Ministry of Economic Affairs and Communications of the Republic of Estonia Emergency Management Department Unit for Investigation of Railway Accidents

Annual report of railway accidents investigated in 2007

Tallinn 2008



Public railways in the Republic of Estonia

A. Summary

The Unit for Investigation of Railway Accidents of the Ministry of Economic Affairs and Communications investigated 14 accidents in 2007. The investigation of all accidents was carried out by an executive officer of the Emergency Management Department, acting as the investigator-in-charge. The investigator co-operated with railway undertakings, safety authorities, the police, emergency centres and other institutions and undertakings as well as private persons. In individual cases we approached experienced railway specialists for expert opinion. The investigator-incharge was independent in decision-making.

The Railway Safety Directive 2004/49/EC was enforced in Estonian judicial area on 2 March 2007 with enacting of amendments to the Railways Act.

The Unit for Investigation had started investigation of 10 accidents before the entry into force of amendments to the Railways Act and of 4 accidents after the entry into force thereof. Starting from 2 March 2007 the Unit for Investigation started

notification of the European Railway Agency of the start of investigation as well as started entering the investigation report into their database and completing of investigation declarations.

The legal basis of the investigation of all 14 accidents is laid down in the Railways Act. None of the investigated accidents was a severe accident according to the classification of the Railway Safety Directive 2004/49/EC. According to the classification of the Railway Safety Directive all the cases investigated were accidents of which 12 were accidents at level crossings, one derailment of rolling stock and one collision of rolling stock with an object in railway structure gauge.

Pursuant to the classification of the Railways Act nine were second level accidents and five were first level accidents.

Four people, none of them a railway-man, died in the accidents investigated in 2007. 11 people were injured, three of them seriously.

During the year 51 recommendations were issued in investigation reports: five to state authorities, 30 to railway undertakings, 13 to owners of roads and three to managers of road vehicles.

Two of the recommendations issued involved organisation of supervision, seven recommendations concerned road traffic control and road traffic control devices, six recommendations were made on winter maintenance, three recommendations on training and dissemination of traffic information, five recommendations on the amendments to legal acts and regulations, seven recommendations on the operation of signalling installations and rail traffic control, one recommendation on the organisation of operation of railway communication devices, one recommendation on the professional qualifications of railwaymen and 19 recommendations on other arrangements.

The recipients of recommendations have accepted and implemented 21 recommendations, proceedings of 28 recommendations are in progress and the Unit for Investigation has no information as regards two recommendations. One of the latter was made to the company which has gone bankrupt and finished operation and the other recommendation was made to a private person and is of personal nature.

B. Introduction

Investigation of railway accidents on national level has been conducted in Estonia since spring 2004 when the Unit for Investigation of Railway Accidents was set up. Since then, during each following year, the Unit for Investigation has prepared reports on the accidents investigated during the previous year.

Railway accidents are split into two levels in Estonia. The classification is provided in the Railways Act.

25 second level and five first level accidents happened in 2007. All first level accidents happened at level crossings. 23 of the second level accidents happened as a

result of the collision of rolling stock and road vehicles, two were derailments of rolling stock of trains. After entry into force of amendments to the Railways Act some cases which earlier had been classified as incidents are now being classified as accidents. Consequently, according to the classification enforced in Estonia during the year the number of accidents, which happened in 2007, was higher than in earlier years.

All in all 65 incidents happened in Estonia during the year which had led to a dangerous traffic situation on railway. Different types of locomotive failures were the major causes on incidents, but also failures of communication and signalling equipment, power cuts, human errors in handling of equipment, rail fractures, etc.

Before March 2007 the Unit for Investigation of Railway Accidents was obligated to investigate all first and second level railway accidents.

First level railway accidents were considered traffic accidents on railway which had caused at least one of the following consequences:

- 1) extensive fire;
- 2) significant pollution of environment;
- 3) one or more casualties (except in the case of accidents caused by rolling stock to persons, who were on rail tracks and which had not led to other consequences);
- 4) interruption of railway traffic for more than 24 hours.

Second level railway accidents were the following:

- 1) collisions of passenger or freight trains with other trains or other rolling stock;
- 2) collisions of passenger or freight trains with other means of transport (motor vehicles);
- 3) collisions of passenger or freight trains with objects located in the railway structure gauge which render the rolling stock unfit for use;
- 4) derailment of rolling stock of train;
- 5) ignoring of prohibiting crossing traffic lights by rolling stock if it leads to immediate danger of collision with another train or another type of rolling stock.

Before 2 March 2007 the Unit for Investigation was not obligated by any public authority to notify the European Railway Agency of starting investigation and it was not done. Proceeding from the interests of Estonia in railway safety and of the requirement to apply the Railway Safety Directive 2004/49/EC of the European Parliament and the Council in the judicial area of Estonia the classification of railway accidents was changed as of 2 March 2007.

Currently first level railway accidents are traffic accidents on railway which have caused at least one of the following consequences:

- 1) extensive fire;
- 2) significant pollution of environment;
- 3) damage to assets or environment, if the damages resulting from the accident, assessed by the Unit for Investigation, are at least 31.3 million EEK (2 million euros);
- 4) one or more casualties (except in the case of accidents caused by rolling stock to persons, who were on rail tracks and which had not led to other consequences);

- 5) health injuries of five or more people
- 6) or interruption of railway traffic for more than 12 hours.

Second level railway accidents are traffic accidents on railway which have caused at least one of the following consequences:

- 1) collisions of rolling stock with other rolling stock (except during shunting)
- 2) collisions of rolling stock with other means of transport (motor vehicles);
- 3) collisions of passenger or freight trains with objects located in the railway structure gauge which render the rolling stock unfit for use;
- 4) derailment of rolling stock of train;
- 5) ignoring of prohibiting crossing traffic lights by rolling stock if it leads to immediate danger of collision with another rolling stock.
- 6) health injuries of up to four people

The amendments to the Railways Act, which entered into force, provided the obligation of the Unit for Investigation to notify the European Safety Agency of starting investigation. The Unit for Investigation is obligated to investigate all first level railway accidents.

