D.nr. OTKES/105/2024

NIB ANNUAL REPORT 2023

Safety Investigation Authority

FINLAND

PREFACE TO REPORT

This is the annual report of the railway sector of the Safety Investigation Authority, Finland (SIAF) for calendar year 2023.

National investigation ID

From the beginning of the year 2012, the identifying of accident investigation reports has been changed.

The new identifier

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 accident category (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 theme investigation (safety study).

The old identifier

Terms used in this report:

Investigation categories	
A-investigation	Major accident
B-investigation	Accident or serious incident
C-investigation	Incident, damage or minor accident
D-investigation	Other incident
S-investigation	Safety study

Investigation identifier:

Each investigation is designated by an identifier that consists of four parts, such as A1/1998R. The first part refers to the investigation category (A, B, C, D or S). The second part is a sequence number referring to the order of the accident within its accident category in the year in question.

The third part refers to the year of the accident. The fourth part indicates the accident category (L, R, M or Y). E.g. A1/1998R refers to the first major railway accident investigation in 1998.

CONTENTS

1 INTRODUCTION TO INVESTIGATION AUTHORITY

1.1 Legal Basis

The SIAF was founded in 1996 and 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 or incidents to be investigated jointly 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 arranged and managed. If necessary, the investigation also examines possible defects in the provisions and orders regarding safety and the authorities. The goal of 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. The SIAF does not, in general, investigate accidents and incidents that are caused deliberately or are the result of an offense.

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

implementing the critical changes needed to prevent future accidents and incidents from occurring.

The SIAF monitors the implementation of recommendations. The purpose of 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. Other authorities and agencies are responsible for that task.

Task of Safety Investigation Authority

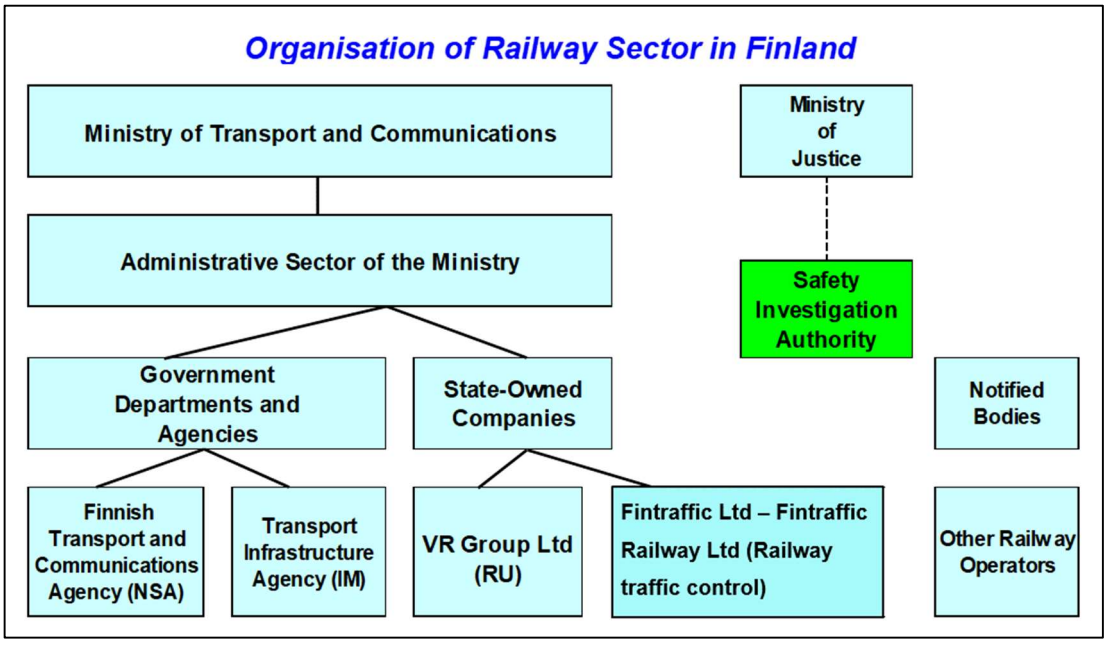
The Safety Investigation Act (525/2011) defines the task and the mandate of The SIAF. The Safety Investigation Act of Finland provides for the types of accidents and incidents investigated by the Authority and how they are investigated.

