BEATT Bureau d'Enquêtes sur les Accidents de Transport Terrestre

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

ANNUAL REPORT 2021

A word from the director

This activity report first presents the 14 accidents into which the BEA-TT opened an investigation in 2021: 4 rail accidents (two collisions between people, one derailment, one factory train fire); 2 collisions on level ground; 5 road investigations (three collisions between heavy vehicles, one collision on a pedestrian crossing, loss of control of an electric vehicle equipped with driver assistance systems); 1 braking fault on a cable car being tested; 1 derailment on metre gauge track; 1 new collision with a bridge deck by a river- -sea vessel.

Although it is duly informed of more than 2,000 events per year, and examines several hundred (746 in 2021), the BEA-TT has no statistical mission and lives under the laws of small numbers. It can, however, carry out studies aimed, like investigations, at issuing recommendations: this is how we launched in 2021, as part of our workload plan, a study on road accidents with immersion, and a study on spontaneous fires of heavy goods vehicles.

This report then presents the 12 reports published in 2021 (accompanied by 34 recommendations): 2 on rail (8 rec), 4 on level crossings (9), 2 on guided transport (7), 2 on roads (3) including the collapse of the Mirepoix bridge, 2 on rivers (7) including the damage to the Sablons lock.

In-depth investigations into exceptional accidents, thanks in particular to special investigative powers, are where the BEA-TT is most useful among all stakeholders. This objective of complementarity has led us to update our cooperation agreements with the EPSF and the STRMTG, as well as to open a dialogue with the National Gendarmerie Criminal Research Institute (IRCGN) and, following the BEA mer, with the Ministry of Justice.

All of this is only worthwhile if we can maintain our skills at the highest level. This is still the case, but I would like to endorse the comments made by the President and Director General of EPSF in their activity report: this issue deserves increased attention in a period of openness to competition and a shortage of engineers in the railway sector.

As every year, this report finally presents, in annexes, the point of the actions remaining to be pursued in response to previous recommendations (736 recommendations in 17 years, the vast majority having been followed up and closed). Improvements have been made to these tables by our partners to make more visible what is going well and what is not going well.

Jean-Damien PONCET

PS: Over the years, the list of recipients of paper copies has been reduced. From now on, such copies will no longer be provided.

SUMMARY

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 organisations remain fallible.

Drawing independent lessons from the most serious or complex accidents or incidents is a constant need for public authorities, victims and travellers, as well as operators.

These are the missions of the Accident Investigation Offices.

The BEA-TT covers rail transport, urban guided modes (metro and tramway), ski lifts, road transport (mainly freight transport and public passenger transport) as well as inland navigation; each of these sectors has its own regulations, its own stakeholders, with their economic, technical, professional and even 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 of Transport. In the railway sector, investigations must be conducted into serious accidents 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: www.bea-tt.developpement-durable.gouv.fr . 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.

1.2 The organization and the means

The BEA-TT is organized around its main mission, namely the carrying out of 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;
- temporary investigators, commissioned by its director for an investigation;
- experts mobilized to answer specific questions.

The BEA-TT can also call upon all government services. This is particularly the case for monitoring and reporting accidents.

As of January 1, 2022 , the BEA-TT has 13 employees: 2 management staff, 9 permanent investigators, including two division heads, and 2 administrative staff. A doctor is now shared with the BEA Civil Aviation. The operating and research budget in 2021 amounted to €60,000.

2 Accidents of the year 2021

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 Alert (CMVOA) of the Ministries of Ecological Transition. and Territorial Cohesion and relations with local authorities, as well as through daily alerts and reports from major transport operators.

Monitoring involves using this information: depending on the number of victims, the conditions and the social sensitivity of the accident, a brief analysis 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.

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.

The results of this analysis for 2021 are as follows:

	Reported events	Events analyzed	Investigations opened
Road, river and national railway transport sector	1110	560	9
Field of rail and guided transport	1151	186	5
Total	2261	746	14

2.2 Investigations opened in 2021

The BEA- TT therefore launched 14 quests in 2021 which concern:

- for the **road sector** , a person hit by a heavy goods vehicle on a pedestrian crossing in the city centre, three collisions of vehicles against heavy goods vehicles on the motorway, two of which involved a passenger transport vehicle and one accident involving a vehicle equipped with driving assistance;
- for the **railway sector** , a fire, a derailment and a collision with people;
- for **level crossings** , two collisions on automatic level crossings with road vehicles, one with a light vehicle and the other with a low-loader, and one collision with a person on a level crossing reserved for pedestrians;
- for the **field of guided transport** , the derailment of a metre-gauge train;
- for **ski lifts** , the collision of two cabins against the structures of a cable car station;
- for the **field of river navigation** , the striking of the deck of a bridge by the wheelhouse of a river-sea vessel.

2.2.1 Road transport

1) A pedestrian was struck by a heavy goods vehicle on May 4 in Clichy (92)

On Tuesday, May 4, 2021, in Clichy (Hauts-de-Seine), at around 9:20 a.m., a heavy goods vehicle turning right from Rue de Neuilly onto Boulevard Jean-Jaurès (RD 911) struck a pedestrian crossing the boulevard at a crosswalk. The pedestrian fell under the impact and found herself under the truck, which stopped a few meters further on. She died instantly.

2) Collision between a coach and a heavy goods vehicle on May 27 on the A62 at Mas -d'Agenais

On Thursday, May 27, 2021, at around 3:15 p.m., a 49-seat BlaBlaCar coach collided with a truck stopped on the hard shoulder of the A62 motorway near the town of Mas-d'Agenais in the Lot-et-Garonne department (47).

At the collision site, the A62 motorway in the direction of Agen towards Bordeaux has two traffic lanes and a 2.5 m wide emergency lane bordered by a metal barrier.

The truck, encroaching slightly on the right-hand lane of the motorway, was hit from behind on the left by the coach which, after the impact, veered about thirty metres downstream from the truck to the right and overturned onto its right side in the ditch below the road.

The accident left 13 people injured, three of them seriously, all of whom were on board the coach. The truck driver, although in the cab at the time of the collision, was not injured.

3) Collision between a heavy goods vehicle and a minibus occurred on August 6 on the A75 in Saint -Poncy (15)

Leaving Amiens (Somme) on the night of Friday, August 6, 2021, two minibuses traveling in convoy, driven by activity leaders from a municipal leisure center in the city of Amiens and transporting teenagers as part of a vacation stay, were heading towards the south of France.

At around 7:30 a.m., the second minibus was about to overtake a heavy goods vehicle on a steep incline on a straight, dual carriageway section of motorway when its right front hit the left rear of the heavy goods vehicle's semi-trailer.

The impact caused the minibus to become wedged under the semi-trailer, with its right side torn off and its roof rippling from front to back. The teenager sitting in the front right seat was ejected and died. The driver and the seven other teenagers suffered minor injuries.

4) Collision between a light vehicle and a salt spreader occurred on December 12 on the A20 in Nespouls (19)

On Sunday, December 12, 2021, at around 9:15 p.m., a light vehicle traveling north struck a salt spreader from the Centre-Ouest interdepartmental road authority which, after completing an initial salting in anticipation of adverse weather conditions, was returning to its operations center.

The impact caused the salt spreader to pivot counterclockwise and then lay on its left side, partially crushing the car. Shortly after the accident, a fire broke out at the front of the car. The three occupants, two of whom were probably already deceased, could unfortunately only be extracted after the flames had been extinguished. The circumstances and violence of the impact also led to the death of the driver of the salt spreader.

5) Accident involving an electric vehicle equipped with a driving assistance system occurred on December 11 in Paris 13th

On Saturday, December 11, 2021, at around 9 p.m., a driver driving a Tesla Model 3 taxi, which was not in service at the time of the accident, lost control of his vehicle on Avenue

d'Ivry. With family members on board, the vehicle struck a cyclist, a glass container, a traffic light, and then a utility vehicle at the intersection with Rue de Tolbiac.

The loss of control was the result of the vehicle gradually accelerating rapidly to a very high speed. The accident resulted in one death and around twenty injuries.

2.2.2 Rail transport

1) Factory train fire on May 28 in Saint-Hilaire-Bonneval (87)

On Friday, May 28, 2021, the ENORAIL train was en route between the Brive-la-Gaillarde works base and the Limoges works base, before joining a work formation towards a track and ballast renewal site near Limoges. As it passed Pierre-Buffière station, the traffic officer detected that the train was traveling with several axles generating sparks and black smoke. Alerted, the transport dispatcher warned the train driver and requested it stop.

The ENORAIL train came to a stop at kilometer point 417.9, straddling level crossing 242. A few minutes after it came to a stop, the fire suddenly increased in intensity and spread to the surrounding vehicles by catching fire on the conveyor belts. The rapid intervention of the firefighters made it possible to extinguish the fire, preventing it from spreading to vehicles containing large quantities of fuel.

There were no human casualties. One car of the factory train was completely destroyed by the fire, and two others were partially destroyed. The track was polluted over 100 meters. Several overhead lines were destroyed. Traffic between Brive-la-Gaillarde and Limoges quickly resumed on a single track, then on a double track under temporary overhead lines.

2) Derailment of a freight train on August 26 in Saint-Hilaire-au-Temple (51)

On Thursday, August 26, 2021, at 10:05 p.m., a SNCF Freight Railway Company train carrying grain and traveling from Châlons-en-Champagne to Tergnier derailed at Saint-Hilaire-au-Temple between Châlons-en-Champagne and Reims.

The train derailed shortly before a bridge that allows passage under the East European high-speed rail line. The locomotive and the last seven cars of the train remained on the rails, while ten cars lay flat and became entangled. Two cars struck the left-hand support wall of the bridge, causing the locomotive to come to an abrupt halt and the following cars to move in an accordion-like fashion.

The overhead wire is down and 200 meters of track are destroyed. Traffic between Châlons- -en- -Champagne and Reims has been suspended for nine days.

3) Four people hit by a regional train on October 12 in Ciboure (64)

On Tuesday, October 12, 2021, at 4:57 a.m., in the town of Ciboure, a Regional Express Train from Hendaye to Bordeaux struck four people. The victims, three of whom died and one of whom was seriously injured, were Algerian migrants who were asleep on the track.

2.2.3 Level crossings

1) Collision between a TER and a light vehicle on January 15 in Péronnas (01)

On Friday, January 15, 2021, shortly after 2 p.m., a Regional Express Train operated by SNCF Voyageurs, coming from Lyon and bound for Bourg-en-Bresse, hit a car at level crossing no. 44 located in the commune of Péronnas in the Ain department. This level crossing, not included in the national safety program, is equipped with automatic light and sound signaling with two half-barriers.

The regional express train, which was traveling at 135 km/h, did not derail, and none of its 146 occupants were injured. However, the driver of the light vehicle, who was in her vehicle at the time of the collision, died instantly.

2) Collision between a freight train and an exceptional transport on June 16 in Rumigny (08)

On Wednesday, June 16, 2021, at around 3:00 a.m., a EUROPORTE train transporting phosphoric acid hit a semi-trailer at level crossing no. 17 in the commune of Rumigny in the Ardennes department (08).

The road train carrying a boat and forming an exceptional convoy was accompanied by two guide vehicles. When the train arrived, the road train was stopped on the level crossing, the tractor positioned beyond the railway tracks with the entry barrier from the opposite direction lowered behind the driver's cab.

The collision caused the derailment of the train's engine and the first seven tanker cars, as well as damage to the tanks of three other cars, releasing some of the acid being transported. In the road convoy, the semi-trailer and boat hit by the train were destroyed, the boat quickly catching fire after being thrown, along with the semi-trailer, about ten meters to the left side of the railway tracks. However, the tractor unit suffered only minor damage.

Only the train driver was slightly injured.

3) Pedestrian hit by a train on November 8 in Héricy (77)

On Monday, November 8, 2021, the first day back at school after holidays, fog hung over the town of Héricy on the banks of the Seine, reducing visibility to 150 meters. A Transilien train consisting of three Régio2N trains, empty of passengers, coming from Paris Gare de Lyon and bound for Montereau, was running without a scheduled stop.

At around 8 a.m., after exiting a tunnel and crossing a train traveling on the opposite track, the train struck a teenager at pedestrian crossing No. 27A. The teenager was taken to hospital with non-life-threatening injuries.

2.2.4 Guided transport

1) Derailment of the "Yellow Train" on January 25 in Fontpédrouse (66)

On Monday, January 25, 2021, at the end of the day, on the metric line of the Yellow Train, a Regional Express Train runs from Latour-de-Carol to Villefranche-les-Bains. Only the driver and the sales representative are on board this railcar.

On the descent, intense fog enveloped the line. The train suffered several skids, which the driver managed by braking, but the train's speed gradually increased. A final skid occurred at high speed. The driver was unable to regain traction. The train arrived at the entrance to the Castagnal tunnel (between the Sauto and Fontpédrouse stops) at excessive speed (56 km/h). It was 5:38 p.m. when the railcar derailed and came to a stop at the tunnel exit, due to the combined effect of the emergency brake (initiated by the driver in the tunnel) and the skidding of the derailed axles onto the ballast.

The driver and the sales representative were not injured. The second axle of the first bogie and both axles of the rear bogie derailed. The train suffered impacts, and the tunnel vault and track were damaged.

2.2.5 Ski lifts

1) Collision of two cabins of the Saulire cable car against the structures of their respective stations on September 29 in Courchevel (73)

On Wednesday, September 29, 2021, during a regulatory maintenance operation (annual inspection), the two cable car cabins collided with the structures of their respective stations at high speed.

In the morning, several brake tests were conducted, followed by an emergency brake test. The braking, which was supposed to be applied at a specific point on the line, had no effect, and the aircraft's speed continued to increase. No action taken by those present would allow the cabins to stop.

