NIB ANNUAL REPORT 2007

Accident Investigation Board

FINLAND

PREFACE

This is the annual report of railway sector of the Accident Investigation Board of Finland for calendar year 2007. This is mainly the part of the Annual Report 2007 of AIBF, which relates to railway sector. There are also some parts which have added that the report would measure up to standards of ERA.

Terms used in this report:

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

Investigation identifier:

Each investigation is designated by an identifier that consists of four parts, such as A1/1998R.

The first part refers to the investigation category (A, B, C, D or S).
The second part is a sequence number referring to the order of the accident within its accident category in the year in question.
The third part refers to the year of the accident.
The fourth part indicates the accident category (L, R, M or Y).

E.g. A1/1998R refers to the first major railway accident investigation in 1998.

CONTENTS

1 INTRODUCTION TO THE INVESTIGATION BODY

1.1 Legal basis

The Accident Investigation Board of Finland was founded in 1996 within the Ministry of Justice. The tasks of the Accident Investigation Board are specified in the relevant act and decree which also include overall directions on the characteristics of the accidents to be investigated and the methods of investigation to be implemented.

The investigation of aviation accidents is based on the relevant European Council Directive and the Convention on International Civil Aviation, and the investigation of rail accidents is based on the EU Railway Safety Directive (published on April 1st, 2004). As for maritime accidents, their investigation is based on the recommendations of the International Maritime Organization (IMO).

In Finland the investigation of rail accidents is based on the EU Railway Safety Directive. The New Rail Act came into force the 1 September 2006. The New Finnish Rail Agency started work the same day. The current accident investigation act is close to the Safety Directive. Making changes to the accident investigation act will start in 2007.

1.2 Role and aim

The tasks of the Accident Investigation Board are specified in the relevant act and decree which also include overall directions on the characteristics of the accidents to be investigated and the methods of investigation to be implemented.

By its investigation activities, the Accident Investigation Board intends to enhance overall safety and prevent accidents. As a result of an accident investigation, an investigation report is produced that contains safety recommendations for the competent authorities and other parties concerned. In fact the safety recommendations translate the investigators' views on the means of prevention of similar or corresponding accidents in the future. The Accident Investigation Board moreover monitors the implementation of the recommendations issued. The investigation work conducted by the Board exclusively focuses on an improvement of safety with no stances taken as for questions of culpability, responsibility or liability for damages.

It is the mission of the Investigation Board to investigate all serious accidents, serious incidents and aviation, rail, and marine accidents and incidents.

Accident 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 acci-

dent, 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 an accident 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 Accident Investigation Board does not investigate an incident or accident caused intentionally or by an offence.

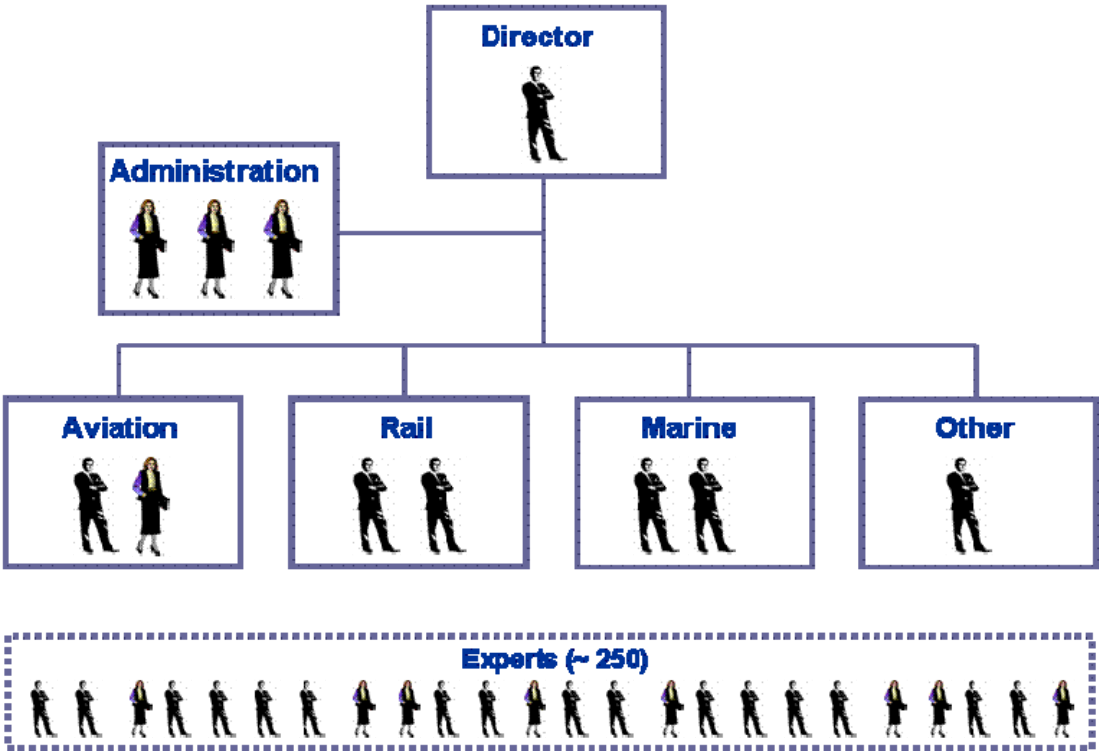
The Accident Investigation Board is also responsible for, e.g. the maintenance of a contingency to rapidly commence an investigation, the training of new accident investigators, the producing of general instructions on the carrying out of the investigation work and on the drawing up of the investigation reports, and the participation in international cooperation in the field.

Finally the Accident Investigation Board is responsible for the printing and distribution of the investigation reports and their publishing on its web pages, www.onnettomuustutkinta.fi.

