D.nr. OTKES/96/2025

NIB ANNUAL REPORT 2024

Safety Investigation Authority

FINLAND

PREFACE TO REPORT

This is the annual report of railway sector of the Safety Investigation Authority, Finland (SIAF) for the calendar year 2024.

National investigation ID

From the beginning of the year 2012, the identification of accident investigation reports has been as follows:

Accident/incident categories

L - Aviation accidents and incidents
R - Rail accidents and incidents
M - Marine accidents and incidents
Y - Other accidents and incidents
T - Social and healthcare accidents and incidents
P - Exceptional events

Investigation identifier

Each investigation is designated by an identifier that consists of three parts, such as R2012-01.

- The first part refers to the investigation branch (L, R, M, Y, T or P).
- The second part refers to the year of the accident.
- The third part is a sequence number referring to the order of the accident within its accident category in the year in question. “S” in the beginning of the number means that the investigation is a thematic investigation (safety study).

CONTENTS

1 INTRODUCTION TO INVESTIGATION AUTHORITY

1.1 Legal Basis

The SIAF is an independent and impartial authority that works under the Agency for Special Authorities in Judicial Administration. The SIAF was founded in 1996 and is housed in connection with the Ministry of Justice. The tasks of the SIAF are specified in the relevant national Finnish legislation (Safety Investigation Act 525/2011). The Act also contains the overall framework of the methods and powers under which an investigation is carried out. In Finland the Safety Investigation Authority is a multimodal investigation authority, which investigates aviation, maritime, rail, other accidents and incidents and social and healthcare accidents and incidents. The Safety Investigation Act also provides for the procedure to be followed in the event of exceptional and very serious events that, while not accident, have threatened or seriously damaged the basic functions of the society. The Safety Investigation Act also enables the investigation of several similar accidents as a safety study.

The current Safety Investigation Act is in harmony with the Railway Safety Directive.

1.2 Role and Mission

The purpose of safety investigation is to promote general safety and to prevent any new accidents from occurring.

A safety investigation examines the course of events related to the accident or incident, its causes and consequences, search and rescue operations as well as actions taken by authorities. The investigation specifically examines whether safety has adequately been taken into consideration in the activity leading up to the accident and in the planning, manufacturing, construction and use of the equipment and structures that caused the accident or incident or at which the accident or incident was directed. The investigation also examines whether the management, supervision and inspection activity has been appropriately carried out. The goal of a safety investigation is to discover factors and background causes contributing to the accident or incident in addition to its immediate cause, which may be found in e.g. the organisation, the instructions or the working methods.

When taking a decision to investigate, the seriousness and the probability that such an incident will recur are considered. An incident (or hazard) with minor consequences should be investigated if several people are in danger and if the investigation is estimated to significantly improve general safety and prevent future accidents from occurring.

Once a safety investigation is completed, an investigation report is published. The report contains safety recommendations that address specific issues discovered during an investigation and specify actions that prevent similar accidents from occurring in the future. The recommendations are addressed to appropriate authorities in charge of implementing the changes needed to prevent future accidents and incidents from occurring.

The SIAF monitors the implementation of recommendations. The purpose of a safety investigation is to promote general safety, prevent further accidents and incidents from recurring, and prevent losses caused by accidents.

Safety investigations are not conducted to allocate legal liability or handle matters of compensation. Other authorities and agencies are responsible for that task.

Task of Safety Investigation Authority

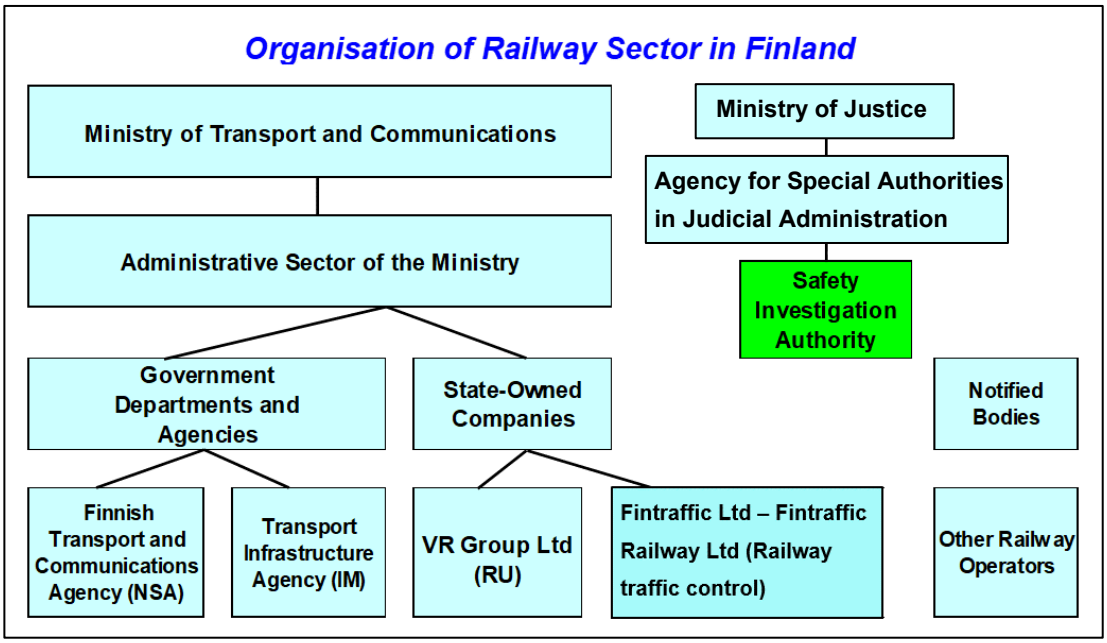
The Safety Investigation Act (525/2011) defines the task and the mandate of the SIAF. The Safety Investigation Act of Finland provides definitions for the types of accidents and incidents investigated by the Authority and how they are investigated.

The task of the SIAF is to investigate all major accidents and serious incidents regardless of their type, as well as aviation, rail traffic and maritime traffic accidents and incidents.

The SIAF task is to:

- ensure the general organisation, planning, guidance, provision of information, and supervision of a safety investigation.
- trains persons suitable to be investigators.
- maintains readiness to quickly initiate an investigation.
- attends international cooperation fora connected with the safety investigation field.
- provide support for the investigation of exceptional events.
- issues safety recommendations and monitors their implementation.

