

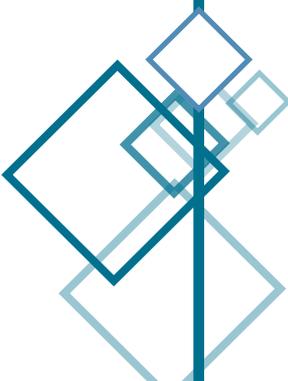
SUMMARY

Safety Investigation Report

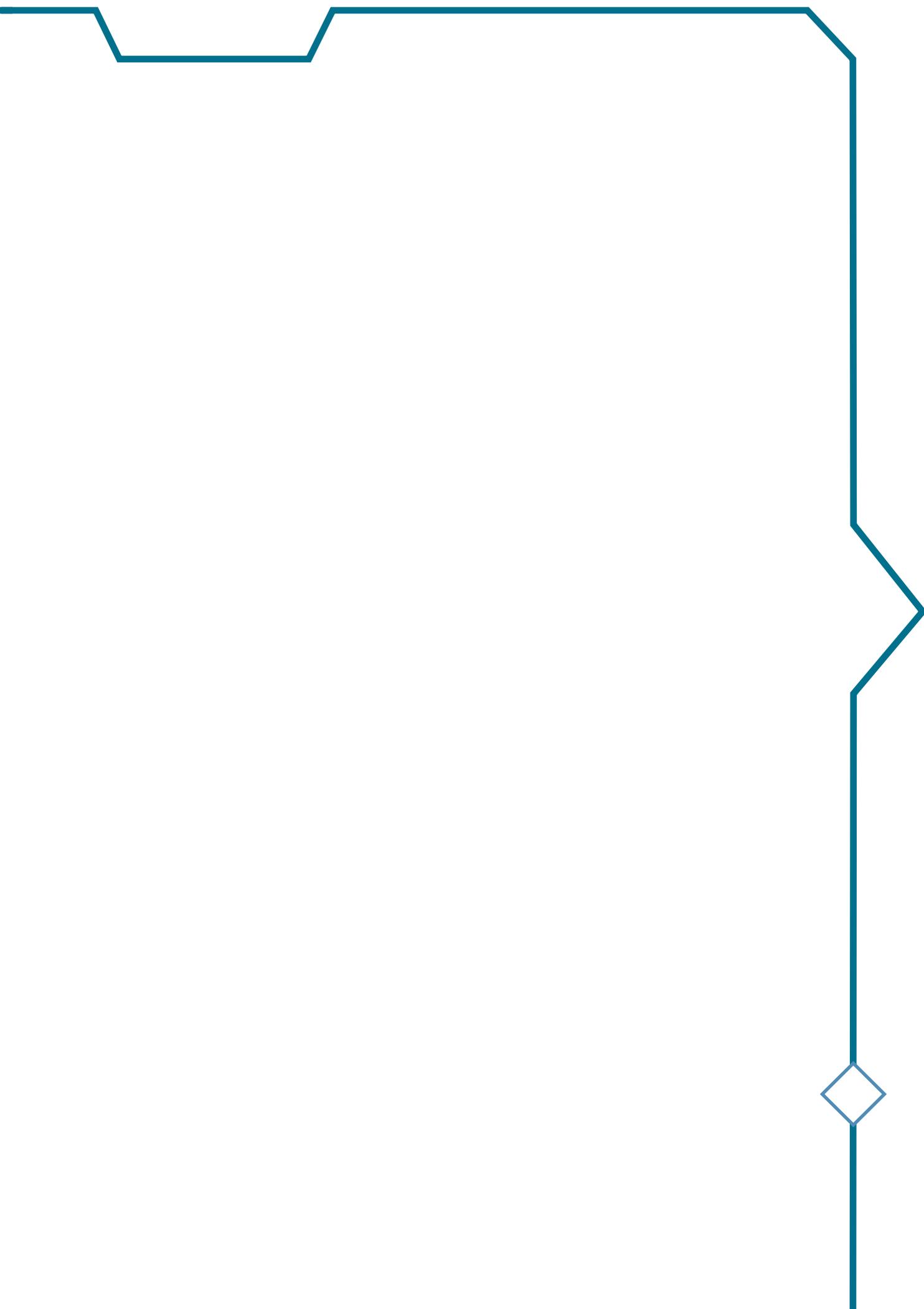
Incident with a signal displaying
a less restrictive aspect than expected
Comblain-la-Tour - 6 September 2018

