

NIB ANNUAL REPORT 2012

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 2012.

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
- S Safety study

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 S).
- 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.

The old identifier

Terms used in this report:

Investigation categories					
A-investigation Major accident					
B-investigation	pation Accident or serious incident				
C-investigation	gation 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.



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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 act (525/2011), which also include overall directions on the methods of investigation to be implemented. 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, had threatened or seriously damaged basic function in society.

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

1.2 Role and Mission

In Finland the Safety Investigation Authority investigates all major accidents regardless of their nature as well as all aviation, maritime and rail accidents and incidents.

The purpose of safety investigation is to promote general safety, the prevention of accidents and incidents, and the prevention of losses resulting from accidents. A safety investigation is not conducted in order to allocate legal liability. The flow of events during the accident, its causes and consequences, as well as the rescue operations are dealt with in the investigation. A report is prepared on the results of the investigation. The report also presents the recommendations, which are based on the conclusions of the investigation. All reports are written in Finnish with English summaries. An English translation of important reports will be available.

In addition the Safety Investigation Authority takes care of the readiness to conduct investigations and of the development of safety investigation methods. The training of investigators, the preparation of guidelines for the process of investigation, publication of the reports and international cooperation are handled by the Safety Investigation Authority.

Safety investigation focuses on the course of events of the accident, its causes and consequences as well as on the relevant rescue measures. Particular attention is paid to whether the safety requirements have been adequately fulfilled in the planning, design, manufacture, construction and use of the equipment and structures involved in the accident. It is also investigated whether the supervision and inspection has been carried out in an appropriate manner. Any eventually detected shortcomings in safety rules and regulations may call for investigation, as well. In addition to the direct causes of an accident, the accident investigation intends to reveal any contributory factors and background circumstances that may be found in the organization, the directions, the code of practice, or the work methods.



In the decision-making on the commencement of a safety investigation, the degree of seriousness of the incident is considered as well as its probability of recurrence. An incident or accident or hazardous situation, with only minor consequences may also require investigation in case it sets several persons at risk and an investigation is assessed as producing important information in view of the improvement of the general safety and the prevention of further accidents. Generally speaking, the Safety Investigation Authority does not investigate an incident or accident caused intentionally or by an offence.

The Safety Investigation Authority is also responsible for the printing and distribution of the investigation reports and their publishing on website *www.sia.fi.*



1.3 Organisational flow

2 INVESTIGATION PROCESSES

2.1 Cases to be investigated

The following shall be investigated in accordance with the Safety Investigation Act:

A serious accident in rail traffic as defined in article 3 of Directive 2004/49/EC of the European Parliament and the Council (Railway Safety Directive) on safety on the Community `s railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and levying of charges for the use of railway infrastructure and safety certification, and a corresponding accident in other private or public railway traffic;



In addition the Safety Investigation Authority can investigate in accordance with Safety Investigation Act;

- A serious incident and another accident and incident.
- A joint investigation (Safety Study) of several similar accidents or incidents.

The Safety Investigation Authority decides on the initiation of the safety investigation and on the extent to which the investigation is to be conducted. When considering the initiation of the investigation, account shall also be taken of the following:

- the seriousness and nature of the accident;
- the frequency with which corresponding accidents occur and the probability that they recur;
- the request of authorities supervising safety, of persons involved in the matter and of others for the conduct of an investigation;
- whether the investigation would provide significant information regarding safety;
- whether the accident caused a danger to several persons at the same time;
- whether some other instance is investigating the accident.

The Safety Investigation Authority may, in order to ensure the prerequisites for an investigation, initiate a preliminary investigation already before a decision is made on the initiation of the investigation.

In accordance with the EU Railway Safety Directive, the Safety Investigation Authority has investigated all fatal level crossing accidents involving road vehicles since 2007. In accordance with the relevant legislation on the matter (24/2001), the traffic accident investigation teams of the Traffic Safety Committee of Insurance Companies (VALT) of the Finnish Motor Insurers' Centre investigate all fatal road and terrain accidents in Finland including fatal level crossing accidents.

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 Railway Act the Finnish Transport Safety Agency can investigate those occurrences SIAF does not investigate. Investigation reports are not public.



3 INVESTIGATIONS

3.1 Overview of investigations completed, identifying key trends

Type of acci-	Number	Number	of victims	Damages in	Trends in rela-
dents inves- tigated	of acci- dents	Deaths	Seriously Injured	€ (approxi- mation)	tion to previous years
Collisions	2	1	0	8 500 000	
Derailments	2	0	0	422 000	
Level cross- ing accidents	4	1	4	125 000* ⁾	
Other	1	0	0	0	

*) Only railway side.

3.2 Investigations completed and commenced in 2012

Investigations completed in 2012

Date of occurence	Title of the investigation (Occurrence type, location)	Legal basis	Completed (date)
21.2.2011	Collision of a freight train with rear end of another freight train in Siuro, Nokia on 21 February 2011	l(a)	20.2.2012
2.2.2011	Collision of freight trains in Nurmes on 2 February 2011	l(b)(1)	30.1.2012
24.2.2011	24.2.2011 Derailment of locomotive bogie wheelset in Kolppi on 24 February 2011		8.2.2012
14.1.2012	Derailment of two freight train wagons in Kouvola railway yard on14 January 2012	l(b)(1)	24.9.2012

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

National rules imposed by implementing of the Safety Directive

- (a) in light of Article 19, §1 of SD
- (b) in light of Article 19, §2 of SD
 - (1) the seriousness of the accident or incident(2) it forms part of a series of accidents or incidents relevant to the system as a whole
 - (3) its impact on railway safety on a Community level

(4) requests from infrastructure managers, the safety authority or the Member State

- (c) in light of Article 21 of SD
 - (§5) cross-border investigation or request to assistance
 - (§6) other reasons than those referred to in Article 19
- II Other national rules/regulations (covering possible areas excluded in Article 2, §2 of the SD)
 (a) metros, trams and other light rail systems
 - (b) networks that are functionally separate from the rest of the railway system
 - (c) privately owned railway infrastructure that exist solely for use by the infrastructure owner for its own freight operations.
- III Other national rules/regulations not referred to the Safety Directive.





Investigations commenced in 2012

Date of occurence	Title of the investigation (Occurrence type, location)	Legal basis
14.1.2012	Derailment of two freight train wagons in Kouvola railway yard on14 January 2012	l(b)(1)
22.5.2012	Derailment of turnout transport wagons in the Riihimäki railway yard on 22 May 2012 and Kouvola railway yard on 28 June 2012	II
19.10.2012	Incident in train traffic at Vammala station on 19 October 2012	

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

I National rules imposed by implementing of the Safety Directive

- (a) in light of Article 19, §1 of SD
- (b) in light of Article 19, §2 of SD
 - (1) the seriousness of the accident or incident
 - (2) it forms part of a series of accidents or incidents relevant to the system as a whole
 - (3) its impact on railway safety on a Community level
 - (4) requests from infrastructure managers, the safety authority or the Member State
- (c) in light of Article 21 of SD
 - (§5) cross-border investigation or request to assistance
 - (§6) other reasons than those referred to in Article 19
- Other national rules/regulations (covering possible areas excluded in Article 2, §2 of the SD) (a) metros, trams and other light rail systems
 - (b) networks that are functionally separate from the rest of the railway system
 - (c) privately owned railway infrastructure that exist solely for use by the infrastructure owner for its own freight operations.
- III Other national rules/regulations not referred to the Safety Directive.

3.3 Safety Studies completed and commissioned in 2012

Safety Studies completed in 2012

Date of commission	Title of the Study (Occurrence type, location)	Legal basis	Completed (date)
12.1.2011	Safety study on level crossing accidents	l(b)(2)	13.2.2012
22.6.2011	Safety study on level crossing accidents 2011	l(b)(2)	20.6.2012

Safety Studies commenced in 2012

Date of commission	Title of the Study (Occurrence type, location)	Legal basis
30.1.2012	Safety study on level crossing accidents 2012	l(b)(2)



3.4 Summaries of investigations completed in 2012



B1/2011R

Collision of a freight train with rear end of another freight train in Siuro, Nokia on 21 February 2011

A freight train, which had arrived to assist another freight train travelling to Mäntyluoto, Pori, collided with the end of the other train in Nokia, between Siuro and Suoniemi, at 4.05 am on 21 February 2011. The engine driver of the assisting train fatally injured in the accident. One wagon and the locomotive, which collided the end of the other train, were badly damaged and had to be scrapped. Additionally, one wagon was badly damaged, but was still repairable. The tracks were undamaged. Traffic at the accident site was interrupted for 14 hours.

According to the running recorder data, the driver of the train which collided had begun emergency braking, at a speed of 46 km/h, five seconds before the impact. The train speed was 43 km/h upon impact. The maximum permitted speed of the train which collided was 50 km/h.

The accident was caused by the erroneous location information of the train to be assisted. This led the driver of the assisting train to approach the location at too high a speed. He believed that the other train was further away. The investigation found that a failure of the charge voltage regulator of the Dv12 locomotive serving as the leading locomotive led to the need for assistance which precipitated the accident. This caused the locomotive battery voltage to drop, which in turn stopped the locomotive. The driver of the train to be assisted had little experience of Dv12 locomotives and their problem solving procedures. This was a factor in the driver failing to note the low battery voltage. Darkness and the track geometry led to the driver of the assisting train's failure to notice the other train in time. At the speed he had attained, he was unable to prevent the collision.

In order to avoid similar accidents in the future, the Safety Investigation Authority, Finland recommends the following:

- A satellite location system should be implemented as quickly as possible to assist in location.
- Locomotives and train units should be equipped with checklist-type problem solving diagrams, which would help the engine driver when a fault occurs in a locomotive on the line¹.
- Reflectors should be installed on the ends of wagons.
- The speed of the assisting unit should be limited to 35 km/h, when it is driving to assist a train on the line.
- The use of group calls should be made into a standard procedure in exceptional situations.

¹ On the line = on the line section between stations.





C1/2011R

Collision of freight trains in Nurmes on 2 February 2011

A collision between a freight trains occurred in the direction of Lieksa, two kilometres from the Nurmes yard, on Wednesday 2 February 2011 at 11.55. Both the engine driver and traffic controller in the locomotive were injured, while both locomotives sustained major damage.

On its way from Lieksa to Nurmes, the freight train stopped at the Nurmes entry signal, which was in the *stop* position. Due to an insulation fault in the freight train's entry track, the traffic controller believed that the train was already in Nurmes. The traffic controller used emergency commands to release the train's route, reset the axle counting system and set the block between Nurmes and Lieksa to normal. Following this, the traffic controller changed the traffic direction to that running from Nurmes to Lieksa and assigned the exit route to the locomotive leaving Nurmes station. Receiving exit permission from the traffic controller, the locomotive collided with the freight train, which was standing at the entry signal on the same track. The enginer driver sustained a cut on the head and contusions in various parts of the body. The traffic controller present in the driver's cab also sustained contusions to various parts of the body. Having jumped off the locomotive into the snow, the driver of the standing freight train was uninjured.

The immediate cause of the accident was the cancellation of interlockings necessary to signal box safety, thus allowing the trains to use the same track. The insulation fault, frequency of critical commands, inadequate train location information and inadequate communication all contributed to the accident. Apparently, the traffic controller believed that train 4713 was already at the Nurmes yard. Despite having spoken to the engine driver, the controller did not realise that this train was standing at the entry signal.

In order to avoid similar accidents in the future, the Safety Investigation Authority, Finland recommends the following:

- Traffic control personnel should undergo regular training and drills, with a special focus on identifying hazards related to error situations and adopting pre-defined, safe procedures.
- Safety management should have a particular focus on punctuality and consistency of communication, as well as accuracy of train location information.
- On all axle counting sections, a prerequisite for emergency resetting should be that axles exiting the section are the final ones counted at an axle counting point.





C2/2011R

Derailment of locomotive bogie wheelset in Kolppi on 24 February 2011

An accident occurred at 4.55 am in Kolppi, Pedersöre on Thursday 24 February 2011, due to the derailment of the front bogie wheelset on the second locomotive of a freight train travelling from Kokkola to Pietarsaari. The locomotive, one turnout, and 163 sleepers were damaged, with total repair and clearance costs amounting to 132,000 euros. The accident prevented all traffic on the section of line for nine hours.

The bogie wheelset was derailed by an SA3 automatic coupler on the track. This coupler had been dragged there by another freight train, as a result of incorrect procedures in reaction to the train's decoupling into two parts. The engine driver had believed that the uncoupling lever chain would break when the train set off and that the automatic coupler would remain in place. Trusting the engine driver's assessment, the traffic controller gave the train permission to drive. The automatic coupler separated from the car after the detachment of the bolted key holding the coupler in place, due to a missing screw and the remaining hex screw being too short and without a hex nut. With the poorly secured key installation going unnoticed, wagon maintenance was not performed in line with the related instructions.

Taking all factors into account, accidents of this type are statistically rare. Nevertheless, to prevent similar accidents the Safety Investigation Authority recommends that all SA3 automatic coupler draft clips without screw holders be replaced with clips with screw holders. The Authority further recommends that traffic controllers be issued with clear instructions on how to obtain immediate advice in exceptional situations, in order to solve problems safely.





R2012-01

Derailment of two freight train wagons in Kouvola railway yard on14 January 2012

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.

The Safety Investigation Authority made two recommendations. The operator should improve the visibility of the stop block and develop its yard work instructions in order to take account of all situations that arise during normal work. Instructions important to safety should be presented as a checklist.





S1/2011R Safety study on level crossing accidents

Number of fatalities in level crossing accidents per one million train kilometres in 2004 and 2009.

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.

On average, some 140 level crossings were removed in Finland between 1991–2010. The number of level crossings has dropped by 10% between 2004–2009, which is higher than average in Europe. Removal of level crossings has not been targeted at dangerous level crossings, because removals have primarily been performed to facilitate an increase in the speed limit for the section of line. Improving level crossing safety is not always a part of railway upgrading projects, but is performed with separate funding.



The average processing time of level crossing accident emergency calls increased in the emergency response centres during the reference period of 2003–2010. Traffic controllers and ERC operators have no uniform way of locating the level crossing in question. Municipality information is not included in the files used by traffic controllers, and the ERC operators of some emergency response centres are unable to locate the level crossing, based on the kilometric railway distance information. Rescue Services' risk evaluation instructions do not guide the operator's actions in the best possible way. These instructions have not been updated and no one is nationally responsible for update work.

Several level crossing information databases are used, but the information contained in them is, to some extent, partial. Railway actors have no common database for registering accidents and incidents, but all actors have their own databases and there is no automatic updating from one system to another.

Several researches of level crossing safety have been conducted in Finland since the completion of the previous level crossing safety study. These have been funded by the Ministry of Transport and Communications, the Rail Administration (now part of the Finnish Transport Agency and the Finnish Transport Safety Agency), the Finnish Transport Agency and the Finnish Transport Safety Agency. Concrete suggestions for improving safety have been outlined by these researches, but only some have been implemented.

A measure implemented after the previous level crossing safety study was a campaign targeted at level crossing users, which included e.g. three different radio spots on using the level crossing. These level crossing campaign radio spots were selected as the best social radio ads in 2009. An ongoing measure is the upgrading project of the Seinäjoki–Oulu section of line, where all level crossings will be removed.

21 out of 61 existing level crossing safety recommendations have been implemented. Nine of the unimplemented recommendations are no longer valid or are too extensive, and the investigation commission decided to remove them.

The Safety Investigation Authority, Finland recommends the following, to improve level crossing safety:

- 1. A new strategy should be drawn up to improve level crossing safety, and a concrete plan with funding arrangements should be drafted based on the strategy.
- 2. The safety of each level crossing should be evaluated using new statistical analyses, in order to better specify the order in which level crossings should be secured or removed.
- 3. Databases on level crossings and their conditions should be merged into one and the database should be kept up to date.
- 4. A single and common accident and deviation database for all those operating the railway system in Finland should be created.
- 5. Level crossing safety should also be included in provincial and municipal traffic safety plans.
- 6. When planning school transportation, the municipalities should improve safety by avoiding level crossings without warning devices along the routes.
- 7. Clear instructions should be drawn up regarding road traffic speed limits and the use of the STOP sign at level crossings.