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

- ensures 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.
- 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 accident**, 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 accident** as specified in Article 3 of the Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety.
  - **train collision** (with another train, a shunting unit or an object or obstacle within the clearance gauge) or **derailment**, 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 accident with similar consequences, which has an obvious impact on railway safety (safety regulation or safety management)
    - level crossing accident, 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.
    - **accident 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

A 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 in particular, 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 about the investigation of road and off-road accidents, 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. The summary is not the same things as the first section 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 processed in separate *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, SIAF's operations were peer reviewed in 2023. The questionnaire was answered during summer and peer review team visited SIAF in 14.-15.11.2023. Final report was published 22.2.2024. Report is publicly available on ERA NIB Network webpages.

4 INVESTIGATIONS

4.1 Overview of investigations completed in 2023, 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	0	0	0	0	0
Derailments	0	0	0	0	1
Level crossing accidents	0	0	0	0	1
Other	0	0	0	0	2

4.2 Investigations completed and commenced in 2023

Investigations completed in 2023

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Completed (date)
N/A	N/A	N/A	

Investigations commenced in 2023

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis
20.9.2023	R2023-01 Collision of two goods trains in Tampere on 20 September 2023	I (2) (c)
30.11.2023	R2023-02 Derailment of a freight train that occurred in Tampere on 30 November 2023.	I (2) (c)

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 2023

Safety Studies completed in 2023

Date of commission	**Title of the Study** (Occurrence type, location)	**Legal basis**	**Completed** (date)
30.6.2021	R2021-S1 Themed investigation into accidents and incidents occurring in urban rail traffic	II (2) (a,b)	20.6.2023

Safety Studies commenced in 2023

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 2023

R2021-S1

Themed investigation into accidents and incidents occurring in urban rail traffic

The objective of the investigation was to examine the current safety status of the urban rail traffic.

The investigation examined statistics on tram traffic from 2021 and metro traffic from 2020 to 2021, compiled on the basis of deviation reports from urban rail traffic operators. The investigation also covered accidents and incidents in metro and tram traffic during the investigation period, from 1 January 2022 to 30 June 2022, and provided examples on urban rail traffic accidents and incidents. The investigation made use of legislation, regulations and guidelines on urban rail traffic. Safety recommendations were prepared based on the investigation results.

Metro and tram traffic are often considered a single mode of transport. They are fundamentally different, however, and simply because of the operating environments, the development of their safety requires different indicators and targets.

In metro traffic, unauthorised access to the tracks was the most common risk factor. There is unobstructed access to the tracks at the stations, and the current control-based procedure is insufficient. Another significant finding was the need to use the exception signal almost daily due to faults. When the exception signal is used, some of the safety systems are bypassed.

In both metro and tram traffic, there were situations where doors opened on the wrong side of the carriage, exposing the passengers to danger. This has not been prevented by technical means in the entire rolling stock. Several recurring clusters of faults involving switches and signalling systems, for example, were observed in the metro and tram traffic in Helsinki. Due to the nature of the notification system, the safety implications of recurring faults may be overlooked.

A significant number of minor accidents and incidents takes place in tram traffic. Typically, other road users are unaware of the seriousness of the tram traffic accident risks or fail to abide by the regulations. However, the damage is limited in most cases due to the relatively low speeds in tram traffic.

To avoid accidents and incidents and to improve the safety of urban rail traffic, the Safety Investigation Authority recommends that:

1. *Metropolitan Area Transport Ltd investigate solutions to boost monitoring and prevent unauthorised access to the track area.*

2. *Metropolitan Area Transport Ltd investigate the possibility of preventing the opening of doors from the wrong side by technical means in both metro and tram rolling stock.*

3. *Metropolitan Area Transport Ltd develop the safety equipment of the metro network for monitoring that the tracks are clear so that the need to use an exception signal is reduced.*

4. *Cities with tram traffic take the special characteristics of tram traffic into account in the de-sign of streets and pedestrian and bicycle routes and aim to design traffic arrangements so that they will guide other road users to act safely and in accordance with the regulations.*

5. *The Finnish Transport and Communications Agency ensure that the operators distinguish safety-related issues clearly from defect notifications in the notification and processing procedures for deviations in urban rail traffic, and that safety deviations are systematically processed and analysed.*

