10/2020	Pedestrian hit at station by a TER in Nouan-le-Fuzelier (41) 09/03/2018	R3	 a) Draw concrete conclusions from the risk study carried out on pedestrian safety at the LC b) implement an action plan accordingly to ensure that this risk is controlled. The BEA-TT invites SNCF Réseau to deal with the "Reserved" sections in its documentation dealing with guarded LC. 	SNCF NETWORK	 SNCF Réseau used the risk study covered by the recommendation to update the policy for controlling pedestrian risks at level crossings, described in a reference document dated October 28, 2020. In 2021, an action plan was presented and validated by the national LC commission. In 2022, a summary of the follow-up action was sent to the EPSF. This is structured around four areas of focus: creation of a LC deletion process improvement of the pedestrian approach route making the crossing of the LC more reliable to access the station development of a cooperation network 	С

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
	Collision between a train and a light vehicle on LC n°8 in Roissy-en-Brie (77) 09/15/2019	R1	E coordination with the departmental council of Seine-et- Marne (77) and SNCF Réseau Modify the traffic plan in the area and the geometric layout of the road intersection to make it impossible, on the one hand, for users arriving from Avenue Gounod to cross the LC and, on the other hand, for users who have crossed the LC to access Avenue Gounod.	Roissy-en-Brie Town Hall	In a June 2022 letter addressed to the BEA-TT, the town hall of Roissy-en-Brie confirmed the requested modifications. Action closed	С
03/2021		R2	In coordination with the departmental council of Seine-et- Marne (77) Improve the visibility of the position signaling triggered upon activation of the level crossing.	SNCF NETWORK	SNCF Réseau plans to add an R24 traffic light at level crossing No. 8, facing the axis of Avenue Mozart. This addition is scheduled for 2022. SNCF Réseau also plans to integrate level crossing No. 8 at Roissy- en-Brie into a series of level crossings where light barriers can be tested. The system could be implemented by the end of 2022, subject to approval by the Road Safety Directorate. Action in progress	0
		R3	Physically prevent parking on the roadways leading to the level crossing within 30 meters of arriving at this level crossing, in order to improve the visibility of the level crossing flashing lights.	Roissy-en-Brie Town Hall	In a letter dated June 2022, the town hall of Roissy-en-Brie informed the BEA-TT of the upcoming ban on parking on the roads leading to the level crossing. Despite the request to the town hall of Roissy-en-Brie by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Action in progress	0
		R4	Have large advertising panels located in the immediate vicinity of the LC on the RD 21 and causing visual distractions that are detrimental to the visibility and readability of the LC removed.	Roissy-en-Brie Town Hall	Despite the request to the town hall of Roissy-en-Brie by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Action in progress	0

LC: Recommendations issued in 2021 - continued

Report date	Title of the survey	N 0.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by EPSF at the end of 2021	Code
	Collision between a		Finalize, in accordance with the conclusions of the	City of Bourg-en-Bresse	This recommendation was taken into account by the Ain department after agreement with the town of Bourg-en-Bresse on the technical and financial arrangements. The creation of the central bordered island on the RD 979/avenue	
11/2021	TER and a light vehicle in Bourg-en-Bresse (01) 10/09/2020	R1	diagnosis carried out on October 18, 2018, the study of the possibility of installing a central bordered island on the Bourg - en - Bresse side of LC No. 7, in order to discourage users coming from the city center from crossing the LC in a chicane.	Ain Departmental Council	Amédée Mercier on the Bourg-en-Bresse side has been included in the 2022 works program for the town of Bourg-en-Bresse, with funding from the Department. Despite the request of the Ain Departmental Council by the DGITM in February 2023, no information on the progress of the implementation of this action could be obtained. Current actions	Ο
12/2021	Collision between a TER and a low-floor road train on LC No. 70 in Boulzicourt (08) 10/16/2019	R2	Study the feasibility of implementing, on board AGC trains, an energy-autonomous and automatic system which, following an impact, triggers and issues an alert to the traffic management operations centre (COGC) associated with the operating line, so that it can adapt the movements of surrounding trains.	SNCF TRAVELERS	A feasibility study led by the Passenger Safety Department and involving Material, Traction and SNCF Réseau was conducted through a study of the use of shock detectors from a smartphone. Furthermore, SNCF Voyageurs has modified the wiring to maintain the power supply to the radio drawer on the permanent 72V circuit in the event of an impact with damage to the coupling coupler, by integrating the associated risk of short circuit. Action closed	0

Annexe 3: Monitoring by EPSF since 2021 of the recommendations issued in the report on the fire that occurred on board a Eurotunnel freight shuttle on January 17, 2015

No.	Wording of the BEA-TT recommendation	Entity	Status of actions monitored by the CIG at the end of 2020	Code
R2	Continuous monitoring of improvements to fire detection systems Conclude the ongoing consultation with various manufacturers seeking innovative systems to more quickly and reliably detect any fire outbreak, including when it is still confined to the cabin of the vehicle concerned. Where appropriate, establish a program for implementing the new systems thus identified. Establish a sustainable technical monitoring system to detect any avenues for progress in terms of speed and reliability of fire detection.	Eurotunnel	The Safety Committee continues to question whether the approach adopted by Eurotunnel to identify innovative systems to detect fires more quickly and reliably has been sufficient and meets the objective of the recommendation.	0
R4	Improvement of the evolution management process Eurotunnel should review its change management process and implementation to understand the causes of the deficiencies identified during this study in the areas of hazard identification, risk assessment, provision of necessary mitigation measures and lessons learned. As part of this review, Eurotunnel should, in particular, examine whether its internal control system for safety studies is sufficient. Eurotunnel must improve its procedures to ensure appropriate identification of significant hazards, accurate assessment of operational risks and that necessary mitigation measures are correctly identified and implemented.	Eurotunnel	The IGC considers that Eurotunnel has met the intent of the recommendation, which can now be closed.	с

Annexe 4 : Table of the Technical Service for Ski Lifts and Guided Transport (STRMTG) presenting the monitoring of the implementation of the BEA-TT recommendations in the field of guided transport (Metro and RER)

Metro and RER: Recommendations issued in 2016

					current recommendation:	EC
					unknown sequel:	NC
Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision of two metro trains, 06/18/2013 in Toulouse (31)	R4	Develop, in conjunction with the operators of the VAL automatic metro networks and the STRMTG, an effective means of measuring the grip of the running tracks. Develop the corresponding operational instructions to trigger corrective actions when these running tracks no longer guarantee sufficient grip, including in adverse weather conditions.	Siemens	01/31/17	To move forward on this issue, the STRMTG has requested, via a recommendation, that operators propose the chosen organization for controlling the grip of VAL track surfaces. The feedback is currently being analyzed and will allow us to, a priori, not rely on a single solution, but to specify the objectives for maintaining the level of grip and to formalize the associated process. This measure could cover the objectives of R2 and R3 Return in progress of compilation as of 04/15/23, Analysis planned for 2023	EC

