NIB ANNUAL REPORT 2020

Safety Investigation Authority

FINLAND

PREFACE TO THE REPORT

This is the annual report of railway sector of the Safety Investigation Authority, Finland for calendar year 2020.

National investigation ID

From the beginning of 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
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 the accident category (L, R, M, Y 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.

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 THE INVESTIGATION AUTHORITY

1.1 Legal Basis

The Safety Investigation Authority, Finland was founded in 1996 in connection with the Ministry of Justice. The tasks of the Safety Investigation Authority are specified in the relevant national Finnish act (Safety Investigation Act 525/2011, updated 187/2019), and they also include overall directions on the methods and powers implemented in an investigation. In Finland the Safety Investigation Authority is a multimodal investigation authority, which investigates aviation, maritime, rail and other 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 current Safety Investigation Act is in harmony with to 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.

Safety investigation is conducted by the Safety Investigation Authority, Finland (SIAF). Safety investigation examines the course of events related to the accident or incident, their causes and consequences, and the search and rescue actions as well as the actions taken by the 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, manufacture, 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 the 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 making the decision on whether to start a safety investigation, the seriousness of the incident and the probability that it will recur is taken into account. An incident or hazard with only minor consequences should be investigated if it causes a danger to several people and it is judged that the investigation will generate information that is significant in improving general safety and preventing accidents. The Safety Investigation Authority does not normally investigate incidents that have been caused deliberately or occur as a result of an offence.

The end result of a safety investigation is an investigation report. At the end of the report, there are safety recommendations addressed to the appropriate authorities and other agencies. The safety recommendations summarise the views of investigators on how similar accidents and incidents can be avoided in the future. The Safety Investigation Authority monitors that recommendations are implemented. The purpose of safety investigation

is to promote general safety, prevent further accidents and incidents, and prevent losses caused by the accidents.

Safety investigations are not conducted to allocate legal liability. Other authorities and agencies are responsible for that task.

Task of Safety Investigation Authority

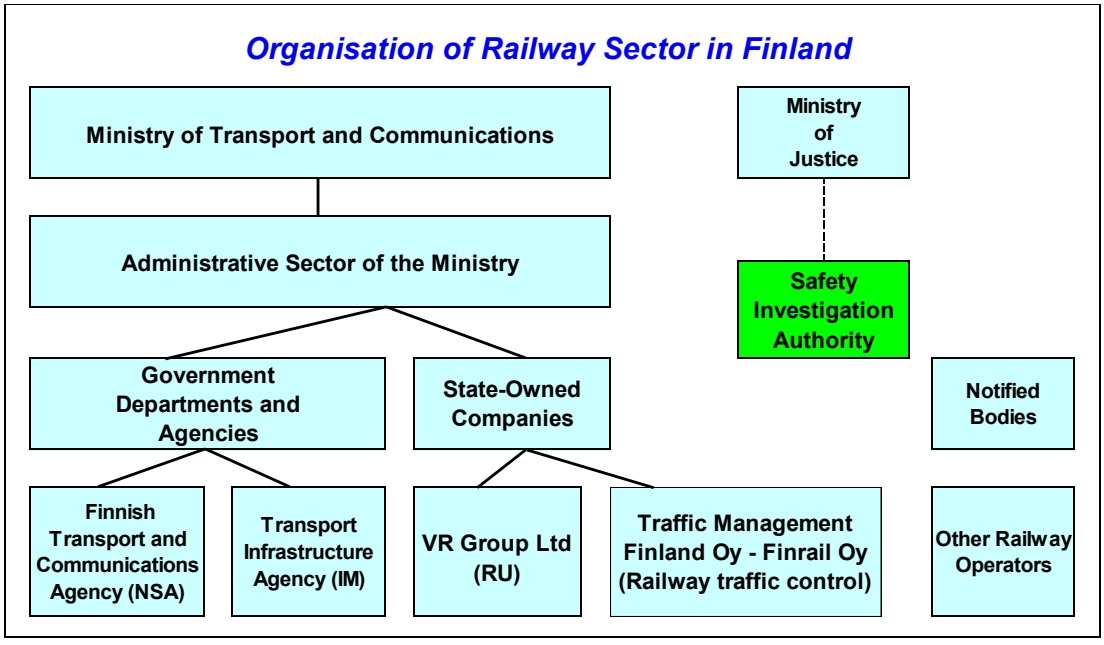
The Safety Investigation Act (525/2011) defines the task and the mandate of the Safety Investigation Authority. The Safety Investigation Act of Finland provides for the types of accidents and incidents investigated by the Safety Investigation Authority and how they are investigated.

The task of the Safety Investigation Authority 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 Safety Investigation Authority

- ensures the general organisation, planning, guidance, provision of information, and supervision of the safety investigation
- trains persons suitable to be investigators
- maintains readiness to quickly initiate an investigation
- attends international cooperation forum 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 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 (**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 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 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 type of accident
- and **any similar accident in private or public rail traffic**
  - metro accident
  - tramway accident.

A serious incident and another 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 Safety Investigation Authority, Finland can investigate all rail accidents. Those investigations are independent, and reports are public. According to The Rail Transport Act (1302/2018) the Finnish Transport and Communications Agency can investigate those occurrences SIAF does not investigate. Investigation reports 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 cross-country traffic accidents, 24/2001, since 1.1.2017 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 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 that what has been told above about the investigation of road and off-road accidents, we would like to mention, that SIAF can investigate any accident which has taken place in Finland, including road and off-road accidents. When SIAF has initiated an investigation, another authority or instance that has initiated its safety investigation shall transfer to SIAF the investigation materials that it has compiled. SIAF has investigated about 80 level crossing accidents and made four safety studies on level crossing accidents.

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

Investigation reports of the Safety Investigation Authority Finland are issued following the structure, as closely as possible, adapted to the type and seriousness of the accident or incident.

Summary, Conclusions and Safety Recommendations are written in a second official European language (in English and in Swedish). These translations are available the same time we publish the investigation report.

We send the investigation report in our national language and the translated parts of it in English to the Agency in a digital format immediately after when the report has been published (at the latest within 7 days).

How “The structure to follow on the reporting” in the appendix has been followed in our investigation reports and where are the matters of the section in question found from in our reports:

1. Summary

We make the summary of every investigation reports. The matters which have been presented in the appendix have been dealt with in the report. The summary is not section 1st in the report but we publish it separately.

2. The 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 also are 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 INVESTIGATIONS

3.1 Overview of investigations completed in 2020, identifying key trends

Type of accidents investigated	Number of accidents	Number of victims		Damages in € (approximation)	Trends in relation to previous years
		Deaths	Seriously Injured		
Collisions	1	0	0	100 000	
Derailments	0				
Level crossing accidents	0				
Other	0				

3.2 Investigations completed and commenced in 2020

Investigations completed in 2020

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Completed (date)
9.12.2019	Collision of a freight train with a track-work machine between Puhos and Kesälahti on 9 December 2019	I (2) (a)	11.8.2020

Investigations commenced in 2020

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis
14.5.2020	Level-crossing accident in Mänttä-Vilppula on 14 May 2020	I (1)

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 effected 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.

3.3 Safety Studies completed and commenced in 2020

Safety Studies completed in 2020

Date of commission	**Title of the Study** (Occurrence type, location)	**Legal basis**	**Completed** (date)
1.9.2019	Theme investigation on shunting accidents and incidents	I(2)(b)	22.9.2020

Safety Studies commenced in 2020

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

3.4 Summaries of investigations completed in 2020

R2019-01

Collision of a freight train with a trackwork machine between Puhos and Kesälahti on 9 December 2019

On Monday 9 December 2019 at 3:00 pm, a freight train travelling from Joensuu to Kouvola collided with a drilling machine used to take soil samples on the track between Kesälahti and Puhos. The site of the accident is located 15 kilometres south from the Kitee railway station.

The drilling machine operator was operating the machine standing sideways with the back towards the direction of the freight train. The drilling machine operator happened to look back and saw the lights of the approaching train. The operator warned the person taking the soil samples at the site, who moved to safety on the eastern side of the track. The drilling machine operator placed a beam against the rails in order to reverse the machine off the rails to the western side of the track. While the operator was reversing the drilling machine off the rails, the machine turned sideways, at which time the engine driver perceived the machine and the two persons. The engine driver gave a sound signal and braked. The speed of the train was 62 km/h at the time. The drilling machine was already almost completely off the rails, when the front corner of the locomotive hit the machine's front left corner at a speed of 30 km/h.

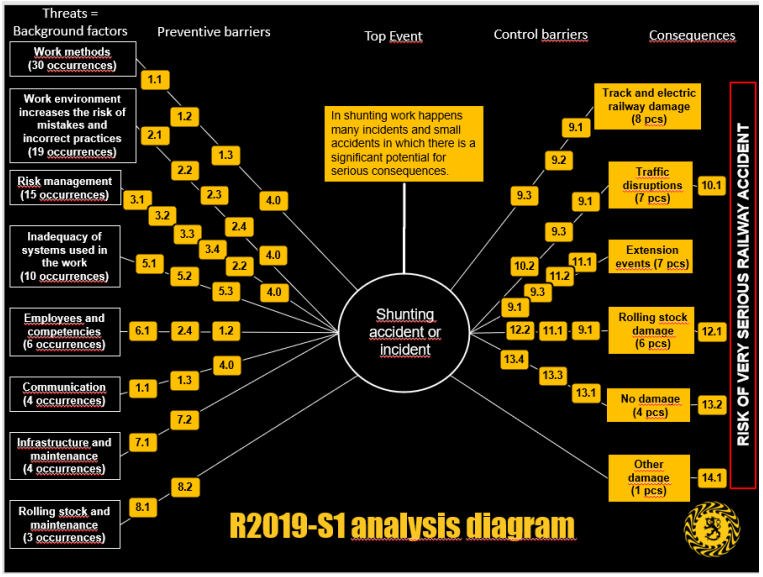
No one was injured, but the drilling machine was badly damaged and the corner of the obstruction clearing device of the locomotive suffered damage. The rail and the track equipment did not suffer damage. The total costs caused by the accident were around €100 000. Train traffic at the site of the accident was interrupted for approximately 50 minutes.

The trackwork supervisor had submitted a trackwork notification for the wrong section of line by mistake. The trackwork supervisor did not use the GPS feature of the RUMA application (RUMA - mobile platform for trackwork contractor), and centralised traffic control did not check that GPS positioning was used. The accuracy of GPS positioning would have been enough to locate the trackwork in the right area. The trackwork supervisor had not checked the location based on track elements or location markers before going on the track, either. Neither did the traffic controller use them to confirm the location of trackwork during voice communications.

The map in the RUMA system does not support the identification of the trackwork site on sections of line in particular. The traffic controllers must use several different information systems and their maps. The systems do not exchange information with each other. There are general deficiencies in the training and competence related to locating trackwork, and the trackwork supervisors do not take full advantage of the features of the RUMA application.

In order to avoid similar accidents in the future, the Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensure that:

1. *The Finnish Transport Infrastructure Agency orders the use of GPS positioning to be mandatory in locating trackwork.*
2. *The Finnish Transport Infrastructure Agency harmonises the location instructions for the railway network so that location markers are used in addition to the track elements in the voice communications between centralised traffic control and the trackwork supervisor, if necessary.*
3. *The Finnish Transport Infrastructure Agency harmonises the maps used for locating trackwork.*
4. *The Finnish Transport Infrastructure Agency emphasises competence assurance in auditing the training of trackwork companies.*



R2019-S1

Theme investigation of shunting accidents and incidents

The investigation was undertaken because of the large number of accidents and incidents occurring during shunting operations. Another factor behind the investigation was the large number of shunting operators and infrastructure managers. The objective of the investigation was to gather detailed information on shunting accidents and incidents and use this information to identify safety defects that could be addressed to improve the safety of shunting work.

The investigation studied shunting accidents and incidents that occurred between 1 January 2019 and 30 April 2020. The events were divided into seven categories: collisions, derailments, signal passed at danger (SPAD), incorrect route, forcing a point open, runaway of wagons, and other shunting accidents and incidents. The shunting accidents and incidents reported to the Safety Investigation Authority were entered into a table according to the type of the event. Thirteen accidents

and incidents from the period 1 September 2019 to 30 April 2020 were selected for more detailed investigation, and brief individual investigation reports were prepared for each of them. Determining what impact the involved individuals as well as the activities and safety management of organizations had on the cases was a key part of the study.

When the facts had been collected, an analysis event was held in which the investigation team sought to identify the background factors of shunting accidents and incidents. The cases were analysed with the Bowtie method. There were two objectives to the analysis: Firstly, the background factors related to the cases were compiled in a structured manner according to their nature, as well as the solutions that could have prevented the accident or incident. Secondly, the consequences of the cases were examined, along with how they could have been managed. Then key factors were identified based on the analysis and conclusions drawn from them. Finally, the investigation team drew up safety recommendations that could be implemented to improve the safety of shunting work.