2.2.6 River transport

1) Collision with a bridge by the ship ANDRE-MICHEL 1 on October 2 in Donzère (26)

On Saturday, October 2, 2021, the Maltese-flagged river-sea vessel ANDRE-MICHEL 1 was sailing up the Rhône River in ballast from Naples to Saint-Usage (Côte d'Or). It included seven Ukrainian crew members. The 68-year-old French river driver boarded at around 7:30 a.m. in Port-Saint-Louis-du-Rhône, where he took over the ship's helm.

At around 8:15 p.m., on the Rhône diversion canal, the vessel, with its wheelhouse not lowered enough, struck the RN7 bridge. The wheelhouse was crushed by the impact with the bridge, being torn off and tilting backward as it deformed. The driver died, while the captain, who was also inside, suffered minor injuries. The crew managed to immobilize the vessel. River navigation was able to resume the following morning.

2.3 Open studies

Two studies were launched in 2021.

The first concerns spontaneous fires affecting goods transport vehicles weighing more than 3.5 tonnes between the beginning of 2021 and the end of 2022. An in-depth analysis of the main causes leading to these events will be carried out.

The second study focuses on accidents involving vehicle immersion in a waterway or body of water. These accidents are associated with high severity related to the resulting drownings. Its objective will be to improve knowledge of the issues and circumstances associated with this type of accident and to establish recommendations to reduce their occurrence and severity.

3 Reports published in 2021

3.1 Road transport

3.1.1 Published surveys

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

The table below specifies the nature, locations and dates of these two accidents which cost the lives of 3 people.

Date	Nature and location of the accident	Number killed
08/13/2019	Accident between a mixer truck and a light vehicle in Bazoches-sur-Guyonne (78)	1
11/18/2019	Two vehicles fall into the Tarn after the collapse of the road bridge at Mirepoix-sur-Tarn (31)	2

The first investigation highlighted the problem of the risk of mixer trucks overturning under certain loading and traffic conditions, and the importance of signage adapted to the infrastructure and its danger.

The second was not the result of a collision between vehicles but of the collapse of a suspension bridge during the movement of an exceptional transport over this structure, the mass of which exceeded by more than twice the limit imposed by the prohibition signs at the entrance to the bridge. This event underlines the urgent need to respect the tonnage limits calculated according to the strength of the bridge, as well as the authorization procedures for exceptional transports for which the infrastructure management services will be able to specify the risks according to the specificities of the convoy.

3.1.2 The recommendations issued

In conclusion of these two reports, 3 recommendations were formulated by the BEA-TT

Nature of the recommendations

- 1 concerns the extension of the scope of international regulations relating to electronic stability control systems including the anti-rollover function and the trajectory control function;
- 1 concerns the practical and theoretical training of mixer vehicle drivers in the risks of overturning;
- 1 concerns the arrangement of road signs in relation to the particular geometry of the road.

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 7, including:

- 1 central department of the ministry in charge of regulations;
- 3 training organizations;
- 3 road managers.

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2021.

Investigation	Recommendations			
	Number	Accepted	Not accepted	No answer
Bazoches-sur-Guyonne	7	4	0	3
Mirepoix-sur-Tarn	0			
TOTAL	7	4	0	3

3.1.3 Monitoring actions

The following table shows the progress of the monitoring of recommendations addressed to road sector organizations established by the BEA-TT based on information obtained from these services.

Year of publication of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not accepted	
2011	1	1	0	0
2012	0	0	0	0
2013	1	1	0	0
2014	0	0	0	0
2015	3	2	0	1
2016	3	2	0	1
2017	7	7	0	0
2018	2	2	0	0
2019	2	2	0	0
2020	3	3	0	0
2021	4	3	0	1

3.1.4 Published investigation reports

Accident between a mixer truck and a light vehicle on August 13, 2019 on the RD13 in Bazoches -sur Guyonne (78)	

On Tuesday, August 13, 2019, a concrete mixer truck overturned on a right-hand bend on departmental road no. 13 in the commune of Bazoches-sur-Guyonne.

When the mixer truck rolled onto its left side, it crushed a light vehicle traveling in the opposite lane, carrying a mother and her two children. The child in the back seat died at the scene. The mother, who was driving, and her daughter, who was in the front passenger seat, were seriously injured. The truck driver received minor injuries.

The direct and immediate cause of the accident was the overturning of the mixer truck on the bend due to a violent right turn, an evasive maneuver on the part of the truck driver who was surprised by the arrival of the light vehicle in the opposite direction, given the layout of the area and an inappropriate speed.

The accident caused moderate damage to road infrastructure.

This accident raises the issue of the risk of overturning of concrete mixer trucks which, when loaded, have a high centre of gravity offset towards the driver. This characteristic results from the mixing of the concrete caused by the continuous clockwise rotation of the mixer, greatly increasing the instability of the truck, particularly on right-hand turns.

The analysis of this accident leads the BEA-TT to formulate recommendations relating to:

- to the driver assistance system to prevent the risk of mixer trucks overturning;
- training of mixer truck drivers regarding this risk of overturning;
- to improve the safety of the bend at the site of the accident.

http://www.bea-tt.developpement-durable.gouv.fr/bazoches-sur-guyonne-r274.html

A heavy goods vehicle and a car fall into the Tarn after the collapse of the road bridge in Mirepoix-sur-Tarn (31)

On Monday, November 18, 2019, at around 8:00 a.m., in the commune of Mirepoix-sur-Tarn, a road combination consisting of a tractor and a low-bed trailer carrying a drilling rig was advancing onto the Mirepoix-sur-Tarn bridge. At the same time, but from the other side, a light vehicle with two people in front was entering. When each of the two vehicles had traveled approximately fifty meters on the bridge, all 80 suspension lines broke, causing the 150-meter-long deck to fall almost vertically, dragging the truck and the light vehicle into the cold waters of the Tarn.

This accident resulted in the deaths of two people. The driver of the tractor-trailer, trapped alone in the tractor cab, was only able to be freed by firefighters around 9:00 p.m. The passenger in the light vehicle was brought to the shore by emergency services but could not be resuscitated. The driver of the light vehicle, seriously injured, was the only one who was able to quickly escape from the vehicle and escape drowning.

Of the structure, only the pylons, the supporting cables, and the anchor blocks suffered no visible damage. The road infrastructure upstream on either side of the bridge was not damaged.

The driver of the HGV did not comply with the tonnage restrictions limited to 19 tonnes positioned upstream of the bridge, while the total rolling weight of the entire vehicle was more than 50 tonnes.

Several factors may have played a role in this accident:

- the failure to prepare this exceptional transport;
- the construction site requirements that the truck driver, owner of the company, was keen to respect.

The driver was undoubtedly familiar with the route through the structure, which he was likely to use with different types of vehicles. The factors cited may justify a lack of attention that led to the failure to notice the signs relating to this prohibition, or more likely to the failure to associate the prohibition with the type of vehicle driven that day. Other hypotheses are possible, which the investigation cannot exclude; for example, that the driver did not give sufficient credence to the reason for the prohibition, and judged that he could cross the structure without risk.

As a result, the BEA-TT does not issue a recommendation. However, given that there are approximately 200 suspension bridges in France, including several dozen with tonnage restrictions, some possible options to reduce this accident occurrence are recalled.

The BEA-TT also invites the main professional road freight transport federations to remind their members of the specific rules of authorization and circulation during exceptional transport, and in the driving of any transport vehicle, strict compliance with the tonnage conditions imposed at the level of a structure.

http://www.bea-tt.developpement-durable.gouv.fr/mirepoix-sur-tarn-r276.html

3.2 Rail transport

3.2.1 Published surveys

Two accidents involving rail traffic outside level crossings were the subject of an investigation report published in 2021. The nature, dates and locations of these accidents are specified in the table below.

In view of Article L. 1621-1 of the Transport Code, none of these accidents constitutes, given the consequences, a “serious” accident for which a technical investigation was mandatory.

Date	Nature and location of the accident	Number killed
07/26/2019	Online deterioration of the wheel tread of a freight wagon between Romilly-sur-Seine and Troyes (10)	0
12/22/2019	Overspeed of a TGV at La Milesse (72)	0

The first accident highlighted the particular behaviour of certain new-generation composite brake blocks fitted to freight wagons which, in the event of a brake application incident, can cause damage to the wheels which is problematic for safety.

The second event, fortunately without any human or material consequences, highlighted a series of errors during the creation of a new generation ERTMS type signalling system.

These events highlight the special attention that must be paid to innovative security systems.

3.2.2 The recommendations issued

In conclusion of these two reports, 8 recommendations were formulated by the BEA-TT

Nature of the recommendations

- 3 concern the improvement of study processes, as well as the processes of evaluation and control of these studies, within the framework of the design of the latest generation signaling systems;
- 1 aims to establish innovative systems for monitoring such studies, which is facilitated by the evolution of technologies and scientific knowledge;
- 1 concerns the improvement of maintenance processes by an entity responsible for wagon maintenance;
- 1 relates to the verification of conformity of brake shoes used on wagons;
- 2 aim to involve experts in wagon braking in defining measures to improve the safety of use of composite soles, with a view to revising the rules and standards.

Recipients

One of these recommendations was addressed, with the same wording, to several recipients, so that the total number of recommendations received by recipients amounts to 10, including:

- 3 to an industrial supplier of railway signaling systems;
- 1 to a body assessing the safety of railway signalling systems;
- 2 to an entity responsible for the maintenance of wagons;
- 1 to the Railway Standards Office;
- 2 to the European Union Agency for Railways;

➢ 1 to the International Union of Railways.

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2021.

Investigation	Recommendations			
	Number	Accepted	Not accepted	No answer
Troyes	6	2	3	1
The Milesse	4	4	0	0
TOTAL	10	6	3	1

A recommendation was rejected by the European Union Agency for Railways. The agency considered that the BEA-TT report made a valuable contribution, but that further evidence and additional analyses still needed to be gathered before activating the expert work within a European framework requested by the recommendation. However, following a similar accident in Italy, the recommendation was implemented.

Two other recommendations were rejected by an entity responsible for wagon maintenance, which considered that the pre-existing provisions were sufficient.

3.2.3 Monitoring actions

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

The progress report for recommendations submitted between 2004 and 2021 is as follows:

Year of publication of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not Accepted	
2004-2015	144	133	7	4
2016	18	16	0	2
2017	17	11	0	6
2018	5	5	0	0
2019	12	4	0	8
2020	-	-	-	-
2021	10	0	3	7
Total 2004-2021	206	169	10	27

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 of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not Accepted	
2016	6	4	0	2

3.2.4 Summaries of published investigation reports

Online deterioration of the wheel bearing table of a freight wagon on July 26, 2019 between Romilly-sur-Seine and Troyes (10)	

On Friday, July 26, 2019, at 4:35 p.m., freight train 60815 of the Europorte railway company, consisting of 20 tanker wagons loaded with vegetable oil and traveling near Troyes in the Aube department, triggered a "hot gearbox" and "brake applied" danger alarm, which led to its stopping by the agent in charge of traffic.

The driver, during the inspection of the train, noticed that two wheels on the same axle of the 4th carriage were severely damaged. The running surfaces had deep grooves and appeared to have partially melted. Several parts of the brake system linkage were missing. The infrastructure manager was also informed that several level crossings had not been opened and that five fires had broken out along the train's route. Subsequently, the majority of the missing parts of the carriage were found and numerous track defects were observed along the train's route.

The damage in this accident is unusual and not easily explained. Among many possible failures, the technical investigation identified that the root cause of the deterioration of the wheel treads was an incident of non-release of the brakes affecting the 4th wagon . The continued application of the brakes most likely originated from an untimely malfunction of the wagon's brake distributor, which would have continued to deliver the application pressure to the wagon's brakes following the braking test conducted by the driver on the line. Another scenario is not completely excluded, but could not be updated in accordance with the damage observed.

The brake application detection system on the line allowed the train to stop in time and prevent a more serious accident such as a derailment. However, the monitoring of moving trains carried out along the train's route did not detect the fault.

A brake incident is a common type of incident on the network. In this case, the investigation identified that the consequences were potentially aggravated by an adverse interaction between the brake blocks and the wagon wheels. The blocks are made of low-friction composite material (LL type) and, at high temperatures, their interaction with the wheels would not have had the expected behavior as verified during their approval. This adverse interaction has been observed in other incidents.

Two factors have been identified as contributing to the accident:

- the damaged wagon had already experienced several untimely incidents which could indicate a malfunction of the distributor, without the entity in charge of maintenance having investigated this series of incidents as a precursor to a more serious event;
- The unfavorable interaction under locked brakes between LL composite soles and the wheels, observed in other incidents, was raised in a working group at European level, without the work leading to concrete results and preventive measures.

The BEA-TT issues four recommendations and two invitations relating to the improvement of the breakdown management system of the entity in charge of maintenance, the use of feedback from comparable events and the verification of the approval criteria for the soles.

http://www.bea-tt.developpement-durable.gouv.fr/troyes-r287.html

Overspeed of a TGV on December 22, 2019 in La Milesse (72)	

On Sunday, December 22, 2019, a Paris – Rennes TGV train traveling on the Bretagne -Pays de la Loire high-speed line was diverted to the adjacent track at La Milesse after a train stopped in front of it. The geometry of the diversion switch allows it to be crossed safely at a speed not exceeding 100 km/h.

However, when crossing the points, the train was travelling at overspeed at 165 km/h. The train was running under ETCS Level 2, the European interoperable rail signalling system, and the maximum authorised speed displayed to the driver in the cab was 170 km/h.

The train's overspeed had neither material nor human consequences.

The speed difference is due to a configuration error in the signaling system.

This error was not detected by any of the parameter verification operations, nor during the validations and tests prior to commercial circulation, although their objective was to ensure flawless reliability of the system for traffic safety.

An initial configuration check failed to detect the error. Subsequent checks were based on an incorrect basis. Also, configuration errors similar to the one that led to the overspeed were corrected but not fully exploited due to a lack of formalized feedback.