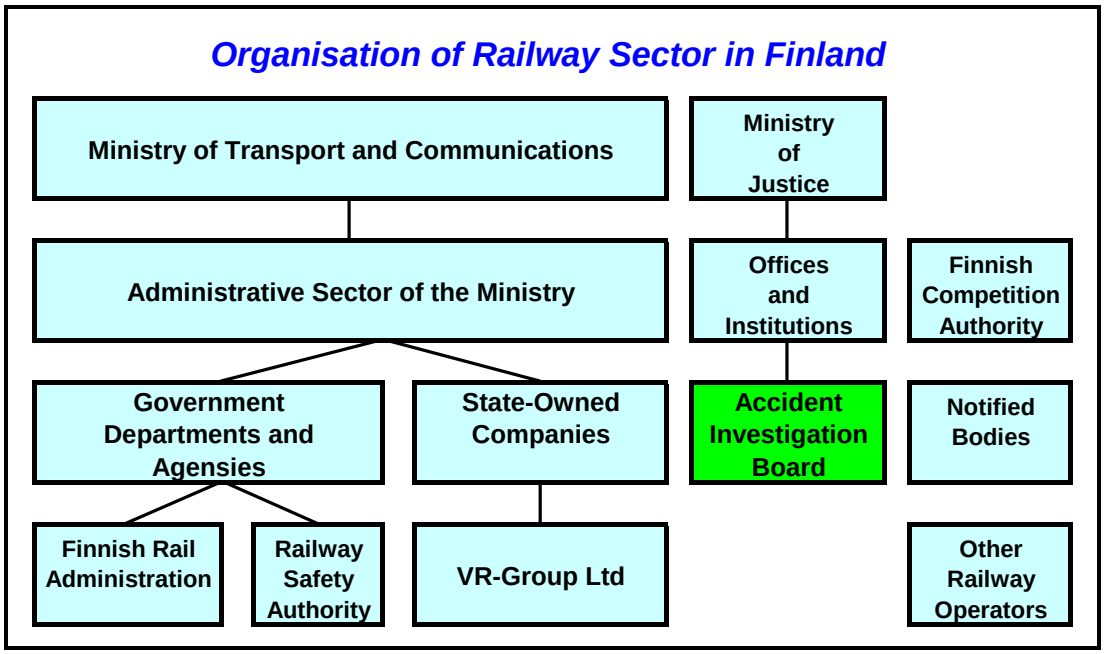
1.3 Organisation

Personnel:

Director	Tuomo Karppinen
Administrative director	Pirjo Valkama-Joutsen
Assistant	Sini Järvi
Assistant	Leena Leskelä
Aviation accidents	
Chief Air Accident Investigator	Esko Lähteenmäki
Air Accident Investigator	Hannu Melaranta
Rail accidents	
Chief Rail Accident Investigator	Esko Värttiö
Rail Accident Investigator	Reijo Mynttinen
Marine accidents	
Chief Marine Accident Investigator	Martti Heikkilä
Marine Accident investigator	Risto Repo
Other Accidents	
Chief Accident Investigator	Kai Valonen



1.4 Organisational flow



1.5 Accident investigation philosophy

It is the mission of the Investigation Board to investigate all serious accidents, serious incidents and aviation, rail, and marine accidents and incidents. The investigation of

aviation accidents is based on the relevant European Council Directive and the Convention on International Civil Aviation, and the investigation of rail accidents is based on the EU Railway Safety Directive (published on April 1st, 2004). As for maritime accidents, their investigation is based on the recommendations of the International Maritime Organization (IMO).

Accident 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 an accident 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 Accident Investigation Board does not investigate an incident or accident caused intentionally or by an offence.

The Accident Investigation Board is also responsible for, e.g. the maintenance of a contingency to rapidly commence an investigation, the training of new accident investigators, the producing of general instructions on the carrying out of the investigation work and on the drawing up of the investigation reports, and the participation in international cooperation in the field.

2 INVESTIGATION PROCESSES

2.1 Cases to be investigated

A rail accident investigation is conducted in following cases:

- Accident in train traffic
- Hazardous situation in train traffic
- Accident in shunting work in railways, if a person is deceased or seriously injured
- Accident in shunting work in railways, if it is related to transportation of dangerous goods
- Underground or tram accident, if several persons have been deceased or seriously injured or there is other special safety related reason for the investigation

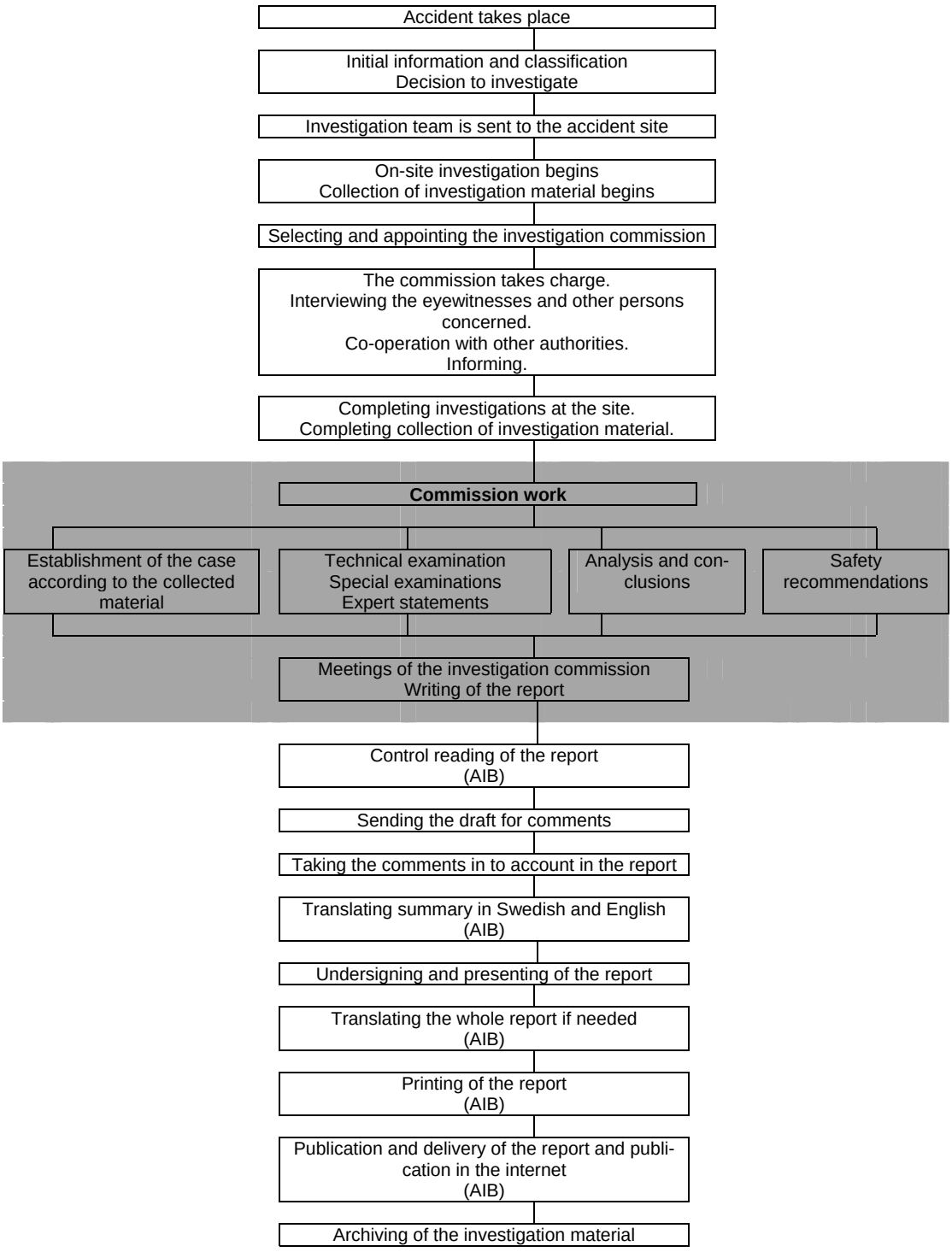
Accident Investigation Board investigates fatal level crossing accidents and level crossing accidents in which a train has derailed or a passenger or a train crew member is deceased or injured seriously.