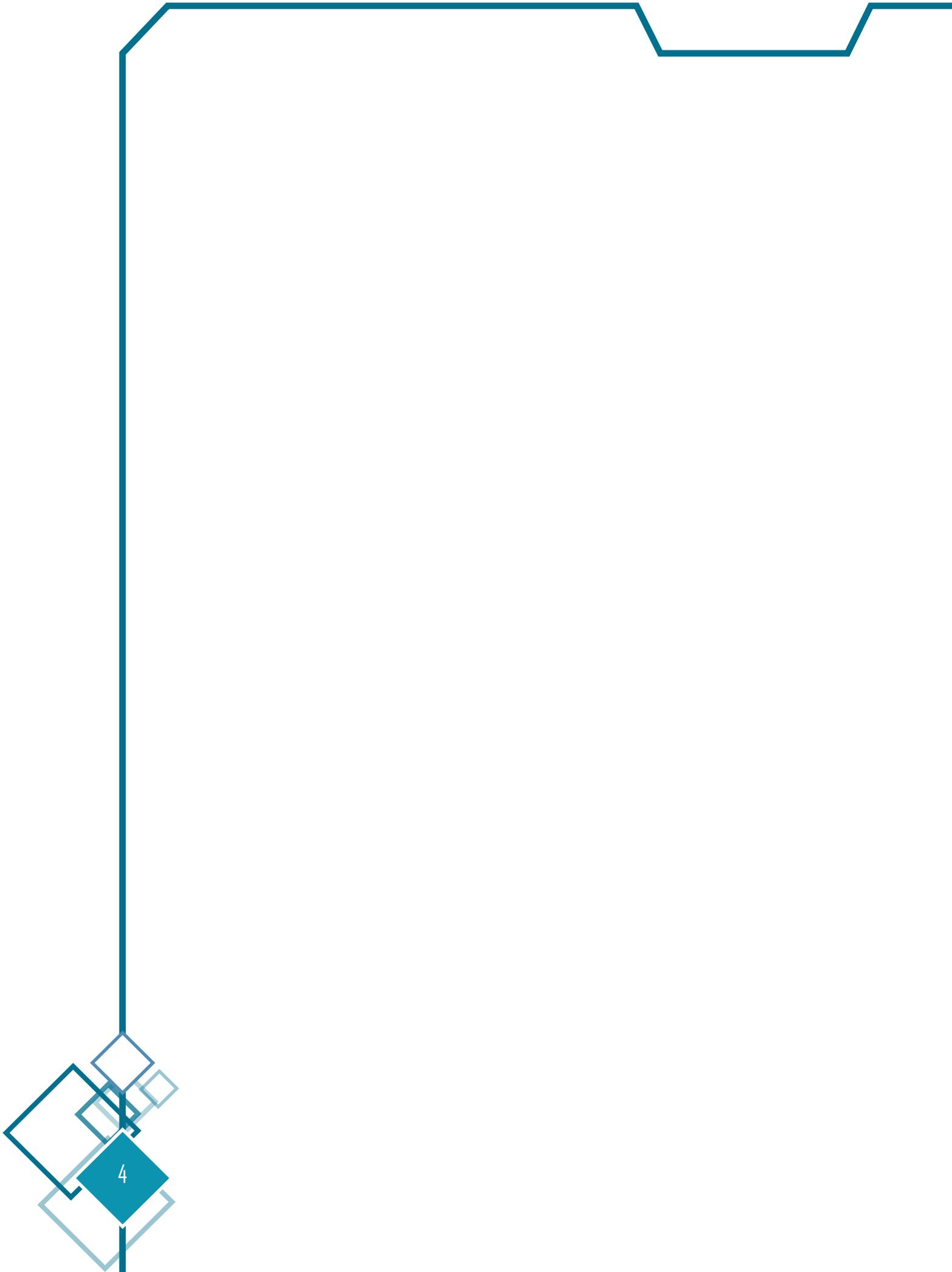
REPORT VERSION TABLE

<u>Version number</u>	<u>Subject of revision</u>	<u>Date</u>
1.0	First version	01/04/2020



*Any use of this report with a different aim than of accident prevention - for example in order to attribute liability - individual or collective blame in particular - would be a complete distortion of the aims of this report, the methods used to assemble it, the selection of facts collected, the nature of questions posed and the ideas organising it, to which the notion of liability is unknown. The conclusions which could be deduced from this would therefore be abusive in the literal sense of the term.
In case of contradiction between certain words and terms, it is necessary to refer to the French version.*





SUMMARY

On 06/09/2018 at 4:05 a.m., the freight train Z36410 departs from Virton Voyageurs station in the direction of Visé-CBR station.

At 6:38 a.m., the freight train runs on track B of line 43 and passes the warning signal o-h.45 which displays the Double-Yellow aspect, indicating that the next signal O-H.45 is to be considered as at danger (Red aspect). The driver of the freight train performs a braking action and stops his train at 6:42 a.m. at the foot of the signal O-H.45, which is at danger (Red aspect).

At this time, the freight train occupies the last track circuit (CV4 : *"circuit de voie"* in French) of the section between signals B249 and O-H.45. This section is part of a zone with automatic signalling: the signals in these sections are automatic, i.e. they are controlled by the train detection system in the section. Due to the presence of the freight train in the section in advance of the signal B249, this signal B249 giving access to that section must be at danger (Red aspect).

