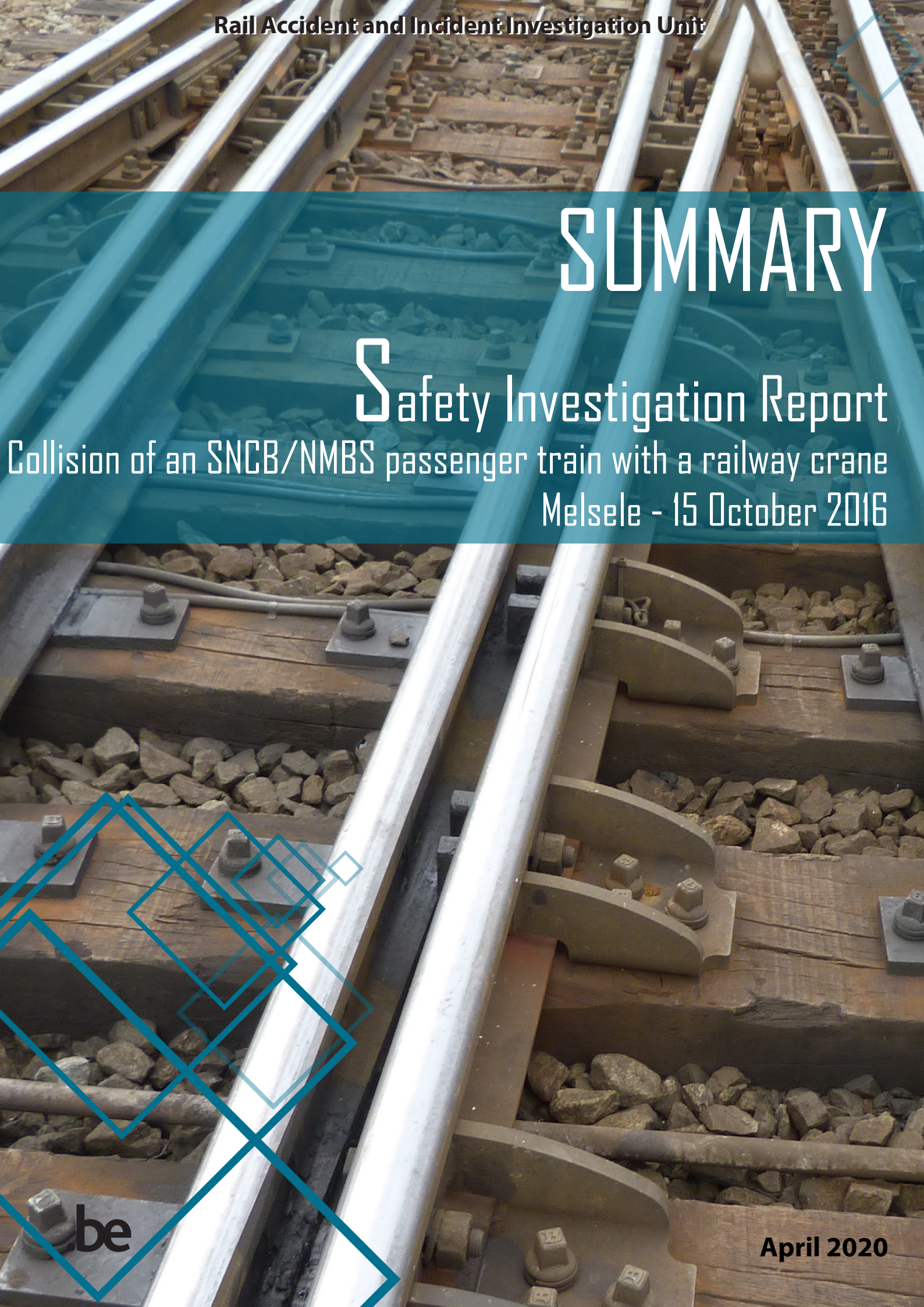
Rail Accident and Incident Investigation Unit



SUMMARY

Safety Investigation Report

Collision of an SNCB/NMBS passenger train with a railway crane

Melsele - 15 October 2016

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April 2020

REPORT VERSION TABLE

Version number	Subject of revision	Date
1.0	First version	17/04/2020

Any use of this restricted 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 Dutch version.

SUMMARY

On 15/10/2016, a collision between a train and the jib of a railway crane took place in a zone where works were being carried out on the tracks in Melsele.

