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**FINAL REPORT ON THE INVESTIGATION INTO THE RAILWAY  
ACCIDENT – RAIL WORKS MANAGER RUN OVER BY FREIGHT  
TRAIN NO 52102 ON THE LEFT-HAND TRACK BETWEEN RAILWAY  
STATIONS LAŠKO AND RIMSKE TOPLICE AT KM 514+930**



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# 1 SUMMARY

On 15 April 2009, freight train no 52102, travelling along the correct left-hand track between the Rimske Toplice and Laško railway stations, ran over a rail works manager who was walking along the track. Train no 52102 was travelling between Rimske Toplice and Laško stations along the (correct) left-hand track in the direction of Maribor. The rail works manager was walking along the left-hand track between the level crossings LC-2 at km 514+605 and LC-3 at km 514+973, between Rimske Toplice and Laško stations in the direction of Maribor.

According to the daily work plan for 15 April 2009, the rail-work group managed by the rail works manager involved in the accident was assigned, by the supervisor of Nadzorništvo prog Celje (Celje Rail Supervisory Service) the task of manually adjusting the track at points no 5 of the Rimske Toplice station, on the right-hand track of the “Oskar” level crossing at km 514+605, on the right-hand track of the “Marija Gradec” level crossing at km 514+973, on the “Pivovarna Laško” bridge and at points 1 and 2 of Laško station. An examination of the Zidani Most-Celje line was also indicated in the plan.

The rail works manager involved in the accident was carrying out these tasks together with six track workers; two members of his group were away on sick leave, and two on annual leave. The group also included two linemen on the day in question.

After the right-hand track had been manually adjusted at the “Oskar” LC2 level crossing at km 514+605, the rail works manager sent the workers of the rail group he was in charge of to the “Marija Gradec” LC-3 level crossing at km 514+973. He instructed the workers to transfer the tools they had been using at the LC-2 level crossing to the LC-3 level crossing. The rail works manager asked one of the workers, who on that day had come to work by car, to transport some of the tools from the LC-2 level crossing to the LC-3 level crossing. The remaining tools were carried by the workers along the road running parallel to the railway line.

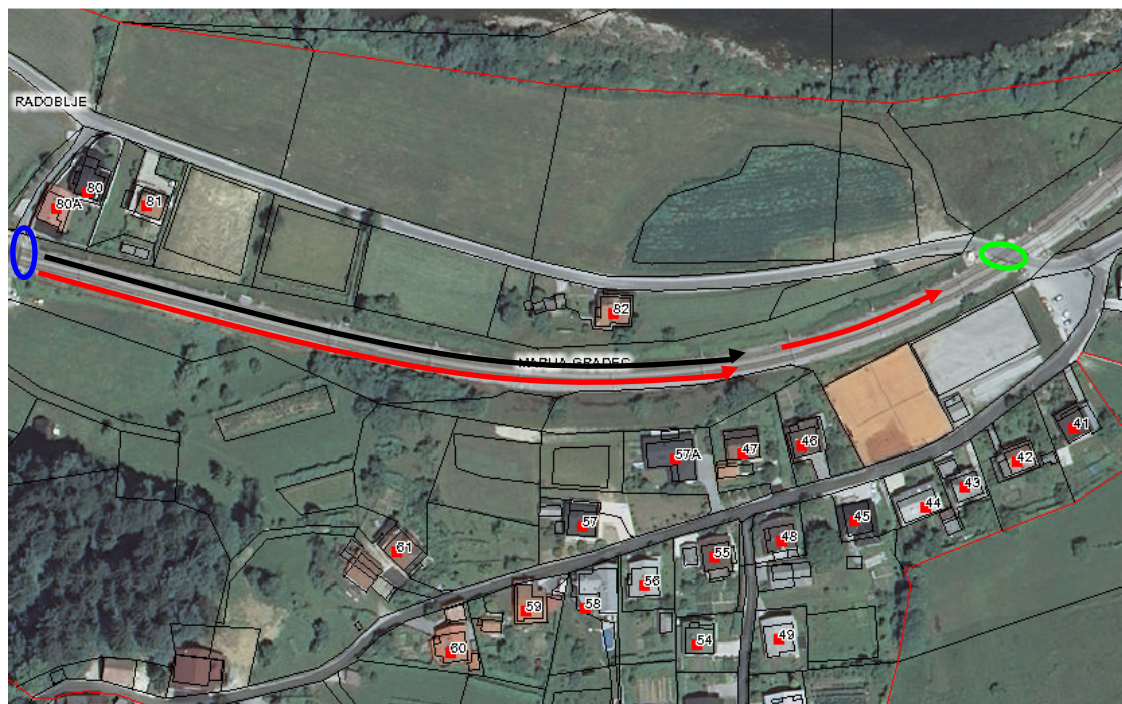


Figure 1: The blue ellipse marks level crossing 2, the green marks level crossing 3, and the red arrow marks the direction in which the rail works manager was walking; the black arrow marks the direction of train no 52102

The road runs in a curve similar to that of the railway line, and is approximately 40 m from the railway line at its farthest point.

It is assumed that the rail works manager set off from the working site at the LC-2 level crossing at km 514+605 for the working site at the LC-3 level crossing at km 514+973 at 09:20. He would have had only 368 m to cover. He started walking on the right-hand track and is reported to have moved over to the left-hand track at 09:24 let train no 2933 pass. Train no 52102 then arrived from behind his back and ran him over at km 514+930 at 09:26.

Because of the accident, the traffic controller of the Rimske Toplice station, immediately on being notified at 09:40, imposed an emergency closure of the left-hand track between Rimske Toplice and Laško stations, which lasted until 14:11.