On 06/09/2018 at 6:08 a.m., the passenger train E7675 departs from Rochefort-Jemelle station in the direction of Liège-Saint-Lambert station. It also runs on line 43 from Marloie. Around 6:38 a.m., the train leaves Bomal station on track B of line 43. The freight train is still stationary at the foot of the signal O-H.45, which is at danger (Red aspect).

The passenger train continues its route and encounters the signal B249. This signal displays the Green aspect (line-clear): given the presence of the freight train in the section in advance of the signal B249, this signal should have displayed a Red aspect (at danger).

The passenger train passes the signal B249, continues its route and makes a commercial stop at the unmanned stopping point of Comblain-la-Tour at 6:50 a.m. It then restarts in the direction of Rivage station.

A few moments later, it passes the warning signal o-h.45 which displays the Double-Yellow aspect, indicating that the next signal O-H.45 is to be considered as at danger (Red aspect). The driver then initiates a braking action in accordance with the procedure.

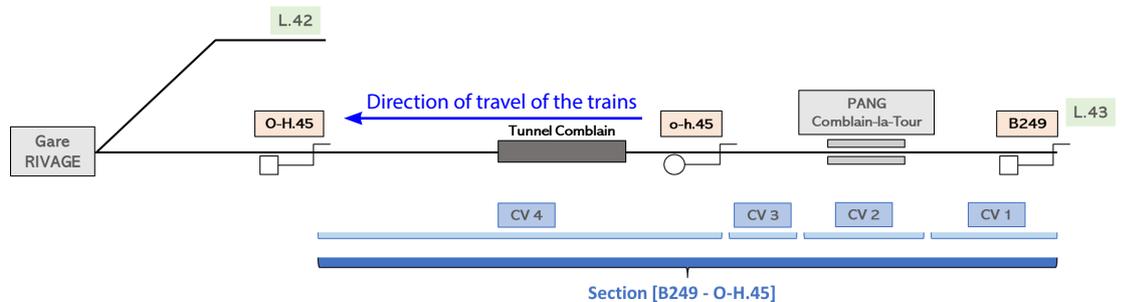
At the exit of the Comblain-la-Tour tunnel, the driver of the passenger train sees a red reflection. Based on his experience and knowledge of the line, he considers that it cannot be the signal O-H.45 standing more than 500 meters further on. He performs a maximum braking action and stops his train approximately 100 metres behind the rear of the freight train, of which he sees the tail lamp by reflection.