6. *The Finnish Transport and Communications Agency specify safety targets and monitoring methods for metro and tram traffic.*

4.5 Comment and introduction or background to investigations

Investigations commenced in 2023 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 2019–2023)

Rail investigations in 2019–2023

Accidents investigated		2019	2020	2021	2022	2023	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	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	1	1	0	**2**
	Involving dangerous goods[1]	0	0	0	0	0	**0**
Other accidents (Art 20.2) + (Art 22.6)	Train collision	1	0	0	0	1	**2**
	Train collision with an obstacle	0	0	0	0	0	**0**
	Train derailment	1	0	2	1	1	**5**
	Level crossing accident	0	0	1	1	0	**2**
	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	1	0	**1**
	Accidents or incidents in shunting work	7[2]	6[2]	0	0	0	**13**
TOTAL		**9**	**7**	**4**	**4**	**2**	**26**

4.7 Preliminary investigations

The Safety Investigation Authority has conducted in compliance with section 8 of the Safety Investigation Act (525/2011), preliminary investigations. The SIAF has decided on the basis of a preliminary investigation, that the special characteristics of the case do not require a full investigation. The report on the preliminary investigation is sufficient to yield desired safety advantages. The events leading to the accident and immediate and indirect causes of the accident/incident are described briefly in the report on the preliminary

[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.

investigation. The reports on preliminary investigations are published in Finnish and Swedish.

In 2013 we started to publish reports of preliminary investigations on the SIAF web pages. In 2017 we developed a new layout of the report. Layout was updated in 2022 and reports have been published in html-format since then. Preliminary investigations have been found to be very cost effective in improving safety.

During the year 2023 SIAF published two preliminary investigation reports of rail occurrences:

1. **R2023-E1 Derailment of an empty tank wagon at Varkaus 14.12.2022 and previous similar incidents in the area.** Report was published 12.9.2023.
    - Focus on maintenance of privately owned tracks, especially verifying that track geometry is within tolerances.
2. **R2023-E2 Fire in a freight wagon of a historical train north of Haarajoki 11.6.2023.** Report was published 30.6.2023.
    - Focus on effects of historical traffic to regular traffic.
    - Importance of proper maintenance to fire safety of steam locomotives.

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

In 2023 occurred a total of 13 level crossing accidents. Four persons were fatally injured in the accidents, two injured seriously and seven injured slightly. Of the fatal accidents, two involved a passenger car, one a bicyclist and one a pedestrian.

The road accident investigation team investigated the four fatal level crossing accidents. Below are short summaries of these four fatal accidents.

1. Fatal level crossing accident in Hyvinkää on 16th of June 2023

On Friday 16th of June 2023 at 14.25, a level crossing accident involving a bicyclist and a freight train occurred on the Mäkelä unprotected level crossing.

A 15-year-old boy was on his way home that was located 270 m from the level crossing. At the same time a freight train was approaching the level crossing from north. The boy rode his bicycle directly in front of the train in the level crossing. Train driver used whistle and applied emergency brake, but the distance was too short. Train collided with the bicyclist at the speed of 77 km/h. Bicyclist died immediately.

The direct cause (*the key event*[3]) was that the person did not notice the approaching train and rode directly into level crossing.

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

Background risk factors[4]:

- Bicyclist used headphone and was listening to music while riding. This prevented him from hearing train whistle.
- Visibility from the level crossing to the direction where train was coming is limited.
- Also, visibility from locomotive to the direction where bicyclist came is limited.

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

- More education in situational awareness in traffic and effects of using headphones.
- Traffic education in schools.
- Equipping the level crossing with warning devices and barriers.
- Improving visibility in level crossings.

2. Fatal level crossing accident in Laihia on 31st of October 2023

On Tuesday 31st of October 2022 at 13.10, a level crossing accident involving a pedestrian and a passenger train occurred on the Maunulanraitti level crossing that is equipped with warning devices and half barriers.

An elderly person had left for Nordic walking from her home that is located 300 meters from level crossing. She walked past the barriers and directly on the tracks. At the same time an intercity passenger train was approaching the level crossing. Train driver did not have time to brake or use whistle. Train collided with the pedestrian at the speed of 118 km/h. Pedestrian died immediately.

The direct cause (*the key event*) was that the person did not notice the approaching train and walked past the barriers directly in front of the train.