recommendation closed: C

Metro and RER: Recommendations issued in 2019

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Cod e
Dereilment	R1	Submit to the French standardization commission UC9XB "Railway electrical applications - On-board electromechanical equipment", which monitors the relevant European and international work, a request intended for the IEC/TC 9 committee "Railway electrical equipment and systems" of the International Electrotechnical Commission aimed at extending to self- induced vibrations the scope and requirements of the IEC 61373 standard, adopted in France as the NF EN 61373 standard.	BNF	02/28/20	BNF indicated in its response that it had fully implemented this recommendation. Thus, as part of an international consultation on the scope of a revision of the IEC 61373 standard decided in November 2018, the competent French standards committee, for which the BNF provides the secretariat, asked the IEC/TC 9 committee on June 13, 2019, to examine the possibility of including self-induced vibrations in the scope of the next edition of the international standard. This request explicitly referred to the aforementioned technical investigation report. A "MT 61373" working group has since been set up within the IEC/TC 9 committee to prepare for the scheduled revision. It was led by a French expert, and three other experts were appointed by the same French committee to participate in the work. The MT 61373 group met for the first time on December 19, 2019. It is now up to it to draft a revised standard and to examine in this context the French proposal, among other developments envisaged, before the draft it will have prepared is submitted for approval to the national members of the IEC/TC 9 committee. During this work, the BNF will continue to support initiatives aimed at ensuring that the request cited is properly taken into account. The publication of the new edition of the IEC 61373 standard was planned for October 2022, but this does not yet appear to have been done by early 2023.	EC
of a metro train running on line 2 of the Paris metro on 2/12/2016 at the Barbès- Rochechouart station in Paris (75)	R2	As with the use of air transport, study a change in regulations aimed in particular at making mandatory: ➤ the exchange of information between the owner, manufacturer, operator and maintainer of passenger rolling stock, or even the infrastructure manager, when one of them identifies a risk to safety from the rolling stock; ➤ the provision of a solution by the manufacturer.	DGIT M	09/26/19	The DGITM provided the following responses: We share the view that information sharing is an important tool for improving safety. However, care must be taken to ensure that its implementation results in proportionate feedback that makes it possible to identify elements useful for preventing incidents and accidents. Consultation work with representatives of all stakeholders in guided public transport systems will therefore have to be carried out in this regard, in order to examine the revision of the current system and to determine the nature and volume of the feedback to be put in place. Such an update may be considered during a future revision of decree no. 2017-440 of March 30, 2017 relating to the safety of guided public transport, in particular to take into account feedback on its application since its entry into force on April 1, ²⁰¹⁷ . At the same time, the issue of improving current procedures for exchanging information will be addressed during feedback meetings organized by the STRMTG. A drafting proposal has been made as part of the future update of the STPG decree. Pending consultation and validation.	EC
	R3	Improve the organization of verification and control campaigns for rolling stock components in order to guarantee their completeness.	RATP	07/18/19	The RATP provided the following responses: RATP has taken stock of this situation and is strengthening its control process to ensure its traceability and completeness. In order to definitively confirm the robustness of this process regardless of the configuration encountered, the RATP has tasked the railway safety correspondent of the Railway Rolling Stock department with ensuring the transversality of this process. RASE 2017 - Improving the reliability of fan maintenance operations – done	С

Metro and RER: Recommendations issued in 2020

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Code
Derailment of an RER B train on 06/12/2018 in Saint-Rémy-lès- Chevreuse (78)	R1	Finalize the study of hydrological and hydraulic risks relating to the network embankments and initiate an action plan to reduce situations presenting high risks.	RATP	03/23/20	The RATP provided the following responses: The target date for the study is June 2020. Detailed analysis of its findings and identification of follow-up actions will be conducted jointly by March 2020. (RASE 2020, RASE 2021) Two separate studies, entrusted respectively to the SETEC Hydratec design office and to the SNCF, were the subject of a detailed analysis by the RATP technical services. An initial study sought to address flood risk by taking into account the various associated hazards (rising water table, overflowing rivers, runoff at the scale of a watershed). This study, [] made it possible to propose a site vulnerability rating integrated into the RATP GIS A more detailed study was carried out in parallel with SNCF-Réseau to develop an analysis of the risks linked to the water problem on the RER, Orlyval and T2 (surface network) lines. This study, finalized in May 2021, did not identify any areas presenting high risks but highlighted some areas requiring monitoring and interventions in the medium term: - No site presents an unacceptable security risk, - 19 "sensitive" sites present a tolerable risk (17 on the RER A and 2 on Orlyval). - The site of the Courcelle-sur-Yvette incident has been added to these sites, taking into account the accident that occurred in 2018. The 19 sensitive sites highlighted by the SNCF study, as well as the Courcelle-sur-Yvette accident site, have also been subject to a specific monitoring procedure since 2021, with detailed checkpoints and reinforced annual inspections. This monitoring is operational. A study on slope stability was carried out by RATP I engineering for the MI20 project. The most sensitive sites were identified based on geometric criteria and incident history. These seven sites are undergoing a detailed analysis with a decision to instrument them for monitoring. As part of the MI020's arrival, the seven slopes have already been instrumented with inclinometers. Automation for the inclinometers is currently being purchased to enable monitoring from July 2023	С

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Code
Derailment of an RER B train on 06/12/2018 in Saint-Rémy-lès- Chevreuse (78)	R2	Define the preventive interventions to be carried out in terms of infrastructure visits and their triggering criteria in relation to Météo- France alert messages, in particular with regard to sectors identified as being at risk following recommendation R1 and not yet addressed.	RATP	03/23/20	The RATP provided the following responses: The RATP infrastructure manager already carries out scheduled monitoring of the engineering and earthworks structures on its network at a frequency adapted to the condition of each structure. In addition, the RATP is now subscribed to the SIAHVY flood warning system and has implemented a procedure for processing these alerts to strengthen its monitoring of the Yvette watershed and supplement the vigilance/alert messages from MétéoFrance. Depending on the vulnerabilities identified and mentioned above, risk reduction avenues adapted to the different cases encountered (implementation of enhanced monitoring or maintenance, upgrading work, etc.) will be studied and then implemented. RASE 2021: The monitoring of earthworks carried out by the Visits and Inspections Group (VI) of RATP Infrastructures consists of five-yearly Detailed Inspections carried out on site by specialized inspectors. During these inspections, the disorders noted on the structure are the subject of a Report and a list of disorders. Each structure is assigned a health rating reflecting its structural condition. Intermediate periodic visits complete this monitoring. These traditional monitoring methods are supplemented by satellite radar interferometry monitoring in place to obtain time series of vertical displacements along our structures. Although no site has been assessed as having an unacceptable level of risk for the safety parameter, 19 sites identified as being at risk are now integrated into a cautious walking-by-sight procedure triggered in connection with Météo- France alerts. In addition, an alert procedure has been put in place for the 19 sensitive RER and Orlyval sites as well as that of Courcelle-sur-Yvette with the operator since 2021 in the event of a weather alert concerning heavy rain events. This involves vigilance throughout the event and cautious post-event operation (passage of the first train in the event of a night-time event).	С

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Cod
	R1	Encourage metro project leaders, and through them rolling stock manufacturers and track component suppliers, to address in the preliminary hazard analysis the risk of loss of a component likely to cause a derailment and to include the identification of potentially affected components and appropriate design and maintenance measures. Ensure that this risk has been given particular attention when preparing regulatory files for new metro projects. In particular, request the provision of a study of the static and dynamic interfaces between the track and the negative or mass collectors for any new rolling stock and/or new rubber-tired metro track equipment.	STRMTG	12/21/20	- Development of the documentation of its quality system to include a vigilance point for the instruction of security files, in order to raise awareness among project leaders (metro) and verify that the problem of loss of objects under the cash register has been taken into account. Meetings on the investigation procedures initiated April 2023	EC
Derailment of a metro train on 12/21/2018 in Marseille (13)	R2	Identify all components of the Marseille metro rolling stock that could present a risk of derailment following the fall of these components onto the track and address the risk.	RTM	03/12/20	RTM indicated that it has implemented or is planning the following actions: An identification of components lost on the track has been carried out. Inspections have been strengthened accordingly. In addition, work is underway on the risk management process in the event of actual loss on the line. This recommendation is also being applied to the Marseille metro rolling stock renewal project. In addition, the STRMTG established a recommendation dated 05/10/2022 asking metro operators to formalize the monitoring of loss of objects under cash registers on the metro and RER networks (excluding RFN)	С
	R3	Agree and finalize track and rolling stock maintenance procedures to satisfactorily address risks related to the interface between the track and the negative or ground contacts of the rolling stock.	RTM / Vossloh	03/12/20	Recommendations transmitted by Vossloh Increased surveillance	EC

Metro and RER: Recommendations issued in 2022

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Code
Derailment	R1	Formalize in the maintenance reference documents: monitoring of the appearance of bulges and the criteria for admissible dimensions on the wheels of the bogies of the trains on RER line B; as well as the corrective operations to be carried out as soon as the dimensions of the bulges exceed the criteria.	RATP	11/01/23	 RATP announced that it has implemented the following actions: Four major actions were carried out following the derailment: 1. All operators responsible for wheel inspection were immediately re-sensitized to this specific defect and its detection method. 2. A specific module for processing data measured by laser tools has also been developed with the supplier of the latter to characterize the beads. This tool has been used systematically since October 20, 2021 on all wheels of the Line B equipment. 3. The control step has been reduced by more than 40%. This convergence of measurements allows for faster correction in the event of a fault appearing. 4. Finally, the beads, designated as "flange defects" in the EN 15-313 standard, are not subject to dimensional criteria. Following the derailment, the RATP defined an intervention threshold for inspection at which the wheel must be reprofiled. This threshold was set at 8 mm. For information, this tolerance is lower than the 1.5 mm threshold defined by British regulations1 	с
of an RER B train on 06/24/2020 near Denfert- Rochereau station (75)	R2	Review the principles of monitoring and maintenance of track devices whose geometry is similar (geometric criteria to be defined) to that of AdV No. 4621, in particular wear benchmarks, grinding practices and criteria for replacing points.	RATP	11/01/23	RATP provided the following analysis: On all the main tracks of lines A and B of the RATP RER, 1° diversion devices with a tip radius of less than 500m are defined as similar to the geometric configuration of track device 4621. These criteria were defined by extending the case of track device 4621 on which the derailment occurred, which has a tip radius of 150m. On secondary or workshop tracks, track devices meeting these same two criteria (deviation 1° and radius at the tip less than 500m) and which could have an impact on the operation of the main tracks will also be selected. The developments envisaged on these track devices are to adapt the maintenance step including the control of half-switch wear. Changes to the maintenance plan for these track devices will be effective no later than the end of March 2023. As stated in the technical investigation report, RATP points out that the current criteria of the RATP maintenance reference system, regarding grinding and replacement of points, are already more demanding than those recommended by ORE2. As a result, RATP does not plan to update the wear reference systems and the associated grinding practices on these points of reference.	с