The driver of the passenger train notifies Block 45 by telephone of a deficiency in the sequence of the signals encountered.

This information is then also transmitted by the driver to Traffic Control.

Following the technical analysis, it could be verified that the signalling displayed a less restrictive aspect than expected: the signal B249 displayed a Green aspect (line-clear) while the section in advance was occupied by a train.

The incident took place in the section between the main automatic stop signal B249 and the main operated stop signal O-H.45 standing at the entry into the Rivage station on line 43. The Liège TGV signal box (block 45) manages the zone where the incident took place.



The signal B249 is an automatic signal: it is not controlled by a signal box operator but by the train detection system consisting of track circuits.

The section between signals B249 and O-H.45 is covered by 4 track circuits.

If at least one of the track circuits in the section is occupied, then:

- the entire section is to be considered as occupied;
- the section access signal (signal B249) must display a Red aspect (at danger).

The investigation revealed that, on the day of the incident, when the passenger train passed at the foot of the signal B249, the signal was displaying a Green aspect, while the freight train occupied the last track circuit of the section.

On the day of the incident, the occupation of the last track circuit in the section did not result in the display of a Red aspect (at danger) for the signal B249.

The investigation also revealed that the occupation of the last track circuit was well reflected in the EBP image of the zone.

The IU therefore undertook an analysis of the operational and organizational conditions that resulted in the omission of the detection information from the last track circuit under the conditions governing the aspect of the signal B249.

The analysis of the information collected from the Infrastructure Manager reveals that works were carried out on the signalling of the Rivage station as part of the signal box concentration project.

During these works, several teams were involved. As part of the signal box concentration project, Infrabel launched several projects aiming at adapting the signalling installations on line 43, including a signalling project at the Rivage station.

According to the initial project, putting into service the Rivage station signalling installation was planned for June 2017.



To this end, a first study was drafted by an Infrabel team (Team 1).

In this study in particular, a wiring project was drawn up, making it possible to determine the changes to be made to the existing signalling installation.

The purpose was to elaborate wiring plans for the installation to put into service. These plans were developed by the team engineer and drawn up by a drawing office.

Generally speaking, the plans of a signalling installation can be found in the signalling cabinets in the field. These plans evolve according to the changes made over time in the field. In the event of a new study, the Deputy Head of Studies:

- returns to the plans available at the drawing office;
- goes out into the field to check the plans in the signalling cabinets and verify the information available to him.

Once the study is drafted, the project plans are entrusted to the person in charge of the works.

In April 2017, due to an increased workload caused in particular by recurring cable thefts, the South East Area Signalling Manager decided:

- to move Team 1 to another project, and
- to call in a second team as reinforcement (= "Team 2"), consisting of an engineer and a technical sector chief from another area.

Team 2 takes over the project and a consultation is organized between both teams for the transmission of the necessary information.

The Team 2 leader is an engineer with about ten years experience, but without previous involvement in putting into service PLP technology. He comes from another *area*.

The technical sector chief of Team 2 has significant experience in ETCS technology, but little experience in EBP-PLP technology and the interface between PLP and all-relay.

He also comes from another *area*.

During the transition period between both teams in charge of the project aiming at adapting the signalling installations of Rivage station, a consultation took place between both teams to ensure the transmission of information.

