



Bureau d'Enquêtes sur les Accidents  
de Transport Terrestre

# ANNUAL REPORT 2016



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# **ANNUAL REPORT**

**2016**

Land Transport Accidents Investigation Board (BEA-TT)  
Grande Arche – Paroi Sud  
92055 La Défense cedex  
Tél : 33 (0)1 40 81 21 83 – Fax : 33 (0)1 40 81 21 50  
email: [Bea-tt@developpement-durable.gouv.fr](mailto:Bea-tt@developpement-durable.gouv.fr)  
web : <http://www.bea-tt.developpement-durable.gouv.fr>



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## A word from the director

*As a result of the analysis of land transport accidents or incidents brought to the attention of BEA-TT during 2016, only a limited number of them were selected as justifying a technical safety investigation. Accordingly, only 12 decisions to open investigations were taken as opposed to the annual average of 15 since the bureau was set up. Although this finding can only be welcomed, we must not forget the people who have nevertheless been victims of transport accidents, in particular the 27 people who died in the five investigated road transport accidents, three of which involved school transport. Investigations were also initiated on four rail transport incidents, two on ski lifts and one on a derailment which was fortunately limited to one component of a Paris Metro train.*

*Although the number of new investigations was reduced in 2016, the same was not the case for the conclusions of cases in progress. 21 reports were published, as opposed to an annual average of 12. These reports are supplemented by a progress report produced at the beginning of March on the TGV Est test train accident in November 2015. These reports concluded with 41 recommendations being made for preventive action: 23 for rail transport, 6 for level crossings, 5 for road transport and 7 for guided transport. Taken together, the lessons that can be learned from these reports show that the causes of accidents are almost equally divided between infrastructures and equipment, the quality of documents and standards and finally organisational procedures and competences. Quite logically, the recommendations issued by BEA-TT are distributed equally between these three areas irrespective of the mode of transport involved.*

*In parallel with these investigations, BEA-TT has undertaken a quality procedure to formally establish its working methods and improve its efficiency. This meets the guidelines contained in the technical section of the 4<sup>th</sup> rail package adopted by the European Union in May 2016. BEA-TT also takes part as actively as possible in exchanging experience with its international counterparts, particularly in Europe.*

*The current situation, both national and international, unfortunately shows us that full safety has never been acquired for land transport and that all parties involved must continue their efforts to improve it. BEA-TT personnel remains fully mobilised to bring its contribution to this ongoing work.*

*I hope you will appreciate reading this report, which provides information about the technical analysis and accident prevention activities carried out by BEA-TT in 2016 in accordance with the roles assigned to it by the transport code.*

Jean PANHALEUX



# 1 - Roles and organisation of BEA-TT

## 1.1 - Reasons for investigating technical accidents

The human dramas caused by transport accidents and the spectacular damage they can cause remind us that people, equipment and organisations are fallible despite the progress made in safety terms.

Public authorities, accident victims and travellers are constantly demanding that the lessons from the most serious or complex accidents or incidents should be learned independently.

This involves analysing the circumstances and causes of these accidents in order to establish safety recommendations that could prevent them happening again, in the form of a technical investigation and an in-depth and transparent approach. Since highly-qualified and independent investigators need to be mobilised and the lessons learned capitalised on, these technical investigations are assigned to a permanent specialised organisation. This has been the role of the Land Transport Accidents Investigations Board (BEA-TT) since 2004.

Its scope covers rail transport, guided urban transport systems (underground railway and tram), ski lifts, road transport (particularly goods and public passenger transport) and navigation on internal waterways, each of these sectors having its own regulations and economic, technical, professional and even cultural logic.

Decisions to open technical investigations are made by the director of BEA-TT on his/her own initiative or at the request of the minister of transport. In the rail transport area, investigations must be carried out for all serious accidents as defined by EU directive 2016/798 of 11 May 2016 on rail safety.

This technical investigation must be completely different from a judicial investigation, which has different objectives focused on establishing responsibility, and different constraints, particularly in terms of deadlines.

In order to carry out their work effectively, technical investigators are commissioned to access all useful documents, evidence and information, even if covered by judicial, professional or medical secrecy. These are legal prerogatives.

On conclusion of the investigations or studies carried out, BEA-TT publishes its reports on its website: [www.bea-tt.developpement-durable.gouv.fr](http://www.bea-tt.developpement-durable.gouv.fr). It notifies the recipients of the safety recommendations it makes.

## 1.2 - Organisation and resources

BEA-TT is organised around its main role, i.e. conducting technical investigations on accidents and incidents. For this purpose it enlists three categories of participants:

- firstly, its own full-time investigators;
- secondly, temporary investigators commissioned by its director for the purposes of an investigation and who benefit from the legal status of technical investigators; these can be active or retired agents of a transport company, an infrastructure management agency or a body of civil servants in charge of inspection or monitoring assignments;
- finally, experts appointed to answer precise questions.

In addition, in accordance with its statutes, BEA-TT may call on all competent state services in its field: this is particularly the case for accident monitoring and notification.

In practice, investigations are carried out by permanent investigators, if applicable, with the support of temporary investigators and experts selected according to the external expertise considered necessary to analyse the accident in question.

On 1 January 2017 BEA-TT had 14 authorised agents: 2 executive staff, 8 permanent investigators, 1 head of assignment and 3 administrative agents. One physician from the General Labour Inspectorate has also been seconded to it to deal with medical aspects.

Its 2016 budgetary allocation for operations and studies was €100,000.

## 2 - Investigations concluded or opened in 2016: general overview

### 2.1 - Conclusions of investigations in 2016

Twenty-one investigations were brought to a conclusion in 2016. Eighteen of these were described in the report, of which 15 included recommendations.

The 21 accidents to which they refer cost the lives of 16 people.

Thirteen of these accidents, including four collisions at level crossings, concerned rail transport. Five others occurred on road transport, one on river transport and two on guided transport. The following chapters contain summaries of these investigations.

### 2.2 - Recommendations issued

As a result of these 18 reports, BEA-TT made 41 distinct recommendations: 29 for rail transport, 5 for road transport and 7 for guided transport.

#### **Nature of the recommendations**

Out of these 41 recommendations:

- 2 related to the access of low-clearance vehicles to a level crossing and 4 concerned the signals, geometry and emergency telephones at level crossings;
- 6 were specific to the Channel Tunnel and mainly concerned fire prevention;
- 11 concerned rail infrastructure maintenance regulations;
- 4 concerned rail traffic management;
- 2 concerned the protection of safety devices placed under rolling stock carriages;
- 1 concerned the information that must always be given to coach passengers on wearing seat belts and evacuating the vehicle;
- 1 concerned the ergonomics of manual controls for speed retarders and speed governors;
- 1 concerned regulations on safety distances;
- 2 concerned procedures to be applied by the motorway emergency services when a vehicle stops on the hard shoulder;
- 4 concerned improvements to rubber-wheeled underground train infrastructures;
- 3 concerned improvements to tram braking systems on existing rolling stock or on new trams.

#### **Recipients**

Nine of the recommendations mentioned above were sent with the same wording to several recipients, so the total number of recommendations received by recipients was 51, i.e. 34 for rail transport, 10 for road transport and 7 for guided transport.

They were sent as follows:

- 14 to regulatory or supervisory authorities (central administration divisions, decentralised departments or safety authorities, local authorities);
- 29 to rail or road infrastructure managing agents;
- 8 to rail or road companies.

## 2.3 - Follow-up action planned by recipients

Article R. 1621-9 of the Transport Code stipulates that the recipients of recommendations must inform the director of BEA-TT within 90 days of the action they intend to take in response and, if applicable, the time required to implement it. Their replies are published, as are the recommendations themselves.

Out of the 51 recommendations issued in 2016:

- 42 were accepted and their implementation confirmed, in some cases setting a deadline;
- none were rejected;
- Responses to 9 of them have still not been received from the recipients involved.

Note that BEA-TT is not authorised to supervise the operational action actually taken in response to the recommendations issued.

By law or de facto, an external authority takes charge of monitoring this implementation beyond simply the collection of information on the intentions of recipients by BEA-TT.

With regard to the main rail transport players, this monitoring is carried out by the National Rail Safety Authority (EPSF)\* in accordance with EU directive 2016/798 of 11 May 2016, which assigns this role to the national rail safety authorities.

DGITM\*, the central administrative division of the ministry of transport or the STRMTG\* (Ski Lift and Guided Transport Technical Department) monitors the implementation of the recommendations by their other recipients.

## 2.4 - Investigations undertaken in 2016

BEA-TT undertook 12 investigations in 2016 concerning the following:

- for **rail travel**, four accidents including a tree falling on a train, multiple rail failures, one trail through of points and a collision that occurred at a level crossing;
- for **road travel**, five accidents including a school bus leaving the road, three collisions involving heavy goods vehicles including two with a coach and one pile-up;
- for **guided transport**, one underground train derailment;
- for **ski lifts**, one chairlift seat fall and one technical incident which led to the evacuation of a cable car.

Appendix 1 to this report sets out the circumstances of these different accidents.

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\* Term contained in the glossary

## 3 - Published reports

### 3.1 - Rail transport

#### 3.1.1 - Investigations concluded in 2016

Thirteen investigations of rail transport accidents were concluded in 2016. The nature, dates and locations of these accidents are specified in the table below.

With regard to Directive 2016/798 of 11 May 2016 on rail safety, in view of the scale of their consequences, three of these cases constituted serious accidents for which a technical investigation was obligatory. These are identified in blue in the table below.

| Date       | Nature and location of the accident  | Number of fatalities | Mode* |
|------------|--|----------------------|-------|
| 20.12.2010 | Collision between a regional express train and a light vehicle on LC No. 100 at Recquignies (59)                       | 3                    | PN    |
| 26.11.2013 | Rail failure on the Toulouse to Tarbes line at Carbonne (31)   | 0                    | F     |
| 17.07.2014 | Catch-up collision between a high-speed TGV train and a regional express train at Denguin (64)                         | 0                    | F     |
| 9.12.2014  | Collision between a regional express train and a tractor-trailer lorry on LC No. 169 at Montauban (82)                 | 0                    | PN    |
| 9.12.2014  | High-speed diversion of a suburban train into sidings near Achères-Grand-Cormier station at Saint-Germain-en-Laye (78) | 0                    | F     |
| 15.12.2014 | Collision between a regional express train and a works train at Saint-Germain-des-Fossés (03)                          | 0                    | F     |
| 17.01.2014 | Fire in a Eurotunnel freight shuttle in the north tunnel of the Channel Fixed Link                                     | 0                    | F     |
| 28.01.2015 | TGV high-speed train derailment at Gare de Lyon in Paris (75)  | 0                    | F     |
| 21.04.2015 | Collision between an Inter-City Train and a heavy goods vehicle at Nangis (77)   | 0                    | PN    |
| 20.10.2015 | Loss of control of a regional express train following a collision with cattle at Serqueux (76)                         | 0                    | F     |
| 2.12.2015  | Regional express train derailment due to trail through of points at the station at Laroche-Migennes (89)               | 0                    | F     |
| 14.01.2016 | Collision between a goods train and a heavy goods vehicle on LC No. 49 at Beuveille (54)                               | 0                    | PN    |
| 17.08.2016 | Collision between a regional express train and a fallen tree on the track at Saint-Aunès (34)                          | 0                    | F     |

#### 3.1.2 - Recommendations issued

As a result of these 10 reports, BEA-TT made 29 different recommendations:

##### Nature of the recommendations

Out of these 29 recommendations, 6 are specific to the Channel Tunnel.

Out of the 23 others concerning the national rail network:

- 11 concern infrastructure maintenance, including 4 on documentation and 2 on the training of personnel;
- 4 concern traffic management;

\*R = rail; LC = level crossing

- 4 concern the signals, geometry and emergency telephones at level crossings
- 2 concern low-clearance vehicles crossing level crossings;
- 2 concern the protection of safety devices placed under rolling stock carriages;

### Recipients

Three of the recommendations mentioned above were sent, each with the same wording, to several recipients, so that the total number of recommendations received by recipients in the relevant investigations was 34, comprising:

- 22 to a rail infrastructure managing agent, including 16 concerning the national rail network and 6 concerning the Channel Tunnel;
- 2 to EPSF, the national safety authority;
- 2 to central administration divisions;
- 1 to a rail transport company;
- 3 to a local authority;
- 4 to road transport federations and organisations.

### 3.1.3 - Follow-up action planned by recipients

The table below shows the follow-up action that the recipients of the above recommendations plan to carry out.

| Investigation            | Recommendations |          |              |          |
|--------------------------|-----------------|----------|--------------|----------|
|                          | Number          | Accepted | Not accepted | No reply |
| Carbonne                 | 4               | 4        | 0            | 0        |
| Denguin                  | 2               | 2        | 0            | 0        |
| Montauban                | 4               | 4        | 0            | 0        |
| Eurotunnel               | 6               | 6        | 0            | 0        |
| Saint-Germain-des-Fossés | 1               | 1        | 0            | 0        |
| Saint-Germain-en-Laye    | 4               | 4        | 0            | 0        |
| Gare de Lyon             | 3               | 3        | 0            | 0        |
| Serqueux                 | 2               | 2        | 0            | 0        |
| Laroche-Migennes         | 2               | 2        | 0            | 0        |
| Nangis                   | 6               | 2        | 0            | 4        |
| TOTAL                    | 34              | 30       | 0            | 4        |

### 3.1.4 - Monitoring the implementation of the recommendations

Independently of the intentions expressed by the recipients and summarised in paragraph 3.3 below, the National Rail Safety Authority (EPSF) monitors the effective implementation of the recommendations that BEA-TT sends to national rail network operators.

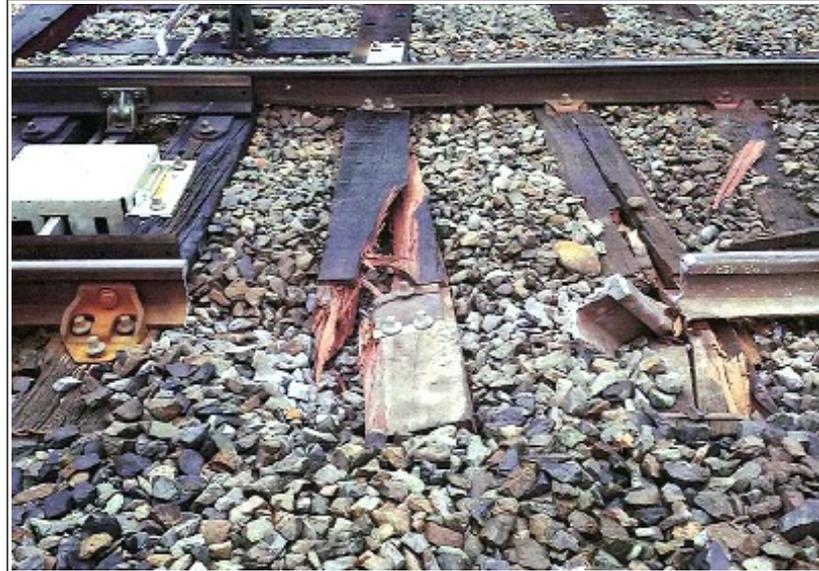
On the basis of this monitoring, the state of progress of operational implementation of the recommendations sent between 2004 and 2015 to these operators is as follows:

| Year of publication of the report | Number of recommendations addressed |           |              |             |
|-----------------------------------|-------------------------------------|-----------|--------------|-------------|
|                                   | Total                               | Closed    |              | In progress |
|                                   |                                     | Completed | Not accepted |             |
| 2004-2006                         | 30                                  | 28        | 0            | 2           |
| 2007                              | 19                                  | 18        | 0            | 1           |
| 2008                              | 21                                  | 20        | 0            | 1           |
| 2009                              | 24                                  | 21        | 2            | 1           |
| 2010                              | 15                                  | 10        | 1            | 4           |
| 2011                              | 10                                  | 7         | 0            | 3           |
| 2012                              | 15                                  | 5         | 4            | 6           |
| 2013                              | 12                                  | 3         | 0            | 9           |
| 2014                              | 9                                   | 2         | 0            | 7           |
| 2015                              | 14                                  | 0         | 0            | 14          |
| Total 2004-2015                   | 169                                 | 114       | 7            | 48          |

Appendix 2 to this report takes stock of this implementation.

### 3.1.5 - General summaries of investigation reports published in 2016

#### Multiple fracture of rail passed at high speed by trains on 23 November 2013 at Carbonne (31)



At 06:03 on 26 November 2013, a rail fractured when a train passed the 39+129 km mark on the right-hand rail of track 1 on the Toulouse to Tarbes line. This caused a train warning bell to malfunction. It began to ring continuously at the station at Carbonne.

This bell was not considered a safety installation and no traffic restriction is prescribed if it malfunctions. Six other trains travelled at normal speed without derailing and without their drivers reporting any abnormal impact on this section of the track before it was closed to commercial traffic at 08:50 due to scheduled infrastructure works.

At 09:50 the signal maintenance agent who had been trying to find the cause of the malfunction of the warning bell since 08:05 discovered a gap of about 1.30 m which, as it turned out, had been passed at 150 km/hour by inter-city train No. 14241.

This event, which could have been extremely serious but only led to limited material consequences, was due to three direct causes:

- multiple failure of the rail linked to the presence of three fragile points on the rail within a short distance and a fault in the track geometry;
- lack of any prescription for safety measures in the event a warning device malfunctions;
- a delay in detecting the rail failure, as the track was not equipped with track circuits linked to the signalling system.

This analysis led BEA-TT to find preventive guidelines and make three recommendations in the three following areas:

- monitoring and eliminating half switch points where the flange is machined in an obsolete manner, resulting in an angular point;
- detection of rail failures by track circuits not linked to safety installations;
- detection of rail failures by train drivers.

## Catch-up collision between two passenger trains on 17 July 2014 at Denguin (64)



At about 17:30 on 17 July 2014 in the Denguin municipality in the Pyrénées-Atlantiques department, regional express train No. 867285 travelling going towards Dax on the railway line connecting this town to Tarbes caught up with TGV high-speed train No. 8585 and collided with it at a speed of 95 km/h.

This TGV was travelling at 30 km/h in accordance with an “*entry into an occupied section procedure*” implemented following a malfunction of stop signal S 23 located between Pau and Artix on the straight section of kilometre post 225 of the relevant railway line. After passing this signal as on a “*free track*”, the impacting regional express train was travelling at 128 km/h and its driver was unable to avoid the collision despite applying emergency braking.

The direct cause of this accident was the fact that signal S 23 incorrectly showed a green light while the next section was still occupied by TGV No. 8585.

This dangerous malfunction was most certainly due to an unintentional “*free track*” command from the signal involved due to several electric wires having been stripped by rodents that entered the signal box mentioned above along the straight section of kilometre post 225.