The following conclusions were made:

1. Rushed work and assumptions decrease the safety of shunting work and can lead to neglecting to keep a lookout or check the actual state of things.
2. Self-direction, the requirements of planning your own studies, and the assimilation of information and verification of competence are emphasized in online training.
3. Not enough attention has been paid to the lighting of railway yards and rolling stock. Obsolete lights should be replaced with new energy-efficient technologies.
4. The visibility of track signs needed during shunting work is poor, especially in artificial light, so their colours can be confused with each other.
5. Deviation reports will only be filed if they are processed quickly, feedback is given and corrective measures are implemented. The boundaries between operators should not prevent the correction of shortcomings in safety.
6. It is crucial to take all operators and user groups, as well as the mutual effects of the changes on each other, into account when making changes.
7. Shunting instructions and the supervision of their compatibility are currently not sufficient in a multi-operator environment.
8. Standardized communications and a culture of asking questions have been neglected in the railway industry. They are vital for safety, especially in uncertain situations. Old practices die hard.
9. Not enough attention has been paid to the compatibility and usability of railway information systems. Technical regulations to ensure the compatibility of systems are insufficient in the industry.
10. Traffic control is largely organized according to the needs of train traffic, and shunting work is viewed as a support function. This can lead to overlooking the safety aspects of shunting.
11. The annual financial impact of shunting accidents is significant because of the large number of annual incidents.
12. The threshold for making railway emergency calls is still too high.

In order to avoid accidents and incidents in the future, the Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

1. *Railway training institutions, infrastructure managers and railway operators develop their online training in order to ensure the assimilation of the required information and the professional competence of employees taking the courses.*
2. *Infrastructure managers improve the lighting of railway yards with modern technology.*
3. *Railway operators improve the lights of locomotives used for shunting with modern technology.*
4. *The Finnish Transport Infrastructure Agency reviews track signs and ensure their visibility and unambiguity.*
5. *The Finnish Transport and Communications Agency develops its safety deviation information system so that it can be used to follow the processing of deviations. Furthermore, the Finnish Transport and Communications Agency ensures that all operators in the railway industry have functional deviation management processes.*
6. *The Finnish Transport Infrastructure Agency assumes overall responsibility for shunting work instructions in Finland by supplementing the Train Traffic and Shunting Safety Guidelines document in this regard. Operators can only be permitted to have supplementary local guidelines drawn up in cooperation with other operators.*
7. *The Finnish Transport Infrastructure Agency and railway operators improve the interoperability and usability of their information systems.*
8. *The Finnish Transport Infrastructure Agency implements technical safeguards for protecting routes from traffic entering from class 2 traffic control areas.*
9. *The Finnish Transport Infrastructure Agency, Finrail Oy, railway industry training institutions, railway operators and infrastructure managers stress the importance of making railway emergency calls in their basic and refresher training.*

3.5 Comment and introduction or background to the investigations

Investigations commenced in 2020 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)**

3.6 Accidents and incidents investigated during last five years (in 2016–2020)

Rail investigations in 2016–2020

Accidents investigated		**2016**	**2017**	**2018**	**2019**	**2020**	**TOT**
Serious accidents (Art 20.1)	Train collision	0	0	0	0	0	**0**
	Train collision with an obstacle	1	0	1	0	0	**2**
	Train derailment	0	0	0	0	0	**0**
	Level crossing accident	1	1	1	0	1	**4**
	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	1	0	1	**2**
Other accidents (Art 20.2) + (Art 22.6)	Train collision	1	0	0	1	0	**2**
	Train collision with an obstacle	1	0	0	0	0	**1**
	Train derailment	1	0	0	1	0	**2**
	Level crossing accident	0	0	0	0	0	**0**
	Accident to person caused by RS in motion	1	0	0	0	0	**1**
	Fire in rolling stock	0	0	0	0	0	**0**
	Involving dangerous goods[1]	1	1	0	1	0	**3**
	Incidents in train traffic	0	0	0	0	0	**0**
	Accidents or incidents in shunting work	1	2	0	7[2]	6[2]	**16**
TOTAL		**7**	**3**	**2**	**9**	**7**	**28**

3.7 Preliminary investigations

The Safety Investigation Authority has made, 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 the starting of the full investigation, but the report on the preliminary investigation is sufficient from the point of view of the safety advantage to be obtained. In the report is described briefly the events which have led to the accident and the immediate and indirect causes, which have been found in the preliminary investigation. In the reports there are

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

not issued recommendations, but observations and suggestions for the measures to the actors. The reports are published only in Finnish.

In 2013 we started to publish reports of preliminary investigations on the SIAF internet pages. In 2017 we developed a new layout of the report.

During the year 2020 SIAF didn't publish any preliminary investigation reports of rail occurrences.

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

In 2020 occurred a total of 26 level crossing accidents, three of them were fatal. Three persons injured fatally in the accidents, two injured seriously and nine injured slightly. The road accident investigation teams investigated the fatal level crossing accidents happened to a vehicle. Below short summaries of the accidents happened to vehicles.

1. Fatal level crossing accident in Mustasaari on 31 March 2020

On Tuesday, 31 March 2020, a level crossing accident involving a private car and a passenger train occurred on the Tuovila level crossing in Mustasaari. Speed of the train was 120 km/h and speed of the car was about 20 km/h. The level crossing was active, automatic with user side protection, equipped with half-barriers. The accident was fatal to the car driver. The car was wrecked beyond repair. The steering car of the train sustained damages in front of the car and to one side door. Pole of electric railway and barrier were damaged.

The direct cause (*the key event*[3]) of the accident was that the car driver drove through the barrier and stopped onto the level crossing in front of the train coming from the left.

The car driver may have misjudged the stopping distance in the prevailing conditions and because of the unexpectedness of the event was not able to prevent damage. (*immediate risk factors*[3]).

Background risk factors[3]:

- the car driver got in panic when driving through the barrier and went on braking which caused stopping on the track
- the level crossing was familiar to the car driver, and that's why did not pay attention to the descending barriers early enough
- it was snowing heavily.

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

- Even at a familiar level crossing train traffic should be followed carefully.
- Lights of the warning devices of level crossings to be changed more efficient, so that they also are seen in bad conditions.
- The traffic sign which warns of the level crossing should be equipped with a yellow flashing light which will be activated when the red lights begin to flash.

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

2. Fatal level crossing accident in Isokyrö on 25 May 2020

On Friday, 25 May 2020, a level crossing accident involving a private car and a passenger train occurred on the Pelmaa level crossing in Isokyrö. Speed of the train was 120 km/h and speed of the car was about 10 km/h. The level crossing was passive, equipped with STOP sign. The accident was fatal to the car driver. The car was wrecked beyond repair. The train sustained damages in front of the steering.

The direct cause (*the key event t*[4]) of the accident was that the car driver drove under (in font of) the train coming from the left.

The driver drove the car consciously to the situation (*immediate risk factors*[4]).

Background risk factors[4]:

- the car driver had money worries
- the car driver was drunk.

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

- Improvement of the availability of mental health services nationally and developing of the services of the low threshold.
- Removal of passive level crossings.

3. Fatal level crossing accident in Ilmajoki on 28 August 2020

On Friday, 28 August 2020, a level crossing accident involving a delivery van with trailer and a freight train occurred on the Peurala level crossing in Ilmajoki. Speed of the train was 80 km/h and speed of the van was about 20–30 km/h at the level crossing. The level crossing was passive. The accident was fatal to the van driver and the passenger of the van slightly injured. The van was damaged very badly and the trailer slightly. The train didn't sustain any damages.

The direct cause (*the key even*[4]) of the accident was that the van driver drove onto the level crossing in front of the train.

The van driver failed to notice the train approaching from the right. (*immediate risk factors*[4]).

Background risk factors[4]:

- rush hour
- attention was paid to the road traffic
- short wait platform between railway and main road; length of the vehicle combination was 14 m and space between track and road was 16 m
- the level crossing was familiar to the van driver which affected possibly to observation
- the van didn't use seat belt.

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

- The level crossing should be removed.

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

- Voice and/or light signal which warns of the disuse of the seat belt should be made mandatory to vehicles.

4 RECOMMENDATIONS

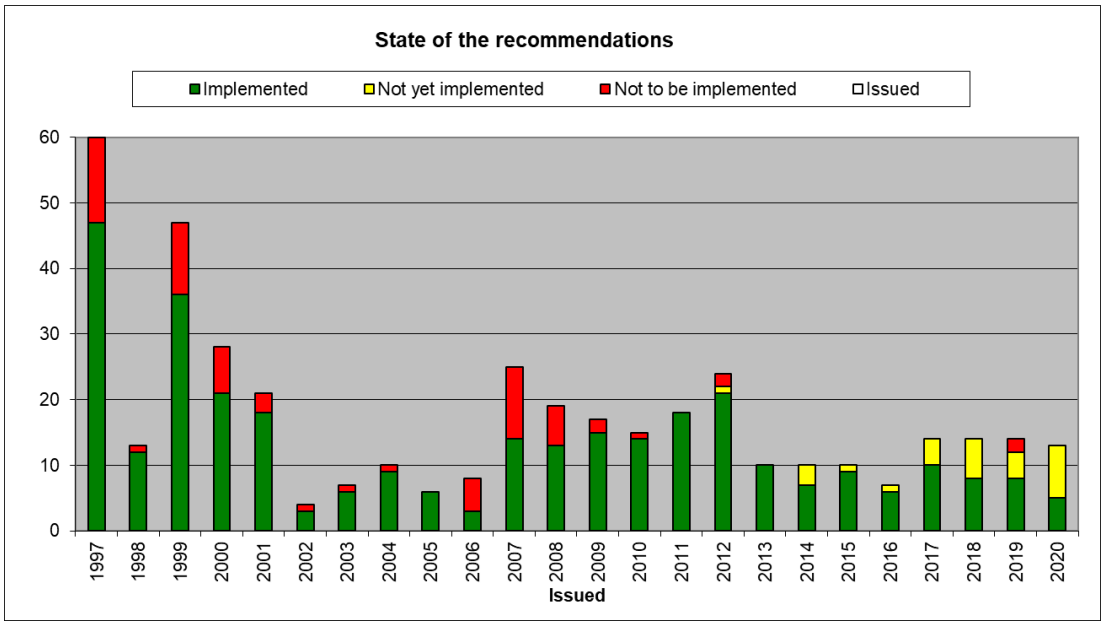
4.1 Short review and presentation of recommendations

Implementation of recommendations during 2007–2020

Recommendations issued		Recommendation implementation status					
		Implemented		In progress		Not to be implemented	
Year	[No.]	[No.]	[%]	[No.]	[%]	[No.]	[%]
2007	25	14	56,0	0	0,0	11	44,0
2008	19	13	68,4	0	0,0	6	31,6
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	21	87,5	1	4,2	2	8,3
2013	10	10	100,0	0	0,0	0	0,0
2014	10	7	70,0	3	30,0	0	0,0
2015	12	11	91,7	1	8,3	0	0,0
2016	7	6	85,7	1	14,3	0	0,0
2017	14	10	71,4	4	28,6	0	0,0
2018	14	8	57,1	6	42,9	0	0,0
2019	14	8	57,1	4	28,6	2	14,3
2020	13	5	38,5	8	61,5	0	0,0
TOTAL	**212**	**160**	**75,5**	**28**	**13,2**	**24**	**11,3**

Implementation status of recommendations, see Annex 1.

A total of 416 recommendations were issued from the beginning of 1997 until the end of 2020. According to information available at 30 March 2020, 321 (77.2 %) recommendations were implemented and 67 (16.1 %) were decided not to be implemented. Since beginning of 2007 until the end of 2020 a total of 212 have been issued. 160 (75.5 %) have been implemented, 24 (11.3 %) have been decided not to be implemented and 28 (13.2 %) are under implementation.



4.2 Recommendations 2020

S1 Clarifying the instructions on GPS positioning in the trackwork permission process

Centralised traffic control did not check that GPS positioning was used before granting a trackwork permission. In the instructions of the Finnish Transport Infrastructure Agency, the use of the GPS positioning feature has not been specified as mandatory for centralised traffic control. The accuracy of GPS positioning is enough to locate the trackwork in the right area on sections of line.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency orders the use of GPS positioning to be mandatory in locating trackwork. [2020-S19]

Centralised traffic control must always check the location of the trackwork team with GPS positioning before granting a trackwork permission.

S2 Use of location markers and track elements in the voice communications between centralised traffic control and the trackwork supervisor

The trackwork supervisor did not check the location based on track elements or location markers before going on the track. Neither did the traffic controller use them to confirm the location of trackwork during voice communications.

On sections of line, the location markers and the numbers of electric-railway poles are often the only way to confirm the location. The TURO instructions do not allow their use to state the location. Neither do the instructions require centralised traffic control to use track elements and location markers in confirming the location of trackwork. According to the rail traffic and shunting work safety rules, location markers or track elements must be used to pinpoint the location.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency harmonises the location instructions for the railway network so that location markers are used in addition to the track elements in the voice communications between centralised traffic control and the trackwork supervisor, if necessary. [2020-S24]

Using track elements and location markers would make the location of trackwork concrete. If they are not used, the voice communications between centralised traffic control and the trackwork supervisor remain too vague.

S3 Harmonising the maps

The map in the RUMA system does not support the identification of the trackwork site on sections of line in particular. The traffic controllers must use several different information systems and their maps. The systems do not exchange information with each other.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency harmonises the maps used for locating trackwork. [2020-S25]

The maps of the information system's platforms should be uniform and sufficiently accurate. They should show landmarks, such as bridges, under crossings and level crossings.

S4 Competence assurance in the trackwork training of companies

Based on the investigation, there are deficiencies in the training and competence related to locating trackwork. Not all trackwork supervisors know how to take advantage of the features of the RUMA application or understand why using them is necessary. This means that competence assurance in the trackwork training of companies has not been completely successful.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensure the implementation of the following recommendation:

The Finnish Transport Infrastructure Agency emphasises competence assurance in auditing the training of trackwork companies. [2020-S26]

For managing rail capacity, use should be made of the information held by the Finnish Transport and Communications Agency on the number of wagons in the country and rail transport operators' advance knowledge of transports.