Pursuant to the Railway Safety Directive all serious railway accidents can be described as first level railway accidents according to Estonian classification. Moreover, taking into account local circumstances, Estonian first level accidents are of more stringent conditions than serious accidents according to the Railway Safety Directive. The Unit for Investigation may investigate second level railway accidents and incidents. The decision for the start of investigation of a case is made in consultations with the Railway Inspectorate and the railway undertaking. Investigation committees are set up for investigation committee is identified in the course of information exchange with the railway undertaking and supervisory body. Railway undertakings submit all collected documents and evidence on the accident to the Unit for Investigation according to the requirements of the Railways Act. The Unit for Investigation has also the right to ask presentation of materials and documents concerning other incidents.

C. Work organisation of the Unit for Investigation

The Unit for Investigation of Railway Accidents is a structural unit in the Emergency Management Department of the Ministry of Economic Affairs and Communications. The executive officer of the Emergency Management Department is the investigatorin-charge in the investigation of railway accidents and he is independent in his decisions concerning investigation. The Emergency Management Department is also responsible for conducting investigation of aircraft accidents, for the development of risk assessment in the administration area of the Ministry and for emergency and crisis regulation work. The Emergency Management Department is subordinated to the Secretary General of the Ministry. Thus the responsibility for the investigation of railway accidents is the primary duty of one official.

Road and Railways Department of the Ministry of Economic Affairs and Communications is responsible for the organisation and regulation of activities concerning railway transport and they report to the deputy Secretary General of Transport. The Railway Inspectorate was the national safety authority in 2007. The Railway Inspectorate and the Emergency Management Department are legally independent of each other. The budget of the Emergency Management Department is a part of the budget of the Ministry, but the Railway Inspectorate has a separate budget.

During 2007 changes were made in the classification of railway accidents. Before the entry into force of the amendments to the Railways Act the Unit for Investigation had to investigate all first and second level accidents. After entry into force of amendments the Unit has the obligation to investigate only accidents with serious consequences, i.e. first degree accidents, also such railway traffic accidents which had led to amendments in railway safety regulations or changes in ensuring railway safety. The Unit for Investigation had the right to conduct investigations of second level railway accidents, railway incidents and collisions or if the circumstances of the event or the circumstances similar to it might have caused a first level accident, including technical failures of a subsystem of the trans-European conventional or high-speed railway system or that of interoperability components. In decision making the Unit for Investigation must take into consideration the severity of the accident or incident, including severity proceeding from the trans-European positions and other circumstances of importance. The Unit for Investigation would ask the opinions of the Railway Inspectorate and railway undertakings while assessing the severity of a second level railway accident or collision.

The Unit for Investigation has the right to involve experts in their investigation and make recommendations to the Minister of Economic Affairs and Communications for setting up investigation committees. The institutions involved in investigation are obligated to give necessary assistance, within their competence, to the Unit for Investigation, members of the Investigation Committee and experts. Good relations for co-operation in information exchange have been developed with regional emergency centres and police structures, as well as railway infrastructure and transport undertakings and safety agencies.

D. Investigation process

The investigation process of railway accidents takes place according to the organisational and legal delimitations provided in legal acts.

The amendments to the Railways Act allow the Unit for Investigation to conduct indepth study of the circumstances of each case and to link different aspects. During the year investigation processes become more thorough and longer. The Unit for Investigation is guaranteed to have access to the accident site, rolling stock, infrastructure, to traffic control and signalling equipment and to all information and documents pertinent to the case. Exercising of the above rights is one part of the investigation process – obtaining information. The Unit for Investigation co-operates with rail transport undertakings, railway infrastructure undertakings, regional emergency centres, medical institutions, the police, other investigation agencies, state agencies, companies and private persons in the course of investigation. During investigation it is possible to use information received from the supervisory body. The Unit for Investigation uses the information for collating facts, describing the situation, analysis of the case and drawing conclusions.

The Unit for Investigation of Railway Accidents did not consider it necessary to set up an investigation committee for the investigation of any railway accident which happened in 2007. The Unit for Investigation did not recommend the Minister to set up such a committee. None of the accidents which happened in Estonia that year was a serious accident for the purposes of the Railway Safety Directive. All accidents were investigated by an executive officer of the Emergency Management Department working in the capacity of the investigator-in-charge of the Unit for Investigation. The investigator-in-charge received the initial information on the case from the Railway Inspectorate, analysed the information and in prescribed manner made a decision to start investigation. The investigation process ended with completion of the investigation report including plans for measures to be taken and recommendations to prevent similar accidents in future. The investigation report was then sent to parties involved. The investigation process took place on the initiative and responsibility of the investigator-in-charge. The investigator-in-charge was independent in issuing recommendations and drawing conclusions.

In individual cases experienced railway specialists were involved as experts in investigation. Their opinions were essential for ascertaining the circumstances of accidents and making recommendations on safety issues.

E. Investigations

By the beginning of 2007 the investigation of two accidents, which had happened at the end of 2006, was not completed. 8 first and second level accidents happened before the entry into force of the new revision of the Railways Act on 2 March 2007 and all of them were investigated. Altogether 10 railway accidents were investigated before the application of the Railway Safety Directive in the legal area of Estonia. The following table is an overview of these accidents.

