



REPUBLIC OF SERBIA
CENTER FOR INVESTIGATION OF ACCIDENTS IN TRANSPORT
SECTOR FOR INVESTIGATION OF ACCIDENTS IN RAILWAY TRAFFIC
Nemanjina 11, 11000 Belgrade

No.: ŽS - 02/19

No.: 340-00-2/2019-02-1-35

Date: 03.06.2020.

FINAL REPORT ON INVESTIGATION OF SERIOUS ACCIDENT

Type of accident:	Death of the railway worker (the train driver) while jumping out of the train in motion
Train No:	432
Place:	Rakovica municipality, settlement Resnik, the area of the train station Resnik
Date:	25.06.2019.
Time:	06:17



This report presents the results of investigation of serious accident, jumping of the railway worker-the train driver, employed at the railway undertaking "Srbija Kargo"a.d., out of the driving locomotive 441-604 of the train No. 432, the property of the railway undertaking "Srbija Voz"a.d., which occurred on 25.06.2019. at 06:17 on the main arterial route E70/E85 Belgrade - Mladenovac - Lapovo - Niš - Preševo - state border - (Tabanovce), on the third track of the station Resnik. In this serious accident it came to death of the railway worker the train driver, employed at the railway undertaking "Srbija Kargo"a.d.

The Working Group for investigation of this serious accident was formed by the Director of the Center for Investigation of Accidents in Transport RS, by Decision No.340-00-2/2019-02-1-5 of 02.07.2019.

In accordance with the Article 33 of the Law on Investigation of Accidents in Air, Railway and Waterborne Traffic ("Official Gazette of RS" No. 66/15 and 83/18) and the Article 23 of the Directive 2004/49/EC of the European Parliament and of the Council of EU (Railway Safety Directive), the Center for Investigation of Accidents in Transport (hereinafter referred to as: CINS) drafted and published this Final Report.

In this report, all sizes and measurements are expressed in accordance with the International System of Units (*SI*).

The meaning of abbreviations used in the text is explained in the Glossary.



CINS has been established in accordance with the Law on Investigation of Accidents in Air, Railway and Waterborne Traffic ("Official Gazette of RS" No. 66/15). The founder is the Republic of Serbia and the holder of founding rights is the Government of the Republic of Serbia.

Sector for Investigation of Railway Traffic Accidents carries out tasks within the competence of CINS in relation to rail traffic with the aim of possible improvement of safety on the railway by issuing safety recommendations. The investigation procedure in the field of railway traffic is conducted on the basis of the provisions of the Law on Investigation of Accidents in Air, Railway and Waterborne Traffic ("Official Gazette of RS" No. 66/15 and 83/18).

CINS conducts investigations following the serious accidents on the railway system with a view to possible improvement of railway safety and the prevention of new accidents caused by the same or similar causes. Serious accident in railway traffic means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety.

In addition to serious accidents, CINS may also investigate other accidents and incidents that could lead to a serious accident, including the technical failure of structural subsystems or interoperability constituents.

CINS has the discretion to decide whether to open an investigation of other accidents and incidents.

CINS is independent in its work and performs independent accident investigations. The aim of an investigation is to identify the causes and the possibility of improving safety on the railway and to prevent accidents by issuing safety recommendations.

Professional activities related to safety investigations are independent of judicial inquiry or any other parallel investigations which objective is to determine responsibility or the degree of guilt.



Glossary:

CINS	Center for Investigation of Accidents in Transport
IŽS	Serbian Railways Infrastructure
ZJŽ	Community of Yugoslav Railways
JŽ	Yugoslav Railways
ŽS	The Serbian Railways
RS	Republic of Serbia
US	Constitutional Court
a.d.	Joint stock company
TK	Telecommand
TT	Telegraph-telephone/telegraphic-telephonic
VJT	Higher Public Prosecutor
MUP	Ministry of Interior
PU	Police Department
PS	Police Station
OJ	Organizational Unit
ETP	Electro-technical affairs
TKP	Technical-vehicle affairs



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1. Summary

1.1. Short description of the serious accident

On 25.06.2019. at 06:17 on the main arterial route E70/E85: Belgrade - Mladenovac - Lapovo - Niš - Preševo - state border - (Tabanovce), during the passing of the train No. 432, of the railway undertaking "Srbija Voz" a.d., through the station Resnik, at km 14+169, on the third station track, from the train locomotive 441-604 of the train No. 432, which was in motion, it came to jumping of the railway worker the train driver employed at railway undertaking "Srbija Kargo" a.d. The railway worker the train driver has, out of the train locomotive 441-604 of the train No. 432, jumped in the direction of the second station platform and fell into the space between the platform and the third track. On that occasion, he sustained serious injuries, from which he died on the spot.

The dead railway worker, the train driver employed at the railway undertaking "Srbija Kargo" a.d. was in the train locomotive 441-604 of the train No.432 of the railway undertaking "Srbija Voz" a.d. for transportation to work (for the purpose of coming to work).

1.2. The causes of the serious accident determined by investigation

Direct and immediate cause of the occurrence of this serious accident is that the train driver employed at the railway undertaking "Srbija Kargo" a.d., who was found in the train locomotive 441-604 of the train No. 432 of the railway undertaking "Srbija Voz" a.d., had exited from the train locomotive while the train was moving, thus creating a dangerous situation related to the occurrence of this serious accident.

The train driver employed at the railway undertaking "Srbija Kargo" a.d. who was travelling to work, was not entitled to travel in the driver's cab of the train locomotive 441-604 of the train No. 432 of the railway undertaking "Srbija Voz" a.d., under no criteria defined in the Rulebook 2, Traffic Rulebook ("Official Gazette ZJŽ" No. 3/94, 4/94, 5/94, 4/96 и 6/03) and 243 Rulebook for traction of trains on JŽ ("Official Gazette ZJŽ" No. 6/91).

"Srbija Kargo" a.d. has issued to the train driver (fatally injured in this serious accident) in accordance with the Labour Law ("Official Gazette RS" No. 24/2005, 61/2005, 54/2009, 32/2013, 75/2014, 13/2017 - decision of the US, 113/2017 and 95/2018-authentic interpretation) (see Point 3.3.2.) issued Decision on commuting (see Point 4.2.2.), according to which the driver was entitled to reimbursement of bus transportation expenses so that driving in the driver's cab of another railway undertaking cannot be considered a regular journey from the place of residence to the place of work (see Point 3.3.3.).

1.3. Main recommendations and information on subjects to which the Report is submitted

CINS has no safety recommendations for this serious accident.

2. Direct facts about the serious accident

2.1. Basic serious accident data

2.1.1. Date, time and place of the serious accident

It came to occurrence of this serious accident on 25.06.2019. at 06:17 in the area of the city of Belgrade, city municipality Rakovica, in the settlement Resnik, in the train station Resnik, on the third station track. The area where the respective serious accident occurred is populated.