S5 Ensuring competence and the assimilation of information in online training

Training in the use of new systems and regulations related to shunting is increasingly conducted online. This leaves the verification of competence partly at the responsibility of the students themselves. Self-direction, the requirements of planning your own studies, and the assimilation of information and verification of competence are emphasized in online training.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

Railway training institutions, infrastructure managers and railway operators develop their online training in order to ensure the assimilation of the required information and the professional competence of employees taking the courses. [2020-S27]

Self-studies must be supported with guidance in both the assimilation and application of the subject matter.

S6 Improving the lighting of railway yards

The rather poor general lighting of railway yards and the weak lights of the locomotives used for shunting work hinder keeping a lookout during shunting operations. Not enough attention has been paid to the lighting of railway yards and rolling stock. Obsolete lights should be replaced with new energy-efficient technologies.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

Infrastructure managers improve the lighting of railway yards with modern technology. [2020-S28]

The hue of the lighting must be taken into consideration in addition to the amount of light.

S7 Improving the lights of shunting locomotives

The rather poor general lighting of railway yards and the weak lights of the locomotives used for shunting work hinder keeping a lookout during shunting operations. Not enough attention has been paid to the lighting of railway yards and rolling stock. Obsolete lights should be replaced with new energy-efficient technologies.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

Railway operators improve the lights of locomotives used for shunting with modern technology. [2020-S29]

The hue of the lighting must be taken into consideration in addition to the amount of light. The use of separate work lights should be considered in addition to the locomotives' buffer lights and spotlights.

S8 Improving the clarity of railway yard signs

The poor visibility and ambiguity of track signs causes hazards during shunting work, especially in darkness or otherwise poor visibility. The visibility of track signs is poor, especially in artificial light, so their colors can be confused with each other.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

The Finnish Transport Infrastructure Agency reviews track signs and ensure their visibility and unambiguity. [2020-S30]

Colors that can be confused with each other in artificial light should not be used in track signs. Attention should be paid to the visibility of signs from every direction. The visibility of track numbers from all directions is of particular importance.

S9 Improving the processing of deviation reports

Personnel often consider it pointless to report safety deviations if corrective measures are not taken and feedback is not given. The division of responsibilities between companies often creates a barrier to the implementation of corrective measures in multi-operator environments.

The Safety Investigation Authority recommends that:

The Finnish Transport and Communications Agency develops its safety deviation information system so that it can be used to follow the processing of deviations. Furthermore, the Finnish Transport and Communications Agency ensures that all operators in the railway industry have functional deviation management processes. I2020-S311

Deviation reports will only be made if they are processed quickly and fairly.

S10 Harmonization of shunting instructions

The shunting instructions of different infrastructure managers and railway operators are fragmentary and partly conflicting. The problem is exacerbated in a multi-operator environment, where changes implemented by one operator often have an impact on others as well. Shunting instructions and the processes for ensuring their compatibility are currently not at a sufficient level.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

The Finnish Transport Infrastructure Agency assumes overall responsibility for shunting work instructions in Finland by supplementing the Train Traffic and Shunting Safety Guidelines document in this regard. Operators can only be permitted to have supplementary local guidelines drawn up in cooperation with other operators. [2020-S32]

As the largest infrastructure manager, the Finnish Transport Infrastructure Agency is a natural choice for coordinating the development of instructions. For its part, the Finnish Transport and Communications Agency must develop its auditing procedures to ensure the compatibility of different operators' instructions.

S11 Development of railway information systems

There are currently several railway information systems, which do not exchange information. There is also room for improvement in the usability of the systems, especially in field conditions. For example, locating trains in the railway system is difficult. Technical regulations to ensure the compatibility of systems are insufficient in the industry.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

The Finnish Transport Infrastructure Agency and railway operators improve the interoperability and usability of their information systems. [2020-S33]

Using GPS positioning in shunting operations would improve the systems' usability. A similar solution is already used for locating trackworks.

S12 Protecting train traffic from traffic entering from class 2 traffic control areas

The interfaces between class 1 and 2 traffic control areas have proven to be dangerous for shunting work. The risk is emphasized if access to a class 1 area from a class 2 area using an incorrect route is not monitored or prevented by technical means. The decision made in 2016 to remove Stop signs has made the situation worse.

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

The Finnish Transport Infrastructure Agency implement technical safeguards for protecting routes from traffic entering from class 2 traffic control areas. [2020-S34]

Correctly placed Stop signs can be used as a temporary measure before the safety devices are replaced.

S13 Railway emergency calls should be used routinely

The threshold for making railway emergency calls is high across the board. For the railway voice communications system to function in emergencies as intended, the threshold for making railway emergency calls should be lowered through training and development of the working culture

The Safety Investigation Authority recommends that the Finnish Transport and Communications Agency (Traficom) ensures that:

The Finnish Transport Infrastructure Agency, Finrail Oy, railway industry training institutions, railway operators and infrastructure managers stress the importance of making railway emergency calls in their basic and refresher training. [2020-S35]

Making railway emergency calls in the event of incidents should be made routine through training and cultural development.

RECOMMENDATIONS

Date and time (Code):	21.11.2007 (B7/2007R)		
Location:	Lahti, Heikinpellontie level crossing, unprotected		
Type of occurrence:	Level crossing accident, freight train – car		
Train type and number:	Freight train 2873, Dv12 diesel locomotive		
Road vehicle:	Car Volkswagen Golf 1.6, 1999 model		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	2	1
	Passengers:	0	0
Fatally injured:	***Crew:***	0	1
	Passengers:	0	0
Seriously injured:	***Crew:***	0	0
	Passengers:	0	0
Slightly injured:	***Crew:***	0	0
	Passengers:	0	0
Damages of rolling stock:	The car was wrecked beyond repair. The front of the locomotive sustained some damage.		
Damages on track equipment:	None.		
Other damages:	None.		

Summary**:** On 21 October 2007 at 12.55 p.m., a fatal level crossing accident occurred on an unprotected level crossing along Heikinpellontie road in Lahti. The accident occurred when a car on Heikinpellontie road drove without stopping in front of a locomotive en route from Lahti to Heinola. The driver, who was the sole person in the car, died instantly. The accident occurred because the driver of the car did not see the train. The level crossing in question meets regulations concerning visibility and crossing angles, but does not meet those concerning wait platforms. It is possible that the driver was not sufficiently vigilant due to familiarity with the crossing and the impression that train traffic was infrequent there.

Final report issued:	9.9.2008

Recommendation Nr. S243	Track renovation investments have been scheduled for the Lahti–Heinola track within the next few years. The intended focus is on track technology renewal, but it is clear that the investments will also cover raising level crossing safety to the level set in technical track requirements (RATO). Considering the danger posed by the level crossings along the track at the moment, it is recommended that actions to improve level crossing safety are initiated in advance before the investments proper. Such actions include the following: possible replacement of level crossings with alternative road routing, sightline improvements, wait platform improvements and crossing angle adjustments.	
	Actions to improve level crossing safety along the Lahti–Heinola track should be carried out before the initiation of scheduled renovation investments.	
Date	***Status***	***Comments***
20.1.2009	In progress	
19.2.2010	In progress	In some level crossings there has been reduced speed limit on roads.
18.8.2011	In progress	Lahti town proposes to make a level crossing plan and to enclose it to the building program in the next few years.
9.2.2012	In progress	
19.9.2013	In progress	Lahti town has made a level crossing plan and has decided to equip the worst level crossing with barriers.
10.3.2014		
25.2.2015	Under implementation	
3.3.2016	Under implementation	Possibly attention devices will be installed.
28.3.2017	Under implementation	Possibly attention devices will be installed.
11.4.2018	Under implementation	Level crossing warning devices that are based on new technology will be installed during 2018.

25.3.2019	Under implementation	Procurement of warning devices for Lahti-Heinola line has been delayed. Process is on-going at commercial court. 12 most dangerous level crossings will be equipped with half barriers during 2019.
30.3.2020	Partly implemented	On this section of line, both new, low-cost warning devices and traditional warning installations are implemented as part of the level crossing removal and safety improvement programme. The work on 10 level crossings is completed, and the safety of 23 level crossings will be improved by other means. 2 are completed on the Heinola factory railway, 1 is completed on the Mukkula railway, and 1 other improvement project is currently going on.
30.3.2021	**IMPLEMENTED**	Everything included in the action plan has been implemented. Warning installations of different types have been implemented in the section of line, some have been implemented using new sources of energy. 23 warning devices, 3 traditional light and sound warning installations and 11 traditional half-barrier installations.

Date and time (Code):	1991–2010 (S1/2011R)		
Location:	Finland		
Type of occurrence:	Level crossing accidents		
Train type and number:			
Road vehicle:			
		In the train	***In the road vehicle***
Persons on board:	***Crew:***		
	Passengers:		
Fatally injured:	***Crew:***		
	Passengers:		
Seriously injured:	***Crew:***		
	Passengers:		
Slightly injured:	***Crew:***		
	Passengers:		
Damages of rolling stock:			
Damages on track equipment:			
Other damages:			

***Summary*:** While the number of level crossing accidents in Finland reduced significantly between 1991 and 1998, since then the number has remained constant and, at times, has even increased slightly. The number of accidents has fallen in the last two years. However, this has not influenced the number of deaths. Since 1993, there has been an average of 10 fatalities per year in level crossing accidents. Compared to other European countries, level crossing safety in Finland is below average.

Some 78 per cent of all fatal accidents occurred on level crossings without warning devices. Accidents on level crossings of this type were generally caused by the vehicle driver misjudging the situation, not by the driver taking unnecessary risks. The road speed limit was typically 80 km/h and the railway speed limit 120 km/h. Most level crossings without warning devices are located on private roads and most fatal accidents occurred on level crossings on such roads. Nearly all level crossings without warning devices fail to meet the related railway regulations. Maintainers of private roads do not have sufficient information on their level crossing maintenance obligations.

Based on statistical analysis, a dangerous level crossing is one without warning devices, with a low road speed limit, and with a high amount of average daily traffic. Such level crossings are typically located in residential areas.

Final report issued:	13.2.2012

Recommendation Nr. S314	The Koululiitu software, which evaluates the dangers of school routes, does not include level crossings, because the road database information used by the software does not contain level crossing information.	
	When planning school transportation, the municipalities should improve safety by avoiding level crossings without warning devices along the routes.	
Date	***Status***	***Comments***
19.9.2013	In progress	
10.3.2014	In progress	

25.2.2015	Under implementation	
3.3.2016	Under implementation	Developed geographic information system.
11.4.2018	Partly implemented	School transport guide will be updated in 2018. Recommendation will be added as a part of designing new school transports.
25.3.2019	Under implementation	No answer to the inquiry.
30.3.2020	Under implementation	Finnish national agency for education has not answered to the inquiry.
30.3.2021	**IMPLEMENTED**	The Finnish National Board of Education published a new guide for school transport 18.1.2021. In the guide among others is instructed as follows in the planning of transportation routes: "In the planning of routes the danger places are taken into consideration. For example one has to avoid as far as possible the unprotected level crossings. There is real-time information about the level crossings in the public map service of the Finnish Transport Infrastructure Agency.

Date and time (Code):	14.1.2012, 0.15 (R2012-01)		
Location:	Kouvola freight traffic railway yard		
Type of occurrence:	Derailment		
Train type and number:	Freight train 2032, Sr1 electric locomotive and 35 wagons		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	
	Passengers:	0	
Fatally injured:	***Crew:***	0	
	Passengers:	0	
Seriously injured:	***Crew:***	0	
	Passengers:	0	
Slightly injured:	***Crew:***	0	
	Passengers:	0	
Damages of rolling stock:	Two derailed wagons sustained minor damage.		
Damages on track equipment:	40 metres of rail were damaged. Turnout 730, the electric railway portal and the electric cables for seven tracks were damaged.		
Other damages:	A signal post fell down.		

***Summary*:** An accident occurred in the Kouvola freight traffic yard at 00.15 hrs on 14th January 2012 when two wagons of a departing freight train were derailed immediately after their departure. One of the derailed wagons struck a signal post, which collapsed onto an electric railway portal ten minutes later. The electrical cables for seven tracks were brought down by the portal's collapse. No personal injuries resulted.

The accident was caused by a stop block left under the train. Difficult weather conditions and darkness made it difficult to see the stop block. Additionally, the brake tester responsible for removing the stop block decided to perform an extra shunt on the train in place of standard procedures, because the train had moved too far alongside the shunting signal.

Final report issued:	24.9.2012

Recommendation Nr. S327	It was found in the investigation that the railway yard work instructions do not take account of all situations arising during normal work. Instructions for safety-critical operations should be presented as a checklist, in order to make work as standardised and uniform as possible, instead of working from memory. A checklist would help to avoid a situation where issues are forgotten.	
	The railway yard work instructions should be developed in order to take account of all situations arising from normal work. Safety-critical instructions should be presented as a checklist.	
Date	***Status***	***Comments***
19.9.2013	In progress	In a different way.
10.3.2104	In progress	Guidelines will be gone through in this year.
25.2.2015	Under implementation	Instruction and training; nearly ready.