Annexe 5 : Table of the Technical Service for Ski Lifts and Guided Transport (STRMTG) presenting the monitoring of the implementation of the BEA-TT recommendations in the field of guided transport (trams and tram-trains)

Trams and tram-trains: Recommendations issued in 2017

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision between a tram and a car on 12/21/2013 in Saint-Denis (93)	R2	Review the internal process for feedback on accidents occurring on the tram lines in operation, in order to improve the collection of information, analyses at different levels, and the definition and monitoring of corrective measures.	RATP	09/15/2017	In its response, the RATP stated that it had implemented or planned to implement numerous actions.	С
Derailment and dislocation of a train on line T1 of the Valenciennes tramway on 04/11/2014	R1	Strengthen operational safety at the PCC by writing operating instructions clearly defining the safety organization of traffic for nominal mode and for degraded mode (disturbances).	Transvilles	07/28/17	Transvilles provided the following elements in its response: The operator issued a memo reminding drivers of the operating procedures for degraded modes in the event of a technical zone malfunction and a track device discrepancy. A 10 km/h speed restriction has been in effect on this section since the accident. Measures have been consolidated to remove this speed restriction. Working groups have been formed to work on the driving, technical regulation, and instruction booklets. This work is expected to be completed by the end of 2017. A continuing training reminder was carried out, in particular on the collation of safety messages. - Transvilles drafting of operating procedures for degraded mode in the event of a technical zone malfunction or ADV discrepancy Work to enable the payment of ZT 16/23 and 15/24 from the PCC – completed in July 2016 - RATP Dev: integration into the initial training of regulators, drafting of booklets and reflex sheets for regulators and drivers	с
	R2	Describe the organization of the circulation of maintenance equipment outside the framework of a PCC-ordered circulation, as well as the measures to be taken to return to the nominal situation.	Transvilles	07/28/17	Transvilles provided the following elements in its response: A political decision was taken immediately after the incident to have no maintenance equipment present on the network in commercial operation. Service memos have been written to provide instructions on the exit of maintenance equipment in degraded mode on the network and on the verification of network compliance at the PCC level during exits with maintenance equipment. Other continuous improvement actions have also been taken.	С

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collicion	R1	Study the feasibility of synchronizing the traffic lights at intersections 38 and 39, requiring, when the traffic lights at intersection 38 turn red, the lights at intersection 39 intended for traffic flows heading towards intersection 38 turn red or remain red.	ADP		RASE RATP 2021: Response from the CD94 on 12/14/2020: The CD 94 has taken charge of the recommendation. It has not identified any major obstacles to its implementation and is finalizing the study by the end of 2020. Oct 2021: These two intersections are numbered 3716 (tramway intersection 38) and 3717 (non-tramway intersection 39) by the CD94. The modification was carried out on intersection 3717 on Monday, March 29, 2021. The technical file is attached to this email: 3717_MOD_290321.pdf ADP response on 12/16/2020: The management of the machines is not the responsibility of ADP, however we have contacted the CD94 on the subject. The feasibility study does not seem to pose a problem for the team in charge of this action at CD94 within the framework of Parcival which manages the road traffic machines.	С
Collision between a T7 tram and a coach February 27, 2019 in Paray-Vieille-Poste (91)	R2	Re-examine the clearance times of the safety matrix for intersection no. 38 based on more representative road vehicle speed assumptions and taking into account the presence of long vehicles, and modify if necessary the times entered in the current matrix.	ADP		Response from CD94 on 12/14/2020: The operation and maintenance of the dynamic equipment at all T7 traffic light intersections (except the last two intersections located south of Orly airport) being the responsibility of CD94, recommendations R1, R2 and R3 have been taken into consideration by CD94. ADP response on 12/16/2020: Same response as for R1. CD94 informed us at the T7 managers meeting in November 2020 and by email that they would be able to submit their study results by the end of March 2021. The list of affected intersections was validated at the management committee meeting on 11/12/2020. The requested verifications were carried out in the field during March 2021. No irregularities in clearance times were observed. The minimum time elapsed between the closing of the third-party traffic light and the arrival of the tram at the intersection was measured (over several measurements) in order to compare them with the clearance times entered in the matrix. It was noted that the margin taken in relation to clearance times is quite significant. ADP response on 10/19/2022: Closed for the part that concerns them	С

recommendation closed: C

current recommendation: EC

Collision between a tram on line T7 and a coach February 27, 2019 in Paray-Vieille-Poste (91)	R3	For each of the intersections on line T7 at which the maximum authorized speed for road vehicles is 30 km/h or less, or at which road traffic includes a significant number of long vehicles, have the entity that owns the traffic light controller carry out a check on the relevance of the clearance times entered in the safety matrix, taking into account these specific features.	IDFM & RATP	08/19/20	The RATP indicated that it had sent the recommendation to each of the T7 road managers by mail in order to carry out the recommended check. It also provides the following elements: For each tram line, Île-de-France Mobilités has established management committees, which meet biannually with the operator and managers of the relevant roadways. These committees are intended, in particular, to address cross-cutting safety issues on the line in a coordinated manner. Your recommendation was addressed during the T7 line committee meetings. And for each of these intersections, the time elapsed between the traffic lights turning red and the arrival of the tramway was measured several times during a verification campaign in March 2021. No irregularities were observed compared to the minimum clearance times entered in the intersection controllers' "safety matrices." The margin observed compared to these minimum clearance times is quite significant, and allows for the passage of heavy goods vehicles or long vehicles.	С
	R4	Encourage their members to provide drivers of public transport vehicles powered by compressed natural gas with training on the specific risks associated with this type of engine, and on the behavior to adopt in the event of an incident or accident on the road.	UTP & GART	07/16/20	The UTP indicated that it had taken note of the BEA-TT recommendation and wanted to raise awareness among its members.	EC

Trams and tram-trains: Recommendations issued in 2020 - continued

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Pedestrian hit by tram Chartrons quay in Bordeaux (33) 02/22/2019	R1	Extend, to isolated pedestrian crossings without traffic lights, the rule limiting the speed of trams to 25 km/h when there is a pedestrian nearby, in the presence of a fixed mask or a temporarily parked vehicle limiting visibility. Conduct awareness-raising and driver monitoring activities on the implementation of such an instruction.	Keolis Bordeaux Metropole	07/12/2020	 KBM clarified the following in its response: visibility masks: the advertising panels identified in the investigation report have been removed. on the current network, a general check will be carried out (1st ^{quarter} 2021). If a mask of visibility is detected, the speed will be reduced while a lasting solution is found, if necessary, with Bordeaux Métropole. KBM expresses the identified black spots during exchange meetings with Bordeaux Métropole. The requested actions are outlined in the single action plan, sent annually to STRMTG. As of the date of this letter, no fixed mask has been identified by KBM. The 25 km/h speed limit has been in effect since 01/01/2021 for all isolated pedestrian crossings. This instruction is included in the annual driver refresher training program. 	С
	R2	Establish, in coordination with the General Directorate of Transport and Maritime Infrastructure (DGITM) and the profession, an instruction standardizing the fixed horizontal and/or vertical signage of pedestrian crossings on tramway sites, informing users of the danger and notifying them that they do not have priority.	DSR	12/23/2020	GT launched in December 2020 (10 meetings held, next meeting 04/21/2023). Study concerning the signaling of pedestrian crossings on tramway platforms launched by STRMTG/CEREMA (cch validated by DSR by email dated 03/11/2020) Experiments and observations underway in 4 urban areas	EC