- 8. Ways of improving the perceptivity of level crossings and their conditions of use and technical properties should be specified.
- 9. Instructions on level crossings should be drawn up for road maintainers.
- 10. The visibility of the fronts of locomotives and train units should be improved.
- 11. When planning delivery routes, Itella should improve safety by avoiding level crossings without warning devices.
- 12. Emergency Response Centre risk assessment instructions should be continuously updated and a national quarter responsible for the instructions should be assigned.

The Safety Investigation Authority wishes to highlight two recommendations for further consideration, because factors supporting their implementation were revealed by the investigation:

- At the Suurisuo level crossing and similar level crossings, where it has been noted that sunlight hinders visibility, the visibility of barriers and warning signs should be improved by replacing red blinking filament lamps with blinking or flashing LED lights. [B6/08R/S256]
- A variety of operators should develop systems and implement equipment to facilitate location of an accident site. [B1/09R/S277]



S2/2011R Safety study on level crossing accidents 2011

Fatal level crossing accidents in 2000–2011 by road category.

In 2011, there were 25 level crossing accidents. This is the smallest annual number of accidents during the reference period 1991–2011. Two people were killed and three seriously injured in these accidents. The number of deaths is also the smallest during the reference period. There were two fatal motor vehicle accidents; both occurred at unprotected level crossings on a private road.



Of the four accidents investigated by the Safety Investigation Authority in 2011, three had similar background factors, as discovered in earlier investigations:

- these accidents take place at level crossings on private roads, unequipped with warning devices
- the road typically has a speed limit of 80 km/h
- the level crossing conditions do not comply with the technical guidelines for the rail network (RATO, Ratatekniset ohjeet in Finnish)
- the vehicle's driver is typically accustomed to using level crossings, which is why they are not as perceptive as they should be when approaching the level crossing.

Based on statistical analysis, a more permanent trend can be detected in the fall in the number of level crossing accidents. A statistical analysis of the numbers of accidents occurring at level crossings shows that, in 2009–2011, there was a clear improvement in comparison to previous years.

In 2011, there were 205 cases of barrier damage, according to collected data. Barrier damage mostly consists of barriers broken by vehicles. Most barrier damage occurs in locations with harbours, industry, and heavy traffic to and from such places. Every occasion when a barrier is broken by a vehicle is a potential accident. Not enough is known about the mechanisms leading to barrier damage.

Nearly half of all incidents of barrier damage on secondary lines/industrial lines occurred in the Mussalo harbour in Kotka. Other localities with several damage cases were the harbour towns Kemi, Oulu, Kokkola and Pori. In inland Finland, most damage occurred in Mänttä-Vilppula.

At the end of 2011, 806 level crossings had been equipped with warning devices; the remaining 2,939 level crossings did not have warning devices. Since 2004, the number of level crossings without warning devices has decreased by 810, and by 116 a year on average.

On 23 February 2012, the Safety Investigation Authority, Finland, published a safety study on level crossing accidents (S1/2011R), examining all previously issued recommendations on level crossings and issuing new recommendations. Based on this investigation, the recommendations issued earlier remain relevant. The Safety Investigation Authority does not consider it necessary to issue new safety recommendations.



3.5 Comment and introduction or background to the investigations

Investigations commenced in 2012 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 (de- cision)
	-			

3.6 Accidents and incidents investigated during last five years (in 2008–2012)

Rail investigations in 2008–2012

Accidents investigated			2009	2010	2011	2012	TOT
	Train collision	1	0	0	1	0	2
ents	Train collision with an ob- stacle	0	0	1	0	0	1
.1)	Train derailment	0	1	0	0	0	1
ac 10	Level crossing accident	5	8	3	1	4	21
erious (Art	Accident to person caused by RS in motion	0	0	0	0	0	0
Š	Fire in rolling stock	0	0	0	0	0	0
	Involving dangerous goods ²	0	0	0	1	0	1
	Train collision	2	0	0	1	0	3
ts 21.6)	Train collision with an obs- tacle	1	0	0	0	0	1
len rt	Train derailment	3	2	3	1	3	12
. (A	Level crossing accident	0	0	1	3	37	41
Other ac (Art 19.2) +	Accident to person caused by RS in motion	0	0	0	0	0	0
	Fire in rolling stock	0	0	0	0	0	0
	Involving dangerous goods ⁶	2	0	0	0	0	2
	Incidents	2	1	0	0	1	4
	TOTAL	14	12	8	7	45	86

² Belongs also to another category and is not calculated another time to the total amount.



4 **RECOMMENDATIONS**

4.1 Short review and presentation of recommendations

Recomme	endations	Recomm	Recommendation implementation status							
issued		Implemented		In progress		Not to be imple- mented				
Year	[No.]	[No.]	[%]	[No.]	[%]	[No.]	[%]			
2007	25	12	48	4	16	9	36			
2008	20	8	40	7	35	5	25			
2009	17	11	65	4	23	2	12			
2010	15	6	40	8	53	1	7			
2011	18	14	78	4	22	0	0			
2012	24	5	21	19	79	0	0			
TOTAL	119	56	47	46	39	17	14			

Implementation of recommendations during 2007–2012

Implementation status of Recommendations, see Annex 1

A total of 322 recommendations were issued from the beginning of 1997 until the end of 2012. According to information available at 19 September 2013, 213 (66.1 %) recommendations were implemented and 58 (18.0 %) were decided not to be implemented. The fulfilment of recommendations can take time, as indicated by the fact that, of the 204 recommendations issued from 1997–2006, 157 (77.0 %) had been implemented by the end of 2012 and 41 (20.1 %) were decided not to be implemented.





4.2 Recommendations 2012

S304 Training and procedures in error situations

Traffic control error situations can have a significant impact on railway traffic safety. Critical commands allow the traffic controller to create a situation in which the technical safety equipment system is unable to ensure traffic safety.

The investigation found that, due to communication errors, there had been a major increase in the need for axle counting emergency commands in the month preceding the accident. The Safety Investigation Authority, Finland therefore recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency take the actions required to implement the following recommendation:

Traffic control personnel should undergo regular training and drills on identifying hazards related to error situations and on applying predefined, safe procedures. [C1/11R/S304]

Procedures should be developed for decision-making in error situations, in order to verify decisions taken by a single person. If error situations are common, users are subject to deteriorating levels of awareness with respect to emergency command use. This makes the reliability of equipment extremely important.

S305 Locating trains

A key factor in this accident was incomplete communication on the train's location. For this reason, the Safety Investigation Authority, Finland recommends that the Finnish Transport Safety Agency ensure that the Finnish Traffic Agency and VR Group take the actions required to implement the following recommendation:

Safety management should have a particular focus on punctuality and consistency of communication and on accurate location of trains. [C1/11R/S305]

S306 Emergency release of axle counting sections

In the MiSO TCS system, the axle counting system emergency release function for line sections with low traffic volumes has been set to release the section without special conditions. In some parts of the railway network, the axle counting emergency release function must detect at least one axle leaving the section. Emergency release of the axle counting system is possible only after this has occurred. The purpose of this is to ensure that the last event was a unit leaving the section. Bearing this in mind the Safety Investigation Authority, Finland recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency take the actions required to implement the following recommendation:

It should be a prerequisite for the emergency release of all axle counting sections, that the last axles counted at an axle counting point must be axles exiting the section. [C1/11R/S306]



S307 Replacement of SA3 automatic coupler draft clips without screw holders, by clips with holders

In the case of SA3 automatic coupler draft clips without screw holders, the hex screws supporting the bolted key can slide out of place when the nut is missing. In the version with the screw holder, the head of the hex screw enters the holder, preventing the screw from sliding and falling off when the nut is detached. Only a fraction of all SA3 automatic coupler draft clips have no screw holder. For this reason, the Safety Investigation Autority recommends that the Finnish Transport Safety Agency ensure that VR Group takes the required actions to implement the following recommendation:

SA3 automatic coupler draft clips without screw holders should be replaced by ones with such holders. [C2/11R/S307]



Figure 6. SA3 automatic coupler draft clip with screw holder.

S308 Clarification of traffic controller instructions

Traffic controllers have clear operating instructions for accidents, but not for exceptional situations. In exceptional situations, the communication channel should be via the traffic controller. The traffic controller should have the required contact and real-time information on events occurring on the controlled section of line. The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Traffic Agency and VR Group take the required actions to implement the following recommendation:

Traffic controllers should be issued with clear instructions on how to obtain immediate advice in exceptional situations, in order to solve the problem safely. [C2/11R/S308]

VR's new operations centre could be a good provider and relayer of information.



S309 Level crossing strategy

It would be appropriate to combine the previously issued recommendation *S235* The Finnish Rail Administration should systematically locate crossings that have a bridge nearby or whose traffic can otherwise be directed through a safer route, removing them even though their volume and risk level might be low. into a larger structure.

The Rail Administration published the current level crossing strategy in 2007. Level crossings have been removed and secured in accordance with the strategy's principles, as permitted by the available resources. Removals of level crossings have primarily been performed to enable the application of greater speeds to the section of line. In the follow-up of the Government's decision-in-principle and in the Government's transport policy report to Parliament, the measures taken are considered insufficient.

Practice has shown that the rate of removal and securing level crossings is governed by allocations granted by the Parliament. The level crossing strategy should be accorded greater importance by moving it under the Ministry of Transport and Communications, which might ease acquisition of the required resources.

The Safety Investigation Authority recommends that the Ministry of Transport and Communications take the required action to implement the following recommendation:

A new strategy should be drawn up to improve level crossing safety, and a concrete plan with funding arrangements should be drafted based on this strategy. [S1/11R/S309]

The strategy should include Trafi's order to repair the TEN network level crossings and the possibility to use technically simpler and cheaper warning devices made available by advances in technology.

S310 Level crossing safety evaluation

Based on statistical analysis performed by the investigation commission, dangerous level crossings have no warning devices, the road speed limit is low, and the average traffic volume is large. Such level crossings are typically located in residential areas. To provide the Finnish Transport Agency with the best possible criteria for describing the danger posed by each level crossing, the Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency takes the required action to implement the following recommendation:

The safety of each level crossing should be evaluated using new statistical analyses, in order to better specify the order in which level crossings should be secured or removed. [S1/11R/S310]

Safety evaluation should be a continuous process and, in practice, requires updating the level crossing database.



S311 Level crossing databases

No single up-to-date level crossing database exists, but there are several databases with partially incomplete information. The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency takes the required action to implement the following recommendation:

Databases on level crossing and their conditions should be merged into one and the database should be kept up to date. [S1/11R/S311]

Ongoing database update work should be completed. The public level crossing database located at *www.tasoristeys.fi* should be developed and maintained to make up-todate location and condition information available to everyone. The municipality, name of the crossing road, and the level crossing address information should be added to the database, at a level of accuracy sufficient for finding the level crossing with a navigator. This would enable the emergency response centres and rescue services to make better use of the database in their operations.

S312 Database of accidents and incidents

Railway actors have no common database for accidents and dangerous situations. According to VTT's research, accident information is saved in the information systems of the railway company, the Finnish Transport Agency, and the Finnish Transport Safety Agency. Merging these accident databases is recommended. For this purpose, the Safety Investigation Authority recommends that the Finnish Transport Safety Agency take the required action to implement the following recommendation:

A single and common accident and deviation database for all those operating the railway system in Finland should be created. [S1/11R/S312]

VTT's research shows that the needs and requirements for creating a traffic and accident information centre common to e.g. the Finnish Transport Agency and the Finnish Transport Safety Agency should be investigated. This centre would cover all forms of transport and the information would be analysed and produced for different needs by specialised personnel. The Finnish Transport Safety Agency states in its statement that it would be good to have own comprehensive database on every form of traffic.

The investigation commission states that all parties should have access to the database and that certain parties would have the right and obligation to add and update database information.

S313 Traffic safety plans of the municipalities

In some cases, insufficient consideration is taken of level crossing safety in traffic safety plans devised by the Centres for Economic Development, Transport and the Environment (ELY Centres) and the municipalities.



Stronger account should be taken of level crossing safety in the traffic safety planning instructions. The Safety Investigation Authority recommends that ELY Centres take the action required to implement the following recommendation:

Level crossing safety should also be included in the provincial and municipal traffic safety plans. [S1/11R/S313]

For example, strong account is taken of level crossing safety in the plan of the City of Pori.

According to the Ministry of Transport and Communication's comments on the investigation report draft, the municipalities and ELY Centres use design software as a traffic safety planning tool. This software displays information on all road traffic accidents, based on location information. However, the software does not include level crossing accidents and the Ministry believes that these should be added.

S314 School transport route planning

A pilot assessment conducted by Ramboll Finland Oy researched and evaluated the Hyvinkää–Hanko section of line level crossings used by school and bus transport routes. Research enabled identification of the most dangerous level crossings and the planning of alternative, safer transport routes. The assessment recommended the performance of similar assessments for other sections of line.

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.

The Safety Investigation Authority recommends that the National Board of Education take the action required to implement the following recommendation:

When planning school transportation, the municipalities should improve safety by avoiding level crossings without warning devices along the routes. [S1/11R/S314]

In its comments on the investigation report, the Association of Finnish Local and Regional Authorities states the following: "Level crossings can be avoided in school transport route planning if alternative route possibilities are available. Attention can be drawn to this in school transport training events, by presenting the assessment on the Hyvinkää–Hanko section of line."

According to Ramboll Finland Oy, the pilot assessment had good results and the school transport safety assessment will continue in 2012 for the Seinäjoki–Kaskinen line section.



S315 The road speed limit and use of the STOP sign in level crossings

The previously issued recommendation S216 At a level crossing the maximum speed allowed on the road should be 50 km/h or lower as depending on the locality and the characteristics of the level crossing. should be reformulated.

The recommendation is still valid, because most level crossings have a general speed limit of 80 km/h. VTT's study *Ajonopeudet vähäliikenteisten teiden tasoristeyksissä* (*Driving speeds in level crossings of roads with low traffic amounts*) (*Poutanen 2006*) states that when sightline becomes unobstructed at only a short distance from the track, at the closest measurement point 20–60 % of vehicles drove too fast for the vehicle to halt before crossing the track. According to the Road Administration's instructions, the speed limit should be no more than 50 km/h at a level crossing without warning devices, or 60 km/h at a level crossing with warning devices.

The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency takes the required action to implement the following recommendation:

Clear instructions should be drawn up regarding road traffic speed limits and use of the STOP sign at level crossings. [S1/11R/S315]

In addition to public roads, these instructions should also concern streets and private roads.

S316 Improving the level crossing's perceptivity

The previously issued recommendation *S215 The perceptibility of a train and a level crossing should be improved.* was too extensive and should be divided into recommendations concerning mobile equipment and the level crossing.

Most fatal level crossing accidents occurred at level crossings without warning devices. Level crossing perceptivity was also noted in VTT's research. To make level crossings perceptible sufficiently early for road users and to ensure correct level crossing use, the Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency takes the required action to implement the following recommendation:

Ways of improving the perceptivity of level crossings and their conditions of use and technical properties should be specified. [S1/11R/S316]

Level crossing perceptivity can be improved by using portals and similar means, as well as by installing level crossing signs and approach signs as described in the instructions. In addition, the condition of the signs should be maintained and their visibility ensured.



S317 Instructions to road maintainers

Recommendation S258 The Finnish Rail Administration should inform parties in charge of road maintenance about their obligation to build and maintain road segments leading to level crossings as set out in the relevant regulations. The Finnish Rail Administration should also appropriately inform of any track changes to be made and any shortcomings discovered during inspection rounds. was issued on a previous occasion. It should be reformulated.

Maintainers of private roads have insufficient information regarding their level crossing maintenance obligations. An investigation by the Safety Investigation Authority revealed that the infrastructure manager and a city had completely different views on the obligation to maintain sightline at the level crossing.

The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency takes the required action to implement the following recommendation:

Instructions on level crossings should be drawn up for road maintainers. [S1/11R/S317]

These instructions should contain sections on constructing and upgrading the road related to the level crossing, the road maintainer's obligations, and the appropriate speed limit and STOP sign practices.

The Finnish Transport Agency should use its own local actors and the Finnish Road Association to distribute instructions and organise training for road maintainers and others responsible for maintaining roads.