Two factors contributed to this situation:

- the design and construction of the signal box did not provide sufficient protection against the entry of rodents on the one hand and the fact that the cables were not easily visible due to the layout of the signal box. In addition, the fact that the different electrical circuits were not separated made it impossible to avoid possible contact between conductors that could lead to dangerous faults;
- during maintenance operations, the damage that could be caused by rodents to electrical cables in signal boxes was not taken sufficiently into account.

In view of these factors, BEA-TT sent two recommendations to SNCF Réseau concerning the following aspects:

- the first recommendation concerned signal box design;
- the second recommendation was to improve prevention of risks due to the entry of rodents into these facilities during preventive and remedial maintenance operations.

**Collision between a regional express train and a lorry  
on 9 December 2014  
at LC No. 169  
at Montauban (82)**



At 18:13 9 December 2014, regional express train No. 871833 travelling on railway line 640000 from Bordeaux-Saint-Jean to Sète-Ville and providing the service from Agen to Toulouse-Matabiau collided with a lorry on level crossing No. 169 mentioned above located in the municipality of Montauban, which allows road vehicles travelling on the Chemin du Quart to cross the railway lines.

Following the accident, 12 people were admitted to ER, including the train driver and the lorry driver. None of these 12 people were hospitalised.

The direct and immediate cause of the accident was the fact that two heavy goods vehicles crossed on level crossing No. 169, which was too narrow and prevented the lorry hit by the train from moving. The other lorry involved managed to move clear of the level crossing before the train arrived.

The main factor which contributed to the situation was the fact that vehicles exceeding 3.5 tonnes were travelling on the Chemin du Quart despite the regulatory prohibition.

In view of these factors, BEA-TT recommended:

- that the City of Montauban should bring the police signs prohibiting vehicles exceeding 3.5 tonnes from using the Chemin du Quart into compliance with the regulations;
- that the City of Montauban should remove the “residents only” signs on the B13 panels on the Chemin du Quart, possibly replacing them with “authorised vehicles only” signs;
- that the City of Montauban and SNCF should use all appropriate means to prevent heavy goods vehicles exceeding 3.5 tonnes from using level crossing No. 169 or to widen level crossing No. 169 and its immediate surroundings by at least 5 to 6 metres.

*Without making any formal recommendation, BEA-TT drew the attention of road transport carriers and drivers to the importance for safety of carefully preparing their journeys, identifying the most suitable routes for the characteristics of their vehicles and anticipating any difficulties that could be encountered.*

In addition, BEA-TT called on:

- *SNCF to provide professional training organisations with illustrations of the mechanical behaviour of level crossing barriers following contact with a heavy goods vehicle;*
- *the developer of the Boulevard Urbain Ouest [West Urban Boulevard] project to implement this project up to the last project section located furthest to the south;*
- *SNCF Réseau to make an accurate estimation of the impact on traffic on the Chemin du Quart of the future construction of the high-speed Bordeaux-Toulouse railway line and its connecting road developments in case the Boulevard Urbain Ouest is not fully completed at the time of commissioning;*
- *the City of Montauban to bring the police signs into compliance with the orders issued in relation to the speed limit on the Chemin du Quart;*
- *SNCF, in cooperation with the city of Montauban, to carry out a full safety diagnosis of the level crossing on the basis of a given traffic moment updated with recent traffic data and a speed limit over the level crossing in accordance with the order of the City of Montauban in force (70 km/h, not 90 km/h)*

**Accidental diversion of a suburban RER A train  
into sidings  
on 9 December 2014  
at Saint-Germain-en-Laye (78)**



At 06:12 on 9 December 2014 near Achères-Grand-Cormier station in the municipality of Saint-Germain-en-Laye in Yvelines, a suburban RER A train travelling on the 2bis line going towards Paris passed switch points 116 at 87 km/h where the speed limit is 30 km/h and was diverted to the sidings without the signals giving any notification. Fortunately the train did not derail and did not collide with any other rolling stock in the sidings. There were no casualties.

The direct cause of the incident was a wiring fault in the four electric control system cables for switch points 116 which occurred in the course of works to replace a signal cable with 28 pairs of conductors connecting the service room of signal post A to a signal box near these switch points. On conclusion of these works, the position of the switch points on the ground was reversed in relation to its control system and controls at the A signal post at Achères.

This wiring fault resulted:

- on the one hand in a reversal of the terminals in the technical diagram describing the available cable ends in the signal box mentioned above, probably from when the facility was first installed. These wiring replacement works were carried out according to this inaccurate diagram and the error was neither detected during their preparation nor in the course of technical checks and tests;
- in addition, from the fact that the numerous provisions regulating works of this kind were not sufficiently familiar to the inexperienced works assistant of the “SES Mantes/Achères” production unit, who managed the work on his own and was never supervised, particularly due to the fact that no quality control process is implemented for this kind of work. Two instances of non-compliance with the requirements set out in SNCF specifications should therefore be noted:
  - In the documents he drafted for the wiring operations and technical checks, he based his work on one single type of diagram concerning this cable, neither using nor sending

the other diagrams that would have made it possible to detect the reversal of the terminals mentioned above by cross checking;

- in the test program he prepared, he merely ensured a match between the commands and the controls obtained without checking the actual positions of the switch points on location, which would have made it possible to detect the functional anomaly.

Analysis of this incident resulted in BEA-TT sending SNCF Réseau four recommendations to improve:

- the quality of training and supervision of young inexperienced agents who manage maintenance and works on signalling installations;
- the legibility of SNCF specifications for work on safety installations;
- the quality of the compliant diagrams of the safety installations;
- the quality of test programs for small-scale works on safety installations.

**Impact between a Regional Express Train stopped at a platform  
and an infrastructure inspection train  
which occurred on 15 December 2014  
in the station at Saint-Germain-des-Fossés (03)**



At 08:37 on 15 December 2014 at Saint-Germain-des-Fossés station in the Allier Department, after moving about 500 metres at an estimated speed of 18 km/h, infrastructure inspection train No. 819 070 collided with regional express train No. 873 355 which was standing at the platform on the second part of track A awaiting departure to Vichy at 08:38.

The regional express train which was travelling between Moulins (03) and Clermont-Ferrand (63) was an AGC type three-car train with a thermal power unit. 80 people were on board.

The infrastructure inspection train was carrying out a shunting manoeuvre from a siding to track A alongside the platform, with the intention of leaving subsequently going towards Moulins. It consisted of a shunting locomotive and a platform vehicle equipped with an articulated boom for inspecting engineering works. Four SNCF Réseau personnel were on board. Its departure was initially planned for 08:30.

The driver of the infrastructure inspection train requested authorisation by mobile telephone to carry out this manoeuvre from the signalman at Saint-Germain-des-Fossés station from the siding where it was stopped. After signal Cv13 opened to indicate that the train could be set in motion, the infrastructure inspection train proceeded towards track A. The shunting locomotive was at the rear of the train and the platform vehicle at the front prevented the driver from seeing the track in front of him.

Four passengers of the regional express train and three SNCF Réseau personnel on the infrastructure inspection train were injured.

The direct cause of the accident was the decision of the driver of the infrastructure inspection train to carry out a shunting manoeuvre without visibility in the direction of the main lines without being guided by a movement controller. In fact he therefore contravened the regulatory procedures and above all simple safety logic.

Several factors contributed to this situation:

- a vague telephone conversation with the station signaller which led the driver of the infrastructure inspection train to assume that he was moving towards a vacant track at the platform;
- the composition of the infrastructure inspection train, which consisted of an engine at the rear and an articulated boom wagon at the front which prevented the driver from seeing ahead;
- absence of the appointed movement controller following an organisational error, which led the driver to carry out the manoeuvre without guidance.

This analysis led BEA-TT to seek preventive solutions in the following two areas:

- improving the reliability of the operational system for monitoring SNCF Réseau drivers to improve the detection and correction of incorrect behavior;
- recording all operational conversations from the service telephones of signallers.

## Fire on board Eurotunnel freight shuttle 7340 on 17 January 2015



At 11:57 on 17 January 2015 Eurotunnel freight shuttle 7340 left the English terminal at Folkestone loaded with 30 vehicles. This shuttle was of the Arbel type on which the Front train section has no roofs.

As the train was entering the tunnel at 12:00, following an electric arc with the catenary, the shuttle stopped due to a power cut in the catenary. After the power was restored, the train set off again at 12:03. At about 12:23, when the train was about 1 km before the firefighting station (SAFE 4F), a fire was detected on board the shuttle.

Shortly after 12:26, the train carried out a controlled halt after the SAFE 4F station with its front at kilometre post 44.2, such that its adapted wagon was located perpendicular to Cross Gallery CP 4418 at about 16 km from the exit on the French side.

Evacuation of the passengers and personnel of the train to the service tunnel proceeded without any particular problems and concluded at 12:37.

None of the 42 people present on the train was injured in the event.

The two lorries located on wagons Nos. 14 and 15 in the front train section burned out completely.

The North rail tunnel was damaged. In addition to the failed catenary and electrical wiring, the reinforced concrete of the vault was damaged by the fire. The rendering came off over about 60 m, leaving the reinforcing steel visible in the lining.

A limited service was resumed as from 03:45 on 18 January in the South rail tunnel.

Normal traffic was restored in both tunnels at 12:00 on 23 January.

The fire started because of a spark-over between the catenary and a CB antenna undetected by the relevant systems and fitted on a lorry which had been loaded onto an Arbel shuttle without a roof.

Analysis of the cause led to three recommendations in the following areas relating to the direct causes:

- processes and systems for detecting antennae and small items;
- roofs or other physical devices separating vehicles from the catenary;
- fire detection systems;
- RCC (Rail Control Centre) procedures in the event of fire and concomitant disjunctions.

Examination of the underlying and primary causes led to three recommendations for the system for managing safety-related changes.

In addition, examination of the execution of emergency and firefighting operations led to a recommendation related to the delays in dispatching firefighters inside the tunnel.

## Train derailment on 28 January 2015 at Paris Gare-de-Lyon



At 17:35 on 28 January 2015 a train composed of two empty TGV sections derailed at a speed of 29 km/h just after the 22L switch points at Paris Gare-de-Lyon. It was proceeding from the washing depot to join line 15 at the platform from which it was to leave at 18:23 for Zurich. The train stopped about 240 metres further down the line. There were no casualties, but the rolling stock and track facilities were badly damaged.

The direct cause of the accident was a change of position of switch points 22L under the third carriage of the front train section. The first part of the train was directed as planned towards track 15 at the platform, while the second part was diverted by the switch points towards track 7. This caused four intermediate carriages to derail and end up across tracks 7 to 15.

This accidental movement of switch points 22L under the train should normally have been made impossible by a safety system referred to as *“transit interlocking”* installed at Signal Post 2 at Paris Gare-de-Lyon, from which the itineraries for this sector are controlled. This interlock had been canceled due to maladjustment during a preventive maintenance operation on the control system devices of these switch points carried out less than two hours previously by two maintenance personnel inexperienced in this type of work.

Analysis of this incident resulted in BEA-TT sending SNCF Réseau three recommendations to improve:

- the quality of practical training and supervision of young SE personnel;
- the quality of local specifications for the maintenance of old and unconventional safety installations;
- the installations at Signal Posts 1 and 2 at Paris Gare-de-Lyon.

**Collision between a passenger train  
and a low-clearance lorry and trailer  
on 21 April 2015  
at LC No. 41 at Nangis (77)**



At about 08:40 on Tuesday, 21 April 2015, a passenger train connecting Belfort to Paris Est station collided with an abnormal load on a low-clearance half-trailer transporting agricultural equipment hauled by a road tractor unit on level crossing No. 41, located on departmental road No. 419 at Nangis in Seine-et-Marne.

This violent collision caused serious injuries to three people including the train driver and minor injuries to 40 others. It caused serious damage to the articulated lorry and to the rail equipment and infrastructure.

The direct and immediate cause of this accident was the fact that the abnormal low-clearance load was stuck on the level crossing.

Several factors played or could have played a role in the occurrence of this accident:

- the behaviour of the driver of the abnormal load who failed to comply with local traffic prohibitions;
- the lack of a sign warning of the hump at the level crossing, which is difficult to detect when approaching from the direction from which the damaged road vehicle had been moving. A sign to this effect has been placed since the accident;
- the pronounced hump at the level crossing was widely known and could have been aggravated a few months before the accident by ballast filling works and replacement of the decking;
- the fact that the telephones at the level crossing, which could have been used to stop the train or reduce its speed before the impact, were not used;
- the fact that the driver of the abnormal load had insufficient control of the half-trailer he was hauling on the day of the accident, which prevented him from increasing the ground clearance.

In view of these factors, BEA-TT made the following recommendations:

- the first was to the Road Safety and Traffic Delegation (DCSR) concerning information provided for drivers of abnormal loads on the existence of level crossings that may be a problem to cross;
- the second was to the Directorate General for Infrastructure, Transport and the Sea (DGITM) on the use of the telephones at level crossings;
- the third was to the National Road Transport Federation (FNTR), the National Union of French Transport and Logistics Companies (TLF), the European Road Hauliers Association (UETR) and the National Union of Road Haulage Trade Union Organisations (UNOSTRA) on taking charge of new vehicles.

In addition, BEA-TT called on the managing agent of the rail infrastructure to ensure that an inspection was carried out of road profiles on level crossings that could cause difficulties for low-clearance vehicles to cross after any works that may have made the road more uneven.

**Loss of control of regional express train No. 848973  
between Formerie (60), Serqueux (76) and Sommery (76)  
on 20 October 2015**



Before twilight at 07:35 on 20 October 2015, regional express train No. 848973 travelling between Abancourt (60) and Rouen (76) collided at full speed with two cows that had escaped from their enclosure after the station at Formerie.

After the impact, the driver realised that he was unable to stop his train, which went out of control at about 100 km/h going towards Serqueux.

He notified the operational traffic management centre (COGC) at Rouen, which took the steps planned for such cases.

After attempting unsuccessfully to stop the train by activating the alarm signal, the agent of the commercial trains department (ASCT) moved the passengers to the rear of the train.

After travelling almost 20 km and going through the station at Serqueux at 80 km/h, the train slowed down to walking speed in the ramp going towards Sommery.

The driver then took two stop blocks, alighted from the train on foot and, once it had stopped, immobilised it at 07:49.

The event caused no human casualties.

Material damage was limited to the front face and underside of the train.

The reason for the loss of control of the train was the loss of all its pneumatic and electromagnetic braking capacity after the impact.

The following technical causes led to the brake failure:

- sensitivity and insufficient protection of the bleeding system;
- position of the cow catcher;
- vulnerability of some safety functions in the event of short-circuit in the hitch coupler.

BEA-TT made one recommendation on the implementation of THE technical modifications announced by SNCF Mobility.

The analysis also highlighted underlying causes by using feedback from the standards for rolling stock dimensions and risk forecast analyses.

BEA-TT made one recommendation and issued four calls for action on these topics.

**Regional express train derailment  
due to trail through of points  
on 1 December 2015  
at the station at Laroche-Migennes (89)**



At 08:02 on 1 December 2015 in the station at Laroche-Migennes located in the municipality of Migennes in the Yonne, regional express train No. 891 350 travelling between Dijon and Auxerre-Saint-Gervais derailed at a speed of 20 km/h at switch points Tb on track A.

The direct cause of the accident was the fact that an earlier train had trailed through and damaged the Tb switch points.

In fact the switch points had not been put back into their proper position after a maintenance machine passed through them at around 04:00 to stop in a siding at Point R. In order to carry out this manoeuvre, the driver had used a safety key on the basis of an authorisation given by the signalman at Position 4 at Laroche-Migennes which controls these switch points remotely. On conclusion of this manoeuvre, the driver forgot to put the switch points and the key back to their proper position and to return the authorisation to the signalman.

An engineer intervened to restore the authorisation using an emergency key but without checking the position of the switch points.

At 06:30 the lug end of a first train crossed the wrongly positioned switch points; the points were damaged by the passage of the wheels, forcing the switch point rail half open.

An hour and a half later, regional express train No. 891 350 approached to cross the switch points by the point rail and derailed.

Two factors contributed to this situation:

- the official procedure for using an emergency key which does not give any information to the signalman about exactly which machines are being manoeuvred and which manoeuvres are being carried out by the person requesting the key, especially as the safety installation includes switch points and crossings which are not remotely controlled by the signal box;
- intervention by numerous personnel external to the Laroche-Migennes site in the safety procedures and the lack of formality and implementing the procedures.

In view of these factors, BEA-TT sent two recommendations to SNCF Réseau concerning the following aspects:

- procedures for using the Point R safety installations, particularly when the emergency key is used;
- the roles and assignments of the permanent operational managers on a regional and national level.

## 3.2 - Road transport

### 3.2.1 - Investigations concluded in 2016

Five reports dealt with road traffic accidents (not including level crossings and intersections with tramlines).

The table below sets out the locations and dates of the five accidents under consideration, which cost the lives of 12 people.

| Date       | Nature and location of the accident   | Number of fatalities |
|------------|---|----------------------|
| 3.02.2014  | School bus comes off the road at Einville-au-Jard (54) – Final report                                       | 1                    |
| 9.06.2014  | Coach comes off the road and overturns on National Trunk Road 316 at Loon-Plage (59)                        | 1                    |
| 22.07.2014 | Head-on collision between a minibus and a heavy goods vehicle on departmental Road 619 at Courteranges (10) | 6                    |
| 5.02.2015  | Collision between two heavy goods vehicles and a light vehicle on motorway A6 at Évry (91)                  | 2                    |
| 13.02.2015 | Collision and fire involving 3 heavy goods vehicles and a coach on motorway A1 at Roberval (60)             | 2                    |

These accidents again highlighted problems related to information on wearing seat belts which BEA-TT had already raised in previous reports, on the ergonomics of manual controls and the training of drivers (a study was published in October 2015 on this matter).

### 3.2.2 - Recommendations issued

#### Nature of the recommendations

On conclusion of these three investigations, BEA-TT issued 5 separate recommendations:

- 1 concerned the information that must always be given to coach passengers on wearing seat belts and evacuating the vehicle;
- 1 concerned the ergonomics of manual controls for speed retarders and speed governors;
- 1 concerned regulations on safety distances;
- 2 concerned the procedures to be applied by the motorway emergency services if a vehicle stops on the hard shoulder.

#### Recipients

Three of the recommendations were each sent with the same wording to several recipients and a total of 10 recommendations has therefore been received, including:

- 1 to a heavy goods vehicle manufacturer;
- 4 to motorway management companies;
- 2 to DSCR and 3 to DGITM, which have not replied.