1.3 Organisational flow



2 INVESTIGATION PROCESSES

2.1 Cases to be investigated

Accidents and incidents to be investigated:

- **Rail traffic accidents**, which due to fatalities or injuries, the extent of damage incurred to the environment, property or assets, or nature of the accident can be regarded as particularly serious (**major accident**)
- **Serious railway accidents** as specified in Article 3 of the Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety.
  - **train collisions** (with another train, a shunting unit or an object or obstacle within the clearance gauge) or **derailments**, resulting in the death of at least one person or serious injuries to five or more persons, or extensive damage to the rolling stock, the infrastructure or the environment (in excess of EUR 2 million)
  - any other railway accidents with similar consequences, which have an obvious impact on railway safety (safety regulation or safety management)
    - level crossing accidents, resulting in train derailment, or resulting in the death of at least one or serious injuries to five or more members of the train crew or passengers, or if the accident was the result of failures within the railway system, or which due to deaths or injuries, the extent of damage incurred to the environment, property or assets, or nature of the accident can be regarded as particularly serious.
    - **accidents to persons** involving rolling stock in motion at a station or railway yard (personnel, passengers), or in connection with a track maintenance operation (personnel)
    - fire in rolling stock when running between the departure station and the destination (including when stopped at the departure station, the interim and destination stops), and re-marshalling operations.
    - other types of accident
- and **any similar accidents in private or public rail traffic**
  - metro accidents
  - tramway accidents

Any serious incident and other accident or incident may be investigated in accordance with the Safety Investigation Act. Also, a joint investigation of several similar accidents or incidents may be conducted in accordance with the Act.

2.2 Institutions involved in investigations

The SIAF can investigate all rail accidents. These investigations are independent and reports thereof are public. According to The Rail Transport Act (1302/2018) the Finnish Transport and Communications Agency can investigate those occurrences that SIAF does not investigate. The investigation reports of the latter are not public.

Level crossing accidents

Road accident investigation teams investigate all fatal road and off-road traffic accidents in Finland, including level crossing accidents. Preventing them is crucial from the human perspective, but also from the economic perspective. In addition, the teams investigate on project basis accidents that have caused serious personal injury and property damage to clarify certain specific questions.

The main aim of the investigation is to promote road safety. Accident investigations do not comment on guilt or compensation issues.

Investigation is regulated by legislation on the investigation of road and off-road traffic accidents (Act on the investigation of road and off-road traffic accidents, 1512/2016).

The Finnish Crash Data Institute (OTI) coordinates the work of road accident investigation teams but does not intervene in the independent working of the teams. OTI also takes care of the training of the teams, the use of investigation results, and information services.

There are 20 investigation teams operating in different parts of Finland. They have a total of approximately 300 members. The teams are mainly positioned according to the current regional borders. The teams independently study the reasons for road accidents and make proposals to improve safety. The investigation team members are subject to public liability and must respect a non-disclosure obligation.

The task of road accident investigation teams is to determine the underlying reasons for an accident and to propose the necessary actions to improve traffic safety. The material collected is used in traffic safety work, the work of public authorities, international cooperation and communication. The teams do not investigate guilt or compensation issues related to accidents.

In addition to the above, the SIAF can investigate any accident which has taken place in Finland, including road and off-road accidents. When the SIAF has initiated an investigation, any other authority or instance that has initiated a safety investigation shall transfer any investigation material it has compiled to the SIAF. Finally, it is worth mentioning that the SIAF has investigated about 80 level crossing accidents and made four safety studies on level crossing accidents since it came into being.

2.3 Implementation of the Commission implementing Regulation (EU) 2020/572

Investigation reports of the SIAF are issued following the structure described in Regulation (EU) 2020/572, as closely as possible and adapted to the type and seriousness of the accident or incident. SIAF uses a common reporting format for all investigation branches; therefore, the structure does not completely follow Regulation (EU) 2020/572.

Summary, Conclusions and Safety Recommendations are also translated into a second official European language (in English and in Swedish). These translations are published at the same time as the investigation report.

The SIAF sends the investigation report in Finnish and the translated parts of it in English to the Agency (ERA) in a digital format immediately after the report has been published (at the latest within 7 days).

In the following paragraphs is described, how the SIAF's investigation report structure compares to the general EU/ERA structure as set in the appendix.

1. Summary

The SIAF drafts a summary of every investigation report. The matters which have been presented in the appendix have been dealt with in the report. Summaries are published as separate documents.

2. Investigation and its context

The matters that have been presented in this section have been dealt with in our investigation report in the section *Preface*, except for point 7 which has been presented in other parts of the report.

3. Description of the occurrence

The matters mentioned in the subsection *(a) The occurrence and background information* are handled as follows:

- Points 1, 2, 4, 5, 7 and 8 have been dealt with in a separate section *Data Summary*.
- Point 3 is in subsections *2.1 Environment, systems and equipment* and *2.2 Conditions* of the section *2 Background information*.
- Point 6 is in subsection *2.4 Personnel, organisations and safety management* of the section *2 Background information*.

The matters mentioned in the subsection *(b) The factual description of the events* are handled in section *1 Factual information*.

4. Analysis of the occurrence, where necessary in respect of individual contributing factors

The matters that have been presented in this section have been dealt with in our investigation report in the section *3 Analysis*. In our report the rescue operations and the actions of all relevant authorities are also analysed

5. Conclusions

The matters that have been presented in this section have been dealt with in our investigation report in the section *4 Conclusions*.

6. Safety recommendations

The matters that have been presented in this section have been dealt with in our investigation report in the section *5 Safety recommendations*.

Table of contents of SIAF's safety investigation reports:

3 PEER REVIEW PROCESS

As part of the peer review process described in Directive (EU) 2016/798 on rail safety, the SIAF's operations were reviewed in 2023. The questionnaire was answered during the summer and a peer review team visited the SIAF on 14.-15 November2023. A final report was published on 22 February2024. The report is publicly available on ERA NIB Network webpage.