2.2 Institutions involved in investigations

The Accident Investigation Board of Finland investigates all rail accidents. Those investigations are independent and they are public. According to the Railway Act the Finnish Railway Agency can investigate those AIBF does not investigate. Those investigation reports are not public.

2.3 Investigation process or approach of the IB

Chart of the investigation process



3 INVESTIGATIONS

3.1 Overview of the last 12 moths, identifying key trends

In 2007, the Accident Investigation Board of Finland initiated seven B-level and seven C-level rail accident investigations. The B-level investigations were fatal level crossing accidents. Of the C-level investigations, one was a shunting accident that led to a fatality, three were freight train derailings, two were derailings involving the transport of dangerous goods during shunting work, and one was an incident involving a passenger train.

Four B-level and nine C-level investigations were completed in 2007. A safety study on level-crossing accidents was also finalised. Of the B-level investigations completed, one was a freight train derailing, and three were fatal level crossing accidents.

3.2 Investigations completed and commenced in 2007

Investigations completed in 2007

Date of occurrance	Title of the investigation (occurrence type, location)	Basis for inv.	Completed (date)
9.12.2005	Safety study on level crossing accidents	iii	20.6.2007
30.3.2005	Passenger train car derailing between Saakoski and Jämsänkoski	i	15.1.2007
17.1.2007	Fatal level crossing accident in Närpiö	i	23.11.2007
5.3.2007	Fatal level crossing accident in Nivala	i	23.11.2007
9.3.2007	Fatal level crossing accident in Parikkala	i	14.12.2007
20.4.2005	Collision of passenger train, shunted to the departure track, with a rail barrier at Helsinki station	iii	27.9.2007
15.7.2005	Derailment of two freight train cars on Kontiomäki railway yard	iii	15.1.2007
31.10.2005	Locomotive and wagon of freight train derailing at Peräseinäjoki	iii	15.1.2007
28.12.2005	Detaching of traction device of locomotive and derailing of freight wagon, on section of line between Ypykkävaara and Vartius	iii	15.1.2007
20.3.2006	Derailment of locomotive and two wagons at Luumäki	iii	11.4.2007
1.6.2006	Freight train running through rail barrier at Karjaa	iii	8.8.2007
15.12.2006	Collision of a shunting unit and a lorry at the level crossing in Sörnäinen	iii	5.6.2007
2.2.2007	Accident during shunting work at the Joensuu railway yard	i	19.9.2007

Basis for investigation: **i** = According to the Safety Directive, **ii** = On national legal basis (covering possible areas excluded in Article 2, §2 of the Safety Directive), **iii** = Voluntary – other criteria (National rules/regulations not referred to the Safety Directive).

Investigations commenced in 2007

Date of occurrance	Title of the investigation (occurrence type, location)	Basis for inv.
17.1.2007	Fatal level crossing accident in Närpiö	i
5.3.2007	Fatal level crossing accident in Nivala	i
9.3.2007	Fatal level crossing accident in Parikkala	i
6.5.2007	Fatal level crossing accident in Kiuruvesi	i
13.8.2007	Fatal level crossing accident in Röykkä, Nurmijärvi	i
6.10.2007	Fatal level crossing accident in Kempele	i
21.11.2007	Fatal level crossing accident in Lahti	i
2.2.2007	Accident during shunting work at the Joensuu railway yard	i
21.3.2007	Derailment of a wagon in Ylivieska	iii
27.5.2007	Incident at the Tampere railway yard	iii
3.7.2007	Eight loaded timber-carrying wagons derailing on section of line between Saarijärvi and Äänekoski	iii
15.7.2007	Derailment of a freight train at Talviainen railway yard	iii
4.8.2007	Overturning of a tank wagon during shunting operations at the industrial track of Kemira in Siilinjärvi	iii
3.11.2007	Derailment of a locomotive wheel set during shunting operations in Vainikkala	iii

Basis for investigation: **i** = According to the Safety Directive, **ii** = On national legal basis (covering possible areas excluded in Article 2, §2 of the Safety Directive), **iii** = Voluntary – other criteria (National rules/regulations not referred to the Safety Directive).

3.3 Safety Studies commissioned and completed in 2007

Safety Studies completed in 2007

Date of commission	**Title of the Study** (Occurrence type, location)	**Basis for investigation**	**Comleted** (date)
9.12.2005	Safety study on level crossing accidents.	iii	20.6.2007

Basis for investigation: **i** = According to the Safety Directive, **ii** = On national legal basis (covering possible areas excluded in Article 2, §2 of the Safety Directive), **iii** = Voluntary – other criteria (National rules/regulations not referred to the Safety Directive).

Safety Studies commenced in 2007

Date of commission	**Title of the Study** (Occurrence type, location)	**Basis for investigation**

Basis for investigation: **i** = According to the Safety Directive, **ii** = On national legal basis (covering possible areas excluded in Article 2, §2 of the Safety Directive), **iii** = Voluntary – other criteria (National rules/regulations not referred to the Safety Directive).