### 3.2.3 - Follow-up action planned by recipients

The table below shows the follow-up action that the recipients of the above recommendations plan to carry out.

| Investigation    | Recommendations |          |              |          |
|------------------|-----------------|----------|--------------|----------|
|                  | Number          | Accepted | Not accepted | No reply |
| Einville-au-Jard | 2               | 0        | 0            | 2        |
| Loon-Plage       | 1               | 1        | 0            | 0        |
| Roberval         | 7               | 4        | 0            | 3        |
| TOTAL            | 10              | 5        | 0            | 5        |

### 3.2.4 - General summaries of investigation reports published in 2016

#### **School bus comes off departmental road 160 at Einville-au-Jard (54) on 3 February 2014**



At about 07:30 on 3 February 2014 at Einville-au-Jard in Meurthe-et-Moselle, a school bus came off the road at low speed on a bend and overturned in the ditch beside departmental road 160.

This accident cost the life of one school pupil and injured 18 others, including one seriously.

The direct and immediate cause of this accident was black ice on a bend with pronounced subsidence<sup>1</sup> on its right-hand edge in the direction of travel of the bus, which caused a local adverse camber.

Several factors played or could have played a role in exacerbating the consequences of this accident:

- almost all passengers in the bus were not wearing safety belts and, when it swung into the ditch, the pupils were thrown around inside the vehicle and one of them was ejected through the window beside which he was seated;
- delay in evacuating the bus, particularly due to the fact that the passengers were unfamiliar with the vehicle evacuation procedures and the location and operation of the emergency exits.

In view of the initial factors in the analysis, BEA-TT recommended in a progress report that as from March 2014 the departmental Council of Meurthe-et-Moselle should carry out road repairs as soon as possible on the bend where the accident occurred. The corresponding works have been carried out since then.

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<sup>1</sup> Subsidence: road deformation characterised by a rounded depression in the surface

In this report, BEA-TT recommends that the Directorate General for Infrastructure, Transport and the Sea and the Road Traffic and Safety Delegation should encourage pre-recorded audio or video messages to be played to inform passengers about the benefits of and obligation to wear seat belts on all buses providing school transport services, regular inter-city lines or occasional medium or long distance services. These messages could be included in a more general message providing information about the safety and evacuation procedures and obligations.

*In addition, without issuing a formal recommendation, BEA-TT drew the attention of the transport organisation authorities to the benefits of widely disseminating information and training pupils on emergency bus evacuation procedures.*

**Overturning of a coach  
on 9 June 2014  
on a roundabout on National Trunk Road 136  
at Loon-Plage (59)**



At about 21:20 9 June 2014, a coach travelling on National Trunk Road No. 316 going towards Gravelines with 51 passengers on board overturned on its right side at the exit of a roundabout in the municipality of Loon-Plage in the Nord department.

This accident cost the life of one passenger in the coach. 10 of its other occupants were injured, of which four were hospitalised for more than 24 hours.

The direct cause of the accident was the excessive speed of the coach as it entered the roundabout, which caused it to overturn as it went through.

This excessive speed was the consequence of manoeuvres made by the driver of this coach, who was unable to slow it down using the manual controls of the speed governor and the speed retarder or by pressing the pedal to activate the main air brake.

The reasons why the coach involved could not be slowed down using the controls mentioned above could not be determined with certainty. The most likely reason is that its driver was impaired by an unfortunate and involuntary action which held in or re-engaged the speed governor.

Two factors played a role in this situation:

- the ergonomics of the manual speed governor and retarder controls which are grouped on one and the same multi-function lever, where there is a risk of confusion between the safety functions and the driving aids when activated;
- incomplete training of the drivers of passenger service vehicles in the conditions for safe use of the driving aids, particularly during obligatory vocational training.

In view of these factors, BEA-TT made a recommendation concerning the ergonomics of the manual controls of speed retarders and speed governors.

*In addition, without formalising the recommendation, BEA-TT reiterated its call for the Directorate General of Infrastructure, Transport and the Sea (DGITM) to call on the bodies responsible for the initial and in-service training of goods and passenger road vehicle drivers to include raising the awareness of these drivers to good driving practices on vehicles equipped with speed retarders and speed governors so as to meet essential safety requirements in particular in their obligatory training.*

**Head-on collision  
between a minibus and a heavy goods vehicle  
on 22 July 2014  
on Departmental Road 169 at Courteranges (10)**



At about 14:40 on 22 July 2014 in the municipality of Courteranges in the Aube department (10), a minibus travelling on departmental road 619 going towards Troyes with nine people on board veered to the left and collided with an articulated lorry travelling in the opposite direction. After this initial impact, the lorry veered to the left and collided with a light vehicle travelling behind the minibus, then came to a halt across the road.

This accident cost the lives of six out of the nine occupants of the minibus and left four people injured: the three other occupants of the minibus, hospitalised for more than 24 hours, and the driver of the lorry who was lightly injured.

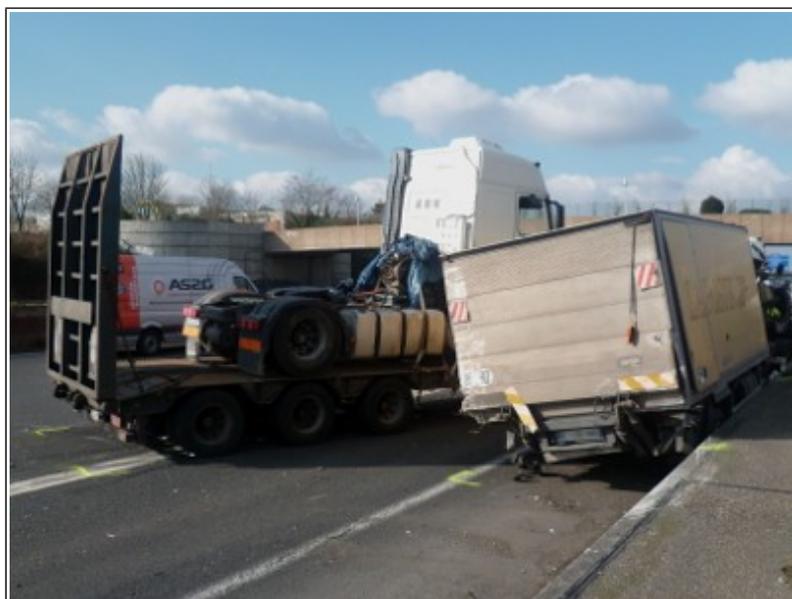
The immediate cause of the accident was the fact that the driver of the minibus lost control due to presumed loss of consciousness and veered off his course, colliding with the articulated lorry travelling normally in the opposite direction.

The reason why the driver lost consciousness was probably that he fell asleep at the wheel due to a combination of extreme fatigue due to loss of sleep and severe hypoglycemia caused by prolonged fasting.

Investigations conducted on all technical aspects of the accident did not lead to BEA-TT making any recommendations.

However, the circumstances of this accident emphasise that the driver of a vehicle must be in optimum physical condition before setting out on a trip of several kilometres.

## **Pile-up on 5 February 2015 on the A6 motorway at Évry (91)**



At 12:09 on Thursday 5 February 2015 on the A6 motorway in the municipality of Évry, following a traffic slowdown, an articulated lorry consisting of a tractor unit and a half-trailer travelling towards Paris from the provinces collided with a light vehicle at the tail of a traffic jam, then with a lorry and finally with a van.

As a result of the collision, the two occupants of the light vehicle died.

The direct cause of the accident was the fact that the articulated lorry did not slow down when approaching the traffic jam on the A6 motorway.

The reason for failing to slow down could have been a combination of factors such as a lack of attention on the part of the driver of the articulated lorry, unsuitable speed for the traffic conditions and failure to keep to the safety distances between moving vehicles.

On this occasion, it was noted that due to the fact that the articulated lorry exceeded the authorised maximum length by 60 cm, it was classified as a category 1 abnormal load. Although technically this excessive length had no effect on the outcome of the accident, the articulated lorry should not have been travelling on the A6 motorway as it was not covered by valid authorisation and was not complying with the authorised travel times for abnormal loads on this section of the A6.

**Collision between three articulated lorries and two coaches  
followed by a fire  
on 13 February 2015  
on the A1 motorway at Roberval (60)**



At about 19:30 on the evening of Friday 13 February 2015, the day the holidays began, an accident involving three articulated lorries (tractor units with half-trailers) and two coaches occurred on the A1 motorway in the Lille to Paris direction on the Roberval viaduct (Oise).

The accident caused a major fire and the A1 motorway was blocked in both directions.

Before the fire completely destroyed one of the coaches involved, its driver managed to evacuate all of its passengers (including a large number of children).

The direct cause of this accident was an inappropriate manoeuvre on the part of the driver of an articulated lorry, which pulled out to the left when approaching an obstacle comprising a first stationary articulated lorry located mostly on the right lane of the motorway, pulled out to the left and collided with a coach which was overtaking it in the middle lane then went on to collide with the stationary articulated lorry.

A further accident was caused by a third articulated lorry which collided with a second coach travelling on the middle lane, then with the articulated lorry that caused the first accident. The direct cause of this additional accident was the fact that the driver of the third articulated lorry did not comply with the safety distance from the articulated lorry that caused the first accident.

Several factors contributed to the occurrence of this accident:

- the stationary articulated lorry had stopped on an area of the motorway without a hard shoulder;
- delay by the driver in notifying the SANEF (North and East France Motorways Company) central operations post, which restricted the opportunity to put a protective system and appropriate signs in place;
- classification of the event as “not obstructing traffic” due to the fact that the SANEF central operations post operator had difficulty in locating it and did not send a patrol officer or arrange for the protection systems and signs appropriate for the actual situation to be put in place;

Accordingly, BEA-TT made three recommendations concerning:

- procedures for central operations post operators to intervene in the event of vehicle breakdowns on sections where the hard shoulder is reduced or non-existent;
- safety distance between two heavy goods vehicles.

BEA-TT also called on motorway operators to undertake or conduct awareness raising campaigns among users concerning the behaviour to adopt in the event of difficulty (stopping on safety zones, calling from emergency telephones, etc.).

### 3.3 - River transport

#### 3.3.1 - Investigation concluded in 2016

One investigation concerning a river transport accident was completed in 2016.

| Date       | Nature and location of the accident   | Number of fatalities |
|------------|---|----------------------|
| 16.03.2012 | Collisions between the MARFRET MARIVEL and the railway and road bridges at Bezons | 0                    |

This accident highlighted the need to learn the limitations of using the radar navigation aid system, in particular in the absence of electronic charts.

BEA-TT did not make any recommendations on conclusion of this investigation.

#### 3.3.2 - General summary of the investigation report published in 2016

### Collisions between the MARFRET MARIVEL and the railway and road bridges at Bezons on 16 March 2012



At about 05:40 on Monday, 16 March 2012 on the River Seine at the upstream end of île Saint-Martin in the municipality of Bezons (Val-d'Oise), the MARFRET MARIVEL, the hull of a cargo vessel about 100 m in length, sailing from Rouen to Gennevilliers loaded with 465 tons of containers, collided several times with the base of the railway bridge pillars at Bezons. The vessel continued along its route and at about 05:52 its containers and its wheelhouse collided with the Bezons road bridge deck.

With the first impact against the pillars of the railway bridge at Bezons, a large hole was made in the hull of the boat at the forepeak<sup>2</sup>. The sheeting<sup>3</sup> at the base of one of the pillars of the Bezons railway bridge was damaged. The second impact damaged numerous containers and the telescopic wheelhouse of the vessel was crushed. The deck of the Bezons road bridge did not appear to be damaged.

There were no casualties.

The direct cause of the impact with the pillar of the Bezons railway bridge was incorrect assessment of the position of the boat in relation to the passage of vessels passing upstream under this bridge due to the position of the navigational radar of the MARFRET MARIVEL, which had large blind spots in which objects were not detected.

Several factors contributed to this accident or exacerbated its consequences:

- the load consisted of three layers of containers on the fore part of the hold which created an obstacle to the propagation of radar waves, substantially increasing the blind spots at the bows and the starboard side of the boat, probably reducing the quality of the radar image due to multiple wave reflections between the containers;
- absence of an electronic navigation chart which would have made it easier to control the position of the boat in its environment when superimposed on the radar image and to monitor changes when the telescopic wheelhouse of the boat was lowered, temporarily causing a blind spot at the bows;
- absence of a green sign marking the pillar of the Bezons railway bridge, which the boat should have left to starboard, and of lights to mark the passage under the bridge, which was dark.

*Without issuing a formal recommendation, BEA-TT drew the attention of the MANFRET shipping company to:*

- *the fact that it must ensure that the navigation licence of its vessels authorises radar navigation by a single person before they are allowed to navigate at night or in reduced visibility without a lookout;*
- *a requirement for the captains it employs to possess a certificate of capacity corresponding to the vessel and to the navigation carried out and a radar certificate when the vessel is required to navigate at night or in fog.*

*BEA-TT also did not issue any formal recommendation to Voies Navigables de France (French navigable waterways), but:*

- *pointed out that this establishment is rapidly developing electronic navigation chart databases on the river Seine, which is an essential prerequisite to the widespread use of an Inland ECDIS (Electronic Chart Display and Information System) on this river, since if the data are correctly updated and brought into line with the environment, this instrument improves the safety of navigation on inland waterways.*
- *encouraged it to ensure that the spars marking the passages under bridges on the river Seine are all present and equipped with radar reflectors and that the passage lights under the bridges are in working order and sufficiently bright to be seen by vessels moving at night.*

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<sup>2</sup> On internal waterway navigation vessels, the wheelhouse refers to a compartment located in the bows which serves as a store or room for auxiliary machines for example.

<sup>3</sup> Metal planks slotted edge-to-edge

<http://www.bea-tt.developpement-durable.gouv.fr/marfret-marivel-bezons-r177.html>

## 3.4 - Guided transport

### 3.4.1 - Investigations concluded in 2016

Two investigations of accidents which occurred in the operation of guided transport were concluded in 2016. The table below sets out the nature, locations and dates of these accidents.

| Date       | Nature and location of the accident  | Number of fatalities |
|------------|--|----------------------|
| 3.09.2012  | Fatal fall of a passenger in a tram resulting from an emergency stop in Montpellier (34) | 1                    |
| 18.06.2013 | Collision of two automatic Toulouse underground trains at "Bagatelle" station            | 0                    |

These two accidents highlighted issues related to rolling stock braking performance: this performance must be sufficient at all times, including during thunderstorms, in order to ensure compliance with the safety distances, but not too sharp, so as to ensure that passengers inside the trains do not suffer frequent and serious falls.

### 3.4.2 - Recommendations issued

On conclusion of these reports, BEA-TT made 7 separate recommendations.

#### Nature of the recommendations

Out of these 7 recommendations:

- 4 concerned improvement in existing infrastructures or rolling stock;
- 2 concerned the design of future rolling stock;
- 1 concerned maintenance procedures and tools.

#### Recipients

The 7 recommendations were sent as follows:

- 5 to STRMTG;
- 2 to manufacturers.

### 3.4.3 - Follow-up action planned by recipients

The table below shows the follow-up action that the recipients of the above recommendations plan to carry out.

| Investigation | Recommendations |          |              |          |
|---------------|-----------------|----------|--------------|----------|
|               | Number          | Accepted | Not accepted | No reply |
| Montpellier   | 3               | 3        | 0            | 0        |
| Toulouse      | 4               | 4        | 0            | 0        |
| TOTAL         | 7               | 7        | 0            | 0        |

### 3.4.4 - *Monitoring the implementation of the recommendations*

On the basis of monitoring carried out by the Ski Lift and Guided Transport Technical Department (STRMTG), the state of progress of the operational implementation of the recommendations made between 2011 and 2015 following guided transport accidents is as follows:

| Year of publication of the report | Number of recommendations addressed |           |              |             |
|-----------------------------------|-------------------------------------|-----------|--------------|-------------|
|                                   | total                               | closed    |              | In progress |
|                                   |                                     | completed | Not accepted |             |
| 2011                              | 26                                  | 24        | 2            | 0           |
| 2012                              | 18                                  | 9         | 3            | 6           |
| 2015                              | 1                                   | 0         | 0            | 1           |
| Total 2011-2015                   | 45                                  | 33        | 5            | 7           |

### 3.4.5 - General summaries of investigation reports published in 2016

#### Fatal fall of a passenger in a tram resulting from an emergency stop on 3 September 2012 in Montpellier (34)



At 11:14 3 September 2012, tram No. 2095 travelling on Montpellier tram line 2 made an emergency stop between the “Comédie” and “Corum” stations that caused a 73 year-old passenger moving inside the tram to fall and hit his head violently on the lower part of a handrail. He died despite resuscitation attempts firstly by passengers, then by the emergency services after the tram was brought to the “Beaux-Arts” station.

The casualty fell as a direct result of the emergency braking triggered by the VACMA automatic vigilance system that the driver must activate regularly to confirm that he or she has not fallen ill or died, thereby not activating it within the prescribed time.

Three factors contributed to this accident:

- the design of the tram, which does not modulate its emergency braking performance according to the system which triggers it and applies the brakes sharply, generating a serious risk of falls in the event of a failure in activating the vigilance system although, in such cases, there is generally no confirmed imminent risk of collision with a third party;
- the ergonomics of the vigilance system alarm signal, the sound of which is less loud and with a softer tone than that of other equipment that the driver was used to operating and only allows the driver a short reaction time before triggering the emergency braking.
- the attention of the driver was diverted by two pedestrians walking on the platform, which is likely to be the cause of the failure to activate the VACMA system, the design and adjustment of which requires frequent operation on French trams, within the prescribed time.

This analysis led BEA-TT to make three recommendations and three calls for action on the following matters:

- vigilance system and the ergonomics of its alarm signal;
- adaptation of the emergency braking performance of trams;
- management of accident situations.

It should be noted that the VACMA system with which most French trams are equipped is currently being analyzed with regard to the driver health risks it may generate. This aspect does not fall within the competences of BEA-TT and was not therefore taken into account in this technical inspection report.

## Collision of two automatic Toulouse underground trains at "Bagatelle" station on 18 June 2013



At 18:33 on 18 June 2013 on line A of the automatic rubber-wheeled Toulouse underground station, following a thunderstorm, train 18 travelling at 10-15 km/h towards the "Balma-Gramont" terminus collided with stationary train 39 at "Bagatelle" station, causing minor injuries to 3 people.

Train 18 was applying normal service braking in advance in order to stop before the beginning of the section occupied by train 39. As it was not decelerating sufficiently, its automatic systems triggered emergency braking. It was then in the tunnel on a section of the track with a 7% gradient. Its wheels locked and it slid about 170 metres.

Train 39, for its part, had been stationary for one minute and 36 seconds awaiting an order from the central control point to set off after having been unable to stop correctly in the station, also due to track adhesion problems.