The replacement of the four track circuits in advance of the signal B249 required the laying of new cables. An external company had been entrusted with this task through a public tender. But given the bankruptcy of the selected company, and in the absence of a public tender, this cabling work fell to Infrabel's teams. Consequently, the project organization and planning had to be reviewed.

Team 2 decided to adapt the project developed by Team 1, and in particular to make the following changes:

- keep three of the four track circuits in place in the section between signals B249 and O-H.45;
- replace the last track circuit (B218) with a Jade track circuit.

However, the sum of the 4 track circuits (CV4 (B218), CV3 (B234), CV2 (B242) and CV1 (B249)) is still provided.

During the signalling installation project for Rivage station, several successive versions of the plans were drawn up.

Some changes were made manually on the paper versions of these plans. These manual changes then had to be forwarded to the drawing office for computer integration into a new version. Depending on the availability of the drawing office, this step may require a certain amount of time.

In the study of Team 1, the sum of the 4 track circuits would be carried out from a computer point of view (PLP¹ parameterisation) and not by a wiring system. This is what was mentioned in the plan at the time.

This information was no longer mentioned in a later version of the wiring plan.

During the project management by Team 2:

- meetings were held between the person in charge of the external installation and the person in charge of the computer parameterization (person in charge of the internal installation);
- plans were modified manually on several occasions and by various team members.

Information got lost between different versions of the wiring plan regarding the sum of the track circuits in the PLP parameterisation.

This loss of information was detected neither by the engineer nor by the team responsible for the project.

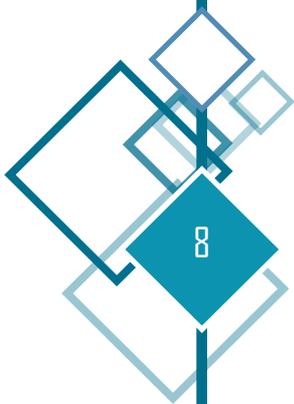
On the basis of the information forwarded to the IU, it is not possible to establish whether this loss of information occurred during a retranscription of a new version of the wiring plan by the drawing office, or by the team in charge of the PLP parameterisation.

The lack of meeting reports made it impossible to keep track of the major decisions having an impact on the safety of the project.

Given the absence of version and date information on the plans, there is a lack of information traceability.

The Investigation Unit recommends the Infrastructure Manager to take the necessary measures to ensure that all documents and plans are traceable at all stages of a project.

¹ PLP (Poste à Logique Programmée) = Programmed logic station. To authorise a movement, various conditions must be met (e.g. position of switches and crossings, direction of traffic, aspect of signals). The main purpose of the part of the signal box known as 'interlocking' is to materialise these various conditions. A PLP-type interlocking is an electronic/computerised interlocking.





During the investigation, we found that in some tests, test sheets used by the staff did not comply with the template of Notice 22. These non-standardised sheets did not include all the information requested in the templates and checklists of Notice 22.

During the transition period between the different teams in charge of the project aiming at adapting the signalling of Rivage station on line 43, the stability requirement stipulated in Notice 22 was not met.

The rule in Notice 22 allowing for the listing of signals to be tested during the tests left room for interpretation in the project aiming at adapting the signalling of Rivage station, but also in previous projects.

As from 2017, a one-day training course on Notice 22 is organised. It draws attention to previous mistakes to avoid any recurrence, but this seems insufficient and did not prevent the occurrence of the incident in Comblain-la-Tour.

These deviations from Notice 22 are part of the elements that an audit as described in the Safety Management System of the Infrastructure Manager must monitor.

Audits concerning the application of Notice 22 in different areas (North-East, Centre, South-West) were carried out in 2016 as part of the action plan "Roadmap incidenten EBP-PLP" by an external company.

During these audits, the staff's understanding of Notice 22 was verified, and several findings were reported.

The audits revealed several nonconformities, deficiencies and remarks concerning the application of Notice 22 in the areas concerned.