| | Table 1 | | | | |
|---|--|--|---------------------------------|---|---|
| Owner of rolling stock/ infrastructure | Place name or open track | Site of accident | Date and time of accident | Description of accident | Accident by classification of Railways Act/Directive |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Eesti Raudtee/ Eesti Raudtee | Maardu – Muuga open track | Maardu level crossing 8,853 km | 16.12.2006 00.57 | Collision of lone locomotive of train with a BMW car | Level II/ accident |
| Eesti Raudtee/ Eesti Raudtee | Antsla station | Antsla level crossing 539,228 km | 27.12.2006 13.57 | Collision of freight train with a Ford Mondeo car | Level II/ accident |
| Spacecom/ Eesti Raudtee | Lagedi station | Switch no. 6 | 13.01.2007 05.34 | Derailment of locomotive of train | Level II/ accident |
| Edelaraudtee/ Edelaraudtee Infrastructure | Pärnu freight terminal– stop Pärnu passenger terminal | 142 km 1 picket | 14.01.2007 19.05 | Collision of passenger train with a VAZ car | Level II/ accident |
| Edelaraudtee/ Eesti Raudtee | Kärkna – Tartu open track | Tiksoja level crossing 423,631 km | 29.01.2007 10.00 | Collision of passenger train with an Audi car | Level II/ accident |
| Edelaraudtee/ Eesti Raudtee | Nõo station | Nõo level crossing 443,66 km | 01.02.2007 10.02 | Collision of passenger train with a Ford Transit van | Level II/ accident |
| Westgate Transport/ Eesti Raudtee | Püssi station | Püssi level crossing 247,155 km | 07.02.2007 11.29 | Collision of freight train with a GAZ truck | Level I/ accident |
| Elektriraudtee/ Eesti Raudtee | Klooga – Kloogaranna open track | Kloogaranna level crossing 2,493 km | 12.02.2007 10.02 | Collision of passenger train with Volkswagen Passat car | Level II/ accident |
| Eesti Raudtee/ Eesti Raudtee | Veriora – Orava open track | Ilumetsa level crossing 66,193 km | 20.02.2007 14.28 | Collision of freight train with a Citroen Picasso car | Level II/ accident |

Accidents which happened before 2 March 2007

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|-----------------------------------|-------------------------------|---------------------|---|-----------------------|
| Edelaraudtee/ Edelaraudtee Infrastructure | Liiva – Ülemiste open track | Veerenni level crossing | 22.02.2007 20.32 | Collision of lone locomotive of train with a Ford | Level II/ accident |
| | | 3,351 km | | Transit van | |

Four accidents were investigated after entering into force of the amendments to the Railways Act. The following table is an overview thereof.

| | | | | | 10002 |
|------------------|-------------|-------------|------------|-----------------|----------------------|
| Owner of | Place name | Site of | Date and | Description of | Accident by |
| rolling stock/ | or open | accident | time of | accident | classification |
| infrastructure | track | | accident | | of Railways |
| | | | | | Act/Directive |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Edelaraudtee/ | Lelle – | Hertu level | 14.04.2007 | Collision of | Level I/ |
| Edelaraudtee | Rapla open | crossing | 18.08 | passenger train | accident |
| Infrastructure | track | 58,163 km | | with a BMW | |
| | | | | car | |
| Edelaraudtee/ | Kiisa – | Männiku | 24.06.2007 | Collision of | Level I/ |
| Edelaraudtee | Liiva open | level | 20.30 | passenger train | accident |
| Infrastructure | track | crossing | | with an Alfa | |
| | | 14,599 km | | Romeo car | |
| Westgate | Jõhvi – Oru | Toila level | 10.07.2007 | Collision of | Level I/ |
| Transport/ Eesti | open track | crossing | 08.32 | freight train | accident |
| Raudtee | | 271,461 km | | with a Scania | |
| | | | | truck | |
| Elektriraudtee/ | Klooga – | Paldiski | 08.09.2007 | Collision of | Level I/ |
| Eesti Raudtee | Paldiski | level | 08.52 | passenger train | accident |
| | open track | crossing | | with a Man | |
| | | 18,091 km | | truck | |

Accidents which happened after 2 March 2007

Altogether 14 accidents were investigated in 2007. The amendments to the Railways Act provided re-classification of some former second level accidents and they became first level accidents. The accidents which happened during the year were classified as first or second level accidents according to the classification in force at the time when the accident happened. The investigated accidents were classified as follows: five serious first level accidents and nine second level accidents, i.e. not so serious accidents.

After entering into force of the amendments to the Railways Act the Unit for Investigation decided not to start investigation of second level accidents. It was decided that investigation of second level accidents would be inexpedient.

Table?

All first level accidents occurred at level crossings. Three of them involved casualties and on two occasions railway traffic was interrupted for more than 12 hours.

In 12 of level crossing accidents investigated last year rolling stock collided with road vehicles. We had one derailment of rolling stock and one collision of rolling stock with a car when prior to collision the car had been driven on the track bed, next to the rail tracks.

No investigation was started pursuant to § 19 of the Railway Safety Act, because no such accidents happened. All investigations were started in compliance with the conditions and requirements of the Railways Act. The European Railway Agency was notified of all investigations started after 2 March 2007 and after completion of investigation the investigation reports were entered into the database thereof and corresponding final declarations were filled out.

No investigation of a case was started in 2007 that would have required completion in the following year.

F. Content of investigation

1. Short description of accidents

Maardu level crossing on 16.12.2006



At night, at 00.57 a diesel locomotive of train no. 4201 collided with a BMW car at Maardu automatically regulated level crossing.

The locomotive of train was approaching the level crossing at low speed of 16km/h. The traffic lights at the crossing were functioning and the exterior of the locomotive was illuminated. The car was approaching the level crossing at high

speed in order to cross it before the locomotive reached the crossing. As a result of collision there were neither casualties nor injuries, the locomotive and car suffered slight damages. The driver had no right to drive (no driving licence).

As a result of investigation it was recommended in the context of general railway safety to analyse the speed limits established for trains, to take a census of road traffic intensity. Relevant institutions were recommended to take a position as regards possible equipping of the level crossing with a barrier.