The direct cause of the collision was insufficient traction of the train tires on the wet rails. Three factors contributed to this accident:

- poor drainage of water present on the tracks, scoring of the tracks in an unfavorable direction and machining faults;
- polishing of the rails by the repeated passage of trains, reducing their roughness;
- under-estimation of the consequences of wheel locking on train stopping distances during initial safety studies.

This analysis led BEA-TT to make four recommendations and four calls for action on the following matters:

- improvement of drainage on the rails;
- timely restoration and maintenance of adhesion on the rails.

### 3.5 - Ski lifts

No reports on ski lift accidents were published in 2016

#### Monitoring the implementation of the recommendations

On the basis of monitoring carried out by the Ski Lift and Guided Transport Technical Department (STRMTG), the state of progress of operational implementation of the recommendations made between 2011 and 2015 following accidents affecting the operation of ski lifts is as follows:

| Year of publication of the report | Number of recommendations addressed |           |              |             |
|-----------------------------------|-------------------------------------|-----------|--------------|-------------|
|                                   | Total                               | Closed    |              | In progress |
|                                   |                                     | Completed | Not accepted |             |
| 2011                              | 3                                   | 2         | 0            | 1           |
| 2012                              | 5                                   | 5         | 0            | 0           |
| 2013                              | 3                                   | 0         | 0            | 3           |
| 2014                              | 10                                  | 3         | 1            | 6           |
| 2015                              | 2                                   | 0         | 1            | 1           |
| Total 2011-2015                   | 23                                  | 10        | 2            | 11          |

## 4 - Closed investigations and progress report

### **Closed investigations**

As the investigations conducted failed to identify factors that could give rise to preventive recommendations, BEA-TT decided to close three investigations. An overview form summarising the conclusions of the investigations was published for each investigation.

The accidents involved were as follows:

- Collision on 20 December 2010 on the level crossing at Recquignies (59)
- Collision on 14 January 2016 on the level crossing at Beuveille (54)
- Rail accident on 17 August 2016 at Saint-Aunès (34)

The decision to close the investigations and the overview forms are published on the BEA-TT website.

### **Progress report**

Depending on the nature of certain accidents, a decision was taken to introduce a new procedure to inform the parties involved and the public of the progress of investigations and to announce the initial preventive guidelines to the entities concerned.

A progress report was published on 5 February 2016 on the derailment of a test train on the Est-Européenne high-speed LGV line on 14 November 2015.

The report is available on the BEA-TT website.



## APPENDICES

Appendix 1: Investigations opened in 2016

Appendix 2: EPSF monitoring of the implementation of rail transport recommendations issued by BEA-TT

Appendix 3: STRMTG monitoring of the implementation of guided transport recommendations issued by BEA-TT

Appendix 4: STRMTG monitoring of the implementation of recommendations on ski lifts issued by BEA-TT

Appendix 5: BEA-TT organisational chart and institutional texts

Appendix 6: Glossary



## Appendix 1: Investigations opened in 2016

### 1 - Investigations of rail transport accidents

#### ***Collision between a goods train and a heavy goods vehicle on 14 January 2016 on LC No. 49 at Beuveille (54)***

At about 04:00 on 14 January 2016, a goods train travelling between Longuyon and Hayange and an articulated lorry travelling on National Trunk Road 18 collided on level crossing No. 49 located in the municipality of Beuveille (Meurthe et Moselle).

The drivers of the train and of the articulated lorry suffered minor injuries. The articulated lorry was destroyed, 21 wagons derailed and extensive damage was caused to the infrastructure.

The investigation was closed in 2016 and a technical analysis form was published online.

#### ***Rail accident on 17 August 2016 at Saint-Aunès (34)***

At about 15:22 on 17 August 2016, a regional express train travelling between Cerbère and Avignon transporting 219 passengers collided with a tree on the track during a hailstorm near the station at Saint-Aunès in the Hérault department.

Although the train did not derail, the accident injured 10 people, including two seriously injured, and caused extensive material damage.

The investigation was closed in 2016 and a technical analysis form was published online.

#### ***Multiple rail failures on 13 December 2016 between Beillant and Jonzac (17)***

On the morning of 13 December 2016, after the passage of goods train No. 72049 travelling between the quarries at Mazières (79) and Bordeaux (33), level crossings 447 and 462 located between Beillant and Jonzac in Charente-Maritime remained closed due to a fault. During investigations into the causes of these disruptions, 3 rail failures were detected in the level crossing warning zones. In the course of the following inspections, 10 other failures were detected on the route of the train. Eleven of these failures were grouped in a 30 km section on either side of the station at Jonzac.

#### ***Regional express train trails through switch points on 26 December 2016 at Antibes (06)***

On 26 December 2016 in the station at Antibes (Alpes-Maritimes), regional express train No. 86036 passed the closed station entry signal (C1324) at about 15 km/h and trailed through switch points 1310a which had been switched to accommodate a high-speed TGV train travelling on the adjacent track.

The beacon speed control system (KVB) on the engine and the signal involved failed to operate and the driver did not notice the explosion of the signal detonator.

Noticing that the controls for switch points 1310a were not working, the signalman did not take the steps prescribed in such cases.

## 2 - Investigations of road transport accidents

### ***A school bus that came off the road on 10 February 2016 on departmental road 437 at Montflovin (25)***

At about 07:30 on 10 February 2016, the driver of a school bus travelling along departmental Road 437 going towards Pontarlier lost control of the vehicle on a road covered with snow and black ice in the municipality of Montflovin (25).

The vehicle skidded, hit the lower right side of the road and came to a standstill in a field, overturning on its left side.

This accident resulted in two fatalities: two young children trapped under the side of the vehicle and 4 injured people including the driver and 3 other passengers.

### ***Collision between a coach and a heavy goods vehicle on 11 February 2016 on departmental road 911 at Rochefort (17)***

At about 07:10 on the morning of Thursday, 11 February 2016 on a two-lane, two-way road at avenue Victor-Louis Bachelar in Rochefort (17), a school bus crossed the path of a refuse collection lorry of which the left-hand side panel was open at an angle of about 90° to the vertical.

As the two vehicles crossed paths, this panel collided with and sheared the left side of the bus, killing six young people seated inside, all on the left-hand side.

### ***Collision between a light van and a heavy goods vehicle on 24 March 2016 on National Trunk Road 79 at Montbeugny (03)***

At about 23:40 on 24 March 2016, a van with a trailer carrying 12 people travelling from Switzerland to Portugal for Easter collided with an articulated lorry on National Trunk Road No. 79 in the municipality of Montbeugny (03).

This accident cost the lives of 12 people, all passengers in the van. Four people were hospitalised for 24 hours including the van driver, the two drivers of the articulated lorry and the owner of the van who arrived on location after the accident.

The accident caused extensive material damage. The van was destroyed and the articulated lorry was badly damaged.

### ***Collision between a school bus and a heavy goods vehicle on 14 November 2016 at Bavincourt (62)***

At about 07:45 on 14 November 2016, an articulated lorry carrying beets to a sugar factory near Arras collided with a school bus travelling in the opposite direction on National Trunk Road 25 in the municipality of Bavincourt (62).

This accident cost the life of the bus driver. A young college student required extensive hospitalisation and his 2 feet had to be amputated. The driver of the heavy goods vehicle was also hospitalised.

The vehicles were completely destroyed due to the violence of the impact.

***Pile-up on 20 December 2016 on departmental Road 160 at Sainte-Flaive-des-Loups (85)***

On 20 December 2016, a pile-up occurred on departmental road No. 160 in the Les Sables-d'Olonne to La Roche-sur-Yon direction, followed a few minutes later by a second pile-up at the same location in the opposite direction. This accident caused numerous casualties including 5 fatalities and involved about 30 light vehicles and six heavy goods vehicles.

### **3 - Investigation of one accident involving guided transport**

***Derailment of a line 2 Paris underground train on 2 December 2016 at Barbès-Rochechouart station***

At 12:01 on 2 December 2016, while train 28 was travelling between stations, a case of electrical equipment located under the body of the train broke away and caused carriages 4 and 5 to derail as the train was arriving at Barbès-Rochechouart station. One of the bogies collided with the end of the platform. There were no casualties. The accident caused extensive damage to the rolling stock and infrastructure.

### **5 - Investigations of ski lift accidents**

***Fall of an empty chair from the Granges chairlift on 4 April 2016 at Menuires (73)***

At 12:21 4 April 2016, in overcast and windy conditions in which the anemometers of the Granges chairlift triggered several "strong wind" alerts during the morning, an empty chair swinging in a gust of wind caught the catwalk on pylon P10 and fell to the ground. The chairlift stopped after the cable derailment detector on the pylon was triggered. There were no casualties.

***Incident and evacuation of the Panoramic Mont-Blanc cable car on 8 and 9 September 2016 at Chamonix Mont Blanc (74)***

At 15:20 on 8 September 2016, the drive cable of the Panoramic Mont-Blanc cable car swung violently, passed over the carrier cable and the two cables became entangled. The engine at the destination station, essential for remedying this situation, broke down at the first attempts to use it. Operations to rescue the 110 users distributed among the 36 four-seater cable cars were completed at 08:50 on the following day. Two people suffered minor injuries. The facility was closed down for one year.



**Appendix 2: EPSF (National Rail Safety Authority) table showing monitoring of the implementation of rail transport recommendations issued by BEA-TT**

## Recommendations issued in 2006

| Report date | Title of the investigation  | No. | Wording of the recommendation   | Entity                            | State of progress of action taken by EPSF   | Code* |
|-------------|---|-----|---|-----------------------------------|---|-------|
| 12/2006     | Collision between a regional express train and a heavy goods vehicle on a level crossing at Saint-Laurent-Blangy (62) on 09/06/2005 | R1  | To continue studying the solutions (an underpass on location or a new route) to eliminate this level crossing in order to reach a decision and implementation as soon as possible.  | SNCF Réseau<br>General Council 62 | Radars were installed and commissioned in September 2014. With regard to the elimination of LC 83, the road traffic accident study documentation was submitted to General Council 62 at the end of 2014. It turns out that there is a substantial extra cost (approximately €2 million) due to highly contaminated soil in vicinity of the future works which was not identified in the preliminary study.<br><br>For this reason, discussions are currently in progress between SNCF and GC62 to find the best economic solution to this project (works target set at 2018). | O     |
| 11/2006     | Corail train derailment at Saint-Flour (15) on 25/02/2006   | R4  | To draft a program to bring lines open to passenger traffic equipped with DC rails up to standard. In the longer term, to organise the gradual replacement of DC rails with Vignole rails in view of the aging of this equipment, its increasing maintenance costs and the high risk of derailing in the event of rail failure. | SNCF Réseau                       | A program to eliminate DC rails will be drafted during the 1 <sup>st</sup> quarter of 2016 and will be submitted to EPSF. On 01/01/2015, less than 500 km of main passenger lines in operation were equipped with double-headed rails. The target of 411 km by 2016 should be achieved.   | O     |

\* C= Closed; O = Open

## Recommendations issued in 2007

| Report date | Title of the investigation   | No. | Wording of the recommendation   | Entity         | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|---|----------------|---|------|
| 11/2007     | Passenger accident in the station at Chaville-Rive-Droite (92) on 10/11/2006 | R1  | For rolling stock on which a major workshop maintenance operation is required, modifications should be designed to allow the doors to be opened manually after a fire alarm system is activated, at a lower speed threshold than the lowest detectable speed; a program should be drafted to implement these modifications. | SNCF Mobilités | <p>Deployment of modifications in progress for the series involved.</p> <p>On 10/12/2015: 60.2 % of the Z2N equipment benefited from the maintenance operation.</p> <p>Z20500: line D implementation rate = 46.2 %, line P = 100 %, line C = 76.5 %.</p> <p>Z5600 and Z8800: line D implementation rate = 50.9 %, line U = 71.4 %, line C = 55.1 % Z20500 hybrid: line D implementation rate 68.9 %.</p> <p>Z 6400 and VB2N: no changes planned.</p> <p>Z 6400 and VB2N: no change.</p> <p>100% of Z2Ns (5600/8800/20500, i.e. 309 trains) will be modified by 12/2016</p> <p>Z20900: the 54 trains will be modernised between 2018 and 2023.</p> <p>The original Z22500s or Z50000s have the required functionality.</p> | O    |

## Recommendations issued in 2008

| Report date | Title of the investigation   | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF | Code |
|-------------|--|-----|---|-------------|---|------|
| 04/2008     | Maintenance engine derailment in the station at Carcassonne (11) on 27/02/2007 | R2  | Examine the placing of a unified derailer on line 4 between switch points 120b and 118a.  | SNCF Réseau | Action closed                             | C    |
| 03/2008     | Collision with a person in the station at Villeneuve-Triage (94) on 01/03/2007 | R1  | Ensure the placing of a sufficient number of "crossing the line prohibited" signs or any other equivalent system and keep them clean and legible. | SNCF Réseau | Action closed                             | C    |

## Recommendations issued in 2008 - continued

| Report date | Title of the investigation   | No. | Wording of the recommendation  | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|--|-------------|---|------|
| 12/2008     | Train derailment at Culoz (01) on 24/07/2006                             | R1  | When dispatching specialised equipment (approved for railway works) incorporated in a works train on the line from the area of the works to the depot location and vice versa, the departure should be made conditional on prior submission of a certificate that the route has been brought up to standard, duly signed by the representative of the operator of the specialised equipment, to the officer in charge of delivering the departure authorisation. The latter may then send a "train ready to depart" message to the personnel of the delegated infrastructure managing agent, who can then authorise access to the network by opening the corresponding signal. | SNCF Réseau | Action closed   | C    |
|             |  | R2  | For future track works machinery with complex architecture in accordance with IN 1418, the suitability of vehicles with new technology which, in particular, measure Y and Q wheel/rail interaction forces for passing twisted tracks should be checked and the procedure prescribed by form UIC 518 should be applied for the test on the line. In the case of a train with an architecture similar to that of the P21/95, at least the working group axle should be subjected to such measurements.  | SNCF Réseau | The recommendation was followed up in the development of special GC MR3A No.3 and GC MR3A No.5 operational rules. As from validation in accordance with the process for developing and updating this type of text ensuing from Article 10 of Order No. 2006-1279, SNCF Réseau will publish it and make it applicable. | O    |
| 12/2008     | Member of personnel hit by a train at LC 37 at Bayard (52) on 26/02/2008 | R2  | Examine a change in the regulations for works in the immediate vicinity of level crossings that no longer involve the use of lights to indicate that security has been resumed, but the use of flashing red traffic lights to notify the person in charge of the warning that traffic is approaching so that the warning signal can be shown.  | SNCF Réseau | Action closed   | C    |

## Recommendations issued in 2009

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|---|-----|--|-------------|---|------|
| 12/2009     | Collision with a group of people at the Stade de France at Saint-Denis (93) | R3  | Organisation and closure specifications should be introduced to ensure that access doors and gates to railway areas are sufficiently effective in preventing third parties from entering, while remaining easily accessible to authorised personnel. | SNCF Réseau | Action closed   | C    |
|             |   | R5  | The policy for locating signs prohibiting access to railway areas and warning of the dangers related to doors and gates giving access to railway platforms should be reviewed. Procedures for implementing this policy should be established.        | SNCF Réseau | Areas identified as similar to the Stade de France (with occasional crowd gatherings) have been identified and are being dealt with. The safety policy has not been published so far. Pending its publication, measures for placing signs are being taken by SNCF Réseau. | O    |

## Recommendations issued in 2010

| Report date | Title of the investigation   | No. | Wording of the recommendation   | Entity | State of progress of action taken by EPSF   | Code        |
|-------------|--|-----|---|--------|---|-------------|
| 02/2010     | Collision between a coach and a regional express train at Allinges (74) on 02/06/2008                  | R2  | The Order of 18 March 1991 (Article 10) should be supplemented, specifying that the delay in closing a level crossing must allow all authorised heavy goods vehicles entering at the moment when an approaching train warning is issued to clear the entry barrier to traffic in the opposite direction before it closes. This condition should be checked in consultation with the road infrastructure managing agency to determine the time required for authorised vehicles to cross.<br>If taking this into account leads to excessive delays with regard to other considerations, leading to limiting the delay in the warning (e.g. the risk of careless users zigzagging through half barriers), measures should be taken to prohibit road vehicles from passing if they cannot cross the level crossing within the allotted time. | DGITM  | Action in progress, safety plan for level crossings<br><br>All level crossings under the National Safety Program must be dealt with by 2018.  | O           |
| 12/2010     | Derailment of two hazardous goods wagons at the station at Orthez (64) on 24/11/2009                   | R2  | Arrange for entities in charge of maintenance to check the relevance of the maintenance regulations on the connections between the carriages and bogies of long wheelbase tanker wagons and strengthen the traceability prescriptions for works on these components.  | VTGF   | Action closed   | O           |
|             |  | R3  | Arrange for the entities in charge of maintenance to amend and supplement the criteria related to the play on the side friction blocks of long wheelbase rigid wagons to bring them sufficiently into compliance with track standards to ensure that the wagons are suitable for passing along twisted tracks.  | AFWP   | Working group introduced  |             |
|             |  |     |   | R5     | Establish a policy to grease the rails to ensure a sufficient level of lubrication on sections where their acute geometrical characteristics and the presence of heavy goods traffic expose them in particular to the risk of wheel climb derailment. | SNCF Réseau |
| 12/2010     | Collision between a train and the load of an oncoming train in the Livernant tunnel (16) on 20/05/2009 | R5  | Examine the procedures for enabling train drivers to assess whether the dimensions of an oncoming train foul the gauge when they hear an unusual impact noise on passing a goods train at night or in poor visibility by adapting regulatory text IN 1514-S2C or by means of specialised railway company documents.   | EPSF   | Action in progress  | O           |
|             |  |     |   | DGITM  | Action closed   |             |