3.3.2016	Under implementation	Instructions renewed.
28.3.2017	Under implementation	
11.4.2018	Under implementation	Responsibility for railway yard instructions should in future be assigned to infrastructure manager therefore that there will be several operators at railyards.
25.3.2019	Under implementation	Development of rail yard instructions has been started in Finnish transport agency and in railway stakeholders' common instruction work group.
30.3.2020	Partly implemented	The development of instructions has already been started in the Finnish Transport Infrastructure Agency and in the joint instruction committee of the railway sector. VR has developed its own station-specific instructions so that the first new-type local instructions common for the entire group were introduced on 1 January 2018. Currently, common instructions are available for all stations where VR has operations. These instructions will be developed further in the period 2020–2021.
30.3.2021	Partly implemented	VR has developed its own station-specific instructions so that there are common instructions for all stations, in which VR operates. The Finnish Transport Infrastructure Agency develops work instructions as a part of the work of the rail safety committee. It is being investigated how extensively the Finnish Transport Infrastructure Agency can draw up instructions on railway yard operations. In addition, the Finnish Transport Infrastructure Agency continues the risk assessment of railway yards with multiple operators, in which instructions are also reviewed.

Date and time (Code):	6.4.2013, 3.22 (R2013-01)		
Location:	Vammala railway yard		
Type of occurrence:	Derailment		
Train type and number:	Freight train 3703, Sr1 electric locomotive and 43 wagons		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	0	-
	Passengers:	0	-
Damages of rolling stock:	13 wagons damaged.		
Damages on track equipment:	Two tracks were damaged at a distance of 177 metres, including two turnouts. In addition, the sleepers of one track were damaged at a distance of 249 metres.		
Other damages:	A small amount of crude tall oil leaked onto the ground.		
Disturbances of traffic:	The accident caused a traffic interruption that lasted approximately 11 hours. The station was returned to normal use one month after the accident. 11 trains in passenger traffic and 11 trains in freight traffic had to be cancelled.		

Summary**:** Freight train 3703 en route from Tampere to Rauma derailed at the Vammala station in Sastamala. The train was proceeding as planned, until at the Vammala turnout V003, the rear bogie of wagon 15 or the front bogie of wagon 16 was directed between the switch blades and the stock rails of the turnout. As a consequence, the rear end of the train began to derail. Two Russian tank wagons tipped over and the train broke into two parts. Nine Finnish freight wagons derailed. The intermediate wagon between the Russian tank wagons and the Finnish freight wagons derailed to the left, causing minor damage to the track to the left of the train's direction of travel. The 16 wagons at the end of the

train remained on the rails. The front end of the train, the locomotive and 15 wagons continued moving for another 314 metres after the brake pipe was broken. The rear bogie of the last wagon at the front end of the train ran off the rails and broke some sleepers. According to the locomotive's data recorder, the train's speed at the moment of derailment was 67 km/h.
The derailment was caused by the switch turning underneath the train. The train caused the open switch blade to move, resulting in the opening of the switch lock, which allowed the switch to turn. When an open switch blade is subjected to vibration or sufficiently powerful impacts, a switch lock that allows trailing may become unlocked. As a result, the closed switch blade opened, and the wagon wheels fell between the switch blade and the stock rail.

Final report issued:	20.2.2014

Recommendation Nr. S338	The log data available in the railway safety system had not been examined and analysed.
	The Finnish Transport Agency should establish a system and methodology for the analysis of the error logs of safety systems to ensure that repeated flaws endangering safety are detected.

Date	***Status***	***Comments***
25.2.2015	Under implementation	Fault situations will be recorded in the POHA system.
3.3.2016	Under implementation	The instruction is being prepared.
28.3.2017	Under implementation	
11.4.2018	Under implementation	Track and safety equipment repair, and measurement data will be integrated to a single system in RAID-E project.
25.3.2019	Partly implemented	The development project of the condition control of the track network and of maintenance systems (RAID-E) improves the matter but because of different generations of equipment, all the equipment cannot be connected to the system.
30.3.2020	Under implementation	The Finnish Transport Infrastructure Agency will develop its RAID-e system further by including a safety device section in the system. The root cause analysis tool for safety devices will be piloted in 2020.
30.32021	Under implementation	The Finnish Transport Infrastructure Agency is involved in the RAID-e project in collecting information from the safety devices. So far, fault log analysis is not included in the system. The analysis has been developed together with Fintraffic Railway Ltd. and the track managers.

Date and time (Code):	7.11.2013, 17.17 (R2013-02)		
Location:	Pännäinen, Seinäjoki Ylivieska section of line		
Type of occurrence:	Train collision, Collision with an obstacle, a maintenance machine.		
Train type and number:	Freight train 5489, 2 Dv12 diesel locomotives and 6 wagons.		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1 + 1	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	0 + 1	-
	Passengers:	0	-
Damages of rolling stock:	The collision caused a hole into the fuel tank of the first engine, and the left steps of both engines were damaged. The excavator was damaged beyond repair.		
Damages on track equipment:	None.		
Other damages:	600 liters fuel leaked onto the track.		
Disturbances of traffic:	Traffic at the accident site was interrupted for 3.5 hours. Delays from hour to four hours for eight passenger trains and effects on several		

	other trains because of waiting. One freight train was cancelled from between Kokkola–Tampere.

***Summary*:** Freight train 5489 collided with an excavator carrying out trackwork on the track section between Pännäinen and Kolppi, on which superstructure and electrification works were being conducted. Located near Pännäinen Station, the trackwork supervisor had requested the traffic controller for permission for an excavator to carry out trackwork. The permission was given for the work to begin on the Pännäinen−Kolppi section "behind a freight train". The trackwork supervisor informed the excavator driver of the permission. At the time, the excavator was located 3.4 kilometres from Pännäinen Station towards Kolppi.
Having driven the excavator partially onto the track, the driver noticed the lights of an approaching train and immediately attempted to get off the track. Only moments earlier, the engine driver had realised that signal P523 had been switched to display Stop and had begun emergency braking from the speed of 50 km/h. However, the locomotive's left buffer hit the left rear corner of the excavator's top carriage and the locomotive's lower part hit the rear left corner of the excavator's undercarriage.

Final report issued:	11.11.2015

Recommendation Nr. S345	Currently, trackworks begin without sufficient preparation and clarification of the parties' responsibilities. Initial safety meetings are held in an attempt to ensure that the safety aspects are put right in order for the contractors to begin work. However, much more time should be devoted to such preparation, planning and clarification of responsibilities. Good planning also involves ensuring that communication between the parties is working.	
	The Finnish Transport Agency will ensure that contracts include a separate and sufficient timeframe for planning trackwork and clarifying responsibilities before trackwork is begun.	
Date	***Status***	***Comments***
25.2.2015	Under implementation	In March workshop of track possession planning.
3.3.2016	Under implementation	Tested in Seinäjoki–Oulu project.
28.3.2017	Under implementation	
11.4.2018	Under implementation	The will is to proceed towards this.
25.3.2019	Partly implemented	Track work meetings are widely in use in the whole of Finland. The handling of track work is systemised in the regional quality and track work meetings concerning traffic. The procedures will be unified during 2019.
30.3.2020	Under implementation	For the purposes of construction processes, the Finnish Transport Infrastructure Agency will specify the minimum time to be used for work planning before the work is actually started.
30.3.2021	Under implementation	The Finnish Transport Infrastructure Agency is updating the safety documents of the procurement with regard to the issue.
Recommendation Nr. S346	Instructions issued by the Finnish Transport Agency define the parties' responsibilities and tasks related to the safety of railway operations. The instructions emphasise monitoring where written forms and reports are used. With the exception of commissioning inspections, site monitoring is rarely carried out on the field. The monitoring of compliance with trackwork safety regulations should be increased. The large number of unauthorised trackworks was a cause for particular concern. These occurrences can be reduced only by increasing field monitoring. An increased risk of getting caught for breaches of regulations efficiently directs the behaviour of both organisations and individuals. Along with this measure, actions that comply with safety regulations should be made financially attractive.	
	The Finnish Transport Agency will increase the field monitoring of trackwork safety regulations by allocating appropriate resources for such work.	
Date	***Status***	***Comments***
25.2.2015	Under implementation	Accepted in the management team; work underway.
3.3.2016	Under implementation	Safety coordinator training underway.
28.3.2017	Under implementation	Piloted. Transport Agency tries to develop monitoring.

11.4.2018	Under implementation	Guidebook for supervisors is being prepared. Rail maintenance supervision instruction is ready. Minimum requirements for supervision will be defined during 2018.
25.3.2019	Under implementation	Finnish transport agency has improved instructions and procurement process. Supervision criteria will be defined in all future contracts.
30.3.2020	Under implementation	The Finnish Transport Infrastructure Agency will prepare separate, additional orientation material for the safety coordinators on the safety culture in railway environment and on the role, responsibilities and rights of the safety coordinators. The project manual will be adopted. Developer consultants will be familiarised on the use of the template documents for procurement instructions.
30.3.2021	Under implementation	The Finnish Transport Infrastructure Agency has developed the safety coordinator training so that the role of the coordinator is emphasised. In addition, discussion of human and organisational factors (HOF) has been increased. Developer consultants have been given instructions on issues such as the use of procurement instructions. The project 'Support of the project and service providers in safety issues' (Projekti- ja palveluntuottajien tuki turvallisuusasioissa) is starting, with the goal of ensuring a uniform operating model in safety issues.

Date and time (Code):	6.2.2015, 9.14 (R2015-01)		
Location:	Kokemäki, Isotalo level crossing (km 285+145), Kokemäki Pori section of line (line number 344)		
Type of occurrence:	Level crossing accident, passenger train–tractor		
Train type and number:	Passenger train 461, Sr1electric locomotive and 3 coaches		
Road vehicle:	Articulated Hauler (Dumper), Volvo A25D, 2002 model		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	2	1
	Passengers:	25	0
Fatally injured:	***Crew:***	0	0
	Passengers:	0	0
Seriously injured:	***Crew:***	1	1
	Passengers:	0	0
Slightly injured:	***Crew:***	0	0
	Passengers:	0	0
Damages of rolling stock:	Locomotive front was damaged, the dumper was broken from its articulation.		
Damages on track equipment:	None.		
Other damages:	None.		
Disturbances of traffic:	Traffic at the accident site was interrupted for 7 hours. The train to Pori was replaced with bus. Three passenger trains from between Tampere–Pori were replaced with busses.		

Summary: On Friday, 6 February 2015, a passenger train and an articulated hauler collided in Kokemäki. The collision occurred at the unprotected level crossing of a private road and the Kokemäki–Pori railway. The accident happened while workmen were preparing to move a track excavator over the track. The driver of the articulated hauler was driving over the tracks to transport materials required for moving the excavator, when the passenger train came from his left and collided with the trailer of the articulated hauler. Both the hauler driver and engine driver were seriously injured. The articulated hauler is a 21-tonne earthmoving machine. The impact split the hauler in two, the tractor being thrown to the left side of the tracks and the trailer to the right side. The front end of the locomotive was badly damaged. The collision caused no damage to the track. The costs of repairs to the train engine and articulated hauler amounted to about EUR 700,000.

Final report issued:	19.8.2015
Recommendation Nr. 2015-S23	The railway maintenance provider issued appropriate instructions to the work supervisors of the earthworks company for how to move the excavator over the tracks. For this purpose, the maintenance provider adapted the trackwork safety instructions, as there are no separate instructions available for non-trackwork-related use

	of level crossings in exceptional circumstances that pose a risk of collision. The Safety Investigation Authority, Finland recommends that the Finnish Transport Safety Agency should ensure the adoption of the following recommendation:	
	The Finnish Transport Agency must draft readily available guidelines for time-intensive, non-trackwork-related use of level crossings or other similar work that poses a risk of a collision.	
Date	***Status***	***Comments***
3.3.2016	Under implementation	Need for new instructions will be taken into account when preparing the next action plan.
28.3.2017	Under implementation	It has been dealt with different actors. Actors must learn to estimate.
11.4.2018	Partly implemented	Guidebook for special road transports in level crossings will be published in 2018.
25.3.2019	Partly implemented	Instructions for special road transports in level crossings have been published 1.1.2019. Instructions for another time-consuming rail crossing will be finished during 2019.
30.3.2020	Under implementation	The Finnish Transport Infrastructure Agency will specify the criteria for the level crossings where crossing with long vehicles will be prohibited. Prohibition will be implemented with prohibitory traffic signs and added to Digiroad or similar service.
30.3.2021	Partly implemented	This has been taken into account in the safety programme 2021 of the Finnish Transport Infrastructure Agency. The Finnish Transport Infrastructure Agency and the ELY Centres can use traffic signs to prohibit long vehicles from crossing the tracks, for example. The matter has been recognised in connection with private roads, and the road association is willing to inform and instruct the managers of private roads. They need further information on the matter from the track manager.