4 INVESTIGATIONS

4.1 Overview of investigations completed in 2024, identifying key trends

Type of accidents investigated	Number of accidents	Number of victims		Damages in € (approximation)	Trend in relation to previous year
		Deaths	Seriously Injured		
Collisions	1	0	0	400 000	0
Derailments	1	0	0	256 000	0
Level crossing accidents	1	1	0	11 000	0
Other	0	0	0	0	0

4.2 Investigations completed and commenced in 2024

Investigations completed in 2024

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Completed (date)
20.9.2023	R2023-01 Collision of two goods trains in Tampere on 20 September 2023	I (2) (c)	19.6.2024
30.11.2023	R2023-02 Derailment of a freight train that occurred in Tampere on 30 November 2023.	I (2) (c)	22.11.2024
6.2.2024	R2024-01 Level crossing accident at Kurkimäki timber loading site on 6 February 2024 resulting in the death of the shunting foreman	I (1)	11.12.2024

Investigations commenced in 2024

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis
6.2.2024	R2024-01 Level crossing accident at Kurkimäki timber loading site on 6 February 2024 resulting in the death of the shunting foreman	I (1)
15.11.2024	R2024-02 Collision on tram line 15 in Espoo on 15th November 2024 and other accidents and incidents on the same tram line in 2023-2025.	II (2) (b)

The Legal Basis for the decision to investigate accident/incident:

I National rules imposed by implementing of the Directive on railway safety
- (1) in light of Article 20, §1
- (2) in light of Article 20, §2
  - (a) the seriousness of the accident or incident
  - (b) it forms part of a series of accidents or incidents relevant to the system as a whole
  - (c) its impact on railway safety on a community level
  - (d) requests from infrastructure managers, the safety authority or the Member State
- (3) in light of Article 22
  - (§5) cross-border investigation or request to assistance
  - (§6) other reasons than those referred to in Article 20

II Other national rules/regulations (covering possible areas excluded in Article 2, §2 and §3)
- (2) (a) metros
- (2) (b) trams and other light rail systems

(2) (c) networks that are functionally separate from the rest of the railway system
(3) (a) privately owned railway infrastructure, including sidings, used by the owner or by an operator for the purpose of their respective freight activities or for the transport of persons for non-commercial purposes, and vehicles used exclusively on such infrastructure
(3) (b) infrastructure and vehicles reserved for strictly local, historical or tourist use
(3) (c) light rail infrastructure occasionally used by heavy rail vehicles under the operational conditions of the light rail system, where it is necessary for the purposes of connectivity of those vehicles only
(3) (d) vehicles primarily used on light rail infrastructure but equipped with some heavy rail components necessary to enable transit to be affected on a confined and limited section of heavy rail infrastructure for connectivity purposes only

III Other national rules/regulations not referred to the Safety Directive.

4.3 Safety Studies completed and commenced in 2024

Safety Studies completed in 2024

Date of commission	**Title of the Study** (Occurrence type, location)	**Legal basis**	**Completed** (date)
N/A	N/A	N/A	N/A

Safety Studies commenced in 2024

Date of commission	**Title of the Study** (Occurrence type, location)	**Legal basis**
N/A	N/A	N/A

4.4 Summaries of investigations completed in 2024

R2023-01

Collision of two goods trains in Tampere on 20 September 2023

Two empty timber trains collided with each other at a set of points in the Viinikka marshalling yard in Tampere on 20th of September 2023. The accident occurred as train T3321, which was headed to Orivesi, was being reversed back into the marshalling yard. The train was too long to fit onto the section of track that had been assigned for it, as a result of which its wagons overran the main signal that marked the end of the movement authority and collided with the side of a train that was going through the points on its way to Parkano. No personal or environmental damage was caused by the accident. Eight wagons designed for carrying timber were damaged in the collision. The track also sustained damage over a distance of 50 metres. In addition, the accident caused widespread disruption to rail services.

The traffic controller authorised the reversing of the train based on the mistaken assumption that the T3321 would fit onto the assigned section of track. The driver of the reversing train had no way of seeing the location of the rear of the train and was therefore unaware that the wagons had overrun the main signal.

The actors within rail industry have failed to recognise all the risks associated with reversing. Reversing is generally seen more as a disruptive inconvenience than a high-risk special manoeuvre. The investigation also revealed that there are no technological systems in place for reversing that would safeguard against the risk of human error.

The current guidelines for reversing are not fully supportive of safety. Keeping the Rail Transport and Shunting Safety Guidelines up to date is the responsibility of the Finnish Transport Infrastructure Agency. The guidelines are reviewed at regular intervals by the Rail Safety Committee. The Rail Safety Committee has failed to identify the weaknesses inherent in the guidelines for reversing, which have been in effect since 2016. The investigation also revealed that there is a lack of a long-term perspective in the decisions of the Rail Safety Committee and that the Committee does not systematically follow the Finnish Transport Infrastructure Agency's internal risk assessment procedures, which are based on the European Regulation on the common safety method for risk evaluation and assessment ('CSM Regulation').

It appears, based on the investigation, that rail network operators often only look at railway safety from their own perspective. This fragmented approach does not support or lead to the development of common safety standards within the rail industry as a whole. It appears, based on the

investigation, that no one organisation is ultimately in charge of managing and improving railway safety.

To improve safety, the Safety Investigation Authority recommends that:

1. *The Finnish Transport Infrastructure Agency and Fintraffic Railway Ltd join forces to improve the safety of reversing and other degraded operations by putting into place an array of technological systems to safeguard against an accident in the event of human error. [2024-S27]*
2. *The Finnish Transport Infrastructure Agency update the sections of the Rail Transport and Shunting Safety Guidelines that deal with reversing and standardised communications so that trains can only be reversed into locations that the train driver is able to see from the cab. The existing checklist for the safe coordination and execution of reversing manoeuvres should also be updated and incorporated into the Finnish Transport Infrastructure Agency's rail transport operation guidelines. [2024-S28]*
3. *The Finnish Transport Infrastructure Agency improve its guidance drafting procedures to better recognise the effect of guidelines on safety and to systematically analyse and document the risks involved in introducing new guidelines also in respect of rail transport operation. [2024-S29]*
4. *The Finnish Transport and Communications Agency ensure not only compliance with the applicable rail transport operation guidelines but also the effectiveness of operators' self-regulation procedures in practice. The Finnish Transport and Communications Agency should also take a more active role in managing and improving railway safety across the whole system. [2024-S30]*

R2023-02

Derailment of a freight train in Tampere on 30 November 2023

On 30th of November 2023, the locomotive of freight train T7121 and the front bogie of its first wagon became derailed at the switch V171 to the north of Tampere station. No personal or environmental damage was caused by the accident. As a result of the derailment, the switch V171 was severely damaged and only one track between Tampere and Lielahti remained in use until 3 December 2023. The derailment and prolonged track clearance caused significant traffic disruptions, and some trains had to be cancelled.

The accident was caused by the combined effect of various factors, which included the worn heel of the switch, the high lateral force on the rails characteristic of the locomotive type, and the worn wheelset of the locomotive.

At the time of the incident, the switch V171 had worn down to its critical operational and maintenance threshold. The switch also had an abnormal wear profile, which contributed to the rising of the wheel of the locomotive and its staying on the tongue of the switch. The track maintenance operator had noticed that the switch was worn out but did not present a repair plan to the client, while the client also did not require the plan.

The monitoring of the condition and wear of the switch currently partly relies on sight-based inspection, and measuring instruments such as gauges are not used systematically. In addition, the instructions prepared to support maintenance have inconsistencies and are not easily accessible.