S318 Improving the visibility of the train's front

The previously issued recommendation *S215 The perceptibility of a train and a level crossing should be improved.* was too extensive and should be divided into recommendations concerning the mobile equipment and the level crossing.

The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that mobile equipment operators take the required action to implement the following recommendation:

The visibility of fronts of locomotives and train units should be improved. [S1/11R/S318]

Glow paint, such as that used for the Allegro train, could be used to improve visibility.

S319 Planning Itella's delivery routes

The previously issued recommendation S224 Itella and other businesses performing deliveries can improve safety by avoiding unguarded level crossings when planning their delivery routes. was too extensively targeted and the follow-up of its implementation was



impossible. To target the recommendation accurately and to facilitate monitoring of its implementation, the Safety Investigation Authority recommends the following:

When planning delivery routes, Itella should improve safety by avoiding level crossings without warning devices. [S1/11R/S319]

S320 The Rescue Services risk evaluation instructions

It seems that nobody is responsible for the Rescue Services' risk evaluation instructions used by the Emergency Response Centres. These instructions have not been changed since their publication. Each rescue department of the Rescue Services area is responsible for these instructions, but the related change needs have not been coordinated nationally.

The Safety Investigation Authority recommends that the Ministry of the Interior take the required action to implement the following recommendation:

Emergency Response Centre risk assessment instructions should be continuously updated and a national operator responsible for the instructions should be assigned. [S1/11R/S320]

The instructions should be changed to better support the selection of the task class most probably suited to the accident type in question.

S321 Use of satellite location to assist in locating trains

Determining the location of trains is a challenging task. In addition to the improved instructions currently in use, the Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Traffic Agency and VR Group take the required actions to implement the following recommendation:

A satellite location system should be implemented as quickly as possible to assist in location. [B1/11R/S321]

An alternative would be to use the location information obtained from the GPS units of VR Group's locomotives and train units.

S322 Checklist for pinpointing locomotive problems while on the line

The relatively inexperienced engine driver was unable to pinpoint the fault, which stopped the train. Engine drivers with the currently required training but less work experience have less equipment-specific technical knowledge than engine drivers with a long career. New drivers must also be able to pinpoint technical locomotive problems and repair them, or provide information about them to technical experts. The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that rolling stock operators take the action required to implement the following recommendation:



Locomotives and train units should be equipped with checklist-type problem solving diagrams, which would help the engine driver when a fault occurs in a locomotive on the line. [B1/11R/S322]

Such a checklist would enable the engine driver to use the instructions in the locomotive instruction holder to solve the problem, or to provide information on the problem to technical experts, who can assist in solving the problem.

When equipment is modernised, the effects of technical changes on the operation of locomotives and locomotive pairs should be investigated.

S323 Reflectors on the ends of the wagons

The visibility of wagons should be improved. In the reconstruction drive, it was found that a wagon without a reflector on the end can only be seen from a short distance in darkness. The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that rolling stock operators take the required action to implement the following recommendation:

Reflectors should be installed on the ends of wagons. [B1/11R/S323]

Reflectors could be in accordance with EU regulation 2011/314/EU section 4.2.2.1.3.2.

S324 Speed during assistance

The calculations show that a distance of 130 metres would have been sufficient to stop the train from a speed of 23 km/h, with normal braking and 32 km/h with emergency braking, when both the reaction time and brake delay are taken into account.

The Safety Investigation Authority recommends that the Finnish Transport Safety Agency take the action required to implement the following recommendation:

The speed of the assisting unit should be limited to 35 km/h, when it is driving to assist a train on the line. [B1/11R/S324]

Traffic control should order shunting work to begin from the main signal displaying the stop signal before the assistance site, or from the station before the assistance site, if there is no main signal to protect the assistance site. Shunting work regulations should be followed when assistance is being provided.

Train assisting should primarily be done with locomotives only. Assisting with a train should be avoided.

S325 Use of the RAILI telephone

The error in location information, which was the main cause of this accident, might have been avoided if the traffic controller and the engine drivers had used group calls. The investigation showed that personnel do not yet know how to use group calls. The Safety



Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the Finnish Transport Agency and rolling stock operators take the action required to implement the following recommendation:

The use of group calls should be made into a standard procedure in exceptional situations. [B1/11R/S325]

In RAILI telephone user training, it should be ensured that all operators know how to use the system in the best possible way. It should also be ensured that the general railway network communication instructions are observed.

S326 Visibility of the stop block

In 1998 the Accident Investigation Board issued a recommendation *The visibility of the stop block should be improved* (S72). This recommendation was registered as having been implemented in 2004.

A stop block constitutes a safety-critical factor and its visibility should be good. During the investigation, it was discovered that some stop blocks are in poor condition with respect to their visibility. The shape of the stop block does not improve its visibility from the direction of the track. Improved reflectivity could improve the visibility of stop blocks in dark conditions.

The Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that railway operators implement the following recommendation:

Stop blocks should be painted well to ensure their visibility, and the block's visibility improved by other means. [R2012-01/S326]

S327 Railway yard work instructions

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 Safety Investigation Authority recommends that the Finnish Transport Safety Agency ensure that the railway operators take the action required to implement the following recommendation:

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. [R2012-01/S327]

RECOMMENDATIONS

Date and time (Co	de):	30.3.2005, 4.07 (1	30.3.2005, 4.07 (B1/2005R)			
Location:		Between Saakoski and Jämsänkoski				
Type of occurrenc	e:	Derailment of car				
Train type and nur	nber:	Passenger train 80	02, locomotive Sr1 + 7 car	r		
Road vehicle:						
			In the train	In the road vehicle		
Persons on board		Crew:	3			
		Passengers:	≈50			
Fatally injured:		Crew:	0			
		Passengers:	0			
Seriously injured:		Crew:	0			
		Passengers:	0			
Slightly injured:		Crew:	0			
		Passengers:	0			
Damages of rolling	g stock:	Derailed wagon and	d its bogie damaged.			
Damages on track	equipment:	About 1 200 meters	s of track were damaged.			
Other damages:		None				
Summary: At Jäms	ä on the Jyväs	kylä - Tampere sec	tion of line between the Saa	akoski and Jä-		
msänkoski stations,	on Wednesda	y March 30, 2005 ea	arly in the morning an incid	ent occurred where a		
bogie of a car of the	e 802 passenge	er train derailed at a rail breakage. The train was carrying about 50				
passengers. Neithe	r the passenge	ers nor the train crew were injured in the incident. The total cost of				
the accident was 12	7 600 euros.					
Final report issued	<i>d:</i> 15.1.2007	7				
Recommendation						
Nr. S212	The complia	nce of the localization	tion data used by the rate	ailway with the data		
	system of the	e Emergency Resp	onse Centre Agencies s	hall be ensured, e.g.		
	by installing	the track-kilometr	e data in the data syste	m of the Emergency		
	Response Ce	entre Agencies.				
Date	Status	Comments				
20.1.2009	In progress	Under process	6.			
19.2.2010	In progress	Will be taken	into consideration in ERC Ac	Iministration's TOTI pro-		
	-	ject.				
16.6.2011 In progress Emergency Response Centre, VR Group		oup Ltd and Finnish				
		I ransport Agency in co-operation are drafting the procedure.				
9.2.2012	In progress	Emergency F	Response Centre, VR Gr	oup Ltd and Finnish		
		Transport Age	ency in co-operation are d	ratting the procedure.		
10.0.0010		Next meeting	last part of this year.	04.4		
19.9.2013	In progress	Will be implen	nented in the end of year 2	014.		

Date and time (Cod	le):	S1/2005R				
Location:	•	-				
Type of occurrence	<i>e:</i>	Safety Study on Level Crossing Accidents				
Summary: At the r	equest of VR-	Group Ltd, in December 2005 the Accident Investigation Board of				
Finland commenced	a safety stud	ly on road/railway level crossing accidents and appointed a commis-				
sion therefore. The	safety study ir	ncluded seven recent level crossing accidents, the first one of which				
had been subject to	investigation	before the commencement of the safety study referred to. Moreover				
the commission inve	estigated othe	r level crossing accidents having occurred in 2003, 2004 and 2005,				
on the basis of data	a collected by	VR-Group Ltd. The investigation also included fatal level crossing				
accidents in 1991-2	004 as based	on investigation documents produced by the Traffic Safety Commis-				
sion of Insurance C	ompanies (VA	LT), statistics from 1991-2004 on level crossing accidents and rail-				
way and road traffic	accidents, inte	ernational statistics on level crossing accidents and railway and road				
traffic accidents, as	well as invest	igation reports on individual accidents in certain countries and docu-				
mentation pertaining	mentation pertaining to projects on the development of level crossing safety in some countries.					
Final report issued	Final report issued: 20.06.2007					
Recommendation	The regulatio	ns in Part 9, RAMO are not applied to old level crossings. Conse-				
Nr. S218	quently it is r	not quite clear what regulations apply to the maintenance of level				
	crossings.					

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	Maintenance inst	Maintenance instructions should be drawn up for level crossings.			
Date	Status	Comments			
20.1.2009	In progress				
19.2.2010	In progress				
16.6.2011	In progress	Maintenance orders and instructions are under preparation.			
9.2.2012	In progress				
19.9.2013	IMPLEMENTED	In guidelines of track maintenance and in book "Guidelines to maintain private owned roads."			

Date and time (Co	de): 17.1.2007, 10.52 (B1/2007R)				
Location:	tion:		Värpiö, Kallmossvägen / Karlå level crossing, unprotected		
Type of occurrence:		Level crossing accident, freight train – van			
Train type and number:		Freight train 3273,	two Dv12 diesel locomotive	s and 35 wagons	
Road vehicle:		Van Opel Astra, 2001 model			
			In the train	In the road vehicle	
Persons on board.	:	Crew:	1	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	g stock:	The locomotive suf	fered minor damage while t	he van was wrecked	
		beyond repair.			
Damages on track	equipment:	None.			
Other damages:		Deliverable post wa	as lost and damaged.		
Summary: On Wed	dnesday 17 Jai	nuary 2007 at 10.50 a.m. an accident occurred in Närpiö in which a			
train carrying lumbe	er on its way fro	om Seinäjoki to Kaskinen collided with a van at an unprotected level			
crossing.	-				
Final report issued	d: 23.11.200	7			
Recommendation	Level crossing	gs and other dange	rous locations should also	be taken into consid-	
Nr. S225	eration when r	mail is sorted route-	specifically.		
	A warning s	ign notifying of	a dangerous location or	n the route, placed	
	between sort	ted mail stacks be	eing delivered, might act	as a prompt to the	
	mail carrier w	hen he/she arrive	s at the dangerous location	on on the route.	
Date	Status	Comments			
20.1.2009	In progress				
16.6.2011	In progress				
9.2.2012	In progress				
19.9.2013	IMPLEMENT	=D STOP-mark b	etween papers.		
Recommendation	Using the safe	ety belt in an accide	ent, even when driving at m	oderate speeds, may	
Nr. S227	prevent injury	or death.			
	Compulsory use of safety belts should be expanded to include delivery				
	vehicle drivers and passengers, irrespective of the driving distance.				
Date	Status	Comments			
20.1.2009	In progress Finnish Transport and Logistics supp		sport and Logistics suppor	ts because of safety	
16.6.2011	In progress				
9.2.2012	In progress				
19.9.2013					
	1				

Date and time (Code):	5.3.2007, 14.39 (B2/2007R)			
Location:	Nivala, Niskakankaantie / Pahaoja level crossing, unprotected			
Type of occurrence:	Level crossing accident, Passenger train – car			
Train type and number:	Local train H494, Dm12 rail bus			
Road vehicle:	Passenger car Renault Laguna Break 1.6, 2000 model			
	In	n the train	In the road vehicle	

Porsons on board		Crow:	2	1
	·	Dessangars:	25	
Fotolly injurady		rassengers. Grow	23	1
ralally ilijuleu.	-	Crew.	0	1
Oo nie week winderne de		Passengers:	0	
Seriousiy injurea:	-	Crew:	0	0
		Passengers:	0	0
Slightly injured:		Crew:	0	0
	_	Passengers:	0	0
Damages of rolling	g stock:	Slight damages to t	he rail bus, the car was cor	npletely wrecked.
Damages on track	equipment:	None.		
Other damages:		None.		
Summary: On Mor	nday 5 March 2	2007 at 2.39 p.m.,	a level crossing accident to	ook place involving a
passenger car and	a rail bus trave	lling from Ylivieska	to lisalmi. Both the driver	and the passenger of
the car perished, whether the car perished whether the second s	hile the train pe	rsonnel and passer	ngers were unharmed. The	accident wrecked the
car beyond repair, w	while the train s	uffered only minor o	damage. The total material	costs due to the acci-
dent were approxim	ately EUR 70,0	00.		
Final report issued	d: 23.11.2007	7		
Recommendation	The Pahaoja	unguarded level c	rossing is situated on a	busy private road in
Nr. S228	Niskakangas v	vhich, in addition t	o the locals, is used by re	egular taxi traffic and
	heavy traffic c	lue to farming and	industry in the area. For	train safety alone, it
	would be extre	emely important that	it the level crossing be equ	lipped with a warning
	station with au	tomátic gates. This	measure would also increa	ase the likelihood that
	a driver notices	s an approaching tra	ain, thanks to lowered or lov	wering gates.
	The Pahaoia	unguarded level	crossing should be ea	uipped with a half
	barrier equipr	nent.	3	
Date	Status	Comments		
20.1.2009	In progress	RHK is not ao	ing to install the level cross	ing with barriers.
16.6.2011	In progress	Nivala town is	of the opinion that the lev	el crossina should be
	1	equipped with	half barriers.	
9.2.2012	In progress			
19.9.2013				
101012010	l			

Date and time (Code):	6.5.2007, 15.33 (B	4/2007R)		
Location:	Kiuruvesi, Pohja level crossing, unprotected			
Type of occurrence:	Level crossing acci	Level crossing accident, passenger train - car		
Train type and number:	Regional train 746,	two Dm12rail busses		
Road vehicle:	Car Nissan Almera	4D Sedan, 2005 model		
		In the train	In the road vehicle	
Persons on board:	Crew:	2	1	
	Passengers:	≈60	1	
Fatally injured:	Crew:	0	1	
	Passengers:	0	0	
Seriously injured:	Crew:	0	0	
	Passengers:	0	1	
Slightly injured:	Crew:	0	0	
	Passengers:	0	0	
Damages of rolling stock:	The car was wreck	ed beyond repair. Equipme	ent of the train's nose	
	and substructure w	ere damaged		
Damages on track equipment:	The wooden cover	ing on the level crossing s	sustained minor dam-	
	age.			
Other damages:	None			
Summary: A fatal level crossing	accident took place	in Kiuruvesi, at the unprote	cted level crossing of	
Pohja. This accident occurred wh	en a car travelling a	along the Pohja private roa	d drove without stop-	
ping under a rail bus running from Ylivieska to Iisalmi. There were two passengers in the car; the drive				
perished and the front seat passenger was seriously injured.				
Final report issued: 29.1.2008				
Recommendation Since the Pol	nja level crossing is	ija level crossing is dangerous with regard to its conditions and very		
Nr. S234 near a safe or	verpass, the investig	ation commission recomme	ends:	

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	The Pohja level crossing should be closed and a replacement overpass be created at the Hilapparannantie bridge.			
Date	Status	Comments		
20.1.2009	In progress			
19.2.2010	In progress			
18.8.2011	In progress			
9.2.2012	In progress			
19.9.2013				

-					
Date and time (Co	de):	9.3.2007, 16.13 (B3/2007R)			
Location:		Särkisalmi, Sinkonen level crossing, unprotected			
Type of occurrenc	e:	Level crossing accident, passenger train car			
Train type and nur	nber:	Regional train 746, Dm12-railcar			
Road vehicle:		Car Mercedes Ben	z 190D, 1985 model		
			In the train	In the road vehicle	
Persons on board	:	Crew:	2	1	
		Passengers:	34	1	
Fatally injured:		Crew:	0	1	
		Passengers:	0	1	
Seriously injured:		Crew:	0	0	
		Passengers:	0	0	
Slightly injured:		Crew:	0	0	
		Passengers:	0	0	
Damages of rolling	g stock:	The railcar's block	age bumper and automati	c coupling of the rail r was severely dam-	
		aged.	a,		
Damages on track	equipment:	None			
Other damages:		None			
Summary: A level crossing accide na to Parikkala took place in Särki passenger car were killed but the		ent involving a passenger car and a rail bus travelling from Savonlin- isalmi on 9 March 2007 at 4.13 p.m. The driver and passenger of the train personnel and passengers escaped uninjured. The passenger the train sustained minor damage.			
Final report issue	ed: 12.12.200)7	<u> </u>		
Recommendation Nr. S237	Drivers cross barriers, as th This route is 2 the Sinkonen ing used, the 2 The Sinkone should be re	a railway through the Särkisalmi level crossing, equipped with half- hey drive along Melkonniementie to the Särkisalmi residential area. 200 metres longer than the route taken by the vehicle driver through level crossing. In order to prevent this dangerous shortcut from be- Accident Investigation Board recommends: en level crossing located in the Särkisalmi residential area			
Date	Status	Comments			
20.1.2009	In progress	The speed lim	nit area of the track has bee	n lengthened.	
16.2.2010	In progress	Parikkala mu Sinkonen level tions.	Parikkala municipal executive board renews comment that the Sinkonen level crossing should be equipped with warning installations.		
16.6.2011	Not yet imple- mented	The Parikkala not agree on t	The Parikkala municipality and Finnish Transport Agency do not agree on the matter.		
9.2.2012	Not yet imple- mented				
19.9.2013	In progress	In municipal d	lecision making process.		