The 56-year-old rail works manager, a citizen of Slovenia as well as Bosnia and Herzegovina, sustained fatal injuries and died at the accident site.

In the accident, the traction vehicle of train no 52102, no 342-025, suffered minor damage to the air pipe and air-pipe faucet of the primary air pipe. Material damage, according to a non-expert assessment, amounted to EUR 300.

## **Recommendations**

To improve safety during maintenance works being carried out while trains are operating, a special regulation should be drafted for the health and safety of workers of Slovenske železnice (Slovenian Railways), with detailed descriptions of the protection procedures and safety measures to be used.

### ***1.1. Copies of the accident report with recommendations to:***

Slovenske železnice, d.o.o.  
Kolodvorska 11  
1506 Ljubljana

Republic of Slovenia  
Ministry of Transport  
Minister Dr Patrick Vlačič  
Langusova 4  
1000 Ljubljana

Public Agency of the Republic of Slovenia for Railway Transport  
Kopitarjeva 5  
2000 Maribor

Ministry of the Interior  
The Police  
Police Directorate Celje  
Ljubljanska cesta 12  
3001 Celje

ERA – European Railway Agency  
120 rue Marc Lefrancq  
BP 20392  
F-59307 VALENCIENNES Cedex

## **2 IMMEDIATE FACTS OF THE OCCURRENCE**

11. Article 11 of the Railway Transport Act stipulates that:

- the maintenance of public railway infrastructure and train-traffic management is a public service obligation to be fulfilled by the manager on the basis of a public-utility service contract;
- the maintenance of public railway infrastructure involves the organisation of regular maintenance works, maintenance work for public benefit, and major maintenance and repair works.

The fatal accident – in which the rail works manager was run over by train no 52102 on 15 April 2009 at 09:26 – occurred during regular maintenance works, which – according to Article 11 of the Railway Transport Act – also include those works that maintain the normal operating capacity of the railway infrastructure and guarantee traffic safety; regular maintenance works also involve replacements as part of maintenance i.e. the replacement of components in preventive and corrective maintenance with parts of identical function and mode of operation, and the supervision of subsystems, ensuring also that railway lines remain operational in the event of natural and other disasters, the keeping of registers and records, and measurements of individual parameters or parts of the system.

To move from one work site to the other, the rail works manager had the possibility – as with the workers he instructed to leave the LC-2 level crossing and go to the LC-3 level crossing – of using the local road, which runs parallel to the railway line at this section.

It is also possible that the rail works manager, when moving from the work site at the LC-2 level crossing to that at the LC-3 level crossing, wished to perform track measurements on the section between the two level crossings, since he was carrying a track gauge that he could have asked a colleague to transport by car.

### **2.1 Date, exact time and location of the occurrence**

The accident – in which the rail works manager was run over by train no 52102 on the (correct) left-hand track of the double-track main Zidani Most-Šentilj state border railway line, at km 514+930 – occurred on 15 April 2009 at 09:26.

### **2.2 Description of the events and the accident site**

On 15 April 2009, the rail work group, consisting of the rail works manager and six workers – track workers, and two linemen – was carrying out regular maintenance tasks of manual track adjustment. According to the daily work plan for 15 April 2009, the group managed by the rail works manager involved in the accident was assigned by the supervisor of Nadzorništvo prog Celje (Celje Rail Supervisory Service) the task of manually adjusting the track at points no 5 of Rimske Toplice station, on the right-hand track of the “Oskar” level crossing at km 514+605, on the right-hand track of the “Marija Gradec” level crossing at km 514+973, on the “Pivovarna Laško” bridge and at points no 1 and no 2 of Laško station. The examination of the Zidani Most-Celje line was also indicated in the plan. In the plan providing for examination of the Zidani Most-Celje line, there is no mention of an individual track or part of the track.

The rail work group started work at points no 5 of the Rimske Toplice station, using the Cobra electric power-tool to level the ballast under loose sleepers. After finishing this work at points no 5, the work group moved over to the “Oskar” LC-2 level crossing at km 514+605, to level the ballast under the sleepers. The rail works manager decided that he needed no advance notices on train journeys from the traffic controllers of Rimske Toplice and Laško stations, and had therefore not requested them, since the works were being carried out at a level crossing protected with half-barriers that, when activated, clearly signal the arrival of the train by ringing, by illuminated signs and half-barriers on which red lights flash.

The rail works manager ordered a signal for the worksite to be placed in front of the work site on both sides of the railway line from both directions (signal 207); from the Laško direction at km 515+282, and from the Rimske Toplice direction at km 514+065.

After completing the work at the “Oskar” LC-2 level crossing, the rail works manager instructed the workers to move on to the “Marija Gradec” LC-3 level crossing at km 514+973. He instructed the workers to transfer the tools they had been using at the “Oskar” LC-2 level crossing to the “Marija Gradec” LC-3 level crossing. The rail works manager asked one of the workers, who on that day had come to work by car, to transport some of the tools (the Cobra handheld ballast-tamping tool) from the LC-2 level crossing to the LC-3 level crossing. The remaining tools were carried by the workers along the road running parallel to the railway line.