As part of a "framework agreement", the infrastructure manager undertook renovation of the rails for track B between Y-Melsele and Y-Fort Zwijndrecht, among other things. These works were carried out by a contractor and were planned for implementation from 15 to 17 October 2016.

The infrastructure manager imposed a number of generic safety measures on the contractor for the implementation of these works. These were referred to in contractual documents, for example in the *"General implementation rules for government contracts"* (Bundle 61) and *"Health and safety measures when carrying out contracts"* (Bundle 63).

The infrastructure manager also included specific safety measures, such as those provided for in the General Exploitation Rules (RGE-ARE[1]), among others, in the *"Temporary Local Instructions"* (ILT-TPO[2]), the *"Safety Instructions"* (CS-VC[3]) and the *"Temporary Speed Restriction Notices"* (ART- BTS[4]).

The BNX information bulletin from 10/10 directs that, in the zone between Melsele-Rooster and Zwijndrecht-Wijksporen:

- track A, L.59 on 15/10 from 00:00 to 07:00 is out of service and that from 07:00 a service on a single track on track A is permitted,
- track B, L.59 is continuously out of service from 00:00 on 15/10 to 04:10 on 17/10.
- *"possible intrusion into the loading gauge for track A between … and … protection in both directions through large, operated stop signals. Use S_460."*

Via the "Works bulletin" (BNX), this data was automatically shared with the services concerned from the infrastructure manager and the railway undertakings. Contractors can receive a copy of the BNX on request.

A contractor brought in two teams for the implementation of these works. Each team was supported by a single railway crane.

On 15/10, between 00:00 and 07:00, a team was working on the Melsele side in advance of level crossing 9.
On 15/10, between 00:00 and 07:00, another team was working on track B of L.59, in the area of signal FX-C.12. The team was supported by a railway crane that was set up on the adjacent track A.

On 15/10, just before 07:00, the Manager of the works – as provided for in the planning – gave the verbal order 'clear track A' to both teams, in preparation for safety method 2 as provided for. Safety method 2 is known as "Procedure S_460", which ensures protection against intrusion by means of large, operated stop signals. Sentries were used for this.

However, the traffic control agent decided not to apply safety method 2 as provided for. Instead, the traffic control agent applied "safety method 3", which was not provided for and was not activated effectively. This safety method, which was not discussed, involves the cessation of works.

1 *RGE: Règlement Général d'Exploitation - ARE: Algemeen Reglement van de Exploitatie*
2 *ILT: Instructions Locales Temporaires - TPO: Tijdelijke Plaatselijke Onderrichtingen*
3 *CS: Consignes de Sécurité - VC: Veiligheidsconsignes*
4 *ART: Avis de Ralentissement Temporaire - BTS: Bericht van Tijdelijke Snelheidsbeperking*

The team and the crane operator, who were working on the Zwijndrecht side, had finished their works and left the tracks.

The team and the crane operator, who were working on the Melsele side, had not yet finished their works. The crane operator suspended his works from track A, moved his railway crane over from track A to track B via level crossing 9, and headed back in the direction of signal FX-C.12. The Manager of the works was standing on the level crossing and saw the railway crane departing in the direction of the signal.

The Manager of the works left the tracks, while the crane operator and the labourers from his team continued to finish off their task at the signal.

In the area of the signal, there was also a sentry present along the track. The sentry was waiting for instructions to commence 'procedure S_460'.

At the end of their task, the labourers loaded equipment into the railway crane's grapple. 2 of them headed in the direction of level crossing 9, with the railway crane following just behind.

Around 07:20, while the team was finishing the works, train E727 was approaching the work zone and stopped at the foot of the closed signal DX-C.12 (see diagram below). The train was held up there until 07:24.

At 07:24 (RT +11), the driver of IC train E727 received an open signal and departed, on condition that the temporary speed restrictions (ART-BTS) were respected, in the direction of level crossing 9. In the area of signal FX-C.12, the driver observed a team of workmen set up at a safe distance along the track. He suspended traction briefly, before accelerating once more.

The sentry at signal FX-C.12 saw the train approaching and realised that the situation for the crane operator was unsafe. He attempted to warn the crane operator of the oncoming train with his horn. The crane operator was in the railway crane's steering post, and was by now around 270m away. He did not hear the horn.

While the train was approaching the railway crane from the rear, the railway crane stopped in rear of the level crossing. A labourer moved in front of the railway crane to remove an angle bar from it that it was carrying away.