Date and time (Code):	31.12.2005, 9.14 (C9/2005R)				
Location:	Tuupovaara railway	Tuupovaara railway yard			
Type of occurrence:	Derailment				
Train type and number:	Shuntig unit, Dv 12 diesel locomotive and 11 wagons				
Road vehicle:					
		In the train	In the road vehicle		
Persons on board:	Crew: 1+1				
	Passengers:	0			

Crew:	0	
Passengers:	0	
Crew:	1	
Passengers:	0	
Crew:	0	
Passengers:	0	
The derailed wagor	n suffered minor damages.	
None		
None.		
ember 2005 at 9.14	4 a.m., a shunting acciden	t occurred in the Tu-
group of empty wag	ons for carrying wood produ	ucts, being pushed by
, causing the derail	ment of the first wagon in t	he direction of travel.
tanding on the wago	on's left end step, was serio	ously injured after fall-
hit by the left end	step of the next wagon as	he extricated himself
o dragged him for se	veral metres before he was	able to break free.
ntion should be	paid to shunting work	safety during the
snow in rail yards.		
Comments		
Project of occ	upational safety in railway	yards has been start-
ed.		
	Crew: Passengers: Crew: Passengers: Crew: Passengers: The derailed wagor None None. ember 2005 at 9.14 group of empty wag , causing the derail tanding on the wago hit by the left end o dragged him for se ntion should be snow in rail yards Comments Project of occ ed.	Crew: 0 Passengers: 0 Crew: 0 Passengers: 0 Crew: 0 Passengers: 0 Passengers: 0 The derailed wagon suffered minor damages. None None. ember 2005 at 9.14 a.m., a shunting acciden group of empty wagons for carrying wood product, causing the derailment of the first wagon in the tanding on the wagon's left end step, was seried hit by the left end step of the next wagon as o dragged him for several metres before he was ntion should be paid to shunting work snow in rail yards. Comments Project of occupational safety in railway ed.

Date and time (Co	de): 1	13.8.2007, 15.15 (B5/2007R)			
Location:		Nurmijärvi, Röykkä, Leppälammentie / Korpi level crossing, unpro-			
		ected			
Type of occurrenc	e: L	evel crossing acci	dent, Freight train – car		
Train type and nur	nber: F	reight train 3649, 2	2 Dv12 diesel locomotives a	and 41 wagons	
Road vehicle:	C	ar Ford Sierra 2.0	, 1990 model		
			In the train	In the road vehicle	
Persons on board	· C	Crew:	1	1	
	P	assengers:	0	1	
Fatally injured:	C	Crew:	0	0	
	F	Passengers:	0	1	
Seriously injured:	C	Crew:	0	1	
	F	Passengers:	0	0	
Slightly injured:	C	Crew:	0	0	
	F	Passengers:	0	0	
Damages of rolling stock:		Damages to the equipment of locomotive nose, private car entirely wrecked.			
Damages on track	equipment: N	lone.			
Other damages:	N	lone			
Summary: On Mo	onday 13 August	: 2007 at 3.15 p.m	n., a level crossing acciden	t occurred in Röykkä,	
Nurmijärvi, in which	a passenger ca	ar collided with a f	reight train en route from k	(irkniemi to Riihimäki,	
resulting in the deat	h of the car's pas	ssenger and serio	us injuries to the car driver.		
Final report issued	<i>t:</i> 23.6.2008				
Recommendation	Because the ar	ea's growing pop	ulation is continuously incr	easing the volume of	
Nr. S241	traffic at the Ko	orpi level crossing	, and because fast growin	g bushes around the	
	crossing do no	ot enable the ma	aintenance of visibility in	line with Ministry of	
	Transport and Communications and Finnish Railway Administration requirements				
	the investigation commission recommends the following:				
	The Korpi leve	level crossing should be equipped with half-barriers.			
Date	Status	Comments			
20.1.2009	In progress	Will be equipp	ed with half barriers, when	the financing is ok.	
19.2.2010	In progress	In action and economic plan 2010–2013.			

Annex 1/6 (29)

18.8.2011	Not yet imple-	No funding yet.
	mented	
9.2.2012	Not yet imple-	
	menteu	
19.9.2013	In progress	No foundind.

Date and time (Co	de):	21.11.2007 (B7/2007R)			
Location:		Lahti, Heikinpellontie level crossing, unprotected			
Type of occurrenc	e:	Level crossing accident, freight train – car			
Train type and nur	nber:	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	g stock:	The car was wreck	ed beyond repair. The front	of the locomotive	
		sustained some da	mage.		
Damages on track	equipment:	None.			
Other damages:		None.			
Summary: On 21 (October 2007 a	it 12.55 p.m., a fata	al level crossing accident o	ccurred on an unpro-	
tected level crossing	ng along Heiki	inpellontie road in	Lahti. The accident occu	rred when a car on	
Heikinpellontie road	I 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 instar	ntly. The accident occurred	because the driver of	
the car did not see	the train. The le	evel crossing in que	estion meets regulations co	ncerning visibility and	
crossing angles, bu	t does not mee	et those concerning	wait platforms. It is possib	le that the driver was	
not sufficiently vigila	ant due to famil	arity with the crossi	ing and the impression that	train traffic was infre-	
quent there.					
Final report issued	d: 9.9.2008				
Recommendation	Track renovat	ion investments ha	we been scheduled for the	e Lahti–Heinola track	
Nr. S243	within the next	few years. The inte	ended focus is on track tech	nology renewal, but it	
	is clear that th	e investments will a	also cover raising level cros	sing safety to the lev-	
	el set in techr	nical track requirements (RATO). Considering the danger posed by			
	the level cross	ings along the trac	k at the moment, it is recon	nmended that actions	
	to improve lev	vel crossing safety are initiated in advance before the investments			
	proper. Such a	actions include the f	ollowing: possible replacem	ent of level crossings	
	with alternative	e road routing, sigh	tline improvements, wait pl	atform improvements	
	and crossing a	ingle adjustments.			
	Actions to in	mprove level cros	ssing safety along the	Lahti–Heinola track	
	should be o	carried out befor	re the initiation of scl	neduled renovation	
	investments.				
Date	Status	Comments			
20.1.2009	In progress				
19.2.2010	In progress	In some level roads.	crossings there has been re	educed speed limit on	
18.8.2011	In progress	Lahti town pro	pposes to make a level cro building program in the nex	ssing plan and to en- t few years.	
9.2.2012	In progress				
19.9.2013	In progress	Lahti town ha	as made a level crossing st level crossing	and has decided to	
·			5		

Date and time (Code):	4.8.2007, 6.24 (C6/2007R)
Location:	Siilinjärvi, Kemira GrowHow Oyj industrial railway yard
Type of occurrence:	Derailment
Train type and number:	Shunting unit, 3 Dv12 diesel locomotives + 6 tank wagons

Road vehicle:			
		In the train	In the road vehicle
Persons on board:	Crew:	1 + 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:	Tank isolation and bogies of the overturned wagon damaged. Minor		
	damages to two other wagons.		
Damages on track equipment:	Derailer and 5 meter track damaged.		
Other damages:	None.		

Summary: At Kemira GrowHow Oyj railway yard an accident occurred on Saturday 4.8.2007 at 6.24 am, where a tank wagon loaded with nitric acid collided with a derailer, causing the wagon to derail and tip over. The following wagon also derailed. It stayed upright. The total cost of the accident was less than 50 000 euros.

The reason for the accident was that the derailer was not removed before shunting of the wagons and that the derailer that had been left on was not noticed in time. The shunting foreman gave order to shunt without securing the route first.

Final report issued	: 28.10.2008			
Recommendation	Right operation of	Right operation of the derailer should always be secured so that misuse could not		
Nr. S247	be possible. Forge	tting a derailer on should be hindered.		
	A derailer should	always have interdependence to the turnout which leads		
	to the track in	question. Especially railway yards where dangerous		
	substances are ha	substances are handled should always be built according to regulations.		
Date	Status	Comments		
20.1.2009	In progress	No instructions exist.		
18.8.2011	In progress			
9.2.2012	In progress			
19.9.2013	In progress	There will not be a direction which includes old equipment.		

Date and time (Code):	6 10 2008 (B6/200	(7R)	
Location:	Kempele, Sobjanantie / Perälä level crossing, unprotected		
Type of occurrence:	Level crossing acci	dent Pendeline train car	
Type of occurrence.	Dendeline SE2 Sm	$\frac{1}{2}$ electric meter train - Car	
Train type and number:	Pendolino 552, 5m	is electric motor train, 6 car	5
Road venicie:	Car voikswagen Po	bio, 1998 model	
		In the train	In the road vehicle
Persons on board:	Crew:	3	1
	Passengers:	38	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:	Damages to the locomotive nose and the equipment of nose, the		
	car entirely wrecke	d.	
Damages on track equipment: None.			
Other damages:	None.		
Summary: On Saturday 6 Octobe	Summary: On Saturday 6 October 2007 at 11.36 a.m., a car and a Pendolino train en route from Oul		
to Helsinki collided on the Perälä level crossing in Kempele, resulting in the death of the car driver. The			of the car driver. The
train staff and passengers were not injured.			
The direct cause of the accident was that the car driver drove onto the level crossing without stopping			sina without stoppina.
It is likely that the driver failed to make any observation of the train approaching from the left.			rom the left.
Final report issued: 29.12.200	Final report issued: 29 12 2008		
Recommendation Because the	speed limit at the lev	el crossing is 140 km/h and	d because the track is
Nr. S251 in heavy use	the Accident Investi	gation Board recommends	the following:

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	The Perälä unprotected level crossing should be removed or replaced by an		
	interchange.		
Date	Status	Comments	
20.1.2009	In progress	The municipality will remove the level crossing during chanc-	
		ing the town plan.	
18.8.2011	Not yet imple-	Will be removed in context of Seinäjoki-Oulu track project.	
	mented		
9.2.2012	Not yet imple-		
	mented		
19.9.2013	In progress	Will be removed latest in year 2015.	
Recommendation	Because a car can become wedged under the front structure of the train when the		
Nr. S252	structure breaks, the Accident Investigation Board recommends the following:		
	The front structure of the Sm3 electric train should be redesigned to preven		
	cars from being w	edged under the structure.	
Date	Status	Comments	
20.1.2009	In progress		
19.2.2010	In progress		
16.6.2011	Not yet imple-	According to VR the running features of the train would	
	mented	change too much.	
9.2.2012	Not yet imple-		
	mented		
19.9.2013	NOT TO BE IM-	VR: Not technically possible.	
	PLEMENTED		

Date and time (Code):	25.2	.2008, 9.53 (B	1/2008R)	
Location:	Lauk	Laukaa, Notkotie / Kauramaa level crossing, unprotected		
Type of occurrence:	Leve	Level crossing accident, freight train – tractor		
Train type and number:	Freig	ht train 3359,	Dv12 diesel locomotive and	27 wagons
Road vehicle:	Trac	tor Case IH 42	40, 1997 model	-
			In the train	In the road vehicle
Persons on board:	Crev	v:	1	1
	Pass	sengers:	0	0
Fatally injured:	Crev	v:	0	1
	Pass	sengers:	0	0
Seriously injured:	Crev	v:	0	0
	Pass	sengers:	0	0
Slightly injured:	Crev	v:	0	0
	Pass	sengers:	0	0
Damages of rolling stock:	The	front of the loc	omotive sustained some da	mage, the tractor
	was totally wrecked.			
Damages on track equipment	: None	None.		
Other damages:	None			
Summary: On 25 February 20	<i>Immary</i> : On 25 February 2008 at 9.53 a.m., a fatal level crossing accident occurred on Laukaa			occurred on Laukaa's
Kauramaa unprotected level crossing. A tractor returning along an agricultural road from ploughir			road from ploughing	
work drove without stopping in front of a freight train en route from Jyväskylä to Suolahti. The only pe			Suolahti. The only per-	
son in the tractor was the driver, who died from his injuries in hospital later that day.			ay.	
The accident occurred because the driver of the tractor did not observe the approaching train an			pproaching train and	
drove onto the level crossing w	ithout s	topping. Furth	ermore, the crossing did no	t meet level crossing
safety requirements on the part	of the v	alt platform an	nd with respect to signtline.	I oo short a wait plat-
form, in particular, may have caused the driver to focus more than usual on controlling the tractor, to			The driver's visibility	
which extra equipment was nitched, as it approached and arrived at the crossing. The driver's visibilit			. The unversivended	
only for agricultural use and not	we been imparied due to the sun similing against min. The agricultural road was interfued			
Final report issued: 26.1.20				
Pacammondation Two altern	\mathbf{U} , $ 20, 1, 2003$			
Nr S255	and an and the source of the s			
	The Kauramaa level crossing should be removed			
Date Status		Commonte		
19 2 2010 In progress		Laukaa comm	unity seconds the recomme	endation

Annex 1/9 (29)

18.8.2011	Not yet imple-	The municipality of Laukaa and Finnish Transport Agency
	mented	have not yet started discussions.
9.2.2012	Not yet imple- mented	
19.9.2013		

Data and time (Cor	da); 25	0 2009 16 19 /	P6/2008P)	
Date and time (Cot	lisalmi. Suurisuo level crossing, protected, equipped with half barri-			upped with helf herri
Location.	ars			iippeu with hall barn-
Type of occurrence		Level crossing accident passenger train – car		
Train type of occurrence	e. Le	Evel clossing accident, passenger train – cal		
Pood vohiclo:	ra	er. Passenger train 1076, Si relectric locomotive and 7 coaches		
Rodu venicie.	Ca	T TOYOLA Carriery	4D sedall, 1998 model	In the read vehicle
Barcons on board		0.4//		
Persons on Doard.		ew.	4 ~190	1
Fotolly, iniure de	Pa	sserigers:	≈160	1
ratally injured:		ew:	0	1
Cariavaly iniurady	Pa	ssengers:	0	1
Seriousiy injurea:		ew:	0	0
	Pa	ssengers:	0	0
Slightly injurea:	Cr	ew:	0	0
		ssengers:	0	0
Damages of rolling	stock: Ih	e front and left	side of the locomotive w	vere damaged in the
	CO	lision. The car w	as wrecked beyond repair.	
Damages on track	equipment: A	column supportir	ng the track's electric cable	es and its foundations
0.1. 1	inc	urred damage.		
Other damages:	NC O a m t a m b a m 0000	ne.		- line to two fotolities
Summary: On 25	September 2008	at 4.18p.m., a	level crossing accident lea	ading to two fatalities
occurred at the half	barrier equipped	level crossing of	Suurisuo in Iisalmi. The ac	cident occurred when
a private car driving	slowly westward	along Parkatint	ie road collided with a pas	senger train en route
rom Kajaani to He	isinki. The two p	ersons in the ca	ar died instantiy. The car	was wrecked beyond
The direct course of	the excident was	that the oar driv	ar drave ente the lavel grad	
The driver applied the	ne accident was	ar the car had d	riven beneath the lowering	barriar and was bit by
it with the recult th	I ne driver applied the brakes only after the car had driven beneath the lowering barrier and was hit			d not notice the level
it, with the result that the car stopp		a barriere Pote	antially contributory factors	nossibly included the
crossing warning signs of the lowening partiers. Potentially contributory fac		d the driver's impaired e	vesight hearing and	
alertness		a, the arriers impared e	yesigni, nearing and	
Final report issued	· 15.6.2009			
Pecommendation	The visibility of r	ad blinking warn	ing signs should be improv	und at protected level
Nr S256	crossings where	bright sublight	from aboad inhibits the	visibility of the level
NI. 3230	crossings where	signe This ha	s been tested along the T	urku-Tojiala track by
	replacing filamen	ing filament lamps with LED lamps and the results indicate that drivers find		
	the visibility of LF	D lights good		
	At the Suurisuo	level crossing	and similar level crossing	s where it has been
	noted that sunl	aht hinders vi	sibility the visibility of b	arriers and warning
	signs should b	e improved by	replacing red blinking f	filament lamns with
	blinking or flash	ing I FD lights		
Date	Status	Comments		
19.2.2010	In progress			
18.8.2011	Not vet imple-	The town of liv	salmi supports the recomm	endation
10.0.2011	mented			
9 2 2012	Not vet imple-			
0.2.2012	mented			
19 9 2013	In progress	The Finnish T	ransport Agency is not su	re if led-light is hetter
10.0.2010	in progress	than ordinary	lights	
	_		inginto.	