Background risk factors:

- The pedestrian had memory illness that included momentary losses of situational awareness.

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

- Replacing the level crossing with tunnel.
- Regular monitoring of diagnosed illnesses.
- Using escorts for walks of persons with memory illnesses.

3. Fatal level crossing accident in Lieksa on 1st of November 2023

On Wednesday 1st of November 2023 at 12.12, a level crossing accident involving a passenger car a locomotive occurred on the Laplahdentie level unprotected level crossing.

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

A driver was driving a passenger car on a public road towards west. When approaching the level crossing, she slowed down but did not stop. She accelerated to the tracks at the same time a locomotive was approaching the level crossing at the speed of 100 km/h. Locomotive driver noticed that the driver of the car did not at all to the left where locomotive was approaching. Locomotive hit the front left corner of the car. Car was thrown 12 meters from the track. Driver of the car did not use seat belts, so she was thrown out of the car and died immediately.

Car was destroyed in the collision. Front corner of the locomotive suffer minor damage.

The direct cause (*the key event*) was that the car drove into the level crossing while train was approaching. It is possible that the driver did not see the train because she was looking the other way when driving into level crossing. Train driver did not have time to prevent the collision.

Background risk factors:

- Visibility in the level crossing is limited to the direction of the train.
- Car driver did not follow the STOP-sign in level crossing.
- Driver did not use seat belt. Use of seat belt could have saved her life in the collision.

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

- Equipping unprotected level crossings with warning signals or barriers
- Improving visibility in level crossings.
- Education to road users about dangers of level crossings.
- Instructions to train drivers to use whistle and apply emergency brake immediately the see traffic in level crossing.

4. Fatal level crossing accident in Nakkila on 11th of December 2023

On Monday 11th of December 2023 at 9.28, a level crossing accident involving a passenger car and a passenger train occurred on the Tynikurkela unprotected level crossing.

An elderly driver was driving a passenger car on a private road towards level crossing. At the same time an intercity passenger train was approaching the level crossing at the speed of 120 km/h. According to train driver, the car stopped just before the level crossing but as the train was approaching the car drove slowly forward and stopped right in the middle of the tracks. Train driver used whistle and applied emergency brake, but the distance was too short. Train collided the right side of the car at the speed of 110 km/h. Train dragged the car for 320 meters before stopping. Driver of the car died instantly. He was not wearing seat belt, but due to the severity of the impact, it would not saved him.

The car was completely destroyed. Front end of the locomotive suffered minor damage,

The direct cause (*the key event*) was that the car drove into the level crossing while train was approaching. It is possible that the driver did not see the train because he was

focused in handling of the car in winter conditions Train driver did not have time to prevent the collision.

Background risk factors:

- Car driver had health issues that could have hindered his abilities to make observations and actions.
- The oncoming train may have shocked the car driver so that he stopped on the tracks.
- White and green trains are difficult to observe in snowy conditions.
- Level crossing did not have warning devices or barriers.
- Level crossing did not have waiting platforms.

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

- Equipping unprotected level crossings with warning signals or barriers
- Improving visibility of trains.
- Adding waiting platforms to level crossings to make it easier for car drivers to stop and make observations before entering level crossing.