Antsla on 27.12.2006



In the daytime, at 13.57 a freight train collided with a Ford Mondeo car at Antsla automatically regulated level crossing. In the conditions of limited visibility due to low sunlight the driver drove to the level crossing ignoring the signal of flashing red lights, the simultaneous sound signal and the traffic sign "Stop and give way" and was not making sure that no rolling stock was approaching. As a result of collision

both the locomotive in front of the train and the car suffered damages, but there were no human injuries

The driver's driving manner and negligence concerning traffic safety in combination with low sunlight disturbing the visibility of traffic lights were the causes of the accident

The driver was recommended to analyse his driving manner in order to improve traffic safety and the railway infrastructure undertaking was recommended to install signal background plates of appropriate size to compensate possible low sunlight.

Lagedi on 13.01.2007



Early morning, at 05.34 a freight train drove past signals with prohibiting traffic lights at Lagedi station. After that the locomotive crew switched the prohibiting red light over into white. The train continued moving and cut through the switch no.6 and then stopped. Reacting to the front lights of an oncoming train the train started to reverse. This resulted in the derailment of the locomotive. There was

immediate danger of the collision of two trains. There were no casualties and nobody was injured in the accident. Railway infrastructure suffered damages, but the locomotive was not damaged.

By the time of driving past prohibiting traffic lights the locomotive crew had lost vigilance. One reason of that could have been tiredness. They had started work previous night at 23.00 and the break for rest before that had been 7.5 hours. It was established after the accident that the locomotive driver was intoxicated by alcohol. In order to prevent such accidents the rail transport undertaking was recommended to revise the regulations for permission of locomotive crews to work, to draw up a training programme of operation in critical situation for locomotive drivers, to revise the principles of alternation of work and rest time and to ensure sufficient periods of rest so that they would come to work well rested. The railway infrastructure undertaking was asked to review the interaction of the entry and exit traffic lights and

work of isolated areas of the station, and to ensure switching off the entry traffic lights if rolling stock passes the exit traffic lights and vice versa. The Railway Inspectorate was asked to review "The Rules for technical use of railway" to have abetter definition of the requirements for pre-shift control of locomotive crews. In addition they were asked to take a position concerning the instructions on the maintenance of national railway tracks and on the instructions of technical service of signal interlocking, blocking devices and automatic signalling and automatic stopping devices of locomotives.

Pärnu on 14.01.2007



In the evening, at 19.05 a passenger train collided with a VAZ car left in the structure gauge of railway, but not on the level crossing.

The driver of the car had no right to drive and had decided to drive to his destination along remote forest and dirt roads. The trackside covered with crushed stone on the track bed next to rail tracks was wide enough to drive a car there and he

continued driving on the track bed, next to rail tracks. The driver met his friends and at some moment decided to turn the car back. The trackside was not wide enough and during manoeuvring the left front wheel of the car crossed the rail. The driver could not finish the manoeuvre and the car stopped. A train appeared from behind a curve and seeing it the driver and his companions panicked. They abandoned the car and ran away. Collision followed. The train hit the side of the car and the car was thrown off the railway structure gauge. The train stopped. The car driver had failed to meet the following requirement - receiving of approval from the rail dispatcher concerning staying in the rolling stock structure gauge.

As a result of collision the car became unfit for use and the front part of the motor car of the passenger train suffered minor damages. There were neither casualties nor human injuries in the accident.

In order to improve traffic safety the railway infrastructure undertaking was recommended take measures to limit access of occasional drivers to the crushed stone on trackside of track bed. The Railway Inspectorate was asked to assess the need and expediency of specifications added to legal acts concerning possible occurrence of unauthorised objects in the structure gauge of rolling stock on open track.

Tiksoja on 29.01.2007



In the morning, at 10.00 a passenger train collided with an Audi car at Tiksoja automatically regulated level crossing.

The car driver, deep in his thoughts, had been driving at stable speed, not exceeding the speed limit. He did not pay attention to traffic signs which were warning him of approaching a level crossing. He was not aware of the flashing red traffic lights ahead and did not hear any sound signals.

Despite sufficient visibility he did not notice the passenger train approaching from the left. He ignored the requirements established concerning following the traffic control devices and crashed into the side of railcar of the train.

There were neither casualties nor human injuries in the accident. The diesel train suffered damages and the car became unfit for use.

In order to improve traffic safety it was recommended to install additional devices to the level crossing, to carry out the census of road traffic intensity and to take a position concerning grade-separating the railway and roadway in future.

Nõo on 01.02.2007



In the morning, at 10.02 a passenger train collided with a Ford Transit van Nõo at automatically regulated level crossing.

The driver crashed into the side of the passenger train driving too fast on a slippery road with low sunlight blinding him. The accident was caused by wrong assessment of circumstances by the driver. There were neither casualties nor human injuries in the accident. The first railcar

trailer and the front of the van suffered damages.

In order to improve traffic safety it was recommended to plan measures for ensuring better visibility of traffic lights in low sunlight and efficient implementation mechanisms for carrying out sufficient winter maintenance of roads.

Püssi on 07.02.2007



Before noon, at 11.29 a freight train collided with a GAZ truck at Püssi automatically regulated level crossing.

The truck was driving at low speed along the road, covered with soft snow, parallel to railway tracks, and was making a turn to the left in order to cross the rail tracks. The red flashing traffic lights were directed at the approaching truck and indicated that the level crossing was

closed. The driver was busy keeping the truck on the road and did not pay attention to prohibiting traffic lights. He should have stopped or if impossible, should have continued driving. He drove the truck to the rail tracks and the truck was hit by the train. The driver's inattentiveness was the direct cause of the accident. The driver died in the accident. The truck was deformed and became totally unfit for

The driver died in the accident. The truck was deformed and became totally unit for use. The first section of the double locomotive in the front part of train was damaged. The signalling devices of railway infrastructure also suffered damages. In order to improve traffic safety it was recommended to review the principles of organisation of winter maintenance of roads, to plan for closing down of Püssi level crossing and to reroute street traffic to a less dangerous level crossing situated in the vicinity.

Kloogaranna on 12.02.2007



In the morning, at 10.02 a passenger train collided with a Volkswagen Passat car at Kloogaranna unregulated level crossing. The car driver was ignoring traffic signs in the conditions of low sunlight and hoped to be lucky, but drove into collision with the passenger train. Since it was winter the road conditions were not very good and the accident was caused by the wrong driving manner of the driver.