Trams and tram-trains: Recommendations issued in 2021

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision by catching up between two trams February 11, 2019 in Issy-les-Moulineaux (92)	R1	Make improvements to operating instructions related to the following topics: - Confirm night-time entries to the SMR via the East access during the critical end-of-rush hour period. - Align the 200-meter distance between trams with the visibility available between the Jacques-Henri Lartigue and Les Moulineaux stations. The analysis could usefully be extended to the entire RATP tram network. - Specify the actions to be taken by the regulators in the event of a lack of collation, and consider potential failure cases including those of the RST and the HMI.	RATP	12/05/21	The RATP indicated the following elements in its response: - the new organization was ratified with the new schedule implemented from 01/10/2020 on T2. - RATP is studying the adequacy of speeds in relation to visibility distance and static masks, and is verifying the relevance of speed indication signs. The definition and implementation of possible corrective actions is planned for the end of 2021. The analysis will be extended to the other lines of the RATP tramway network by the end of 2021. - an update of the regulations was carried out in November 2020 to clarify the rules for collating messages related to safety and traffic management. In the event of a potential failure, including that of the RST or the HMI, any anomaly must be transmitted to the regulator by other means of communication available to the driver.	EC
	R3	Develop and deepen organizational and human factors in accident analyses, particularly on topics such as attention disturbance and attention competition, and translate them into corrective actions. During initial driver training, supplemented by regular communication campaigns, include awareness-raising actions regarding possible lapses in attention while driving.	RATP	12/05/21	The RATP indicated the following elements in its response: Numerous FOH actions have been undertaken by the RATP. An application dedicated to maintaining Tramway knowledge is to be deployed in May 2021 for drivers and will complement continuing training. This system is part of a logic of continuous improvement concerning the maintenance of knowledge and skills in tram mode. Awareness of organizational and human factors (OHF) in management since 2017. Creation of a "FOH fundamentals" module for initial and continuing driver training since 2020. Deployment of a tramway knowledge maintenance application for drivers deployed in May 2021	С
	R4	Implement actions to assess and then improve the reliability of the ground-train radio, and ensure that of the HMI, given that these are the means of rapid alert transmission by the PCL to T2 drivers.	RATP	12/05/21	The RATP indicated the following elements in its response: The reliability of the ground-train radio is monitored as part of equipment maintenance. A quarterly report allows for verification of the level of reports and removals, and for triggering actions in the event of deviation. The reliability of the HMI is also monitored as part of equipment maintenance. No downtime has been observed on this equipment. The SAE On-Board Post project, which will soon be deployed on the T2 line equipment, will improve communication between PCL and the train via the screen installed in the cabin. Developments to the on-board operating assistance system (SAE) to improve communication between the PCL and drivers: Short-term deployment on line T2, and as part of the new SAE on T1 in 2026	EC
Trams and tram-trains: Recommendations issued in 2022

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Line T4 tram train derailed on 11/8/2020 in Clichy- sous-Bois (93)	R1	Study all the risks (and their coverage) linked to the use of the direction selector of tram-trains in a driving situation and re-examine the relevance of the current professional action of stopping in front of a route signal.	SNCF Passengers	04/29/22	SNCF provided the following responses in its letter announcing the recommendation's implementation: Two risks have been identified inherent to the direction of travel selector on line T4: - the risk of drift, - the risk of starting to move on a closed signal. The professional action of stopping in front of a closed route sign by positioning the direction selector to "0" constitutes a procedural safety barrier to prevent crossing a closed route sign. The REX figures support this. In addition, as soon as the internal investigation into the causes of this event was concluded, the line operator requested a study on the Dualis so that, regardless of the position of the direction selector, there could be a technical anti-drift system. A modification was proposed: the modification work on the trains was studied and validated by the equipment engineering center. An explanatory note for this project was sent to the STRMTG. Analysis carried out by SNCF Voyageurs; confirmed relevance of the business action to limit the risk of crossing closed IS (positive REX). To cover the risk, modification of the Dualis traction software (for T4 and T11) allowing the detection of drift with the direction of travel at 0: intention file submitted, opinion given by the prefect on 06/17/22. Conclusive tests carried out in August 2022. Deployment finalized at the end of 2022.	с
	R2	Identify all the driving actions carried out on the Dualis on the T4 line and verify the impacts in terms of safety risks.	SNCF Passengers	04/29/22	SNCF provided the following responses in its letter announcing its consideration of the recommendation: The inventory of professional gestures was carried out with the help of the Traction business driving expertise center. A risk analysis of each professional gesture, placed in the context of Dualis equipment and the T4 line, led to the following conclusions: - it is essential to place the manipulator in the maximum braking position to perform a stop only the stop in front of a closed IS is to be completed by positioning the direction of travel selector at "0". The driving manual will be amended Analysis carried out internally by SNCF: modification of the Dualis driving manual to include the maximum braking instruction for any train immobilization \rightarrow point closed	С
	R3	Clarify the information provided during initial and ongoing training for learning how to behave when stopping at a Route Signal. Clarify the language used for this professional action as well as the associated instructions in the various operating documents.	SNCF Passengers (ETTPE)	04/29/22	SNCF provided the following responses in its letter announcing its consideration of the recommendation: The specifications for initial training courses have been rewritten, ensuring the use of the exact terms appropriate to the actions they describe. A validation point on this topic has been added. A continuing education day was created to update the knowledge of drivers trained using the old training method. All operators were retrained for continuing education on the job.	С

Trams and tram-trains: Recommendations issued in 2022 - continued

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
	R4	Provide more in-depth training to tram-train drivers in emergency procedures, including emergency braking using the joystick and pushbutton on the control panel. Improve training in active management of a drift.	SNCF Passengers	04/29/22	SNCF provided the following responses in its letter announcing its consideration of the recommendation: The agents in initial driving training for line T4 were all able to benefit from an emergency situation using the driving simulator, with the main objective of triggering emergency braking using the brake lever and the emergency push button. For the rest of the group, an exercise involving the driver activating the emergency brake using the brake lever and the emergency push button was carried out in the first ^{quarter} of 2021. In addition, during the 2022 continuing education day, agents will be trained in handling rare and emergency situations with practice of emergency braking via brake manipulator and push button. All drivers were brought online to perform the various manipulations. These manipulations were also included in the simulator, in the specifications, and in the driver validation phase.	С
Line T4 tram train derailed on 11/8/2020 in Clichy- sous-Bois (93)	R5	Identify possibilities for authorising video recording by front cameras on trams and tram- trains in order to have a recording of events on the infrastructure, usable only for a short period before and after an accident, for the exclusive purposes of judicial investigations and, with the aim of improving safety, technical accident investigations.	Directorate of Public Liberties and Legal Affairs of the Ministry of the Interior DGITM	04/05/2022 And 11/12/2022	DLPAJ: Law No. 2022-52 of January 24, 2022 relating to criminal liability and internal security, in its article 61, authorizes on an experimental basis public rail passenger transport operators to implement the capture, transmission and recording of images taken on public roads and in places open to the public, by means of front cameras on board the rolling stock they operate. No plans to extend these recent legislative provisions to buses and tram-trains are therefore envisaged at this stage. DGITM: Pursuant to Article 61 of Law No. 2021-646, known as the "global security" law, a draft decree relating to the testing of on-board front cameras is currently being finalized. Various state bodies have issued or will issue statements on this project. The DGITM is awaiting all of this feedback before transmitting to the BEA-TT the follow-up given to recommendation R5. DGITM 11/12/2022 Article 61 of Law No. 2021-646 of May 25, 2021 for global security preserving freedoms authorizes, on an experimental basis, public rail passenger transport operators () to implement the capture, transmission and recording of images taken on public roads and in places open to the public, using front cameras on board the rolling stock they operate. > for a period of three years from the publication of the law. This same article refers to a decree in the Council of State, taken after consulting the National Commission for Information Technology and Civil Liberties (CNIL). The draft decree has just been examined by the Council of State, which did not fail to point out that trams are excluded from the experiment. Thus, while the use of such cameras may appear promising for improving security, the reservations that justified the reduction of the scope at the time of the Senate's examination, namely an excessively high risk of recording considerable volumes of images of private places or building entrances, cannot be ignored. The draft decree is expected to be published soon. Decree No. 2022-1672 of December 27, 2022, taken in application	С