The appearance of the area of the serious accident site in the station Resnik, taken from the satellite is shown in Fig. No. 2.1.1.1.

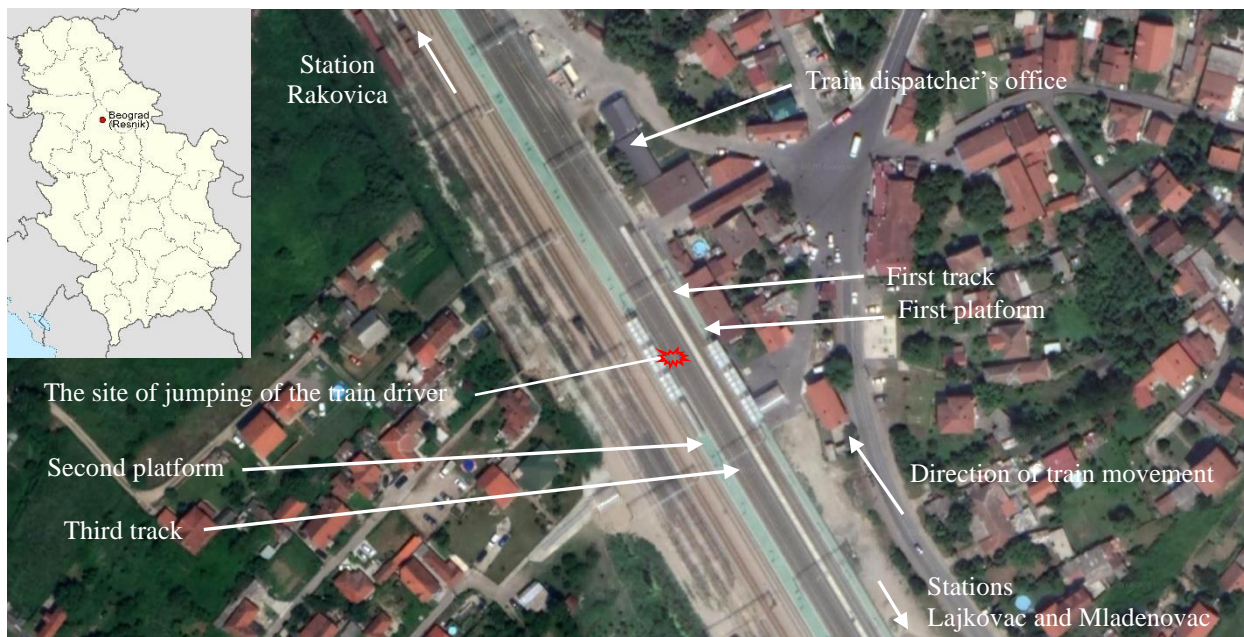


Figure 2.1.1.1: Satellite image of the area of the serious accident site (source: Google maps)

2.1.2. Description of the serious accident and the serious accident site and work of rescue and emergency services

On the main arterial route E70/E85: Belgrade - Mladenovac - Lapovo - Niš - Preševo - state border - (Tabanovce), on the area of the infrastructure manager "IŽS" a.d., during the passage of the train No. 432, of the railway undertaking "Srbija Voz" a.d. through the station Resnik, upon driving of the train through the third station track in the direction towards the station Rakovica, on the part of the third track near the covered part of the second station platform, which is located between the third and fourth station track, out of the locomotive 441-604 of the train No. 432 it came to jumping of the railway worker the train driver, employed at the railway undertaking "Srbija Kargo" a.d. The railway worker the train driver has, from the train locomotive 441-604, which was in motion, through the door of the engine compartment on the left side of the train locomotive (viewed in direction of the train movement), jumped in the direction of the second station platform. On that occasion, he fell in the space between the second station platform and the third station track, that is, in the space between the second station platform and the train in motion, thus sustaining serious injuries from the train in motion, resulting in his death on the site.

The train No. 432, of the railway undertaking “Srbija Voz“ a.d. has, thorough the station Resnik, passed within the regular transportation route.

The railway worker the train driver, employed at the railway undertaking “Srbija Kargo“ a.d. was, in the train locomotive 441-604 of the train No. 432 of the railway undertaking “Srbija Voz“ a.d, found because of commuting to work (with the purpose of coming to work).

The appearance of the site of the serious accident, jumping of the railway worker out of the train No. 432, is shown in Figure 2.1.2.1.



Figure 2.1.2.1: The appearance of the point of jumping
(view from the direction of the station facility - of the first station track)

Due to this serious accident, the team of City Institute for Emergency medical assistance was engaged.

Due to this serious accident, it did not come to the railway traffic interruption.

The appearance of the site where the train No. 432 stopped after the serious accident is shown in Figure 2.1.2.2.



Figure 2.1.2.2: The appearance of the site where the train stopped after the serious accident

2.1.3. Decision on launching the investigation, composition of the investigative team and conducting of the investigation

CINS has been informed immediately upon the occurrence of this serious accident. Main Investigator for Railway Traffic received the first notification of the accident occurred on 25.06.2019. at 06:47 via e-mail by traffic dispatcher of the Central Operations Department of “Srbija Voz” a.d. and at 07:03 via telephone by Assistant Director of Sector of Operations of “IŽS” a.d. Based on the information received and the facts that the investigative team of CINS determined by on-site investigation of the serious accident, CINS has launched the investigation of the respective serious accident in accordance with the Law on Investigation of Accidents in Air, Railway and Waterborne Traffic (“Official Gazette RS” No. 66/15 and 83/18).

The composition of the Working group for investigation of the serious accident is determined by Decision No. 340-00-2/2019-02-1-5 of 02.07.2019. of the Director of CINS based on the Articles 6 and 32 of the Law on investigation of Accidents in Air, Railway and Waterborne Traffic (“Official Gazette RS” No. 66/15 and 83/18).

2.2. Serious accident background

2.2.1. Involved railway staff, contractors, other persons and witnesses

Employees at the railway undertakings “Srbija Kargo” a.d. and “Srbija Voz” a.d. participated in this serious accident.

From the employees at “Srbija Kargo” a.d. the train driver who was travelling to work and who jumped out of the train locomotive 441-604 from the train No.432 participated in this serious accident.



From the employees at “Srbija Voz” a.d. the train driver of the train locomotive 441-604 of the train No.432 and the train driver who in the driver's cab of the train locomotive 441-604 of the train No.432 travelled to domicile after the shift.

The employess of the infrastructure manager “IŽS” a.d. did not participate in the respective serious accident, as well as contractors, other persons and witnesses.