Date and time (Code):	25.6.2008, 16.23 (B3/2008R)
Location:	Liperi, Viinijärvi, Huikuri agricultural road / Huikuri level crossing, unprotected

Annex 1/10 (29)

Type of occurrenc	e: Level crossing accident, passenger train – scooter		oter	
Train type and nur	nber:	Regional train 784, Dm12 rail bus		
Road vehicle:	,	Scooter: Baotian BT49QT-7-TCAP7/49, 2006 model		
			In the train	In the road vehicle
Persons on board	-	Crew:	2	1
		Passengers:	≈20	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	y stock:	The rail bus was slightly	y damaged; the scooter was wrec	ked beyond repair.
Damages on track	equipment:	The ploughing sign	was bent	
Other damages:		None.		
Summary: On Wed	Inesday, 25 Jur	ne 2008, at 4:22.50	pm, a level crossing accide	nt involving a scooter
and a rail bus en ro	oute from Joens	suu to Pieksämäki	occurred at the Huikuri leve	el crossing. The acci-
dent was fatal to the	e driver of the s	cooter. The persor	nel and passengers of the	rail bus remained un-
injured. The scoote	r was wrecked	beyond repair. The	e rail bus incurred damage	to its left front corner
and the obstruction	clearing device	. The repair costs c	of the rail bus amounted to E	EUR 1,400.
The direct cause of	the accident wa	as that the driver of	the scooter drove onto the	level crossing without
stopping. The drive	r of the scooter	probably did not not	otice the rail bus at all or sa	aw it too late. Contrib-
uting to this were th	e following facto	ors:		
- the level crossin	ng was very clos	se to a highway wit	h substantial traffic	
- the driver of the	e scooter was f	ocusing on maintai	ning balance as the road s	surface changed from
tarmac to grave	l 			
 the level crossing the neil human sector of the sector of t	ng was not equi	pped with an active	e warning installation	
- the fail bus was	approaching tr	e crossing at 120 k	(M/M	
Final report incurt of 2.0.2000		see.		
Pinal report issued	I. 7.9.2009		a in the visitive of the livil	
	I nere are several level crossings in the vicinity of the Hulkuri unprotected level			
The Huikuri uppretected level crossing chevid he		be directed.		
Data	Status		rossing should be remove	<u>eu.</u>
19.2.2010		Comments		
18.8.2010	In progress			
9 2 2012	In progress			
10 0 2013	In progress	No changes		
13.3.2013	in piogress	Livo changes.		

Date and time (Code):	13.6.2008, 13.50 (B2/2008R)		
Location:	Helsinki, Mäkelänk	atu 45, Mäkelänrinne stop,	no. 0269
Type of occurrence:	Collision, rear collis	sion	
Rolling stock type and num-	Articulated tram typ	be I, no. 70, line 1, shift 3 –	articulated tram type
ber:	I, no. 42, line 7B, sl	hift 71	
Road vehicle:			
		In the tram	In the road vehicle
Persons on board:	Crew:	1 + 1	
	Passengers:	18 + 31	
Fatally injured:	Crew:	0	
	Passengers:	0	
Seriously injured:	Crew:	0 + 0	
	Passengers:	2 + 0	
Slightly injured:	Crew:	0 + 1	
	Passengers:	11 + 11	
Damages of rolling stock:	The front of the tram colliding with the other was somewhat dam-		
	aged, and the rear of the other tram was seriously damaged.		
Damages on track equipment:	None.		
Other damages:	None.		

Summary: On Friday, 13 June 2008, at 1:50pm, a line-1 tram collided with the rear of a line-7B tram on the Mäkelänrinne stop, on Mäkelänkatu, in Helsinki. Two passengers were severely injured. A tram driver and 22 passengers were slightly injured. Several others received lesser injuries such as bruises and neck and shoulder pain and headaches caused by whip flash. The rails were not damaged and the trams remained on the rails. The rear of the line-7B tram was substantially damaged. For example, the chassis of the rearmost car was bent out of shape. The front of the line-1 tram was somewhat damaged, but after minor repairs it was temporarily operative.

The cause of the accident was that the driver of the tram approaching from behind was not able to stop the tram in time. The driver apparently tried to stop the tram via incorrect braking methods in the belief that the brakes were not working properly. The background factors were the driver's inexperience, the possibility that the driver anticipated that the tram ahead would leave the stop earlier, and the driver's suspicion that the brakes were not working properly and therefore the use of the incorrect braking method.

Final report issued	d:	4.11.2009		
Recommendation	The	The floor hatch that came off at the joints caused severe injury to one passenger.		
Nr. S267	The	floor hatches of	of articulated trams are not locked. In order to ensure that the	
	hate	ches do not com	ne off in collisions and similar accidents.	
	lt s	hould be ensu	red that tram floor hatches remain fastened in all condi-	
	tion	IS.		
Date	Sta	tus	Comments	
19.2.2010	In p	rogress	Fastening of hatches in articulation part has been solved, de-	
			signing of the fastening of other hatches is not yet ready.	
16.6.2011	In p	rogress	Is postponed to year 2012.	
9.2.2012	In p	rogress		
19.9.2013	IMP	EMENTED	65 done, last 17 until in the middle of year 2014.	

Date and time (Code):	Safety Study S1/2008R
Location:	Kouvola remote control
Type of occurrence:	Incident, traffic control safety deviations

Summary: On 21 August 2008, the Accident Investigation Board decided to start a safety study on traffic control safety deviations observed in Kouvola, Finland. The basis for the study was a VR Group Ltd letter sent to the Accident Investigation Board, dated 17 June 2008, in which VR Group expressed its concern about the possible route automation and safety system malfunctions observed in Kouvola Centralised Traffic Control.

Initially, the investigation commission was tasked with investigating two safety deviations that had been observed before the initiation of the study. However a third incident occurred during the early stages of the study, and the decision was made to include it within the scope of the study.

The first deviation occurred on 25 April 2008 at Järvelä station on the Lahti-Riihimäki section of line. During shunting, a route automation memory function generated an unexpected train route setting leading to the turning of the turnouts in front of the shunting unit's intended route.

The second deviation occurred on 23 May 2008 on the Lahti-Riihimäki section of line, between the Hakosilta junction and Lahti station. A commuter train that had departed from Lahti station toward Riihimäki was issued with the number and train route of another commuter train that was awaiting its departure time at the station.

The third deviation was observed on 6 September 2008 on the Kerava–Lahti directr line on the southern side of the Hakosilta junction. Two trains were proceeding toward Lahti with only one block section between them. At the boundary between two interlocking areas on the southern side of the junction, the number of the train travelling first was replaced in the traffic control system with the number of the latter train.

Final report issued	1: 31.8.2009						
Recommendation	In the deviation	management system currently in use information about a					
Nr. S269	deviation does not always reach all the relevant parties. It is possible that even						
	documented devia	itions may not be handled. Also, some deviations has been					
	undocumented. Th	e informing of procedures related to the deviation management					
	has been inadequa	ate.					
	The organisations responsible for the ownership, use, and maintenance of						
	The organisations	s responsible for the ownership, use, and maintenance of					
	traffic control and	a safety equipment systems should improve and clarify the					
	traffic control and procedures by wh	a safety equipment systems should improve and clarify the nich deviations are identified and managed.					
Date	traffic control and procedures by wh Status	a safety equipment systems should improve and clarify the nich deviations are identified and managed.					
<i>Date</i> 19.2.2010	traffic control and procedures by wh Status In progress	a safety equipment systems should improve and clarify the nich deviations are identified and managed.					

Annex 1/12 (29)

9.2.2012	In progress	
19.9.2013	In progress	Will be implemented in 2014.

Date and time (Co	de):	20 10 2008 16 /6	(C6/2008R)	
Location:	Kerava Helsinki Riibimäki section of line			
Type of occurrence:		Incident		
Train type and number:		Commuter train 0700. Sm4 electrical train		
Deed vehicles				
Road venicie:			In the train	In the ready schiele
Democra on hoord	-	0		In the road vehicle
Persons on board:		Crew:	2	
		Passengers:	?	
Fatally injured:	_	Crew:	0	
		Passengers:	0	
Seriously injured:	_	Crew:	0	
		Passengers:	0	
Slightly injured:		Crew:	0	
	-	Passengers:	0	
Damages of rolling	g stock:	None.		
Damages on track	equipment:	One turnout was da	amaged.	
Other damages:		None.		
Summary: On Mon	nday, 20 Octobe	er 2008, at 4:46pm	, an incident occurred in the	e Kerava railway yard
when an H-marked	local train en ro	ute from Riihimäki	to Helsinki passed an entry	signal that was in the
stop position and fo	rced open the to	urnout.		
The reason for pass	sing the entry sig	gnal in the stop pos	sition and forcing open the t	turnout was that the H
train's driver did not	observe the sto	op signal, drove pa	st the signal, and forced op	en the turnout after it.
Final report issued	d: 11.4.2010			
Recommendation	The bridge str	uctures and the ca	atenary suspension limit the	e visibility of the stop
Nr. S272	signal from the	locomotive cab.		
	Signal E681 s	hould be moved to	o a more visible location.	
Date	Status	Comments		
18.8.2011	In progress			
9.2.2012	In progress			
19.9.2013	In progress	Nothing has b	een done yet.	
Recommendation	The train drive	r's advance notific	ation information (ET) did	not provide sufficient
Nr. S274	details about th	ne construction are	a. The information, for exar	nple, did not point out
	that the signal	box was functioni	ng as normal and also did	not remind the driver
	that the visible	signals should be f	followed.	
	Advance notif	ication (ET) provi	ded to the engine driver s	should provide more
	specific inform	nation about ATC	construction area condit	ions.
Date	Status	Comments		
16.6.2011	In progress	ET reported in	the main message that the	e ATP is off.
9.2.2012	In progress		<u> </u>	
19.9.2013	In progress	In 2015 table	et computers to drivers w	ill make the situation
		better		
Recommendation	The informatio	n provided by the	a locomotive's running cor	ntrol as the train an-
Nr S275	proached the A	TC construction ar	ea was incomplete	
11.0270	The running	control monitors	of locomotives and the i	nformation provided
	via these mon	vitors should be d	eveloped in such a way the	hat they provide bet-
	ter informatio	n during non-stan	dard situations	at they provide bet
Date	Status			
18.8.2011		Comments		
0.2011				
10 0 2012		In 2015 table	t computere te drivere: w	ill make the situation
19.9.2013	in progress		a computers to anvers; w	in make the situation
	l	Dellei.		

Date and time (Code):	11.2.2009, 15.12 (B1/2009R)
Location:	Pori, Kyläsaari / Teurastamo level crossing, unprotected
Type of occurrence:	Level crossing accident, freight train – car

Train type and number:	Freight train 3864, diesel locomotive Dv12			
Road vehicle:	Private car Volvo S40, 1997 model			
	In the train In the road vehicle			
Persons on board:	Crew:	1	1	
	Passengers:	1	2	
Fatally injured:	Crew:	0	0	
	Passengers:	0	2	
Seriously injured:	Crew:	0	1	
	Passengers:	0	0	
Slightly injured:	Crew: 0		0	
	Passengers:	0	0	
Damages of rolling stock:	Minor damages to the locomotive. Car was entirely wrecked.			
Damages on track equipment:	None.			
Other damages:	None.			

Summary: A level crossing accident took place at the unprotected level crossing of Teurastamo on the Mäntyluoto–Pori track and Pikakyläntie road on Wednesday, 11 February 2009, at 3.12 p.m. The engine driver emergency braked 29 metres before the collision, when the car had disappeared from his sight. The locomotive hit the middle of the car's right side, not being able to reduce speed before the collision. The car clung to the front of the locomotive and travelled in front of it for 223 metres, until the locomotive stopped. Two passengers in the car suffered fatal head injuries in the accident, and the driver was seriously injured. The locomotive suffered minor damage, while the car was wrecked beyond repair.

The accident was caused by the car driver noticing the train too late and not having time to stop or otherwise prevent the accident.

Final report issued	ed: 10.3.2010			
Recommendation Nr. S276	The Pikakyläntie road is mainly used as a shortcut, and there are two guarded level crossings in the vicinity of the level crossing. Traffic on Pikakyläntie could be safely directed to these roads and over the Pori–Mäntyluoto track. In addition, since equipping a level crossing with a warning installation with half-barriers is expensive, the Investigation Commission recommends: The unprotected level crossing of Teurastamo on the Pikakyläntie road should be removed.			
Date	Status	Comments		
18.8.2011	In progress	Private road transaction is in progress.		
9.2.2012	In progress			
19.9.2013	In progress	Will be removed, scedule not yet decided.		
Recommendation Nr. S277	Time was wasted controller and bety Because of these ERC operator the cue operation, the worst, such locati with fatal consequ A variety of oper facilitate location	The was wasted in locating problems between the engine driver and the traffic introller and between the traffic controller and the Emergency Response Centre. cause of these difficulties, the traffic controller had problems clarifying to the C operator the location of the level crossing. For the entire duration of the res- e operation, the level crossing was referred to with incorrect names. At their rst, such location problems can lead to treatment procedures being delayed, in fatal consequences.		
Date	Status	Comments		
18.8.2011	In progress	Markings on track to demote the location will be improved.		
9.2.2012	In progress			
19.9.2013	In progress	Emergency Response Centre, VR Group Ltd and Finnish Transport Agency in co-operation are drafting the procedure of best practises. Next meeting last part of this year.		