Trams and tram-trains: Recommendations issued in 2022 - continued

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
	R1	Improve initial and ongoing training and regular monitoring of Montpellier tram drivers on the following subjects: - knowledge and practice of the safety brake by drivers - the proper use of magnetic pads - the risks of excessive speed - the need to receive and take into account messages from the PCC in anticipation of obstacles that may arise in front of any Tramway driver.	ТАМ	01/07/22	TAM indicated that it plans the following actions in its letter announcing the recommendation Distribution of a safety note to tram drivers, reminding them of the rules for using the different types of braking (September 2022). Planned "quarter hour safety" for drivers on braking and the use of brake pads (2nd half of 2022). Integration of the subject through a specific module during the accreditation and updating of knowledge (annual), support produced in AMI 2022 (next sessions). Specific integration of feedback on the December 2019 catch-up into educational content.	EC
Collision by catching up two trams on 2/12/2019 in Montpellier (34)	R2	Confirm in the maintenance documentation the frequency of rail cleaning with reinforcement in the autumn and winter periods as now planned. In addition, track cleaning interventions carried out on demand.	ТАМ	01/07/22	 TAM provided the following response elements in its letter announcing the consideration of the recommendation: A "leaf plan" already exists at TAM; it will be supplemented by a procedure specifying the method of traceability of one-off intervention requests and their implementation. TAM has initiated a process of acquiring a second vehicle to increase the frequency of service, particularly during the fall and winter periods. The maintenance plan will be updated with cleaning procedures and frequencies. Seen in audit of 03/16/2023, the report of which was finalized in April 2023. 	С
	R3	Adapt the maintenance processes of the flange lubrication system, and implement the modification of this system, in order to avoid the presence of grease on the rolling table and the formation of grease agglomerates on the tram bogies.	ТАМ	01/07/22	TAM indicated that it had carried out or planned the following actions in its letter announcing the consideration of the recommendation: An exceptional campaign was carried out at the end of 2021 to recalibrate all the grease ejectors. Cleaning and resetting the ejectors are included in the permanent visits of the maintenance plan (15,000 km for the Citadis 401 and 302 and 25,000 km for the 402). A new system (Bijour de Limon) equips 10 Citadis 401 trains and 10 others will be equipped in the second half of 2022. Seen in audit of 03/16/2023, the report of which was finalized in April 2023.	С

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision by catching up two trams on 2/12/2019 in Montpellier	R4	Finalize the validation process for changes to safety maintenance steps initiated with the STRMTG control service.	ТАМ	01/07/22	TAM indicated that it plans to take the following action in its letter announcing the recommendation: The safety demonstration process for the relaxation of maintenance steps on the Citadis 401 is relaunched by TAM, based on technical expertise and feedback and by associating the STRMTG. Seen in audit of 03/16/2023, the report of which was finalized in April 2023.	С
	R5	Continue to improve the traceability of preventive and corrective maintenance of rolling stock, particularly concerning daily tests of emergency braking and safety brakes, maintenance of sand pits and actions carried out on flange lubricators.	ТАМ	01/07/22	TAM indicated that it plans to take the following action in its letter announcing the recommendation: TAM will continue to improve the traceability of tests, maintenance of sand pits, and lubricators, with a process overhaul (2nd half of 2022). A dual perspective will be provided by management and during internal audits. Seen in audit of 03/16/2023, the report of which was finalized in April 2023.	С
(34)	R6	Carry out an audit on the maintenance of the 401 trains and on the maintenance of the rail network of the Montpellier network, following the improvement actions carried out by TaM following the accident of December 2, 2019.	STRMTG	06/27/22	This audit is scheduled for March 16, 2023, in order to monitor the improvement actions implemented by the TAM following the accident and in particular those in response to recommendations R1 to R5. Audit carried out on 03/16/2023, the report of which was finalized in April 2023.	С
	R7	As part of a new market for the acquisition of tramway rolling stock, define the level of safety associated with the anti-skid function and define the braking performance objectives in degraded grip, drawing inspiration from current best practice.	Alstom	09/30/22	Process in progress, meeting scheduled between Alstom and STRMTG on 04/27/2023	EC

Annexe 6 : Table of the Technical Service for Ski Lifts and Guided Transport (STRMTG) presenting the monitoring of the implementation of the BEA-TT recommendations in the field of guided transport (secondary, tourist and rack railways)

Secondary, tourist and rack railways: Recommendations issued in 2021

recommendation closed: C

current recommendation: EC

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Title of the survey	No	Wording of the recommendation	Entity	Response date	Follow-up and progress	Cod e
	R1	Identify, study and implement appropriate control methods to ensure compliance with the ban on smartphone use in positions identified as safety-related, including driving the Montenvers rack railway.	Mont Blanc Company (CMB)	04/27/21	The CMB indicated the following in its response: In order to strengthen its means of control to ensure compliance with the ban on the use of mobile phones at security posts, which is an obligation of its internal regulations, the CMB has put in place: - regular unannounced checks, - cameras at crossing points, - regular reminders to managers, - "mystery" checks carried out by an independent firm.	С
Derailment of a Montenvers rack railway on 08/11/2019 in Chamonix (74)	R2	Increase awareness among officers of the dangers associated with distracted driving.	Mont Blanc Company (CMB)	04/27/21	The CMB indicated the following in its response: Raising awareness and training officers on the dangers of distraction is a key element of the action plan implemented following the derailment of 08/11/19. The CMB is deploying: - annual integration sessions which have included a module on this aspect since autumn 2019. - awareness sessions with a specialist firm, scheduled for 2020, 2021 and 2022, in order to reach all personnel in security positions. - an annual evacuation exercise which, in its shared course and debriefing according to the chosen scenario, makes it possible to raise awareness among officers of all the risks they may face, including those linked to distracted driving.	С
	R3	Study, in relation to the profession, a national regulatory provision on the prohibition of the use of smartphones during a mission of driving a guided vehicle or a ski lift device, similar to that of the Highway Code or other international legislation.	DGITM	07/23/21	The decree of February 20, 2023 relating to the restriction of the use of mobile devices for certain personnel of guided public transport systems and ski lifts covered by the tourism code constitutes the DGITM's response to recommendation R3.	С

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Cod e
	R1	In driver training, emphasize the specific risks of this line (steep slopes, lubrication issues, weather conditions, etc.) and reinforce this in the educational response. Strengthen driving reflexes, adapted to these risks, particularly driving gestures in the event of a brake jam.	SNCF Passenger s	03/14/23	SNCF Voyageurs provided the following responses: The educational response has been adapted and highlights the different risks on this line. Training for drivers operating on this line has already begun with these new elements. The completion of training for drivers is carried out during support provided by the management line. However, this verification could only be carried out through questioning in almost all cases, since there have been very few situations exposing the risk of a breakdown since the new training courses.	EC
Train derailment on 01/25/2021 in Fontpédrouse (66) on the line connecting Villefranche – Vernet- les-Bains to Latour-de- Carol	R2	On the Z150s, study lowering the threshold for automatic emergency braking (currently 80 km/h) by adapting it to the maximum authorized speeds of the line. Request for the rolling stock that will replace the Z150s on the Yellow Train in the future, a speed limit threshold triggering emergency braking at the maximum authorized speeds of the line.	SNCF Passenger s	03/14/23	SNCF Voyageurs provided the following responses: Technically, lowering the speed threshold on Z150 equipment is feasible. The feasibility study was therefore forwarded to a competent company. The company provided an initial response, which was not accepted, and the process for this service is still ongoing. We [the BEA-TT] remain at your disposal if you would like to consult the documents. Furthermore, the specifications for future equipment have been amended to take into account the recommendation on lowering the speed limit threshold.	EC
	R3	Continue the improvement of the rail lubrication system using the Z100s, by completing the installation of the flange lubricators.	SNCF Passenger s	03/14/23	 SNCF Voyageurs provided the following responses: Initially, a study was initiated with a view to modifying the current lubrication system (GRR type) into a GRB system coupled with the 3rd rail system. The various tests on the Z104 have demonstrated that this solution was not reliable and consequently the Material Engineering Centre (CIM) has proposed two possible alternatives. Solution 1: Lubrication of the wheel-rail contact with the stick-type system and 3rd rail lubrication with the current modified system (removal of the GRR part) Solution 2: Implementation of a complete GRB system that would operate independently of the 3rd rail lubrication system (current system modified). The technical and economic study carried out by the CIM reveals that solution no. 2 would be the most relevant for this type of equipment. The file is being finalized in order to be able to present the draft modification (OM) to the DGTER and the BU TER Occitanie by July. The outcome of the decision will be forwarded to the Passenger Security Department along with the schedule of changes, if applicable. 	EC