2.2.2. The trains that were involved in the serious accident and their composition

In the respective serious accident the train No. 432 was involved. The train No. 432 operated regularly on the route Bar - Topčider. The train composition consisted of the train locomotive of the railway undertaking “Srbija Voz” a.d. of series 441-604 and 10 (ten) wagons for transport of passengers.

The Table 2.2.2.1 shows the overview of wagons that were in the composition of the train No. 432.

Table 2.2.2.1: Overview of the wagons in the train No. 432 (viewed from the train locomotive)

Serial wagon No.	The letter mark of the wagon series	Individual wagon No.	Ownership	Note
1	WLABlm	50 62 72-10 510-3	„Željeznički prevoz Crne Gore“ a.d. Podgorica	Couchette car
2	WLABlm	50 62 72-10 503-8	„Željeznički prevoz Crne Gore“ a.d. Podgorica	Couchette car
3	WLABlm	50 62 72-10 505-3	„Željeznički prevoz Crne Gore“ a.d. Podgorica	Couchette car
4	Bcm	50 62 50-27 304-8	„Željeznički prevoz Crne Gore“ a.d. Podgorica	Cars with bearings
5	Salon	51 72 99-80 601-1	“Srbija Voz“ a.d.	Car salon
6	AcBc	51 72 44-76 000-8	“Srbija Voz“ a.d.	Cars with bearings
7	Bc	51 72 59-76 001-8	“Srbija Voz“ a.d.	Cars with bearings
8	Aeelmt	61 72 10-70 002-8	“Srbija Voz“ a.d.	Cars with seats
9	Aeelmt	61 72 10-70 001-0	“Srbija Voz“ a.d.	Cars with seats
10	A	51 72 19-71 100-2	“Srbija Voz“ a.d.	Cars with seats

Monophase electric locomotives of the series 441, manufactured by TRAKTION UNION (ASEA, SECHERON, ELIN UNION), which are licensed to be produced by “Rade Končar” from Zagreb and its associates, are diode four-axle locomotives with the single axle drive (Bo’-Bo’). They are intended for traction of the passenger and cargo trains on flat and hilly lines with reaching the maximum speed of 120, 140 and 160 km/h, whereby the change of maximum speed is performed by changing the gear ratio of the gear pair. The locomotives produced were given a sub-series designation and an individual No., depending on whether individual devices and components were installed on them.

Sub-series “600” (4 locomotives), with inventory Nos.: 601, 602, 603 and 604 are locomotives without electrodynamic brake, with a wheel rim lubrication device, without coupling for synchronous control of another locomotive, with a maximum speed of 140 km/h.



Figure 2.2.2.1: The appearance of the locomotive 441-604 (source: MUP RS)

According to the allegations from “The book of Electric vehicle LO-49E“ the basic technical data for the locomotive 441-604 are:

- type: diode locomotive, Bo'-Bo' type
- construction year: 1976.
- date of commissioning: 25.12.1976.
- length of electro locomotive via buffers: 15470 mm,
- body width: 3100 mm,
- the distance between the centers of the bogies: 7700 mm,
- axle spacing in bogies: 2700 mm,
- the weight of the locomotive ready for service: 78 Mp
- axle pressure (statistical): 19,5 Mp
- weight of bogies with their equipment: 38 Mp.

There are two doors on the sides of the locomotive 441-604 (one door to enter the driver's cab and the other to enter the engine compartment). Doors to entry into the engine compartment do not have a window and are placed between the condenser windows. On all 4 doors there is a handle in the dented part of the door plating. The door lock does not lock, but can be locked from the inside by a movable lever. On each side of each door are handrails located in the dented space of the locomotive body plating. Below the doors for entrance into the driver's cab on the lower base there are two dents and two steps for entrance, and below the doors for entrance into the engine compartment there are one dent and two steps. The appearance of the doors of the side of the locomotive 441-604 is shown in Figure 2.2.2.1.

Wagon of series WLABlm, Bcm, Salon, AcBc, Bc, Aeelm and A are intended for transport of passengers, equipped with seats, cabins with bearings (sleeping and couchette cars) and salon space. The use of the given series of wagons is given in Table 2.2.2.1.



Figure 2.2.2.2: The appearance of wagon *WLABlm* - couchette car No. 50 62 72-10 510-3

Figure 2.2.2.2. shows the appearance of *WLABlm* wagon - sleeping car No. 50 62 72-10 510-3. The dead train driver, employed at the railway undertaking “Srbija Kargo” a.d., was found below the second axle of the first bogie of the given wagon (viewed in direction of train movement).

2.2.3. Infrastructure and safety-signalling system

The station Resnik is interstation on the main arterial route *E 70/E 85*: Belgrade - Mladenovac - Niš - Preševo - state border (Tabanovce) and dividing station that regulates the crossing of trains to the *E79* arterial route: (Belgrade) - Resnik- Požega - Vrbnica - state border - (Bijelo Polje) and Belgrade Marshalling Yard “A” - Junction “B” - Junction “K/K1” - Resnik. Also, the station Resnik is a two-lane to a single-lane crossing station and a border station (receives the trains from the TK line and dispatches them to the TK line). Traffic regulation and securing the driving routes in the station Resnik is performed by the train dispatchers.

Station Resnik is equipped with electrical relay safety-signalling devices of the system “Siemens - EI”. The traffic in the area of the station Resnik is regulated according to the provisions of the Instructions for operating the electrical relay safety-signalling devices of the system “Siemens - EI” in the station Resnik No. 4/2018-1205-285 of 27.12.2018.

Section of the arterial route E79: (Belgrade) - Resnik - Požega - Vrbnica - state border - (Bijelo Polje) between the stations Bela Reka and Resnik is equipped with devices of interstitial dependence and telecommand. The traffic of trains is regulated according to provisions of the Article 38 of the Rulebook 2, Traffic Rulebook ("Official Gazette ZJŽ" No. 3/94, 4/94, 5/94, 4/96 and 06/03). The station Bela Reka is unmanned TK station. The traffic between the stations Bela Reka and Resnik is regulated and driving routes are secured by the train dispatcher of the manned station Resnik and the TK dispatcher of the section "Sever" at TK Center Požega. By the station Bela Reka the entrance signal Cu91 (at km 0+825 of the arterial route E79) and presignal PCu91 (at km 1+920 of the arterial route E79).

Section of the main arterial route E70/E85: Belgrade - Mladenovac - Lapovo - Niš- Preševo - state border - (Tabanovce) between the stations Rakovica and Resnik is two-track and equipped with devices of automatic track block. This section is enabled for both side traffic. The traffic of trains is regulated according to provisions of the Articles 38 and 66 of the Rulebook 2, Traffic Rulebook ("Official Gazette ZJŽ" No. 3/94, 4/94, 5/94, 4/96 and 06/03). The traffic of trains and the driving routes are secured by the train dispatchers of the manned stations Rakovica and Resnik. For exit of trains to the station Rakovica, on the third track of the station Resnik the exit signal is installed Ao3 (at km 13+569 of the arterial route E70/E85).