Date and time (Code):	1.10.2009, 12.29	1.10.2009, 12.29 (C4/2009R)			
Location:	Koria station on th	Koria station on the Lahti–Kouvola section of line			
Type of occurrence:	Incident, risk of co	Ilision of a passenger tra	ain and a freight train.		
Train type and number:	Passenger train IC	Passenger train IC6 – freight train 2823			
Road vehicle:					
		In the train In the road vehicle			
Persons on board:	Crew: 2+2				
	Passengers:	400+0			

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Fatally injured:		Crew:	0		
		Passengers:	0		
Seriously injured:		Crew:	0		
,		Passengers:	0		
Slightly injured:	(Crew:	0		
		Passengers:	0		
Damages of rolling	g stock:	None.			
Damages on track	equipment:	None.			
Other damages:	1	None.			
Summary: At 12:2	9pm on Thursda	ay, 1 October 2009	, an incident occurred at th	e Koria station on the	
Lahti–Kouvola secti	on of line, when	n a passenger train	ended up on the wrong tra	ck in front of a freight	
train.					
Several sub-project	s relating to the	Lahti–Luumäki–Va	ainikkala construction proje	ct were under-way on	
the Lahti–Kouvola s	ection of line. V	Vith regard to the K	Coria station, work was in pr	rogress relating to the	
commissioning of a	new signal box	to be installed on	the Lahti–Kouvola section of	of line. The Automatic	
Train Protection (A)	P) system was	not operational at	the Koria station and specia	al arrangements were	
applied at the statio	n. The signal bo	ox of Koria station v	vas manned.		
Final report issued	nal report issued: 18.5.2010				
Recommendation	Safety planning	g for the transitiona	I stage was not entirely suc	ccessful. The location	
Nr. S280	of the construc	tion area, the use	of the railhead sign on the	route, and the utilisa-	
	tion of the feat	ures of the signal	box, were not appropriate	in terms of the entire	
	project. Decom	missioning or exc	eptional usage of systems	relating to Automatic	
	Train Protectio	n and safe traffic	arrangements should be ta	aken into account as	
	separate risk fa	actors in safety plar	nning relating to the railway	system.	
	A risk assess	ment of technical	safety systems as well a	as the planning, im-	
	plementation,	provision of inst	ructions, and monitoring	of safety-enhancing	
	measures bas	sed on this asses	sment should be carried	I out in conjunction	
	with all constr	uction projects in	volving work on safety de	evices.	
Date	Status	Comments			
18.8.2011	In progress	Implemented i	n major projects.		
9.2.2012	In progress				
19.9.2013	IMPLEMENTE	D Risk assessm	ent in SMS.		

Date and time (Code):	25.4.2009, 13.08 (25.4.2009, 13.08 (B3/2009R)			
Location:	Raasepori, Mustio /Ingvallsby level crossing, unprotected				
Type of occurrence:	Level crossing accident, freight train – car				
Train type and number:	Freight train 3534, Dv12 diesel locomotive and 7 wagons				
Road vehicle:	Car Toyota 4D Cor	olla Sedan, 2004 model			
		In the train	In the road vehicle		
Persons on board:	Crew:	1	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 locomotive suffered minor damage and the car was entirely				
	wrecked.				
Damages on track equipment:	Damages on track equipment: None.				
Other damages:	None.				
Summary: At 1:08 p.m. on Satu	rday 25 April 2009,	a level crossing accident	occurred in Mustio in		
Raasepori involving a car and a	freight train en route	e from Kirkniemi to Karjaa.	The accident proved		
fatal to the car driver, while the e	ngine driver escape	d uninjured. While the car	was wrecked beyond		
repair, the train sustained only mi	nor damage.				
The direct cause of the accident	lay in the car's drivi	ng onto the level crossing	while the freight train		
was approaching simultaneously	from the right. It has	s not been ascertained wh	y the car driver drove		
onto the level crossing.					
Final report issued: 15.10.20	nal report issued: 15.10.2010				
Recommendation The Ingvallsb	y unprotected level	crossing offers a shortcut	to Nikuntie, but an al-		

Nr. S282	ternative route to this destination also exists via road 186. The investigation com- mission therefore recommends the following:				
	The Ingvallsby un	Ingvallsby unprotected level crossing should be removed.			
Date	Status Comments				
18.8.2011	In progress				
9.2.2012	In progress				
19.9.2013					

	,				
Date and time (Co	de):	14.7.2009, 11.17 (B6/2009R)		
Location:		Vihti, Kotkaniemi / Kotkaniemi 1 level crossing, unprotected			
Type of occurrenc	e:	Level crossing accident, freight train – car			
Train type and nur	mber:	Freight train 3647, two Dv12 diesel locomotives			
Road vehicle:		Car Renault Megane 1.6, 2000 model			
			In the train	In the road vehicle	
Persons on board.	:	Crew:	1	1	
		Passengers:	0	1	
Fatally injured:		Crew:	0	0	
		Passengers:	0	1	
Seriously injured:		Crew:	0	1	
		Passengers:	0	0	
Slightly injured:		Crew:	0	0	
		Passengers:	0	0	
Damages of rolling	g stock:	The front of the loce	omotive suffered minor dam	nage and the car was	
		entirely wrecked.			
Damages on track	equipment:	Wooden cover of th	e next level crossing was d	lamaged.	
Other damages:		None.			
Summary: At 11:1	7 a.m. on Tue	sday 14 July 2009,	a fatal level crossing acc	ident occurred on the	
Kotkaniementie un	protected level	crossing in Ojakka	ala in Vihti. The accident	occurred when a car	
travelling along Ko	tkaniementie ro	bad drove without	stopping in front of a frei	ght train en route to	
Riihimäki. A nine-y	ear-old girl in	the car was fatally	injured. The car was wre	ecked beyond repair.	
Damage totalling €6	6,000 was cause	ed to yhe rolling sto	ck and to the track.		
The cause of the a	ccident lay in th	ne car driver's com	pletely failing to observe th	e approaching freight	
train.					
Final report issued	d: 15.10.2010	0			
Recommendation	The level cros	sing is very busy w	vith various kinds of traffic,	especially during the	
Nr. S283	summer. Each	year, nearly 4,000	people visit the premises	of Yara Suomi on the	
	other side of t	he crossing (Kotka	niemi road maintenance co	ommittee statement 5	
	November 200	9). There is no alte	ernative route to these prer	nises. In addition, the	
	Kotkaniemi pri	vate road maintena	ance committee covers four	r properties and sum-	
	mer residence	s with a total of 2	2 shareholders. Considerir	ig the busy domestic	
	and internation	hal traffic on the Ko	tkaniemi road, the investiga	ation commission rec-	
	ommends the	following:			
	The Kotkanie	mi 1 level crossin	ng should also be equipp	ed with warning in-	
	stallation with	half-barriers.			
Date	Status	Comments			
16.6.2011	In progress	Transport Age	ency and Vihti municipality	y are drafting a joint	
		project Nissol	a interchange arrangemer	nt preliminary master	
		plan, the purp	ose is the removal of Kotka	niemi level crossing.	
9.2.2012	In progress				
19.9.2013	In progress in a	a The level cros	sing will be equipped with h	alf barriers.	
	different way				

Date and time (Code):	16.12.2009, 13.26 (B9/2009R)			
Location:	Laukaa, Lemettilänmäentie / Lemettilä level crossing, unprotected			
Type of occurrence:	Level crossing acci	Level crossing accident, freight train – van		
Train type and number:	Freight train 3365, Dv12 diesel locomotive and 23 wagons			
Road vehicle:	Van Volkswagen Transporter, model 1998			
	In the train In the road vehicle			
Persons on board:	Crew:	2	1	

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19.9.2013

In progress

	Passengers:	0	1
Fatally injured:	Crew:	0	1
	Passengers:	0	1
Seriously injured:	Crew:	0	0
	Passengers:	0	0
Slightly injured:	Crew:	0	0
	Passengers:	0	0
Damages of rolling stock:	The front of the locomotive sustained some damage, the van was		
	totally wrecked.		
Damages on track equipment:	None.		
Other damages:	None.		

Summary: On Wednesday 16 December 2009 at 13:26 p.m., a fatal level crossing accident occurred on the Lemettilä unprotected level crossing in Laukaa municipality. The accident occurred when a van with a couple inside drove in front of a freight train en route from Jyväskylä to Aänekoski. The van's driver and passenger died immediately from the injuries received. The damage caused by the accident to rolling stock amounted to \in 1,300.

The cause of the accident was that the van driver drove onto the level crossing without apparently observing the train approaching from the right. A contributing factor was the fact that, when approached, the crossing looks safe, rendered observation more difficult. Special care should have been exercised, however, considering that the road slopes downwards before the level crossing, that there is a road crossing close to the level crossing and that the sun was shining directly towards the approaching van. *Final report issued:* 13.12.2010

 Recommendation
 With the supply of relevant signs and within limitations set by the road maintainer, traffic passing through the Lemettilä unprotected level crossing could be redirected to cross the bridge on road 637 north of the crossing. In addition, given that equipping the crossing with a half-barrier installation is expensive and would not ensure that further accidents are prevented, the investigation commission recommends:

 Date
 Status
 Comments

 16.6.2011
 In progress
 In progress

Will possible be removed next year.

Date and time (Code):	26.4.2010, 17.10 (B4/2010R)	
Location:	Helsinki railway ya	rd, turnout V013	
Type of occurrence:	Derailment		
Train type and number:	Commuter train 94	88, 3 x Sm4 electric train ur	nits
Road vehicle:			
		In the train	In the road vehicle
Persons on board:	Crew:	2	0
	Passengers:	100	0
Fatally injured:	Crew:	0	0
	Passengers:	0	0
Seriously injured:	Crew:	0	0
	Passengers:	0	0
Slightly injured:	Crew:	0	0
	Passengers:	0	0
Damages of rolling stock:	The train's wheels, bogies, chassis protection sheets, left side, two		
	windows, pantograph, and some roof structures were damaged.		
Damages on track equipment:	Both switch mecha	nisms were replaced. Sleep	pers and rails were
	damaged. A catena	ary, portal and support were	e replaced.
Other damages:	None.		
Summary: On Monday 26 April 2010 at 5:10 pm, a commuter train was derailed in Helsinki at a			
turnout. The train was approaching	ng track 6 at Helsin	ki station when a turnout a	long the route turned

turnout. The train was approaching track 6 at Helsinki station when a turnout along the route turned underneath the train causing the train to be derailed. The rearmost unit of the three-unit train derailed and collided with a catenary support, with the result that the portal fell on the train's roof causing extensive power outage at Helsinki railway yard. The derailed unit was damaged and there was also damage to track equipment. There were no personal injuries.

The cause of the derailment was that the turnout turned underneath the train. This was due to

emergency commands issued from the signal box control. The traffic controller issued the commands to a turnout other than the one intended. Contributing to this was the fact that insulated track section faults had been common at Helsinki railway yard. Due to these faults, traffic control was using shunting routes for which emergency commands could be issued. This had become almost daily practice. Methods with stripped security were being used so as not to disturb the flow of traffic. Partly contributing to the accident was the fact that the traffic controller had very little experience with the task.

Final report issued	1:	7.4.2011		
Recommendation	The	e rail system and	d traffic control involve tasks for which proper handling requires	
Nr. S287	plenty of system knowledge, practice, and attention. During the rush hour, and			
	esp	ecially during e	quipment failure, the Helsinki signal box control tables are criti-	
	cal	locations with	regard to safety. The investigation commission therefore rec-	
	om	mends the follow	ving to the Finnish Traffic Agency and VR Group:	
	Tra	ffic control job	rotation should ensure that demanding posts are familiar	
	to traffic controllers by means of training and sufficient job rotation. With			
	regard to training in the identification and handling of disturbances, and			
	response procedures relating to them, special attention should be given to			
	pra	ctices that do	not compromise safety.	
Date	Sta	itus	Comments	
9.2.2012	In p	orogress		
19.9.2013	IMF	PLEMENTED	Regular training.	

Data and time (Cada):	10 2 2010 4 42 (24/20400)		
Date and time (Code):	19.2.2010, 4.43 (C1/2010R)			
Location:	The tracks at the N	The tracks at the Neste Oil Oyj unloading terminal in Kilpilahti		
Type of occurrence:	Collision with a soli	d object (buffer stop)		
Train type and number:	Shunting unit, Dr14	diesel locomotive + 51 tan	k wagons	
Road vehicle:				
		In the train	In the road vehicle	
Persons on board:	Crew:	1+2	0	
	Passengers:	0	0	
Fatally injured:	Crew:	0	0	
	Passengers:	0	0	
Seriously injured:	Crew: 0 0			
	Passengers:	0	0	
Slightly injured:	Crew:	0	0	
	Passengers:	0	0	
Damages of rolling stock:	One tank wagon was badly damaged, whilst the wheels of another			
	got flats.			
Damages on track equipment:	The rail barrier on the track was damaged.			
Other damages:	Some of the gas pipelines at the refinery were bent, and the pipe			
	insulation was damaged. The pipeline supports were also dam-			
	aged.			
Oursenance On Editer to Editer an OOAO fine test and shall be all offer with several states				

Summary: On Friday, 19 February 2010, five tank wagons pushed by a shunting unit bumped against a rail-barrier stop on track 204 at the Neste Oil Oyj unloading terminal in Kilpilahti, Finland. The first barrier wagon fell down the embankment, hitting a gas pipeline at the bottom. The second protection wagon came to a stop at the edge of the embankment, and the three Russian wagons behind it, containing industrial gasoline, were derailed. Neither the gas pipeline nor the wagons suffered any leaks. The wagons containing industrial gasoline had to be emptied before clearance work could begin.

The immediate cause of the accident was the shunting foreman's failure to escort the wagons all the way. He was under the impression that there was enough room for the wagons on the track. The shunting foreman's activities were influenced by the following factors:

-While trying to disengage the brakes, the conditions for the shunting foreman were hot.

-They were then cold during the long (3 km) pushing movement.

-It was the foreman's third night shift in a row and he was very tired.

-It was the foreman's first shift as an independent shunting foreman at Kilpilahti.

-The shunting foreman had not received sufficient training to act as a shunting foreman at the unloading terminal.

Final report issued: 13.4.2011

Recommendation If the person participating in orientation training is working as a member of a train

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Nr. S289	crew, it is difficult for him or her to observe what the shunting foreman is doing. Therefore, the Accident Investigation Board recommends the following: The orientation training given to shunting foremen should be carried out so that the person participating in the training accompanies the shunting unit as an extra crew member.		
Date	Status	Comments	
9.2.2012	In progress		
19.9.2013	IMPLEMENTED	New orientation training system.	
Recommendation Nr. S290	To ensure that the orientation training for new duties is comprehensive, the Acci- dent Investigation Board recommends the following:		
	An orientation plan and an orientation training card be drawn up, with the		
	latter signed by b	oth the orientation trainer and the trainee after the training	
Date	Status	Comments	
9.2.2012	In progress		
19.9.2013	IMPLEMENTED	New orientation training system.	

Date and time (Code):	16.6.2009, 20.51 (B5/2009R)			
Location:	Toijala railway yarc	1		
Type of occurrence:	Derailment			
Train type and number:	Freight train 3513,	Sr1 electric locomotive and	30 wagons	
Road vehicle:				
		In the train	In the road vehicle	
Persons on board:	Crew:	1	0	
	Passengers:	0	0	
Fatally injured:	Crew:	0	0	
	Passengers:	0	0	
Seriously injured:	Crew: 0 0			
	Passengers:	0	0	
Slightly injured:	Crew:	0	0	
	Passengers:	0	0	
Damages of rolling stock:	Ten wagons damaged.			
Domogoo on trock oguinmont	450 metres of track, two turnouts, safety devices and the portal			
Damages on track equipment.	suspension of elect	tric railway were damaged.		
Other damages:	A safety device and communications cable was damaged.			

 Other damages:
 A safety device and communications cable was damaged.

 Summary:
 Ten wagons of a freight train on its way from Turku to Tampere were derailed in Toijala on 16 June 2009 at 8:51pm. Five of the wagons tipped over. The derailed wagons were the 17th–26th wagons of the total 30 wagons in the train. The speed of the train at the moment of derailment was 70km/h. Safety equipment, parts of the track, and electric railway equipment were damaged in the accident. Safety device and communications connections were disrupted in Toijala and in the nearest operating points.

Traffic was totally interrupted for 5 hours 20 minutes. When operations were resumed, diesel locomotives were used initially to pass the accident spot, using one track only. The first train passed the accident spot at 2:10am. The first electric train passed Toijala on 18 June 2009 at 3:40pm, that is, some 43 hours after the accident. Close to normal operations were resumed on the main track on 18 June 2009 after 8pm, 48 hours after the accident. Traffic between Turku and Tampere resumed on 19 June 2009 after 6pm, but trains were unable to stop at Toijala. Trains between Turku and Tampere were again able to stop at Toijala on 28 June 2009. Normal operations were resumed 15 days after the accident.

According to VR, 134 passenger trains and more than 100 freight trains had to be cancelled as a result of the accident at Toijala. In terms of direct costs, the damage to rolling stock, track and equipment amounted to more than € 2 million.

No direct environmental damage was caused by the accident. Due to insufficient clearing and cleaning operations, an odour problem and a pest problem later developed in the railway yard. The wagons involved in the accident contained grain and fishmeal, among other things. The cleaning was completed on 21 July 2009, 35 days after the accident.