## Recommendations issued in 2011

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity                                 | State of progress of action taken by EPSF   | Code |
|-------------|---|-----|--|--|---|------|
| 01/2011     | Goods train derailment in the station at Neufchâteau (88) on 22/05/2010   | R2  | Send a recommendation to the holders to strengthen and improve the reliability of the wheel crack detector frames on their wagons jointly with their entities in charge of maintenance or their maintenance engineering service providers.   | AFWP                                   | Action in progress  | O    |
| 01/2011     | Collision between a passenger train and an agricultural trailer at Boisseuil (87) on 03/07/2009                                 | R2  | Assess the possibility of installing a ground-to-train radio warning system (SAR) in operational traffic management centres (COGC) and signal boxes to provide effective warnings to trains in the event of an obstacle on the track or an imminent hazard.  | SNCF Réseau                            | Action closed   | C    |
| 08/2011     | Goods train derailment in the station at Bully-Grenay (62) on 29/07/2010  | R2  | Contribute on a European level to the establishment and implementation of an obligatory certification and monitoring system for workshops working on brake valves and, more generally, on the most critical safety components.   | DGITM                                  | Action in progress<br>Documents provided in the course of approval  | O    |
|             |   | R3  | Jointly with the main European networks, compare the consistency, density and quality of full monitoring and detection systems for moving trains (not including high-speed LGV lines) and find innovative systems in their project or trial phase. Share the results of the above with the main stakeholders involved in national rail network safety and learn lessons to benefit the infrastructure and equipment on this network. | SNCF Réseau                            | The benchmarks were used as inputs for network control centre studies (in particular STEM) and X15. These documents will allow the recommendation to be closed. | O    |
| 10/2011     | Collision between a regional express train and a heavy goods vehicle on an unmanned level crossing at Gimont (32) on 27/09/2010 | R2  | Rapidly carry out safety works on the access route to the village of Julias, either by eliminating level crossing No. 76 or by developing its crossing arrangements by installing audible and light signals and by straightening the route of local road No. 10 approaching the level crossing.  | SNCF Réseau<br><br>Gimont municipality | Action closed   | C    |

## Recommendations issued in 2012

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity         | State of progress of action taken by EPSF  | Code |
|-------------|---|-----|--|----------------|--|------|
| 01/2012     | Goods train derailment in the station at Neufchâteau (88) on 22/05/2010 | R1  | Address the European Railway Agency (directly in the case of EPSF, through the Joint Sector Group [JSG] in the case of SNCF and through the European Railway Wheels and Wheel Sets Association [ERWA] in the case of Valdunes) in order to promote a set of studies and tests to assess the actual forces exerted on the running gear of tank wagons on the line and in marshalling yards and the interactions between these forces with a view to taking them into account in wheel design standards. | SNCF Mobilités | Action closed  | O    |
|             |   |     |  | EPSF           | This recommendation does not appear to have been very feasible. No special action was therefore planned. |      |
|             |   |     |  | Valdunes       | On 31/12/2015:<br>Action not concluded.<br>Documents provided in the course of approval                  |      |
|             |   | R2  | Address the European standardisation authorities to withdraw wheels with non-machined webs from European wagon wheel design and manufacturing standards pending sufficiently in-depth knowledge of the effects of their surface characteristics on their fatigue resistance.   | BNF            | Action in progress   | O    |
|             |   | R6  | Address the GCU office to arrange for the search for wheel web fractures during technical transfer inspections and on post-repair checks to feature more explicitly in annexes 9 and 10 of the general contract of use.  | SNCF Mobilités | Action closed  | O    |
|             |   |     |  | NACCO          | On 31/12/2015:<br>Action not concluded<br>Documents provided in the course of approval                   |      |
|             |   |     |  | VTG            | Action closed  |      |
|             |   | R9  | Action on a national level addressing the European Railway Agency to ensure that the holders of wagons and the entities in charge of maintenance acquire organisational structures and tools to determine the condition and situation of their fleet of wagons and axles and to ensure that maintenance operations are traceable. Action in this respect to implement the European Wheelset Traceability guidelines (EWT)  | EPSF           | Action closed  | C    |
|             |   |     |  | AFWP           | Action closed  |      |

## Recommendations issued in 2012 - continued

| Report date | Title of the investigation  | No. | Wording of the recommendation   | Entity | State of progress of action taken by EPSF           | Code |
|-------------|---|-----|---|--------|---|------|
| 05/2012     | Collision between a regional express train and a heavy goods vehicle at Saint-Médard-sur-Ille on 12/10/2011                             | R2  | <p>1 - Arrange for an assessment of the conditions for implementing the level crossing safety improvement policy, particularly with regard to:</p> <ul style="list-style-type: none"> <li>- procedures for listing level crossings referred to as “causing concern” in terms of the relevance of the classification criteria and taking into account the safety diagnoses prescribed by the circular of the transport minister dated July 2008 and approval of this list;</li> <li>- clarification of the procedures and actions involved in entering a level crossing on this list, particularly with regard to programming design studies and works to develop or eliminate them;</li> <li>- putting this policy into operation in terms of assessing and possibly redirecting actions already implemented or pending implementation;</li> <li>- role of the national body for coordinating the policy for the elimination and development of level crossings in the implementation of this policy.</li> </ul> <p>2 - Introducing the adjustments ensuing from this assessment.</p> | DGITM  | Action in progress, safety plan for level crossings | O    |
| 06/2012     | Collision between a goods train and a lorry carrying an abnormal load of metal girders stopped by LC 222 at Balbigny (42) on 25/01/2011 | R3  | Arrange for the French rail network (RFF) and SNCF to draft information on the special hazards involved when abnormal loads pass through level crossings and disseminate it among professional road transport organisations, in particular drawing attention to the precautions to be taken to avoid immobilisation on level crossings and situations for which the rail infrastructure managing agent must be asked to provide protection.   | DGITM  | Action in progress                                  | O    |
| 07/2012     | Derailment of two wagons on the line at Artenay (45) on 09/03/2011  | R1  | As an entity in charge of maintenance, introduce and apply under-vehicle axle inspections as defined in the European visual inspection catalogue (EVIC) for axles in its own maintenance documents; as a member of Vereinigung der Privatgüterwagen Interessenten (VPI), take action to bring the maintenance log book criteria of this professional association into line with those of the EVIC.  | NACCO  | Action closed                                       | C    |

## Recommendations issued in 2012 - continued

| Report date | Title of the investigation  | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|---|-----|---|-------------|---|------|
| 11/2012     | Catch-up collision of two goods trains at Maillé (37) on 01/02/2012 | R1  | <p>Ensure that safety communications between the regulators and signalmen on their service landline telephones are recorded and traceable.</p> <p><i>In addition, BEA-TT calls on rail operators on the national rail network to remind their drivers of the safety requirements attached to travelling at restricted speed, particularly in terms of vigilance and controlling the speed of their train, so as to be able to stop before any signal or obstacle.</i></p> | SNCF Réseau | <p>Three initiatives were taken by SNCF Réseau with regard to recording conversations with signal boxes:</p> <ul style="list-style-type: none"> <li>• In the short term, deployment during 2016 of recording devices on existing telephone switchboards at 100 to 120 sites. These sites have been selected for their importance and technical capacity to enable installation. Subsequently, signal boxes fitted with technology that does not allow quick deployment will be identified.</li> <li>• In the medium term, recording on the core of the GSMR network is planned for mid-2017. Details of the expected functionality must be provided before the implementation decision.</li> <li>• In the long term, deployment of new generation railway telephony (TFNG) will include recording functionality.</li> </ul> | O    |

## Recommendations issued in 2013

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity   | State of progress of action taken by EPSF   | Code |
|-------------|---|-----|--|--|---|------|
| 06/2013     | Collision between a regional express train and an automobile at Breuil (69) on 04/12/2011 | R1  | Establish and implement the national unmanned level crossing safety program as soon as possible at Croix de Saint-André.   | DGITM  | Action in progress  | O    |
|             |   | R2  | As part of the national level crossing safety improvement policy, request prefects to call on local authorities to take appropriate steps to ensure that access to the unmanned level crossings at Croix de Saint-André that only serve a few residents is quickly and strictly restricted to these residents only.  | DGITM  | On 31/12/2015:<br>Action not concluded<br>Documents provided in the course of approval  | O    |
|             |   | R3  | Take the required steps to eliminate level crossing No. 65 on the Lozanne railway line at Paray-le-Monial and, pending this, restrict access to it strictly to residents only by all appropriate means.<br><i>In addition, without issuing formal recommendations, BEA-TT:</i><br>- <i>Called on railway companies to ensure that their drivers comply with "S" signs and, more generally, the regulations for the use of the audible warning;</i><br>- <i>drew the attention of the French Rail Network to the fact that the surroundings of certain unmanned level crossings at Croix de Saint-André make it difficult to hear the warning signals of trains, increasing the risks run by road users, and called on it to take account of this in the level crossing safety program.</i> | SNCF Réseau<br>Rhône Prefecture<br>Breuil Municipality | The calculation has been carried out. In view of the amount, a study has been initiated to eliminate the level crossing. The elimination date will be determined on conclusion of the study.<br>The proposal by SNCF Réseau is to eliminate the level crossing by transferring to an old municipal path. The municipal mayor turned down the solution, calling for an overpass to be built. SNCF Réseau does not wish to make any financial commitments beyond the cost of restoring the old municipal path. The difference between the costs of these two solutions is about €4 million. Following a meeting held at the Villefranche sub-prefecture to eliminate the level crossing, it appears that the mayor has reviewed his position. | O    |

## Recommendations issued in 2013 - continued

| Report date | Title of the investigation   | No. | Wording of the recommendation  | Entity  | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|--|---|---|------|
| 06/2013     | Collision between a rail motor vehicle and an insulator at Sevrans (93) 01/02/2012 | R1  | Monitor fluctuations in the number of Vt 200223 type ceramic insulator fractures.<br>In the event of a significant increase in this number, insulators of this type should be removed from the main line catenaries in positions where they could be impacted by rail traffic in the event of fracture.  | SNCF Réseau                                   | Action closed   | C    |
|             |  | R2  | List the characteristics of front windscreens and windscreen heaters fitted on rolling stock and the regulations for the use of these windscreen heaters. For rolling stock equipped with front windscreens that do not comply with EN 15152 or NF F 15-818 or an equivalent national standard, examine the possibility and relevance of improving protection against the entry of projectiles into driving cabs during cold weather, for example by specifying the rules for the use of windscreen heaters or by planning to replace the glass with components with improved impact strength at low temperatures.   | All EF  | Action in progress  | O    |
|             |  | R3  | Ensure that the changes in EN 15152 on rolling stock windscreens take account of the variability of the glass with temperature and impact resistance and ensure that driver protection is maintained or even improved throughout the temperature range currently encountered on the national rail network and particularly at negative temperatures.<br><i>In addition to this last recommendation, BEA-TT also called on rail companies other than SNCF to endeavour to take similar steps with regard to the national or international standardisation authorities in which they take part.</i><br><i>In addition, BEA-TT called on AGC glass and Saint-Gobain to acquire actual knowledge of the impact resistance of the glass used for rolling stock windscreens through tests, studies or any other means, throughout the entire temperature range currently encountered on the national rail network, including in hot weather with the windscreen heater in operation, and to share this knowledge in the course of the work to revise EN 15152.</i> | Saint Gobain<br><br>BNF<br><br>SNCF Mobilités | Action closed<br><br>Action in progress<br><br>SNCF is currently taking part in the work of the standardisation authorities (BNF, ERA, sector, etc.), particularly for EN 15-152 on train cab windscreens as BEA-TT wished. | O    |

## Recommendations issued in 2013 - continued

| Report date | Title of the investigation   | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF  | Code |
|-------------|--|-----|---|-------------|--|------|
| 07/2013     | Collision between a train and a works machine at Lachapelle-Auzac (46) on 04/07/2012 | R1  | As part of the feedback process carried out on the application of works insurance processes and in order to avoid the appearance of incorrect practices, examine the conditions for safely facilitating the use of the equipment guarantee process during unforeseen works with a minor impact on rail traffic. | SNCF Réseau | <p>Simplifying safety procedures is being kept as one of the priorities of the large-scale multiple-year procedure conducted by the SNCF infrastructure division for the "Safe Conduct of All Projects". In particular, important work was carried out with a view to "alleviating the Equipment Guarantee procedure".</p> <p>These provisions are already being tried out for a six-month period, which will be followed by a feedback process for the purposes of approving their long-term application.</p> | O    |
|             |  | R2  | Remind all personnel in charge of railway works of the essential requirement to comply strictly with the interlock and protection measures to ensure that no trains are unable to stop before reaching the works.   | SNCF Réseau | Action closed  | C    |

## Recommendations issued in 2013 - continued

| Report date | Title of the investigation   | No. | Wording of the recommendation  | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|--|-------------|---|------|
| 07/2013     | Collision between a train and a works machine at Lachapelle-Auzac (46) on 04/07/2012 | R3  | <p>Ensure that all communications related to operations carried out from signalmen's service telephones are recorded.</p> <p><i>In addition, BEA-TT calls on SNCF to carry out a feedback process on the use of new LOR'AXE catenary maintenance engines and on the conditions for training their drivers.</i></p> | SNCF Réseau | <p>Three initiatives were taken by SNCF Réseau with regard to recording conversations with signal boxes:</p> <ul style="list-style-type: none"> <li>• In the short term, deployment during 2016 of recording devices on existing telephone switchboards at 100 to 120 sites. These sites have been selected for their importance and technical capacity to enable installation. Subsequently, signal boxes fitted with technology that does not allow quick deployment will be identified.</li> <li>• In the medium term, recording on the core of the GSMR network is planned for mid-2017. Details of the expected functionality must be provided before the implementation decision.</li> <li>• In the long term, deployment of new generation railway telephony (TFNG) will include recording functionality.</li> </ul> | O    |

## Recommendations issued in 2013 - continued

| Report date | Title of the investigation                                    | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF  | Code |
|-------------|---|-----|---|-------------|--|------|
| 08/2013     | Derailment of a passenger train at Mercuès (46) on 22/05/2012 | R1  | Establish and implement procedures and methods for monitoring combined works to ensure that they are comprehensively supervised, particularly when they include works on sensitive land.  | SNCF Réseau | <p>SNCF will continue its action to jointly update its special civil engineering works and earthworks monitoring procedures to establish a procedure where both types of works will take the other into account where the personnel involved on either of them observe disorder in the other.</p> <p>Initially the system will involve aligning the relevant standards: IN256</p> <p>“Monitoring of earthworks, drainage systems and platforms” and IN1253 “Monitoring civil engineering works and visible structures”, along with the production of special professional guidelines on “Wall coatings”. Activities will subsequently be undertaken to raise the awareness of the parties involved.</p> <p>MTM-DT-GC will produce a summary note with comments on the works carried out in the different fields.</p> <p>Approval of the standards is planned for 2017.</p> | O    |
|             |   | R2  | In acquiring familiarity with the surroundings of the works and establishing the procedures for monitoring them, data contained in the different information and documents and prevention documents related to major natural hazards produced by public authorities (departmental documentation of major hazards, local authority information documents on major hazards, natural risk prevention plans and local contingency plans) should always be taken into account. | SNCF Réseau | <p>A meeting was held between DGPR (Directorate General on Risk Prevention) and SNCF (Technical and Engineering Division) for this purpose on 5 June 2014.</p> <p>On the scale of the national rail network, direct and uninterrupted access to geographical (GIS) data is required. For the time being, the reply given by DGPR only allows one-off access via a publicly accessible instrument (Cartorisques) which is of limited effectiveness for the issues concerned. The procedure was undertaken with DGPRN on 14/12/2015. The natural risk prevention plans are currently being rewritten.</p>  | O    |

## Recommendations issued in 2013 - continued

| Report date | Title of the investigation                                     | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|---|-------------|---|------|
| 08/2013     | Derailement of a passenger train at Mercuès (46) on 22/05/2012 | R3  | Improve simple real-time rail traffic warning systems that can be activated quickly, drawing lessons from national or foreign road and rail projects, pending permanent measures, for dangerous disorder affecting works. | SNCF Réseau | <p>SNCF Réseau feasibility studies are currently in progress for applying new simple warning systems. A research project (Dimodo) began in 2014. Previously undertaken benchmarking activities have continued. These activities identified:</p> <ol style="list-style-type: none"> <li>1. a specific movable device, the laser scanner, which will be tested in the field in 2015 (an aptitude test for obstacle detection and a suitability test for integration into the rail system to be assessed);</li> <li>2. a fixed linear fibre-optic system which will also be tested in the field in 2015. This system is also currently being tested on another European network for the same problems.</li> </ol> <p>Trials are still in progress or scheduled on fixed warning systems. Completion is planned for September 2016.</p> | O    |

## Recommendations issued in 2014

| Report date | Title of the investigation  | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF  | Code |
|-------------|---|-----|---|-------------|--|------|
| 01/2014     | Inter-city train derailment at Bretigny-sur-Orge (91) on 12/07/2013 (progress report) | R1  | <p>Overall improvement in the level of knowledge of the bolted assemblies of switch points and crossings by working on different factors, in particular:</p> <ul style="list-style-type: none"> <li>• technical specifications and the quality of the components;</li> <li>• bolt tightening systems;</li> <li>• compliance with the instructions for bolt tightening and, more generally, with the specifications and industry standards during assembly and maintenance of these assemblies.</li> </ul> | SNCF Réseau | <p>Following the expert inspections carried out, the progress report from summer 2014 identified two types of action:</p> <ul style="list-style-type: none"> <li>• action referred to as “short-term” focusing on improving the performance of existing components. This type of action concerned the manufacture of two bolt prototypes (end of September 2014) and establishing test areas for comparison (November 2014). The end of the tests and the conclusions of these activities are planned for mid-2016.</li> <li>• Action referred to as “medium-term” to redesign all or part of fish plate joints through improved understanding of their functions. Action in progress</li> </ul> | O    |
|             |   | R2  | <p>Clarify and strengthen the rules concerning steps to be taken in the event that anomalies are detected that affect the fastenings of switch points and crossings.</p> <p>In this connection, specify the maximum deadline after any maintenance work or tour of inspection in which all fastenings must be present and tightened. Similarly, specify a deadline for level two fasteners.</p>   | SNCF Réseau | Action closed  | C    |
|             |   | R3  | <p>Identify switch points and crossings or groups thereof with features that require enhanced maintenance or premature regeneration in comparison with the general prescriptions.</p> <p>Provide systems to ensure that these special features are taken into account in a reliable and auditable manner in the general organisation of maintenance works or that of the establishments.</p>  | SNCF Réseau | The new process for strictly adapting the maintenance of devices to local conditions established at the end of 2014 has been in a trial phase since 2015 at several equipment and maintenance depots. The feedback process conducted at the end of 2015 shows that this trial phase must continue in 2016. Feedback from this trial phase will be processed in 2016. This should result in widespread deployment at the beginning of 2017.   | O    |