These nonconformities, deficiencies and remarks concerned different levels of application of the Notice. According to the audit conclusions, Notice 22 is perceived as the basis for putting an installation into service but, in some cases, the Notice is not correctly applied.

These audits were not conducted in the South-East area, which is responsible for the project to put the Rivage station into service. Moreover, these audits have not been repeated on an annual basis.

The Investigation Unit recommends the Infrastructure Manager to ensure that the audit of Notice 22 complies with the requirements of its Safety Management System, and that it covers all *areas*.

Notice 22 specifies that the staff in charge of the projects must be qualified. The staff of the team that managed the project aiming at adapting the signalling installation of Rivage station on line 43 was qualified, but in a different area of expertise than that required for the project concerned.

The engineer in charge of the project for Team 2 was hired in 2009. When he was hired, he followed a twenty-day training course covering, in particular, the All-Relay and PLP installations (as well as the track, switches, level crossings, etc.). He then took part in ETCS projects for 6 years. He obtained his regularisation in 2011.

From 2015 onwards, he took part in various projects: modernisation works on level crossings, removal of crocodiles, works on All-Relay installations, etc. He was involved in a project on line 43 in Bomal (EBP I/O technology). He was called in to work on the project aiming at putting Rivage station into service (EBP/PLP technology), given the heavy workload of the teams in charge of the project at the time. This project was his first experience in putting the EBP/PLP technology into service.

The Infrastructure Manager should ensure that project managers put in place teams whose experience is commensurate with the project.



Putting into service a signalling installation must comply with Notice 22, which allows to plan the checks and tests to be carried out in order to demonstrate the correct functioning and safety of the entire installation, whether it is put into service for the first time or following changes.

The tests to be carried out during the putting into service must demonstrate the correct functioning and safety of the entire installation. There are several types of tests:

- functional tests: to check if the system under test meets the required operating programme;
- safety tests: to check if the system under test meets the safety principles;
- integration tests: to check the consistency of the entire EBP-PLP post from the EBP workstation to the elements outdoor. They are therefore intended to check the consistency between the EBP parameterization, the PLP parameterization and the external installation.

In order to put into service the signalling installation of Rivage station, safety tests were carried out in accordance with the requirements and documents contained in Notice 22 and its annexes (tests relating to the EBP/PLP installation).

The test sheets were completed in accordance with Notice 22 by the technical sector chief during the months or weeks prior to the putting into service. They were subsequently validated by the Engineer - Signalling in the days prior to the putting into service.

The signal B249 is a main automatic stop signal, standing in a non-EBP zone, operating in "All-Relay" technology. Notice 22 describes the checks and functional and safety tests to be carried out to put into service a relay installation:

- on signalling cabinets outdoor;
- on devices connected to them.

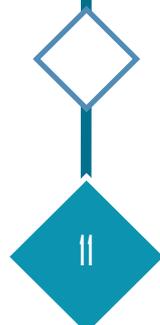
As part of the signal safety testing, the procedure includes checking the aspect of the signals (main stop signal, whether operated or automatic, independent warning signal, small stop signal). For automatic signals, the conditions for the signal to be clear, i.e., among other things, each detection device in the covered section, must be checked.

As part of the project aiming at adapting the Rivage installation, the test programme did not include the testing of a signal (i.e., B249), although it was planned in Notice 22. The independence between the engineer who listed all items to be tested and the technical sector chief who validated the scope of the tests did not make it possible to limit the risk of misinterpreting the zone to be tested or to detect the absence of the signal B249 in the list of items to be tested.

In the past, cases of less restrictive signalling than expected, hence infringing the safety requirements, occurred (in Izegem in 2007, in Ottignies in 2012, and in Kortrijk in 2015).

The analysis of these incidents shows similar problems during signalling adaptation works.

The Infrastructure Manager has undertaken an adaptation project to strengthen Notice 22: the Investigation Unit recommends the Infrastructure Manager to ensure that the elements identified during the investigation are integrated into this adaptation.



Rail Accident and Incident Investigation Unit
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