The rail works manager left the LC-2 level crossing for the LC-3 level crossing using the right-hand track of the line, in the direction facing the oncoming trains when they are travelling on their correct track. He is reported to have left the LC-2 level crossing at 09:19, after the passage of train no 13, which had passed Laško station at 09:17. He was carrying a track gauge in one hand. When, at around 09:25, train no 2933 was coming towards the rail works manager on the right-hand track from the Laško direction, he moved to the left-hand track in order to avoid it. Train no 52102, travelling on the left-hand track from the Rimske Toplice direction, was at the signal for the work-site at 09:25:30. At the signal for work-site, the locomotive driver sounded signal 63, “Caution!” using the locomotive whistle, and continued to drive towards the accident site. Directly ahead of the accident site, the railway line runs in a minor cutting, which is around 1.5 m under the surface level on the left-hand side, while on the right-hand side there is a 30° slope. Because of the cutting, the locomotive driver of train no 52102 was able to see the rail works manager, who was walking in the same direction as the train was travelling a distance of only 100–150 m, before running him over. As soon as the locomotive driver of train no 52102 caught sight of the rail works manager, he sounded the “Caution!” signal and activated the high-speed brake. Despite being alerted to the danger by means of the locomotive whistle of the traction vehicle, the rail works manager did not move out of the way and was therefore run over by train no 52102 at km 514+930.

### ***2.3 The body that established the investigation***

The investigation procedure was launched by the Railway Accident and Incident Investigation Division of the Ministry of Transport of the Republic of Slovenia, Celje Criminal Investigation Police Section of the Celje Police Directorate, and Slovenske železnice, d.o.o.

Their investigation procedures were conducted entirely separately.

### ***2.4 The decision to establish an investigation, the composition of the team of investigators and the conduct of the investigation***

The Railway Accident and Incident Investigation Division of the Ministry of Transport of the Republic of Slovenia launched an investigation to determine all direct and indirect causes, with the purpose of collecting information important for improving the safety of workers during rail works carried out while trains are kept running.

The Chief Investigator of the Railway Accident and Incident Investigation Division of the Ministry of Transport of the Republic of Slovenia conducted the investigation and brought it to a close himself.

Slovenske železnice, d.o.o. conducted its investigation through an investigation commission.

Two employees of the Criminal Police Division of Police Directorate Celje carried out their investigation in accordance with the provisions of the Criminal Procedure Act.

### ***2.5 The background to the occurrence***

In compliance with Article 68 of the Signalling Rules published in Uradni list RS (Official Gazette of the Republic of Slovenia) No 123 dated 28 December 2007, signals for the work site were placed ahead of the work site at the LC-2 level crossing, at km 514+605, on both sides of the railway line and from both directions (signal 207); from the Laško direction at km 515+282, which is 677 m ahead of LC-2 and from the Rimske Toplice direction at km 514+065, which is 540 m ahead of LC-2.

Immediately before the accident, the train's speed was 63 km/h.

It was the rail works manager's own decision to move from the work site at the LC-2 level crossing to the work site at the LC-3 level crossing in the way he did.

Before deciding to walk on the track from the LC-2 level crossing to the LC-3 level crossing, the rail works manager did not ask the traffic controllers of the Laško and Rimske Toplice stations for information on the train services operating at the time of his movements, although he could have done this since there is a telephone set installed on the small hut at the LC-2 level crossing, with a direct connection to both traffic controllers.

The rail works manager used none of the personal protective equipment specified by the SIST EN 471 standard (warning vest) prescribed for work in the danger zone of the track where rail workers may be run over.

### **2.5.1 Staff involved**

The accident involved:

The driver of section freight train no 52102, an employee of Slovenske železnice d.o.o., Poslovna enota Vleka, Sekcija za vleko Ljubljana.

The locomotive driver had passed the qualifying examination for the position of “Shunter diesel locomotive driver” on 6 July 1989, and for the position of “342 series electric traction vehicle driver” on 17 May 2006.

The rail works manager was employed by Slovenske železnice d.o.o., Sekcija za vzdrževanje prog Celje. The rail works manager had passed the qualifying examination for the position of “lineman” on 24 February 1976, and for the position of “rail works manager” on 23 October 1986.

### **2.5.2 The trains and their composition, including the registration numbers of the items of rolling stock involved**

Internal traffic section freight train no 52101 consisted of an electric traction vehicle – a locomotive of the 342 series, reg. No 91 79 1 342025-8 – and carriages of various series, totalling 1248 t, 94 axles and having a length of 448 m.

### **2.5.3 The description of the infrastructure and signalling system – track types, switches, interlocking, signals, train protection)**

The main Zidani Most-Šentilj state-border railway line is a double-track line from Zidani Most station to Maribor station. Rail traffic at the railway section between Zidani Most and Maribor stations is of the left-hand type, which means that the trains are travelling on the left-hand track from the beginning of the line, which is Zidani Most station on this line, until the end of the line, and on the right-hand track in the opposite direction. All the stations at the Zidani Most-Celje railway line section are equipped with the Iskra Lorenz SLT-30 signalling and safety device. Interstation sections are equipped with APB devices (automatic railway-line block). The line is electrified with DC voltage of 3 kV.

This section of the railway line consists of UIC-49 tracks.

The maximum permitted speed as laid down in the time table for train no 52102 for this section of the railway line is 70 km/h from km 506+500 to km 517+200.

Both level crossings i.e. LC-2 at km 514+605 and LC-3 at km 514+937 are protected with half-barriers, which depend on the signalling and safety device. Operation control is in the hands of the Laško station traffic controller on the control panel of the electric relay device.

### **2.5.4 Means of communication**

Along the entire railway line are boxes containing telephones installed next to every main signal, with an internal telephone set enabling a connection on the keeper telephone wire with the traffic controllers of the neighbouring stations, on the dispatcher telephone wire with the Maribor train

dispatcher, on the power-supply telephone wire with the dispatcher of the relevant power-supply stations, a construction telephone wire intended to establish connections when construction works are in progress, an emergency telephone wire used in the event of accidents, and a line telephone wire intended to be used when rail work groups are carrying out maintenance works.