Date and time (Code):	12.3.2015, 13.19 (R2015-02)			
Location:	Oulunkylä, Helsinki–Riihimäki section of line (line number 112), km 8.			
Type of occurrence:	Incident, risk of collision			
Train type and number:	Commuter train 9676, 2 x Sm4 electric train units – Commuter train 9840, 2 x Sm4 electric train units.			
Road vehicle:	-			
			In the train	***In the road vehicle***
Persons on board:	***Crew:***		2 – 2	-
	Passengers:		50 – 50	-
Fatally injured:	***Crew:***		0	-
	Passengers:		0	-
Seriously injured:	***Crew:***		0	-
	Passengers:		0	-
Slightly injured:	***Crew:***		0	-
	Passengers:		0	-
Damages of rolling stock:	None.			
Damages on track equipment:	None.			
Other damages:	None.			
Disturbances of traffic:	H-train fell behind its schedule for about 24 minutes and Z-train fell behind its schedule about 15 minutes.			
Summary**:** On Thursday, 12 March 2015 at 1.19 pm, an incident occurred at Pukinmäki Station after two Sm4 commuter trains ended up within the same block section. The incident occurred after the H train stopped as a result of a malfunction in safety device on the neutral section following signal E581. The engine driver let the train "roll" backwards in order to exit the neutral section, causing it to enter the block section of the Z train following it on the same track. The H train ran late 24 minutes and the Z train 15 minutes. Other rail traffic was not disturbed. The incident did not cause any damage.				
Final report issued:	22.10.2015			
Recommendation Nr. 2015-S30	In this case the fault of the safety device had not been repaired even though it had been signed repaired. In order that in the future the maintenance would know how to correct the right faults:			

	The maintainer of the rolling stock must ensure and instruct the repairs of safety device malfunctions in the rolling stock better than at present.	
Date	***Status***	***Comments***
3.3.2016	Under implementation	VR will settle.
28.3.2017	Under implementation	VR will settle.
11.4.2018	Partly implemented	Has been applied partly in VR Group's intelligent maintenance concept.
25.3.2019	Under implementation	VR has implemented for its part as a part of the developing of the maintenance systems of the rolling stock (intelligent maintenance).
30.3.2020	Partly implemented	VR FleetCare is developing a new model for qualifications management. The preparation of curriculums has been started from the Sm3 and Sm5 trains and the aim is to have the most part of that work completed by the end of 2020.
30.3.2021	**IMPLEMENTED**	VR FleetCare has been developing a management system for maintenance qualifications. In connection with this, a rolling stock-specific TURVA-KR system qualification will be required from technicians repairing faults in safety devices. A curriculum has been drawn up for obtaining the qualification and new employees will be trained for the qualification according to it. Mastery of the issues included in the curriculum is also required from the current employees.

Date and time (Code):	3.2.2016, 8.09 (R2016-01)		
Location:	Uimaharju, (line number 701), km 673+930		
Type of occurrence:	Accident to persons involving rolling stock in motion – Track worker hit by a train.		
Train type and number:	Regional train 760, Dm12 rail bus		
Road vehicle:	-		
		In the train	***Other***
Persons on board:	***Crew:***	1	
	Passengers:	24	
Fatally injured:	***Crew:***	0	
	Passengers:	0	
Seriously injured:	***Crew:***	0	1
	Passengers:	0	
Slightly injured:	***Crew:***	0	
	Passengers:	0	
Damages of rolling stock:	None.		
Damages on track equipment:	None.		
Other damages:	Portable earth radar was damaged.		
Disturbances of traffic:	Traffic at the accident site was interrupted for 20 minutes.		

Summary: The accident happened when one of the cable markers did not notice the approaching train and moved too close to the rails. The cable marker's attention was focused on the cable detector. In addition, the current weather conditions and the train being quiet made the train more difficult to notice. Due to the suddenness of the situation, the engine driver had no chance to avoid the collision.

Final report issued:	4.10.2016

Recommendation Nr. 2016-S27	The Finnish Transport Agency's cable marking request form does not directly address the need for protective measures during the work. The instructions on cable marking do not discuss work safety sufficiently. At the moment, there is a great variety among cable marking requests, cable marking request forms are not used, and the responsibilities for using the forms are unclear.		
	The Finnish Transport Agency shall renew the instructions on cable marking and adapt the cable marking request form so that the purchaser must comment on the protective measures to be used in the work.		
Date	***Status***	***Comments***	
28.3.2017	Under implementation	Not yet ready.	

11.4.2018	Under implementation	Instructions will be updated during 2018.
25.3.2019	Under implementation	Finnish transport agency is updating cable detection form's commercial issues. Instructions for cable detection will be updated at the same time. New instructions clearly state that all cable detection work on railways is official track work and all trac work instructions must be followed.
30.3.2020	Under implementation	The cable marking request form will be revised so that it will address the safety method to be used.
30.3.2021	Partly implemented	The cable marking request form has been revised, but it will be reviewed again in 2021. An important change is the addition of an entry stating that the party that ordered the work confirms the method used to ensure the safety of the work.

Date and time (Code):	8.7.2016 (R2016-03)		
Location:	Finland		
Type of occurrence:	Train collision		
Train type and number:	Shunting unit, Dr14 diesel locomotive and 20 tank wagons		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	2	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	0	-
	Passengers:	0	-
Damages of rolling stock:	Two wagons were damaged.		
Damages on track equipment:	Buffer stop damaged.		
Other damages:	Few.		
Disturbances of traffic:	None.		

***Summary*:** A radio-controlled shunting unit collided with a rail barrier and two tank wagons loaded with SPB gasoline were derailed at the port of Mussalo in Kotka on the night of Friday 8 July 2016. As the first wagon was derailed, the end of the second wagon mounted the under-frame of the first wagon. Because the height difference was so great, the override protection on the central buffer coupling was unable to prevent the couplings from detaching from each other.

Final report issued: 10.3.2017

Recommendation Nr. 2017-S9	In railway yards, old buffer stops are of little relevance in stopping wagons. In addition, the transport of dangerous goods in wagons built according to varying standards sets a wide range of requirements for buffer stops. In risk analyses, overshootings have been identified as a potential cause of accidents. Because there has been no change in shunting supervision practices, structural accident prevention should be made more effective, particularly in railway yards where dangerous goods are being handled. To improve the safety of railway yards in which dangerous goods are being transported, the Safety Investigation Authority recommends that:	
	Infrastructure managers should modernise buffer stops on tracks where shunting work is done related to the transport of dangerous goods.	
Date	***Status***	***Comments***
11.4.2018	Partly implemented	Some infrastructure managers have studied the situation and made action plan for replacement. Information is missing from some infrastructure managers.
25.3.2019	Partly implemented	Finnish transport agency has checked all end buffers on its network and made a schedule for renewal of obsolete buffers. Information from some of the smaller infrastructure managers is missing.
30.3.2020	Partly implemented	Finnish transport agency has checked all end buffers on its network and made a schedule for renewal of obsolete buffers. Information from some of the smaller infrastructure managers is missing.

30.3.2021	Partly implemented	According to the Finnish Transport Infrastructure Agency, the matter has not progressed fully with regard to the managers of private tracks. They can contact the Finnish Transport Infrastructure Agency in order to receive instructions and guidance about the issue.

Date and time (Code):	27.7.2016 (R2016-04)		
Location:	Finland		
Type of occurrence:	Train collision		
Train type and number:	Metro trains		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	0	-
	Passengers:	0	-
Damages of rolling stock:			
Damages on track equipment:			
Other damages:			
Disturbances of traffic:			

***Summary*:** Two metro trains collided at Itäkeskus metro station in. The sides of the departing test drive train and the teaching train standing at the turnout area of the station collided and the test drive train was derailed.

Final report issued: 8.5.2017

Recommendation Nr. 2017-S22	The accident investigation revealed that the safety device design included a fault that has been carried across two generations of devices.	
	Helsinki City Transport and the safety device supplier should investigate and analyse the requirements relating to the operational safety of the metro railway system thoroughly in order to avoid potential faults being carried across to the next system in the course of the current safety device revision.	
Date	***Status***	***Comments***
11.4.2018	Partly implemented	Helsinki City Transport (HKL) has started to use notified bodies to improve safety devices design and installation. Safety devices will be unified.
25.3.2019	Partly implemented	Definitions have been analysed and clarified during recent safety devices update project. Work continues due to deficiencies found in old documentation.
30.3.2020	Partly implemented	Requirements have been investigated, analysed and specified further. However, there is still work to be done due to the shortcomings in the old documentation.
30.3.2021	Under implementation	Development measures are in progress at different levels and with different timespans. The issue is linked to the project package for increasing the capacity of the metro (METKA) as a key part of the planning tasks, in which special attention is paid to things such as the requirements and risk management.
Recommendation Nr. 2017-S24	Controlling night-time traffic is challenging. Unscheduled night-time test and teaching traffic had not been planned sufficiently well or coordinated. It was difficult to form a comprehensive picture of the traffic situation. Night-time traffic requires traffic controllers to make quick decisions based on events.	
	Helsinki City Transport should schedule night-time metro trains and other units and draw up a driving programme for them.	
Date	***Status***	***Comments***
11.4.2018	Partly implemented	There is still room for development in maintenance planning and track reservations.

25.3.2019	Partly implemented	Helsinki City Transport is improving synchronising of track work and night time traffic on metro lines. Also of the teaching drivings are drawn up more detailed plans. There is however still room for improvement in these processes.
30.3.2021	Partly implemented	The track reservation process used to coordinate the work outside the operating hours of the metro as well as work train, test drive and training traffic during the night has been developed, and self-monitoring of the issue has also been used. The planning of traffic during the night has become more systematic. Further development is in progress with regard to the information systems used in the matter, for instance.

Date and time (Code):	13.8.2916 (R2016-06)		
Location:	Finland		
Type of occurrence:	Train collision		
Train type and number:	Freight train 5316, 2 x Sr1 electric locomotives and 24 wagons		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	1	-
	Passengers:	0	-
Damages of rolling stock:	Locomotive and three wagons damaged badly. Seven wagons damaged less severely.		
Damages on track equipment:	Track damaged about 100 meters and the portal suspension of electric railway damaged.		
Other damages:	None.		
Disturbances of traffic:	Railway yard traffic disrupted due to a power outage.		

Summary: An empty timber train on its way from Kemi to Kontiomäki was about to arrive at the Oulu freight yard, where it was intended to stop for two hours and change drivers. The freight train arrived on track 118 and collided with the empty wagons standing on the tracks at a speed of 33 km/h.

Final report issued:	23.5.2017

Recommendation Nr. 2017-S28	A safety risk is involved in the work done by switchmen to protect routes in railway yards without modern technical systems to protect the passage of trains. Route protection by the switchman is not verified in any way, which also constitutes a risk. The faulty procedure used by the switchman made it possible to protect the route of a train on an occupied track. Traffic implemented as shunting operations should be more controlled, in which case the engine driver would also have an obligation to keep a lookout. If, say, for financial reasons it is not possible to equip all railway yards with technical monitoring by centralised traffic control, the Safety Investigation Authority recommends that	
	The Finnish Transport Agency should restrict trains running on tracks that are not under technical centralised traffic control.	
Date	***Status***	***Comments***
11.4.2018	Under implementation	A test is in process where a part of trains route is run according to shunting operation rules. A report will be made from this test and decisions will be based on it.
25.3.2019	Partly implemented	Due to recommendation, procedures have been changed for example at Oulu railway yard, partly with different procedures.
30.3.2020	Partly implemented	A plan and programme to equip the railway yards with appropriate safety devices has been on established for all railway yards with inadequate safety devices, with the exception of Kuusankoski railway yard. Funding is already secured for some of these sites.

30.3.2021	Partly implemented	A plan and programme to equip the railway yards with appropriate safety devices has been on established for all railway yards with inadequate safety devices, with the exception of Kuusankoski railway yard. Funding is already secured for some of these sites.

Date and time (Code):	28.6.2017 (R2017-01)		
Location:	Ylivieska, Seinäjoki Ylivieska section of line, (line number 412), km 629+164.		
Type of occurrence:	Incident – A track tamping machine began moving by itself – Hazard of collision.		
Train type and number:	A track tamping machine.		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	0	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	0	-
	Passengers:	0	-
Damages of rolling stock:	None.		
Damages on track equipment:	Point machine was damaged.		
Other damages:	None.		
Disturbances of traffic:	The traffic was at a standstill for two hours.		

Summary: A self-powered track maintenance machine used for track tamping began moving of its own accord from the western double-track work site located to the south of Ylivieska. The machine trailed a turnout leading from the work site to a track section used by traffic and rolled north on a track used by traffic for a distance of one kilometre, coming to a halt on track 1 of the Ylivieska station. Only moments before, the track section had been used by a freight train heading south. Passenger trains were on their way to the Ylivieska station from both south and north.

Final report issued:	14.2.2018

Recommendation Nr. 2018-S1	The Finnish Transport Agency did not require the contractors participating in the track project to have their own safety management systems; instead, it required the application of the Finnish Transport Agency's safety management system. The adoption of the system on a work site with several contractors and subcontractors was deficient, as was the monitoring of the adoption process.	
	Already at the competitive tendering phase for the project, the Finnish Transport Agency should require each main contractor participating in track projects to have its own safety management system that takes the special characteristics of the companies and work sites into consideration and include monitoring of the realisation of these systems as part of its auditing process.	
Date	***Status***	***Comments***
25.3.2019	Partly implemented	Finnish transport agency will include subcontractor safety management system requirements to its own safety management system. Changes will be introduced during 2019.
30.3.2020	Under implementation	The Finnish Transport Infrastructure Agency will prepare safety management minimum requirements for the service providers in the period 2020–2021 and will make the decisions on their implementation.
30.3.2021	Partly implemented	The implementation is included in the safety plan for 2021. The safety management system and its implementation will be reviewed in the audit of 2021, and decisions on the future will be made based on it.
Recommendation Nr. 2018-S4	At the time the incident occurred, the brake system of the maintenance machine was worn and poorly adjusted. This was the case despite a Finnish Transport Safety Agency (Trafi) traffic worthiness and safety inspection that had been conducted on the machine before it was taken into use. At the request of Trafi, extensive tests	

	and measurements were performed on the machine, analysing the characteristics of the machine type, despite the fact that the machine type has been used in Finland for over 20 years. The purpose of these tests remains unclear, as the visibly poor condition of the individual machine was not detected. One factor could have been the missing of the machine's maintenance documentation. The role of the party that conducted these inspections was unclear in the investigated incident, as the company also participated in the refurbishment of the machine.	
	The Finnish Transport Safety Agency should specify in more detail the checks required during a traffic worthiness inspection as well as the qualification and independence criteria for the party conducting the inspection.	
Date	***Status***	***Comments***
25.3.2019	Under implementation	Finnish Transport Safety Agency will describe rolling stock track worthiness requirements more precisely in its internal work instructions.
30.3.2020	Under implementation	Finnish Transport Safety Agency will describe rolling stock track worthiness requirements more precisely in it's internal work instructions.
30.3.2021	**IMPLEMENTED**	The Finnish Transport and Communications Agency has drawn up a form for traffic-worthiness inspections. The traffic-worthiness inspection is conducted by the Finnish Transport and Communications Agency or an independent expert.