As the plan was to replace the switch V171 in connection with a railway yard renovation project, there was an aim to minimise the maintenance of the switch before the start of the renovation project. However, in deviation from the plan, the renovation project was delayed several times at the annual level, and the impacts of the delay on the switch maintenance plan were not reassessed.

The Dr18 locomotive was brought to Finland through a cross-approval procedure. For this reason, the approval process was more limited in Finland and the authority responsible for the safety of the railway system was unable to identify the high lateral forces caused by the rolling stock to the track when granting the rolling stock authorisation for placing in service. The infrastructure manager commissioned lateral force measurements on various equipment, which showed that the structure of the Dr18 locomotive causes high lateral forces on the track. High lateral forces increase the wear of the track and wheels, leading to a higher risk of derailment of rolling stock, especially around the heel of the switch. The revealed risk of derailment led to no action.

In addition to the lateral forces and the worn heel of the switch, the risk of derailment was also increased as the wheels of the derailed locomotive were worn nearly to the point of being unfit for use, which weakened the directional capacity of the wheelsets at the switch. In addition, a curve had formed on the wheel flange, which had a significant impact on the derailment. With regard to the wheels of locomotives, the effect of the flange tip and the shape of its wear on the operational performance of rolling stock has not been identified and it has not been addressed in the rolling stock maintenance instructions.

The investigation revealed that the current safety risk monitoring and management practices have mainly focused on assessing critical thresholds for individual factors. They do not take sufficient account of the cumulative safety risk arising from the combined effect when several elements are close to the critical threshold, as was the case in this accident.

In addition, the investigation showed that cooperation between different operators was one of the key factors in the success of clearing. When examining clearing operations, it was found that rolling stock maintenance operators have equipment and resources suitable for clearing operations that are currently not utilised efficiently in clearing operations on the state-owned railway network. More extensive cooperation could minimise the duration of disruptions in the rail network and their impact on the functioning of society.

To improve safety, the Safety Investigation Authority recommends that:

1. *The Finnish Transport Infrastructure Agency ensure the uniformity of the guidelines and improve their accessibility, unambiguously define the method of measuring the maintenance needs of the heel of the switch and specify accurate wear profiles for the heels of the switch. [2024-S33]*
2. *The Finnish Transport Infrastructure Agency examine the track maintenance process so that the impacts of delays in renovation projects on maintenance are taken into account in more detail when planning maintenance. [2024-S34]*
3. *Railway operators and rolling stock maintenance operators draw up instructions for inspecting the shape of the wheel flange and include a guided inspection as part of the maintenance of wheelsets. In addition, a procedure must be introduced for monitoring the wear of rolling stock wheelsets to identify and anticipate wear on the wheels between maintenance. [2024-S35]*
4. *Infrastructure managers, railway and clearing operators and rolling stock maintenance operators agree on cooperation practices in relation to clearing to ensure smooth clearing operations. In addition, the stakeholders proactively examine the tools and resources available and agree on their use and related communication in clearing situations. [2024-S36]*
5. *Infrastructure managers and railway operators using six-axle locomotives jointly define safety margins for the wear of the track and the wheelsets of rolling stock that ensure safe operation, taking into account the combined effect of different factors. [2024-S37]*

R2024-01

Level crossing accident at Kurkimäki timber loading site on 6 February 2024 resulting in the death of the shunting foreman

A shunting unit pushing empty timber transport wagons collided with the trailer of a vehicle combination for timber transport at Kurkimäki timber loading site on 6th of February 2024. The vehicle combination was crossing a level crossing. The shunting foreman directing the shunting unit was killed in the accident. The material damage caused by the accident was minor.

A student in independent work practice at the timber loading site was leaving the site in a vehicle combination. Wagons involved in shunting were temporarily standing at the level crossing located on the original route. The student chose a route via another level crossing. A shunting unit was approaching the level crossing. The shunting foreman was standing on the footstep of the first wagon of the unit in the direction of travel. The shunting foreman intended to disembark at the level crossing. The shunting foreman noticed the vehicle combination that was approaching the level crossing and that stopped before the crossing and probably assumed that the driver had noticed the approaching shunting unit. The shunting foreman prepared for jolts caused by braking and turned round so that his back was towards the level crossing. The vehicle combination driver failed to notice the approaching shunting unit. The shunting unit collided with the rear of the trailer at slow speed. In the collision, the shunting foreman was stuck between a wagon and the trailer and was killed.

The accident was typical for an unguarded level crossing, and the failure of the vehicle combination driver to notice the approaching shunting unit and the manner in which the shunting foreman interpreted the driver's intentions both contributed to the course of events.

The safety of timber loading sites was examined more thoroughly in the investigation on the basis of users' experiences. Several operators work at timber loading sites at the same time, and they are not necessarily familiar with the content of each other's work and do not have the capacity to take into account the impacts of their own work on the activities of other parties or overall safety. At a site with several operators but no jointly agreed cooperation procedures or communication methods, employees are more prone to make decisions that are not necessarily safe to other operators. There is currently no actor at timber loading sites that would coordinate different functions and be responsible for overall safety.

Most of the timber loading sites have level crossings even though traffic at them could also be managed without crossing tracks. Planning of timber loading sites and operations at them are guided by such factors as maximising of timber volumes. The combined effect of cramped conditions and vision barriers on traffic safety has not been fully recognised in the planning of the sites.

There are no safety requirements or guidelines for level crossings at timber loading sites to support planning and maintenance. Furthermore, the requirements for level crossings on the public road network do not apply to them.

To improve safety, the Safety Investigation Authority recommends the following:

1. *The Finnish Transport Infrastructure Agency should, in its capacity as the owner of the timber loading sites, assume responsibility for developing the overall safety of the sites, especially the coordination of operators' work practices and definition of communication practices. [2024-S38]*
2. *The Finnish Transport Infrastructure Agency should update the planning guidelines for timber loading sites so that the sites can be planned without level crossings. If level crossings are needed at the sites, safety requirements that are independent of the site classification should be specified for them. [2024-S39]*

4.5 Comments and introduction or background to investigations

Investigations commenced in 2024 and not followed

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Reason of non-following or suspension of investigations	Who, why, when (decision)
N/A	N/A	N/A	N/A	N/A