## Recommendations issued in 2014 - continued

| Report date | Title of the investigation   | No. | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF   | Code |
|-------------|--|-----|---|-------------|---|------|
| 06/2014     | Collision between a regional express train, a minibus and an automobile at Amilly (28) on 27/11/2012 | R1  | On level crossings where the warning zone is separated from the short zone (approach zone installation), improve the safety of the short zone warning re-set function either by technically modifying the resetting circuit or by changing the rules for maintaining the relevant electrical joints.                              | SNCF Réseau | On existing facilities, with arrangements of this type the systematic preventive maintenance regulation will be changed: all short circuit connection blocks will be systematically replaced when they reach 20 years of age.<br><br>A survey of blocks more than 20 years old has been carried out and their replacement has been planned. The IN edition that will cover the organisation of the shuttle loop transit is planned for the first quarter of 2016.<br><br>In the case of new or extensively re-engineered facilities, this action involved correction of the signalling system design directive 167 and 190. | O    |
|             |  | R2  | Amend specification SAM S 004 to ensure that assessment of the suitability of thermal engines equipped with scrubbers coupled with the air brake for shunting takes account of the fact that during their service life these engines will inevitably travel considerable distances without braking.                               | EPSF        | Action in progress  | O    |
|             |  | R3  | Implement a feedback process focusing on deshunting involving thermal locomotives on deadheading runs.<br><br>Check whether deshunting occurs more frequently than average on series equipped with scrubbers coupled with the brakes, only taking account of deadheading runs. If applicable, establish the measures to be taken. | SNCF Réseau | Action closed   | O    |
| EPSF        | Action in progress   |     |   |             |   |      |

## Recommendations issued in 2014 - continued

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity         | State of progress of action taken by EPSF  | Code |
|-------------|---|-----|--|----------------|--|------|
| 10/2014     | Derailment of a regional express train at Lyon - Guillotière (69) on 26/06/2013 | R1  | In the process of allocating axle repair and workshop quality monitoring expenditure, include systematic verification that the axle painting process is sustainably mastered for type 984 axles.   | SNCF Mobilités | <p>The production and repair of type 984 axles has been centralised on only two sites which have suitable facilities for this type of axle: the Languedoc Roussillon Maintenance Technicentre (Nîmes site) and the Picardie Industrial Technicentre.</p> <p>The safety monitoring plans for the two sites include checking that the repair procedure is applied.</p> | O    |
|             |   | R2  | <p>Finish drafting version B of technical data sheet TR 1 018 on the elimination of axle defects and enforce it by ensuring that its prescriptions are fully understood and applied by all personnel in charge of implementing it, by means of all appropriate support systems.</p> <p>Disseminate the filling training module (MAORRAG) to all repair centre personnel allocated to this job, including all personnel already working in this area.</p> | SNCF Mobilités | The data sheet was drafted in June 2014. The training module (MAOR RAG filling) has been used since June 2014 and is currently being disseminated among all repair centre personnel (due to conclude at the end of 2015)   | O    |

## Recommendations issued in 2015

| Report date | Title of the investigation                                    | No . | Wording of the recommendation   | Entity | State of progress of action taken by EPSF  | Code |
|-------------|---|------|---|--------|--|------|
| 05/2015     | Collision due to loss of control at Modane (73) on 24/01/2013 | R1   | Re-tighten and specify the maintenance regulation for finding and eliminating coupling devices on all wagons for which you are the entity in charge of maintenance that do not carry marks of compliance with the European standard or recognised national standards. | ERMEWA | <p>The use of repaired or re-used coupling devices is prohibited and, in the event of replacement, use complete coupling devices compliant with EN 15 566 of 2009. In particular, this standard requires a manufacturing date to be affixed to the different components of the coupling device, along with a higher impact strength level than the one stipulated in the old French standard (NF F 10407) or in UIC 826 which it replaces.</p> <p>In addition, at the time of general inspections, systematically replace all coupling devices that do not bear the manufacturing dates with new coupling devices.</p> <p>This measure will be deployed on the entire ERMEWA industrial wagon fleet by September 2015 at the latest</p> <p>With these measures, the fleet will be brought up to standard within 12 years at the latest</p> | O    |

## Recommendations issued in 2015 - continued

| Report date | Title of the investigation                                    | No | Wording of the recommendation   | Entity                               | State of progress of action taken by EPSF  | Code |
|-------------|---|----|---|--------------------------------------|--|------|
| 05/2015     | Collision due to loss of control at Modane (73) on 24/01/2013 | R1 | Tighten up and clarify the maintenance regulation for finding and eliminating coupling devices on all wagons for which you are the entity in charge of maintenance that do not carry marks of compliance with the European standard or recognised national standards. | SNCF Mobilités<br>Equipment division | <p>As from the first half of 2016, when carrying out routine inspections, check for the markings of each component of the coupling device as specified in NF F 10407/UIC 526 or NF EN 15566 and reject all non-compliant coupling devices and those for which the service life of the screw calculated on the basis of its year of manufacture exceeds 30 years.</p> <p>For series of wagons with a routine inspection interval exceeding 12 years, comprehensive inspections should be carried out at the time of intermediate inspections (six-year interval) so as to bring the fleet up to standard within 12 years as proposed elsewhere by the ERMEWA ECM (the entity in charge of maintenance for freight wagons) for its fleet of wagons.</p> <p>In addition, SNCF has examined the additional measures to be taken and has identified two actions to improve the reliability of the SCMT train movement control system on BB36300 in order to significantly limit the number of times the system accidentally causes emergency braking.</p> |      |

## Recommendations issued in 2015 - continued

| Report date | Title of the investigation  | No . | Wording of the recommendation  | Entity                               | State of progress of action taken by EPSF   | Code |
|-------------|---|------|--|--------------------------------------|---|------|
| 05/2015     | Collision due to loss of control at Modane (73) on 24/01/2013   | R2   | For type C3A and C3W type distributors, make a suitable change in the specifications of the sleeves of “disconnecting” and “initial stage” devices or their assembly in order to ensure that the brake cylinder circuit is leakproof down to -25°C for a service life consistent with the maintenance schemes. | FAIVELEY-TRANSPORT                   | For the purposes of permanent improvement in product performance, Faiveley-Transport is carrying out a more accurate analysis of recommendation R2 and is working on the material and shape of the “disconnecting” and “initial stage” devices on C3A and C3W distributors. Assessment every 12 months of the laboratory research and development time required to be able to confirm the relevance and technical feasibility of this recommendation.   | O    |
|             |   | R3   | When the modification specified in recommendation R2 has been perfected, apply it at the time of inspections of the relevant distributors in wagons for which you are the entity in charge of maintenance.   | SNCF Mobilités<br>Equipment division | Hearing the proposals that Faiveley has the capacity to make with regard to the materials to be used for sleeves.<br>Progress monitoring during regular updates with Faiveley.  | O    |
|             |   |      |  | SNCF Mobilités<br>Equipment division | Decision on the action to follow up recommendations R2 and R3 until August 2017 after assessment and before modifying all the distributors, the impact of the modification on their service life and on the ensuing maintenance rules.<br><br>In addition, SNCF has examined the additional measures to be taken and has identified two actions to improve the reliability of the SCMT train movement control system on BB36300 in order to significantly limit the number of times the system accidentally causes emergency braking. |      |
| ERMEWA      | Pending proposals from Faiveley Transport, no other particular measures other than enhancing monitoring and inspection to check the proper application of the specifications. |      |  |                                      |   |      |

## Recommendations issued in 2015 - continued

| Report date | Title of the investigation  | No. | Wording of the recommendation  | Entity         | State of progress of action taken by EPSF  | Code |
|-------------|---|-----|--|----------------|--|------|
| 06/2015     | Loss of control of a regional express train at Mérens-les-Vals (09) on 18/12/2013 | R1  | Update regional application document INFP MPY 01074 on preventing skidding, wheel sliding and deshunting, taking feedback and notifications from drivers into account.<br>In this framework, include the section of line connecting Ax-les-Thermes to Latour-de-Carol among those which repeatedly show deteriorated adhesion requiring suitable preventive and remedial measures to be taken. | SNCF Réseau    | The line connecting Ax-Les-Thermes to Latour-de-Carol has now been identified as repeatedly showing deteriorated adhesion. The autumn rail cleaning operation will include this section of line and the INFP MPY INFP MPY 01074 text is currently being re-drafted.  | O    |
|             |   | R2  | In the procedure manuals intended for personnel in charge of rail traffic management, specify the steps to be taken in the event of major skidding, particularly in the event of repeated skidding not limited to a precise location.  | SNCF Réseau    | A normative definition of the alarm thresholds and the steps to be taken will be undertaken by a working group including members of the Traffic, Maintenance and Works and Network Access branches and rail operators. The guidelines adopted will be set out in the local operating procedures.   | O    |
|             |   | R3  | Introduce organisation and checks at the Toulouse service station to ensure that sand hoppers are filled each time an AGC type train passes.   | SNCF Mobilités | Immediately after the event, sand hoppers should always be tested by drivers before setting out on the line. As from 2013, all movement logistics operators have been monitored on level 1 monitoring by their line managers and finished product inspection is being introduced by the entity in charge.<br><br>Traceability of the filling of sand hoppers is established in the two service stations involved.<br><br>Finished product inspections have been introduced and inspections in action have also been carried out. In parallel, the Midi-Pyrenees Technicentre is initiating a study for the purposes of automating the monitoring and traceability of sand hopper filling operations. | O    |

## Recommendations issued in 2015 - continued

| Report date | Title of the investigation   | No . | Wording of the recommendation  | Entity  | State of progress of action taken by EPSF   | Code |
|-------------|--|------|--|---|---|------|
| 06/2015     | Loss of control of a regional express train at Mérens-les-Vals (09) on 18/12/2013                                      | R4   | Improve the braking performance of high-capacity self-propelled trains in cases of poor adhesion by:<br>- quickly lowering the speed threshold below which electromagnetic rolling stock brake blocks must not be in contact with the rails to as low a level as possible that is compatible with the infrastructure and passenger comfort and with the constraints on this rolling stock;<br>- prescribing and organising systematic checks on the operation and filling of sand hoppers every time the rolling stock visits the service station. | SNCF Mobilités                                  | Action in progress<br>A deployment schedule is currently being established over the period from 2016 to 2018. | O    |
| 06/2015     | Collision between a TGV high-speed train and an articulated tank transporter at Saint-Rémy-de-Sillé (72) on 15/10/2013 | R1   | Prevent the access of low-clearance vehicles by all appropriate means to local road No. 3 or restore the profile along this route immediately to the north of level crossing No. 128 so that these vehicles can cross it without getting stuck.  | SNCF Réseau<br>Saint-Rémy-de-Sillé municipality | Action in progress  | O    |

## Recommendations issued in 2015 - continued

| Report date | Title of the investigation   | No . | Wording of the recommendation   | Entity      | State of progress of action taken by EPSF  | Code |
|-------------|--|------|---|-------------|--|------|
| 09/2015     | Inter-city train derailment at Bretigny-sur-Orge (91) on 12/07/2013 (Final report) | R4   | By means of external audits and on the basis of explicit targets, check that changes in the average age of the different components of the national rail network comply with the guidelines adopted and that the resources allocated to maintenance are consistent with the requirements in connection with the state of the facilities and the expected performance.   | SNCF Réseau | An initial audit should have been conducted during the 4 <sup>th</sup> quarter of 2016 and repeated at a pre-set interval of three years.  | O    |
|             |  | R5   | <p>Improve the management personnel allocation policy in bodies in charge of maintaining the rail infrastructure:</p> <ul style="list-style-type: none"> <li>- by avoiding concentrations of young managing personnel in operational units and keeping this objective in mind when determining the managing personnel to organise these units;</li> <li>- by ensuring the required complementarity of skills, competence and seniority of the teams at the head of the rail track sectors, including the line manager, the support technician and the operational technician.</li> <li>- by reducing their turnover, particularly in establishments located in the Île-de-France region.</li> </ul> | SNCF Réseau | <p>Several actions to limit this turnover have already been introduced.</p> <p>Systems to ensure improved complementarity among locally based supervising teams, improved use of experience and support for improvements in the competence of new line managers should be implemented by the first half of 2017.</p>                 | O    |
|             |  | R6   | <p>In the safety audits of bodies in charge of rail infrastructure maintenance, always include inspection of the actual state of a sample of equipment on which monitoring or maintenance work has recently been carried out in order to assess the relevance of the maintenance regulations and the quality of their implementation.</p> <p>In this connection, pay particular attention to the implementation of supervisory and inspection tours for category B switch points and crossings.</p>   | SNCF Réseau | <p>Since the 2017 campaign, SNCF Réseau has already agreed to include internal safety audits and technical inspections on recently monitored or maintained installations.</p> <p>Procedures for implementing technical inspections of the actual state of the facilities and maintenance operations will be established in 2016.</p> | O    |

**Appendix 3: STRMTG (Ski Lift and Guided Transport Technical Department)  
table setting out the process of monitoring the implementation  
of guided transport recommendations issued by BEA-TT**

## Recommendations issued in 2011

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title  | Recommendation N° | Recommendation Item   | Addressee(s) | Answer Y/N<br>Date  | Outcomes Specified and Progress Status<br>(Literal and Encoded)  |          |
|--|-------------------|---|--------------|---|--|----------|
|  |                   |   |              |   | Literal  | Encoding |
| Technical Investigation Report on a Derailment of a Valenciennes Tramway Train following a Collision with a Car on the 8th October 2009 at Denain (59) | 2009-09-R2        | Start considering the principles of crossings and the parts set out at roadway intersections located on suburban sections of the tramway line.  | STRMTG       | 26/10/11  | Raising awareness of those responsible for safety files on tramway projects about intersection issues in suburban areas.                             | R        |
|  | 2009-09-R4        | Start considering how to define a method to enable checking of new tramway trains' vulnerability to the risk of derailment after collision with a light vehicle from design onwards.  | STRMTG       | 26/10/11  | Work-group formed.<br>First meeting 4th quarter 2011.<br>End of work end 2012<br>Guide on "Designing Tramway Front Ends: published on the 17/10/2016 | R        |
| Collision between a Tram and a Private Car that Occurred on the 27th April 2010 at Orvault (44)  | 2010-004-R1       | Finish the project to enhance luminous signals already decided upon as soon as possible in order to increase visibility, understanding and credibility (doubling the R24s, optimising red light times, etc.)  | Nantes -City | 15/11/11  | The analysis of the light signals trial remains to be done. A signalling choice shall be made based on it.   | EC       |
|  |                   |   | SEMITAN      | 01/12/11  | Ditto  | EC       |
|  | 2010-004-R2       | Complete the comparative assessment of the signaling devices usable at the crossroad crossing stop lights for trams (especially R24 signals and R11v traffic lights), in order to assess their effectiveness from the safety and road user compliance point of view and draw conclusions about recommendations for use. | CERTU        | 16/12/11  |  | NC       |
|  |                   |   | DSCR         | 25/07/11  |  | NC       |
|  | 2010-004-R3       | Start a dialogue at national level, with the transport authorities, GART and UTP, to improve awareness of the meaning and scope of R24 signals for crossing tramway lines, especially in urban environments.  | DSCR         | 25/07/11  |  | NC       |
|  | 2010-004-R4       | Finish the study for redesigning the layout of the crossroads at the "Cardo" esplanade started in 2008, finishing the work as soon as possible and then monitoring its efficacy in preventing accidents.  | Nantes -City | 15/11/11  | The works launched after that accident were completed in the summer of 2011.   | R        |
| SEMITAN  |                   |   | 01/12/11     | The analysis of the trial in progress on the Cassin/Rennes roundabout since November 2011 (phases with no traffic lights, then using R22j and then R24) remains to be performed | EC   |          |

## Recommendations issued in 2011 - continued

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title   | Recommendation N° | Recommendation Item  | Addressee(s) | Answer Y/N<br>Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)  |          |
|---|-------------------|--|--------------|--------------------|--|----------|
|   |                   |  |              |                    | Literal  | Encoding |
| Technical investigation Report on the pile-up between Two Tramway Trains that occurred on the 12th May 2010 in Montpellier (34) | 2010-07-R3        | Check that the Operational Safety Regulations (RSE) for tramway operators, or the operational instructions they are broken down into, provide for the assessment of drivers' capacities to react to complex situations, in emergencies and under stress and train them for such situations before licensing them.                              | STRMTG       | 26/10/11           | Information provided via GT REX TW (May and October 2011) Instruction given during network meeting on the 17th November 2011: Check in the RSE or in the reference document, for the existence of provisions for stress "tolerance" tests and a training module on the topic.  | R        |
|   | 2010-07-R4        | Ensure on commissioning tramway rail lines with steep slopes, that the vehicles due to travel along them have an anti-drift device.  | STRMTG       | 26/10/11           | Incorporating Alstom RS into the generic assessment. Topic forms part of the steep slope systems for other constructors. Application to new RS for existing or new lines that present a slope $\geq 3\%$ over a distance $\geq 2$ train lengths, "when those parts of the line are liable to give rise to frequent hill starts." | R        |
| Technical Investigation Report on a Fire in a Tramway Train on Tyres at Clermont-Ferrand (63), on the 26th December 2009        | 2010-001-R4       | Ensure, on commissioning new tramway trains, that the materials that make them up offer a level of safety as regards fire risks equivalent to that required by standard NF F 16-101 relating to the fire performance of railway rolling stock.   | STRMTG       | 06/12/11           | Recommendation not approved because it intended to impose provisions for rolling stock running in tunnels to all RS running on tramways. Additional requirement beyond current regulations.  | NR       |
|   | 2010-001-R6       | Systematically check, when examining the safety file for the new guided public transport system, that the organisation for project quality and safety covers the period from the start of operations to the end of the warranty period and that it is suitable for the more or less advanced nature of the system or of its constituent parts. | STRMTG       |                    | Supervision departments alerted. Current proposal to amend the STPG decree by adding a safety checking file in the year following the start of commercial operation. OK incorporated in the STPG on the 30th March 2017  | R        |