Date and time (Code):	21.9.2017 (R2017-02)		
Location:	Kouvola marshalling yard, track number 843, (line number 412), km 193+568.		
Type of occurrence:	Collision – A shunting locomotive with 6 wagons collided into 48 wagons loaded with timber.		
Train type and number:	Shunting unit 6403, a Dr14 diesel-hydraulic locomotive and 6 wagons.		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	2	-
	Passengers:	0	-
Fatally injured:	***Crew:***	0	-
	Passengers:	0	-
Seriously injured:	***Crew:***	0	-
	Passengers:	0	-
Slightly injured:	***Crew:***	1	-
	Passengers:	0	-
Damages of rolling stock:	1 hopper wagon was seriously damaged, 2 container wagons were slightly damaged. A 20-foot tank container that was loaded on container wagon was seriously damaged.		
Damages on track equipment:	None.		
Other damages:	11 000 litres of hydrogen peroxide-water mixture leaked to ground, 10 000 litres were salvaged but had to be sent to chemical waste plant for disposal.		
Disturbances of traffic:	The traffic on track east of Kouvola was stopped for 15 minutes. Kouvola rail yard was partly out of use for 24 hours.		
Summary**:** A shunting unit consisting of diesel locomotives, four empty hopper wagons and two container wagons loaded with tank containers containing hydrogen peroxide, on a container car collided with timber wagons standing in the eastern up yard at Kouvola.			
Final report issued:	1.6.2018		
Recommendation Nr. 2018-S14	Work guidance forms a major part of the training of shunting foremen. Trainee competencies are not sufficiently ensured, because the monitoring of work guidance does not give a true picture of the competencies of trainees. Nor does this ensure that all issues have been learned.		
	When approving safety management systems and persons who are responsible for the verification of personnel skills, the Finnish Transport Safety Agency makes sure that their skills verification methods are sufficient, and skills verification is reported accordingly.		

Date	***Status***	***Comments***
25.3.2019	Under implementation	According to Finnish Transport Safety Agency, they use EU-level criteria when auditing safety management systems. Procedures have not been changed due to recommendation. Investigation showed that procedures are not sufficient to ensure competencies of trainees.
30.3.2021	**IMPLEMENTED**	Operators describe the procedures for verifying competence in their safety management system. The Finnish Transport and Communications Agency audits the operators in accordance with the EU regulations, and verifying competence is included in the procedures being audited.
Recommendation Nr. 2018-S15	Training at the educational institute does not include the possibility to practice the use of radio-controlled equipment. Guided training on a simulator would improve the preparedness of trainees for work.	
	Training institutions in the railway sector include simulator training in the training programme for shunting foremen.	
Date	***Status***	***Comments***
25.3.2019	Under implementation	KRAO is researching on acquiring a simulator for radio-controlled locomotive operator training. Decision will be made during 2019.
30.3.2020	Under implementation	Training centre KRAO decided that the recommendation will be taken into account in connection with the update of the simulator environment supplied by Corys. The board of KRAO discussed the matter and made a decision on the procurement. The aim is to sign the procurement agreement as soon as possible. The estimated delivery time from signing the agreement is about one year.
30.3.2021	Partly implemented	The education institution Kouvolan Rautatie- ja Aikuiskoulutus Oy - KRAO has ordered the equipment, but the coronavirus has slowed down the delivery. The aim is to start using the equipment in teaching in early 2022.
Recommendation Nr. 2018-S17	The radio control system of the locomotives responds slowly to the driver's commands. There is no separate *emergency stop* button on the radio control unit. The delay in the radio control system slows the start of emergency braking in critical situations.	
	The Finnish Transport Safety Agency (Trafi) require that the radio control units used for shunting work have a separate, non-delayed emergency stop button.	
Date	***Status***	***Comments***
25.3.2019	Under implementation	According to Trafi adding an emergency-stop button to existing rolling stock would be time consuming and expensive. Because of these reasons Trafi cannot require this kind of feature. SIAF has information, that there are radio-control systems in use in Finland that fulfil the recommendation. So, the solutions should still be clarified.
30.3.2021	**IMPLEMENTED**	The issue has been corrected in the new equipment. According to the current knowledge of the Finnish Transport and Communications Agency, adding an emergency stop button to the old locomotives would be time-consuming and expensive, and therefore it is the opinion of the Finnish Transport and Communications Agency that it cannot require such a button.
Recommendation Nr. 2018-S19	Emergency service routes are marked in the rescue plans for railway yards for the transport of dangerous goods), along which routes into the area are planned in case accidents occur. However, these routes are largely unknown to the Emergency Response Centre Administration, and this could hamper and delay access to the accident site.	
	The Emergency Response Centre add numbered emergency service routes for railway yards to its system, and emergency duty officers be instructed to locate the accident site primarily through such routes.	
Date	***Status***	***Comments***
25.3.2019	Under implementation	According to Emergency response centres, emergency service routes cannot be added to its new ERICA system. Ministry of

		Interior has proposed that emergency service routes could be handled like normal streets, so they would be visible in all road maps. Finnish transport agency has checked all rail yard emergency service routes as a part of safety study for dangerous gods rail yards.
30.3.2021	Under implementation	The Emergency Response Centre Administration cannot add roads to the map by itself. It is hoped that roads could be included in the data of the National Land Survey of Finland as well as the Digiroad data, in which case they would be transferred to the topographic bases of the Emergency Response Centre's system in the transfers made four times per year.
Recommendation Nr. C10/2003R/S194	Several railway yards have not been equipped with clearly visible track numbers at the ends of tracks. Identifying the destination track can be difficult and it may come as a surprise that the track is occupied. For these reasons, the Safety Investigation Authority will open Recommendation C10/2003R, intended for the Finnish Transport Agency in the investigation report, with the status "Not to be implemented":	
	Railway yard tracks should be equipped with number plates.	
Date	***Status***	***Comments***
25.3.2019	Partly implemented	Finnish transport agency is studying best possibilities to display track information to railway operators in all operating conditions. Priority is in rail yards for dangerous goods.
30.3.2020	Partly implemented	Tracks in railway yards will be equipped with number plates by 2024.
30.3.2021	**IMPLEMENTED**	Already exists in the largest railway yards and is under construction in others. Implementation is progressing, signs are installed in connection with other projects in the railway yard.

Date and time (Code):	26.10.2017 (R2017-03)		
Location:	Raasepori, Skogby level crossing, line number 142, Karjaa–Hanko section of line (km 183+714)		
Type of occurrence:	Level crossing accident		
Train type and number:	Passenger train 382, Dm12 rail bus		
Road vehicle:	Military off-the-road truck Sisu A2045		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	1
	Passengers:	15	7
Fatally injured:	***Crew:***	0	0
	Passengers:	1	3
Seriously injured:	***Crew:***	0	1
	Passengers:	0	2
Slightly injured:	***Crew:***	0	0
	Passengers:	0	2
Damages of rolling stock:	Front end damage to Dm12 rail bus. Military off-the-road truck was wrecked totally.		
Damages on track equipment:	None.		
Other damages:	None.		
Disturbances of traffic:	Track between Tammisaari and Hanko out of service 6.5 hours.		
***Summary*:** A rail bus travelling from Karjaa to Hanko collided with a Defence Forces high mobility terrain vehicle in Skogby, Raasepori, at an unprotected level crossing. A pioneer unit from the Uusimaa Brigade was engaged in an attack exercise, moving vehicles from Skogby to Syndalen in Hanko.			
Final report issued:	7.6.2018		

Recommendation Nr. 2018-S20	The Defence Forces have developed their risk assessment with regard to exercises, but this work is still in progress. The current risk assessment form does not encourage naming identified risks, but these are evaluated by predetermined risk type (e.g. land or sea traffic accidents). If the risks involved in exercises are not identified and named, it is difficult to control and warn troops on exercise.	
	The Defence Forces develop the risk assessment of exercises in order to identify the actual risks and name those which are identified.	
Date	***Status***	***Comments***

25.3.2019	Partly implemented	Risk management is and has been under development in Finnish defence forces. Aim is to make risk management a fixed part of all activities. Development program has been planned to be completed by the end of year 2020.
30.3.2020	Partly implemented	Part of the development work is already completed and part of it is still ongoing. The occupational and in-service safety system was audited in 2018, and one of the system's focus points is the consistent and systematic implementation of risk management. Risk management training has been developed in staff in-service training, and it has been implemented since 2019. Training 2020 Programme is currently going on. Risk management reporting has been developed, and the procurement of a coherent/joint risk management information system has been completed; implementation/training will take place in 2020.
30.3.2021	Under implementation	Reporting on forming the situation picture to serve as the basis of the occupational and in-service safety system has been developed continuously. For example, reminders on taking the road conditions into account in risk assessments are issued regularly. The acquisition of an information system needed as a uniform and systematic tool of dynamic risk management was implemented in 2020. The deployment project of the system is in progress, and the system deployment and training will be implemented during 2021.
Recommendation Nr. 2018-S21	Repairs of level crossings have not always focused on the most dangerous level crossings.	
	The Finnish Transport Agency and the Finnish Transport Safety Agency ensure that resources are allocated to improving the safety of, or removing, the most dangerous level crossings.	
Date	***Status***	***Comments***
25.3.2019	Partly implemented	Finnish transport agency is implementing the so called 65-program, in which safety of several level crossings will be improved. In addition to this, the agency has introduced a new action package to improve level crossing safety. Actions will be realised 2018–2022.
30.3.2020	Partly implemented	The Finnish Transport Infrastructure Agency is implementing a level crossing safety improvement programme that improves the safety of almost 300 level crossings. In addition, the use of more affordable level crossing systems is developed and extended further.
30.3.2021	Partly implemented	The Finnish Transport Infrastructure Agency has improved the safety of more than 390 level crossings in the project. In addition, new warning device solutions have been developed. The road association has cooperated with the Finnish Transport Infrastructure Agency in the matter with regard to level crossings of private roads. Of the 72 level crossings with an obtuse angle that were assessed as being dangerous, presented in a list in an attachment to the investigation report of the Raasepori level crossing accident, the safety of 51 level crossings has not been improved or they have not been removed.
Recommendation Nr. 2018-S22	Seatbelts in the cargo space seating modules of the Defence Force's high mobility terrain vehicles are difficult to use for soldiers in combat gear. The use of seatbelts is not effectively monitored. There are guidelines on the use of seatbelts and the monitoring of such use.	
	The Finnish Defence Forces develop seatbelts in cargo space seating modules so that they are easier to use and enhance their monitoring of the use of seatbelts.	
Date	***Status***	***Comments***
25.3.2019	Partly implemented	Finnish defence forces is studying and planning possible technical changes to seatbelts. Decisions on changes will be made after studies are finalised. Training and monitoring of seat belt usage has been improved.

30.3.2020	Partly implemented	Part of the development work is already completed and part of it is still ongoing: The instructions on the use of cargo area seats as well as related training and monitoring has been specified further. The usability of seatbelts has been improved with technical solutions, the suitability of which has been tested during 2019. The Finnish Defence Forces will make the necessary decisions based on the results and analyses of these tests before the end of 2020.
30.3.2021	Partly implemented	In 2020, the Finnish Defence Forces specified and clarified the instructions on the passenger transport training provided; in it, detailed instructions were issued on the content and implementation of the training and the monitoring of seatbelt use in passenger transport was developed further. The Finnish Defence Forces does not consider it practical to make structural changes to the seatbelts of the seats in the cargo space. With proper training in their use and adjustment, the original seatbelts of the seats in the cargo space were found to be safer than those of the new type during a trial. The correct adjustment of the seatbelt does not give the person room to move in the seat while driving, which also increases safety.

Date and time (Code):	7.4.2018, 14.40 (R2018-01)		
Location:	Kinni rail yard, line number 231, Kouvola–Pieksämäki section of line, km 248+396, track number 332, turnout V308		
Type of occurrence:	Collision – Tank wagons moved accidentally downhill and collided with rail buffer.		
Train type and number:	50 Vgobo tank wagons (no train number, wagons were brought to rail yard on 21.3. with train T58221).		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	0	
	Passengers:	0	
Fatally injured:	***Crew:***	0	
	Passengers:	0	
Seriously injured:	***Crew:***	0	
	Passengers:	0	
Slightly injured:	***Crew:***	0	
	Passengers:	0	
Damages of rolling stock:	1 tank wagon was seriously damaged, 1 tank wagon was slightly damaged.		
Damages on track equipment:	Rail buffer was destroyed totally.		
Other damages:	35 000 kgs of MTBE leaked to ground and nearby waters.		
Disturbances of traffic:	The traffic between Hillosensalmi and Mäntyharju was suspended between 7.–13.4.2018.		

***Summary*:** 50 tank wagons temporarily stored in railway yard began to move of their own accord. The wagons rolled a distance of 145 metres and collided with a buffer stop. The first two wagons were derailed by the collision. A leak was created in the first wagon, with 35,000kg of Methyl tert-butyl ether (MTBE) leaking into the surrounding environment.