The parameter validation was not carried out for the speed limit data on the diversion, although this operation is prescribed by the requirements of the CENELEC operating safety standards which impose exhaustive validation of the signaling parameters. The assessment body, responsible for monitoring process conformity, did not detect this non-conformity.

At the same time, the investigation revealed that the dynamic tests were subject to insufficient quality reporting, delaying the understanding of the event during the investigation.

This analysis leads the BEA-TT to address four recommendations and three invitations in the following areas:

- the review of the manufacturer's “ETCS signaling” production processes, so that this production complies with the operational safety doctrine;
- the use of formal methods for the validation of configuration files;
- the review of evaluation processes in the field of operational safety standards;
- the structuring of a process for the systematic exploitation of precursors in the design of signaling systems;
- the scope of dynamic tests and the quality of the reports of these tests.

http://www.bea-tt.developpement-durable.gouv.fr/la-milesse-r296.html

3.3 Level crossings

3.3.1 Published surveys

Four investigations into level crossing accidents were published in 2021. The table below details the nature, location and dates of these accidents, which cost the lives of two people.

In accordance with Article L. 1621-1 of the Transport Code, one of these accidents constitutes, given its consequences, a "serious" accident for which a technical investigation was mandatory. It is identified in blue in the table -below.

Date	Nature and location of the accident	Number killed
11/04/2019	Collision between a TER and a light vehicle in Pavilly (76)	0
09/15/2019	Collision between a Transilien train and a light vehicle at Roissy-en-Brie (77)	0
10/16/2019	Collision between a TER and a low-floor road train in Boulzicourt (08)	0
09/10/2020	Collision between a TER and a light vehicle in Bourg-en-Bresse (01)	2

These accidents highlighted the importance of ensuring road markings are clearly visible near level crossings. The conditions under which an exceptional convoy crosses a level crossing were also, once again, at the heart of the investigations for a particularly significant accident.

3.3.2 The recommendations issued

In conclusion of these 4 reports, 7 recommendations were formulated by the BEA-TT.

Nature of the recommendations

- 1 concerns the creation of a development in the center of the road to avoid the PN barriers having to go through a chicane;
- 1 concerns the continuation of the construction of a mapping tool to help road hauliers plan and carry out the movements of exceptional convoys;
- 1 concerns the study of the installation on board trains of an autonomous and automatic system for issuing an alert message following a collision;
- 1 concerns the modification of the road junction located near the PN;
- 1 concerns the improvement of the PN position signaling;
- 1 concerns the improvement of visibility on the flashing red lights of the PN;
- 1 concerns the dismantling of large advertising panels near a level crossing.

The recipients

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

- 1 to the road domain manager;
- 1 to the railway infrastructure manager;
- 4 to the municipal authority holding the power of traffic police;
- 1 to a central department of the Ministry of the Interior, responsible for regulating the movement of exceptional convoys;
- 1 to a railway company.

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2021

Investigation	Recommendations			
	Number	Accepted	Not accepted	No answer
Pavilly	0			
Roissy-en-Brie	4	4	0	0
Boulzicourt	2	2	0	0
Bourg-en-Bresse	2	1	0	1
TOTAL	8	7	0	1

3.3.3 Monitoring actions

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

The progress report for recommendations submitted between 2004 and 2021 is as follows:

Year of publication of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not Accepted	
2004-2006	25	22	0	3
2016	5	5	0	0
2017	-	-	-	-
2018	-	-	-	-
2019	7	2	0	5
2020	7	3	0	4
2021	7	0	0	7
Total 2004-2021	51	32	0	19

3.3.4 Published investigation reports

Collision between a TER and a light vehicle on April 11, 2019 on LC n° 48 in Pavilly (76)	

On Thursday, April 11, 2019, at 9:15 p.m., regional express train (TER) No. 3133 from Paris to Le Havre hit a light vehicle (LV) on level crossing (LC) No. 48 in the commune of Pavilly.

This PN, registered since January 1, [2017] in the national security program, is equipped with automatic light and sound signaling with four half-barriers.

The TER, which was traveling at a speed of 122 km/h at the time of the collision, did not derail or overturn. One of the 152 occupants of the train was slightly injured.

Both occupants of the vehicle were in the vehicle at the time of the collision. The 50- year-old driver and the 17-year-old passenger were seriously injured.

In the absence of operating data from both the PN equipment and the light vehicle, the BEA-TT favors the scenario of the light vehicle entering the PN at the time of its activation as part of normal operation of the installations, and crossing it at very low speed.

The driver's lack of reaction once on the level crossing and until she stopped in front of the half-barriers on the Pavilly side suggests that she probably did not hear the bell ringing.

The BEA-TT's analysis of the circumstances and testimonies of this accident did not allow it to issue any specific recommendations.

However, the BEA-TT recalls the recommendation issued in the context of the Millas accident and relating to the reception of the bell on board vehicles and underlines that new signage has been put in place on the rails of SAL4 type level crossings indicating that the barriers are breakable.

The BEA-TT also invites SNCF Réseau to include a message relating to the speed conditions for road vehicles when a road user crosses a level crossing in an upcoming national awareness campaign on level crossing safety. It invites the Seine- -Maritime departmental council to initiate an ad hoc experimental procedure associated with the installation of checkerboards painted on the ground upstream of the railway lines.

[2017] http://www.bea-tt.developpement-durable.gouv.fr/pavilly-r283.html

Collision between a Transilien train and a light vehicle on September 15, 2019 on level crossing no. 8 in Roissy-en-Brie (77)	

On Sunday, September 15, 2019, at 11:06 p.m., Transilien train No. 117 589 from Paris-Gare de l'Est (75) to Provins (77) hit a light vehicle on level crossing No. 8 in the commune of Roissy-en-Brie (77).

This PN was equipped with automatic light and sound signaling with four half-barriers.

The collision occurred while the train was traveling at a speed of 100 km/h. Despite the violence of the impact, the train did not derail.

Four occupants were initially on board the light vehicle (LV), which they were able to evacuate just before the impact; none were injured.

Among the 43 passengers and the driver on board the train, 9 were slightly injured.

The direct causes of the accident were, on the one hand, the failure of the light vehicle to stop at the level crossing despite the flashing red lights having been activated for several seconds and, on the other hand, the immobilization of the vehicle on the railway tracks for almost 45 seconds while the lowered barriers were breakable.

Several factors may have played a role in the occurrence of the accident:

- the attention of the driver of the light vehicle, who was inexperienced as she held a probationary licence, could have been drawn to the tracking of the vehicle in front, and to the navigation instructions transmitted by her passenger who was using his mobile phone;
- the road junction just upstream of the PN is complex, because many access routes converge there, requiring each road user to focus their attention on the related flows, and thus potentially reducing the attention needed to perceive the activation of the PN;
- PN No. 8 is located in an urban environment comprising numerous visual elements, some of which may have obscured or reduced the visibility of the PN approach and position signs.

In view of these elements, the BEA-TT makes recommendations relating to:

- the development of the road junction near the national park;
- improving the readability and visibility of the PN and its position signage.

http://www.bea-tt.developpement-durable.gouv.fr/roissy-en-brie-r285.html

Collision between a TER and a low-floor road train on October 16, 2019 on LC No. 70 in Boulzicourt (08)	

On Wednesday, October 16, 2019, at 4:12 p.m., Regional Express Train No. 840 808 from Charleville-Mézières to Champagne-Ardenne TGV station struck a low-bed truck stopped at level crossing No. 70 in the commune of Boulzicourt.

This PN is equipped with automatic light and sound signaling with two half-barriers.

The regional train, which was traveling at a speed of 120 km/h at the time of the collision, derailed but did not overturn. Of the 63 passengers on board, 11 suffered minor injuries.

The driver of the exceptional convoy, although outside his vehicle at the time of the impact, was also slightly injured.

The direct cause of the accident was the stopping of the low-loader convoy at the level crossing to perform a maneuver to raise the ground clearance of the semi-trailer in preparation for crossing it. This maneuver should have been carried out beforehand.

Several factors may have played a role in the occurrence of the accident, including the lack of -preparation and recognition -of the route by the drivers, as well as the failure to -comply with local traffic bans.

The BEA-TT makes several recommendations relating to the preparation of these exceptional transports and to feedback from this accident.

At the train level, the loss of radio resulting from the power cut of this safety equipment following the collision is not a cause and had no consequences for this accident. However, if the sequence of events involving the passing trains present in the area had been different, it is possible to envisage, due to the derailment of the train, a worsening of the consequences. The BEA-TT therefore makes a recommendation on the study of the installation on board, of equipment to transmit an alert in the event of a collision to surrounding trains, energy-independent and automatically triggered.

http://www.bea-tt.developpement-durable.gouv.fr/boulzicourt-r286.html

Collision between a TER and a light vehicle on October 6, 2020 on LC n° 7 in Bourg-en-Bresse (01)	

On Friday, October 9, 2020, at 10:34 a.m., a regional express train (TER) from Bourg-en-Bresse (01) to Oyonnax (01) hit a light vehicle on level crossing (PN) no. 7 in the commune of Bourg-en-Bresse (01).

This PN, not registered at the time of the accident in the national security program, was equipped with automatic light and sound signaling with two half-barriers.

The collision occurred while the regional express train was traveling at a speed of 100 km/h. The light vehicle was thrown more than 30 meters downstream of the level crossing. Despite the violence of the impact, the train did not derail.

The two occupants of the car, the 71-year-old driver and the 72-year-old passenger, were killed instantly.

Eighteen passengers, a conductor, and a driver were on board the train. None were injured.

The direct cause of the accident was the stopping of the road vehicle on the railway line while the level crossing was closed. The level crossing equipment operated correctly, and no evidence gathered during the judicial and technical investigations suggested the hypothesis of a deliberate act on the part of the driver of the light vehicle.

The investigations carried out were unable to determine whether the vehicle entered the level crossing before the start of the closing sequence, during it, or whether it went around the half-barrier already in the lowered position. The reason for its stop could not be established with certainty, the most likely hypothesis being a mechanical failure of the vehicle linked to its poor state of maintenance.

The analysis does not lead the BEA-TT to make any specific recommendations related to the circumstances of the accident. However, although this factor did not a priori play a role in the accident, it does make a recommendation regarding the improvement of the configuration of the PN and its surroundings.

http://www.bea-tt.developpement-durable.gouv.fr/bourg-en-bresse-r302.html

3.4 Guided transport

3.4.1 Published surveys

Two investigations into guided transport accidents were published in 2021. These accidents did not result in any fatalities.

Date	Nature and location of the accident	Number killed
11/02/2019	Collision by catching up between two trams in Issy-les-Moulineaux (92)	0
08/11/2019	Derailment of a rack railway from Montenvers to Chamonix (74)	0

The first accident involved another tram catching up with a tram that had stopped on the line. The report presents the various technical (reliability of equipment), organizational (communication between different operating personnel, increased frequency), and human (understanding of instructions, lack of attention) factors that contributed to the accident.

The second accident involved the derailment of a rack railway train at a switch. The investigation highlighted various organizational and human factors: on the one hand, the driver's lack of attention to his driving, distracted by the use of his smartphone, and the tacit tolerance associated with the poor enforcement of rules prohibiting this use. During the investigation, the operator installed a system to secure the crossing of switches.

These events highlight the particular attention that must be paid to the human factor in the operation and particularly the management of guided transport systems.

3.4.2 The recommendations issued

Seven recommendations were made by the BEA-TT.

Nature of the recommendations

On these 7 recommendations:

- 3 deal with the organisation of operations and associated procedures, as well as awareness of dangers and regular monitoring of driving agents by their management;
- national regulatory provision ;
- impact analysis of the reinforcement of the commercial offer on security;
- 1 relates to the reliability of a means of rapid transmission of warnings in the face of danger;
- 1 concerns the integration of organizational and human factors in accident analyses.

The recipients

These recommendations were sent to several recipients:

- 5 to the system operator;
- 2 to State bodies: the General Directorate of Infrastructure, Transport and the Sea (DGITM), and its technical service for ski lifts and guided transport (STRMTG).

The follow-ups planned by the recipients

The table below shows the follow-up given by the recipients at the end of 2021.

Investigation	Recommendations			
	Number	Accepted	Not accepted	No answer
Issy-les-Moulineaux	4	4	0	0
Chamonix	3	3	0	0
TOTAL	7	7	0	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 2015 and 2021 following guided transport accidents is as follows:

Year of publication of the report	**Number of recommendations addressed and followed up**			
	Total	Fenced		In progress
		Made	Not accepted	
2015	5	3	0	2
2016	7	6	0	1
2017	14	11	2	1
2018	6	6	0	0
2019	3	2	0	1
2020	12	2	0	10
2021	7	1	0	6
Total 2015-2021	54	31	2	21

3.4.4 Summaries of published investigation reports

Collision by overtaking between two trams on February 11, 2019 in Issy-les-Moulineaux (92)	

On Monday, February 11, 2019, at 9:01 p.m., on the T2 tram line of the Île-de-France network, a tram in commercial traffic struck from behind another tram stopped in line. The collision occurred at the tram maintenance and storage site in Issy-les-Moulineaux, between the Jacques-Henri Lartigue and Les Moulineaux stations.

The collision left 12 people injured, one of them seriously. Both trams were partially derailed. The tram that struck the car entered the adjacent roadway. Material damage, particularly to the two trams, was significant.

The cause of this collision was the late braking of the driver of the bumper tram, while he was paying attention to other tasks and while a build-up of trains was occurring in front of him.

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

- the mobilization of the attention of the driver of the bumper tram while driving on secondary tasks in competition with his attention paid to the track;
- the location of the stopping position of the struck train, at a distance from a railway light;
- the accumulation of several trains in the area due to the parking of a train in the station awaiting a driver changeover, the return of trams to the maintenance and storage site via the West entrance, known as the exceptional entrance, and the high frequency of trains on the line;
- the possible transient malfunction of the ground-train radio of the bumper tram which could have resulted in the non-receipt of the oral alert messages issued by the regulation;
- non-verification by regulation of the collation of alert messages.