## Recommendations issued in 2012

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item   | Addressee(s)                            | Reply Date                              | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|--|-----------|-------------------|---|---|---|---|----------|
|  |           |                   |   |   |   | Literal   | Encoding |
| Passenger Train Impact against Buffers that Occurred on the 12th July 2011 at Calvi Station (2B)   | 01/04/12  | R1                | Improve driver training and employment terms taking account of the peculiarities that the operation of the network in question involve, especially during the period of summer crowding.  | SAEML CFC                               | 17/07/2012 (CFC)                        | Reorganisation of the Equipment/Engine department in progress. Introduction of a resources manager on the 9/5/2012. For driver training review of MT011 "Specifications for Driver Training" in the course of being revised. New driver monitoring by head driver.  | EC       |
|  |           | R2                | Organise pedestrian pathways between the beaches, port and town of Calvi in order to channel flows towards the railway crossings identified and developed as such. In that context, fence off as much as possible the railway tracks from level crossing n° 26A and the station platforms.  | CTC, SAEML CFC, ; Municipality of Calvi | 17/07/2012 (CFC),<br>22/05/2012 (Calvi) | Municipality of Calvi: work incumbent upon CTC or SAEML CFC.<br>SAEML CFC: COPIL participation in the study to make pedestrian crossings between Calvi and Monticello safe.<br>Temporary arrangements and 9 PN pedestrian grading in summer 2013.<br>Final arrangements for a total of 15PN pedestrians due by the end of 2014.   | EC       |
|  |           | R3                | Improve the passenger transit and parking conditions at Calvi station by suitable sizing of platform and access area taking account of the period of summer crowding.   | CTC, SAEML CFC                          | 17/07/2012 (CFC)                        | Renovation of Calvi station provided in the investment programme.<br>Temporary measure: platform n°3, as an intermediate platform and no longer a parking platform (area bounded by chains and appropriate signage).<br>Fencing provided between PN26A and the passenger platforms. Provision of signs to indicate platform numbers.<br>Depot gates kept closed.  | EC       |
|  |           | R4                | Ask the Corsica Railways operator to draw up a safety handling assessment on that network dealing in particular with the state of the operating documents and the effectiveness of their implementation, and invite them to draft, based on practices in comparable networks in France and abroad, a plan to improve safety conditions for their operations that is suited to its peculiarities and its forecast changes. | CTC                                     | N                                       |   | NC       |
| Technical Investigation Report on the Derailing of a Tramway Train on Tyres at Clermont-Ferrand (63) that took Place on the 10th January 2011. | 05/04/12  | 2011-001-R5       | Ensure the strengthening, and then regularly check the correct operation of the organisation and the running of the control process and feedback relating to the Clermont-Ferrand tramway in order that any safety anomalies detected may form the scope of corrective or palliative measures within timing that is appropriate to the risks being analysed.  | STRMTG                                  | 28/08/12                                | We have already put in place the terms for special monitoring intended to enable us to ensure the strengthening of the organisation and piloting of the control and feedback process for this tramway, as you have recommended.<br><br>This action has been taken while taking care that this strengthening of State intervention will not give rise to the disengagement of the primary stakeholders, those who are in direct charge of maintaining safety levels. | R        |

## Recommendations issued in 2012 - continued

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title   | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s) | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)  |          |
|---|-----------|-------------------|--|--------------|------------|--|----------|
|   |           |                   |  |              |            | Literal  | Encoding |
| Technical Investigation Report on a Collision between an Orleans Tramway Train and a Car that Took Place on the 23rd April 2010 at Olivet (45)              | 04/05/12  | 2010-03-R3        | Refine the approach used at national level for identifying, on tramway lines commissioned before May 2003, the fixed obstacles that must form the scope of preventive initiatives as a priority in order to reduce the risks they present in the case of collision. In this context, extend beyond accidents alone, the criteria that enable the special dangers of an intersection to be assessed with regard to the fixed obstacles that are located in proximity. | STRMTG       | 28/08/12   | <p>We have selected (<i>in the context of preparing the DSR</i>) a method that addresses the most worrying crossroads.</p> <p>Today, most of the DSR preparation has been completed. The prefects have given their opinions or recommendations to the various AOTs. It does not seem to me to be appropriate to reverse these decisions immediately.</p> <p>However, it is obvious that regular periodical monitoring of the tramway networks by the STRMTG offices would be beneficial to add to the list of crossroads at which the presence of a fixed obstacle turns out to be an unacceptable aggravating factor.</p>   | NR       |
| Technical Investigation Report on a Collision between an Orleans Tramway Train and a Coach that Took Place on the 25th June 2011 at Fleury-les-Aubrais (45) | 13/12/12  | 2011-008-R2       | Conduct a study of the risks liable to be run by announcing to tramway drivers that their train is being taken into account by the crossroads controllers and add, if required, to the technical guide entitled "Driving Assistance Signals for Guided Transport Systems such as Tramways or Similar - Operating and Safety Principles" appropriate recommendations to limit these risks.  | STRMTG       | 30/05/13   | <p>To sum up, the risk of overconfidence potentially generated by the device that announces to drivers that their train has been taken into account by the crossroads controllers did not arise during this investigation.</p> <p>In conclusion, your recommendation to "conduct a study of the risks liable to be incurred by announcing to tramway drivers that their train is being taken into account by the crossroads controllers" seems to us worthy of consideration.</p> <p>This is a serious behavioural study that seems to us to be disproportionate to the benefits expected at tramway system safety level.</p> <p>We do not deny that driver assistance systems can have undesirable effects on driving, and that drivers seem sometimes to disregard elementary safety rules, but we prefer to stress the training and monitoring of driving practices to operators.</p> | NR       |
|   |           |                   | In addition, BEA-TT encourages STRMTG to continue implementing the recommendation it sent to it at the end of the technical inquiry on the collision between a tram and a private car that took place on the 4th June 2007 at Saint-Herblain in Loire-Atlantique (44), concerning fitting tramway trains with video cameras pointing towards the area to be traversed.   | STRMTG       | 30/05/13   | Recommendation made systematically in the context of the purchase of new vehicles  | R        |

## Recommendations issued in 2015

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s) | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)  |          |
|--|-----------|-------------------|--|--------------|------------|--|----------|
|  |           |                   |  |              |            | Literal  | Encoding |
| Fall of a Child under a Tramway Train that Occurred on the 28th April 2013 at "René Cassin" Station in Nantes (44) | 28/05/15  | R1                | <p>Adding to the operational resources and procedures for triggering and processing alarms so as to ensure, as soon as there is the suspicion of an accident, the rapid stoppage of the tramway vehicles involved.</p> <p>To this end, providing the stations on the Nantes tramway network with simple devices to enable any witness of an accident to issue warnings to the central control station without delay.</p> | SEMITAN      |            | Display an emergency number at all tramway stations and draft a procedure at the Central Control Station for handling calls. |          |

**Appendix 4: STRMTG (Ski Lift and Guided Transport Technical Department)  
table showing the monitoring of the implementation of ski lift  
recommendations issued by BEA-TT**

## Recommendations issued in 2011

**Completed Recommendation: R**

**Amended Recommendation: RM**

**Recommendation in Progress: EC**

**Rejected Recommendation: NR**

**Unknown Outcome: NC**

**Outcome Not Monitored by STRMTG: NS**

| Investigation Title   | Recommendation N° | Recommendation Item   | Addressee(s) | Answer Y/N Date | Outcomes Specified and Progress Status (Literal and Encoded)  |          |
|---|-------------------|---|--------------|-----------------|---|----------|
|   |                   |   |              |                 | Literal   | Encoding |
| Stage Report on the Personal Accident that occurred on the "L'écho alpin" Chair Lift at Châtel (74) on the 23rd February 2011 | 2011-003-R1       | Ask operators of chairlifts fitted with a device that automatically stops the facility when a passenger does not manage to leave the seat (a "non disembarkation device") to check its effectiveness during the 2011-2012 operating season based on the method defined by STRMTG.   | STRMTG       | 25/11/11        | Meeting with the profession on the 5/9/11 to define the method for checking the efficacy of non disembarkation devices (DND).<br>STRMTG recommendation dated 20/10/2011 formalising the terms for adjusting and monitoring DNDs sent to operators via STRMTG offices.<br>Arrangements implemented under control by STRMTG offices.  | R        |
|   | 2011-003-R2       | Ask operators of chairlifts not fitted with a technical non disembarkation device to fit that kind of device as quickly as possible prior to the 2011-2012 operating season. That operation shall be performed under supervision by the prefects of the departments in which one or more facilities involved are located. | DGITM        | 25/11/11        | DGITM circular dated 05/10/2011 requiring TSDs be fitted with DNDs prior to starting operations again in the winter of 2011/2012 (with tolerance up to 10/02/2012). That circular referred to an STRMTG recommendation for the definition of the technical measures for compliance upgrading.<br>=>Definition included in the STRMTG recommendation dated 20/10/2011.<br>Compliance upgrading campaign performed under control by STRMTG offices.<br>Update to the RM2 guideline has not yet been completed but is due in 2013 to incorporate the need to fit TSDs with DNDs.<br>CEN TC242's WG2 has also amended the draft standard EN12929-1 in the same way in order to spread out the obligation to have a DND to cover all chair lifts. The CEN investigation on this draft standard is in progress and we will only know at its end if that provision has finally been selected at European level. But this goes much further than the BEA-TT recommendation. | EC       |
|   | 2011-003-R3       | Ask chair lift operators to check every day, prior to starting up their facilities, that these non disembarkation devices are working properly and to ensure the tracking of those checks to guarantee their implementation   | STRMTG       | 25/11/11        | Recommendation followed and requirement incorporated in STRMTG dated 20/10/2011.<br>Update to guideline RM1 (part A) due in 2013 to incorporate that monitoring into the list of tests to be performed daily before opening (tracked in the operations log).<br>OK taken into account in RM1 on the 18th May 2016.  | R        |

## Recommendations issued in 2012

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s) | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |  |
|--|-----------|-------------------|--|--------------|------------|---|--|
|  |           |                   |  |              |            | Literal   | Encoding   |
| Technical Inquiry Report on a Personal Accident that occurred on the 'L'écho alpin' chair lift at Châtel (74) on the 23rd February 2011. | 01/08/12  | R1                | Upgrade the model of chair involved in the accident in order to reduce the risk of jamming in this kind of chair with rucksack or clothing fastenings, especially between the roof bow and the seat.   | POMA         |            | See POMA/BEA correspondence, shared on the BEA-TT website:<br>POMA first of all stressed the need to improve non-boarding detection, which BEA deemed did not meet their recommendation. POMA then announced that they were working on a new kind of seat, on which the issue of jamming is covered by placing caps over certain constructional details.  | NC   |
|  |           | R2                | Define a method that will enable the identification, prior to the issue of compliance certification for chair lift seats required by European Directive 2000./9/CE relating to cable facilities transporting persons, the risks of equipment snagging at offloading, and promote the application of this initiative with the coordinating group of notified bodies in the sector.                | STRMTG       |            | STRMTG has analysed the issue and has researched how the problems have been dealt with in other sectors. It turns out that EN1176-1 relating to playground equipment and flooring proposes a test method for assessing the risk of jamming a child's clothing string with a duffle coat button at the end. That test is intended to eliminate construction details that are liable to produce direct body part jamming or strangulation during the normal use of the play area. STRMTG-ON held that it is illusory to hope to define catch-all modelling criteria for items that can be caught up. Given that the risk involved in being caught up in equipment is indirect first and foremost (consequences of not disembarking) and<br>The issue was raised at a meeting of notified bodies on the 15/05/2013. The group of NB stated it was convinced that the design of the seats (and thus their checking) should not be brought to the fore as regards entanglement risk and that the residual risk involved in an entanglement and a non-disembarkation is covered by operator supervision at the station  | R  |
|  |           | R3                | During the next revision of European standards for safety requirements applicable to cable facilities transporting persons, proposing on the one hand to the "TC242" European standards committee that the requirement handling equipment entanglement risks at disembarkation from chair lifts be clarified and on the other hand that the means or methods for checking compliance be defined. | STRMTG       |            | During the CEN investigation on the draft review of EN 13796-1 (the review by WG5 ended in Sept 2011 and the part for expressing remarks from the CEN investigation took place from June to August 2012), France made a comment intended to ask for clarification of section 11.4.1.2. of the standard within the meanings indicated by BEA-TT<br>Discussions on that comment took place on the 28th November 2013 and WG5 rejected the French request, since the experts considered that it was impossible to eliminate any source of entanglement and to define a universal risk assessment method. The following events were referred to during those talks:<br>- All seats cannot be of the "bucket" type because they must often include folding seats and/or backs (in order to avoid snow build-up during and outside of operation), or openings in backs (to reduce wind resistance), which form a number of construction details in which belts or various items of clothing can potentially become entangled.<br>- Seat makers are confronted with a large variety of materials (rucksacks, clothing, and various accessories) and it is impossible for them to define criteria to model the items that might become entangled. Any such definition would be subjective and perforce involve the choice of non-representative material. | R<br>(proposal made by France)<br><br>NR<br>(proposal not accepted by the WG5 experts) |

## Recommendations issued in 2012 - continued

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s)           | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|--|-----------|-------------------|--|------------------------|------------|---|----------|
|  |           |                   |  |                        |            | Literal   | Encoding |
| Technical Inquiry Report on a Personal Accident that occurred on the 'L'écho alpin' chair lift at Châtel (74) on the 23rd February 2011. | 01/08/12  | R4                | Strengthen tools and methods to enable identifying the appearance of gaps between operating practices and the rules and requirements of all kinds that must be applied, and durably remedy the gaps observed.  | SEM Sports et Tourisme |            | See SEM letter dated 12/10/2012:<br>Several actions, and in particular the change of organisation at sector head level, who, freed from the specific role they could have at the level of a facility, now can work within their sector and its various facilities, specifically taking a second look.<br>In addition, internal safety inspections are due in situ, so as to provide an "independent" view of operations.              | NC       |
|  |           | R5                | Systematically ensure after each serious accident that the operator involved performs an analysis, files the report required with the prefect with authority as required by regulations, and takes the relevant prevention measures  | STRMTG                 |            | This BEA-TT recommendation must be complied with since it only restates regulatory provisions.<br>This need was restated in a network meeting on the 11th and 12th September 2012 and the STRMYG offices will monitor to ensure that the operator performs an analysis and prepares a formal report in the case of a serious accident.  | R        |
|  |           |                   | <i>In addition, BEA-TT suggests examining the usefulness of displaying a diagram at the lower station that calls the attention of users to the risks of entanglement of belts in the seats and/or prior to arrival at the upper station , and of a diagram inviting them to check that no item has become entangled in the seat.</i> |                        |            | STRMTG observes that this suggestion is not consistent with the conclusions of the Ligeron study on mountain lift passenger behaviour, which stressed the ineffectiveness of current signage, because of the shape of the panels and of their location. Accordingly, Ligeron called for the signage to be replaced. Taking account of these observations and the context, it does not seem appropriate to follow BEA-TT's suggestion. | NR       |

## Recommendations issued in 2013

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item   | Addressee(s) | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|--|-----------|-------------------|---|--------------|------------|---|----------|
|  |           |                   |   |              |            | Literal   | Encoding |
| Technical Inquiry Report on Passenger Fall from a Pleney Cable Way car that occurred on the 31st December 2011 at Morzine (74) | 24/04/13  | R1                | <p>Permanently strengthen the handling of operational safety of the Pleney cable way and, more generally, of all the ski lifts that serve the Pleney and Nyon areas by:</p> <ul style="list-style-type: none"> <li>➢ Increased training and skills monitoring of the staff involved, of the head of operations, the area manager, drivers and watchmen;</li> <li>➢ Formalizing the safety procedures to be applied both in normal operations and in fail-safe mode, including in the case of accidents or incidents into operating instructions;</li> <li>➢ Organising effective internal checks, including an independent level of operational running of the facilities involved;</li> <li>➢ Ensuring exhaustive logging of incidents and accidents and of the remedial action undertaken.</li> </ul> | SA du Pleney |            | <p>See response from SA du Pleney dated 18th July 2013 published on the BEA-TT website. SA du Pleney has incorporated the BEA-TT recommendations into a plan of action (15 actions) drafted after a safety audit performed by an external consultant in April 2012.</p> <p>Also see BHS audit following the accident</p>  | EC       |
|  |           |                   | <p><i>Furthermore, in the sequence of recommendations made in the inspection report that the Environment and Sustainable Development General Council (CGEDD) made on the safety of mountain lifts and of track-guided transport, BEA-TT:</i></p> <p><i>➢ Invited the Directorate General for Infrastructures, Transport and the Sea (DGITM) to launch a study into additions to be made to regulatory requirements, in terms, on the one hand, of the approval of mountain lifts by operators, by heads of operations and by staff that perform major safety tasks, and on the other hand of setting up, for larger facilities, partly independent internal checks on their operation;</i></p>  | DGITM        |            | <p>STRMTG has proposed to DGITM that consideration be given to setting up Operational Safety Regulations for ski-lift operators. These Regulations would enable practices to develop by increasing the formalities required for skill development and maintenance, assignment of work positions, internal checking, managing operating events, feedback management, etc. The timetable envisaged provides:</p> <ul style="list-style-type: none"> <li>- CdC project and RSE model, framework with general philosophy and justifying events / RSE Chapter Headings and List of regulations to be amended (mid January 2014)</li> <li>- Proposal to DGITM (mid February 2014)</li> <li>- Notice to DSF and other professionals (end March 2014)</li> <li>- Professional working group (April to September 2014)</li> <li>- Trial (from September 2014)</li> </ul> | EC       |
|  |           |                   | <p>➢ Encourages the Ski Lift and Guided Transport Technical Department (STRMTG) to develop a programme for inspecting operators of mountain lifts, based on a formalised methodology and references.</p>  | STRMTG       |            | <p>STRMTG has not waited either for the CGEDD or for BEA-TT to start considering the use of inspection techniques to add to its range of checking tools. Initial experiments took place in the field of mountain lifts from 2005-2006. After the merger of code inspectors with STRMTG, joint criteria for planning operator inspections have been defined and inspection frameworks have been rediscussed. Nowadays inspections are performed by all offices of STRMTG and internal communications meetings have been organised to enable experience to be shared and for the tool to be further refined.</p>  | R        |

## Recommendations issued in 2013 - continued

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s)    | Reply Date | Outcomes Specified and Progress Status (Literal and Encoded)   |          |
|--|-----------|-------------------|--|-----------------|------------|--|----------|
|  |           |                   |  |                 |            | Literal  | Encoding |
| Technical Investigation Report on the Fall of Five Cars from the "Aup-de-Véra" cable car that occurred on the 13th October 2011 on the skiable area in Flaine (74) | 25/11/13  | R1                | Organise, together with manufacturers and operators, studies and trials of technical or organisational devices to be developed in order to detect any cars or chairs in ski lifts that jam while passing a pylon.<br><br>Updating regulations, standards or guidelines in accordance with the conclusions of those analyses. | DGITM<br>STRMTG |            | STRMTG held a meeting with professional partners to ask them to consider the issue in June 2014. During 2015, STRMTG must define the specifications to state the expected performance and the scenarios that must be taken into account by these arrangements. | EC       |
|  |           |                   | <i>In addition, BEA-TT has invited approved principals and STRMTG to ensure, through tests performed prior to commissioning, that the values for maximum longitudinal tilting of the cars or chairs of new or amended facilities in all circumstances remain less than those taken into account during their design,</i>     |                 |            |  |          |