The third track in the station Resnik is from km 13+977.63 to km 14+509.98 in direction. From km 13+316.28 to km 14+200.00 the third track is horizontal, while from km 14+200.00 the third track is in rise of 2.30‰.

In station Resnik, the station facility is located at km 14+060.18. Beside the third track at the station Resnik, on the right side in the direction of the growing mileage, is located the second platform of length 295.33 m, width 6.20 m and height 0.55 m (from km 13+943.30 to km 14+238.63). On the second platform at km 14+148.90 a pedestrian underpass is located. The stairs for entrance is from the direction of Belgrade.

According to the data given from "IŽS" a.d. (Annex 3 of the Letter No. 1/2019-2257 of 23.08.2019.), for the timetable for 2018/2019 through the station Resnik the maximum allowed speed is 70 km/h, while the speed limit over the switches for the drives in turn on the block 1 with 35 km/h, and on the block 2 is 40 km/h. The speed over the switches on the main running passages in the direction is 70 km/h.

The maximum speed for train No. 432 on the section between the stations Bela Reka and Resnik, according to the Timetable Booklet 1.1. (which was valid in the time of occurrence of the respective serious accident) was 70 km/h. In the area of the station Resnik, for the maximum speed over the switching area in the Timetable Booklet 1.1. for the train No. 432 there are no limits prescribed.

The marks for the lines are taken according to the Regulation on the Categorization of railways ("Official Gazette RS" No. 115/2013 and 57/2017) which was valid in the time of occurrence of the respective serious accident.

Video surveillance equipment is installed in the station Resnik. Two cameras were mounted on the roof structure of the entrance to the underpass (see Figure 2.1.2.1.), so that the video shows a part of the station plateau from the entrance to the underpass on the second platform in direction to the station Rakovica.

2.2.4. Communication tools

In the area of the station Resnik, the communication between the staff that regulates the traffic on the line and staff of the traction vehicle is done by phone via local telephone connection. The Resnik station has Telecommunication Desk (special for the main arterial route E 70/E 85: Belgrade - Mladenovac - Lapovo - Niš- Preševo - state border - (Tabanovce) and special for the arterial route E79: (Belgrade) - Resnik - Požega - Vrbnica - state border - (Bijelo Polje), located on the desk of the dispatcher in which are all the telephone lines with which the respective railway lines are equipped with, as well as all the local telephone connections.

The communication line includes all the official positions on the line, telephone devices apart from all the main signals. Communication on this line is recorded on the register device, located in the Section for ETP Belgrade, so this type of communication is considered evidence based.

2.2.5. Works performed on or near the serious accident site

In the vicinity of this serious accident in the area of “IŽS“a.d. no works were performed.

2.2.6. Activation of the emergency plan on the railway and sequence of events

Railway undertaking “Srbija Voz“a.d. has immediately after the occurrence of the serious accident informed CINS, that is, the Main Investigator for Railway Traffic, and then the infrastructure manager “IŽS“a.d. The infrastructure manager “IŽS“a.d. and the railway undertaking “Srbija Voz“a.d. formed the joint investigative committee which conducted investigation of the respective serious accident in accordance with the applicable regulations. Upon completion of the investigation, Investigation Report U-271/19 was drafted.

After the occurrence of the serious accident, in the attempt of giving the first aid to the injured, the train No. 432 was again started in the direction to the station Rakovica in the length of few meters so that the body of the injured could be released from below the wheel of the second axle of the first bogie of series WLABIm No. 50 62 72-10 510-3 (the first wagon to the locomotive 441-604).

According to the allegations from the Letter “IŽS“a.d. No. 1/2019-2257 of 23.08.2019., on the occurred serious accident the outside dispatcher of trains of the stations Resnik has been informed by the train driver of the train No. 432. Upon the received notification, the ambulance was called, and then all the interested parties were informed according to the applicable regulations.

Upon arriving on the site, the team of the Institute for Emergency Medical Assistance stated the death of the train driver employed at railway undertaking “Srbija Kargo“a.d. Upon completed on-site investigation by the members of MUP, the team of public company “Pogrebne usluge Beograd“ has at about 09:45 removed and driven the remains from the serious accident site. Upon that, cleaning and disinfection of the track and the vehicle was not carried out.



According to the Report on irregularities during operation (K-91) submitted on 25.06.2019. at the train No. 432 by the conductor of the train No. 432 and the Head of the Section for Traffic and Commercial Affairs Belgrade, upon being informed on the reasons for delay, 100 (hundred) passengers departed from the train. In the train 12 (twelve) passengers were left who agreed to wait to continue their route to the station Topčider.

The train No. 432 was at 10:28 dispatched from the station Resnik in the direction to the station Rakovica and further for the station Topčider.

Due to this serious accident there was no interruption of traffic through the station Resnik. In the period from 06:19 to 10:28 the traffic was not possible through the third station track on which the train No.432 was stopped.

2.2.7. Activation of the emergency plans of public rescue services, police and medical services and sequence of events

Due to this serious accident the members of MUP RS, Police Department for the city of Belgrade, members of the VJT in Belgrade and members of the Institute for Emergency Medical Assistance in Belgrade.

By the Letter of the Institute for Emergency Medical Assistance No. 8770 of 30.07.2019., the data were submitted that on 25.06.2019. the call for intervention was received from the mobile telephone number at 06:21, most probably from the employed on the railway. One team composed of the doctor, medical technician and the driver exited to the site of the accident at 06:37. According to the allegations from the Report, the train driver wanted to exit from the train in motion, wiggled and crashed under the train, and nobody approached the patient except the police. The team found the body on the rails. The doctor stated in the medical report the position of the body and the injuries observed. In these circumstances, the doctor could only ascertain death. There were no other injured.

By the Letter of VJT in Belgrade No. KTP 3677/19 of 30.07.2019. the data were submitted that the members of MUP, Police Department for the city of Belgrade, Criminal Police Directorate, Investigative Operations Division (8th Department) came to the site of the serious accident, who upon being given the oral consent of the deputy Public Prosecutor, carried out the on-site investigation.

CINS did not receive the data on engagement on the site from MUP RS, PS Rakovica.

2.3. Dead, injured and material damage

2.3.1. Passengers, third parties and the railway staff including contractors

In this serious accident one person died. There were no injured.

Table 2.3.1.1: Overview of the dead and injured persons

	Passengers	Railway staff	Third persons	Total
Dead	-	1	-	1
Seriously injured	-	-	-	-
Lightly injured	-	-	-	-

2.3.2. Goods, luggage and other assets

In this serious accident there were no damages to the luggage in the railway vehicles.