The BEA-TT issues **4 recommendations** and **2 invitations** in the following areas:

- the organization of the operation of the T2 line and the associated procedures;
- analysis of the impact on security of the reinforcement of the offer;
- methods of feedback on driving events, integrating organizational and human factors;
- the reliability of the ground-train radio.

http://www.bea-tt.developpement-durable.gouv.fr/issy-les-moulineaux-r278.html

Montenvers rack railway on August 11, 2019 in Chamonix (74)	

On August 11, 2019, in the early afternoon, a Montenvers rack railway train consisting of a railcar and a trailer derailed on the lower Planards switch, heading downhill towards Chamonix.

The four axles of the railcar came off the rails, as did three of the four axles of the trailer. The entire train slid for about thirty meters and ended up tilted in the ballast. The material damage to the train and the track was relatively minor: cracks in the chassis, a damaged footboard, and impacts on the rails, the rack, and a stone parapet. There were 145 passengers on board; no injuries were reported.

The derailment led to panic evacuation of train passengers, who received no information, and the interruption of service led to 2,243 people being transferred from the Montenvers site to Chamonix in uncomfortable conditions.

The direct cause of this derailment was the train crossing the downstream switch at Planards when the route was not formed.

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

- the driver's lack of attention to his driving, resulting in particular from the use of his smartphone during his journey, despite a ban in the operator's internal regulations;
- the tacit tolerance of this use of mobile phones and the weak control of compliance with the rules prohibiting this use.

Similar derailments had already occurred in the past. They had led the operator to consider a device to compensate for driver inattention, which was not installed at the time of the accident and is now installed.

Furthermore, the evacuation of passengers after the accident was carried out in conditions which revealed shortcomings in the anticipation and preparation of the management of such events by the operator.

The BEA-TT issues 3 recommendations and 2 invitations on the following themes:

- raising awareness among officers of the risks of distracted driving;
- monitoring compliance with the instruction not to use smartphones;
- post-accident crisis management by the operator.

http://www.bea-tt.developpement-durable.gouv.fr/chamonix-montenvers-r291.html

3.5 River transport

3.5.1 Published surveys

Two investigations were published in 2021. For one of them, a joint report with BEAmer was published, supplemented by an addendum produced by BEA-TT alone.

Date	Nature and location of the accident	Number killed
09/28/2019	Collision of two bridges by the river-sea vessel ARAMIS on the Donzère-Mondragon canal (84)	0
02/18/2020	Sinking of the PAMPERO boat at the Sablons lock (38)	0

The first survey highlights the problems of vessels operating on inland waterways, particularly with regard to their dimensions and the relationship between the maritime crew - including the captain - and the river driver.

The second investigation concerns the safety of the lock infrastructure and highlights the importance of conducting a comprehensive risk analysis that takes into account the safety issues of the lock users, namely the navigators.

3.5.2 –The recommendations issued

9 separate recommendations were made by the BEA-TT.

Nature of the recommendations

- 1 aims to improve the visualization of the air drafts of the vessel concerned;
- 2 concern the improvement of information relating to free heights under the most restrictive bridges, via police regulations, the river information system and restriction signage;
- 2 aim to develop the regulatory framework for river driving in order to adapt it to river-maritime activity and to regulate the working hours of independent river transport drivers.
- 1 aims to strengthen the quality of maintenance and the level of monitoring of the gates of the lock concerned;
- 1 concerns the installation of a device allowing the position of the lock gate to be known directly;
- 2 aim to strengthen the consideration of locks in the context of the implementation of the safety policy for hydraulic structures, including increased attention to gate failure scenarios in hazard studies.

The recipients

These recommendations were sent to the following recipients:

- 1 to the owner of the vessel concerned;
- 4 to the operator of the waterway concerned;
- 1 to the manager of this waterway;
- 2 to the general directorate responsible for transport (DGITM);
- 1 to the General Directorate for Risk Prevention (DGPR), also within the Ministry of Ecological Transition.

The follow-ups planned by the recipients

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

Investigation	Recommendations			
	Number	Accepted	Not accepted	No answer
Donzère-Mondragon joint report	1	0	0	1
Donzère-Mondragon addendum	4	2	0	2
Sablons	4	4	0	0
TOTAL	9	6	0	3

3.5.3 Monitoring 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 of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not accepted	
2020	2	1	0	1
2021	6	3	0	3
Total 2020-2021	8	4	0	4

3.5.4 Summaries of published investigation reports

Collision of two bridges by the river-sea vessel ARAMIS on September 28, 2019 on the Rhône diversion canal at Donzère (26)	

On Saturday, September 28, 2019, the Lithuanian-flagged ship ARAMIS sailed up the Rhône, on ballast, from Naples to Villefranche-sur-Saône.

The river driver boarded at Port-Saint-Louis-du-Rhône on September 27 in the early afternoon, where he took charge of the vessel.

After stopping for part of the night near Avignon, the ship set sail on September 28th around 4 a.m. and continued its ascent. Around 9:10 a.m., on the Rhône diversion canal near the commune of Donzère, it struck the deck of the road bridge supporting the RN7 with its wheelhouse, the top of which tore off and fell into the water. Then, it struck a pier of the railway bridge located 200 m further on. The crew managed to immobilize the ship 700 m after the bridge. In the early afternoon, the ship was moved using a pusher to be brought to safety at a jetty located 2 km further upstream. The driver and the captain of the ship were slightly injured.

The accident involved a ship on a river, and the investigation was conducted jointly by BEAmer and BEA-TT.

The joint report highlights that the accident most likely resulted from a misjudgment of the position of the wheelhouse or the driver forgetting to lower it before crossing the bridge.

He highlights the factors that may have played a role in the occurrence of the accident:

- driver fatigue;
- the lack of safety margin and constraints linked to the dimensions of the vessel;
- an underestimation of the level of risk by the driver. In particular, while navigators generally know that the clearance height under bridges on the Rhône can be at its guaranteed minimum of 6.30 m, not all of them seem to be fully aware that this can be the case even during low water periods;
- the organization of tasks between the (maritime) captain and the river driver, with a current situation leaving many responsibilities to the driver alone;

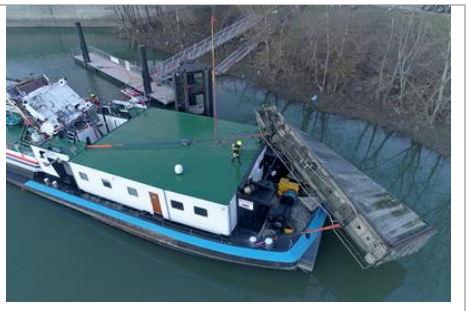
The addendum produced by the BEA-TT alone covers a more in-depth look at the last two subjects and also addresses the issue of post-accident management.

The BEA-TT has made recommendations relating to:

- improving the visualization of the air drafts of the vessel concerned;
- improving information on clearances under bridges, in particular to better attract the driver's attention;
- the evolution of the regulatory framework for river driving.

http://www.bea-tt.developpement- durable .gouv.fr/aramis-donzere-r289.html

Sinking of the PAMPERO dangerous goods transport vessel on February 18, 2020 on the Rhône when a gate of the Sablons lock (38) broke



On February 18, 2020, at around 12:30 a.m., the tanker PAMPERO, traveling up the Rhône, was moored in the chamber of the Sablons lock. The downstream gate of the lock consists of four stacked caissons. When the chamber was two-thirds full, one or two of the intermediate caissons of the gate gave way. The chamber suddenly emptied. The boat was pulled backward and then expelled from the chamber. The captain and the deckhand managed to evacuate the wheelhouse before it was torn off by hitting the top of the structure. The upper element of the gate was carried away with the boat and remained embedded in its aft section. The boat eventually stabilized. The crew managed to secure it and then, due to gas leaks, evacuated it and reached the shore, jumping into the water.

Crisis management was particularly complex due to the condition of the boat and the product being transported, vinyl chloride being a toxic and highly flammable gas. The material toll was heavy: the boat proved beyond repair; the lock gate was destroyed; river traffic was stopped for six weeks. The five crew members were very shocked by the accident, and some suffered some physical aches and pains.

The lock is part of a hydroelectric development comprising a factory-lock block, a retention dam, and a dam of the Rhône. It is remotely controlled and automated. Its downstream gate, with lateral displacement, consists of four caissons assembled together. It is suspended from a maneuvering trolley, located 6 m higher, which is connected to a winch and translates on horizontal rails.

The direct causes of the accident were a loss of coupling between the positions of the carriage and the door, due to a blockage occurring at the door at the end of the closing maneuver and made possible by the non-functioning of the winch's mechanical overload protection. The carriage was thus able to reach its nominal position, without the door doing so, and activate the sensors used in the automation systems. The blockage could be linked to floating wood.

Other elements that could have contributed to ensuring protection against such a configuration, such as the control of the door operating time and the current limitation at the speed variator, were not configured with a view to safety. More generally, it appears that the risk analysis linked to door failures had not been carried out in sufficient depth as part of the hazard study associated with the hydraulic structure.

The investigation highlights the need to strengthen maintenance at the gates of this lock. It highlights that locks are not currently covered by regulations on the safety of transport infrastructure and that their consideration in the implementation of the safety policy for hydraulic structures would benefit from being strengthened, not forgetting the fact that lock gates also fall within the scope of the European directive on the safety of machinery.

It led the BEA-TT to formulate recommendations and invitations on these aspects and to seek preventive guidelines in connection with the management of floating wood around locks as well as the processes of remote control operators.

http://www.bea-tt.developpement-durable.gouv.fr/pampero-sablons-r294.html

3.6 Ski lifts

3.6.1 Published surveys

No investigations were closed in 2021 in the ski lift sector.

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 2015 and 2021 following ski lift accidents, and which received a response, is as follows:

Year of publication of the report	Number of recommendations addressed and followed up			
	Total	Fenced		In progress
		Made	Not accepted	
2015[13]	0	0	0	0
2016	0	0	0	0
2017	8	6	0	2
2018	5	1	0	4
2019	3	0	0	3
2020	0	0	0	0
2021	0	0	0	0
Total 2015-2021	16	7	0	9

[13] Rack railways are now included in the Guided Transport section.

4 Studies and progress notes published in 2021

Study

The BEA-TT has published a note as part of its feedback regarding the wearing of seat belts on public transport.

Although mandatory since 2003, the BEA-TT's analysis of coach accidents over a decade shows that some passengers, including the youngest, do not comply with this regulatory requirement.

Unfortunately, the suddenness of the forces involved is surprising and their intensity cannot be countered, systematically resulting in unbelted passengers being thrown violently against the structure of the vehicle and other passengers often suffering serious or even fatal injuries.

The accompanying video of an American bus hit by a car illustrates the dangers of not wearing a seat belt, both for yourself and for others. These documents can be viewed on the BEA-TT website.

Stage notes

Depending on the nature of the accidents and when the time required to conclude the investigation exceeds one year, the publication of notes aims to inform stakeholders and the public of the progress of the investigations and to announce the first preventive guidelines to the entities concerned.

In 2021, six progress notes were published, concerning:

- the collision between a TER and a low-bed road train which occurred on October 16, 2019 in Boulzicourt (08);
- the collision by catching up two tram trains which occurred on December 2, 2019 in Montpellier (34);
- the derailment of a TGV on the East European high-speed line which occurred on March 5, 2020 in Ingenheim (67)
- the accident involving a TER and an SNCF mobile construction site which occurred on March 18, 2020 in Schiltigheim (67);
- the derailment of an RER B train which occurred on June 24, 2020 near the Denfert -Rochereau station
- the derailment of a RegioRail freight train which occurred on September 17, 2020 in Corbonod (01)

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

5 Summary of recommendations

5.1 Overall assessment

Twelve investigations were completed in 2021, including one conducted with the Maritime Incident Investigation Bureau. The accidents they investigated claimed the lives of five people and caused five serious injuries. Four occurred at level crossings. Ten investigations concluded with the issuance of recommendations and invitations to stakeholders: operators, managers, infrastructure operators, regulatory and standards authorities, recommendations aimed at preventing similar incidents.

5.2 Nature of the recommendations

In conclusion of the 12 reports, the BEA-TT made 34 separate recommendations.

Seven concern **level crossings:**

- firstly, five recommendations on the development of the areas around level crossings, on the one hand to improve the readability of the signs, and to dissuade motorists from crossing closed level crossings by using chicane manoeuvres,
- a recommendation recommends improving and supplementing the information available on the “exceptional transport” section of the Géoportail website,
- Finally, it is recommended to study the feasibility of equipping trains with an autonomous energy system alerting rail traffic management centers in the event of an impact.

For **road transport,** a recommendation is addressed to a network manager to limit speed and better signal the danger around the bend where the accident under investigation occurred.

Two other recommendations target the stability of concrete mixer trucks: regulations to implement sensor systems for stability control, and training for drivers of this type of truck.

The eight recommendations issued for **rail transport** cover three subjects:

- wagon maintenance management;
- the quality of a type of brake shoe: quality control of the supplier, the reactivation of thinking on the prevention of wear of wheels equipped with this type of shoe, and the terms of approval of the shoes;
- the quality of ETCS railway signalling settings: production and verification processes, including standardised validation methodology.

For **guided transport,** two accidents were analyzed, the causes of which led to recommendations being issued:

- on the operating instructions at a specific location on the Île-de-France tramway network;
- and on the necessary safety impact studies when the commercial frequency is increased;
- on the reliability of ground-train radios;
- on the deepening of human and organizational factors in the analysis of accidents and in parallel on the awareness of guided transport drivers of attention lapses;
- on the means to be implemented to monitor compliance with an obligation given to drivers not to use a telephone while driving;
- Finally, a recommendation concerns the regulatory authorities who must analyze the feasibility of a ban on the use of telephones for guided transport drivers.