### **2.5.5 Works carried out at or in the vicinity of the site**

At the time of the accident, there were no building works in progress at the scene of the accident or in the vicinity.

### **2.5.6 Trigger of the railway emergency plan and its chain of events**

The locomotive driver of train no 52102 notified the train dispatcher of Prometna operativa Maribor of the accident on the emergency channel of the A-60 radio dispatch communication system (RDZ) along with the Laško station traffic controller. The traffic controller of the Laško station notified the Operation and Communication Centre of the Celje Police Directorate.

Paramedics of the Celje Health Centre were deployed to the accident site, along with a patrol of police officers of the Celje Traffic Police Station, and two police officers of the Criminal Police Division Celje who inspected the accident site and documented the situation after the accident. The accident site was also inspected by the investigating judge of the Celje Local Court and by the Chief Investigator of the Railway Accident and Incident Investigation Division of the Ministry of Transport of the Republic of Slovenia, who also documented the situation after the accident.

### **2.5.7 Trigger of the emergency plan of the public rescue services, the police and the medical services and its chain of events**

The left arm of the rail works manager was found in the space between the left-hand and the right-hand tracks in the middle of the roadway of the LC-3 level crossing at km 514+973, and the body on the left-hand track under the train, 289.5 m from the train front, at km 514+990.5.

After the notification provided by the Laško station traffic controller, an emergency plan of rescue measures was set in motion. A rescue team of the Celje Emergency Medical Service arrived at the accident site, examined the body of the victim – the rail works manager – and found that his injuries were incompatible with life.

## **2.6 Fatalities, injuries and material damage**

The 55-year-old rail works manager, born on [REDACTED] in the town of [REDACTED], a citizen with dual nationality – of the Republic of Slovenia and the Republic of Bosnia and Herzegovina – sustained fatal injuries in the accident at work.

The rail works manager was an employee of Slovenske železnice d.o.o., Sekcija za vzdrževanje prog Celje, an organisational unit of Nadzorništvo proge Celje.

In the accident, the faucet handle of the primary air-pipe was broken at the front side of the electric traction vehicle, locomotive no 342-025; the tube of the primary air-pipe was also damaged. The track gauge the rail works manager was carrying was destroyed. Material damage, according to a non-expert assessment, amounted to around EUR 700.00.

## **2.7 External circumstances**

Weather conditions at the time the accident occurred: Sunny, +10° C, good visibility.

Because of the left-hand curve, the railway line cutting, a residential building and the vegetation at the left-hand side of the railway line ahead of the accident site, the field of vision of the locomotive driver of train no 52102 was reduced to 150 m.



### 3 RECORD OF INVESTIGATIONS AND INQUIRIES

On 15 April 2009, the day of the accident, at 11:15:00, the Chief Investigator of the Ministry of Transport inspected the accident site.

On 8 May 2009, the Railway Accident and Incident Investigation Division asked the Celje Criminal Investigation Police Section of the Celje Police Directorate, and Slovenske železnice d.o.o. for the accident investigation material.

On 21 May 2009, the accident investigation material of Slovenske železnice d.o.o. was received:

- Notification 1.2.-84/2004 – Definition of measures to ensure the safety and health of workers carrying out works on the railway line.
- The following minutes of the interrogation of the employee – witness: Traffic controller of the Rimske Toplice station, traffic controller of the Laško station, locomotive drivers of freight train no 521021 and passenger train no 2933, head of Nadzorništvo proge Celje, 6 track workers, a lineman and an auxiliary worker;
- Copy of manual records (records of voice texts) of the rail works manager;
- Copy of the work register of Nadzorništvo proge Celje – daily plan for 15 April 2009;
- Copy of the weekly work plan of Nadzorništvo proge Celje;
- Copy of the medical report of the rail work manager's periodic medical examination;
- Copy of the record of working time of Nadzorništvo proge Celje for the month of April 2009;
- Copy of the head of maintenance works qualifying examination certificate;
- Copy of the head of maintenance works qualifying examination certificate;
- Letter by Sekcija za vleko Ljubljana – analysis of the speedometer tape of train no 52102;
- Copy of the police minutes of the confiscation of the speedometer tape taken from locomotive 342-025;
- Copy of the record of the confiscation of the speedometer tape taken from locomotive 342-025;
- Request by the Internal Supervision Service of Slovenske železnice d.o.o. for the interrogation of workers and written analysis of the movements of trains 52102 and 2933;
- Copy of the Daily report on emergency by the locomotive driver of train no 52102, Sekcija za vleko Ljubljana, Delovna enota Zidani Most no 23/3 Z;
- Letter by Sekcija za vleko Ljubljana no 3.3.4.-1265/2009-9/4 dated 6 May 2009, Request for the interrogation of workers and written analysis of the movements of trains 52102 and 2933;
- Copy of the routine maintenance plan for the railway line superstructure for April, March 2009, SVP Celje;
- Copy of the Emergency report by the Laško station traffic controller, dated 15 April 2009;
- Copy of Incident notification no 9/2009 of the head of Nadzorna postaja Celje (Celje supervisory station), dated 16 April 2009;
- Copy of the authorisation empowering the head of Sekcija za vleko Ljubljana to be a member of the commission drafting the Commission report on incident investigation no 09/2009 of Nadzorna postaja Celje (Celje supervisory station);
- Copy of the authorisation empowering the head of Sekcija za vleko Maribor to be a member of the commission drafting the Commission report on incident investigation no 09/2009 of Nadzorna postaja Celje (Celje supervisory station);

- Copy of the Commission report on incident investigation no 09/2009, Sekcija za vodenje prometa Maribor, dated 18 May 2009;
- Copies of the P-13 traffic logbooks of the stations Laško and Rimske Toplice for 15 April 2009;
- Letter by the Internal Supervision Service of Slovenske železnice d.o.o., no 1.0.4./01-1125/09 JK, Accident investigation materials – the rail works manager having been run over on 15 April 2009 and
- Commission report on incident investigation no 09/2009, of Sekcija za vodenje prometa Maribor, dated 18 May 2009;

On 22 June 2009, the Railway Accident and Incident Investigation Division received letter no FIO 157310 (3A312-2) dated 18 June 2009 and a copy of the accident investigation materials elaborated by the Celje Criminal Investigation Police Section of the Celje Police Directorate (a photograph album and a sketch).