4.6 Accidents and incidents investigated during last five years (in 2020–2024)

Accidents investigated		2020	2021	2022	2023	2024	TOT
Serious accidents (Art 20.1)	Train collision	0	0	0	0	0	**0**
	Train collision with an obstacle	0	0	0	0	0	**0**
	Train derailment	0	0	0	0	0	**0**
	Level crossing accident	1	0	0	0	1	**2**
	Accident to person caused by RS in motion	0	0	0	0	0	**0**
	Fire in rolling stock	0	1	0	0	0	**1**
	Involving dangerous goods[1]	0	0	0	0	0	**0**
Other accidents (Art 20.2) + (Art 22.6)	Train collision	0	0	0	1	0	**1**
	Train collision with an obstacle	0	0	0	0	0	**0**
	Train derailment	0	2	0	1	0	**3**
	Level crossing accident	0	1	0	0	0	**1**
	Accident to person caused by RS in motion	0	0	0	0	0	**0**
	Fire in rolling stock	0	0	0	0	0	**0**
	Involving dangerous goods[1]	0	0	0	0	0	**0**
	Incidents in train traffic	0	0	0	0	0	**0**
	Accidents or incidents in shunting work	6[2]	0	0	0	0	**6**
	Accidents or incidents in tram systems	0	0	0	0	1	**1**
TOTAL		**7**	**4**	**0**	**2**	**2**	**15**

4.7 Preliminary investigations

The Safety Investigation Authority, Finland has conducted in compliance with section 8 of the Safety Investigation Act (525/2011) preliminary investigations referred to as assessments. In these cases, the SIAF decided, on the basis of a preliminary investigation, that the special characteristics of the case do not require a full investigation. The assessment report is sufficient to yield desired safety advantages. In addition, the reports contribute to openness of government agency activities. The events leading to the

[1] Belongs also to another category and is not calculated another time to the total amount.
[2] Cases belong to the theme investigation on shunting work accidents and incidents in railway traffic.

accident and immediate and indirect causes of the accident/incident are described briefly in the report. The assessment reports are published in Finnish and Swedish, and on a case-by-case basis in English.

The assessment reports have been published on the SIAF website since 2013. In 2017 we developed a new layout for the report. The layout was updated in 2022, and reports have been published in html-format since then. The assessments have been found to be very cost effective in improving safety.

During the year 2024 SIAF published one assessment report of a rail occurrence:

R2024-E1, Fatal accident in trackwork at Tikkurila on 29th of September 2024.
Report was published 7.10.2024.

- A track worker was fatally injured when he was hit by a passenger train north of Tikkurila station on 29 August 2024 at 23.20.
- Track workers routinely crossed tracks when walking from their premises to work sites in the Tikkurila rail yard and station area.
- The assessment served to remind the industry of the risks involved in trackwork that is done while adjacent tracks are kept open to traffic.
- Additionally, it drew the attention to risks involved in using modern high power led lights in track work. That is, while they are excellent for workers, they make it impossible for train drivers to see if someone is walking next to a lit working area.

4.8 Fatal level crossing accidents investigated by the road accident investigation teams

In , a total of 14 level crossing accidents occurred Three persons were fatally injured and one person seriously injured in these accidents. Additionally, three people suffered minor injuries. It is noteworthy that all fatal accidents involved a pedestrian.

The road accident investigation team investigated two of the three fatal level crossing accidents. Both of these accidents were intentional. Below are short summaries of the two fatal accidents.

1. Fatal level crossing accident in Kiuruvesi on 27th of February 2024

On Tuesday 27th of February 2024 at 15.00, a level crossing accident involving a pedestrian, and a rail bus occurred on Ryönäjoki level crossing. The level crossing is equipped with warning devices and half-barriers.

A 39-year-old female walked from road to level crossing and proceeded to walk to east along the track. At the same time a rail bus was approaching from the east at 120 km/h. Driver of the rail bus noticed the person walking next to rails about two seconds before collision. Driver used whistle and started emergency braking. When rail bus was near the person, she stepped right in front of the rail bus. She died immediately in the collision.

The direct cause (*the key event*[3]) was that the person stepped right in front of the rail bus.

[3] Terms used by the road accident investigation teams.

Background risk factors[4]:

- Due to a curve on the track, the driver of the rail bus noticed a person walking on the track only 2 seconds before the collision.
- The victim had had chronic health issues, to which she hadn't received help despite several attempts. Health care did not notice the possible risk of a suicide when treating her.

In order to prevent similar accidents, the investigation team made the following recommendations under *proposals and safety recommendations*[5]:

- Focusing the care of a patient to dedicated persons so that all aspects can be considered in health care.
- The identification of suicide risks in long term health care situations, especially taking into account the feeling of desperation in prolonged health care situations.
- Establishing safety premises for people who have thoughts about suicide.

2. Fatal level crossing accident in Tuuri on 6th of October 2024

On Sunday 6th of October 2024 at 14.25, a level crossing accident involving a pedestrian, and a rail bus occurred in the Kokkomäki unprotected level crossing.

A 44-year-old male person was standing on the road next to level crossing while a rail bus was approaching from the east at 100 km/h. The driver of the rail bus noticed the person from a distance of 200 meters and sounded the whistle. When the rail bus was at a distance of 30 meters from the level crossing, the above-mentioned person stepped right in front of the rail bus. The driver started an emergency braking, but the rail bus collided with the person at a speed of almost 100 km/h. The person died immediately in the collision.

The direct cause (*the key event*) was the person stepping in front of the rail bus.

Background risk factors:

- The victim's blood alcohol level was 0,99‰ and he was going through a divorce. He was diagnosed with a depression and had no social support network.

In order to prevent similar accidents, the investigation team made the following recommendation *proposals and safety recommendations*:

- Persons with suicidal thoughts should be guided more efficiently into the care of healthcare professionals.
- Improving services and social support for persons that have problems with alcohol.

5 RECOMMENDATIONS

5.1 Implementation of recommendations

A total of 452 recommendations have been issued from 1997 through 2024. According to information available on 12th of May 2025, 357 (79.0 %) of the recommendations were