Eleven recommendations concern **river transport:**

- two target methods of monitoring and maintaining lock gates, including the installation of sensors to detect faults;
- two others propose an improvement of hazard studies and consequently the methods of inspection of locks;
- four concern current and real-time information on water and air drafts on shipping routes;
- Finally, three last recommendations point to the necessary clarification of the practice of piloting ships: the legal framework of this practice, the regulation of driving time, contractual relations and the sharing of roles between the captain and the pilot of the ship.

5.3 The follow-ups planned by the recipients

Article R. 1621-9 of the 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 34 recommendations issued in 2021:

- 29 have been accepted, of which 17 have already been implemented and 12 with a time limit*;*
- 5 have not yet received a response from the recipient concerned.

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.

It should be remembered that the BEA-TT does not have the authority to monitor the actual operational follow-up given to the recommendations issued. Monitoring of this implementation, beyond the simple collection of the recipients' intentions, carried out by the BEA -TT, is, by law or in fact, handled by an external authority.

With regard to the main railway stakeholders, this monitoring is carried out by the EPSF, in accordance with European Directive 2016/798 of 11 May 2016 and national transposition texts.

For other modes of transport, monitoring is generally carried out by a central administration directorate-general: the DGITM for road infrastructure, the DGEC for road vehicles, the Road Safety Delegation for traffic regulations, and the STRMTG (service attached to the DGITM) in its field.

SUMMARY OF APPENDICES

Appendix 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 12/31/2021 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 2021 financial year is shown in bold.

Railway: Recommendations issued in 2012

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 *
01/2012	Derailment of a freight train at Neufchâteau station (88) on 05/22/2010	R2	Intervene with European standardisation bodies to have raw fabric wheels removed from European standards for the design and manufacture of wagon wheels, pending sufficient development of knowledge on the influence of their surface characteristics on their fatigue resistance.	BNF	A new version of the EN 13979-1 standard was published in July 2020, removing the notion of raw canvas and machined canvas. **The analysis of the EN 13979-1 standard made it possible to close this action.**	C
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. *Furthermore, the BEA-TT invites railway operators operating on the national rail network to remind their drivers of the safety requirements relating to running on sight, in particular in terms of vigilance and control of the speed of their train, in order to be able to stop it before any signal or obstacle.*	SNCF Network	The deployment of recorders in substations is still ongoing. Due to the health crisis in 2020, progress has been delayed, and the planned completion date of 2025 must be revised. Action in progress **The deployment was delayed in 2021. A progress report and an updated schedule must be sent to the EPSF in the first half of 2022.**	O

* C = Close; O = Open

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
07/2013	Collision between a train and a construction machine in Lachapelle-Auzac (46) on 07/04/2012	R3	Ensure the recording of all operational communications made from traffic officers' service telephones. *Furthermore, the BEA-TT invites the SNCF to conduct a feedback exercise on the use of new LOR'AXE type overhead line maintenance equipment and on the training conditions of their drivers.*	SNCF Network	As for recommendation R1 of the investigation relating to the catching up of two freight trains at Maillé (37) on 01/02/2012: The deployment of recorders in substations is still ongoing. Due to the health crisis in 2020, progress has been delayed, and the planned completion date of 2025 must be revised. **The deployment was delayed in 2021. A progress report and an updated schedule must be sent to the EPSF in the first half of 2022.**	O

Railway: Recommendations issued in 2015

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	Collision following a drift in Modane (73) on 01/24/2013	R1	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 2020, 46% of the wagon fleet affected by this recommendation had been treated. **No additional information received in 2021 on the progress of this action.**	O
		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 of the only Industrial Technical Center concerned.**	O

Railway: Recommendations issued in 2016

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	As for recommendation R1 of the investigation relating to the recovery of two freight trains at Maillé (37) on 01/02/2012: The deployment of recorders in substations is still ongoing. Due to the health crisis in 2020, progress has been delayed, and the planned completion date of 2025 must be revised. **The deployment was delayed in 2021. A progress report and an updated schedule must be sent to the EPSF in the first half of 2022.**	O
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	Analysis in progress with regard to the publication of new versions of the standard: • rolling stock gauge (EN 15273-2) • passive safety (EN 15227) **Standard about passive safety (EN 15227) had been published in 2020.** **Sandard about rail vehicle (EN 15273-2), the publication will be implemented in 2024.**	O

Railway: Recommendations issued in 2017

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	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 Passengers 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 2021, EPSF continued to monitor the progress of the work carried out by SNCF Réseau and SNCF Voyageurs with a view to making an upgrade to SAM 004.**	O
		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. **The experimental phase should lead to the generalization of the principle of local risk analyses in 2022. A file for this purpose must be submitted to the EPSF in early 2022.**	O
		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 received in 2021.**	O

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
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. **The technical feasibility study has been completed. The use of Voestalpine stations already deployed in the region for other uses is capable of meeting the recommendation.** **The alarm thresholds for which action would be necessary are being reviewed and the related operating rules are being defined.** **The goal is now to produce a demonstrator by the end of 2022 and a series production unit in 2023.**	O

Railway: Recommendations issued in 2018

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/ 2018	Catching up with two TER trains on August 18, 2017 near La Redonne-Ensuès station (13)	R3	Carry out a retroactive safety study for the Marseille – Miramas line, of the impacts in nominal mode and in degraded mode, and of the technical solutions or procedures that can be implemented to contain the risks.	SNCF Network	SNCF Réseau has decided to respond to this recommendation by testing a technical solution to assess its potential for deployment. In the meantime, a procedural adaptation has been initiated in cases of entry into occupied cantons. In 2020, the adaptation of procedures was completed and allows this part of the response to be closed. **The technical solution has been abandoned. The implementation of the procedural solution addresses the problem by disseminating the procedures to all establishments responsible for traffic management.** **SNCF Réseau has carried out an analysis of the application of the procedures mentioned above since 2019.** **The elements received made it possible to close this recommendation.**	C

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
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. **The technical study continued in 2021. Two solutions were selected and are currently being tested. The target date for approval is set for the end of the first half of 2022.** **As of 12/31/2021, no target date has been set for the deployment plan. This date will depend on the results of the technical study.**	O
		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. **Implementation of the matrix for testing is scheduled from December 2021 / January 2022. An adjustment is planned to take into account the Rex and the sharing of work in connection with Gare & Connexions. Use of the matrix has been validated from September 2023.**	O

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)	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. This first stage has been delayed due to the health crisis and is expected to be completed in March 2021. 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 results of the signage experiment have been analyzed. The availability of the new signage charter has been postponed until the first half of 2022 (due to delays caused by the health crisis). The rollout remains to be specified, depending on the charter's availability.**	O
		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 adopt real preventive behaviours to address these risks.	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. **The communications campaign has been postponed due to the health crisis, which prevented local actions from taking place. It is expected to be rolled out before the second half of 2022. However, a website with the communications materials is available.**	O
				SNCF Passengers	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. **No additional information in 2021 on this action.**	

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 are still planned before the end of 2024.** **To date, no target date has been set for the integration of the devices selected in the security policy relating to the prevention of the risk of collisions in stations on TVPs.**	O
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 2021, the evidence did not allow this recommendation to be closed. Additional information is to be provided by SNCF Réseau in 2022.**	O
		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 conducted within eighteen months and 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 study the advisability of setting a regulatory requirement. **The initial target date of December 31, 2021, could not be met. A working group or other form of reflection must be launched without a specified target date.**	O

Railway: Recommendations issued in 2021

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
05/2021	Axle jammed on a freight train between Romilly-sur-Seine and Troyes (10) on 07/26/2019	R1	Implement management of repetitive anomalies at the level of each wagon or wagon component, and decide on the methods for defining the actions to be taken in this case to guarantee the safety of maintaining the equipment in operation.	VTG	**VTG responded to this recommendation by specifying that, in order to meet its regulatory obligations and its safety policy, VTG has a damage management system which includes the management of repetitive anomalies.** **VTG states that this system is clearly documented and that the railway maintenance and safety management system is certified as compliant with Regulation 445/2011 "concerning a certification system for entities responsible for the maintenance of freight wagons" applicable at the time of the event. The management of repetitive anomalies was not the subject of any comments or non-compliance during the audits.** **Finally, VTG adds that the investigation report fails to specify that the effectiveness of the management of repetitive anomalies depends, to a large extent, on the reliability and clarity of the information received from the railway companies. As such, VTG considers that this recommendation should be addressed to all the railway stakeholders concerned and not be limited to just one of them.** **In view of the response provided, this recommendation is closed as it is considered rejected by VTG.**	C
		R2	Check with suppliers of “LL” brake shoes that their quality control system guarantees the conformity of the products delivered to the approved type.	VTG	**VTG responded to the recommendation by stating that the process of searching for and selecting a supplier is clearly documented in the quality, safety and maintenance management system.** **Among the prerequisites, brake shoe suppliers must be certified according to the ISO 9001 standard. This standard requires the certified company to detect non-compliant products during production or after delivery. Based on a risk analysis of the detected non-compliance, each supplier must alert its customers in the event of a safety-critical non-compliance and organize the recall of defective delivered products.** **At present, VTG has not received any alert following the delivery of the soles involved in this case and which could have been non-compliant with the approved type and/or whose non-compliance would involve a recall of the defective batch.** **In view of the response provided, this recommendation is closed as it is considered rejected by VTG.**	C

Railway: Recommendations issued in 2021 - 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
05/2021	Axle jammed on a freight train between Romilly-sur-Seine and Troyes (10) on 07/26/2019	R3	Reactivate the Joint Network Secretariat "wagon braking systems" to define measures to prevent the risk of damage to rolling surfaces by digging into wheels fitted with LL blocks during braking incidents.	ERA	**The European Union Agency for Railways (ERA) responded to this recommendation by clarifying that, as things stand, a clear correlation between LL composite brake blocks and deterioration of the wheel running surface in a locked situation cannot be proven.** **ERA considers the investigation report to be a valuable contribution, however further evidence and detailed analysis still need to be gathered before considering a potential effective reactivation of the JNS wagon braking systems.** **In view of the response provided, this recommendation is closed as it is considered to have been rejected by the ERA.** **ERA Post-Response Information: Following new events in Europe, a JNS "Extreme effects of thermal overload in special cases of freight operation" has been triggered with the aim of publishing measurements by February 2022.**	C
		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.	ERA	**The Agency responded to this recommendation by recognizing the validity of this proposal.** **A two-step approach is proposed to address this. First, 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, then it could be considered by the appropriate working group in charge of the revision of the TSIs in order to modify the technical document ERA/TD/2013-02/INT to which Regulation 321/2013 (TSI Wagon) refers.** **As of 12/31/2021, no target date set for the closing of this action.**	O
				BNF	**No response has been received as of 12/31/2021**	
				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.** **As of 12/31/2021, no target date has been set for the implementation of this action.**	

Railway: Recommendations issued in 2021 - 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
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.** **No new errors were identified by these studies on the LGVEE, BPL and SEA projects.** **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.**	O
		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.**	O
		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**	O
		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.** **CERTIFER offers to inform its staff and implement this RFU document within 6 months of publication.**	O

Appendix 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 12/31/2021 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 2021 financial year is shown in bold.

LC: Recommendations issued in 2006

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 PN, in order to reach a decision and completion as soon as possible.	SNCF Network General Council 62	The road ring road project allowing the removal of the level crossing included in the list of level crossings in the national security plan has been cancelled and no new study has been relaunched. For several years, this national park has been equipped with a radar system designed to detect untimely road crossings. SNCF R continues to study the development options for securing this level crossing, including experimental video surveillance devices. Action in progress **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 PN, and the study of the electric torch equipment.** **No target date has yet been set for the closure of this action.**	O

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 PN No. 4 (as well as PN 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.	Municipality of Nevers	No information obtained following the reminder letter from the DGITM in order to obtain elements on the implementation of measures to respond to this recommendation. **No additional information received in 2021.**	O

LC: Recommendations issued in 2014

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 at the intersection of Chemin du Passet and Rue Albert Cohen. The response letter sent to the BEA-TT announces that consideration is being given to removing this level crossing. No information obtained following the reminder letter from the DGITM in order to obtain elements on the implementation of measures to respond to this recommendation. **No additional information received in 2021.**	O

LC: 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
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 and continued in 2021, with challenges encountered due to the current health crisis. As of December 31, 2021, no target date has been set.**	O

PN: 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
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 INPN on March 17, 2021.** **Furthermore, SNCF Réseau is conducting a project called "smart intersection" aimed at testing the feasibility of transmitting information on the status of an automatically signaled and illuminated level crossing to road vehicle drivers. This study concluded that this type of alert transfer is technically feasible. The future deployment of such devices does not depend solely on SNCF Réseau, which is involved in European and French ground/road vehicle communication projects (Croads, Indid, Coopits, etc.).** **As of 12/31/2021, the EPSF is awaiting evidence on these actions to close the recommendation.**	O

LC: 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
05/2019	Collision between a TER and a coach school transport in Millas (66) 12/14/2017	R3	Study the options for widening existing intersections on either side of the PN25 to facilitate turnings depending on the type of heavy vehicle. Failing this, take police measures to prohibit left turns, towards the PN, 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 PN°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. **No information on the successful completion of the work was obtained in 2021.**	O
		R4	Update and supplement the provisions of the circulars relating to the safety of level crossings, and their application documents, so that safety diagnoses become more complete and high-quality risk analyses in order to make the necessary preventive actions more relevant.	General Directorate of Infrastructure, Transport and the Sea - DGITM	A circular was published in January 2020 to ask prefects to ensure the implementation of the obligation to carry out safety assessments by the stakeholders concerned and to monitor them. At the end of 2020, the decree and order relating to road safety assessments of level crossings are in draft. They introduce the obligation to carry out safety assessments, including the structure as well as the methods of execution and provision of these assessments. **The decree was published in May 2021 and allows this action to be closed.**	C

