Investigation Body for Railway Accidents and Incidents

Summary Safety report

COLLISION BETWEEN 2 FREIGHT TRAINS REMERSDAAL - 1 OCTOBER 2013

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December 2014

SUMMARY

On Friday 1 October 2013, a first freight train (train E47540), originating from Montzen, was travelling on track B of line 24 in the direction of Genk.
A second freight train (train Z65292) originating from Aachen West in the direction of Antwerp, was travelling on the same track B of the same line.

At around 04:00, the first train stopped at a signal in operation just before Remersdaal station. The second train reached a signal at danger (on red) which protected the section where the first train could be found. The driver stopped their train at this signal at danger. Due to the permissive nature of this signal at danger, the driver filled in their on-board document and passed the signal in running at sight, i.e. at a reduced speed in accordance with the procedure.
At around 04:07, the driver of the first train restarted their train after the changing of the signal (to green) where they were stopped, they then felt an impact: the second train had just collided with the back of their train.
A GSM-R alarm was activated and protection measures were taken. The movement of trains on line 24 was suspended.

The accident caused major damage to the infrastructure and to the rolling stock but no one was injured.

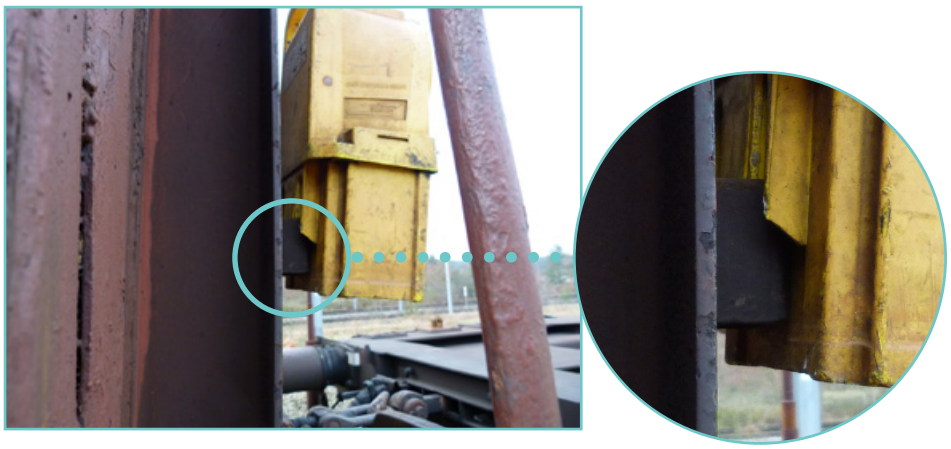
An investigator from the investigating body went to the scene of the accident to gather information on the circumstances of the collision, following which an investigation was opened.
The analysis of the accident by the investigating body was intended to determine the most probable scenario as well as the direct, indirect and underlying causes.

An accident can be defined as a loss of control of the dynamic of a situation: the course of events is altered following the occurrence of a pivotal or initiating event. The safety principles intended to avoid the occurrence of the pivotal event are called the control principles. Following the initiating event, the process turns into an unstable safety situation, it becomes inherently unsafe. A door to an accident is opened, and the course of events will inevitably lead to an accident if a voluntary and efficient recovery action is not made in time.
If this recovery fails, the accident occurs. The consequences may be weakened by absorbing the impact through mitigating principles.

The analysis of the dynamics of the accident allowed the pivotal event to be identified as the passing of the permissive signal at danger by the second train.
The driver had no information on the reason for the signal B335 being at danger: there could be several reasons and the mental image that the driver makes of the situation could be affected. The regulations do not provide for any contact between the driver of the train and the signal box when passing an automatic permissive signal at danger: the signal box has no view of the automatic signals.

Once the B335 signal was passed, various recovery barriers could still prevent an accident occurring: successful running at sight by the second train and technological barriers.

In night-time running at sight, one of the professional gestures made by drivers involves looking for the tail lights of another train.
The first train was equipped with a tail lamp but, as it was seized by the police, it was not tested immediately: the investigation could not determine if it was working at the time of the accident.
What is more, following contradictory comments on the draft of its investigation report, the IB decided to organise a reconstruction. The IB has thus found compatibility problems between the lamps and the lamp brackets present on certain types of wagons. These incompatibilities could result in, amongst others, the lamp failing to illuminate. The rear wagon on the first train was concerned by this issue.



During the running at sight of the second train, the signal where the first train was stopped changed to green. It could be that the changing of this signal to green, which was not intended for the second train, acted as a trigger element at the wrong moment and an exceptional routine (running at sight) was replaced by a routine considered by the human brain to be more normal (a free track shown by the signal changing to green).
This is an error of understanding by the driver and by automatic reflex, creating an incorrect mental image, reinforced by the absence of visibility of the tail lamp.

Technological barriers could represent another recovery principle.
The analysis by the Investigating Body has shown the TBL1+ driver assistance system was insufficiently effective under the circumstances of the accident, as well as the cab signalling system ETCS (levels 1 and 2): these 2 systems allow a permissive signal at danger to be passed at a low speed and the detection of trains is carried out by track circuits, they do not give technological assistance to the driver in managing running at sight.
Level 3 ETCS (system still being looked into) would ensure that the spacing between trains is no longer based on train detection by (fixed) track circuits, but by the information supplied by the trains themselves. ETCS level 3 could represent a recovery barrier.
Other technological devices allowing the driver to be warned of the presence of another train travelling on the same track (Railway Collision Avoidance System (RCAS) developed by the German Aerospace Center) are also being studied: the driver of the second train did not therefore benefit from this type of technological assistance.

The driver's incorrect mental image and the absence of technological barriers have, according to our scenario, contributed to the driver of the second train applying the emergency brake too late, causing the collision.

Mitigation measures allowed the consequences of the accident to be attenuated: the GSM-R alarm and the suspension of traffic allowed further accidents to be avoided.

The conclusions of the investigation accompany those on the accident in Tintigny which occurred in May 2012: the passing of a permissive signal at danger in running at sight had also caused a collision by the overtaking up of a train present further along in the section by a second train. A recommendation from the IB concerns the reflection to be led by the actors in the railway sector on the risks of collision following the catching up of a train by another, in order to identify the various elements involved at an organisational, technical or operational level and so as to identify control and recovery measures to be taken.

Other recommendations concern measures to be taken to mitigate the identified risks of a lamp battery failure and the inadequacy of tail lamps and lamp brackets on wagons.

The IB also recommends that the necessary measures are taken to raise staff awareness of the transmission of information and the application of procedures described in the SMS.

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