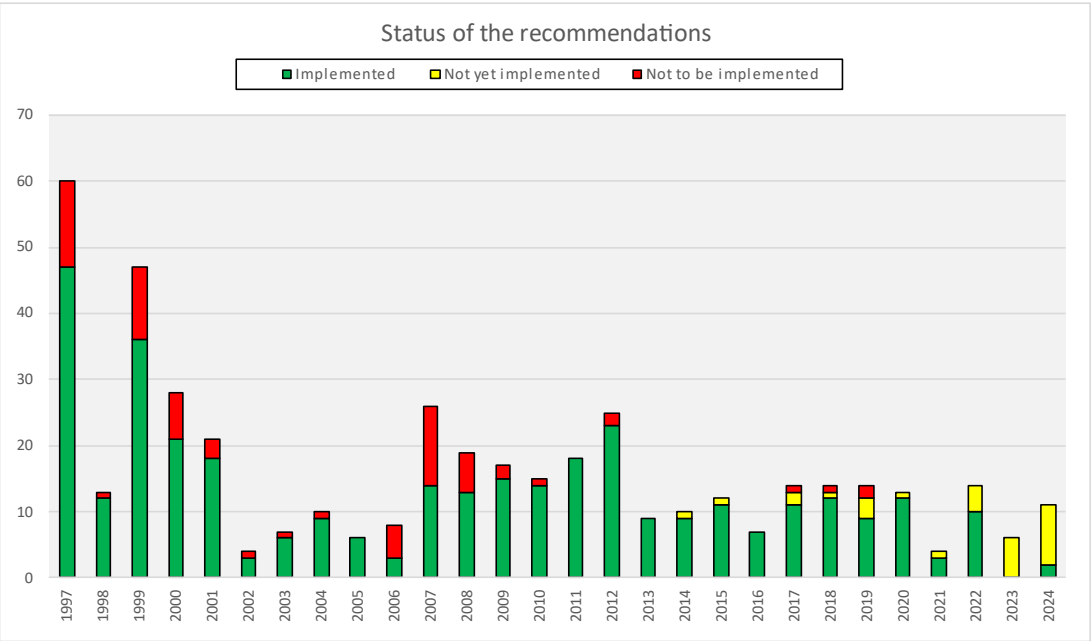
[4] Terms used by the road accident investigation teams.
[5] Terms used by the road accident investigation teams.

implemented. On 70 (15.5 %) issued recommendations, the SIAF received a reply stating that they would not be implemented.

Recommendations issued		Recommendation implementation status					
		Implemented		In progress		Not to be implemented	
Year	[No.]	[No.]	[%]	[No.]	[%]	[No.]	[%]
2010	15	14	93,3	0	0,0	1	6,7
2011	18	18	100,0	0	0,0	0	0,0
2012	25	23	92	0	0,0	2	8,0
2013	9	9	100,0	0	0,0	0	0,0
2014	10	10	100	0	0,0	0	0,0
2015	12	11	91,7	1	8,3	0	0,0
2016	7	7	100,0	0	0,0	0	0,0
2017	14	11	78,6	2	14,3	1	7,1
2018	14	13	92,9	0	0,0	1	7,1
2019	14	9	64,3	3	21,4	2	14,3
2020	13	12	92,3	1	7,7	0	0,0
2021	4	3	75,0	1	25,0	0	0,0
2022	14	12	85,7	2	14,3	0	0,0
2023	6	0	0,0	6	100	0	0,0
2024	11	2	18,2	9	81,8	0	0,0
TOTAL	**186**	**154**	**82,8**	**25**	**13,4**	**7**	**3,8**

From 2010 through 2024 a total of 186 recommendations have been issued. 154 (82,8 %) have been implemented. On 7 (3,8 %) issued recommendations, the SIAF received a reply stating that they would not be implemented. 25 recommendations (13,4 %) are currently under implementation.

Changes in implementation statuses of recommendations during 2024 are described in detail in Annex 1.



5.2 Recommendations issued in 2024

1. 2024-S27 (FI-10451/1) Upgrading of technological safety systems

It was down to the traffic controller's misjudgement that the train was authorised to be reversed onto a section of track that was not long enough for it. The situation escalated quickly and ended up requiring action from three traffic controllers. Reversing is a relatively common manoeuvre but still something that an individual traffic controller and an individual train driver rarely have to do.

The reversing train in this case had been given movement authority based on zero overlap from signalling control. This meant that there was no positive confirmation that the track would be clear after the signal marking the end of the movement authority. The on-board unit of the automatic train control system had been switched to shunting mode for the reversing manoeuvre. The on-board unit is located inside the cab at the front of the train, and the system was consequently not able to detect the wagons' passing of the stop signal.

There was no technological system in play that could have prevented the accident after the human error was made.

The Safety Investigation Authority urges the Finnish Transport and Communications Agency to ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency and Fintraffic Railway Ltd join forces to improve the safety of reversing and other degraded operations by putting into place an array of technological systems to safeguard against an accident in the event of human error. [2024-S27]

Examples of ways to improve safety include prohibiting the giving of movement authority for reversing based on zero overlap at stations and stopping traffic behind a reversing train over a safe distance. The possibility of using the ETCS automatic train control system as a safety mechanism for reversing maneuvers should also be explored. The identification and prevention of the risk of human error should be given more attention in operator training and in organizations' safety management systems.

2. 2024-S28 (FI-10451/2) Updating of the guidelines for reversing and the associated checklist

According to the current guidelines for reversing, movement authority is given up to a limit that the train must not pass. It is impossible for the driver of the reversing train to comply with this rule in practice if they cannot see the carriages at the rear of the train that can be hundreds of metres away. Train drivers and traffic controllers are aware of the weaknesses in the guidelines, but no steps have been taken to change the rules and make the procedure safer.

Fintraffic Railway Ltd's reversing checklist says nothing about checking whether the reversing train will fit onto the section of track that has been assigned for it.

The Safety Investigation Authority urges the Finnish Transport and Communications Agency to ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency update the sections of the Rail Transport and Shunting Safety Guidelines that deal with reversing and standardized communications so that trains can only be reversed into locations that the train driver is able to see from the cab. The existing checklist for the safe coordination and execution of reversing maneuvers should also be updated and incorporated into the Finnish Transport Infrastructure Agency's rail transport operation guidelines. [2024-S28]

The reversing guidelines and checklist should be updated taking into account the earlier, more comprehensive versions of the guidelines. Operator training should also be provided to ensure that the users of the guidelines understand the procedures and their significance from the perspective of the railway system as a whole.

3. 2024-S29 (FI-10451/3) Improving of the Finnish Transport Infrastructure Agency's guidance drafting procedures

It appears, based on the investigation, that the Finnish Transport Infrastructure Agency does not have a systematic approach to drawing up rail transport operation guidelines and ensuring compliance with the associated common safety method for risk evaluation and assessment ('CSM'). From the perspective of safety management, the guidelines mostly focus on the risks involved in introducing new procedures and fail to recognise the risks associated with the performance of the existing guidance on a daily basis. The members of the Rail Safety Committee keep changing, as a result of which its decisions lack a long-term perspective.

The Safety Investigation Authority urges the Finnish Transport and Communications Agency to ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency improve its guidance drafting procedures so as to better recognize the effect of guidelines on safety and to systematically analyze and document the risks involved in introducing new guidelines also in respect of rail transport operation. [2024-S29]

The effectiveness of rail transport operation guidelines should be tested in practice before they are adopted, and enough feedback should be collected about their functionality.