LC: 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
05/2019	Collision between a TER and a coach school transport in Millas (66) 12/14/2017	R5	Study the feasibility of installing a front camera at the 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 Network	The proposal concerning 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 published and the follow-up to the conclusions is now awaited. **The experiment is underway with the installation of six new video surveillance systems, with delays due to the health crisis. No target date has been set yet.**	O
				SNCF Passengers	Consideration was already being given to installing front-facing cameras at the front 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 for the next two years includes the completion of work on the technical components. The planned trajectory will allow for the first equipment to be installed in 2023.**	
07/2019	Collision between a regional train and a car at LC 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 PN no. 8 with transfer to PN 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. **The communities are asking for automation of this PN but this option is not being considered by SNCF Réseau.** **A study was requested but it is not considered acceptable by the communities.**	O

LC: Recommendations issued in 2020

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
05/2020	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 PN No. 302 from the northern approach, particularly by acting on vertical signage and vegetation.	Saint-Etienne Metropolis	**As of 12/31/2021, Saint-Etienne Métropole's response to this recommendation is not yet known.**	O
		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 PN 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 PN 302 from the north. This signal would remain red when the PN is closed.	Saint-Etienne Metropolis		O
		R3	Study the removal of advertising elements present on road rights-of-way which could contribute to distracting road users approaching PN No. 302. Remove interference between directional signage and warning or police signage by retaining only the elements most essential for safety.	Saint-Etienne Metropolis		O

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	R1	a) Implement devices at the end of the platform in Nouan-le-Fuzelier and Theillay that enforce compliance with the routes provided for accessing or leaving the platforms and that are sufficiently dissuasive to prevent non-compliance with the prohibited passages. b) Study the other guarded PN located near a passenger service point on lines with speeds above 160 km/h and, for those presenting a risk of non-compliance with prohibited crossings, apply the same treatment to them.	SNCF NETWORK	a) SNCF Réseau declares that it implemented the planned changes in the summer of 2019. b) SNCF Réseau states that it has carried out the requested study which showed that no other passenger service point on a section of line travelled at more than 160 km/h was close to a guarded level crossing. **The evidence provided on these actions made it possible to resolve this recommendation.**	C
		R2	Review the installation of safety signs and directional signs in Nouan-le-Fuzelier to make them visible from route alternatives and to discourage early use of prohibited routes.	SNCF Station and Connections	SNCF Réseau and Gares & Connexions implemented this recommendation by carrying out the signage changes at the same time as the work mentioned in the previous R1 recommendation. **The evidence provided on these actions made it possible to resolve this recommendation.**	C
		R3	a) Draw concrete conclusions from the risk study carried out on pedestrian safety at the PN 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 PN.	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 PN commission.** **Evidence of this action plan must be provided in order to close this recommendation.**	O

LC: Recommendations issued in 2021

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
03/2021	Collision between a train and a light vehicle on LC n°8 in Roissy-en-Brie (77) 09/15/2019	R1	in 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 PN and, on the other hand, for users who have crossed the PN to access Avenue Gounod.	Roissy-en-Brie Town Hall	**As of 12/31/2021, the response of Roissy-en-Brie town hall to this recommendation is not yet known.**	O
		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.**	O
		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	**As of 12/31/2021, the response of Roissy-en-Brie town hall to this recommendation is not yet known.**	O
		R4	Have large advertising panels located in the immediate vicinity of the PN on the RD 21 and causing visual distractions that are detrimental to the visibility and readability of the PN removed.	Roissy-en-Brie Town Hall		O

LC: Recommendations issued in 2021 - 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
11/2021	Collision between a TER and a light vehicle in Bourg-en-Bresse (01) 10/09/2020	R1	Finalize, in accordance with the conclusions of the 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 PN No. 7, in order to discourage users coming from the city center from crossing the PN in a chicane.	City of Bourg-en-Bresse Ain Departmental Council	**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 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.**	O
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 launched in 2021 to examine how to respond to the recommendation. The choice of a solution in principle has been confirmed.** **Without waiting for the BEA-TT recommendation, SNCF Voyageurs worked on a wiring modification 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, while taking into account the associated risk of short circuit.** **To date, 91% of the fleet has been modified.**	O

Appendix 3: EPSF monitoring 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 *
R1	**Treatment of risks associated with objects of abnormal height** Take measures that are both appropriate and sufficiently reliable to reduce the risks associated with sparking between the overhead line and objects of unusually high height, such as parts of a truck or its load. This objective can be achieved by reinstalling the pagodas, installing, after validation, a different roof model, implementing an improved detection system with associated procedures or an alternative solution.	Eurotunnel	Eurotunnel's proposal was to reinstall four pagodas on each of the carriages, coupled with additional protective measures. In October 2021, Eurotunnel submitted the final safety case confirming the completion of this project. This was accompanied by a safety assessment report from an unqualified safety assessment body. The IGC closed this recommendation on December 8, 2021. Quarterly written monitoring updates will be provided to the SC to demonstrate that the identified control measures continue to ensure risk control as intended.	C
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 have reservations about Eurotunnel's approach to these projects. While Eurotunnel has provided further details on the proposed solutions during regular workshops, the file reporting on the overall safety of the projects is not complete. Until the proposed systems have passed final tests, there is no clear indication that a fire will be detected early in an HGV shuttle. The relationship between the two projects (fire detection on board HGV shuttles and fire detection in rail tunnels) is also unclear.	O
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	Although the Safety Committee considers the work undertaken by Eurotunnel to take into account and implement the recommendations from the Frazer-Nash report to be conclusive, the recent review of Eurotunnel's application for safety approval has revealed a series of problems affecting the management of developments which require a further inspection before closing this recommendation.	O
R5	**Mastering the limits of the services of external verification bodies** Review the arrangements to ensure that the framework and scope of all checks by external bodies mandated by Eurotunnel are clearly defined and implement any necessary changes.	Eurotunnel	The IGC echoes the Safety Committee's view that Eurotunnel should revise procedure SAFD 0080 to define its own expectations regarding the services provided by its external bodies and the checks to be carried out to ensure that they have performed properly. Eurotunnel should clearly define the framework and scope of these checks in its development management procedure.	O

* C = Close; O = Open

Appendix 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

recommendation closed:	***C***
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, which occurred on June 18, 2013 in Toulouse (31)	R1	Ask operators of VAL automatic metros that have sections of track with a steep slope, located in the open air or at tunnel entrances, to counter-groove their running tracks by orienting the arcs of the grooves in the opposite direction of the slope, in order to improve water drainage.	STRMTG	10/10/16	13-14/12/16 : Inter-VAL Working Group : discussions with the profession on the content of a STRMTG recommendation 01/30/17 : publication of a recommendation from STRMTG headquarters 06/15/17 : deadline for responses from operators 10/15/17 : effective date when the notices were issued to operators after analysis of their responses Points still being monitored by the inspection offices in connection with the opinions issued *It should be noted that recommendation R3 was the subject of a remark to all operators in the STRMTG opinions issued : "I ask you, however, while waiting for a tool to measure runway grip continuously [R4], to now include in the annual report a monitoring of the level of grip carried out using the means currently available, specifying the operational procedure used,"* *This remark links recommendation R3 (STRMTG) to recommendation R4 (Siemens). Since progress on recommendation R4 on the development of the tool is currently difficult (Siemens is waiting for all networks to adhere to the approach (a priori financial reasons)) and STRMTG does not have any levers for action today, it is feared that in the long term, the follow-up given to recommendations R3 and R4 will not be as expected.* *Overall, the subject of grip is regularly and always addressed by the Inter-VAL GT, which brings together the entire profession.*	C
	R2	Ensure that VAL automatic metro operators have an efficient procedure for monitoring the state of fouling of the running tracks and effective cleaning tools when the criteria, particularly clogging of the grooves, are met.	STRMTG	01/31/17		C
	R3	Ask VAL automatic metro operators to check and, if necessary, restore the grip of the running tracks on their network.	STRMTG	01/31/17		C
	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 organization chosen to control the grip of the VAL track. The feedback is currently being analyzed and will, in principle, allow us to not rely on a single solution, but to specify the objectives for maintaining the level of grip and to formalize the associated process.	EC

Metro and RER: Recommendations issued in 2019

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Derailment of a metro train running on line 2 of the Paris metro on 2/12/2016 at the Barbès-Rochechouart station in Paris (75)	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 standardization commission, 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 the scheduled revision. It was led by a French expert, and three other experts were appointed by the same French commission 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 the French proposal in this context, 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 is planned for October 2022.	EC
	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.	DGITM	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.	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.	EC

Metro and RER: Recommendations issued in 2020

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Derailment of an RER B train on June 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.	EC
	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.	EC

Metro and RER: Recommendations issued in 2020 - continued

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Technical investigation into the derailment of a metro train that occurred on December 21, 2018 in Marseille (13)	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	EC
					Pending integration into the Quality documents, communication to the offices in the form of a generic response	C
	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.	EC
	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

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)

Trams and tram-trains : Recommendations issued in 2015

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Child fall under a tram train that occurred on April 28, 2013 at the “René Cassin” station in Nantes (44)	R1	Supplement the means and operational procedures for triggering and processing alerts in order to ensure, as soon as an accident is suspected, a rapid stop of the tram trains concerned. To this end, equip the stations of the Nantes tramway network with simple devices enabling any witness to an accident to immediately notify the centralized control station.	SEMITAN	08/27/2015	display of an emergency number at all tram stations and development of a procedure at the PCC for handling calls	C_2015

Trams and tram-trains: Recommendations issued in 2016

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Fatal fall of a traveler in a tram during emergency braking September 3, 2012 in Montpellier (34)	RI	Ask tram operators to ensure that the driver has sufficient time, and in any event more than two seconds, between the moment when an alarm indicating a failure to activate his standby device is triggered and the moment when the corresponding emergency brake is applied.	STRMTG	05/07/16	This measure aims to reduce the occurrence of untimely standby FUs unrelated to potential driver discomfort. The STRMTG will engage in discussions with operators and transport authorities to determine the conditions for implementing this recommendation. For future rolling stock, the technical guide "Tram standby function - Safety requirements" currently being developed by the STRMTG will take this recommendation into account. Technical guide “Tram standby function” published on 02/10/2017	C_2022
	R2	Check that the NF EN 13452 standard is specified in the safety files for future tram trains. In particular, ensure that the emergency braking system design allows for different performance levels depending on whether it is triggered by the driver or by the emergency braking system.	STRMTG	05/07/16	Designing emergency braking with different performance depending on whether it is triggered by the driver or by the Standby FU is a measure that tends to reduce the severity of events associated with standby-related emergency braking activation. The STRMTG has therefore already undertaken this work with rolling stock manufacturers and the latest generations of rolling stock already have different braking performances depending on whether it is triggered by the driver or by the FU Veille. These elements will also be specified in the aforementioned guide. Technical guide “Tram standby function” published on 02/10/2017	C_2017
	R3	Examine, in conjunction with operators and the STRMTG, the extent to which instantaneous deceleration and jerk of existing trains can be reduced under acceptable technical and economic conditions when emergency braking is triggered by the standby device or by technical safety devices unrelated to a proven and imminent danger outside the train.	ALSTOM	11/07/16	Taken into account in the design of the new X05 range (Nice in 2018)	C_2018

Trams and tram-trains: Recommendations issued in 2017

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Data response	Follow-up and progress	Code
Collision between a tram train and a car on December 21, 2013 in Saint-Denis (93)	R1	Quickly complete programs to deal with fixed obstacles likely to aggravate the consequences of collisions between trams and road vehicles, and in the meantime, take simple and temporary preventive measures for the most critical ones.	AOM of the 11 networks tram put into service before 2003		All urban areas have developed their own fixed obstacle treatment programs. Most have finalized their programs. The progress of these programs is reported in the annual reports.	C
	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.	EC
	R3	Request that mobility organizing authorities in charge of tram lines and their operators formalize their relationships with road managers and traffic police authorities, enabling effective consideration of feedback from accidents and incidents.	STRMTG, UTP, GART	09/25/2017 11/01/2019 (information on the closure of actions initiated by STRMTG)	Decree No. 2017-440 of March 30, 2017 relating to the safety of guided public transport (STPG decree) provides for the formalization of exchanges between AOT, operators and road managers within the framework of feedback from accidents and incidents through the provisions of three articles 81, 89 and 92. The STRMTG has, in particular, undertaken an action to standardize and strengthen annual reports following the proposal to eliminate updated safety files. The working group is now closed and the STRMTG has completed updating the guide on the content of annual reports. The STRMTG now systematically requests the implementation of a system (agreement or other) between AOT and road managers enabling them to be able to present to the State control services the supporting documents relating to the maintenance over time of the safety level of the system.	C_2019

Tramways and tram-trains: Recommendations issued in 2017 – continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision between a tram train and a car on December 21, 2013 in Saint-Denis (93)	R4	Decline, in the implementing decree and technical guides, the new provisions provided for by decree no. 2017-440 of March 30, 2017 relating to the safety of guided public transport, ensuring that the following are made operational : ➢ verification of the implementation of corrective actions ; ➢ the systematic involvement of road managers and traffic police authorities ; ➢ binding measures in the event of delay, lack of involvement or failure of process stakeholders. Carry out an assessment of their effectiveness when we have sufficient hindsight.	DGITM and STRMTG in conjunction with DGCL and DSCR	09/25/17	As regards the verification of the implementation of corrective actions, the STRMTG, through the inspection offices, ensures continuous local monitoring of the networks in operation according to the following provisions : operational monitoring meetings operational control audits “on-the-fly” monitoring through operating events, which allows for the rapid detection of safety issues (accidents, pathologies, etc.). Regarding the second point of the recommendation, it calls for the same comments as those presented previously for recommendation R3. Regarding binding measures in the event of delay, lack of involvement or failure of actors in the process, the STPG decree provides for provisions in its article 85. Furthermore, the Prefect may ask the operator, infrastructure manager, leader or transport organizing authority to have a system safety diagnosis carried out by a qualified body when the annual report has not been submitted or if its content is insufficient to enable the overall level of safety to be assessed.	C_2017
Derailment and dislocation of a train on line T1 of the Valenciennes tramway on April 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.	EC
	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.	EC