2.3.3. Railway vehicles, infrastructure and the environment

In the respective serious accident there was no material damage on the railway vehicles, infrastructure and the assets of the third parties.

2.3.4. External conditions – weather conditions and geographic characteristics

The site of occurrence of the respective serious accident is located in the area of the city of Belgrade, city municipality Rakovica, on the railway station in the settlement Resnik. The area of the serious accident is mainly plain. The section of the railway line on which this serious accident occurred (the third station track) is located in direction and is horizontal.

The geographic coordinates of the serious accident site are: 44° 42' 16.65" N and 20° 26' 55.71" E.

At the time of occurrence of the serious accident, the weather was clear, without wind and precipitation. The air temperature was about 27°C.

At the time of on-site investigation of the respective serious accident by the investigative team of CINS, it was day. The weather was sunny, clear, without precipitation, fog or wind. The visibility was good. The air temperature was about 30°C.

3. Minutes on the investigation and interviews

Data, facts and evidence regarding the occurrence of the respective serious accident were collected and determined on the basis of:

- On-site investigation by the investigative team of CINS;
- materials submitted by infrastructure manager “IŽS” a.d.;
- materials submitted by railway undertaking “Srbija Voz” a.d.;
- materials submitted by railway undertaking “Srbija Kargo” a.d. and
- Materials submitted by the VJT from Belgrade.

For the respective accident, on-site investigation and investigation was performed by the joint investigative committee of the infrastructure manager “IŽS” a.d. and the railway undertaking “Srbija Voz” a.d.

3.1. Summary of testimonies

Working group of CINS has on 04.10.2019. conducted hearing of employees involved in this serious accident at the CINS' premises.



From the employees of “Srbija Voz” a.d. the train driver who was operating the locomotive 441-604 of the train No.432 and the train driver, who, upon returning from the shift to domicile was found in the driver’s cab of the locomotive 441-604 of the train 432.

From “IŽS” a.d. and “Srbija Voz” a.d. the Minutes on hearing of all employees who were in the locomotive 441-604 of the train No. 432 (the train driver who was operating the locomotive and the train driver who was returning from the shift to domicile) and the staff that regulated the traffic in the station Resnik (train dispatchers) were submitted.

From “IŽS” a.d. the Report of dispatchers on irregularities during operation (S-23) No. 0055492 of 25.06.2019. was submitted, issued by the dispatcher of trains of the station Resnik who was on service at the time of occurrence of the respective serious accident.

Summary of testimonies for the train drivers who were in the driver’s cab of the locomotive of the train No. 432 is given according to the hearing conducted by the working group of CINS on 04.10.2019., while the summary of testimonies for the train dispatchers of the station Resnik was given according to the Minutes of hearing submitted by “IŽS” a.d.

3.1.1. The railway staff

The train driver of the train No. 432 stated that on 25.06.2019. at 05:20 he took over the shift at the train No. 432 at the station Lajkovac and on that occasion had found the train driver who was returning home from the finished shift, travelling from Bijelo Polje and who had told him that he was going to the station Rakovica. He also received the driver from the railway undertaking “Srbija Kargo” a.d., who had asked him to transport him to the station Rakovica, since he was working on a pusher at Resnik station and that there was no other transport to Resnik. The situation changed as they approached the station Resnik, where the entrance signal showed the aspect of a signal “Speed limit, expect stop”, which meant that the train would exceptionally have been handled at the station Resnik, due to the traffic reasons. After that, both of the train drivers stated that, due to this new situation, they would exit at the station Resnik, and the train driver of the train No. 432 informed them that he would stop in the direction of the office of the dispatcher, to determine the reason of stopping. Upon entering on the third track, on the section where the second platform is located, the train driver of the train No. 432 saw the train driver of the railway undertaking “Srbija Kargo” a.d., standing on the step and at the next moment, jumping out of the train in motion. Due to the noise of the locomotive, he cannot confirm the communication between the train drivers that were in the engine compartment. He confirms that on the site he was examined by the emergency medicine doctor, that he stated higher pressure due to stress, as well as that he received a tablet of tranquilizer, after which he was sent to the railway ambulance, where from he was sent to the neurologists at the Clinical Center of Serbia.

The train driver who in the driver’s cab of the train locomotive 441-604 of the train No. 432 was returning from the shift into the domicile stated that on 24.06.2019., after finishing the shift at the train No. 433 at the station Bijelo Polje, he handed over the locomotive to the train driver who was working on the train No. 432 after the turn, as well as that he stayed in the driver’s cab of the locomotive of the train No. 432, which left from Bijelo Polje station at about 23:15. According to his allegations, the train No. 432 came to the station Lajkovac at about 05:15, where a handover was made between the drivers. He also states that the train driver of the railway undertaking “Srbija Kargo” a.d. was standing in front of the locomotive and that after the finished turnover he entered into the locomotive. He emphasizes that he was planning to exit the train at the station Rakovica but, the entrance signal of the station Resnik showed the aspect of a signal

“Speed limit, expect stop”, which meant that the train will be exceptionally handled, because of that he changed the plan and decided to exit at the station Resnik, like the train driver of the railway undertaking “Srbija Kargo” a.d. He emphasized that the train driver of the train No. 432 mentioned that he will stop the train in the direction of the dispatcher’s office, where they could exit from the locomotive. To the engine compartment first went the train driver of the railway undertaking “Srbija Kargo” a.d. and behind him the train driver who was travelling from Bijelo Polje. He watched him climb down the stairs cling to the hangers. Afterwards, he heard the cry of the train driver of the train No. 432, and after a few moments the train stopped and he exited and saw the fatally injured between the locomotive and the first wagon.

Outside train dispatcher of the station Resnik stated that on 25.06.2019. at the time of occurrence of this accident, at the station Resnik he was on duty as the outside dispatcher. The train No. 432 had the entrance on the third track because at 06:10 from the station Resnik from the first track BG train No. 8303 was exiting. After the check-out received for BG train, the train No. 432 received an exit from the station Resnik. He timely came out to wait for the passage of the train No. 432 because according to the Timetable Booklet there is no stopping at the station Resnik. The train No. 432 at 06:17 stopped, the train driver exited from the locomotive and asked to call the ambulance because during the jump out from the train it came to run over of his colleague the train driver. From where he was standing (he waited for the passage of the train) he could not see the event because it happened on the opposite side of the train. Due to the accident occurred, he suffered from psychological stress.

Inside train dispatcher of the station Resnik stated that on 25.06.2019. he received the shift at 06:00 which was recorded in the Traffic Log. At the time of the accident he was in the office of the train dispatcher (on the counter and he did not see the accident). Filling out the Report of train dispatcher on irregularities during operation (S-23) was started by the outside train dispatcher who was working the night shift because he was present at the time of the accident, and was finished by the colleague who replaced him.