Secondary, tourist and rack railways: Recommendations issued in 2022 - continued

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Cod e
Train derailment on 01/25/2021 in Fontpédrouse (66) on the line connecting Villefranche – Vernet- les-Bains to Latour-de- Carol	R4	Improve the quality of implementation of existing devices for monitoring the condition of rail lubrication on the line connecting Villefranche – Vernet-les-Bains to Latour-de- Carol and adapt them if necessary. - Identify which monitoring tour must check the rail lubrication condition. - Improve detection of excess lubrication during tours. - Improve the traceability of tour monitoring in order to analyze the evolution of lubrication by rolling stock. - Decide on the application of 4-week monitoring, in light of the basic frequency given by the maintenance reference for 1-meter gauge tracks.	SNCF Network	03/16/23	SNCF Réseau provided the following responses: The rewriting of the MT02070 standard "Monitoring of rails laid on main tracks" will redefine and update the lubrication qualification criteria; the notion of acceptable will be removed because it is subject to confusion between what is close to "excessive lubrication" and what is close to "insufficient lubrication". The method of assessing the presence of grease on the rolling fillet using the handkerchief method will be specified. The application of I'IN03818 "Maintenance of 1 meter gauge tracks" states in its article 5.2.8 a frequency of 4 weeks for monitoring the lubrication control points. On the line connecting Villefranche - Vernet-les-Bains to Latour-de-Carol, the maintenance references of the Infrapôle Languedoc INFP LR MT00181 and INFP LR MT000ó based on these two national references will be modified accordingly.	EC
	R5	On the line connecting Villefranche – Vernet-les-Bains to Latour-de-Carol, conduct a study on the transposition of existing rail cleaning rules on the National Rail Network, whether in preventive or corrective maintenance in order to improve cleaning.	SNCF Network	03/16/23	SNCF Réseau provided the following responses: SNCF Réseau is initiating a feasibility study aimed at implementing a mechanized grease cleaning system adaptable to metric gauge.	EC

Secondary, tourist and rack railways: Recommendations issued in 2022 - continued

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Cod e
Train derailment on 01/25/2021 in Fontpédrouse (66) on the line connecting Villefranche – Vernet- les-Bains to Latour-de- Carol	R6	On the line connecting Villefranche – Vernet-les-Bains to Latour-de-Carol, improve the process of reporting and handling blockages, and in particular: - Systematize the reporting of information by drivers to line managers in the event of jamming or slippage, who in turn transmit it to the infrastructure and rolling stock maintainers. - Ensure that the definition of "significant" jams is correctly understood by drivers and line managers and improve their handling. Specify what actions are expected of maintainers once informed. - Strengthen communication between the various operating, track maintenance and rolling stock maintenance entities. - Ensure that these new measures are taken into account in a reliable and auditable manner.	SNCF Network and SNCF Passengers	03/16/23	 SNCF Réseau provided the following responses: The weekly teleconference between the operating, track maintenance and rolling stock maintenance entities of the line connecting Villefranche-Vernet-les-Bains to Latour-de-Carol will systematically include a lubrication and major brake issues section in its agenda. A decision report will be systematically produced at the end of these teleconferences to track the actions decided. This will strengthen communication between these entities in a reliable and auditable manner and specify maintenance measures where appropriate. A joint safety day will be offered to the various entities involved in the line to remind people, among other things, of the concepts of rail lubrication and major jamming. For SNCF Réseau, a support process for the new lubrication quotes included in the future version of MT02070 will be provided by Infrapôle. SNCF Voyageurs provided the following responses: The concept of significant blocking is integrated into the educational response in line with recommendation number 1. Several avenues of reflection are underway in order to respond to these 3 points in a synthetic format and allowing for the best traceability. They are based on a benchmark carried out with different units. For example, a form called "DEDA" for lack of adhesion which could help drivers and be forwarded to the line manager. The decision on the arrangements to be implemented will be made by July 2023. 	EC

Annexe 7 : Table of the Technical Service for Ski Lifts and Guided Transport (STRMTG) presenting the monitoring of the implementation of the BEA-TT recommendations in the ski lift field

Ski lifts: Recommendations issued in 2017

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Fall of an empty seat on the Granges chairlift on April 4, 2016 in Les Ménuires	R3	Establish, in conjunction with the manufacturer Leitner, a training course on the operation, adjustments and checks of the chairlift bubble actuation devices. Make participation in this course a necessary condition for any agent to be assigned to the maintenance of these devices. Organize hierarchical control to periodically ensure that the maintenance procedures provided by the manufacturer and the specific instructions decided by the operator are correctly applied.	SEVABEL	02/10/2017	The SEVABEL letter of 2/10/2017 announced the implementation of training before the 2017/2018 season. This training was conducted with the manufacturer and replicated on other aircraft from other manufacturers. SEVABEL has established a 5-year refresher cycle for these training courses. SEVABEL also announced that it is implementing a system to monitor the proper application of maintenance procedures by sector managers at the start and end of vehicle maintenance. Finally, LEITNER has established the notice ST 881 028 30 4 ind B relating to the use and maintenance of the SA4H-SA6H-CD6H bubble operating devices	С

Ski lifts: Recommendations issued in 2018

recommendation closed: C

current recommendation: EC

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Immobilization and late evacuation of the "Panoramique Mont Blanc" cable car on September 8, 2016 in Chamonix	R1	Formalize the lessons learned from the analyses and tests on the dynamic behavior of the Panoramic Mont-Blanc in an "instruction" type document for use by future stakeholders in the operation, describing: - the settings chosen for the installation must be the subject of sustained attention with regard to their modifications or their drifts - the envelope of dynamic effects at risk with description of the load configurations which produce them; - periodic dynamic tests to be carried out in order to guarantee the stability of behavior over time, by deciding on the criteria, measurable during the tests, allowing the behavior and its non-drift to be validated.	СМВ	07/12/18	The CMB has announced that it intends to undertake, with the support of those involved in the 2015-2016 renovation, the drafting of an internal and external document aimed at: - specify the settings selected which must be the subject of particular attention with regard to their modification, distinguishing between those accessible to the operator and those only accessible to the company designing the automation. - define, within the limits of the available modeling possibilities, the envelope of dynamic effects and the load cases which produce them. - identify the periodic dynamic tests to be carried out in order to guarantee the stability of behavior over time (including assessment criteria and values). During a renovation of the control-command architecture on the Aiguille du Midi cable car, the CMB and its project manager applied these principles with the implementation of a test protocol to characterize and evaluate the effects of the modification (accelerations, arrows, vehicle movement, etc.).	с
	R2	Supplement the rules of technical guides RM1 and RM2 on dynamic tests, for installations which are sensitive to the effects of cable oscillations, with a double obligation to evaluate the most penalizing dynamic load cases, and to conduct tests with these load cases.	STRMTG	11/30/18	The principles of the response to the recommendation were defined at the professional meeting of 13/11/2018 and were given in the STRMTG response to the BEA-TT dated 30/11/2018. These principles were introduced in the draft new versions of the RM1 and RM2 guides currently being finalized in conjunction with the profession. These guides should come into force during 2023.	EC

recommendation closed: C

Title of the survey	No.	Wording of the recommendation	Entity	Respons e date	Follow-up and progress	Code
Immobilization and late evacuation of the "Panorama Mont Blanc" cable car on September 8, 2016 in Chamonix	R4	Establish the minimum list of risks to be taken into account in safety studies for integrated recovery cable cars, and make it available to design offices and operators. Require, in these safety studies, the consideration of provisions	STRMTG	11/30/18	The principles of the response to the recommendation were defined during the professional meeting of 11/13/2018 and were given in the STRMTG response to the BEA-TT dated 11/30/2018. For the "minimum list of scenarios" section, a list was drawn up by the STRMTG based on the integrated recovery files already validated and feedback from cases involving cable car immobilization. It is currently being communicated on a case-by-case basis to professionals concerned by cable car projects with integrated recovery. It was decided in early 2023 to integrate the topic of integrated recovery into the European standard EN1909 (evacuation/recovery). The STRMTG is leading the European working group that will prepare the new evacuation/recovery standard starting in 2023. The STRMTG has already proposed integrating a minimum list of risks to be taken into account into the standard. Regarding the final provisions, the DGITM has been contacted and has contacted the Ministry of the Interior (DGSCGC). Two meetings have already taken place between our departments, and discussions are underway to determine the legal framework for these final plans. In a second ^{phase} , a working group will be launched, possibly in 2023, to define the concrete modalities of these final plans.	EC
	R5	Implement a plan to sustainably strengthen the management of safety in the operation of the Panoramic Mont-Blanc by: - ensuring the completeness of safety documentation, and the correct information of personnel and external contacts who must apply it; - ensuring traceability and monitoring of operating faults, as well as the implementation of actions taken to remedy them, - ensuring comprehensive traceability of incidents and accidents to consolidate feedback; - ensuring a plan for controlling service provider interventions during operating periods.	СМВ	07/12/18	The CMB has implemented a safety management system in accordance with Article R342-12 of the Tourism Code. It has chosen to have this system audited by a third party to ensure a continuous improvement process. However, and without waiting for the results of these audits, it has initiated, for the specific case of the Panoramic Mont-Blanc cable car, a specific analysis process aimed at strengthening for this device: - technical and safety documentation (instructions, procedures). - traceability of events and interventions as well as feedback. - control of service provider interventions. The CMB has indicated that it wishes to limit such interventions as much as possible during operating periods.	EC