3.4 Summaries of investigations completed in 2007

S1/2005R

Safety study on level crossing accidents

At the request of VR-Group Ltd, in December 2005 the Accident Investigation Board of Finland commenced a safety study on road/railway level crossing accidents and appointed a commission therefor. The safety study included 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 investiagted other level crossing accidents having occurred in 2003, 2004 and 2005, on the basis of data collected by VR-Group Ltd. The investigation also included fatal level crossing accidents in 1991–2004 as based on investigation documents produced by the Traffic Safety Commission of Insurance Companies (VALT), statistics from 1991–2004 on level crossing accidents and railway and road traffic accidents, international statistics on level crossing accidents and railway and road traffic accidents, as well as investigation reports on individual accidents in certain countries and documentation pertaining to projects on the development of level crossing safety in some countries.

Among recent railway level crossing accidents, the collision of a Pendolino train with an animal carrying truck on November 10, 2005 on an unguarded level crossing in Kälviä, was investigated, as well as the collision of a freight train with a private car on February 14, 2006 on a level crossing equipped with a light and sound warning system in Kouvola, the collision of a freight train consisting of two locomotives with a private car on March 16, 2006 on an unguarded level crossing in Tornio, the collision of a freight train with a private car on May 5, 2006 on an unguarded level crossing in Närpiö, the collision of a freight train with a private car on May 5, 2006 on an unguarded level crossing in Raahe, the collision of a Dm7 DMU museum train with a private car on June 17, 2006 on a level crossing equipped with half-barriers in Alavus, and the collision of a freight train with a private car on June 21, 2006 on an unguarded level crossing in Ylistaro.

There were altogether three fatalities in the seven accidents investigated: two persons died in one accident and one person in one of the accidents. Five persons suffered mild injuries in the accidents; among them one was a train passenger and one was an engine driver. Four car passengers or drivers were unharmed. Among the accident trains, the Pendolino train was severely damaged while the other trains only suffered minor dam-

age. Among the accident cars, six were completely wrecked and one car was severely damaged.

In all of the individual level crossing accidents investigated by the commission, the travelling of the road the vehicle to the level crossing without stopping was disclosed as the immediate cause of the accident. In three cases, the driver's vigilence in terms of the traffic situation was insufficient as due to his absent-mindedness. In two cases the driver essentially focussed on his manipulation of the road vehicle and in two other cases, the driver's attention was concentrated on other objects than the level crossing. Among environmental factors having contributed to the occurring of the accident, there was in four cases too high a speed limit before the level crossing, in three cases a rising gradient to the level crossing, in two cases the road and railway meeting angle, in one case insufficient visibility, in one case darkness and rain, in one case glaring sunshine, and in one case slippery road.

According to VR's accident irregularities reports, in 2003 and 2004 altogether 52 level crossing accidents took place and in 2005, 64 such accidents occurred. In 2003 seven accidents took place on level crossings equipped with half-barriers, five accidents occurred on level crossings with light and sound warning systems, and the remaining forty accidents took place on unguarded level crossings. In 2004 five accidents occurred on level crossings with half-barriers, four on level crossings with light and sound warning systems, and the remaining forty-three accidents on unguarded level crossings. In 2005 four accidents took place on level crossings with half-barriers, four on level crossings with light and sound warning systems, and the remaining fifty-six accidents on unguarded level crossings. In 2003 there were six fatalities in level crossing accidents and 26 persons were injured. Among the injuries, six were serious. The injuries occurred in a total of 22 different accidents. In 2004 there were seven fatalities in level crossing accidents and 14 persons were injured. Among the injuries, three were serious. The injuries occurred in a total of 15 different accidents. In 2005 there were eight fatalities in level crossing accidents and 20 persons were injured. Among the injuries, five were serious. The injuries occurred in a total of 22 different accidents. In almost all level crossing accidents in 2003–2005, the accident was caused by the road vehicle running to the level crossing without stopping.

According to the data produced by VALT, in 1991–2004 a total of 110 fatal level crossing accidents took place in the country, that is, on average 7.9 fatal accidents per year. Over the earlier years under investigation (1991–1997), on average 9.7 fatal accidents took place while thereafter (1998–2004) 6 fatal accidents were recorded on average each year. Among the accidents, 22 occurred on level crossings with half-barriers, 5 on level crossings with light and sound warning systems and 78 on unguarded level crossings (no relevant data was available on 5 cases). Over the investigated period, there were altogether 142 fatalities in level crossing accidents, that is, 10 fatalities on average per year, with a variation ranging from 4 (in 2002) to 20 (in 1991). In almost all fatal level crossing accidents in 1991-2004, the road vehicle ran to the level crossing without stopping. The driver's inappropriate behaviour was in most cases explained by erroneous observation (58%) and anticipation and assessment errors (28%). The driver's inappropriate behaviour was moreover explained by the familiarity of the level crossing and the

driver as being in a hurry. Among the environmental factors, the most general background factors included the rising gradient of the road to the level crossing, the slipperiness of the road and obstructed sightline. Among factors hampering observation, there were moreover the glare caused by sunshine, fog, darkness and the road-railway crossing angle.

According to the 1991-2004 statistics, over the investigated period a total of 818 level crossing accidents took place in Finland. Among the accidents 106 (12 in 1991, 7 in 2004) occurred on level crossings with half-barriers, 74 (5 in 1991, 4 in 2004) occurred on level crossings with light and sound warning systems, and a total of 638 (80 in 1991, 41 in 2004) on unguarded level crossings. Over the period under investigation, the number of level crossings decreased from 6,634 to 4,635: the number of level crossings with half-barriers diminished from 816 to 772 that of level crossings with light and sound warning systems respectively from 154 to 114, and the number of unguarded level crossings decreased from 5,859 to 3,749.

According to international statistics of 2004, 9.06 level crossing accidents as per a thousand track-km took place in Finland. The rate was only slightly poorer than the average figure of 8.44; however the number of these accidents was twofold in comparison with Sweden and threefold in comparison with Norway and Denmark. Also in terms of train-kilometres, the frequency of level crossing accidents in Finland was clearly greater than in the other Nordic countries and higher than the overall average (in Finland, 1.07 accidents; 0.79 accidents on average as per one million train-km).

As a rule the investigation commission considers the removal of level crossings as regularly being the fundamental and foremost means of improvement of safety; the number of level crossings needs to be drastically reduced, the removal of level crossings has to follow an expedient systematic plan with the authorities maintaining and pursuing a relevant strategy, in the removal work safety has to be prioritized, and finally sufficient public funds are to be allocated to the removal of level crossings and the enhancement of safety.