On 16 October 2009, the Chief Investigator of Railway Accidents and Incidents of the Ministry of Transport carried out measurements of the visibility at the accident site and collected additional information.

### 3.1 Summary of testimonies

The locomotive driver of section freight train no 52102 involved in the accident stated that he had sounded the signal “Caution!” several times at the signal for work-site. When the locomotive driver noticed that a rail worker was walking in the middle of the track, he sounded the whistle again and activated the high-speed brake; the locomotive nevertheless hit the person. He notified of the event all those responsible and handed the tape over to the head of the Celje unit and was tested for alcohol; samples of his blood and bodily fluids were taken at the Celje Health Centre for alcohol testing.

The Celje station traffic controller who at the time of the accident was carrying out traffic controller duties at the Rimske Toplice station indicated in his statement that the work group carrying out works at the LC-3 level crossing at km 514+973, between the stations Rimske Toplice and Laško, had not reported their work from the time the group turned up for work at 07:00 until the time the accident happened.

The Laško station traffic controller indicated in his statement that the work group that on 15 April 2009 was carrying out works at the LC-3 level crossing, at km 514+973, between the stations Rimske Toplice and Laško, had not reported their work from the time the group turned up for work at 07:00 until the time the accident happened.

The locomotive driver of local passenger train no 2933 that, immediately before the accident, had been travelling along the right-hand track from the Laško station towards the Rimske Toplice station, indicated in his statement that the journey of train no 2933 was proceeding in compliance with regulations and that he was not aware of any irregularities that might influence the safety of railway transport. On the above-mentioned route, the summary of the journey on his track shows that none of above-mentioned workers was moving around and thereby jeopardising the safety of railway transport. He cannot recall any other movements that might have been present at the route in question, however, not in direct vicinity.

The head of Nadzorništvo proge Celje says in his statement that on that day he came to work before six. He prepared travel orders for company cars. The work for that particular day had been agreed upon the day before. Orders for work are given on the basis of confirmed monthly and weekly plans and the requirements related to the safety of transport on the railway line, respectively. It is established practice that the following persons gather in his office at 06:00 every morning: two maintenance coordinators and the rail works manager in order to be given tasks and duties for the day. The rail works manager involved in the accident was instructed

on that day to carry out work on the Rimske Toplice-Laško section, account no: 3530 – Manual track adjustment. There were 6 workers in the group – track workers, two linemen and the group manager. The group manager, i.e. the rail works manager was instructed to take over the necessary tools, load them into the company road freight vehicle and to start work at the Rimske Toplice station. He reminded the rail works manager to carry out work on the right-hand track only and in a quality and safe manner.

In his statement a track worker of Nadzorništvo proge Celje, permanently resident at [REDACTED] provided a description of the work the group was carrying out on that day. He himself was waiting for the group before the warehouse in Rimske Toplice. He was instructed by the group manager to set up the signals for work-site. Upon completed work at points 5, they moved on to the “Oskar” level crossing at km 514+600 where he set up the signals and then went to Laško to fetch snacks. When he asked the group manager whether he should report the work to the traffic controller, the group manager’s answer was that this was unnecessary since there were barriers in place and that he should go and fetch snacks. He was also instructed to bring the saw from the Laško warehouse. When he was in Laško, a fellow worker called him with the news of the rail works manager having been run over.

A track worker of Nadzorništvo proge Celje, permanently resident at [REDACTED] says in his statement that they were working in Rimske Toplice, at points 5, and then moved over to the Oskar LC also in order to level the ballast under the sleepers. Upon completed work at this level crossing they were instructed to move the tools to the Marija Gradec LC. The tools were travelling in a fellow worker’s private car. When they were unloading the tools at the Marija Gradec LC, they heard the locomotive whistle and the braking of the freight train. When he cast a look at the track he saw the rail works manager having been run over.

A track worker of Nadzorništvo proge Celje, with temporary residence in [REDACTED], says in his statement that, after transferring to the “Oskar” level crossing, he sent the linemen to fetch snacks. When they finished work at this level crossing, he instructed them to walk along the road and carry the tools to the next level crossing; as for him, he would be walking on the track. He took the track gauge, said: "Bye!" and left. When they were walking along the road, they heard the train whistle in the vicinity of the accident site. The damaged track gauge was lying on the right-hand track.