Final report issued:	1.3.2019

Recommendation Nr. 2019-S1	Existing information on the number of transports entering Finland was not used for the management of railway network capacity and, where necessary, the restriction of RID traffic coming from Russia. According to their own interpretations, the Finnish Transport Agency and VR had no means of restricting traffic. The Finnish Transport Safety Agency (Trafi) and the Ministry of Transport and Communications lacked information on the safety risk posed by congestion.	
	Railway traffic operators, the Finnish Transport Infrastructure Agency and the competent authorities must develop means of preventing traffic congestion amongst transports with dangerous goods arriving from Russia. The acquisition and use of predictive information must be developed in particular.	
Date	***Status***	***Comments***

30.3.2020	Partly implemented	The Finnish Transport Infrastructure Agency has strengthened operative cooperation with respect to border traffic through the TMFG service agreement and in cooperation with RZD. VR has agreed with its customers on a principle on the basis of which the customers can leave orders from RZD unconfirmed for the subsequent month if the traffic and pace of traffic's handling are not as planned. VR has agreed with RZD on the sidelining of trains in Russia if congestion occurs amongst traffic on the Finnish side of the border. Traficom's information system related to the transit traffic stock is undergoing a renewal process, and efforts have been made to include a tool that would enable better utilisation of existing rolling stock information.
30.3.2021	**IMPLEMENTED**	VR has agreed with its customers on a principle on the basis of which the customers can leave orders from the Russian railway company RZD unconfirmed for the subsequent month if the traffic and pace of traffic's handling are not as planned and congestion starts to occur amongst the stock on the Finnish side of the border. With regard to urgent cases, VR has agreed with RZD on the principles of sidelining of trains in Russia, as well as loading prohibition practices, if congestion occurs amongst traffic on the Finnish side of the border. The Finnish Transport Infrastructure Agency, Fintraffic Railway Ltd. and RZD have drawn up a trilateral agreement on how to act in case of disruptions. The matters are being continuously brought up at meetings between the Finnish and Russian authorities.
Recommendation Nr. 2019-S2	Safety levels dramatically decrease during the temporary storage of RID wagons outside RID railway yards. There is no recognition of the risks associated with the temporary storage of RID wagons outside RID railway yards. **Railway operators and infrastructure managers must perform a risk assessment of the temporary storage of RID wagons in locations other than designated RID railway yards, and the due care and attention required under RID legislation must be observed.**	
Date	***Status***	***Comments***
30.3.2020	Partly implemented	Since its decision on the matter in 2018, VR Group has not stored RID wagons temporarily elsewhere than in designated RID railway yards or locations where it has been determined to be possible based on a separate risk assessment. The first joint risk assessments have been carried out in Hovinsaari and Harjavalta, in close cooperation with the Finnish Transport Infrastructure Agency and local operators. The Finnish Transport Infrastructure Agency has carried out a temporary storage risk assessment, and none of the assessed stations was suitable for temporary storage of RID wagons. The Finnish Transport Infrastructure Agency has also carried out research on locations for storing wagons other than RID wagons. This research is not yet completed. As far as the Finnish Transport and Communications Agency is concerned, the work on this matter continues as follow-up work. This follow-up work also focuses on the safety procedures used in the designated RID railway yards and aims to reduce any hazards identified.
30.3.2021	**IMPLEMENTED**	After the Kinni accident, VR immediately decided not to store VAK stock temporarily at any places other than VAK railway yards approved by the Finnish Transport and Communications Agency. As far as the Finnish Transport and Communications Agency is concerned, the work on this matter continues as follow-up work. This follow-up work also focuses on the safety procedures used in the designated VAK railway yards and aims to reduce any hazards identified.
Recommendation Nr. 2019-S3	The identification and management of risks related to normal rail traffic was deficient in the safety management systems of the actors. The Finnish Transport Agency's	

	railway safety management system is focused on the management of risks in railway infrastructure management and construction projects. In VR's safety management system, the assessment of change-related risks is emphasised, while less attention is given to risks related to daily traffic.	
	Railway operators and the Finnish Transport Infrastructure Agency must develop the identification and management of risks related to normal rail traffic in their safety management systems.	
Date	***Status***	***Comments***
30.3.2020	Partly implemented	The Finnish Transport Infrastructure Agency has set out the risk management for normal operation as part of risk management procedures and has also set out a risk management programme in accordance with this. The Finnish Transport Infrastructure Agency will adjust its risk assessment guidelines so that all risks aspects that jeopardise the attainment of the objectives will be taken into account. According to VR Group, the identification and management of risks are part of everyday activities. A requirement to identify, assess and manage the risks of key processes of railway operations has been added to VR Group's railway safety management system. The 2020 action plan of the Finnish Transport and Communications Agency includes the task to evaluate whether the operator has the ability to identify the risks and perform effective risk management work concerning its own operations. The risk management procedures of railway operations are among the key supervision themes, and assessing the risk management procedures is a priority when the agency carries out plan-based supervision of railway operators.
30.3.2021	**IMPLEMENTED**	At VR, risk management in railway safety is based on the risk management policy and safety policy. Risk management ensures that the risks related to railway safety are identified, assessed and managed proactively. In the risk assessments, risks due to human and organisational factors in addition to functional and technical risks are identified and analysed. Measures, managed in the Tuuma system. The risk management methods of the Finnish Transport Infrastructure Agency are a part of the management and safety management systems. Forming the situation picture and continuous identification of risks are a part of the processes.
Recommendation Nr. 2019-S4	The railway operator's guidelines on the number of stop blocks failed to take account of the weight of the wagons or the longitudinal gradient of the track. The guidelines overestimated the holding power of the stop blocks. Guidelines on ensuring that wagons remain stationary should be drawn up by the infrastructure manager in order to ensure their consistency in a multi-actor environment.	
	The Finnish Transport Infrastructure Agency will draw up guidelines on keeping wagons stationary in the Finnish state rail network.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	The Finnish Transport Infrastructure Agency is updating instructions for ensuring that rolling stock is kept stationary when it is left standing. Updated instructions will be published during 2019. Track gradient information is added to track plans for tracks that are used for storing and/or loading/unloding of wagons.
30.3.2021	**IMPLEMENTED**	The Finnish Transport Infrastructure Agency has added longitudinal gradient information to the track diagrams. The requirement of securing rolling stock in place is included in the rail traffic and shunting work safety rules (JT) and the rail traffic and shunting work safety rules (TURO). The use of brake shoes is discussed in the railway yard risk assessments. The instructions of the Finnish Transport Infrastructure Agency specify that the transport operator is responsible for the detailed instructions. Fenniarail and VR have instructed their personnel on securing rolling stock. VR has drawn up an extensive report on brake shoes as a basis for the updated instructions.

Date and time (Code):	12.12.2018, 4.50 (R2018-02)		
Location:	Kemijärvi, Palojärvi level crossing, line number 542, Rovaniemi–Kemijärvi section of line (km 1038+856)		
Type of occurrence:	Level crossing accident		
Train type and number:	Freight train T5155, Sr3 locomotive and 22 unloaded timber wagons		
Road vehicle:	Truck Volvo FM		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	2	1
	Passengers:	0	0
Fatally injured:	***Crew:***	0	1
	Passengers:	0	0
Seriously injured:	***Crew:***	0	0
	Passengers:	0	0
Slightly injured:	***Crew:***	1	0
	Passengers:	0	0
Damages of rolling stock:	Front end, side and undercarriage of Sr3 locomotive were damaged. One bogie of first wagon was damaged. Truck was totally wrecked.		
Damages on track equipment:	300 meters of track was damaged.		
Other damages:	-		
Disturbances of traffic:	Section of line between Rovaniemi and Kemijärvi was out of service for 6 days.		

Summary: A freight train en route from Kemi to Kemijärvi and a waste collection lorry collided at the Kuusivaarantie unprotected level crossing on Wednesday, 12 December 2018 at 4.49 am. In the collision, the driver of the lorry died and one of the two engine drivers in the locomotive was injured. The train's locomotive and first wagon were derailed.

Final report issued:	18.7.2019

Recommendation Nr. 2019-S40	All safety risks of the waste collection process had not been identified. For example, the safety plan did not identify level crossings and other traffic safety issues as risks, there was no handling process for feedback, and orientation was deficient. The deficiencies in work instructions, orientation and supervision form the prerequisites for the establishment of high-risk working methods.	
	The safety management related to the waste collection process shall take comprehensively into account the requirements of the work processes and the identification of occupational safety and traffic safety risks. Instructions shall be drawn up for the work processes and the orientation of the employees, and they shall be documented. Processes for handling feedback shall be defined in order to improve the operations.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	The Association of Finnish Local and Regional Authorities has reported the SIA's enquiry to KIVO Finland (Finnish Solid Waste Association representing Finnish regional and municipal waste management companies) and has had initial discussions on the subject. Lapeco is currently having a competitive bidding for new contracts. The new invitations to tender impose obligations on the contractor to establish a safety plan. Electronic feedback process has been introduced through the transport control system. Orientation will be carried out and documented once the new contracts are started.
30.3.2021	Partly implemented	Lapeco, a joint municipal authority for waste management, has paid attention to safety plans and feedback systems in the new procurements that have undergone a tendering process. Contractors are responsible for instructing their personnel in the activities. For its part, the customer instructs the drivers concerning its own operations during driver training. There are no national instructions on the issue.
Recommendation Nr. 2019-S42	The conditions at the level crossing were further deteriorated during the superstucture replacement project. The risks had been identified, but they were not corrected; instead, they were postponed as residual risks. The legislation enables using the	

	residual risk procedure to postpone the correction of level crossing risk factors identified during track projects.	
	In its track projects, the Finnish Transport and Infrastructure Agency shall prepare a plan and a timetable for the correction of the risks identified at level crossings. It must not be possible to transfer the risks into the future as residual risks.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	According to the Finnish Transport and Communications Agency, all residual risks cannot be excluded. However, the SIA states that all risks must be assessed, and appropriate measures must be taken to keep the risks at an acceptable level.
30.3.2021	Under implementation	The Finnish Transport Infrastructure Agency is in the process of including an entry on recording the risks of level crossings during the planning phase in the instructions. The safety risks of level crossings must now be reviewed during the planning stage of all projects.
Recommendation Nr. 2019-S43	In the collision, the fuses of the locomotive's batteries broke down, causing the emergency lighting to fail. The locomotive's emergency lighting did not have the independent power supply required by the TSI.	
	VR Group shall change the emergency lighting of the Sr3 locomotive to meet the TSI requirements.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	According to the Finnish Transport and Communications Agency, the requirements of the technical specification for interoperability (TSI) concern new rolling stock, stock being upgraded and stock being improved. Sr3 has been approved in accordance with the TSI.
30.3.2021	**NOT TO BE IMPLEMENTED**	According to the Finnish Transport and Communications Agency, the Sr3 locomotive has been approved in accordance with the technical specification for interoperability (TSI). According to the TSI requirements, the emergency lighting system must ensure sufficient lighting in the passenger cabin and the service areas for at least 90 minutes after the main source of energy has malfunctioned. The main source of energy of an electric locomotive is the 25 kV contact line, in addition to which the Sr3 locomotives use a diesel APU. In that case, the safety lighting supplied by the battery is independent of the main source of energy. In the view of VR's experts, the locomotive complies with the TSI requirements, and therefore no changes are needed.
Recommendation Nr. 2019-S44	In the collision, the fuses of the locomotive's batteries broke down, causing the data recorder to fail. Independent power supply is not required for data recorders in the TSI, which means that important information may be missed during accidents if power is cut out.	
	An independent power supply is required for new rolling stock being type approved that guarantees the operation of the recorder for a minimum of 30 minutes after power has been cut off.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	ERA will include the recommendation in the EC standardisation request to the CCMC (CEN-CENELEC Management Center). The standardisation request will be sent to the CCMC by June 2020.
Recommendation Nr. 2019-S45	The wrong kind of shattering of the side windows of the locomotive's cabin and the missing fragment retention film increased the injuries of the engine drivers.	
	Railway undertakings shall ensure that the cabin windows of the rolling stock are made of glass that does not cause additional injuries when breaking in an accident.	
Date	***Status***	***Comments***
30.3.2020	Issued	

30.3.2021	**NOT TO BE IMPLEMENTED**	According to the Finnish Transport and Communications Agency, most of the rolling stock still contain Securit safety glass approved during the period of validity of the technical regulations and instructions on rolling stock (LIMO); the glass crumbles into granules when it breaks. In some locomotives, they have been replaced with insulating glass elements that have a protective film. There is no legal basis for forcing the change of windows in old rolling stock units.
Recommendation Nr. 2019-S46	Railway clearance operations are not currently efficient or economical, particularly from the perspective of the entire rail network. The problem stems from the infrastructure manager's interpretation of the regulations on clearance operations, which prevents the railway undertaking from carrying out clearance operations.	
	The Finnish Transport and Infrastructure Agency shall initiate a new review of the regulations concerning clearance work and clarify the roles of the actors in clearance operations.	
Date	***Status***	***Comments***
30.3.2020	Partly implemented	According to the Ministry of Transport and Communications, our legislation in chapter 22 of the Rail Transport Act (1302/2018) fully complies with EU legislation, and especially under section 173 of the said law, the Finnish Transport Infrastructure Agency operating as the infrastructure manager has the right to access all necessary resources also from other operators after a disruption in order to normalise the situation.
30.3.2021	**IMPLEMENTED**	According to the Finnish Transport and Communications Agency, the legislation is compliant with the EU regulations, and there is no need for change. The Finnish Transport Infrastructure Agency has procured situation coordination for exceptional situations from Fintraffic Railway Ltd., and the procurement of work on the ground is ongoing.
Recommendation Nr. 2019-S47	There was no process for the handling of the risk assessment required by the authority for the track project, and there were no instructions on the matter. The identified risks did not lead to measures being taken.	
	The Finnish Transport and Communications Agency shall define an approval process for the risk assessment of level crossings and supervise that the corrective measures are taken.	
Date	***Status***	***Comments***
30.3.2020	Under implementation	According to the Finnish Transport and Communications Agency, the infrastructure managers will assess the risks in accordance with their own process. All level crossing risks will be assessed in connection with other risks.
30.3.2021	**IMPLEMENTED**	The Finnish Transport and Communications Agency has a process (work instructions) for the risk assessment of track projects. An operator is responsible for the risk assessment, but the work instructions describe how the operator should demonstrate the implementation and realisation of the risk assessment so that permission to implement the project can be granted. The work instructions are also applied to the level crossings and warning installations that have required a commissioning permission or otherwise fall within the scope of the commissioning permission of the part of the system.