The driver suffered slight bodily injuries. A car of the passenger train and the right side of the car suffered damages. In order to improve traffic safety it was recommended to draw special attention to changes in traffic intensity and accordingly plan equipping of level crossings with necessary devices. In addition it was recommended to review the contractual obligations of companies responsible for winter maintenance to ensure effectiveness of work done.

Ilumetsa on 20.02.2007



In the afternoon, at 14.28 a freight train collided with a Citroen Picasso car at Ilumetsa automatically regulated level crossing.

The roadway was slippery, covered with hard-packed snow and it was snowing. Driving on the straight road the driver did not reduce speed and did not pay attention to the signs warning him of approaching a level crossing. He did not look far ahead

and thus did not notice the flashing of traffic lights at the level crossing. After driving out of the forest and passing an obstacle he suddenly noticed the train which had appeared in his field of vision from the right. Before collision at Ilumetsa level crossing the speed of the car had been 93km/h.

The accident was directly caused by the fact that the driver had not taken into account the road and weather conditions as well as the speed limits established in traffic rules. The driver and the fellow passenger suffered slight bodily injuries as a result of collision. The locomotive was slightly damaged, but the car became unfit for use.

In order to improve traffic safety it was recommended to review the contractual obligations of companies responsible for winter maintenance

Veerenni on 22.02.2007



In the evening, at 20.32 a lone locomotive of train collided with a Ford Transit van at Veerenni unregulated level crossing.

When driving to the level crossing of limited visibility the driver noticed the locomotive approaching the level crossing from the right. The driver was not sure whether he would be able to stop the van before the level crossing. He braked, but

then decided to slip over the rail tracks before the locomotive reached the level crossing. He stepped on the gas. The van had almost crossed the level crossing when it was hit at its rear corner by the right corner of the locomotive. The accident was caused by wrong driving speed chosen by the driver while approaching the level crossing.

There were no human injuries as a result of collision, but the locomotive and van suffered slight damages.

In order to improve traffic safety it was recommended to hold a traffic intensity census. Based on available data on traffic intensity it was recommended to equip the level crossing with automatic traffic lights.

Hertu on 14.04.2007



In the afternoon, at 18.08 a passenger train collided with a BMW car at Hertu unregulated level crossing.

The driver was approaching the level crossing without exceeding the speed limit. During driving she was talking with her child over her right shoulder. The child was at the back seat on the right. The passenger train was approaching the level crossing from the left. The driver did not

notice the approaching train and did not react to the warning signs which were before the level crossing. This resulted in collision.

The accident was caused by inattentiveness of the driver.

The car driver died as a result of collision and her fellow passenger suffered slight bodily injuries. The car became unfit for use. The motor car of the diesel train suffered damages. In order to improve traffic safety it was recommended that in future, during inspection, possible problems of visibility caused by the specific features of landscape should be assessed.

Männiku on 24.06.2007



In the evening, at 20.30 a passenger train collided with an Alfa Romeo car at Männiku unregulated level crossing.

The car was driving at high speed to the level crossing of limited visibility. Before level crossing the driver braked and reduced speed of the car. When the car reached the level crossing, the train was approaching from the right and the car collided with the train.

The driver had chosen the wrong speed for approaching the level crossing and he did not take into account the requirements of the warning traffic sign.

The driver and the follow passenger died as a result of the accident. The car became unfit for use. The motor car of the diesel train suffered damages.

In order to improve traffic safety it was recommended to equip the level crossing with additional traffic control devices, to carry out traffic intensity census and to plan for closing down the level crossing in future and to reroute street traffic to other level crossings situated in the vicinity.

Toila on 10.07.2007



In the morning, at 08.32 a freight train collided with a Scania truck at Toila unregulated level crossing.

The driver stopped before the priority sign and glanced in both directions on the railway. He did not notice the approaching train. After having started driving he reached the level crossing and then noticed the train approaching from the right. Collision followed as a result of which six wheelsets of the first section of the diesel locomotive were derailed.

The driver had started driving from the priority sign without being convinced that no train was approaching the crossing. While driving over the level crossing he ended up in front of the train.

The locomotive driver suffered slight and the truck driver severe bodily injuries. The locomotive and the truck with trailer were seriously damaged. The railway infrastructure was damaged in a 325m section.

In order to improve traffic safety it was asked to make equipping of Toila level crossing with automatic traffic lights a priority. It was recommended to ensure following of valid legislation concerning permission of locomotive crews to work and to analyse the case in the truck company

Paldiski on 08.09.2007



In the morning, at 08.52 a passenger train collided with a MAN truck at Paldiski unregulated level crossing.

The truck driver was driving to the level crossing at the speed of 52km/h. He did not pay attention to warning signs, did not reduce speed, nor did he notice the approaching passenger train.

The accident happened because the driver had not adequately assessed the traffic

situation.

As a result of the accident the locomotive driver and the truck driver suffered severe bodily injuries. In addition, two railwaymen and one passenger suffered slighter injuries. The railway infrastructure was damaged in a section of 40m, including breakage of rails. The first two cars of the passenger train were derailed and suffered damages. The truck with trailer was deformed.

In order to improve traffic safety it was recommended to analyse the traffic situation at the level crossing and to equip it with traffic lights. The truck company was asked to discuss and analyse the case.

2. General observations of investigations

All railway traffic accidents investigated during the year happened in the railway infrastructure of two undertakings. The majority of them happened at level crossings.

| | | | | Table 3 |
|--------------------------------|--|---|--------------------------------|--|
| Infrastructure owner | Accident at regulated level crossing (active level crossing) | Accident at unregulated level crossing (passive level crossing) | Derailment of rolling stock | Collision of rolling stock with object in railway structure gauge |
| Edelaraudtee Infrastructure | - | 3 | - | 1 |
| Eesti Raudtee | 6 | 3 | 1 | - |
| Total | 6 | 6 | 1 | 1 |

Accidents by infrastructure managers

The largest number of accidents investigated happened in the infrastructure of AS Eesti Raudtee. Edelaraudtee Infrastructure AS is smaller than the infrastructure of AS Eesti Raudtee. That would logically explain the division of accidents investigated.