Outside train dispatcher of the station Resnik who received the shift after the serious accident stated that at the time of accident he was on the way to the station Resnik. When he arrived at the station, the accident occurred. Filling out of the Report of train dispatcher on irregularities during operation (S-23) was started by the colleague who worked before him (the night shift), and he finished filling out after the dispatch of the train No. 432.

Inside train dispatcher of the station Resnik who handed in the shift before the serious accident stated that he left the station immediately after the handover of the shift and that at the time of the accident he was not at the station Resnik.

3.1.2. Other witnesses

There were no witnesses to this serious accident.

3.2. Safety management system

3.2.1. Organizational frame and manner of issuing and executing orders

In accordance with the applicable Rulebook of Safety Management System, “IŽS” a.d. has informed CINS on the serious accident occurred.

In accordance with the Safety Management System Manual, “Srbija Voz” a.d. has informed CINS on the serious accident occurred.

Infrastructure manager “IŽS” a.d. and the railway undertaking “Srbija Voz” a.d. have, in accordance with the Law on Railway Traffic Safety (“Official Gazette” RS No. 41/2018) formed joint investigative committee which conducted the investigation of the respective accident. Upon completion of the accident, the Report on Investigation U-271/19 was drafted.

3.2.2. Requirements to be fulfilled by the railway staff and the manner they are applied

“Srbija Voz” a.d. has, through the Safety Management System Manual (SMS) secured management of competencies, that is, the processes that all the employees directly involved in conducting of the railway traffic are trained and competent, as well as planning of the work load.

Regarding the respective serious accident, at the train driver of the locomotive 441-604 of the train No. 432 and the train driver in the driver's cab of the locomotive 441-604 of the train No. 432 who was travelling into the domicile after the shift, employed at “Srbija Voz” a.d., all activities relating to the professional training, competence and planning of the work load are conducted according to the applicable regulations.

“Srbija Kargo” a.d. has through the Safety Management System Manual (SMS) secured the management of competencies that is, the processes that all the employees directly involved in conducting of the railway traffic are trained and competent, as well as planning of the work load.

Regarding the respective serious accident, at the train driver who was travelling to work and who jumped out of locomotive 441-604 of the train No. 432, employed at “Srbija Kargo” a.d., all the activities relating to the professional training, competence and planning of the work load were conducted in accordance with the applicable regulations.

“IŽS” a.d. has through the Safety Management System Manual (SMS) secured management of competencies that is, processes that all the employees that are directly directly involved in conducting of the railway traffic are trained and competent, as well as planning of the work load.

Regarding the respective serious accident, at the outside train dispatcher and the inside train dispatcher of the station Resnik, employed at “IŽS” a.d., all activities relating to professional training, competence and planning of workload are conducted in accordance with the applicable regulations.

3.2.3. Procedures for internal audits and controls and their results

“Srbija Voz” a.d. as a railway undertaking has established Safety Management System Manual. The general purpose of the Safety Management System (SMS) is to secure that “Srbija Voz” a.d. achieves its business goals in the safe manner.

Rolling stock must maintain required technical level of correctness and must follow the maintenance plans (EV-62) and its cycles of control-technical checks and execution of the regular repairs, so that they would be as reliable as possible in the traffic, according to the Rulebook on maintenance of railway vehicles and other law and by-laws, which are integral part of Safety Management System Manual of “Srbija Voz” a.d.



Regarding the respective serious accident, regular and corrective maintenance of the railway vehicles (locomotive 441-604) was carried out in accordance with the applicable regulations.

3.3. Relevant international and national regulations

3.3.1. Law on Safety in Railway Traffic ("Official Gazette RS" No. 41/2018)

VIII Traffic regulation and management

...

Records on trains

Article 46

For each train, the railway undertaking shall keep records of the train staff, the composition, braking and movement of the train, as well as of events that affect or may affect the train timetable or railway traffic safety.

Provisions of Paragraph 1 of this Article are applicable for other entities that start the train.

The manager keeps record on train movements on the railway infrastructure that he manages.

The Directorate prescribes the type, content and forms of records referred to in Paragraph 1 and 3 of this Article, as well as the manner of their keeping and the terms of their keeping.

...

XI Conditions that must be met by the railway staff

1. General conditions

Article 59

Railway workers must have a prescribed educational qualification, be professionally qualified for the assignments and tasks they perform in the performance of railway traffic, they must have passed the professional examination and met special health and other conditions in accordance with the provisions of this Law.

...



3.3.2. Labour Law (“Official Gazette RS“ No. 24/2005, 61/2005, 54/2009, 32/2013, 75/2014, 13/2017 – decision US, 113/2017 и 95/2018 – authentic interpretation)

VIII Earnings, remuneration and other income

...

5. Reimbursement of expenses

Article 118 (excerpt)

An employee is entitled to reimbursement of expenses in accordance with the general act and the employment contract, as follows:

1) for arrival and departure from work, in the amount of fare for the public transport, if the employer has not provided his own transportation;

...

3.3.3. Law on Pension and Disability Insurance (“Official Gazette RS“ No. 34/2003, 64/2004 - decision US, 84/2004 – other Law, 85/2005, 101/2005 - other Law, 63/2006 - decision US, 5/2009, 107/2009, 30/2010 - other Law, 101/2010, 93/2012, 62/2013, 108/2013, 75/2014, 142/2014, 73/2018, 46/2019 - decision US, 86/2019)

Article 22.

Injury at work, within the meaning of this Law, is considered to be an injury to the insured that occurs in the spatial, temporal and causal connection with the performance of the work on the basis of which he is insured, caused by direct and short-term mechanical, physical or chemical action, sudden changes in body position, sudden loading on the body or other changes in the physiological state of the organism.

...

An injury at work shall also be considered to be an injury caused in the manner referred to in paragraph 1 of this Article, suffered by an insured person on a regular commute from the place of residence to the place of work or vice versa, on the road taken for the performance of official duties and on the road taken for entering into work, as well as in other cases established by law.

An injury at work is also considered to be a sickness of the insured that arose directly or as an exclusive consequence of an accident or force majeure during the performance of the work on the basis of which he or she was insured or regarding it.

...



3.3.4. Rulebook 2, Traffic Rulebook

(“Official Gazette ZJŽ” No. 3/94, 4/94, 5/94, 4/96 u 6/03)

Section IV

Preparation of trains

...

Article 25.

Right to travel on a traction vehicle

1. Apart from the train driver and the train driver assistant, only railway workers and persons who have a written driving consent may travel on a traction vehicle locomotive and in the section for the driver of the motor vehicle.

2. The right to travel on a traction vehicle without a written consent is granted to the freight train attendant when there are no official wagons on the train, attendants to receive the train on the locomotive heading for that train, or after the train is handed over when the locomotive returns to domicile if there is no suitable train for passenger transport, as well as the persons provided for by the Rulebook 243. The same Rulebook prescribes the conditions for driving on a traction vehicle.