The rest of the work equipment was in the railway crane's grapple and needed to be loaded into a delivery van. This delivery van was stationed on the other side of the track. The crane operator's intention was to use the railway crane to lift the work equipment in the grapple from track B across track A to the delivery van.

Around 07:27, the train on the adjacent track caught up on the railway crane from behind. While the labourer was standing in front of the railway crane, the crane operator was lifting the work equipment with the grapple and swinging the crane jib out towards track A. The train driver saw the crane jib swinging out and engaged the emergency brake, but could not prevent the collision with the crane jib.

The shock from the train pushed the railway crane forward and derailed it. This caused a rail that had not yet been secured to topple. The foot of the labourer standing just in front of the railway crane became trapped and the labourer suffered serious wounds, with lasting injury. The work equipment in the grapple was flung away and damaged the private car of a local resident.

The **direct cause** of the accident was the intrusion of the crane jib into the adjacent track's loading gauge and the train's ability to enter this zone without an effective safety method being activated.

Recommendation 1 – direct factor
The infrastructure manager should ensure that there is an active safety method in place at all times when works are being carried out.

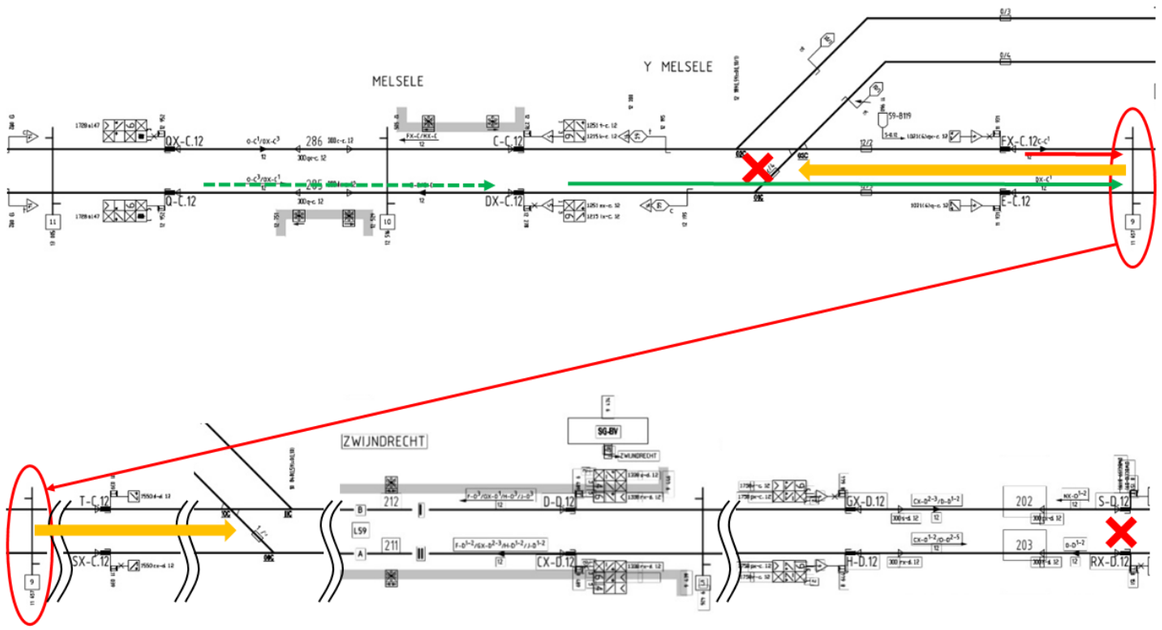

Diagram: Schematic signalling plan – SSP

zone of the works;

demarcations "total line interruption";

route taken by the train (solid line from the opening of signal DX-C.12);

route taken by the railway crane just before the accident.

The investigation showed that the communication between Block 12 and the site on the one hand, and between the various parties on the site on the other, failed at various levels:

- the managing block post did not inform the Manager of the works and the agent I, holder S_460 of its intention to apply a safety method that had not been provided for;
- the Manager of the works, the agent I, holder S_460 and the sentries all assumed that the "S_460 procedure" would be commenced, communicating insufficiently amongst themselves and with the Block Post that the "track had been cleared" while the conditions for this had not been met.

The **first indirect factor** is the **poor communication**:

- without prior communication, safety method 2 as provided for was altered to safety method 3, which had not been provided for;
- information on the "track cleared" condition on the site was shared insufficiently with the block post.