An exceptional occasion was the case when a car was in the railway structure gauge outside level crossing and the train collided with it. Thus the rolling stock and the car participated in the accident. In this case the car was like an object, located in the open track in the structure gauge of train, when it was hit by the train. According to the classification in force in Estonia there is no difference whether the collision of rolling stock took place on the level crossing or outside. In Estonian classification the case was defined as a collision of passenger train and other means of transport.

The following table describes the accidents investigated broken down by managers of rolling stock.

| | | | | Tuble 1 |
|----------------|---------------|----------------|---------------|----------------|
| Manager of | Accident at | Accident at | Derailment of | Collision of |
| rolling stock | regulated | unregulated | rolling stock | rolling stock |
| | (active level | level crossing | | with object in |
| | crossing) | (passive level | | railway |
| | | crossing) | | structure |
| | | | | gauge |
| Edelaraudtee | 2 | 3 | - | 1 |
| Eesti Raudtee | 3 | - | - | - |
| Elektriraudtee | - | 2 | - | - |
| Spacecom | - | - | 1 | - |
| Westgate | 1 | 1 | - | - |
| Transport | | | | |
| Total | 6 | 6 | 1 | 1 |

Accidents by managers of rolling stock

Table /

The largest number of accidents investigated happened to the rolling stock belonging to Edelaraudtee Veeremi OÜ. Trains of Edelaraudtee AS use both their own infrastructure and the infrastructure of AS Eesti Raudtee.

Derailments of rolling stock in tables 3 and 4 happened outside level crossings. The accidents at level crossings may also involve derailment of rolling stock, but the above tables do not reflect it.

Since 2004, when the Unit for Investigation was established, altogether 73 accidents have been investigated. The following table is the overview of the investigations conducted.

| Qualification | Year, number of investigations | | | | |
|---|--------------------------------|------|------|------|-------|
| of occurrences | 2004 | 2005 | 2006 | 2007 | Total |
| Accident at regulated level crossing | 3 | 9 | 6 | 6 | 24 |
| Accident at unregulated level crossing | 7 | 16 | 12 | 6 | 41 |
| Derailment of rolling stock | 2 | 2 | 1 | 1 | 6 |
| Danger of collision by ignoring prohibiting signals | - | - | 1 | - | 1 |
| Collision of rolling stock with object in railway structure gauge | - | - | - | 1 | 1 |
| Total | 12 | 27 | 20 | 14 | 73 |

Breakdown of investigated accidents by years

The majority of accidents investigated during the years happened at level crossings. Since the number of unregulated level crossings is higher in Estonia than that of regulated level crossings, the number of accidents which happened at unregulated level crossings is also higher. The number of accidents investigated each year is different and that for several reasons. The Unit for Investigation started to work in the spring of 2004. Consequently, all accidents which had happened before that were not investigated. In the following two years the number of accidents investigated all accidents with the number of accidents that had happened. We had to investigate all accidents and the investigator had to focus on the most important facts keeping in mind that the investigation should be completed as a rule before a probable new accident happened. In 2007 the legal basis for investigation changed and that has enabled the investigator to focus more fully on each case.

Table 5

The following table describes the casualties and injuries of 2007 accidents.

| Infrastructure owner | Casualties | Injured in road vehicle/of them seriously | Injured in rolling stock/ of them seriously |
|-------------------------|------------|---|---|
| Edelaraudtee | 3 | 1/- | - |
| Infrastructure | | | |
| Eesti Raudtee | 1 | 5/2 | 5/1 |
| Total | 4 | 6/2 | 5/1 |

Injuries and casualties

Altogether four people died in railway accidents investigated. One of the accidents caused the death of two people and as a result of two accidents one in each died. The Unit for Investigation investigated all accidents with casualties. There are no differences in the number of people injured in road vehicles or rolling stock in the accidents investigated. There is a difference if we compare the number of injured people per accident. People who are in road vehicles suffer bodily injuries more often than those in rolling stock. In one serious accident the number of injured people in rolling stock exceeded that of injured people in the road vehicle. One passenger, three railwaymen and four people who had been in road vehicles suffered slight bodily injuries in the accidents investigated in 2007. One railwayman and two people in road vehicles suffered serious bodily injuries. Not a single rail passenger suffered serious injuries. The casualties were fellow passengers (other persons) travelling in cars. The Unit for Investigation did not investigate the cases when persons on rail tracks were hit by rolling stock when the only consequences were bodily injuries or death. These cases are not reflected in this report.

The following table gives the breakdown of casualties and injured by years.

| | | | | | Table 7 | | |
|---------------------|------------|--------------|------|------|---------|--|--|
| Individual division | | Year, number | | | | | |
| | | 2004 | 2005 | 2006 | 2007 | | |
| Casualties | Passengers | - | - | - | - | | |
| | Staff | - | - | - | - | | |
| | Other | 2 | 2 | - | 4 | | |
| | persons | | | | | | |
| | Total | 2 | 2 | - | 4 | | |
| Injured | Passengers | - | - | 6 | 1 | | |
| | Staff | 2 | 1 | 1 | 4 | | |
| | Other | 5 | 13 | 8 | 6 | | |
| | persons | | | | | | |
| | Total | 7 | 14 | 15 | 11 | | |

Injured and casualties by years

20

Table 6

The table above shows only train passengers as passengers. The drivers of road vehicles and their fellow passengers are described as other persons. Locomotive crews and other employees of railway undertakings who were on the train because of their duties are entered as staff. The total number of injured people shows people both with slight and serious bodily injuries.