5 RECOMMENDATIONS

5.1 Short review and presentation of recommendations

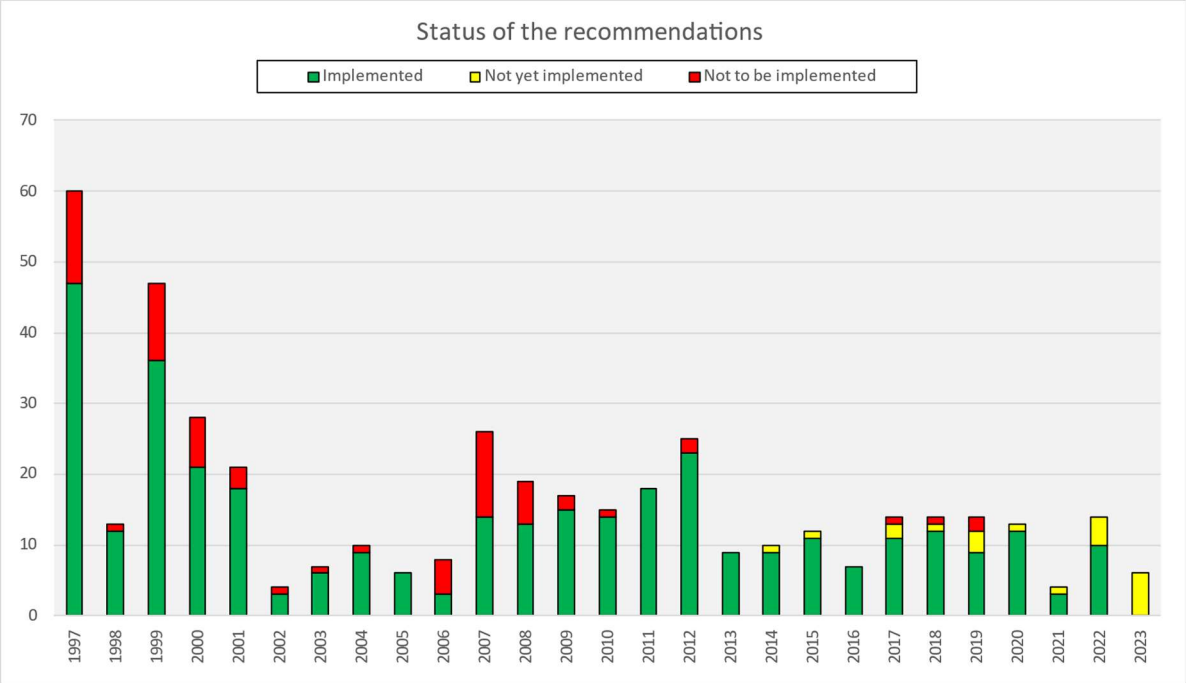
Implementation of recommendations during 2009–2023

Recommendations issued		Recommendation implementation status					
		Implemented		In progress		Not to be implemented	
Year	[No.]	[No.]	[%]	[No.]	[%]	[No.]	[%]
2009	17	15	88,2	0	0,0	2	11,8
2010	15	14	93,3	0	0,0	1	6,7
2011	18	18	100,0	0	0,0	0	0,0
2012	24	22	91,7	0	0,0	2	8,3
2013	10	10	100,0	0	0,0	0	0,0
2014	10	8	80,0	2	20,0	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	11	78,6	2	14,3	1	7,1
2019	14	9	64,3	3	21,4	2	14,3
2020	13	11	84,6	2	15,4	0	0,0
2021	4	3	75,0	1	25,0	0	0,0
2022	14	5	35,7	9	64,3	0	0,0
2023	6	0	0,0	6	100	0	0,0
TOTAL	**192**	**163**	**84,9**	**20**	**10,4**	**9**	**4,7**

Changes in implementation statuses of recommendations during 2023 are described in detail in Annex 1.

A total of 441 recommendations have been issued from 1997 through 2023. According to information available on 17th May 2024, 351 (79.6 %) recommendations were implemented. On 70 (15.9 %) issued recommendations, the SIAF received a reply stating that they would not be implemented.

From 2009 through 2023 a total of 192 recommendations have been issued. 163 (84,9 %) have been implemented. On 9 (4.7 %) issued recommendations, the SIAF received a reply stating that they would not be implemented. 20 (10.4 %) are currently under implementation.



5.2 Recommendations 2023

2023-S8 Trespassing on metro tracks

In metro traffic, the most common threat to safety is trespassing on the tracks. Common reasons for trespassing on the tracks is often taking a shortcut or the retrieval of an object that has fallen on the tracks. Station areas do not contain technical solutions that prevent people from trespassing on the tracks. Unrestricted access to the tracks also makes vandalism possible.

The Metro organisation has tried to manage the problem through monitoring. However, based on the investigation, this is not sufficient to prevent trespassing on the tracks.

The Safety Investigation Authority recommends that:

Metropolitan Area Transport Ltd investigates solutions to intensify monitoring and prevent unauthorised access to the track area [2023-S8]

Platform doors preventing access to the track have been tested at Helsinki metro stations. However, they were dismantled at the end of the automatic metro project. Similar solutions are in use at metro stations in several cities. Solutions based on different technologies, such as light curtains, have also been introduced in recent years.