In view of the removal of level crossings, the investigation commission recommends that:

- stopping should be adopted as the regular model of behaviour at unguarded level crossings where the sightline along the railway is only attained at a distance of 8 metres from the railway;
- the visual range requirements should be modified so as to also consider the possibility of crossing a level crossing without stopping;
- the perceptibility of a train and a level crossing should be improved;
- the speed limit before a level crossing should be reduced to max. 50 km/h;
- the wait platforms at level crossings in poor condition should be upgraded to meet the specifications set forth in the Track Technological Rules and Regulations (RAMO);
- maintenance instructions for level crossings should be drawn up;

- the authority responsible for track maintenance and the safety authority should have the possibility to restrict motor vehicle traffic on level crossings;
- a study should be conducted on the use of train whistles on level crossings and a relevant decision on their use should subsequently be made;
- avoiding of crossing of level crossings ought to be adopted as a basis for route planning for private cars and company road transports;
- in planning of land use, special attention should be paid to safe railway crossing, and the building of new level crossings should be avoided.

The investigation commission reiterates three recommendations published earlier:

- level crossings should be equipped with signboards indicating the name and the location of the level crossing;
- also the general emergency telephone number should be directly called from the scene of a level crossing accident;
- the information system of the Emergency Response Centre should also incorporate the track-km data.

B1/2005R

Passenger train car derailing between Saakoski and Jämsänkoski on 30 March 2005

At Jämsä on the Jyväskylä - Tampere section of line between the Saakoski and Jämsänkoski stations, on Wednesday March 30, 2005 early in the morning an incident occured where a bogie of a car of the 802 passenger train derailed at a rail breakage. The train was carrying about 50 passengers. Neither the passengers nor the train crew were injured in the incident. The total cost of the accident was 127 600 euros.

Earlier at night the engine driver of a freight train travelling from Tampere toward Pieksämäki had noticed something grey on the rail, and while running over the grey point the locomotive had shaken. The driver was not sure whether there had been a rock on the track or whether there was something wrong with the rail. The driver notified the remote control operator of his observations by line radio, specifying that the exact location was at electric rail pole seven, track kilometre 298. The remote control operator then warned the driver of the following freight train of the matter, requesting its engine driver to pay close attention to that location. Having passed the specific point, the driver of the freight train called the remote control operation by line radio. He told the remote control opera-

tor that he had felt a violent bang in the locomotive and that the engine driver of the approaching passenger train should be warned thereof.

The remote control operator contacted the engine driver of the passenger train, by line radio and told him of the observations and experiences of the drivers of the two previous freight trains and of the broken rail. The remote control operator told the engine driver to run over the place in question at a reduced speed and to inform the remote control operator of his relevant observations. As the train approached the breakage point, the driver reduced the speed from 118km to 87km/h. When the locomotive passed the rail breakage point, the driver heard a bump. The conductor in the fourth car heard a loud bang as the car ran over the breakage point. By using his interphone, the conductor advised the driver of his observation. The driver viewed the rear end of the train in the mirror and saw a big cloud of dust behind the train and sparks flying beside the train. The driver started to brake and notified the conductor of the sparkling. When the train had come to a full stop, the conductors went out to check the situation. The front bogie of the second last car of the train had derailed.

The immediate cause of the incident was the rupture of the rail that had broken just a moment earlier, under the weight of the cars of the train. The rupture of the rail was probably due to the combined effect of a poor finishing of the hole drilled in the rail and the local characteristics of the rail steel. Moreover the important stress of the rail possibly also contributed to the rupture.

The rail breakage resulted in the incident as due to an incorrect reaction thereto. The drivers of the two freight trains had perceived the bang caused by the rail breakage but the traffic control unit had failed to appraise the situation as hazardous enough to generate derailment.

As a result of the incident, the Finnish Rail Administration decided to replace the rails on this particular section of line over the summer 2005. Furthermore VR Ltd introduced a modification in its traffic control instructions: should the remote control operator receive a notice of a bang or a swing from the engine driver, he shall regularly introduce a speed limit of max. 50km/h at the location in question. The Central Finland Emergency Response Centre has adopted in its data systems the track-km localization data of the sections of line of the region.

In order to prevent similar accidents in the future, the Accident Investigation Board of Finland recommends that the instruction on a 50km/h speed limit to be introduced in unclear situations as specified in the Traffic Control Operator's Manual of VR Ltd, be also adopted and included in the Train Safety Regulations. VR Ltd should moreover introduce a modification in its emergency situation instructions: in addition to a notice addressed to the traffic control unit from the railway accident or incident scene, also an emergency response centre should be directly contacted in case urgent help is needed from a rescue service. The Emergency Response Centre Administration should ensure the compatibility of the data system of the Emergency Response Centre Agencies with the localization data used by the railway.

B1/2007R

Fatal level crossing accident in Närpiö on 17 January 2007

On Wednesday 17 January 2007 at 10.50 a.m. an accident occurred in Närpiö in which a train carrying lumber on its way from Seinäjoki to Kaskinen collided with a van at an unprotected level crossing. The van driver perished in the accident, and the van was wrecked beyond repair, while the front of the locomotive suffered only minor damage.

The accident was caused by the van driver not driving clear of the train travelling from the right. It is obvious that the driver either did not look towards the approaching train or did not notice it.

To prevent similar accidents, the Accident Investigation Board of Finland recommends that delivery services and their planning aim to avoid unprotected level crossings. Furthermore, level crossing warnings placed between the delivered material and the use of a GPS device notifying of level crossings would improve safety. The Investigation Commission also recommends that the use of safety belts be extended to apply to delivery vehicle drivers and passengers irrespective of the driving distance. In addition, the Investigation Commission would reiterate its recommendation, S1/05R/S216, regarding the lowering of the speed limit to 50 km/h on unprotected level crossings.

B2/2007R

Fatal level crossing accident in Nivala on 5 March 2007

On Monday 5 March 2007 at 2.39 p.m., a level crossing accident took place involving a passenger car and a rail bus travelling from Ylivieska to Iisalmi. Both the driver and the passenger of the car perished, while the train personnel and passengers were un-

harmed. The accident wrecked the car beyond repair, while the train suffered only minor damage. The total material costs due to the accident were approximately EUR 70,000.