Ski lifts: Recommendations issued in 2019

recommendation closed: C

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Costebelle cable car cabin fell	R1	Continue progress in security management, including improvements in the following areas: - track the evolution of measured values and maintenance actions carried out on the devices; - carry out a comprehensive assessment of the gaps between practices and the maintenance recommended by the manufacturer, followed by an analysis of the risks generated by these gaps; - update the procedures describing the essential and safety points for each installation; - strengthen training, particularly ongoing training and knowledge monitoring, including the behavior to adopt when faced with alarms; - complete the sharing of information with operating and maintenance personnel as well as Feedback on operating log data.	RPLU04	10/09/19	The Pra Loup Ubaye 04 Authority has conducted a review of each of the points listed in the recommendation, in conjunction with their Safety Management System. Corrective actions have been identified, with implementation deadlines.	С
on March 25, 2018 in Pra Loup (04)	R2	For new or reconditioned safety automatons, introduce into the regulations the obligation of data recording and easy extraction over a minimum period of one year in order to allow feedback and analysis of the operation of the device following an incident.	STRMTG	09/09/19	The principles of the response to the recommendation were defined during a meeting with the profession on 06/09/2019 and were given in the STRMTG response to the BEA-TT dated 09/09/2019. The concrete measures defined have been integrated into the draft new versions of the RM1 and RM2 guides currently being discussed with the profession in 2021/2022/2023. These new versions should come into force during 2023.	EC
	R3	In accordance with Article 34 of the decree of 7 August 2009, as amended, carry out a complete exercise annually on one of its installations, from the simulation of the breakdown to the complete evacuation of volunteer passengers, allowing it to test the implementation of the means, materials and procedures and to ensure the proper coordination of the various stakeholders.	RPLU04	10/09/19	The RPLU04 indicated the following in its response: The RPLU04 is planning a full-season exercise on the new Costebelle gondola lift. The internal trainer-evaluator will be in charge of ongoing evacuation training throughout the season. Monthly training is becoming mandatory. The authority is considering hiring an external training organization.	С

Annexe 8 : Table from the Directorate General for Energy and Climate (DGEC) showing the monitoring of the implementation of the recommendations issued by the BEA-TT in the field of road transport

DGEC Road: Recommendations issued in 2015

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Monitoring
09/2015	A motorcyclist fell between two lines of vehicles on April 8, 2014 on the A6 motorway in Savigny-sur- Orge (91)	R2	Promote within the European Union and the United Nations Economic Commission for Europe (UNECE) the fitting of goods transport vehicles and their trailers with sufficient side protection to prevent vulnerable road users who have fallen to the ground from slipping under their wheels under all circumstances.	A study was conducted to propose an evolution of Regulation No. 73 with a view to defining new rules for the installation and resistance of side protections with adapted deformation parameters. Proposals have been made and discussions are underway with all stakeholders.	In progress

DGEC Road: Recommendations issued in 2021

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Follow up
09/2021	Collision between a mixer truck and a light vehicle occurred on August 13, 2019 on the RD13 in Bazoches-sur-Guyonne (78)	R1	As part of the revision of Regulation No. 13 on vehicle braking, propose to make it mandatory to equip mixer trucks with more than 3 axles with an electronic stability control system including the anti-rollover function and the trajectory control function.	UNECE Regulation No. 13 provides , for the categories subject to it, that the vehicle stability control function includes the anti - rollover function and the trajectory control function . Concrete mixer trucks could be identified at the level of the regulations relating to the approval of vehicles by the " concrete mixer " body. Regarding the recommendation, the DGEC proposed during the group (GRVA) in Geneva in January 2022 to re-examine the exemptions of regulation 13 with a view to making this provision mandatory for the vehicles in question. A proposal was made by France, and adopted at the GRVA in January 2023. The project will be definitively approved at WP29 in June 2023, for an obligation on September 1, ²⁰²⁶ .	In progress

DGEC Road: Recommendations issued in 2021 - continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Follow up
08/2022	Pedestrian hit by heavy goods vehicle on May 4, 2021 in Clichy (92)	R1	To initiate a study on the performance of vulnerable user detection systems intended to equip heavy vehicles, covered by UNECE regulations No. 151 and 159, with a view in particular to defining a protocol for assessing the proportion of false alarms and then applying this protocol to a panel of marketed systems	UTAC is currently undergoing consultation. Funding for this study will be proposed in the budget of the 2023/2024 study agreement.	In progress

Annexe 9 : Table of the Road Safety Delegation (DSR) presenting the monitoring of the implementation of the recommendations issued by the BEA-TT in the field of road transport

DSR Road: Recommendation issued in 2022

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Follow up
08/2022	Pedestrian hit by heavy goods vehicle on May 4, 2021 in Clichy (92)	R1	To initiate a study on the performance of vulnerable user detection systems intended to equip heavy vehicles, covered by UNECE regulations No. 151 and 159, with a view in particular to defining a protocol for assessing the proportion of false alarms and then applying this protocol to a panel of marketed systems.	In response to this joint recommendation, the DSR and the DGEC plan to commission a study from UTAC, as part of the next UTAC 2023-2024 agreement.	In progress

Annexe 10 : Table showing the monitoring of the implementation of other recommendations issued by the BEA - TT in the field of road transport

OTHER Road: Recommendations issued in 2022

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Follow up
		R2	To encourage drivers to respect the speed limit of 70 km/h at the entrance to the curve of exit ramp no. 136, reinforce and supplement the signage of the curve to indicate its dangerous nature. Study and implement, where appropriate, the addition of vertical position signage at the "earliest exit point" of the exit ramp to remind drivers that they are driving on an exit ramp.	SANEF	Addition of two A1a "right turn" signs: in progress Study of an adaptation of the signaling sequence: completed Following the study, shift of around twenty meters upstream of the entire speed limit signaling sequence: in progress	In progress
03/2022	crashed on November 4, 2019 on the A1 motorway in Estrées-Deniécourt (80)	R3	Implement a safety management system to cover its subcontractors and develop internal control mechanisms to ensure compliance by its subcontractors with safety requirements and other clauses of the contract, such as those relating to subcontracting.	FlixBus	A safety management system was implemented in 2022, standardizing procedures within the company and providing a decision-making mechanism based on effective risk analysis. It includes a clear safety policy (defining clear internal standards for drivers and coach partner vehicles), risk management (defining safety focus points and performance indicators), a safety audit system (defining quantified objectives for periodic inspections of coach partner fleets and safety breaches within the road transport ecosystem directly affecting our operations), and finally the promotion of the safety policy within the company and with its stakeholders, particularly coach partners and bus stations. A new partner audit system is in place, verifying a non-exhaustive list of elements allowing FlixBus to assess the risk associated with a particular coach operator, as well as a series of periodic fleet condition checks with an external audit company, is in place throughout France. Adaptations are being considered based on feedback we receive from our internal and external stakeholders, within the framework of working groups bringing together field teams and IT teams, for better use of the data generated by daily FlixBus traffic.	Fence