A track worker of Nadzorništvo proge Celje, permanently resident at [REDACTED] says in his statement that he came to Rimske Toplice by train leaving Celje at 07:23, and joined the group. He was called by a fellow track worker and asked to wait at the station since the group would proceed to the Marija Gradec level crossings. When they reached the first level crossing, a fellow track worker asked the group manager if he should set up the boards and report the group. The rail works manager said that no report was necessary since work would proceed with barriers closed. At this time, the group manager sent a track worker to fetch snacks. After they completed the work at this level crossing, he asked them to go the next level crossing by car or on foot, while he was going to walk on the right-hand track, carrying the track gauge. The tools were loaded into the fellow track worker's private car and followed it by road. When they were walking, he saw the express train (Croatia) travelling from Laško to Rimske Toplice and presumed that the rail works manager had moved over to the left-hand track. The freight train from Rimske Toplice sounded its whistle at the signals for work-site; then they heard the train apply its brake; when they reached the vicinity of the Marija Gradec level crossing, they saw the run-over rail works manager.

A track worker of Nadzorništvo proge Celje, permanently resident at [REDACTED], says in his statement that they were working in Rimske Toplice, at points 5, and then drove to the “Oskar” level crossing. There they were levelling the ballast under the sleepers on the right-hand side of the track on each side of the level crossing. The rail works manager

instructed them to move the tools to the next level crossing. Take the tools with you; or perhaps our fellow track worker would be kind enough to take the tools in his car. After the loading was completed, the last one of the group set off to the Marija Gradec level crossing on foot along the road. He heard the train whistle at the signals for work-site; he looked up and saw that the train was transporting stone chippings; the train whistle sounded again when the train drew parallel with him on the road, around 100 – 150 m ahead of the level crossing; then there was a loud bang and the sound of air as the train braked hard and then stopped. He arrived at the barriers and heard his colleagues scream and cry, and when he asked: “What is going on?” They replied: “Can’t you see, the rail works manager has been run over!”

The lineman of Nadzorništvo proge Celje, permanently resident at [REDACTED] says in his statement that they started at Rimske Toplice around 06:45 at points 5. They were levelling the ballast under loose sleepers with the Cobra handheld ballast tamping tools. After they completed the work on the points, the manager said: “Now we are going to go to the Oskar level crossing”. He had his own car, a fellow track worker was travelling with him, the rest took the company van. There they were levelling the ballast under the sleepers on the right-hand side of the track on each side of the level crossing. The company car was taken to Celje for the fitting of summer tyres. When they were levelling the ballast, the group manager asked him to take the Cobra tools to the Marija Gradec level crossing. First of all, he and his fellow worker transported two Cobras, then he went back alone to fetch another Cobra, petrol, oil and a small cranking handle. The group manager went to the new work location by himself, on the right-hand track, carrying a bag and a track gauge. During the loading, he was assisted by three fellow track workers. He drove away with the tools, and the workers followed walking along the road. He drove across the level crossing and at the entrance to the playground, he and a fellow track worker unloaded the tools. At this moment the barriers were lowered and a train passed through the level crossing. My fellow track worker saw an arm that came flying from under the train and fell in the space between the tracks on the level crossing proper. The train stopped and they saw that the group manager had been run over.

A lineman of Nadzorništvo Celje, permanently resident at [REDACTED] says in his statement that they started at Rimske Toplice at points 5 and that he rode with his fellow lineman to the “Oskar” level crossing. There they were levelling the ballast under the sleepers on the right-hand side of the track on both sides of the level crossing. Then his colleague took two Cobras to the “Marija Gradec” level crossing and waited at the level crossing along with three more fellow track workers. The group manager said that the fellow track worker would go back for more tools; they would help him load and then follow him to the next level crossing. By way of a joke he said: “Bye, see you at the level crossing where shall have a bite to eat”. He set off along the right-hand track. After they had loaded the tools, he set off on the road to the “Marija Gradec” level crossing along with two more colleagues. They heard the train whistle and then brake. The train stopped; his colleague asked whether there was a signal there; he replied that it was but that he did not know why the train had stopped. When they reached the little hut at the level crossing, they saw a colleague crying and waving his hand, saying: “He’s dead”. When he saw the arm on the level crossing near the train and then the body under the train, he realized that the group manager had been run over. They went to the back of the train across the track and he saw the train gauge on the right-hand track; his colleague picked it up. They were standing next to their tools, in shock, when the ambulance arrived.

An auxiliary worker of Nadzorništvo proge Celje, permanently resident at [REDACTED] says in his statement that they were levelling the ballast under the sleepers on the right-hand track of the “Oskar” level crossing and that he and his colleague went to “Dobro” to fetch snacks. When they left the shop, his colleague received a telephone call from another

colleague who told him that the rail works manager had been run over by the train. When they reached the level crossing he saw the tragedy and was deeply shocked.

### 3.2 The safety management system

For the execution of works on the railway line, the Health and Safety at Work Service of the former Holding Slovenske železnice, d.o.o. issued Notification 1.2.-84/2004 – Definition of measures to ensure the safety and health of workers carrying out works on the railway line.

Item 4 of the Notification lays down the conduct the workers are to observe when walking on the tracks. It is stated that, as a rule, workers should use public paths when moving from one work-site to another. The railway area may be used to walk to a work-site and back only when there is no public path around.

It is forbidden to walk in the space between the tracks of a double-track railway or between two parallel railways.

A person must, as a rule, be facing the train when walking on the double-track line. Particular attention must be paid on single-track lines, lines with alternating traffic and on parallel lines. When a train is passing along the nearest track, workers walking along the shoulders must be outside the track danger zone.

When walking from one work-site to another, workers must avoid crossing the tracks, in particular when visibility is poor.



Figure 2: Reduced visibility on the left-hand railway track, 230 m before the accident site

### 3.3 Rules and regulations

The maintenance of railway subsystems is laid down in Article 11 of the Railway Transport Act, Uradni list RS No 44/2007 dated 21 May 2007 and in Article 37 of the Safety of Railway Transport Act, Uradni list RS No

61/2007 dated 10 July 2007. The protection of traffic by means of linemen is laid down in Article 158, and protection of work groups in Article 173 of the Traffic Rules published in Uradni list RS No 123/2007 dated 28 December 2007.