Trams and tram-trains: Recommendations issued in 2018

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Derailment of a train on line T2 of the Lyon tramway (69) following its collision with a light vehicle August 23, 2015	R1	For ranges that have not yet been developed, in the application of the technical guide "Design of the front ends of trams", do not validate reference equipment with unfavorable feedback such as the CITADIS X02 range. If the manufacturer cannot reasonably propose another reference equipment, require a significant improvement in the derailability rate compared to the reference or compensatory measures significantly reducing the severity of a derailment.	STRMTG	10/18/2018	The STRMTG will implement the BEA TT recommendation concerning the tram ranges that have not yet been developed. However, the STRMTG considers that compensatory measures are interesting for existing tram ranges but are not sufficient for the ranges to be developed. Therefore, it will be necessary to require each manufacturer to offer a tram less sensitive to derailment if it has a reference model with unfavorable feedback, such as the X02 range. However, it will be necessary to specify the criteria for qualifying a significant improvement in the derailment rate. The STRMTG has no additional comments regarding recommendation R2 addressed to Alstom. Regarding recommendation R3 addressed to Keolis Lyon, SYTRAL, SEMITAG and SMTC Grenoble, the STRMTG is entirely in favour of imposing a speed limit for crossing intersections, a measure which is currently applied by almost all tram networks in France.	C_2018
	R2	Propose solutions in ranges subsequent to CITADIS X05 to significantly improve derailability compared to CITADIS X02. Failing this, propose compensatory measures to reduce the severity of a derailment ; these measures could also be presented as retrofits to current ranges.	ALSTOM	07/01/2019	To be seen after the X05 range, a range not launched by Alstom	C_2022
	R3	Impose a speed limit for trams crossing intersections adapted to the danger and visibility, generally between 30 and 40 km/h. Specify, in driving instructions and training, the methods for approaching and crossing intersections by drivers to prevent the risk of collision.	Kéolis Lyon, SYTRAL, SEMITAG and SMTC	02/15/2019 02/15/2019 05/03/2019 04/04/2019	Approach validated with SYTRAL, BSE, KEOLIS Lyon and DTMR	C_2021

Trams and tram-trains: Recommendations issued in 2020

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Collision between a T7 tram and a coach February 27, 2019 in Paray-Vieille-Poste (91)	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			NC
	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			NC
	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.	EC
	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_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Technical investigation into the collision of a pedestrian by a tram Chartrons quay in Bordeaux (33) February 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.	EC
	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	WG launched in December 2020 (3 meetings held, next meeting 09/21/2021). Study concerning the signaling of pedestrian crossings on tramway platforms launched by STRMTG/CEREMA (cch validated by DSR by email dated 03/11/2020)	EC

Trams and tram-trains: Recommendations issued in 2021

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

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 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
	R2	For any tram line in France, consider an increase in frequency as a system modification and, therefore, require the person carrying out the modification to carry out an analysis of the operational impacts on safety, across the entire line concerned.	STRMTG	03/19/21	The STRMTG has already taken this recommendation into account when developing instruction documents for inspection offices covering the activity "Characterizing and evaluating changes in urban guided transport". To this end, the issue of increasing frequency is identified as a point of attention involving the request for a file of intent from project leaders in order to assess the possible impacts on safety as well as on the operability of the entire line concerned.	C_2021
	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.	EC
	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 cab.	EC

Appendix 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 2015

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Derailment of a train on the rack railway "The Panoramic of the Domes" October 28, 2012 in Orcines (63)	R1	Carry out a comprehensive study of the risks associated with accidental tailgating of the various track devices on the "Panoramique des Dômes" rack railway and, if justified, implement measures to limit the consequences.	TC Dome	07/07/15	The feedback following the derailment was taken into account by the operator and it was decided to install a system called Active and Automatic Surveillance (SAA) in the crossing area. This system requires the driver to limit his speed in the crossing area and to check the position of the switches before crossing them at the heel.	C
	R2	Amend the legislation to extend the application of the regulations relating to guided transport systems to rack railways installed in mountain areas, instead of those relating to ski lifts. At the very least, if such a legislative amendment were not to take place, strengthen the conditions of approval of the project managers called upon, pursuant to Article R. 342-4 of the Tourism Code, to work on rack railways so that they guarantee in-depth knowledge and experience on their part in terms of railway-type technologies and operating methods.	DGITM	03/30/15	A draft decree *is under study and* provides for the creation, in the approval of ski lift project managers, of a category dedicated to rack railways which will make it possible to strengthen the consideration of the specific features of these installations. *A guide "design and operation of rack railways" was published on 21/12/2016, it provides elements on the design of rack railways and essential requirements for operation.*	C

Secondary, tourist and rack railways: Recommendations issued in 2015 - continued

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Train derailment on the Nice-Digne-les-Bains line following a rock fall, February 8, 2014 in Saint-Benoît (04)	R1	Define a common system for monitoring rock slopes overlooking railway or road rights-of-way, in areas at risk of rockfalls, in order to detect warning signs of destabilisation of rock masses and check the good condition of the protective devices. Specify the criteria for triggering exceptional rounds and the measures to be taken in the event of detection of an anomaly.	PACA Region, Interdepartmental Directorate of Mediterranean Roads	O/2016	"The RRT PACA has already concluded an agreement with the General Council of the Alpes-Maritimes which defines a common alert procedure for the road and rail networks regarding the observation of rockfall or landslide. This agreement has been included in the safety regulations of the Chemins de Fer de Provence in the form of a local directive DL-INF n°2. The RRT PACA is currently working with the DIRMED to establish an identical procedure for the risk areas identified in the Alpes de Haute-Provence department. Field monitoring and risk studies have led to the construction of protection structures against rockfalls. This work was financed within the framework of contractual investment programs (in particular CPER and PDMI)." STRMTG opinion issued on 28/10/15 on the pre-report; June 23, 2016: STRMTG is relaunching the study to develop a forecasting tool for more rational consideration of variable data from natural hazards in railway operations. CEREMA will handle the natural hazard component, and the working group composed of STRMTG and operators will propose associated operating measures. Contact is currently being made with IRSTEA and SNCF. *The study is still underway as of early 2018. Céréma must complete the inventory phase on both networks before proposing alert thresholds based on climatic hazards.*	EC

Secondary, tourist and rack railways: Recommendations issued in 2021

recommendation closed:	***C***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Derailment of a Montenvers rack railway on August 11, 2019 in Chamonix (74)	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.	EC
	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.	EC
	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	As of 6/29/22 Draft text produced by the DGITM, consultation carried out Text awaiting validation.	EC

Appendix 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 field of ski lifts

Ski lifts: Recommendations issued in 2017

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Falling from an empty seat from the Granges chairlift occurred on April 4, 2016 in Les Menuires	R1	Specify the concrete measures to be taken in the event of the strong wind alarm being triggered and state, unambiguously, those to be taken when the wind speed reaches the maximum anticipated during the design of the installation, in this case 20 m/s. Provide the measures to be taken in the event of the unavailability of one or more anemometers. Provide traceability and recording rules to monitor the correct application of these measures.	SEVABEL	02/10/2017	SEVABEL indicated in its letter of 2/10/2017 that it had updated its general operating procedure to specify the instructions in the event of unfavorable wind conditions and the unavailability of a wind speed measurement.	C_2017

Ski lifts: Recommendations issued in 2017 - continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Falling from an empty seat from the Granges chairlift occurred on April 4, 2016 in Les Menuires	R2	Specify the regulatory requirements for wind speed measuring and alarm devices, including the following: ➢ the determination of the number and positioning of anemometers which should be based on prior consideration of the aerological characteristics of the site and the visibility of the line from the control station; ➢ recording of anemometric measurements; ➢ the ergonomics of the display and alarms in relation to the driver's tasks; ➢ the materialization of the maximum wind speed in operation by a specific alarm or by an automatic shutdown device.	STRMTG	02/10/2017	Organization of a meeting with the profession on 09/19/2017 which made it possible to define the overall strategy. Then setting up a working group with 5 meetings in 2018 and 2019 in order to: - provide clarification in French regulations on the installation and use of anemometer measurements for new devices, - identify possible measures to be planned for the fleet in service. Regarding the determination of the number and positioning of anemometers, requirement of a specific note detailing for each project the analysis of the anemometric conditions of the site and justifying the numbers, positions and types of anemometers to be installed. Letter to the profession in July 2018 to impose this rating for new devices Concerning the historization of wind data and the corresponding operating conditions, it was decided that they must be ensured for a minimum period of one week, a period deemed sufficient to allow their exploitation either in the case of a particular event (accident for example), or as part of the internal control carried out by the operator. The same article as the one cited above formalizes this requirement. These rules have been incorporated into the RM2 guide project, which should be validated by the end of 2022. In the meantime, the corresponding rules have been disseminated by letter from the STRMTG to the profession and have applied to new devices since 2018. They will be partially applied to the fleet in service, according to the recommendations of the STRMTG of 07/18/2019 and 07/09/2020, organizing a global compliance (wind management, gauge management – cf. R4) of the most sensitive devices in the fleet - bubble TSD, single-cable TPH operated with significant wind pressure. The STRMTG considers the recommendation as implemented.	C_2020

Ski lifts: Recommendations issued in 2017 - continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Falling from an empty seat from the Granges chairlift April 4, 2016 in Les Menuires	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. During the inspection on 5/4/2018, the operator informed the STRMTG/BS of the postponement of this training until spring. 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	EC
	R5	Modify the technical documentation attached to the “CE” declaration of conformity for the SA6H seat in order to specify the maximum oscillation amplitudes corresponding to its area of use.	LEITNER	09/25/2017	The manufacturer has created a new vehicle subsystem specific to the TSD des Granges, certified as compliant with directive 2000/9/EC by the STRMTG-ON on 12/21/2017 (certificate no. 518). The associated technical documentation (D10216262) clearly identifies the area of use of this seat, including in particular the maximum possible oscillation amplitudes.	C_2017

Ski lifts: Recommendations issued in 2017 - continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Falling from an empty seat from the Granges chairlift April 4, 2016 in Les Menuires	R4	Develop the RM2 technical guide and contribute to the development of the European standard NF EN 12929-1, in order to better prevent the risk linked to oscillations of seats under the effect of wind, in particular: ➢ for the calculation of the passage gauge, provide for the prior determination, by calculation or by tests, of the maximum amplitude of longitudinal oscillations taking into account the characteristics of the seat and the wind speed permitted in operation; ➢ in calculating the passage gauge, take into account the superposition of longitudinal and transverse oscillations; ➢ in special cases where the passage gauge calculated with the new rules cannot be completely cleared, provide devices to limit the risk of snagging.	STRMTG	02/10/2017	Organization of a meeting with the profession on 09/19/2017 which made it possible to define an overall strategy. Establishment of a working group which met 5 times in 2018 and 2019. Implementation of new rules for longitudinal templates, partially applied to devices built in 2017 and 2018 and completely from 2019: - Permissible wind pressure in operation ≤ 250 Pa Flat rate oscillation of 0.34 rad (current rule = European rule) - Permissible wind pressure in operation > 250 Pa (and for bubble chairlifts whatever the permissible wind pressure in operation) Flat rate oscillation calculated or measured by tests + margin of 0.1 rad (with a minimum of 0.34 rad) No overlapping of longitudinal and transverse oscillations because the calculations and verifications carried out by professionals under the coordination of STRMTG led to the conclusion that the margin of 0.1 rad now required for longitudinal oscillations offered a significant improvement in the templates. This improvement, based on 2D verifications on longitudinal oscillations and then on transverse oscillations, which are simple to carry out, makes it possible to avoid a cumulative effect, which is not otherwise adopted at European level. Provisions integrated into the RM1 and RM2 guide projects currently being discussed with the profession and which will be finalized during 2022. Finally, provisions brought by the STRMTG before the European Committee for Standardization, for inclusion in the EN12929-1 standard. A working group is currently underway to study these proposals in particular. At the same time, a compliance campaign has been launched targeting the fleet in service. - bubble chairlifts (STRMTG recommendation of 07/18/2019), - other devices (STRMTG recommendation of 07/09/2020).	C_2021

Ski lifts: Recommendations issued in 2017 – continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Telemetro derailment January 12, 2017 in La Plagne (73)	R1	Complete the ongoing operations to redesign the cable supports and vehicle trolleys of the Telemetro and bring them into compliance with current regulations.	SAP	12/02/18	SAP has commissioned the manufacturer BMF to modify the Télémétro from May 2018. The principle adopted is to remove the trolley brakes from the vehicles, with the supply of new trolleys and hangers, allowing the replacement of the line and station shoes with shoes that more significantly envelop the carrier cables. The cables will also be replaced at this time. The machinery will also be modified, but to a lesser extent, in order to meet the criteria for justifying the integrity of the single-tractor cable loop. On the one hand, this envelopment is favorable to the stability of the carrier cables and on the other hand, the trolley / shoe interface will be improved, the new design making it possible to improve the available passage gauge. The modification was the subject of a Works Execution Authorization file, approved by the Prefect of Savoie in 2018. The device was modified in 2018 according to the provisions indicated above and put back into operation.	C_2018
	R2	Conduct a risk analysis of all cable cars affected by STRMTG circular letter no. 86-229, assessing for each of them the risk factor and the effectiveness of the countermeasures and measures adopted by the operators, to protect against the consequences of icing of supports. Trigger actions to deal with critical situations.	STRMTG	01/31/18	Organization of a meeting with the profession on 01/22/2018 to define the treatment strategy. Survey by way of recommendation dated 03/12/2018 among twin-cable cable car operators with at least one line pylon, including in particular type 3S devices (i.e. a larger fleet than that covered by circular 86-229). => aims to identify the characteristics of dual-cable installations with regard to their support conditions for the carrier cables on the line pylons, both for the design of the supports and the operating conditions and practices, particularly in the presence of snow. It is also requested to collect feedback with all events/incidents involving the supports of the carrier cables. Feedback from operators received in mid-2018: this provides more precise information, for each device, on the one hand, on the specific features in terms of support design and on the other hand, on the feedback and associated operating instructions. The exploitation of this survey by the STRMTG resulted in the production of a report dated 17/12/21 providing an overview of the compatibility between design elements and associated operating rules, particularly in the presence of snow.	C_2021
	R3	Establish a Telemetro-specific instruction specifying the detailed checks to be carried out before a safety shunt and the compensatory measures to be taken afterwards. Incorporate the corresponding learning into training.	SAP	12/02/18	The SAP has established operating procedures, on the one hand, concerning the specific monitoring of the device (MO145) and the conditions for monitoring and snow removal (MO93) of the telemetro supports in the event of snowy weather, and on the other hand, concerning the bridging conditions (MO97) of the device's monitoring functions. Training for operating personnel was also organized on 17/12/2018 to prepare them for the use of the device's electrical control-command architecture.	C_2018