The immediate cause of the accident was the passenger car driver driving onto the level crossing without stopping. Presumably, the car driver and passenger did not notice the rail bus approaching from the right. This might have been affected by the following:

- The driver was distracted by a phone call the passenger received and was possibly looking for the ringing mobile phone
- The driver's attention was focused on attaching the safety belt
- The approaching short train was in a blind spot formed by the moving vehicle's structures and the passenger
- The driver was not in the habit of stopping every time at the level crossing.

To prevent similar accidents, the Accident Investigation Board of Finland recommends that the level crossing environment be made safe for road traffic and that the unprotected level crossing of Pahaoja be equipped with a half barrier equipment. In addition, the Investigation Commission would repeat its previous recommendations on train and level crossing visibility and placing emergency calls directly from the accident location. Furthermore, the Commission would reiterate its proposals in recommendation S1/05R/S213 for improving information on level crossings, monitoring them more effectively and enhancing the related traffic offence penalties.

B3/2007R

Fatal level crossing accident in Parikkala on 9 March 2007

A level crossing accident involving a passenger car and a rail bus travelling from Savonlinna to Parikkala took place in Särkisalmi on 9 March 2007 at 4.13 p.m. The driver and passenger of the passenger car were killed but the train personnel and passengers escaped uninjured. The passenger car was completely wrecked and the train sustained minor damage.

The accident was directly due to the failure of the car driver to look carefully enough both ways as the car approached the level crossing. Another factor that may have impacted on the accident lies in the possibility that the car driver became satisfied that the level crossing was empty as the car approached the crossing on Melkoniementie, run-

ning parallel with the tracks, which may have resulted in the driver failing to observe the tracks upon arriving at the crossing.

In order to prevent similar accidents, the Accident Investigation Board recommends that the Sinkonen level crossing, located in the Särkisalmi residential area, be removed.

C2/2005R

Collision of passenger train, shunted to the departure track, with a rail barrier at Helsinki station on 20 April 2005

In Helsinki on 20 April 2005 at 16.04, while being shunted to its departure track, passenger train 171 collided with a rail barrier, broke it and, having mounted it, continued for a further six metres towards the end platform. The collision caused no personal injuries. The rail barrier and the collision car were damaged and the departure of the train was cancelled due to the inspection of the cars.

The cause of the accident was that there was some kind of black spot in radio audibility, which prevented the locomotive driver from hearing the instructions given by the conductor on the escort radio, causing the train's situational speed to remain too high and braking to occur too late.

Since similar accidents have previously occurred at Helsinki Central Railway Station, the Accident Investigation Board recommends that the operation of escort radios at Helsinki Central Railway Station be examined to identify any black spots in radio audibility and any external interference. On the basis of these inspection results, an implementation solution should be elaborated to guarantee secure audibility.

C5/2005R

Derailment of two freight train cars on Kontiomäki railway yard on 15 July 2005

On 15 July 2005 an incident took place on Kontiomäki railway yard in Finland: two freight wagons derailed. The wagons were carrying turnout elements. The incident occurred when the freight train arrived at Kontiomäki from the Kajaani direction. Track 16 had been secured as the travelling route for the freight train that arrived on Kontiomäki railway yard at a speed of 20 km/h. When reaching the south end of the yard, the train then travelled to a turnout lane between two turnouts and now the first two wagons of the train derailed. The train still travelled a distance of about 50 m before stopping, as a result of the breaking of a brake conduit. The incident caused only minor damage.

The incident resulted from the combined effect of the work site track and the long wagons. Between the V049 and V054 turnouts, a temporary site track had been constructed for the time of the ongoing track work. The track featured several consecutive curves. Such curves may cause running problems particularly for long wagons. When the freight train entered the track, its two long turnout-carrying wagons in front derailed. In addition, the rail packing was rather flexible, thus contributing to the occurring of the incident.

The Accident Investigation Board of Finland does not make any recommendations as based on this incident, as the risks involved remained relatively small. Nevertheless the Investigation Report includes some factors that should be paid attention to in the future, e.g. advance planning of construction work and interactive planning, building and exploitation, as well as transport operation restrictions concerning certain cases.

C7/2005R

Locomotive and wagon of freight train derailing at Peräseinäjoki on 31 October 2005

On Monday October 31, 2005 at 14.35 hrs at Peräseinäjoki in Finland, an incident occurred where the locomotive and one wagon of a freight train with round wood load, derailed. The train was heading toward Seinäjoki. The derailment took place when the train was leaving track 3 and entering turnout V008, where first the locomotive derailed and then the first round wood carrying wagon, that the locomotive had pulled along. The costs generated by the incident amounted to 175 000 Euros. No personal injury was caused by the incident. Both track and track equipment were damaged. In addition overhead line equipment was damaged over a distance of several hundreds of metres. As a result of the incident, the bogies and the axle control equipment of the derailed locomotive had to be replaced. Moreover the flank of the locomotive as well as its buffer and railings suffered damage. The wheelset, buffer, some handles and steps of the derailed wagon had to be replaced.

The incident was not caused by one particular factor, but by the joint effect of several circumstances. The causes of the incident included the poor condition and fastening of the sleepers, thus permitting a yielding of the rails at the turnout. The V008 turnout was worn and hence it failed to meet all of the measurement requirements set thereupon. Furthermore the locomotive displayed very worn wheelsets which again may have contributed to the wheel slipping over to the wrong side of the turnout check rail.

The Accident Investigation Board of Finland does not make any recommendations pertaining to the derailment as the V008 turnout was repaired immediately after the incident and later it was submitted to a mechanical overhaul.

C8/2005R

Detaching of traction device of locomotive and derailing of freight wagon, on section of line between Ypykkävaara and Vartius on 28 December 2005

On Wednesday December 28, 2005, on the Ypykkävaara– Vartius section of line between Kontiomäki and Vartius in Finland, an incident took place in which the detaching of the traction equipment of a locomotive caused the derailment of the rear bogie of the third wagon of a freight train. The incident generated no personal injury. The derailed wagon damaged some sleepers. The following day the track was repaired. The detached traction device caused some damage to the two locomotives in the train. The fuel tanks of the locomotives were pierced and the fuel contained therein leaked out. The costs generated by the incident amounted to about 108 000 Euros.

The traction device of the locomotive detached as caused by the unfastening of the retention screws of the clamp disc of the traction device wedge. The clamp disc and the wedge fell off and the traction device detached from the locomotive.

In order to prevent corresponding accidents, the Accident Investigation Board of Finland recommends that the Dr16 locomotive maintenance instructions be supplemented by a checking of the fastening of the clamp disc of the traction device wedge.