Recommendation 2 – indirect factor - 1
The infrastructure manager and the contractor should ensure that the communication between the various parties involved is complete and unambiguous, at both the start and the end of a safety method as well as when switching between safety methods.

During the transition from total line interruption to service on a single track, the traffic control agent based his judgement on the incorrect information that 'work has been ceased' to allow the 'first train' to pass. By deviating from the safety method provided for, a dangerous situation arose that was not corrected because various rules were not being followed strictly on the site:

- the railway crane left track A without 'clearing' the track (work continued);
- 'clearing the track' was not checked;
- procedures were not fully restarted, as required when the operational circumstances change.

The infrastructure manager has provided for the use of forms to confirm verbal arrangements in writing, so that no misunderstandings can arise. Forms cannot guarantee physical safety, but they do impose a moral obligation. They can enhance communication, serve as a memory aid, help to limit ambiguous situations and help to prevent communication problems. The use of these forms is required by the internal regulations.

The forms were not being used correctly on the site. This was a routine violation owing to the distance between different parts of the site.

The **second indirect factor** was the **failure to respect the "clear track" rules and the failure to apply the instructions for the use of forms** (a routine violation) on the site.

Recommendation 3 – indirect factor - 2
The infrastructure manager and the contractor should ensure that the "clear track" rules and instructions for the use of forms are followed strictly.

There were no fully-fledged, well-developed procedures for the choice of safety methods or for starting or terminating safety methods. Drawing up these procedures may contribute towards making arrangements that are not susceptible to interpretation or misconception.

Dynamic situations arise when operating conditions change. The internal regulations stipulate that forms must be renewed when operational conditions change. This rule has not been developed into procedures. On the day of the accident, there was a deviation from safety method 2 as provided for and safety method 3, which was not provided for, was applied before it had actually commenced.

The **first underlying factor** is the lack of fully developed procedures on the part of the infrastructure manager for the choice, dissemination and application of the specific safety methods, which should take account of dynamic working conditions such as the transition from one safety method to another, among other things.

Recommendation 4 – underlying factor - 1
The infrastructure manager should supervise to ensure that full procedures are developed for:

- ***the commencement and termination of safety methods (specific working conditions) and***
- ***switching between safety methods (dynamic working conditions).***

The contractor's health and safety plan did not contain a risk analysis of the safety methods imposed by the infrastructure manager. This risk analysis should be drawn up from the angle of dangers and risks to the contractor's staff arising from the safety methods imposed. In doing so, the contractor should also take account of dangers and risks that arise during dynamic phases.

The development of these risk analyses may contribute towards the identification of dangers and risks and should lead to appropriate preventative and corrective measures being taken.

A **second underlying factor** is **the lack** on the part of the contractor **of a risk analysis or of accompanying measures** for the application of safety methods that are imposed by the infrastructure manager.

Recommendation 5 – underlying factor - 2
The contractor should ensure that a risk analysis (including the accompanying measures) is made for the application of safety measures that are imposed by the infrastructure manager.

When tendering, the contractor supplies a standard health and safety plan. This health and safety plan is not altered or supplemented once the order has been awarded.

No co-ordinator representation was assigned and the contractor's health and safety plan was not checked. No checks were carried out as to whether risks and dangers related to safety methods had been analysed by the contractor or whether the safety methods provided for could guarantee safe operation when commencing, terminating or altering a safety method.

Nor was there any effective safety co-ordination prior to the works or prior to altering the safety method provided for.

A **third underlying factor** is the **lack of checks for completeness or of the content** of the **contractor's health and safety plan**.

Recommendation 6 – underlying factor - 3
The infrastructure manager and the contractor should ensure that the contractor includes a risk analysis of the safety methods provided for in its health and safety plan.

Working with a railway crane - photo for illustrative purposes

The infrastructure manager's documentation contains instructions for the use of forms at the start (and end) of works. It does not discuss a change in operational circumstances.
During training sessions, only limited consideration is given to dangers and risks related to dynamic working circumstances that arise when safety methods are **altered**.

A **fourth underlying factor** is the **limited consideration** given in the infrastructure manager and the contractor's **training sessions** to dangers and risks related to a **change in operational circumstances**.

Recommendation 7 – underlying factor - 4
The contractor and the infrastructure manager should ensure that the training sessions give consideration to dangers and risks related to a change in operational circumstances (dynamic working circumstances).

Position of the railway crane after the accident.


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