The derailment of the freight train was caused by a switch turning underneath the train. In the ensuing investigation, it was shown that it was possible to force open the switch lock by exposing the switch blade to mechanic oscillation at the frequency same as caused by the axles of the freight train in question. It also became apparent in the investigation that the Railex locking device had been adjusted

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eccentrically, and the	nat the switch conta	ctors at the locking device allowed the closed switch blade to		
move in excess of the reference value. The Investigation Commission considers it likely that as a				
combined result of track geometry, switch adjustments, the oscillatory properties of the switch, and the				
rolling stock passing	g through the turnou	t, the switch lock became unlocked as the train passed over it.		
Final report issued	d: 4.5.2011			
Recommendation	A switch is the sing	le most dangerous element in a railway system. Incorrect work		
Nr. S291	methods used in the	ne maintenance of switches may lead to systematic faults. To		
	ensure that no misa	adjusted locking devices or switch contactors remain on Finnish		
	railways, causing a	a significant risk of derailment, the Investigation Commission		
	recommends that t	the Finnish Transport Agency and VR Track Oy carry out the		
	following:			
	Adjustments of the	ne locking devices and switch contactors located next to		
	them should be	inspected regularly and adjusted according to reference		
	values.			
Date	Status	Comments		
9.2.2012	In progress			
<u>19.9.2013</u>	IMPLEMENTED	Inspected and adjusted in the end of 2013.		
Recommendation	The investigation revealed that under test conditions it was possible to repeatedly			
Nr. S292	create a situation	in switch where mechanical oscillation in the closed blade		
	caused the point switch to become unlocked. The Investigation Commission there-			
	fore makes the following recommendation to the Finnish Transport Agency:			
	How the mechanical switch lock become unlocked should be investigated			
	under normal circ	cumstances, as well as control disturbances in the point		
	switches.	A		
Date	Status	Comments		
9.2.2012	In progress	-		
19.9.2013	IMPLEMENTED	l ested under normal circumstances, in well-adjusted switch.		
Recommendation	During the investig	pation it transpired that the documentation of switch mainte-		
Nr. S293	nance was insuffici	ent. The Investigation Commission therefore makes the follow-		
	ing recommendatio	n to the Finnish Transport Agency:		
	The installation, in	nspections and maintenance of switches and their compo-		
Dete	nents should be s	eamiessiy documented.		
	Status	Comments		
9.2.2012	In progress			
19.9.2013	In progress	Project of managing condition of switches started, ready 2014.		

Date and time (Code):	4.1.2010, 8.28 (B1	/2010R)	
Location:	Helsinki Central Railway Station, track 13		
Type of occurrence:	Collision with an ob	stacle (with a rail barrier ar	d thereafter the wall
	of a building)		
Train type and number:	Shunting unit: Pass	senger train IC71 during shu	unting to the depar-
	ture track, Sr2 elec	tric locomotive and 8 passe	nger cars
Road vehicle:			
		In the train	In the road vehicle
Persons on board:	Crew:	1+1+2+1	0
	Passengers:	0	0
Fatally injured:	Crew:	0	0
	Passengers:	0	0
Seriously injured:	Crew:	0	0
	Passengers:	0	0
Slightly injured:	Crew:	1	0
	Passengers:	0	0
Damages of rolling stock:	One car damaged badly and other four sustained some damage.		
Damages on track equipment:	A rail barrier, parts of the track and some electric track equipment		
	damaged.		
Other damages:	The building at the end of the track suffered damage.		
Summary: At 8:28am on Monda	ummary: At 8:28am on Monday, 4 January 2010, four passenger cars that had become separated		
from a train collided with a rail barrier at the end of the track at the Helsinki Central Railway Station at			

from a train collided with a rail barrier at the end of the track at the Helsinki Central Railway Station at a speed of approximately 35 km/h. The front end of the double-decker coach that was the first in the train was pushed onto the damaged rail barrier and then the concrete buffer stop at the end of the

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track, eventually hitting the wall of the office building at the end of the track. The car broke the wall and came to a stop partially inside the building. Pushed by a locomotive, the train was being shunted to its departure track at the Helsinki station from the Ilmala depot, 4.5 kilometres away. The security officers at the station managed to evacuate the people from the platform before the collision.

Of the three people in the cars during the collision, one was slightly injured. Having collided first with the rail barrier and then the wall of the office building, the double-decker coach was so badly damaged that it had to be scrapped. The second, third, and fourth cars in the train suffered minor damage. In the fifth car, a 1,500-volt cable and a UIC cable were broken, and a brake conduit came loose. The other cars were undamaged. The rail barrier at the end of the track was completely crushed, and the concrete buffer stop behind it suffered minor fractures in the corners. The horizontal end beam to which the contact wires are attached was torn off. The office building suffered substantial material damage. The load-bearing primary frame of the building did not suffer significant damage, but the hollow-core slabs were fractured, and they also moved slightly. A meeting room in the impact area on the second floor of the building was completely destroyed, and the street-level entrance suffered substantial damage. Additionally, the building maintenance and safety-technology-related systems in the immediate vicinity of the impact area were damaged. The total costs of the damage amounted to € 825 000.

The accident was caused by the coupling loop coming loose from the hook during the pushing movement. This caused the train to break into two, and the automatic air brakes engaged once the brake conduit had come off. The conductor released the brakes of the cars to get the train moving. He did not realise that the train had broken into two. The coupling loop come loose because, as the car buffers compressed, the coupling loop, which had frozen solid, rose off the hook. The situation was aggravated by the fact that the screw coupling had not been tightened properly. Seeing the coupling loop was difficult because of poor lighting and the ice and snow in the space between the cars. The train in question had last been de-iced nine days previously, and there was a lot of snow on the bogies and between the cars. Additionally, the water coming from the outlet pipe of the sink in the WC of the car behind the restaurant coach had increased the formation of ice in this space.

Final report issued	d: 5.5.2011			
Recommendation	The current instructions for tightening of the screw coupling, 'to be tightened suffi-			
Nr. S296	ciently', leave too much room for interpretation. This is why the Investigation			
	Commission recom	mends to the Finnish Transport Safety Agency that it ensure		
	that the VR Group	take the necessary steps to implement the following recom-		
	mendation:			
	Unambiguous ins	tructions concerning the tightening of the screw coupling		
	in various car type	es should be drawn up.		
Date	Status	Comments		
9.2.2012	In progress			
19.9.2013	IMPLEMENTED	Instructions has been given.		
Recommendation	Currently there are	no instructions concerning use of the handbrake in a situation		
Nr. 5297	where cars have to be released by milking them to get the train moving. To en-			
	sure that cars remain stationary at all times, the investigation Commission rec-			
	ommends to the Finnish Transport Safety Agency that it ensure that the VR Group			
	take the necessary steps to implement the following recommendation:			
	To ensure that the cars remain stationary while the brakes are released by			
	'milking', instructions on the use of the handbrake should be drawn up.			
Date	Status	Comments		
9.2.2012	In progress			
19.9.2013	In progress	Instructions in the making.		

Date and time (Code):	30.12.2008 (C1	30.12.2008 (C1/2009R)			
Location:	Korvensuo-Haar	ajoki, Kerava Hakosilta sect	ion of line		
Type of occurrence:	Incident, wrong s	ignal information of the ATP			
Train type and number:					
Road vehicle:					
		In the train In the road vehicle			
Persons on board:	Crew:	0	0		
	Passengers:	0	0		
Fatally injured:	Crew:	0	0		
	Passengers:	0	0		
Seriously injured:	Crew:	0	0		

	Passengers:	0	0
Slightly injured:	Crew:	0	0
	Passengers:	0	0
Damages of rolling stock:	None.		
Damages on track equipment:	None.		
Other damages:	None.		

Summary: According to a deviation notification a safety problem was encountered in Korvensuo on 30 December 2008. Engine drivers notified that they were receiving restrictive information. A distant signal was indicating stop even though a balise at the previous signal had given to the automatic train protection equipment (ATP) the preliminary information that driving at the fastest speed was permitted (proceed FsI), and, as the train caught sight of the subsequent main signal, it showed the proceed aspect.

The reasons for the faulty ATP operation was that an outdated card version had been placed in the IM -module (signal box computer) controlling data transfer between Haarajoki and Korvensuo signal boxes. The wrong flash card had been installed because the software version had not been verified before installing the card. The installers said that this was because verification equipment was not operational due to the transfer of the office to another location. The card had also not been marked sufficiently clearly.

The situation was temporarily fixed once the deviation had become apparent by setting an 80 km/h speed limit in the area. The Thales "Emergency Team" met on 5 January 2009 to analyse the situation. Once the reason for the irregularity was observed, a new flash card was installed in the Haarajoki signal box module on 5 January 2009 at 23.00. The operations were tested and on 7 January 2009 the 80 km/h speed limit was lifted from the area.

Final report issued	1: 11.5.2011		
Recommendation	In order to prevent the use of wrong card versions, the Accident Investigation		
Nr. S300	Board has made the following recommendation:		
	The Finnish Tran	sport Agency should ensure that signal box adjustment	
	and repair work ir	spections, and documentation relating to them, are super-	
	vised and the imp	ortance of inspection is emphasised in signal box mainte-	
	nance training.		
Date	Status	Comments	
9.2.2012	In progress		
19.9.2013	IMPLEMENTED	In RATO part 6.	
Recommendation	In order to prevent the use of wrong card versions, the Accident Investigation		
Nr. S301	Board has made th	e following recommendation:	
	The Finnish Transport Agency should ensure that component versions a marked clearly and that personnel are made aware of different versions d		
	ing maintenance actions.		
Date	Status	Comments	
9.2.2012	In progress		
19.9.2013	In progress		

Date and time (Code):	14.4.2010, 16.47 (B3/2010R)	
Location:	Karjaa, Leskinen/Leppämäentie level crossing, unprotected		
Type of occurrence:	Level crossing acci	dent, commuter train - car	
Train type and number:	Commuter train 38	9, Dm12-railbus	
Road vehicle:	SUV Mitsubishi PA	JERO, model 1993	
		In the train	In the road vehicle
Persons on board:	Crew:	3	1
	Passengers:	~ 30–40	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 front of the commuter train was damaged; the SUV was		
	wrecked beyond re	pair.	
Damages on track equipment:	None.		
Other damages:	None.		

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Summary: On Wednesday 14 April 2010 at 4.47pm, a fatal level crossing accident occurred on the Leskinen/Leppämäentie unprotected level crossing in Raasepori, Karjaa. The accident occurred when an SUV leaving a nearby logging site collided with a commuter train (railbus) en route from Hanko to Karjaa. The only person in the SUV was the driver, who died instantly. The damage caused by the accident to track equipment amounted to \notin 94,500. The SUV was wrecked beyond repair.

The accident occurred because the car driver observed the approaching train too late and was no longer able to stop before the level crossing.

The factors contributing to this were:

-The driver was probably focused on something other than making a safe crossing. -The crossing was quite familiar to the driver, which usually reduces vigilance when approaching.

-The level crossing was not equipped with warning installations.

-Driving and a safe crossing were hindered by the road being on an incline, the lack of wait platforms, high track embankment and trees surrounding the road.

Final report issued	d: [25.5.201	1	
Recommendation	Con	sidering	the po	por sightlines at the level crossing as well as the incline and
Nr. S302	track	rack speed limits, the investigation commission makes the following recommen-		
	datio	on:		
	The	The Leskinen/Leppämäki level crossing should be replaced by an inter-		
	chai	nge.		
Date	Stat	tus		Comments
9.2.2012	In pr	rogress		
19.9.2013	IMP	LEMENT	ED	Replaced with underpass.

Date and time (Code):	25.2.2010, 12.42 (B2/2010R)	
Location:	Pori Tattaritie/Tatta	ri level crossing, unprotecte	ed
Type of occurrence:	Level crossing acci	dent, Car – Freight train	
Train type and number:	Freight train 3862,	Dv12 diesel locomotive and	5 wagons
Road vehicle:	Car Ford Mondeo,	model 1998	
		In the train	In the road vehicle
Persons on board:	Crew:	1	1
	Passengers:	0	1
Fatally injured:	Crew:	0	1
	Passengers:	0	1
Seriously injured:	Crew:	0	0
	Passengers:	0	0
Slightly injured:	Crew:	0	0
	Passengers:	0	0
Damages of rolling stock:	Minor damages to t	the locomotive front, the car	r entirely wrecked.
Damages on track equipment:	None.		
Other damages:	None.		

Summary: On Thursday 25 February 2010 at 12:42, a fatal level crossing accident occurred in Pori on the level crossing at the intersection of Tattaritie and the Mäntyluoto-Pori railway line. The driver of the train noticed that a passenger car was approaching the crossing from the right and gave a warning signal. It then became apparent to the driver of the train that the passenger car was not going to stop and the driver of the train put on the emergency brakes. The train ran into the left side of the car, the car jammed into the locomotive and the locomotive forced the car forward for 304 metres until the train came to a halt. The right buffer of the train penetrated the left side window of the car. The driver of the car died immediately from head and chest injuries. A car passenger died later in hospital from head and chest injuries.

The accident occurred because the driver of the car failed to notice the approaching train in time and was no longer able to stop or otherwise prevent the collision. Factors contributing to this were:

-The crossing was familiar to the driver of the car, which is a factor that generally reduces vigilance. The driver had also driven across the level crossing in the other direction moments before the accident.

-The level crossing was not equipped with warning installations.

-The level crossing was not equipped with proper waiting platforms and the road rises before the crossing to such an extent that drivers tend to avoid stopping before the crossing, especially in wet or slippery conditions.

-The car had tyres designated for summertime use.

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-For	-For the 30 metre stretch before the level crossing, the road had two intersections with		
give	way signs.		
Final report issued	<i>l:</i> 19.7.2011		
Recommendation	The Tattaritie level crossing provides the only access to a nearby residential area,		
Nr. S303	but it would be possible to organise a safer route by building 200 metres of road in		
	such a way that the new road would connect with the Ulasoori-Kanaa road, which		
	has a level crossing equipped with warning installations.		
	The Tattaritie level crossing should be removed.		
Date	Status	Comments	
5.1.2012	IMPLEMENTED	Restricted to light traffic only.	

Date and time (Co	de):	2.2.2011, 11.55 (C	:1/2011R)	
Location:		Nurmes, Joensuu Kontiomäki section of line		
Type of occurrence:		Collision of freight trains		
Train type and nur	nber:	Freight train 4720,	Dv12 diesel locomotive – F	reight train4713,
		Dv12 diesel locomo	otive and 8 wagons	-
Road vehicle:		-		
			In the train	In the road vehicle
Persons on board	:	Crew:	3	
		Passengers:	130	
Fatally injured:		Crew:	0	
		Passengers:	0	
Seriously injured:		Crew:	0	
		Passengers:	0	
Slightly injured:		Crew:	2	
		Passengers:	0	
Damages of rolling	g stock:	The diesel engine of	chassis were bent and the b	ouffers, centre buffers
		with shunting coup	ers, and engine covers wer	e damaged.
Damages on track	equipment:	None.		
Other damages:		None.		
Summary: A collis	ion between a	freight trains occurr	ed in the direction of Lieksa	a, two kilometres from
the Nurmes yard, o	n Wednesday	2 February 2011 at	11.55. Both the engine driv	ver and traffic control-
ler in the locomotive	e were injured,	while both locomotiv	ves sustained major damag	je.
The immediate cau	ise of the acci	dent was the cance	ellation of interlockings neo	cessary to signal box
safety, thus allowin	g the trains to	use the same track	k. The insulation fault, freq	uency of critical com-
mands, inadequate	train location i	nformation and inac	lequate communication all	contributed to the ac-
cident. Apparently, the traffic cont		roller believed that	train 4713 was already at 1	the Nurmes yard. De-
spite having spoken to the engine		driver, the controlle	r did not realise that this tra	in was standing at the
entry signal.				
Final report issued	1: 30.1.2012			
Recommendation	I raffic control	error situations can	have a significant impact of	on railway traffic safe-
Nr. S304	ty. Critical cor	nmands allow the t	raffic controller to create a	situation in which the
	technical safe	y equipment system is unable to ensure traffic safety.		
	ine investigat	ion found that, due to communication errors, there had been a major		
	ind the accide	of		
	Traffic contro	n. Narsonnal shoul	d undergo regular trainin	a and drills on idon-
tifying bazards related to orro		de related to error	situations and on apply	ing predefined safe
	procedures.		situations and on apply	ing predefined, sale
Date	Status	Comments		
19.9.2013	In progress	Will be taken i	nto account in repetition tra	aining program
101012010	in progreeo			
Recommendation	A key factor in	this accident was in	ncomplete communication	on the train's location
Nr. S305 Safety management should have sistency of communication and		runs accident was incomplete communication on the train's location.		
		on accurate location of t	rains.	
Date	Status	Comments		
19.9.2013	In progress	Ifrastructure r	managers instructions 201	4 can possibly solve
		the poblem.		