C1/2006R

Derailment of locomotive and two wagons at Luumäki on 20 March 2006

On Monday March 20, 2006 at 21.41 hours two wagons and the rear bogie of a locomotive derailed on a turnout in the east end of Luumäki railway yard. The incident entailed

no personal injury. The derailed wagons damaged two point mechanisms of the operating switch crossing, and stretcher rods, and they caused rail fastening parts to detach.

The chain of events resulting in the derailment started from the heating fuse of the crossing with a movable frog having burnt, thus preventing an adequate heating of the crossing. When operated laterally, the crossing failed to take the detection position and the point failed to take the detection position. The incident was caused by the remote control operator and the engine driver being unable to act in an expedient manner in such an exceptional situation. Neither of them was very familiar with the high-speed turnouts with turning-point frogs at Luumäki. The remote control operator granted the train the permission to pull via a secondary track to the turnout, though the turnout had been operated to take the position toward the straight track. Having forced open the turning point frog turnout, the engine driver set out to push the wagons back.

In order to prevent such incidents in the future, the Accident Investigation Board of Finland reiterates its previously issued recommendation suggesting that the orientation training designed for dispatchers include detailed data on all stations within their respective responsibility so as to enable them to secure the safety of traffic operation.

C2/2006R

Freight train running through rail barrier at Karjaa on 1 June 2006

On Thursday 1 June, 2006 an accident took place at Karjaa, Finland, where a freight train collided with a rail barrier at the end of a trap siding. The locomotive of the train derailed. As a result of the collision, the locomotive and the rail barrier were damaged.

The immediate cause of the incident was the fact that the driver of the 3046 train passed a signal in a stop position, without permission. Inadequate communication between the engine driver and the remote control operator essentially contributed to the generation of the incident. The driver of the 3046 train had advised the remote control operator of a balise failure, and the remote control operator pursued this discussion while giving another train permission to pass the signal in the stop position. The driver of the 3046 train hence firmly believed that the permission was granted to the train run by himself.

The Accident Investigation Board of Finland does not make any new safety recommendations based on this incident, but it underscores the importance of the communication

procedures as adhering to a due form specified in the Railway Signalling Regulations (Junaturvallisuussääntö, Jt).

C4/2006R

Collision of a shunting unit and a lorry at the level crossing in Sörnäinen on 15 December 2006

On Friday 15 December 2006, a lorry and a shunting unit collided on the unprotected level crossing in front of the harbour gates in Sörnäinen, Helsinki. The shunting unit foreman was seriously injured in the accident.

The accident was the result of the lorry driver not paying enough attention at the level crossing. The fact that the shunting unit was to the right of the lorry driver, who was not familiar with Sörnäinen harbour, may have been a contributing factor to the accident.

The Accident Investigation Board finds no reason to make new recommendations based on this accident. However, the Accident Investigation Board points out that the necessity of having the level crossing in front of the gates to the harbour in Sörnäinen should be evaluated. Consideration should be given to replacing it with one further north.

C1/2007R

Accident during shunting work at the Joensuu railway yard on 2 February 2007

An accident claiming the life of a shunting unit foreman occurred at the Joensuu railway yard on Friday 2 February 2007 at 9.01 a.m. The foreman, employed by VR Cargo Joensuu, perished instantly after being run over by one of the wheels of a freight car.

The aim was to shunt a domestic container wagon equipped with a screw switch pulling device using a Russian wagon equipped with an automatic coupling. Apparently, the shunting unit foreman intervened to move the slowly moving Russian wagon's automatic coupling towards the coupling hook of the container wagon. He fell on his stomach onto the tracks, where he was run over by the wheel of the wagon coming from behind. The direct cause of the foreman's fall was not revealed by the investigations, but is likely to have been the result of slipping or being nudged by the shunting wagon.

In order to prevent similar accidents from occurring again, the Accident Investigation Board of Finland recommends that the instructions for safe working in a railway yard be supplemented to forbid employees from placing themselves between moving wagons in all situations, and improving the grip of footwear used in yard work. The Accident Investigation Board further recommends that the Emergency centre use an emergency response that corresponds to the type of accident. In urgent cases, it would be important to have a sufficient number of appropriate units attend the scene of the accident quickly. The Accident Investigation Board also repeats its recommendation issued in its investigation report B1/2005R on making the emergency call directly from the scene of the accident.

3.5 Comment and introduction or background to the investigations

There were clearly more investigations initiated and completed than in 2006. In the comparison period 2003–2006, more investigations were completed only in 2004 than in 2007. The number of completed category B investigations is significant. Four of these were fatal level crossing accidents. Their investigation was initiated in 2007 in accordance with the EU railway safety directive, which came into force in the previous year. Of the category B investigations initiated, seven were level crossing accidents, a type of accident that had not previously been investigated.

3.6 Accidents and incidents investigated during last five years (in 2002–2007)

Accidents investigated		2003	2004	2005	2006	2007	TOT
Serious accidents	Train collision	-	-	-	-	-	0
	Train collision with an obstacle	-	-	-	-	-	0
	Train derailment	-	-	1	-	-	1
	Level-crossing accident	-	-	1	1	7	9
	Accident to person caused by RS in motion	-	-	-	-	1	1
	Fire in rolling stock	-	-	-	-	-	0
	Dangerous goods accident	-	-	-	-	-	0
	Other	-	-	-	-	-	0
Other accidents	Train collision	1	1	1	1	-	4
	Train collision with an obstacle	-	-	-	-	-	0
	Train derailment	8	6	8	2	5	29
	Level-crossing accident	1	1	-	6	-	8
	Accident to person caused by RS in motion	-	1	1	-	-	2
	Fire in rolling stock	-	-	-	-	-	0
	Dangerous goods accident	-	-	-	-	-	0
	Other	-	-	-	-	-	0
Incidents		1	1	0	0	1	3
TOTAL		11	10	11	9	14	55
Safety studies		0	0	1*	0	0	1

* Safety Study includes 1 serious level crossing accident in 2005 and 2006 and 5 other level crossing accidents in 2006 marked on the table.