The material damage that resulted from the accidents is given in the following table.

| | | | Table 8 |
|--|---------------------------|---|--------------------------------|
| Damage | Collisions with trucks | Collisions with cars, minibuses or objects in gauge | Derailment of rolling stock |
| 1 | 2 | 3 | 4 |
| Damage to rolling stock | 3 | 10 | - |
| Damage to infrastructure | 3 | - | 1 |
| Damage to road vehicles | 3 | 10 | - |
| Damage to roadway and its traffic control devices | _ | _ | _ |
| Pollution of environment | 1 | - | - |

Material damage as a result of accidents

14 accidents were investigated during the year, including three of which were collisions of rolling stock and trucks at level crossings. Damages in these accidents were more considerable in comparison to other accidents. In all such accidents both the means of transport and railway infrastructure were damaged and in one case the accident caused environmental pollution, but not a very extensive one.

As a result of collisions of smaller road vehicles and rolling stock both means of transport suffered some damages, but there were no other damages (to infrastructure or environment). Roadway and traffic control devices were not damaged in the accidents investigated in 2007. Railway infrastructure suffered damages when a train was derailed.

G. Recommendations

1. General information concerning recommendations

From the time of establishment of the Unit for Investigation in 2004 recommendations have been issued after the analysis of investigation results in order

to improve railway traffic safety. The following table gives an overview of recommendations made each year.

| Field of activity of recommendation | Year, number of recommendations | | | |
|---------------------------------------|---------------------------------|------|------|------|
| | 2004 | 2005 | 2006 | 2007 |
| 1 | 2 | 3 | 4 | 5 |
| Maintenance and arrangements of | 7 | 8 | 1 | - |
| railway infrastructure | | | | |
| Care, maintenance and managing of | 8 | 4 | 5 | - |
| rolling stock | | | | |
| Organisation of supervision | 18 | 9 | 7 | 2 |
| Road traffic management, road traffic | 12 | 33 | 10 | 7 |
| control devices | | | | |
| Winter maintenance of roads | - | 7 | 6 | 6 |
| Dissemination of information | 6 | 17 | 14 | 3 |
| concerning traffic, training | | | | |
| Amendments to legal acts and | 6 | 17 | 8 | 5 |
| regulating instructions | | | | |
| Operation of crossing traffic lights, | 11 | 17 | 9 | 7 |
| railway traffic control | | | | |
| Organisation of operation of railway | - | 6 | 4 | 1 |
| communication devices | | | | |
| Professional qualifications of | 2 | 2 | 2 | 1 |
| railwaymen | | | | |
| Other arrangements | - | 32 | 22 | 19 |
| Total | 70 | 152 | 88 | 51 |

Recommendations for improvement of safety

Table 9

51 recommendations were made during the year for improvement of railway traffic safety. The independent investigator issued recommendations to the owners of railway infrastructure undertakings, transport companies and roadways, Railway Inspectorate, managers of road vehicles and in individual cases to other institutions and companies for proceeding.

2. Overview of recommendations made during the year

During the year no recommendation was made to improve maintenance of railway infrastructure and rolling stock.

Once we had to turn to the Labour Inspectorate concerning organisation of supervision and once we asked a company to comply with valid legislation.

Recommendations concerning road traffic control asked to assess the possibilities of equipping level crossings with barriers. Such recommendations were addressed to several parties whose duty is to participate in annual inspections of level crossings. In the course of inspection they assess the safety of level crossings and agree on positions as regards equipping level crossings with additional devices. The other recommendations included mounting of additional traffic signs, planning of closing down of two level crossings in future and organisation of traffic through other level crossings and taking a position on transferring traffic to two levels.

The circumstances of several accidents, which happened in winter, were related to poor winter maintenance of roads. Road managers were asked to review conditions for more effective de-icing in the vicinity of level crossings.

Three recommendations were made on training of truck drivers, dissemination of traffic information and assessing driving manners. Recommendations were issued both to transport operators and drivers individually.

Regulations on work organisation of railway transport undertakings were assessed during investigation, paying attention to safety aspects, and recommendations were issued to make amendments to them or to draft additional instructions. The Unit for Investigation also recommended the Railway Inspectorate to review "The Rules for technical use of railway" for better definition of the duties of locomotive crews and responsibilities concerning technical conditions of locomotive equipment. In addition they were asked to take a position concerning the possible drafting of a new legal act or the need to make amendments to legal acts as regards a better definition of the purposeful use of railway infrastructure.

Bad visibility of operating traffic lights was pointed out among other circumstances of accidents. Recommendations were made to railway infrastructure undertakings to take measures for improvement of visibility. On one occasion we made a recommendation concerning interaction of the entry and exit traffic lights in a station. One proposal was about the assessment of the speed limit established for rolling stock in one section of railway infrastructure and of probable changes of it.

A rail transport undertaking was recommended to draw up and implement a training programme for locomotive crews on adequate behaviour in critical situations.

Other organisational measures included clearer definition of data and individual recommendations on work organisation.

3. Implementation of recommendations

Starting from the establishment of the Unit for Investigation of Railway Accidents we have made recommendations on the improvement of traffic safety. In the beginning the recipients of recommendations did not have any obligation to inform the Unit of their attitude or possible measures on the proceeding of recommendations. Consequently, the Unit for Investigation did not get any feedback on recommendations, which were made before 2006. After application of the Railway Safety Directive 2004/49/EC in the legal area of Estonia the addressees of recommendations of 2007 were obligated to submit reports to the Unit for Investigation on the measures implemented, proceedings in progress or rejection of recommendations by the 1 April of the following year. Rejections of recommendations had to be reasoned.

The outcome of the proceedings of recommendations made in two years is presented in the following table.

Implementation of recommendations

| Activities | concerning | Year, number of recommendations | | | |
|--------------------------|------------|---------------------------------|------|--|--|
| recommenda | tions | 2006 | 2007 | | |
| Total r | umber of | 88 | 51 | | |
| recommendat | ions | | | | |
| Accepted recommendations | | 25 | 21 | | |
| Proceedings in progress | | 15 | 28 | | |
| Rejected recommendations | | 1 | _ | | |

Since feedback on recommendations made in 2006 was voluntary, we have no information on the proceedings of 47 recommendations.