4. 2024-S30 (FI-10451/4) Managing and improving of railway safety across the whole system

It appears, based on the investigation, that rail network operators' current self-monitoring procedures and the authorities' audits of safety management documentation are not enough to ensure adequate instruction and safe operation.

The operators involved in the investigated accident had widely different views on the causes of the accident. This leads the investigation team to conclude that rail network operators tend to only look at railway safety from their own perspective and not from the perspective of the whole system. This approach is not conducive to raising the standard of safety across the entire rail network.

The Safety Investigation Authority recommends the following:

The Finnish Transport and Communications Agency ensure not only compliance with the applicable rail transport operation guidelines but also the effectiveness of operators' self-regulation procedures in practice. The Finnish Transport and Communications Agency should also take a more active role in managing and improving railway safety across the whole system. [2024-S30]

Visible and transparent supervision of the guidelines is the most effective way to improve safety across the whole railway system.

5. 2024-S33 (FI-10480/1) Inspection and maintenance procedures for the heel of the switch

The switch where the derailment occurred had been worn down to its critical operational and maintenance threshold. Due to its location, the wear on the switch was uneven, which resulted in an abnormal wear profile and thus increased the risk of derailment. Despite wear, no repair plan was drawn up for the switch and was not required by the client.

Maintenance does not systematically utilise measuring instruments, such as gauges, to monitor wear. Wear control is mainly based on a visual assessment, which depends on the individual's level of competence and experience. In addition, the current technical guidelines on railways (RATO) prepared to support maintenance work contain inconsistent instructions between different sections and cannot be considered easily accessible. The above factors impair the quality of maintenance.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

The Finnish Transport Infrastructure Agency ensure the uniformity of the guidelines and improve their accessibility, unambiguously define the method of measuring the maintenance needs of the heel of the switch and specify accurate wear profiles for the heels of the switch. [2024-S33]

As inspection methods develop, it is important to ensure the competence of persons carrying out maintenance by developing training and instructions.

6. 2024-S34 (FI-10480/2) Consideration of renewal and investment projects in track maintenance

In the investigated case, there were plans to replace the switch in connection with a railway yard renovation project, as a result of which measures to change the switch part were not launched. The renovation project had been delayed several times at the annual level, but its impacts on the need to maintain the switch and, consequently, rail traffic safety, had not been identified.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

The Finnish Transport Infrastructure Agency examine the track maintenance process so that the impacts of delays in renovation projects on maintenance are taken into account in more detail when planning maintenance. [2024-S34]

7. 2024-S35 (FI-10480/3) Monitoring the wear of the wheel profiles on rolling stock

The wheels of the derailed locomotive were approaching their wear limit. The conicity of the wheels was low, which weakened the maneuverability of the wheelset in turns and, together with the large lateral forces of the rolling stock, increased the risk of derailment. In addition, a curve had formed on the wheel flange, which had a significant impact on the derailment. The impact of the shape and wear of the flange tip of rolling stock on the performance of rolling stock has not been identified and it has not been generally discussed in the rolling stock maintenance instructions.

Anticipating wear on the wheels between maintenance occasions and identifying wear patterns is a prerequisite for the safe operation of rolling stock, especially when the wheels are worn.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

Railway operators and rolling stock maintenance operators draw up instructions for inspecting the shape of the wheel flange and include a guided inspection as part of the maintenance of wheelsets. In addition, a procedure must be introduced for monitoring the wear of rolling stock wheelsets to identify and anticipate wear on the wheels between maintenance. [2024-S35]

Rolling stock-specific special features must always be taken into account in the maintenance of wheelsets. For example, the standard SFS-EN 15313 can be applied to determine the maintenance limits for brush wear on the flange tip.

8. 2024-S36 (FI-10480/4) Cooperation in clearance activities

The clearers work part-time, and the clearance tasks are carried out sporadically, preventing competence on specific rolling stock from forming. The training of clearance personnel does not currently provide sufficient capabilities for knowledge of the locomotive equipment in relation to clearance.

The hoisting instructions for the derailed locomotive were insufficient with regard to jacking, and the clearing workers did not have sufficient competence in the locomotive. The lack of practical experience in the rolling stock was compensated by cooperation with an expert of the rolling stock owner. In the case examined, cooperation between the clearing workers and the rolling stock owner worked very well and was a key factor in successful clearing.

The rolling stock maintenance operators had equipment and resources suitable for clearing operations that are currently not utilized sufficiently efficiently in clearing operations on the state-owned railway network. Cooperation can be used to minimize the duration of disruptions in the rail network and their impact on the functioning of society.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

Infrastructure managers, railway and clearing operators and rolling stock maintenance operators agree on cooperation practices in relation to clearing to ensure smooth clearing operations. In addition, the stakeholders proactively examine the tools and resources available and agree on their use and related communication in clearing situations. [2024-S36]

The owners of the rolling stock must ensure that the hoisting instructions are available to all those who need them and that they are suitable for the hoisting methods used. To ensure practical competence, it must be ensured that the workers involved in clearing the track have access to rolling stock-specific instructions

9. 2024-S37 (FI-10480/5) Taking rolling stock features into account when defining the interoperability thresholds for track and rolling stock

The structure of the Dr18 locomotive causes high lateral forces in turns, which increases wear on the wheel and rail and results in a growing risk of derailment, especially around the heel of the switch.

Due to the cross-approval procedure for the locomotive, the authority responsible for the safety of the railway system did not identify the risks associated with the high lateral forces caused by the rolling stock when granting the authorization for placing in service for the locomotive series. However, lateral forces and the risk of derailment they cause, especially in switches, came to the attention of the authorities through lateral force measurements later commissioned by the infrastructure manager. The measurements did not result in any measures, even though the safety authority has the preconditions for

requiring the railway operator using the rolling stock and the infrastructure manager to take measures to manage the identified accident risks.

In the accident in question, the combined effect of the worn heel of the switch, the worn wheel and the high lateral forces resulted in derailment. The current thresholds do not take into account the safety risk arising from the combined effect of the different components. The TSI requires operators to ensure the interoperability of vehicles and tracks in all situations.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

Infrastructure managers and railway operators using six-axle locomotives jointly define safety margins for the wear of the track and the wheelsets of rolling stock that ensure safe operation, taking into account the combined effect of different factors. [2024-S37]

Based on the measurements, all six-axle locomotives have a high risk of derailment around the heel of the switch, which should be taken into account especially when determining use thresholds.

10. 2024-S38 (FI-10522/1) Safe cooperation at timber loading sites

Several operators work at timber loading sites at the same time. They are not necessarily familiar with the content of each other's work and do not have the capacity to take into account the impacts of their own work on the activities of other parties or overall safety. There is no jointly agreed communication mechanism between the operators or a method for notifying of shunting in progress.