4 RECOMMENDATIONS

4.1 Short review and presentation of recommendations

A total of 26 recommendations were issued in 2007, most of which were addressed to more than one body or authority. Recommendations were directed at the following:

Finnish Railway Agency	9
Finnish Rail Administration	12
VR Group Ltd	8
Ministry of the Interior	1
Ministry of Transport and Communications	8
Emergency Response Centre Agency	2
Finnish Road Administration	5
Finnish Transport and Logistics SKAL	3
Itella Corporation	3
Other	5

Recommendations as per target category:

Rolling stock	2
Track equipment	3
Rolling stock and track equipment	1
Traffic control equipment	1
Operating directions	15
Rescue operations	3

The annual follow-up meeting on the implementation of recommendations was held on 7 November 2007. At the end of 2007, a total of 231 recommendations had been issued, of which 141 (63%) had been implemented, and 27 (11.7 %) were categorised as not to be implemented.

Implementation of recommendations during 2003–2007

Recommendations issued		**Recommendation implementation status**					
		Implemented		**In progress**		**Not to be implemented**	
Year	**[No.]**	**[No.]**	**[%]**	**[No.]**	**[%]**	**[No.]**	**[%]**
2003	7	5	71	2	29	0	0
2004	10	3	30	6	60	1	10
2005	6	3	50	3	50	0	0
2006	8	3	38	4	50	1	13
2007	26	2	8	24	92	0	0
TOTAL	**57**	**16**	**197**	**39**	**281**	**2**	**23**

4.2 Recommendations 2007

S237 The Sinkonen level crossing located in the Särkisalmi residential area should be removed. (B3/2007R, 12.12.2007) RHK, Muu

S233 The grip of footwear used in rail yard work should be better than average under all weather and working conditions. (C1/2007R, 7.12.2007) VR

S232 The Emergency centre should use an emergency response that corresponds to the type of accident. (C1/2007R, 7.12.2007) Häke

S231 The instructions for rail yard work should be supplemented to forbid going between moving cars in all situations. (C1/2007R, 7.12.2007) VR

S230 The structure of the obstruction cleaning device of Dm12 rail bus should be such that it is either formed of one piece or possible additional parts are attached sufficiently well. (B2/2007R, 23.11.2007) VR, RVI

S229 Level crossing environment should be made safe for road traffic. (B2/2007R, 23.11.2007) LVM, RHK, TH, kunta

S228 The Pahaoja unguarded level crossing should be equipped with a half barrier equipment. (B2/2007R, 23.11.2007) RHK, TH, kunta

S227 Compulsory use of safety belts should be expanded to include delivery vehicle drivers and passengers, irrespective of the driving distance. (B1/2007R, 23.11.2007) LVM, SKAL

S226 A navigator/GPS device in the vehicle, should be installed warning of dangerous locations such as level crossings. (B1/2007R, 23.11.2007) Itella, SKAL

S225 A warning sign notifying of a dangerous location on the route, placed between sorted mail stacks being delivered, might act as a prompt to the mail carrier when he/she arrives at the dangerous location on the route. (B1/2007R, 23.11.2007) Itella

S224 Itella and other businesses performing deliveries can improve safety by avoiding unguarded level crossings when planning their delivery routes. (B1/2007R, 23.11.2007) Itella, SKAL

S223 The operation of escort radios at Helsinki Central Railway Station must be inspected in order to identify any black spots in radio audibility and any external interference. (C2/2005R, 26.9.2007) RVI, RHK, VR, LVM

S222 In land use planning, special attention should be paid to safe railway crossing, and the building of new level crossings should be avoided. (S1/2005R, 20.6.2007) TH, Muu

S221 In their route plans, transport operators should consider possible crossings of railways. Railway crossings should be minimized and more safe crossings prioritized. (S1/2005R, 20.6.2007) Muu

S220 A study should be conducted on the use of whistles at level crossings. (S1/2005R, 20.6.2007) RVI, RHK, VR

S219 The railway keeper and the safety authority should be allowed to restict road vehicle traffic on level crossings. (S1/2005R, 20.6.2007) LVM, RHK, RVI

S218 Maintenance instructions should be drawn up for level crossings. (S1/2005R, 20.6.2007) RHK, RVI

S217 Such wait platforms of level crossings that feature a poor condition should be upgraded to meet the relevant RAMO specifications. (S1/2005R, 20.6.2007) RHK, LVM, TH

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. (S1/2005R, 20.6.2007) LVM, TH

S215 The perceptibility of a train and a level crossing should be improved. (S1/2005R, 20.6.2007) RVI, RHK, VR

S214 The sightline requirements for level crossings should be modified so as to also consider the crossing of a level crossing without stopping in case a sufficient sightline along the railway is attained substantially before 8 metres from the railway. (S1/2005R, 20.6.2007) RVI, RHK, LVM

S213 Stopping at unguarded level crossings with the sightline along the railway only attained at a distance of 8 metres from the railway, be adopted as the regular model of behaviour. (S1/2005R, 20.6.2007) RVI, RHK, VR, SMp, LVM

- (a campaing on level crossings is going on)

S212 The compliance of the localization data used by the railway with the data system of the Emergency Response Centre Agencies shall be ensured, e.g. by installing the track-kilometre data in the data system of the Emergency Response Centre Agencies. (B 1/2005 R, 15.1.2007) (S1/2005R, 20.6.2007) RHK, HäKe

S211 The instructions for the drawing up of an emergency notice should be developed to ensure that whenever urgent aid is needed from the rescue service, also the general emergency number is called from the incident scene, in addition to the notifying of the traffic control unit. (B 1/2005 R, 15.1.2007) (S1/2005R, 20.6.2007) VR

S210 The instruction on limiting the speed to 50km/h when the engine driver perceives a swing movement or hears a bang noise, contained in the Traffic Control Op-

erator's Manual, should also be added as a regulation in the Train Safety Regulations. (B 1/2005 R, 15.1.2007) RVI

- IMPLEMENTED

S209 The Dr16 locomotive maintenance instructions should be supplemented by a checking of the fastening of the clamp disc of the traction device wedge. (C8/2005R, 15.1.2007) VR

- IMPLEMENTED

In parenthesis, the number and date of the investigation report. The acronyms refer to the addressee of the recommendation:
RHK = Finnish Rail Administration
VR = VR-Group Ltd
RVI = Finnish Rail Agency
TH = Road Administration
HäKe = Emergency Response Centre
LVM = Ministry of Transport and Communication
SM = Ministry of the Interior, Rescue Department
SMp = Ministry of the Interior, Police Department
STM = Ministry of Social Affairs and Health, Labour Protection Department
OTK = Accident Investigation Board of Finland
Muu = Other relevant parties.