Safety of the workers walking on the tracks is laid down in Item 4 of the internal Notification 1.2.-84/2004 – Definition of measures to ensure the safety and health of workers carrying out works on the railway line, issued by the Health and Safety at Work Service, Holding Slovenske železnice, d.o.o. on 22 December 2004.

Risks and safety measures for the position of rail works manager are specified in the List of risk assessments for positions in Holding Slovenske železnice, d.o.o. issued by Holding Slovenske železnice, d.o.o. on 21 December 2009, with effect from 1 January 2005.

### 3.4 Functioning of rolling stock and technical installations

There is a Hasler speed recorder incorporated into the locomotive of the 342-025 series of Slovenske železnice d.o.o.. The speed recorder of this type also records individual events related to drivers' activities, operating the braking and security devices built into this locomotive.

The train speed recorder recorded a train speed of 63 km/h 350 m before stopping and immediately before braking, which means that the locomotive driver, having taken into account 4 seconds required for the response of the freight train braking system, activated the high speed brake at km 514+880, which is 50 m before the train hit the rail works manager.

### 3.5 Documentation on the operating system

Work groups have no safety operating systems at their disposal when they carry out regular maintenance works on open tracks and with trains operating. The rail work groups are protected by a lineman who is kept informed of the train services by telephone by the traffic controllers of the neighbouring railway stations, each for their own travelling direction.

In order to protect the work group while it was working at the LC-2 level crossing, the rail works manager used the signal for work-site. The NPr DK level crossing device (automatic protection with remote control) is activated when the train passes over make-break contacts, which, however, is not sufficient for reliable information on train movements, since a train can pass over make-break contacts from either side.

### 3.6 Man-machine-organisation interface

There are no special integrated devices to warn locomotive drivers to reduce speed and stop before an obstacle on the track. They operate their vehicles by pressing or releasing the accelerator and applying braking systems.

Freight trains brake by applying the pneumatic braking system whose braking effect needs up to 4 seconds to begin.

The locomotive driver of train no. 52102 who was involved in the railway accident on the left-hand track at km 514+930, between the stations Rimske Toplice and Laško on 15 April 2009 at 09:26, had passed all the required qualifying examinations to operate the traction vehicle of the series 342; he was physically and mentally fit for driving, had had the statutory rest break between the two working shifts involved and had not exceeded the working hours

in the shift.

The rail works manager involved in the accident passed all the required qualifying examinations; he was physically and mentally fit for performing work, had the statutory rest break between the two working shifts involved and did not exceed the working hours in the shift.

### **3.7 Previous occurrences of a similar character**

On 6 May 1997 a shunter, walking too close to the track, was grazed by a shunter locomotive.

On 10 May 1997, train no 151 hit a ŽGP worker standing too close to the track, at km 531+530, between the stations Šentjur and Celje. The worker who had been hit then crashed into two more workers. All three workers sustained injuries and were taken to hospital.

On 5 September 1997, incoming passenger train no 3217 hit a shunter at track 2 at the Novo mesto station, who, when working on track 1, was not careful enough and stepped into the track section right into the incoming train.

On 15 January 1998, locomotive train no 59302 hit a SVP Maribor worker on track 1 of the Maribor station. The work group was carrying out works between points 106 and 109. The works manager had failed to properly inform the train dispatcher of the work location and method.

On 10 September 1998, train no 53001 grazed a carriage examiner because he was in the track section of track 2 of the Ljubljana station.



## 4 ANALYSIS AND CONCLUSIONS

Regulations determining the movement of railway workers who carry out works on tracks with trains operating have been analysed during the investigation procedure. Several irregularities have been established in the case of the rail works manager, which he himself committed through his decisions taken during work and while walking on the track.

Staying, and in particular, moving about in the railway and track danger zone calls for particular caution to be exercised by any individual who finds himself on such a location. First and foremost, all relevant sense organs must be on the alert during the movements in the danger zone. The most important, however, is concentration. One has to constantly bear in mind that one is in the railway or track danger zone. It is necessary to have full knowledge of all the dangers one is exposed to when moving about or staying in the danger zone. With his year-long work experience, the rail works manager was undoubtedly well aware of the working conditions and hazards. It is a fact that the cause of such incidents is often excessive self-confidence growing with years of experience, which can be extremely deceptive. It is in human nature not to consider the consequences and to go against the rules, thinking that they are unnecessary.



Figure 3: The rear of stopped train no 52102 located at km 514+848

### 4.1 Final account of the event chain

Since there is no other explanation, it can be inferred that the rail works manager intended to transfer from one work-site to another by walking along the track in order to check the tracks in this section – this was one of the planned tasks for this particular day.

At the moment he was hit, the rail works manager was walking in the middle of the left-hand track and obviously had no intention of leaving it despite the signal “Caution!” – a long whistle having been sounded immediately before he was run over. It can therefore be inferred that the rail works manager was confident to be on the track with trains coming towards him and not from behind.

When moving from the work-site at the LC-2 level crossing to the one at the LC-3 level crossing, the rail works manager set off along the right-hand track along which trains travel



from the direction of Laško towards Rimske Toplice, i.e. *towards* the rail works manager. Because of the passage of local passenger train no 2933 that had left the Laško station at 09:23, the rail works manager supposedly moved over from the right-hand track to the left-hand track in order to avoid it. While walking along the left-hand track, the rail works manager may have been so engrossed in the examination of the state of the tracks that he erroneously thought that he was on the track facing the trains and therefore failed to react when the “Caution!” signal was sounded. Quite the contrary, the locomotive driver said he had seen the rail works manager shrug his shoulders, which could have meant that he was confident the train was passing along the neighbouring track.