47

No information

51 recommendations were sent to 16 different addressees concerning 14 accidents investigated in 2007. Two out of the 51 recommendations were sent to several agencies and undertakings for proceedings. The two recommendations involved inspections of level crossings by committees. The agencies and undertakings, members of the inspection committee, were asked to take a position as regards the recommendations in the course of inspection. The two recommendations and the outcome of their proceedings will be dealt with within the framework of recommendations made to railway infrastructure undertakings.

The greatest number of recommendations was made to AS Eesti Raudtee, the transport undertaking and manager of railway infrastructure with the busiest traffic. Eight out of 19 recommendations made were implemented by the time of completion of this report. The undertaking has arranged their data and checked the operation of equipment. Following the recommendation issued by the independent investigator, the undertaking assessed among other measures in the context of general railway safety the compliance of speed limits of freight trains at Maardu level crossing with the provisions of "The Instructions for building, maintenance and use of level crossings". The outcome of proceedings was that the level crossing met the requirements of the Instructions and it was not necessary to lower the speed limit.

11 recommendations are in the proceedings stage and decisions will be made during inspections of level crossings, e.g. closing down of Püssi level crossing and equipping of several level crossings with barriers, as well as replacement of existing traffic lights by LED traffic lights to offer better visibility. Toila level crossing will have automatic traffic lights by May 2008 and Paldiski level crossing will have automatic traffic lights by June 2009, preparatory work for that has already started. The company has included a new provision in their internal rules of operation on the obligation to check locomotive crews before they start working in order to make sure that they are ready to follow all traffic safety rules and duties in driving rolling stock. The above recommendation will also be addressed when the amendment proposals to the "Rules for technical use of railway" will be under discussion together with the Railway Inspectorate.

Five recommendations were made to the railway undertaking Edelaraudtee AS. Two of them have already been implemented and three are in the proceedings stage. The undertaking limited the access of road vehicles to the track bed for driving on crushed

2

stones and arranged their database. The recommendation on poor visibility for road vehicles at Hertu level crossing in summer because of lush vegetation is in the proceedings stage. Plans have been made for closing down one level crossing in Saku rural municipality following the recommendation made in the investigation report. In order to do it, reconstruction of a road in the neighbourhood has been planned and design of a new level crossing will be ordered. Carriage of goods on the railways of Edelaraudtee Infrastructure AS has stopped. The company plans to equip only Veerenni level crossing with automatic traffic lights after they again start carriage of goods.

Five recommendations on improvement of work with their personnel were made to the rail transport undertaking AS Spacecom by the independent investigator. The company has taken all recommendations into account, has accepted them and continues proceeding of them according to changes implemented in the company.

Rail transport undertaking Westgate Transport OÜ was recommended to permit locomotive crews to work according to the Working and Rest Time Act and the company's "Regulations on work organisation of employees responsible for the operation of locomotives". In their report submitted to the independent investigator they gave a thorough analysis of how they comply with the provisions of the Working and Rest Time Act as regards permission of locomotive crews to work and concluded that all requirements had been met.

Four recommendations on planned amendments to legal acts were made to the Railway Inspectorate in 2007. One recommendation was accepted and proceedings of the other three are in progress. Our Railways Act now includes a provision on mandatory contracts to be made between the company doing winter maintenance and the manager of railway infrastructure to define all technical details of winter maintenance.

Northern Inspection of the Labour Inspectorate reported on the recommendations made to the Labour Inspectorate. The proceedings of the recommendation are in progress and they have planned to inspect the performance of the rail transport undertaking concerning occupational safety and health, which would include control on recording of work time.

In 2007 the independent investigator issued two proposals to road transport undertakings and one recommendation individually to a car driver. The recommendation made individually to the driver led the driver to self-analysis and assessment of that process may be quite subjective. There is no obligation to report back to the investigator on recommendations made to individuals, and consequently there is no information on the reaction of the driver to the recommendation. One road transport company accepted the recommendation made to them, but the other has gone bankrupt and consequently we have no information of them.

Altogether 13 recommendations were made to seven road management undertakings to improve traffic safety. The recommendations to them were made as a result of level crossing accidents. Based on reports we may conclude that seven recommendations were accepted and implemented and six recommendations were in the proceedings stage. Road management undertakings have implemented recommendations on better organisation of winter maintenance. The provisions of contracts made with those who carried out winter maintenance were reviewed and preventive measures are now taken in winter when roads are slippery. Reorganisation of road traffic has been planned for Maardu and Tiksoja and that will lead to changes in traffic operation at corresponding level crossings. Possible closing down of Püssi level crossing will be on the agenda in the inspection. The proceedings were not over by the time of completion of the report. Tallinn Transport Department carried out a census of road traffic intensity for 10 days (24 hours a day). The outcome of the census will enable better assessment of the use of level crossings and the need for equipping them with traffic control devices.

The following table gives an overview of the implementation of recommendations issued in 2007.

| | | | | Table 11 | | | |
|--------------|--------------------------|----------|-------------|----------|--|--|--|
| Field of | Field of Recommendations | | | | | | |
| activity | No | Accepted | In progress | Total | | | |
| - | information | - | | | | | |
| To state | - | 2 | 3 | 5 | | | |
| agencies | | | | | | | |
| To railway | - | 11 | 19 | 30 | | | |
| undertakings | | | | | | | |
| To owners of | - | 7 | 6 | 13 | | | |
| roads | | | | | | | |
| To managers | 2 | 1 | - | 3 | | | |
| of road | | | | | | | |
| vehicles | | | | | | | |
| Total | 2 | 21 | 28 | 51 | | | |

Implementation of recommendations by fields of activities

Several addressees were issued similar recommendations and any recommendation is recorded in tables 9, 10 and 11 only once.