At a site with several operators but no jointly agreed cooperation procedures or communication methods, employees are more prone to make decisions that are not necessarily safe from the perspective of other operators.

The role of the party responsible for coordinating the operations is highlighted at timber loading sites. There is currently no actor at these sites that would coordinate different functions and be responsible for overall safety. The Finnish Transport Infrastructure Agency, which owns the sites, is currently responsible for the maintenance of the sites and overall guidance.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

The Finnish Transport Infrastructure Agency should, in its capacity as the owner of the timber loading sites, assume responsibility for developing the overall safety of the sites, especially the coordination of operators' work practices and definition of communication practices. [2024-S38]

It is important to ensure the coordination of operators' work practices and uniform communication and warning practices at timber loading sites.

11. 2024-S39 (FI-10522/2) Planning of timber loading sites and the level crossing requirements for them

Most of the timber loading sites have level crossings. However, at many of the sites, traffic could be managed without crossing tracks.

There are no safety requirements or guidelines for level crossings at timber loading sites to support planning and maintenance. The requirements for level crossings in the public road network do not apply to them.

Planning of timber loading sites and operations at them are primarily guided by ensuring maximum timber volumes. The general view is that there is not enough space for traffic at the timber loading sites. The location of the timber stacks results in cramped conditions and vision barriers. The combined effect of cramped conditions and vision barriers on traffic safety has not been fully recognized in the planning of the sites.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency ensure that the following recommendation is implemented:

The Finnish Transport Infrastructure Agency should update the planning guidelines for timber loading sites so that the sites can be planned without level crossings. If level crossings are needed at the sites, safety requirements that are independent of the site classification should be specified for them. [2024-S39]

Where applicable, the planning of level crossings at timber loading sites should be based on the same criteria as the level crossings in the road network. The impact of site maintenance on level crossing safety should also be considered in the guidelines.

ANNEX 1: Changes in implementation statuses of previous recommendations during 2024 and actions taken by the addressees

1. **Recommendation number: R2013-02/S346 (ERA FI-2950 REC-000463 and ERA FI-5386 REC-000395)**

Recommendation: The Finnish Transport Agency will increase the field monitoring of trackwork safety regulations by allocating appropriate resources for such work.
Issued in investigation: R2013-02 Collision of a freight train with an excavator on the Pännäinen–Kolppi section, Finland, on 7 November 2013 and other occurrences and incidents in 2013
Previous status: Under implementation
New Status in 2024: Implemented
Description on implementation: The Finnish Transport Infrastructure Agency's guidelines on the supervision of investment projects are undergoing final consultations and will be published in the spring of 2024. The guidelines will apply to all new investment projects. The guidelines obligate project managers to draw up a supervision plan and include an indicative table of contents for the plan. The supervision plan is designed to describe how each project is to be supervised in practice. The Finnish Transport Infrastructure Agency will communicate more information about the new guidelines once they have been published to ensure that the guidelines are properly adopted.

2. **Recommendation number: 2018-S20 (ERA FI-5479 REC-000407)**

Recommendation: The Defence Forces develop the risk assessment of exercises in order to identify the actual risks and name those which are identified.
Issued in investigation: R2017-03 Level crossing accident which led to four deaths at Raasepori on 26 October 2017
Previous status: Under implementation
New Status in 2024: Implemented
Description on implementation: The Finnish Defence Forces deployed a new risk management and occupational and in-service safety incident reporting system (PVRIPO) on 1 July 2022. A revision of operational system requirements is documented in the Defence Forces' 2023 Action Plan. The requirements for occupational and in-service safety risk management emphasise the need to review at least the most significant occupational and in-service safety risks involved in work that falls under the Occupational Safety and Health Act annually and to identify the most significant risks involved in military exercises on a case-by-case basis. The system's risk management tools can also be used to plan and organise individual events such as military oath and affirmation ceremonies. Training courses that deal with occupational and in-service safety risk management emphasise the importance of carrying out risk assessment task-specifically and at the right time to ensure that all the relevant risks are factored in and that the chosen risk management measures are effective and capable of promoting safety in a proactive manner. Occupational and in-service safety incidents can be reported by officers, recruits as well as reservists, for example. Awareness about the occupational and in-service safety incident reporting system is growing steadily. There are also plans for a system update that will enable the reporting of positive safety observations and good safety practices. Occupational and in-service safety incident reporting is a prerequisite for proactive risk management that focuses on controlling at least the most significant known risks.

3. Recommendation number: 2022-S6 (ERA FI-10083/1)

Recommendation: The Finnish Transport Infrastructure Agency instructs that when preparing for railway work on the surface structure of sections of track where the support layer is weakened, the condition of the support layer and the rail joints should be examined, and they should be taken into account in the planning, scheduling and implementation of the work. The ability of the rail to withstand lateral forces in particular must be verified in the final inspection.

Issued in investigation: R2021-02, Derailment of a freight train in Vesanka on 3 July 2021

Previous status: Under implementation

New Status in 2024: Implemented

Description on implementation: The Finnish Transport Infrastructure Agency published a guideline called 'Railway Technology (RATO) 23: Design and construction of mechanical rail clamps' in 2023, which sets out temperature requirements for post-clamping operations as well as temperature forecasts that prevent the start of work. The guideline also instructs operators to inspect and repair any faults in the superstructure before clamping can begin. The Finnish Transport Infrastructure Agency and the Finnish Meteorological Institute have developed an online tool for predicting the temperature of railway tracks based on factors such as air temperature and wind speeds. The tool will be deployed, and instructions for using the tool incorporated into the RATO 23 guideline, before the start of the 2024 engineering season.

4. Recommendation number: 2022-S7 (ERA FI-10083/2)

Recommendation: The Finnish Transport Infrastructure Agency instructs that the rail temperatures should be recorded regularly and that the parties managing and monitoring railway work should monitor their development in real time and take measures, if necessary.

Issued in investigation: R2021-02, Derailment of a freight train in Vesanka on 3 July 2021

Previous status: Under implementation

New Status in 2024: Implemented

Description on implementation: The Finnish Transport Infrastructure Agency and the Finnish Meteorological Institute have developed an online tool for predicting the temperature of railway tracks based on factors such as air temperature and wind speeds. The tool will be deployed, and instructions for using the tool incorporated into the RATO 23 guideline, before the start of the 2024 engineering season. The Finnish Transport Infrastructure Agency intends to introduce a checklist for superstructure inspections during 2024 and to incorporate the checklist into the RUMA mobile application, which obligates rail maintenance operators to record track temperatures.