OTHER Road: Recommendations issued in 2022 - continued

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Follow up
08/2022	Pedestrian hit by heavy goods vehicle on May 4, 2021 in Clichy (92)	R2	To jointly study a technical solution to move the outlet of Rue de Neuilly onto Boulevard Jean-Jaurès and the pedestrian crossing located further downstream on the boulevard away from each other, by moving one or other of these elements, and to create a rounded sidewalk in the southern corner of the intersection. In the absence of a satisfactory technical solution: - Jointly study a modification to the operating diagram of the traffic lights at the intersection in order to separate in time the movements of vehicles leaving Rue de Neuilly and the crossings of pedestrians on the crossing located downstream on the boulevard; - Restore the damaged warning strips in the southern corner of the intersection; - Remove the part of the pedestrian crossing overhanging the center of the intersection on the extension of rue de Neuilly.	Departmental Council 92	Firstly, a modification to the horizontal signage of the crossing was carried out, allowing the pedestrian space on Rue de Neuilly to be shifted in accordance with the prescribed guidelines. The principle of a special phase dedicated to pedestrians was also adopted and studied in consultation with the municipality of Clichy-la-Garenne, which also eliminated traffic on the opposite rue de Villeneuve, also facilitating the process. Preparatory civil engineering work is underway. The corresponding work is expected to take place before summer 2023. In addition, and in the longer term, the principle of redeveloping the forecourt and the roadway in front of the Town Hall is being considered. A repositioning of the crossing, completely separate from Rue de Neuilly, will be examined in this context, the outcome of which is not yet known.	In progress

Annexe 11 : Table monitoring the implementation of recommendations issued by the BEA-TT in the field of river transport

River: Recommendations issued in 2020

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Monitoring
12/2021	Collision of the motorway bridge in Givors (69) by the passenger boat BIJOU DU RHÔNE on April 6, 2018	R1	Study and install channel marking signs, visible day and night, upstream and downstream of the Givors motorway bridge in accordance with the CEREMA guide "Signaling for inland navigation".	CNR	In collaboration with VNF and with the support of navigators, particularly within the framework of the Rhône- Saône basin safety subcommittee, feasibility studies were carried out to improve the visibility of the channel markings both day and night. Completion is expected in 2023.	In progress
		R2	Install signage using B.11 panels as provided for in Article A. 4241-51-1 of the Transport Code imposing the obligation to announce the passage of large-gauge structures on the Rhône between PK 16 and 20.	CNR	The arrangements for installing B.11 signs on both sides of the affected area were analyzed in consultation with stakeholders. The signs have been installed.	Fence

River: Recommendations issued in 2021

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Follow up
12/2021	Sinking of the PAMPERO, a dangerous goods transport vessel, on the Rhône, when a gate at the Sablons lock (Isère) broke on February 18, 2020R1Stren 	Strengthen the quality of maintenance and the level of monitoring of lock gates, by applying the standard maintenance plan to each structure and ensuring its proper implementation, by improving the consideration of follow-up to interventions and work reports, and in order to better consider the gates as a functional unit, with all associated equipment, control and command systems and protection elements of the installations.	CNR	Following feedback from the Sablons accident, the Technical Maintenance Reference Document was updated in October 2022, for deployment on the structures by 2023. Concerning the protection elements, the Technical Reference RT EXP GENE 11 "Tests of safety barriers and Strategic Materials for Hydraulic and Navigation Safety" was updated in 2021 and includes mechanical overload and Excessive Execution Time, with operational implementation taking place from 2021. Regarding the issue of monitoring the proper implementation of maintenance, CNR will strengthen existing internal control over lock maintenance operations and the identification of corrective actions that may result. To this end, a working group has been formed to formalize and harmonize internal control practices. The conclusions and the timetable for implementing the improvements are expected to be validated by mid-2023.	In progre ss	
		R4	Implement a sensor system to enable direct measurements of the position of the downstream gate of the Sablons lock at the end of the operation. Study the feasibility and install, if necessary, such a system on the other lateral displacement lock gates.	CNR	In November 2021, the Sablons downstream gate in operation was instrumented to enable direct measurements of the gate's position. This same instrumentation was replicated on the new downstream gate installed during the March 2022 navigation shutdown. After an initial phase of operation on the new Sablons gate, CNR will study, by the end of 2023, the possibility of duplicating these sensors on the other sliding side gates of the other locks.	In progre ss

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Follow up
01/2021	BEA-TT addendum to the joint BEAmer-BEA-TT technical investigation report on the collision of two bridges by the river-sea vessel ARAMIS on September 28, 2019 on the Rhône diversion canal at Donzère-Mondragon (26)	R2	Using the river information system (RIS), provide navigators with real-time information on clearances under bridges, starting in the short term with bridges for which the data is already available or can easily be, then including all limiting bridges according to criteria to be specified by the operator. Study, for bridges for which the free height can often be close to the minimum of 6.30 m, the installation of a C2 sign specifying that "the free height above the water level is limited; indicated limit: 6.30 m" as provided for in the waterway signage guide, in its 1993 version, for bridges constituting critical points of the section in relation to the air drafts.	CNR	The real-time clearance data available to the CNR will be made available as a priority: this will include the RN7 and SNCF double bridges on the Donzère-Mondragon feeder canal where the Aramis river-sea vessel collided. For bridges for which real-time clearance data is not available, this requires the installation of measuring stations and consequently a feasibility study and works: this is an improvement that will be included in the "waterway safety" actions of Plan5Rhône. Concerning the installation of C2 traffic signs for bridges frequently clearing a clearance close to 6.30m of the gauge of the Bas-Rhône waterway, having considered that a clearance limit is frequently cleared when reached 100 days / year, an initial inventory has identified around ten bridges for which the clearance is between 6.30m and 7m more than 100 days / year. In consultation with waterway users and subject to validation by safety committees led by VNF, it is proposed to undertake the installation of limited clearance signage for these bridges by 2022.	In progress
		R3	Define a legal framework for the practice of "river pilotage" of vessels, or develop the definition of "driver" given in inland navigation by the Transport Code in order to adapt it to the activity of a vessel in a river zone.	DGTIM	No answer	
		R4		Regulate the driving time of boat drivers or supervise the working hours of independent drivers in river transport.	DGITM	No answer

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIEN T	Status of actions	Follo w up
12/2022	Collision of two bridges by the ship ANDRE MICHEL1 on October 2, 2021 on the Rhône diversion canal in Donzère (26)	R1	Bring to the European framework the approach aimed at ensuring that the provisions applicable to vessels operating on the Rhine (art 25.01 ES-TRIN) are extended, for the most relevant, to vessels operating in inland waters and, moreover, are supplemented so as to include certain of the specific rules for height- adjustable wheelhouses which apply to boats.	DGITM	The analysis was carried out with a view to working towards the integration of such a provision into the transport code. It will also be proposed that France submit a request for amendment of the chapter relating to sea vessels in the work programme of the European standards development committee. in navigation for the 2024-2028 program.	In progre ss
		R2	Study the possibilities of improving navigation safety in the area of the two Donzère bridges, during poor visibility conditions, by means of signaling and beacons (alignment of lights or other devices to mark the direction of the channel, spars topped with radar reflectors and lights, bridge lighting, reflective materials).	CNR	By the end of 2024, CNR will study the improvements that can be made to signage and marking, in consultation with waterway users, within the framework of the safety sub-committees led by VNF.	In progre ss
		R3	Carry out, in conjunction with Voies Navigables de France and the departmental territorial directorate of the Rhône department (both responsible for supporting prefects in matters of navigation policing), a trajectory study, in order to ensure that the reversal of the direction of navigation in the area of the two Donzère bridges remains relevant in view of the current and the strong wind on this section.	CNR	A diagnosis of the situation will be carried out, including: - Research into studies and contextual elements that led to this navigation diagram. - Analysis of the input data of this navigation scheme and their potential evolution. - A consultation of sailors on navigation conditions. In conjunction with VNF and DDT69, this first phase will make it possible to assess by the end of 2024 the relevance of carrying out a trajectory study aimed at re-examining the current navigation scheme.	In progre ss

Annexe 12 : Institutional texts

European Directive No. 2016/798 of May 11, 2016

Law No. 2018-515 of June 27, 2018 for a new railway pact

Order No. 2019-397 of April 30, 2019 transposing Directive (EU) 2016/797 on the interoperability of the railway system within the European Union and Directive (EU) 2016/798 on railway safety and adapting French law to Regulation (EU) 2016/796 on the European Union Agency for Railways

Decree No. 2019-525 of May 27, 2019 relating to the safety and interoperability of the railway system and amending or repealing certain regulatory provisions

Order of May 27, 2019 relating to the conditions and procedures for notification and designation of conformity assessment bodies and accredited internal bodies.

Transport Code: articles L. 1621-1 to L. 1622-2 and articles R. 1621-1 to R. 1621-26

Tourism Code: Article L. 342-8 making Articles L. 1621-1 to L. 1622-2 of the Transport Code applicable to ski lifts



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