## Recommendations issued in 2014

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title   | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s)  | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|---|-----------|-------------------|--|---|------------|---|----------|
|   |           |                   |  |   |            | Literal   | Encoding |
| Technical Investigation Report on the Derailment of a Grande Motte Cablecar Car that occurred on the 3rd December 2011 at Tignes (73) | 07/02/14  | 2011-017-R1       | By way of feedback, ensure that the design, maintenance and supervision terms for the scrapers fitted to the cable-way cars prevent the derailment risk that could be caused by those parts coming loose.                                    | STRMTG  | 15/09/14   | STRMTG sent out a recommendation dated 11/07/2014 (see attached document of which you have already received a copy) intended to:<br>1) List the ice scraper mountings on existing twin-cable cableway cars in France,<br>2) Assess the reliability of the mountings<br>3) Change any mountings deemed inadequate<br>4) Fix the terms for monitoring homogeneous mountings across France.<br><br>The date for filing information for the survey has been set at Friday 12/09/2014.<br>Assessments of insufficiently reliable mountings, changing them and setting the terms for monitoring homogeneous mountings across France shall be implemented prior to the next winter season 2013/2014. | R        |
|   |           | 2011-017-R2       | Ensuring, especially during exercises, that all timing for work set out in the Grande Motte cable-car rescue plan can be actually complied with even in the most difficult weather conditions in which the use of the facility is permitted. | Société des Téléphériques de la Grande Motte [Grande Motte Cable Car Company] |            |   | NS       |

## Recommendations issued in 2014 - continued

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title   | Date Sent | Recommendation N° | Recommendation Item   | Addressee(s) | Reply Date | Outcomes Specified and Progress Status (Literal and Encoded)   |          |
|---|-----------|-------------------|---|--------------|------------|--|----------|
|   |           |                   |   |              |            | Literal  | Encoding |
| Technical Investigation Report on the Derailment of a Grande Motte Cablecar Car that occurred on the 3rd December 2011 at Tignes (73) | 07/02/14  | 2011-017-R3       | Check that the goals set in the sky lift rescue plan, especially as regards evacuation times, can actually be complied with in the case of difficult weather conditions in which operating the facility is nonetheless permitted. In this context, invite operators to perform exercises regularly, for each of the modes of evacuation provided, in such weather conditions and execute them on the most sensitive facilities in particular. | STRMTG       | 15/09/14   | <p>Reports on experience in past situations shows that difficult evacuations are very largely encountered in equipment at risk. A facility can be described as being at risk when it presents difficult access, extensive overflight, a watercourse, very rough or very sloping overflights (thus with difficult access on the ground) etc. The existence of specific procedures such as a zip line for evacuation or the use of car access equipment using non-standard cables are also to be considered for this definition.</p> <p>Furthermore, over a thousand cable-ways exist in French territory (chair lifts, cable cars, twin cable cable cars, etc.). Reassessing their evacuation plans would demand work that the professionals involved (operators, Prefectural training departments and supervisory services) do not have the resources to provide.</p> <p>Taking these observations into account, it thus seems necessary to focus primarily on the sensitive facilities.</p> <p>After consulting the Domaines Skiabiles de France during the month of July 2014, and also in liaison with the ski lift manufacturers' association, STRMTG has decided to start a procedure for identifying the facilities at risk (based on the criteria set out above) and for the assessment of the evacuation plans for those facilities at risk, incorporating the following topics:</p> <ul style="list-style-type: none"> <li>- The reliability of the evacuation method</li> <li>- The time it take to mobilise teams</li> <li>- Evacuation times</li> </ul> <p>Based on that assessment, it will be possible to work to improve the plans deemed inadequate, by working with the operators involved in planning exercises in tricky conditions to corroborate the relevance of the changes deemed necessary.</p> <p>The target timetable is as follows:</p> <ol style="list-style-type: none"> <li>1) Formalizing the procedure by a STRMTG recommendation by the end of the month of September 2014. Everyone will be reminded in that recommendation that the operation of a facility is subject to the operator's ability to implement the User Evacuation Plan under the conditions specified (as the BEA-TT report restates).</li> <li>2) Revision of the User Evacuation Plans involved by the end of 2015.</li> </ol> <p>Furthermore, in order to improve operators' collective capacity to properly handle the evacuation of all the equipment transported, STRMTG has decided to start drafting a guide to the application of part B of STRMTG guide RM1 on cable car evacuation at the beginning of 2015. That application guide, drafted with professional participation, and that of operators in particular, will be intended to specify good practice with regard to the design, execution and maintenance of evacuation plans. In particular it will enable a practical context to be specified for handling evacuation exercises, which stresses the need to perform exercises regularly on the various kinds of facilities installed at each location, especially on facilities at risk, including in difficult conditions.</p> | EC       |

## Recommendations issued in 2014 - continued

Completed Recommendation: R

Amended Recommendation: RM

Recommendation in Progress: EC

Rejected Recommendation: NR

Unknown Outcome: NC

Outcome Not Monitored by STRMTG: NS

| Investigation Title  | Date Sent  | Recommendation N° | Recommendation Item  | Addressee(s) | Reply Date                                 | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|--|--|-------------------|--|--------------|--|---|----------|
|  |  |                   |  |              |  | Literal   | Encoding |
| Technical Investigation report on the Fall of a Skier from the "Fontaines-de Cotch" chair lift that occurred on the 22nd December 2012 on the skiable area at Gourette in Eaux-Bonnes (64) | 24/07/14 (draft report)<br>No trace of official filing in the Log for Specific reports | 2012-017-R1       | Increase the safety of loading of users onto the "Fontaines-de Cotch" chair lift by any appropriate technical or organisational means that will either physically limit the risks of a fall or significantly extend the area that can be effectively supervised.   | EPSA         |  |   | NC       |
|  |  | 2012-017-R2       | Ask all chair lift operators to ensure that their loading area layout, their working condition, the amount and nature of their use, the methods for their supervision and their equipment form a cohesive whole that guarantees safe loading of users and optimal supervision when they take their places in their seats.<br><br>Coordinate the upgrading campaign that arises from this and support the efforts by constructors and operators in developing, implementing and assessing additional technical devices to prevent falls and to assist with supervision. | STRMTG       | 12/09/14<br>(response to the draft report) | We envisage that it will be implemented by means of a process intended to define a methodological framework to enable operators to analyse their chair lifts as regards their exposure to the risks of passengers falling and to define the facilities organisation and equipment in a manner that is consistent with the main risk factors identified. A timetable could be specified later to enable the operators to make the necessary changes. | EC       |
|  |  | 2012-017-R3       | In the technical guides for the design and operation of cable cars, state, adjust and ensure overall consistency of demands that contribute to safety when loading chairlifts so that their application can ensure optimal prevention of user falls having regard to the layout, equipment and operating conditions of the facilities involved.  | STRMTG       | 12/09/14<br>(response to the draft report) | Recommendation R3 will be handled in the context of the methodology referred to above, and relevant terms will then be incorporated during the course of streamlining of the decree and the cable car guidelines due to be introduced in 2014-2015.   | EC       |
|  |  | 2012-017-R4       | For each of the chairlifts that serves the Gourette skiing area, define the automatic actions that the staff in charge of supervising operations must adopt when they detect a user in difficulty after loading, and train staff in their implementation. Extend that initiative to the Pierre-Saint-Martin area.  | EPSA         |  |   | NS       |

## Recommendations issued in 2014 - continued

**Completed Recommendation: R**  
**Amended Recommendation: RM**  
**Recommendation in Progress: EC**  
**Rejected Recommendation: NR**  
**Unknown Outcome: NC**  
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title  | Date Sent | Recommendation N° | Recommendation Item  | Addressee(s) | Reply Date | Outcomes Specified and Progress Status (Literal and Encoded)   |          |
|--|-----------|-------------------|--|--------------|------------|--|----------|
|  |           |                   |  |              |            | Literal  | Encoding |
| Technical Investigation Report on the Fall of a Car from the Bosses cable car that occurred on the 2nd February 2013 on the skiable area at Gourette in Eaux-Bonnes (64) | 02/06/14  | 2013-002-R1       | Take action with the European Standards Committee so that standard NF EN 13223 relating to the security requirements applicable to cable facilities transporting persons specify the requirements it formulates as regards the dimensions of the balance beams fitted to the pylons in such facilities and provide in this field, for account to be taken of all the lateral stresses that these parts may be subjected to during operation. With this in mind, to add to the provisions of the technical guidelines entitled "Mountain lifts - RM2 - General Design and Amendments to Cable Ways" in order to ensure that these lateral stresses are taken suitably into account during the design of new cable car or chair lift facilities or during the renovation of existing facilities. | STRMTG       | 17/07/14   | The analyses performed after the accident under STRMTG coordination (and in particular restrictive measures on balance-beams fitted by the POMA manufacturer) have in fact revealed the existence of horizontal dynamic stresses on the balance beams that the current balance beam design rules do not cover. STRMTG will act within the European Standards Committee (CEN) in order to make a proposed amendment to standard NF EN 13223 intended to introduce practical rules to justify fatigue under dynamic horizontal loading on balance beams of single cable cable ways. In order to do this it will first be necessary to put in place an investigation programme in order to qualify and quantify the horizontal stress generated by the normal operation of that equipment, in addition to the parameters that have an influence on those strains. In practice, this kind of proposal may only take place during the next revision of the standard NF EN 13223. Pending this, a change to STRMTG guide RM2 to incorporate additional design arrangements for balance beams is difficult to envisage insofar as it would constitute a breach of the European rules for the free circulation of EC marked components. Accordingly, as stated below, STRMTG will make arrangements so that prior to the amendment of the standard NF EN 13223, the design of new balance beams commissioned will incorporate the new knowledge relating to horizontal dynamic stresses.   | EC       |
|  |           | 2013-002-R2       | Ensure that the operators of these cable cars and chair lift facilities set up and implement precise and verifiable visual supervision procedures for the state of balance beam bogies fitted to their pylons, which will enable any cracks developing to be detected.   | STRMTG       | 17/07/14   | Detailed specific visual checking procedures may be required when the level of risk involved in a situation demands special monitoring whilst awaiting the set-up of a permanent safety measure. Accordingly, if actions to make changes to balance beams identified as being at risk of fatigue generated by horizontal stresses (see outcomes of recommendation R3) were to be spread over a period requiring interim operation using balance beams in their pre-existing state, precise visual checking procedures could be necessary and, if appropriate, STRMTG will ensure that such procedures are duly documented and implemented.   | EC       |
|  |           | 2013-002-R3       | Provide new chair lift and cable car facilities with safety devices that enable their operation to be stopped automatically in the case of total or partial breakage of a bogey on their balance beams and define the arrangements to be put in place to reach that goal on facilities currently in operation in accordance with their technical features and their operating conditions.  | STRMTG       | 17/07/14   | Fitting a breakage detector to part of the balance beam is intended to deal with the consequences of a structural failure of the balance beam but will not allow the appearance of such a failure to be prevented in the absence of action on its primary cause. Based on rules defining the justification of fatigue under dynamic horizontal loads on balance beams (see outcomes of recommendation R1), it will be possible to carry out a survey of the sensitivity of the various kinds of balance beams present across all single cable cable ways in service to this fatigue phenomenon and thus to identify the designs that present weaknesses and need reviewing. STRMTG thus envisages setting up that initiative by defining an action programme that enables the kinds of balance beams identified as being at risk from the "horizontal" fatigue phenomenon to be dealt with. This programme may combine replacing balance beam structures with improved design structures, non-destructive testing, or even fitting them with balance beam part breakage detection for cases where replacement is not possible. That survey including recent generations of balance beams will thus enable checking good design of such balance beams with regard to the phenomenon of fatigue connected with horizontal stresses and suitable steps to be taken if this is not the case, pending the relevant update to standard NF EN 13223. This strategy will enable action on the phenomenon identified as the initial cause of the accident at Gourette and thus significantly reduce the probability of such a breakage occurring again. Furthermore that was the strategy that was selected for defining actions to be undertaken on balance beams whose type had been implicated after that accident. In this way the main action involved replacing the bogies of two of the 420 POMA balance beams with bogies whose resistance to fatigue was improved following strain measurements on various bogies. | EC       |

## Recommendations issued in 2015

**Completed Recommendation: R**

**Amended Recommendation: RM**

**Recommendation in Progress: EC**

**Rejected Recommendation: NR**

**Unknown Outcome: NC**

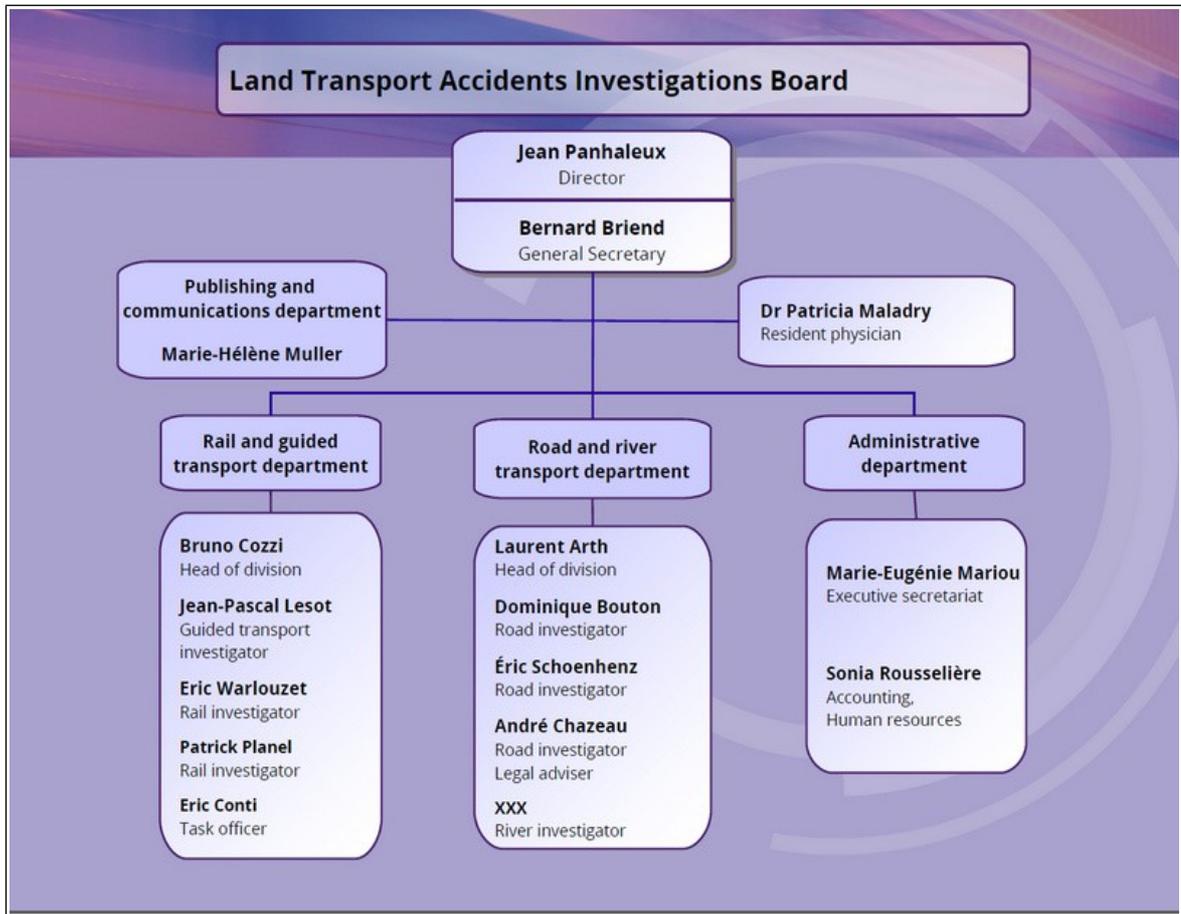
**Outcome Not Monitored by STRMTG: NS**

| Investigation Title   | Date Sent | Recommendation N°                   | Recommendation Item  | Addressee(s) | Reply Date | Outcomes Specified and Progress Status<br>(Literal and Encoded)   |          |
|---|-----------|-------------------------------------|--|--------------|------------|---|----------|
|   |           |                                     |  |              |            | Literal   | Encoding |
| Train derailment on "Le Panoramique des Dômes" rack and pinion railway that occurred on the 28th October 2012 at Orcines (63) | 11/03/15  | R1                                  | Prepare a full study of the risks involved in the accidental tailgating of various track apparatus on the "Panoramique des Dômes" rack and pinion railway, and setting up suitable measures to limit its impact, if justified.   | TC Dôme      |            | Following the derailment the REX was duly noted by the operator and it decided to install monitoring called Active and Automatic Supervision (SAA) at the crossing area. This system forces the driver to limit speed in the crossing area and to check the position of the points before crossing them with the trailing heel. |          |
|   |           | R2                                  | Amend legislation to extend the application of regulations on track-guided transport to rack and pinion trains located in mountainous areas instead of that which applies to mountain lifts. At least, if such a change of regulations were not to take place, strengthen the terms for approving the main contractors involved, by applying Section R. 342-4 of the Tourism Code to rack and pinion trains so that they may guarantee in-depth knowledge and experience on their part on the technologies and modes of operation of this kind of railway. | DGITM        |            | A draft decree in the course of signature provides for creating a specific class devoted to rack and pinion railways within the approvals system for mountain lifts, which will enable the specific features of such equipment to be better acknowledged.   |          |
| Derailment of the Bastille Cable Car on the 29th June 2014 in Grenoble.   | 07/10/15  | No recommendation but an invitation | BEA-TT made no recommendations at the conclusion of its technical investigation.<br><br><i>It did, however, invite the operator of the facility involved, the Grenoble-Bastille cable car company, to set up specific procedures and appropriate training to enable its criminally liable managers to take a fully informed decision in the case of an incident about implementing the rescue plan or otherwise.</i>   |              |            |   |          |



## Appendix 5

### BEA-TT organisational chart as on 1/01/2017



### Institutional texts

Articles L. 1621-1 to L. 1622-2 of the Transport Code.

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

Articles R. 1621-1 to R. 1621-26 of the Transport Code.



## Appendix 6: Glossary

- **DGEC**: Directorate General for Energy and Climate
- **DGITM**: Directorate General for Infrastructure, Transport and the Sea
- **DSCR**: Road Safety and Traffic Delegation
- **EPSF**: National Rail Safety Authority
- **LC**: Level Crossing
- **RFF**: French Rail Network, the body managing the national rail network until 31 December 2014
- **RFN**: national rail network
- **SANEF**: North and East France Motorways Company
- **SNCF**: French National Railways Company, a Rail Operator and, until 31 December 2014, delegated body in charge of managing the national rail network
- **SNCF Mobilités**: rail company in the SNCF Group
- **SNCF Réseau**: body in charge of managing the national rail network
- **STRMTG**: Ski Lift and Guided Transport Technical Department
- **TER**: Regional Express Train
- **TGV**: High-Speed Train



Bureau d'Enquêtes sur les Accidents de Transport Terrestre



**Grande Arche - Paroi Sud**  
**92055 La Défense cedex**

Téléphone : 01 40 81 21 83

Télécopie : 01 40 81 21 50

[bea-tt@developpement-durable.gouv.fr](mailto:bea-tt@developpement-durable.gouv.fr)

[www.bea-tt.developpement-durable.gouv.fr](http://www.bea-tt.developpement-durable.gouv.fr)