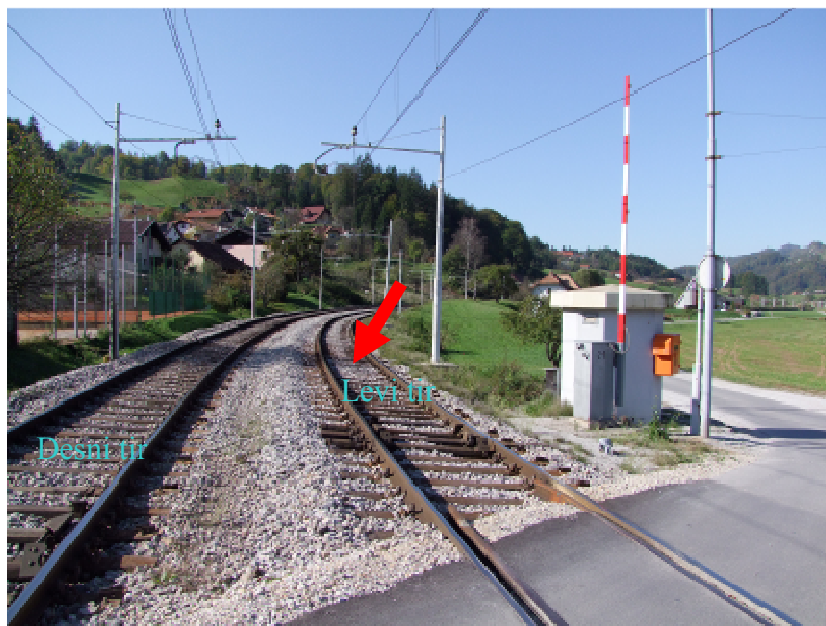
## 4.2 Discussion

One of the reasons for the rail works manager’s walk in the very track of this section may also have been the fact that it was difficult to walk next to the track because of the rising ground continuing immediately under the railway ballast and because of the drainage duct for rainwater.



Figure 4: Layout of the terrain at the left-hand track in the area where the rail works manager was walking in the left-hand track

It is probable, that the rail works manager was looking for a suitable place to withdraw from the track since he was only 43 m away from the LC 3 level crossing – which is at km 514 + 973 – when he was run over. The railway is running in a minor cutting and is pressed against the side of a hill at this section and there are, moreover, residential buildings along the track; therefore, the sound emitted by the train is absorbed to a large extent. Because the sound of the whistle rebounds from the hill and is then attenuated among the buildings, it has a different level than in areas without obstacles. It is also possible that, when walking on the track, the rail works manager relied chiefly on what he heard. The locomotive driver sounded the signal “Caution!” as early as at km 514+065, at the point where the signals for work-site (signal 207) had been placed, which is 865 m ahead of the accident site; the rail works manager may have inferred from the sound level – that was attenuated for reasons mentioned above – that the train was not so near.



Slika št. 5: Layout of the terrain next to the track and on the track in the area where the rail works manager was walking on the left-hand track; the red arrow marks the accident site.

### 4.3 Conclusions

The rail works manager could have avoided the accident if he had observed at least one of the measures to ensure the safety of the workers walking on the tracks, as laid down by Notification 1.2.-84/2004 – Definition of measures to ensure the safety and health of workers carrying out works on the railway line, issued by the Health and Safety at Work Service, Holding Slovenske železnice, d.o.o. on 22 December 2004, stipulating that one should always be walking on double-track railways facing the train.

When walking from one work-site to another, workers must avoid crossing the tracks, in particular when visibility is poor.

If a track needs to be crossed, one must make sure that there is no train approaching from either direction, thereby not relying on one's hearing only.

The rail works manager should also have complied with the provisions of Articles 158, 159 and 173 of the Traffic Rules, Uradni list RS No 123 dated 28 December 2007.

### 4.4 Additional observations

Two track workers – fellow workers who worked with the rail works manager killed in the accident on that day said at the accident site that the rail works manager was in a good mood before the accident.

The day of the accident, 15 April 2009, was payday since Slovenske železnice, d.o.o. staff receive their salaries every 15th day of the month.

## 4.5 Measures that have been taken

There is no record of any measures having been previously taken as a result of the accident related to the walk along the track with trains operating and with maintenance works being carried out.

## 4.6 Recommendations

In order to improve the safety during maintenance works being carried out while trains are operating, a special regulation should be drafted for the safety and health of workers of Slovenske železnice, with detailed descriptions of protection procedures and safety means used in the process.

## 5 REFERENCES

Railway Transport Act, Uradni list RS No 44/2007 dated 21 May 2007

Safety of Railway Transport Act, Uradni list RS No 61 dated 10 July 2007

Traffic Rules, Uradni list RS No 123 dated 28 December 2007

Signalling Rules, Uradni list RS No 123 dated 28 December 2007

Rules on brakes, safety devices, special devices and equipment of railway vehicles, Uradni list RS No 122 dated 28 December 2007

List of risk assessment for positions in Holding Slovenske železnice, d.o.o., issued by Holding Slovenske železnice, d.o.o., on 21 December 2004, with effect from 1 January 2005

Notification 1.2.-84/2004 – Definition of measures to ensure the safety and health of workers carrying out works on the railway line, issued by the Health and Safety at Work Service, Holding Slovenske železnice, d.o.o. on 22 December 2004.

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