2023-S9 Opening of passenger doors in metro and tram traffic

Hazards occur in both metro and tram traffic when the driver opens the doors of the metro train or tram on the wrong side. Opening of the doors on the wrong side has not been

technically prevented in all respects. These situations always pose a risk of serious danger: in the metro, passengers may fall onto the track next to a live conductor rail, and in tram traffic, passengers step directly into traffic.

The Safety Investigation Authority recommends that:

Metropolitan Area Transport Ltd investigate the possibility of technically preventing the opening of doors on the wrong side of the metro and tramway fleet. [2023-S9]

The risk of opening doors on the wrong side also applies to railway rolling stock. Therefore, the potential technical solutions should be introduced in all railway rolling stock as far as possible.

2023-S10 Monitoring the occupancy of the metro tracks

In metro traffic, an exception signal is often used to manage disruptions. Typically, the cause is a fault in the track circuit, i.e. a fault in the monitoring of track occupancy.

When an exception signal is used, some of the safety systems are bypassed and the safety level is reduced.

The Safety Investigation Authority recommends that:

Metropolitan Area Transport Ltd develop safety devices for the metro network in terms of monitoring track occupancy so that the need for an exception signal is reduced. [2023-S10]

2023-S11 Coordination of tram traffic with other traffic

Even though few serious accidents occur in tram traffic, a significant number of smaller bumps and near misses with vehicles and pedestrians are reported. These incidents are particularly common with vehicles at intersections and with pedestrian and bicycle traffic in the vicinity of stops. In most cases, other road users are not aware of the seriousness of the risks of tram traffic accidents and break traffic rules in some way.

The consequences of the accidents are usually minor, mainly due to the low speeds currently used in tram traffic. As light rail becomes more common, speeds in tram traffic will increase significantly in the near future. It is likely that the other road users will not change their behaviour as the speeds of tram traffic increase. The increase in speeds increases the likelihood of serious accidents.

The Safety Investigation Authority recommends that:

When planning streets and pedestrian and cycle paths, cities with tramways take into account the special features of tram traffic and strive to plan traffic arrangements so that they guide other road users to act safely and in accordance with the rules. [2023-S11]

Examples of such design solutions include solutions to prevent turning in front of a tram, and the design of stops to prevent passengers from crossing tramways after leaving the tram car.

2023-S12 Processing and analysis of fault and deviation reports

The ways in which urban rail transport organisations handle deviations and manage the identified risks differ from each other. Especially in Helsinki, the system designed for reporting deviations is also used for reporting general maintenance needs and faults. Other reports are made many times more often than safety incidents, and the processing of reports continually ties up a lot of resources.

If safety deficiencies are not clearly distinguished from other notifications, there is a risk that they will not be detected. There is also a risk that safety incidents will become more commonplace and that any systematic risks behind them will not be identified.

The Safety Investigation Authority recommends that:

The Finnish Transport and Communications Agency ensure that, in the procedures for reporting and processing deviations in urban rail traffic, operators clearly distinguish safety-related matters from fault notifications and that safety deviations are systematically processed and analysed. [2023-S12]

Fault analysis should also be developed further. In metro and tram traffic systems, several repeating fault clusters were observed in, for example, turnouts, signalling systems and rolling stock doors. By analysing faults and their frequency, safety can be improved and the reliability and functionality of traffic can be improved.

2023-S13 Setting and monitoring safety targets for urban rail transport

Urban rail transport is a new field of activity for the supervisory authority. Partly for this reason, the supervisory authority has so far not intervened in the development of operators' safety management systems or the safety situation in the sector in general. The authority has not prepared safety performance indicators, nor does it systematically monitor the safety situation and deviation reports submitted by transport operators.

Defining and monitoring safety performance indicators lays the foundation for safety work in the sector.

The Safety Investigation Authority recommends that:

The Finnish Transport and Communications Agency define safety targets and their monitoring methods for metro and tram traffic. [2023-S13]

Based on the investigation, metro and tram traffic cannot be treated as a single entity due to their technical and operational differences and, in particular, differences in operating environments. For example, tram traffic has many characteristics of road traffic. For this reason, metro and tram traffic require different safety performance indicators.

ANNEX 1: Changes in implementation statuses of previous recommendations during 2023 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 2023: 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 2023: 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 2023: 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 2023: 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.