Date and time (Code):	9.12.2019, 15.00 (R2019-01)		
Location:	Between Puhos and Kesälahti stations, Parikkala Joensuu section of line, (line number 711), km 444+899		
Type of occurrence:	Train collision with an obstacle, a tracwork machine		
Train type and number:	Freight train T2728, Sr1 electric locomotive and 31 wagons		
Road vehicle:	-		
		In the train	***In the road vehicle***
Persons on board:	***Crew:***	1	
	Passengers:	0	

Fatally injured:	***Crew:***	0	
	Passengers:	0	
Seriously injured:	***Crew:***	0	
	Passengers:	0	
Slightly injured:	***Crew:***	0	
	Passengers:	0	
Damages of rolling stock:	The drilling machine was badly damaged and the corner of the obstruction clearing device of the locomotive suffered damage.		
Damages on track equipment:	None.		
Other damages:	None		
Disturbances of traffic:	Train traffic at the site of the accident was interrupted for approximately 50 minutes.		

***Summary*:** On Monday 9 December 2019, a freight train travelling from Joensuu to Kouvola collided with a drilling machine used to take soil samples on the track between Kesälahti and Puhos. The locomotive hit the machine's front left corner at a speed of 30 km/h. No one was injured, but the drilling machine was badly damaged and the corner of the obstruction clearing device of the locomotive suffered damage.

Final report issued: 11.8.2020

Recommendation Nr. 2020-S19	Centralised traffic control did not check that GPS positioning was used before granting a trackwork permission. In the instructions of the Finnish Transport Infrastructure Agency, the use of the GPS positioning feature has not been specified as mandatory for centralised traffic control. The accuracy of GPS positioning is enough to locate the trackwork in the right area on sections of line.	
	The Finnish Transport Infrastructure Agency orders the use of GPS positioning to be mandatory in locating trackwork.	
Date	***Status***	***Comments***
30.3.2021	**IMPLEMENTED**	The Finnish Transport Infrastructure Agency has specified the positioning requirement in the valid track maintenance safety instructions (TURO). The positioning in the trackwork contractors' mobile platform (RUMA) system must always be on before a trackwork permission is requested. Trackwork supervisors must confirm their own position and the position of the team members both in the system as well as visually. The use of precise positioning in trackwork is being developed. Fintraffic Railway Ltd. is developing the RUMA system in ways such as the system giving an alarm if the stated location differs from the location based on positioning.
Recommendation Nr. 2020-S24	The trackwork supervisor did not check the location based on track elements or location markers before going on the track. Neither did the traffic controller use them to confirm the location of trackwork during voice communications. On sections of line, the location markers and the numbers of electric-railway poles are often the only way to confirm the location. The TURO instructions do not allow their use to state the location. Neither do the instructions require centralised traffic control to use track elements and location markers in confirming the location of trackwork. According to the rail traffic and shunting work safety rules, location markers or track elements must be used to pinpoint the location.	
	The Finnish Transport Infrastructure Agency harmonises the location instructions for the railway network so that location markers are used in addition to the track elements in the voice communications between centralised traffic control and the trackwork supervisor, if necessary.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	The Finnish Transport Infrastructure Agency is transferring to electronic communications for requesting a trackwork permission. Fintraffic Railway Ltd. is developing the RUMA application so that it enables the electronic permission process.
Recommendation Nr. 2020-S25	The map in the RUMA system does not support the identification of the trackwork site on sections of line in particular. The traffic controllers must use several different information systems and their maps. The systems do not exchange information with each other.	

	The Finnish Transport Infrastructure Agency harmonises the maps used for locating trackwork.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	The systems of Fintraffic Railway Ltd. use several different kinds of maps. The maps used for trackwork in information systems and the traffic control diagrams differ from each other, and combining them is not currently possible. Harmonisation is possible in the DigiRail project
Recommendation Nr. 2020-S26	Based on the investigation, there are deficiencies in the training and competence related to locating trackwork. Not all trackwork supervisors know how to take advantage of the features of the RUMA application or understand why using them is necessary. This means that competence assurance in the trackwork training of companies has not been completely successful.	
	The Finnish Transport Infrastructure Agency emphasises competence assurance in auditing the training of trackwork companies.	
Date	***Status***	***Comments***
30.3.2021	**IMPLEMENTED**	The Finnish Transport Infrastructure Agency has implemented the recommendation in the auditings in 2020 which applied to complience and control of validity of service providers. Also in the similar auditings which are done in 2021 attention will be paid to the procedures of companies and to the ability to secure the competence of its staff.

Date and time (Code):	1.1.2019–30.4.2020 (R2019-S1)		
Location:	Finland		
Type of occurrence:	Shunting accidents and incidents		
Train type and number:	Shunting units		
Road vehicle:			
		In the train	***In the road vehicle***
Persons on board:	***Crew:***		
	Passengers:		
Fatally injured:	***Crew:***		
	Passengers:		
Seriously injured:	***Crew:***		
	Passengers:		
Slightly injured:	***Crew:***		
	Passengers:		
Damages of rolling stock:			
Damages on track equipment:			
Other damages:			
Disturbances of traffic:			

***Summary*:** The investigation was undertaken because of the large number of accidents and incidents occurring during shunting operations. Another factor behind the investigation was the large number of shunting operators and infrastructure managers. The objective of the investigation was to gather detailed information on shunting accidents and incidents and use this information to identify safety defects that could be addressed to improve the safety of shunting work. The investigation studied shunting accidents and incidents that occurred between 1 January 2019 and 30 April 2020.

Final report issued:

Recommendation Nr. 2020-S27	Training in the use of new systems and regulations related to shunting is increasingly conducted online. This leaves the verification of competence partly at the responsibility of the students themselves. Self-direction, the requirements of planning your own studies, and the assimilation of information and verification of competence are emphasized in online training.	
	Railway training institutions, infrastructure managers and railway operators develop their online training in order to ensure the assimilation of the required information and the professional competence of employees taking the courses.	
Date	***Status***	***Comments***

30.3.2021	**IMPLEMENTED**	Fenniarail's safety-related training always includes verifying competence in a suitable manner, that is, as a theory test or a demonstration of practical experience. The structural implementation of VR's online training will take the assimilation of information and verifying competence better into account with intermediate and reflection assignments to be completed throughout the training as a whole. The education institution Kouvolan Rautatie- ja Aikuiskoulutus Oy – KRAO has developed and is developing online training. Verifying competence is carried out online in the same way as VR and Fenniarail.
Recommendation Nr. 2020-S28	The rather poor general lighting of railway yards and the weak lights of the locomotives used for shunting work hinder keeping a lookout during shunting operations. Not enough attention has been paid to the lighting of railway yards and rolling stock. Obsolete lights should be re-placed with new energy-efficient technologies.	
	Infrastructure managers improve the lighting of railway yards with modern technology.	
Date	***Status***	***Comments***
30.3.2021	Partly implemented	According to the Finnish Transport Infrastructure Agency, the lighting of railway yards will be improved systematically in connection with other projects. The lighting has also been taken into account in the instructions. In the responses of smaller railway infrastructure managers, too, they have been found to use LED technology in lighting currently or intending to do so in the future.
Recommendation Nr. 2020-29S	The rather poor general lighting of railway yards and the weak lights of the locomotives used for shunting work hinder keeping a lookout during shunting operations. Not enough attention has been paid to the lighting of railway yards and rolling stock. Obsolete lights should be replaced with new energy-efficient technologies.	
	Railway operators improve the lights of locomotives used for shunting with modern technology.	
Date	***Status***	***Comments***
30.3.2021	Partly implemented	During 2021, VR will determine the different kinds of options for improving the lights of shunting locomotives. The decisions on improving the lights will be made after a study and piloting. The decision will take the remaining service life of the rolling stock into account. The smaller railway operators that responded to the enquiry have reported that they have developed the lighting. Implementation methods: LED, spotlights on the sides, too.
Recommendation Nr. 2020-S30	The poor visibility and ambiguity of track signs causes hazards during shunting work, especially in darkness or otherwise poor visibility. The visibility of track signs is poor, especially in artificial light, so their colors can be confused with each other.	
	The Finnish Transport Infrastructure Agency reviews track signs and ensure their visibility and unambiguity.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	In the Oulu railway yard, the Finnish Transport Infrastructure Agency is trialling the use of new kinds of black-and-white signs. Feedback on the visibility of the signs is collected from the drivers. Section 17 of the Railroad Regulations (RATO) specifies the appearance of the switch sign, and opinions on the new version will be requested in the spring of 2021.
Recommendation Nr. 2020-S31	Personnel often consider it pointless to report safety deviations if corrective measures are not taken and feedback is not given. The division of responsibilities between companies often creates a barrier to the implementation of corrective measures in multi-operator environments.	
	The Finnish Transport and Communications Agency develops its safety deviation information system so that it can be used to follow the processing of deviations. Furthermore, the Finnish Transport and Communications Agency	

	ensures that all operators in the railway industry have functional deviation management processes.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	Safety deviation reporting systems are under development on both the EU and the national level. Instead, reacting to and monitoring deviation reports has been discussed in the network of human and organisational factors (HOF) in rail traffic and in connection with safety culture. Developing an actual system is not in view on the EU or the national level.
Recommendation Nr. 2020-S32	The shunting instructions of different infrastructure managers and railway operators are fragmentary and partly conflicting. The problem is exacerbated in a multi-operator environment, where changes implemented by one operator often have an impact on others as well. Shunting instructions and the processes for ensuring their compatibility are currently not at a sufficient level.	
	The Finnish Transport Infrastructure Agency assumes overall responsibility for shunting work instructions in Finland by supplementing the Train Traffic and Shunting Safety Guidelines document in this regard. Operators can only be permitted to have supplementary local guidelines drawn up in cooperation with other operators.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	The Finnish Transport Infrastructure Agency has had discussions with operators and the Finnish Transport and Communications Agency. The rail safety committee has discussed the matter in connection with preparing the next version of the rail traffic and shunting work safety rules (JT). The matter will also be discussed in connection with the risk assessments of railway yards with multiple operators.
Recommendation Nr. 2020-S33	There are currently several railway information systems, which do not exchange information. There is also room for improvement in the usability of the systems, especially in field conditions. For example, locating trains in the railway system is difficult. Technical regulations to ensure the compatibility of systems are insufficient in the industry.	
	The Finnish Transport Infrastructure Agency and railway operators improve the interoperability and usability of their information systems.	
Date	***Status***	***Comments***
30.3.2021	Under implementation	According to the Finnish Transport Infrastructure Agency, there has been no progress in the matter. The pandemic has delayed the deployment of the SAAGA system. The aim is to implement the pilot in Kouvola and Lauritsala in 2021.
Recommendation Nr. 2020-S34	The interfaces between class 1 and 2 traffic control areas have proven to be dangerous for shunting work. The risk is emphasized if access to a class 1 area from a class 2 area using an incorrect route is not monitored or prevented by technical means. The decision made in 2016 to remove Stop signs has made the situation worse.	
	The Finnish Transport Infrastructure Agency implement technical safeguards for protecting routes from traffic entering from class 2 traffic control areas.	
Date	***Status***	***Comments***
30.3.2021	**IMPLEMENTED**	Attention is paid to the technical protecting of routes in new safety device realisation. The possibility to use of the STOP sign has been taken back to Jt and the signs are added according to separate target-specific evaluation.
Recommendation Nr. 2020-S35	The threshold for making railway emergency calls is high across the board. For the railway voice communications system to function in emergencies as intended, the threshold for making railway emergency calls should be lowered through training and development of the working culture.	
	The Finnish Transport Infrastructure Agency, Finrail Oy, railway industry training institutions, railway operators and infrastructure managers stress the importance of making railway emergency calls in their basic and refresher training.	

Date	*Status*	*Comments*
30.3.2021	**IMPLEMENTED**	In the traffic control refresher training events in 2021, the importance of railway emergency call use is emphasised. Railway emergency call use training will be provided as a part of the VaO ('Vaara- ja onnettomuustilanteet' (Hazard and accident situations)) module. In addition, training on the new instructions on preparing for railway accidents and hazardous situations (OVRO) that will enter into force on 1 June 2021 will be provided to all traffic controllers by 31 May 2021. The meaning of the railway emergency call has changed: it will not stop traffic, but instead it will lead to so-called driving by sight. For Fenniarail, railway emergency call use is a part of the annual refresher training. For VR, the training related to railway emergency call use is included in the annual occupational group-specific refresher and supplementary training programme specified in the personnel management system for personnel with duties related to railway safety. In addition, this recommendation has made smaller railway infrastructure managers and rail traffic operators aware of railway emergency call use.