3. The names of the persons travelling on a locomotive are to be signed in the travel document.

3.3.5. 243 Rulebook for traction of trains on JŽ

(“Official Gazette ZJŽ” No. 6/91)

Note: By decision of the Board of Directors of “Srbija Kargo” a.d. on the transposition of regulations under the Railway Traffic Safety Management System No: 4/2015-29-13 of 1.12.2015. (published in the “Official Gazette of ŽS” No. 28/2015) “Srbija Kargo” a.d. has adopted this regulation as its internal act within the framework of the Railway Traffic Safety Management System. According to Annex 4 (List of regulations in force in the company "Srbija voz" a.d.) of the Rulebook of the Safety Management System (SMS) in "Srbija Voz" a.d. Belgrade No. 1/2016-461 of 23.09.2016 This Regulation is still in application in "Srbija Voz" a.d.

Section III

Operation of traction

...

License for drive on the traction vehicle

Article 23. (excerpt)

A. Persons entitled to travel on the traction vehicle

1. Travel on a traction vehicle means travel in the driver's cab of the traction vehicle.

2. On the traction vehicle during the drive, apart from the crew of the traction vehicle, can be found:

- the staff of the traction vehicle travelling with the EV 1 certified,
- workers who are authorized to travel on a traction vehicle and



- other persons provided for in the Point 3 of this Article.

...

4. As a rule, in the driver's cab, apart from the crew up to two more persons can be found. Exceptionally, more persons can be driven, but they must be arranged and positioned so that they do not disturb the work of the traction vehicle staff. Unofficial conversation with the crew of the traction vehicle is forbidden.

...

6. All persons travelling on the traction vehicle must be individually signed in, by the attendant or the train driver in the travel report of the train, that is on the other travel document prescribed by the ŽTP.

...

3.3.6. 246 Instruction for work of the traction vehicle staff **("Official Gazette ZJŽ" No. 8-9/91)**

Note: By decision of the Board of Directors of "Srbija Kargo" a.d. on the transposition of regulations under the Railway Traffic Safety Management System No: 4/2015-29-13 of 1.12.2015. (published in the "Official Gazette of ŽS" No. 28/2015) "Srbija Kargo" a.d. has adopted this regulation as its internal act within the framework of the Railway Traffic Safety Management System. According to Annex 4 (List of regulations in force in the company "Srbija voz" a.d.) of the Rulebook of the Safety Management System (SMS) in "Srbija Voz" a.d. Belgrade No. 1/2016-461 of 23.09.2016. this Regulation is still in application in "Srbija Voz" a.d.

Section I

General provisions

...

Entrance, stopping and handling of the train in the station

Article 9 (excerpt)

1. To enter the station at the speed prescribed by the timetable, that is, by general order or according to the aspect of signal, respecting also the aspects of signal of the station staff.

....

3.4. Functioning of the railway vehicles and technical installations

3.4.1. Control, command and signalling

At the time of occurrence of the respective serious accident, devices for control, command and signalling at the station Resnik were operational and in function. On the devices for control, command and signalling no disturbances or malfunctions were noted.

3.4.2. Infrastructure

The condition of infrastructure (in the sense of condition of the track and facilities) in the area of the station Resnik was orderly in the sense that there were no irregularities that could adversely affect railway traffic safety.

3.4.3. Means of communication

At the time of occurrence of the respective serious accident, communication tools in the area of the station Resnik were operational and in function. On the communication tools no disturbances or malfunctions were noted.

3.4.4. Railway vehicles

From the data on maintenance of locomotive 441-604 submitted from “Srbija Voz” a.d. for the period from 25.12.2018. to 25.06.2019. (document of the Sector for rolling stock maintenance Condition of the traction vehicle, delivered in the attachment of the Letter of “Srbija Voz” a.d. No. 2/2019-218 of 20.08.2019.) it can be stated that the complete immobilisation of locomotive 441-604 was 288.59 hours. In this period four P1 checks were conducted, one check P12, and the other were corrective repairs.

Based on the documentation submitted by “Srbija Voz” a.d., regular and corrective repair of the locomotive 441-604 in the period from 25.12.2018. to 25.06.2019. was conducted in accordance with the Rulebook on rolling stock maintenance (“Official Gazette RS”, No. 101/2015, 24/2016 and 36/2017) and Instruction for traction vehicles maintenance “Srbija Voz” a.d. No. 4/2016-16-4 of 23.02.2016.

Locomotive 441-604 was, after the occurrence of the respective serious accident checked (25.06.2019. in the period from 13:00 to 13:50 daily check of the locomotive was conducted) and on that occasion no malfunctions, irregularities or damages that could affect the occurrence of the serious accident were noted.

On the train locomotive 441-604 speeding devices of the manufacturer Hasler were installed, registering speeding device type RT12, serial No. 88M-9905.037 and indicating speeding device type A28i, serial No. K01.120.

“Srbija Voz“a.d. has submitted the data that within the regular check of the range P12 a check of speeding devices installed on locomotive 441-604 was conducted, on which on 13.03. 2019. a Certificate No. 40/19 was issued with the validity date until 13.03.2020. After the conducted check of the speeding devices, repair of the speeding devices was two times recorded (29.05.2020 and 30.05.2020.)

Processing of the data registered on the speeding device tape of the locomotive 441-604 of the train No.432 was conducted in “Srbija Voz“a.d., Section for traction of trains Belgrade.

Processing the data taken from the memory of the electronic speeding device, taken from the speeding device of the locomotive 441-604 of the train No.432 (Data from the speeding tape No. Z-378 of 25.06.2019.) determined that at 06:15 with the speed of 63 km/h 1987 m before stopping the locomotive the influence of the active track balise 1000 Hz with the use of the button “Acknowledge”. After passed 836 m the speed is 23.5 km/h, then after passed 261 m the speed of locomotive has increased to 27 km/h. In that moment the influence of the active track balise of 1000 Hz has been recorded with the use of the button “Acknowledge”. After passed 266 m the speed has increased to 32.5 km/h, so that after passed 288 m the speed has been reduced to 22.5 km/h. After new 236 m passed, the locomotive stopped at 06:19. The next starting was registered at 10:31. The time is given according to the speeding device clock.

Based on the data from the speeding tape of the locomotive 441-604, it was stated that it did not come to overpassing of the allowed speed on this railway section prescribed by the Timetable Booklet 1.1 and documentation of Timetable Booklet (restricted speed running).