Ski lifts: Recommendations issued in 2018

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Immobilization and late evacuation from the “Panoramic Mont Blanc” cable car 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.	CMB	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).	EC
	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 discussed with the profession. These guides should come into force during 2022.	EC

Ski lifts: Recommendations issued in 2018 - continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Immobilization and late evacuation from the “Panoramic Mont Blanc” cable car September 8, 2016 in Chamonix	R3	Study the feasibility of improving cabin derailment safety by strengthening the physical cabin restraint system.	CMB	07/12/18	This provision was included in the prefectural decree to resume operations after the event, signed on June 6, 2017. Since then, the CMB has conducted a study on this subject, with its assistant DCSA reaching the following conclusion; *Following the analysis, the detection rod is held in piano wire, with its length which will be adapted to a value allowing the safe detection of derailment on diabolos. Maintaining the copper cable allowing the rod to be connected to the clamp is more than necessary.* *The search for new types of materials for the baguette using components commonly used today has also not led to a suitable solution.* *Thus, the detection of vehicle derailment based on the use of a piano wire is not called into question on its principle, because it benefits from good feedback, a sought-after spring effect and has been improved by the installation of a copper cable for electrical grounding between the detection rod and the clamp.* These improvements were implemented prior to the aircraft being returned to service in June 2019 (operation had been interrupted since January 2018 due to the rupture of a carrier under the effect of Storm Eleanor).	C_2019
	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 involved in cable car projects with integrated recovery. This list will eventually be formalized in a STRMTG guide dedicated to integrated recovery. Regarding the final provisions, the DGITM was contacted and contacted the Ministry of the Interior (DGSCGC). An initial meeting took 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 2022/2023, to define the concrete modalities of these final plans.	EC

Ski lifts: Recommendations issued in 2018 - continued

recommendation closed:	***C_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Immobilization and late evacuation from the “Panoramic Mont Blanc” cable car September 8, 2016 in Chamonix	R5	Implement a plan to sustainably strengthen the management of safety in the operation of the Panoramic Mont-Blanc by: ➢ guaranteeing 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.	CMB	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_AAAA***
current recommendation:	***EC***
unknown sequel:	***NC***

Title of the survey	No.	Wording of the recommendation	Entity	Response date	Follow-up and progress	Code
Costebelle cable car cabin fell on March 25, 2018 in Pra Loup (04)	R1	Continue progress in security management, including improvements in the following areas: ➢ trace the evolution of the measured values and the 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.	EC
	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. These new versions should come into force during 2022.	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 elements in its response: The RPLU04 is planning a full-season exercise on the new Costebelle gondola lift. The internal trainer-evaluator will be responsible for ongoing evacuation training throughout the season. Monthly training is becoming mandatory. The authority is considering hiring an external training organization.	EC

Appendix 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 2017

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Monitoring
07/2017	Collision followed by a fire between a coach and a heavy goods vehicle on October 23, 2015 on the RD 17 in Puisseguin (33)	R3	As part of the revision of UNECE Regulation No. 107, propose to strengthen the requirements concerning the opening mechanisms of smoke extraction devices in order to facilitate their opening.	*The work in Geneva is finished.* *A series of amendments to Regulation No. 118 on the fire behaviour and impermeability to fuels or lubricants of materials used for category M3 vehicles classified II or III was adopted and voted on in 2021 and introduced new tests on the flammability of materials when using unknown adhesives in association with the materials.* *The group also studied the relevance of integrating toxicity tests into R118 but had to abandon this part due to a lack of data and studies on the issue.*	Fence
		R4	As part of the revision of UNECE Regulation No. 107, propose: • the addition of an emergency door positioned on the rear part of the vehicle **.** FAILING this, extend the provisions of Decree No. 2015-1170 of September 22, 2015 relating to the accessibility of rolling stock assigned to regular interurban public road transport services for passengers freely organized to all coaches. • and/or strengthening the requirements for emergency exit window opening mechanisms to make them instantly operable to facilitate their use in the event of an emergency evacuation.	Work in Geneva has been completed. A series of amendments to Regulation No. 107 was adopted by GRSG in 2021 and validated in WP29 in March 2021 and March 2022. The amendments concern: - equipping vehicles with safety instructions for passenger information (location of emergency exits, fire extinguishers) - triggering a fire alarm above a reference temperature - the possibility for the driver to simultaneously trigger the opening of all the doors and the emergency lighting - the improvement of window breaking devices and in particular their efficiency, their visibility and their ease of use.	Fence
		R5	Strengthen the regulations relating to "emergency lighting systems" on coaches so that the safety devices to be used for emergency evacuations and the lighting of the vehicle's evacuation routes remain visible, particularly in the event of the vehicle's passenger compartment being invaded by opaque smoke.	See R4	Fence

DGEC Road: Recommendations issued in 2020

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Follow up
11/2020	Coach fire that occurred on March 10, 2019 on the A6 motorway at Coudray-Montceaux (91)	R1	In the event that France's proposed amendment relating to electronic devices for breaking emergency window glass is not accepted by the UNECE bodies, propose supplementing Regulation No. 107 by defining a test method and a required performance level for assessing whether safety glass can be considered easy to break.	Work has been completed with UNECE bodies within the framework of the subgroup initiated after the Puisseguin accident. Regarding France's proposed amendment relating to electronic devices for breaking emergency window glass, the latter was not supported as it stood. Some contracting parties considered the proposal to be technologically biased. However, an alternative proposal was adopted and voted on at WP 29 in March 2022, introducing performance requirements for window breaking devices and thus authorizing electronic devices.	Fence

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 compulsory 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, which will be re-discussed at the May 2022 group.	In progress

Appendix 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: Recommendations issued in 2016

Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	Status of actions	Follow up
09/2016	School bus crashed on the RD160 in Einville-au-Jard (54) on February 3, 2014	R1	Promote, through consultation or regulation, the broadcasting on all coaches providing a school transport service, a regular intercity line or an occasional medium or long distance service, of pre-recorded audio or video messages informing passengers of the importance and obligation of wearing seat belts. These messages could be included in more general messages reminding passengers of the instructions and obligations regarding safety and evacuation.	Joint response letter from the DGITM/DSR dated 24 April 2017 explaining that improving passenger information should be left to the initiative of coach transport stakeholders before considering imposing it through regulation. The letter mentions that an interministerial discussion could be initiated in parallel around road safety communication on the wearing of seatbelts on coaches. Article 127 of the Mobility Orientation Law included in Article L. 3116-8 of the Transport Code the following provisions, which came into force on January 1, [2022] : *"On all coaches, information regarding on-board safety rules and evacuation instructions in the event of an emergency is provided to passengers.* *The information provided includes the location, operation and emergency use of emergency exits and safety equipment.*	Fence

Appendix 10 : 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 sub-committee, CNR proposes to undertake a feasibility study aimed at having valid solutions by the end of 2021 to improve the visibility of the channel markings both day and night.	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 panels on both sides of the sector concerned are underway, in consultation with the navigators and VNF within the framework of the safety sub-committees, and CNR plans to effectively install the panels by the end of 2020.	In progress

River: Recommendations issued in 2021

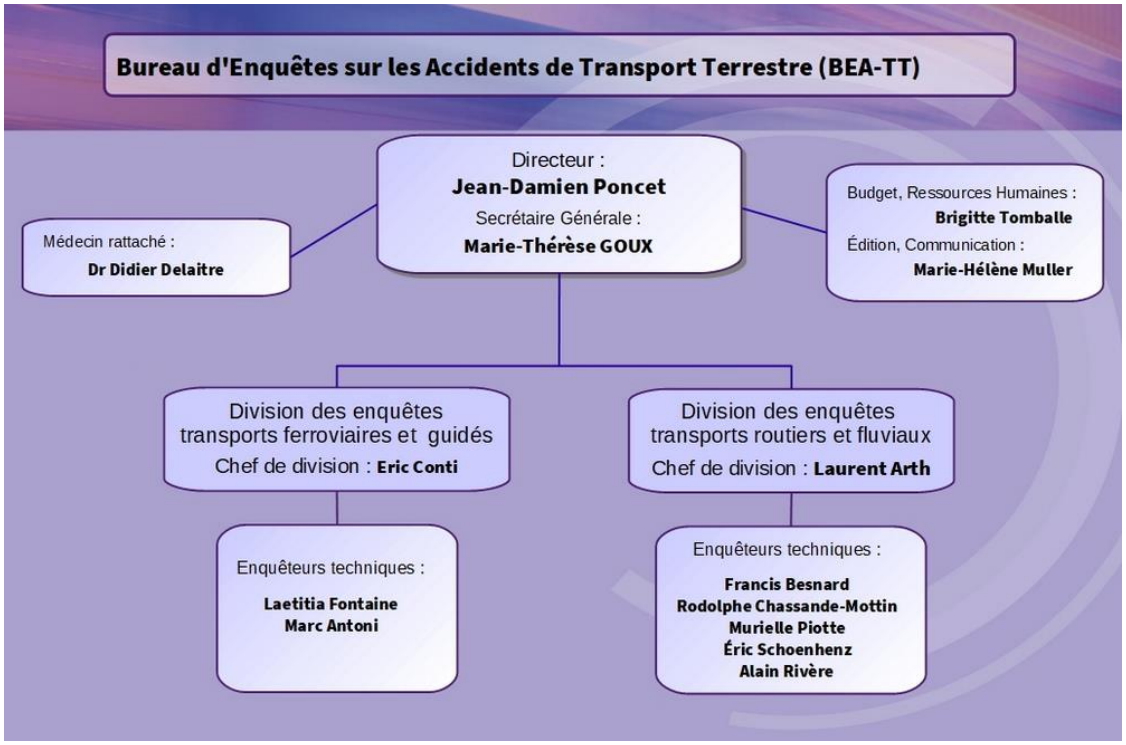
Report date	Title of the survey	No.	Wording of the BEA-TT recommendation	RECIPIENT	Status of actions	Follow up
12/2021	Sinking of the PAMPERO, a dangerous goods transport vessel, on the Rhône, when a gate at the Sablons lock (Isère) broke on February 18, 2020	R1	Strengthen the quality of maintenance 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 the feedback from the Sablons accident, an update of the Technical Maintenance Reference is planned by the end of 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 from 2021. Regarding the issue of monitoring the proper implementation of maintenance, CNR will strengthen existing internal control of lock maintenance. This control aims to improve the monitoring of routine 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 deadline for implementing the defined improvements is June 2023.	In progress
		R2	As part of the hazard studies, thoroughly study the scenarios of breakage and failure to close lock gates, and for those that can be operated under load, accidental opening of gates.	CNR	These scenarios have already been integrated into the latest Danger Studies distributed in 2021 to the DREAL for the Roussillon and Donzère-Mondragon toll road developments.	Fence
		R3	Strengthen the consideration of locks within the framework of the implementation of the safety policy for hydraulic structures, during inspections by control services and based on the expectations of in-depth technical visits and danger studies. As part of hazard studies, develop particular attention to the severity and possible diversity of scenarios linked to lock gate failures.	DGPR	The recommendation was included in the guide for the control and examination of hazard studies, published by the DGPR in January 2022. This internal guide is intended for hydraulic structures inspection services to carry out their inspections. It states that hydraulic structures inspection services must verify that those responsible for the structures, accompanied by their approved design offices, have analyzed, through the hazard study, the failure scenarios related to the locks, when they are within the perimeter of a dam subject to the latter. The analysis of the causes of the Pampero accident at the Sablons lock that the BEATT carried out does not appear likely to lead to a modification of the regulations on the safety of hydraulic structures. Furthermore, the DGPR is at the disposal of the DGITM for the articulation of these regulations with regulatory variations related to the safety of navigation structures in the transport code.	Fence
		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 progress

River: Recommendations issued in 2021 - continued

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)	R1	Change the wording of the RPP so as to show that the free height under the structure of 6.30 m on the Rhône may correspond to a current situation and not only to the approach of a flood period.	VNF	RPPs are prefectural decrees with regulatory force. They only set limit values, but are not intended to provide users with navigation advice or warnings, especially since these documents are sometimes poorly understood by sailors, unlike Notice to Skippers No. 1. In response to the recommendation, the following information was inserted on p71 of this document: "The free height under the structure of 6.3m guaranteed by regulation may correspond to a common situation on the reaches and not only to a situation of high flows or when approaching the RNPC." In addition to this mention, all the bridges for which this value in normal times can approach the value of the RNPC have been listed.	Fence
		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

Annex e 11

BEA-TT organizational chart



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

Bureau d'Enquêtes sur les Accidents de Transport Terrestre

Grande Arche - Paroi Sud
92055 La Défense cedex
Téléphone : 01 40 81 21 83
bea-tt@developpement-durable.gouv.fr
www.bea-tt.developpement-durable.gouv.fr