Annex 1/24 (29)

Recommendation Nr. S306	In the MISO TCS system, the axie counting system emergency release function for line sections with low traffic volumes has been set to release the section with- out special conditions. In some parts of the railway network, the axie counting emergency release function must detect at least one axie leaving the section. Emergency release of the axie counting system is possible only after this has oc- curred. The purpose of this is to ensure that the last event was a unit leaving the section.		
	sections, that the exiting the section	last axles counted at an axle counting point must be axles	
Date	Status	Comments	
19.9.2013	In progress	In Traffic control handbook. New specification will be made in 2013.	

Date and time (Code):	de): 24.2.2011, 4.55 (C2/2011R)			
Location:	Ped	Pedersöre, Kolppi statin, Seinäjoki–Ylivieska section of line		
Type of occurrence:	Dera	Derailment, wheelset of the locomotive		
Train type and number:	<i>Iber:</i> Freight train 5478, Dv12 diesel locomotive and 29 wagons		e and 29 wagons	
Road vehicle:	-			
			In the train	In the road vehicle
Persons on board:	Cre	w:	1	
	Pas	sengers:	0	
Fatally injured:	Cre	w:	0	
	Pas	sengers:	0	
Seriously injured:	Cre	w:	0	
	Pas	sengers:	0	
Slightly injured:	Cre	w:	0	
	Pas	senaers:	0	
Damages of rolling stock:	Dam	nagages to the	locomotive.	·
	A tu	rnout was dam	aged and the rail was	broken at three points.
Damages on track equipm	nent: Elas	tic rail fas-tene	rs were loosened and	163 concrete sleepers
	were	e damaged.		· · · · · · · · · · · · · · · · · · ·
Other damages:	Non	e.		
Summary: The front bogie	wheelset o	n the second lo	comotive of a freight	train travelling from Kokko-
la to Pietarsaari derailed	The locomo	tive one turno	ut and 163 sleepers	were damaged with total
repair and clearance costs	amounting	to 132 000 eur	os. The accident prev	ented all traffic on the sec-
tion of line for nine hours.	anouning			
The bogie wheelset was de	The bodie wheelset was derailed by an SA3 automatic counter on the track. This counter had been			
dragged there by another fr	dragged there by another freight train, as a result of incorrect procedures in reaction to the train's de-			
coupling into two parts. The	e enaine dr	iver had believ	ed that the uncouplin	ig lever chain would break
when the train set off and t	hat the auto	omatic coupler	would remain in place	e. Trusting the engine driv-
er's assessment, the traffic	controller c	ave the train p	ermission to drive. Th	ne automatic coupler sepa-
rated from the car after the	detachmen	, of the bolted k	key holding the couple	r in place, due to a missing
screw and the remaining he	x screw bei	ng too short ar	nd without a hex nut. V	Vith the poorly secured key
installation going unnoticed	l, wagon m	aintenance wa	s not performed in lir	he with the related instruc-
tions.	-			
Final report issued: 8.2	.2012			
Recommendation In the	case of SA	3 automatic co	upler draft clips with	out screw holders, the hex
Nr. S307 screws	supporting	the bolted key	can slide out of place	when the nut is missing. In
the ver	sion with th	e screw holde	r, the head of the he	x screw enters the holder,
prevent	ing the scre	ew from sliding	and falling off when t	he nut is detached. Only a
fraction of all SA3 SA3 automatic c		SA3 automatic coupler draft clips have no screw holder.		
		tic coupler draft clips without screw holders should be replaced		
by one	s with sucl	n holders.		-
Date Status		Comments		
19.9.2013 In prog	ress	Not yet done		
Recommendation Traffic	controllers	have clear ope	erating instructions for	accidents, but not for ex-
Nr. S308 ception	ceptional situations. In exceptional situations, the communication channel should			

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	be via the traffic co	ontroller. The traffic controller should have the required contact	
	and real-time information on events occurring on the controlled section of line.		
	Traffic controllers	should be issued with clear instructions on how to obtain	
	immediate advice in exceptional situations, in order to solve the problem		
	safely.		
Date	Status	Comments	
19.9.2013	IMPLEMENTED	VR's Center of operations.	

Date and time (Code):	1991–2010		
Location:	Finland		
Type of occurrence:	Level crossing ad	ccidents	
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. Ac-cidents 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	d: 13.2.2012		
Recommendation Nr. S309	Practice has shown that the rate of removal and securing level crossings is gov- erned by allocations granted by the Parliament. The level crossing strategy should be accorded greater importance by moving it under the Ministry of Transport and Communications, which might ease acquisition of the required resources. A new strategy should be drawn up to improve level crossing safety, and a concrete plan with funding arrangements should be drafted based on this strategy.		
Date	Status	Comments	
19.9.2013			
Recommendation Nr. S310	Based on statistical analysis performed by the investigation commission, danger- ous level crossings have no warning devices, the road speed limit is low, and the average traffic volume is large. Such level crossings are typically located in resi- dential areas. To provide the Finnish Transport Agency with the best possible cri- teria for describing the danger posed by each level crossing: The safety of each level crossing should be evaluated using new statistical analyses, in order to better specify the order in which level crossings should		

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Date	Status	Comments
19.9.2013	IMPLEMENTED	Tarca LC is in use.
Recommendation	No single up-to-da	te level crossing database exists, but there are several data-
Nr. S311	bases with partially	incomplete information.
	Databases on leve	el crossing and their conditions should be merged into one
	and the database	should be kept up to date.
Date	Status	Comments
19.9.2013	In progress	Not vet done. There will be just one database
101012010	in progrooo	
Recommendation	Railway actors have	ve no common database for accidents and dangerous situa-
Nr S312	tions According to	VTT's research accident information is saved in the infor-
11.0012	mation systems of	the railway company the Finnish Transport Agency and the
	Finnish Transport	Safety Agency, Merging these accident databases is recom-
	mended	callety rightey. Morging these decident databases is recent
	A single and com	mon accident and deviation database for all those operat-
	ing the railway sy	stem in Finland should be created
Date	Status	Comments
19 9 2013		Trafi will in future hold a common database
19.9.2013		
Bacommondation	In como conco inc	ufficient consideration is taken of level grossing actatu is traffic
	ni some cases, ins	unicient consideration is taken of level crossing safety in traffic
Nr. 5313	salety plans devise	ed by the Centres for Economic Development, Transport and
		LT Centres) and the municipalities.
	Stronger account s	nould be taken of level crossing safety in the traffic safety plan-
		fatu abauld also be included in the provincial and munici
	Level crossing sa	lere
Dete	pai traffic safety p	lans.
	Status	Comments
19.9.2013	in progress	Finnish Transport Agency can order Centres for Economic
		Development, Transport and the Environment to contact mu-
		nicipalities.
Recommendation	The Koululiitu soft	ware, which evaluates the dangers of school routes, does not
Nr. S314	include level crossings, because the road database information used by the soft-	
	ware 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	
Recommendation	The previously iss	ued recommendation S216 At a level crossing the maximum
Nr. S315	speed allowed on t	he road should be 50 km/h or lower as depending on the locali-
	ty and the characte	ristics of the level crossing. should be reformulated.
	Clear instructions	s should be drawn up regarding road traffic speed limits
-	and use of the ST	OP sign at level crossings.
Date	Status	Comments
19.9.2013	In progress	Partially implemented; STO-mark is missing from the direc-
		tions.
Recommendation	Most fatal level cr	ossing accidents occurred at level crossings without warning
Nr. S316	devices. Level cros	ssing perceptivity was also noted in VTT's research. To make
	level crossings per	ceptible sufficiently early for road users and to ensure correct
	level crossing use:	
	Ways of improving the perceptivity of level crossings and their conditions of	
	use and technical properties should be specified.	
Date	Status	Comments
19.9.2013	In progress	Researches made and also on going.
Recommendation	Maintainers of priv	vate roads have insufficient information regarding their level
Nr. S317	crossing maintena	nce obligations. An investigation by the Safety Investigation
	Authority revealed	that the infrastructure manager and a city had completely dif-

	ferent views on the obligation to maintain sightline at the level crossing.				
	Instructions on level crossings should be drawn up for road maintainers.				
Date	Status	Comments			
19.9.2013	IMPLEMENTED	In guidelines of track maintenance and in book "Guidelines to maintain private owned roads."			
Recommendation	The previously iss	ued recommendation S215 The perceptibility of a train and a			
Nr. S318	level crossing shou	uld be improved. was too extensive and should be divided into			
	recommendations of	concerning the mobile equipment and the level crossing.			
	The visibility of from	onts of locomotives and train units should be improved.			
Date	Status	Comments			
19.9.2013	In progress	Started. Material will be reflective.			
Recommendation	The previously issu	ued recommendation S224 Itella and other businesses perform-			
Nr. S319	ing deliveries can	improve safety by avoiding unguarded level crossings when			
	planning their deliv	ery routes. was too extensively targeted and the follow-up of its			
	implementation wa	s impossible. To target the recommendation accurately and to			
	facilitate monitoring	J of its implementation:			
	When planning de	When planning delivery routes, Itella should improve safety by avoiding lev-			
	el crossings witho	out warning devices.			
Date	Status	Comments			
19.9.2013	In progress	Itella tries to avoid level crossings where it is possible and economically vice.			
	[!				
Recommendation	It seems that nobc	bdy is responsible for the Rescue Services' risk evaluation in-			
Nr. S320	structions used by	the Emergency Response Centres. These instructions have not			
	been changed sinc	e their publication. Each rescue department of the Rescue Ser-			
	vices area is responsible for these instructions, but the related change needs have not been coordinated nationally.				
	Emergency Respo	Emergency Response Centre risk assessment instructions should be con-			
	tinuously up-dated and a national operator responsible for the instructions				
	should be assigned.				
Date	Status	Comments			
19.9.2013					
· · · · · · · · · · · · · · · · · · ·	'				

	•			
Date and time (Code):	21.2.2011, 4.05 (B1/2011R)			
Location:	Nokia, between Siuro and Suoniemi stations			
Type of occurrence:	Collision of trains, rear end collision			
Train type and number:	Freight train 3811, Sr1 electric locomotive and 21 wagons – Freight			
	train 3801, 2 Dv12 diesel locomotive and 24 wagons			
Road vehicle:	-			
		In the train	In the road vehicle	
Persons on board:	Crew:	1 – 1		
	Passengers:	0		
Fatally injured:	Crew:	1 – 0		
	Passengers:	0		
Seriously injured:	Crew:	0		
	Passengers:	0		
Slightly injured:	Crew:	0		
	Passengers:	0		
Damages of rolling stock:	Sr1 electric locomotive and two timber wagons were badly dam-			
	aged.			
Damages on track equipment:	Some sleepers were damaged.			
Other damages:	None.			
Summary: A freight train, which had arrived to assist another freight train travelling to Mäntyluoto,				
Pori, collided with the end of the other train in Nokia, between Siuro and Suoniemi, at 4.05 am on 21				

Pori, collided with the end of the other train in Nokia, between Siuro and Suoniemi, at 4.05 am on 21 February 2011. The engine driver of the assisting train fatally injured in the accident. One wagon and the locomotive, which collided the end of the other train, were badly damaged and had to be scrapped. Additionally, one wagon was badly damaged, but was still repairable. The tracks were undamaged.

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Traffic at the accide	Traffic at the accident site was interrupted for 14 hours.				
According to the running recorder data, the driver of the train which collided had begun emergency					
braking, at a speed of 46 km/h, five seconds before the impact. The train speed was 43 km/h upon impact. The maximum permitted speed of the train which collided was 50 km/h					
The accident was caused by the erroneous location information of the train to be assisted.					
Final report issued: 20.2.2012					
Recommendation	 Determining the location of trains is a challenging task. In addition to the improved instructions currently in use: A satellite location system should be implemented as quickly as possible to 				
Nr. S321					
Data	assist in location.				
Date 10.0.2013		Comments			
13.3.2013	in progress	Transport Agency in co-operation are drafting the procedure of			
		best practises. Next meeting last part of this year.			
		· · · · ·			
Recommendation	The relatively inexp	perienced engine driver was unable to pinpoint the fault, which			
Nr. S322	stopped the train.	Engine drivers with the currently required training but less work			
	experience have le	ss equipment-specific technical knowledge than engine drivers			
	problems and repa	ir them, or provide information about them to technical experts			
	Locomotives and	train units should be equipped with checklist-type prob-			
	lem solving diagr	m solving diagrams, which would help the engine driver when a fault oc-			
	curs in a locomotive on the line.				
Date	Status	Comments			
19.9.2013	IMPLEMENTED	In a different way. Help desk in VR's Center of operations.			
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Docommondation	The visibility of we	acong chauld be improved. In the reconstruction drive, it was			
Recommendation	The visibility of wa	agons should be improved. In the reconstruction drive, it was			
Recommendation Nr. S323	The visibility of wa found that a wagor distance in darknes	agons should be improved. In the reconstruction drive, it was n without a reflector on the end can only be seen from a short as.			
Recommendation Nr. S323	The visibility of wa found that a wagor distance in darknes Reflectors should	agons should be improved. In the reconstruction drive, it was n without a reflector on the end can only be seen from a short as. be installed on the ends of wagons .			
Recommendation Nr. S323 Date	The visibility of wa found that a wagor distance in darknes Reflectors should <i>Status</i>	agons should be improved. In the reconstruction drive, it was n without a reflector on the end can only be seen from a short ss. be installed on the ends of wagons . Comments			
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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		

	F	assengers:	0		
Fatally injured:		rew:	0		
		assengers:	0		
Seriously injured:	0	Crew:	0		
	F	assengers:	0		
Slightly injured:	0	Crew:	0		
	F	assengers:	0		
Damages of rolling	y stock: T	Two derailed wagons sustained minor damage.			
	4	40 metres of rail were damaged. Turnout 730, the electric railway			
Damages on track	equipment:	portal and the electric cables for seven tracks were damaged.			
Other damages:	A	A signal post fell down.			
Summary: An acc	ident occurred in	in the Kouvola freight traffic vard at 00.15 hrs on 14 th January 2012			
when two wagons of	of a departing free	eight train were d	erailed immediately after th	neir departure. One of	
the derailed wagon	s struck a signal	l post, which colla	apsed onto an electric railw	av portal ten minutes	
later. The electrical	cables for seve	n tracks were bro	ught down by the portal's	collapse. No personal	
injuries resulted.		-		, .	
The accident was c	aused by a stop	block left under th	e train. Difficult weather co	nditions and darkness	
made it difficult to s	see the stop bloc	k. Additionally, th	e brake tester responsible	for removing the stop	
block decided to pe	rform an extra sh	nunt on the train in	place of standard procedu	res, because the train	
had moved too far a	alongside the shu	unting signal.	•	·	
Final report issued	d: 24.9.2012				
Recommendation	A stop block co	onstitutes a safety	v-critical factor and its visit	bility should be good.	
Nr. S326	During the inve	stigation, it was di	scovered that some stop b	locks are in poor con-	
	dition with respe	ect to their visibilit	v. The shape of the stop bl	ock does not improve	
	its visibility from	the direction of t	he track. Improved reflectiv	vitv could improve the	
	visibility of stop	blocks in dark cor	nditions.		
	Stop blocks sh	nould be painted	well to ensure their visib	ility, and the block's	
	visibility impro	ved by other me	ans.	3 , 1	
Date	Status	Comments			
19.9.2013	In progress	New stop bloc	ks will be purchased.		
····					
Recommendation	It was found in the investigation that the railway yard work instructions do not take				
Nr. S.327	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 standard- ised 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 ac- count 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 v	Nav		
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	1				