3.5. Traffic operation and management

3.5.1. Actions taken by the staff that manages traffic regulation, control and signaling

The train No. 432 was on the route Bela Reka- Resnik operated from TK track to the border station. For the traffic of train No. 432 was from the border station (station Resnik) orderly sought and given allowance according to applicable regulations and in that sense, there were no irregularities. The train staff was, through accompanying documentation, given orders and notifications on the traffic of trains on this railway section. Documentation of the timetable booklet, for the train No. 432 did not predict stopping at the station Resnik for the reasons of manipulation (entering and exiting) of passengers. At the time of approaching of the train No. 432 in the station Resnik on the first track there was the train No. 8303 (the train of the BG voz system), which was to be dispatched in the direction of the station Rakovica. According to the rules of traffic regulation, and with paying attention to the priority of the train dispatch, before passage of the train No. 432 it was necessary to first dispatch the train No. 8303.

With regard to the traffic situation at the station Resnik, for the train No. 432 the drive route could not be formed immediately for passage through the third station track, but first the drive route for entering the third station track was formed, and after meeting the conditions for it (finished dispatch of the train No. 8303 from the first station track and given check-out for the same), for the train No. 432 the exit drive route was formed in the direction of the station Rakovica.



3.5.2. Exchange of voice messages in relation to the serious accident

Immediately before and during the occurrence of the respective serious accident, there was no communication between the train driver of the train No. 432 and the staff which at the station Resnik regulates the traffic.

Communication between the staff that regulates the traffic at the station Resnik and the train driver of the train No. 432 was achieved after the occurrence of the respective serious accident with the aim of informing on the serious accident occurred, in a manner that the train driver of the train No.432 in direct contact, verbally, informed the outside dispatcher of the station Resnik on the serious accident occurred.

3.5.3. Measures taken to protect and secure the place of accident

Given the fact that the train No. 432 stopped after the occurred serious accident on the third station track and that the body of the injured was in such a position that it did not affect the traffic on the neighbouring station track, no special measures to secure traffic through station Resnik were undertaken. Given the fact that the train stopped on the track section which is horizontal and that the train was not decoupled, no special measures to secure the train from self-rolling were undertaken.

Other measures were not undertaken until the arrival of the police and the ambulance team.

3.6. Interface between men, machine and organisation

3.6.1. Working hours of the staff involved

From the railway undertaking “Srbija Voz” a.d. the data was submitted that show that the train driver of the locomotive 441-604 of the train No. 432 did not spend more time on work than the maximum allowed by the Law. And that before coming to work he had the stipulated rest, as well as the data that the train driver who in the driver’s cab of the locomotive 441-604 of the train No. 432 was travelling returning from the shift home, had finished the shift on 24.06.2019. at 22:30 in Bijelo Polje.

From the railway undertaking “Srbija Kargo” a.d. the data was submitted that show that the train driver who was jumping out of the train locomotive 441-604 of the train No. 432 was planned for work on 25.06.2019. from 07:00 with the place of reporting Belgrade Marshalling Yard. The previous work of the train driver was on 24.06.2019. starting with 08:30, but the data on structure and lasting of work were not familiar because the train driver did not submit the form EV-1 from the service to the OJ for traction of trains and TKP Belgrade. To the employed (the train driver) was issued the Decision on reimbursement of expenses of transportation No. 17/2019-222-335 of 17.05.2019. with which to the employed were recognized the expenses of transport on the route Lajkovac - Belgrade, according to the expense of the transport in bus transportation.

3.6.2. Health-related and personal circumstances that have effects on the accident, including the presence of physical or mental stress

For the railway staff employed at “Srbija Voz” a.d., the data were submitted showing that the train driver of the locomotive 441-604 of the train No. 432 and the train driver who in the driver’s cab of the locomotive 441-604 of the train No. 432 was returning home after the shift are professionally trained and medically fit to perform the work. The train driver of the train No. 432 owns the License to operate the traction vehicle No. RS 71 2017 0353 issued by the Railway Directorate on 01.01.2017. valid until 18.09.2022. The train driver who was in the driver’s cab of the locomotive 441-604 of the train No. 432 travelling home from the shift owns the License to operate the traction vehicle RS 71 2017 0317 issued by the Railway Directorate on 01.01.2017. valid until 18.09.2022.

For the railway staff employed at “Srbija Kargo” a.d., the data were submitted showing that the train driver who was jumping out of the locomotive 441-604 of the train No. 432 was professionally trained and medically fit to perform the work. The train driver who was jumping out of the locomotive 441-604 of the train No. 432 owns the License to operate the traction vehicle No. RS 71 2017 1291 issued by the Railway Directorate.

Joint investigative committee composed of the representatives of “IŽS” a.d. and “Srbija Voz” a.d. did not perform the alcotesting of the participants of the serious accident.

Alcotesting was performed by the members of MUP and the train driver of the train No. 432 was tested on the site, at 08:00, by the police officials of the Traffic Police Directorate by the alcometer No. 17030160, EM 18/19-3, calibrated until 30.09.2019. and the train driver who in the driver’s cab of the locomotive 441-604 of the train No. 432 was returning to domicile in the official premises of PU for the City of Belgrade, Criminal Police Directorate, Department of Investigative Operations, at 10:13 by the police officials of the Traffic Police Directorate by the alcometer No. 112183, certificate No. 2019-10-11, calibrated until 31.12.2020. Alcotesting of both train drivers did not determine the presence of alcohol.

CINS has submitted the Letters No 340-00-2/2019-02-1-26 of 19.02.2020. and No. 340-00-2/2019-02-1-28 of 18.03.2020. to the Institute for Forensic Medicine in Belgrade, with a request to submit the autopsy results and chemical-toxicological analysis for the presence of alcohol and psychoactive substances at the deceased person. At the request of CINS from 19.02.2020., the Institute for Forensic Medicine in Belgrade submitted a response on 26.02.2020. stating that the autopsy report for the deceased train driver under No. S-680/19 was still not completed, since they were waiting for the report of the chemical-toxicological analysis, which was still in progress. At the request of CINS from 18.03.2020. the Institute for Forensic Medicine in Belgrade has, on 01.06.2020., submitted via e-mail the Autopsy Report S-0680/2019 for the deceased train driver employed at the railway undertaking “Srbija Kargo” a.d., in which the following is stated: “Chemical-toxicological finding T-691/19: The presence of ethyl alcohol, methyl alcohol and acetone was not detected in the blood by using the method of gas chromatography with the headspace technique. Preliminary urine immunochromatographic test for the detection of amphetamine, methamphetamine, cocaine, opiates, tetrahydrocannabinol, barbiturates, benzodiazepines, phencyclidine, methadone and tricyclic antidepressants was negative for the presence of all substances included in this test. The method of gas chromatography with mass spectrometry in the submitted samples did not detect the presence of drugs and medicines from the attached list”.

According to their own statements, at the participants of the respective serious accident (the train driver of the locomotive 441-604 of the train No. 432 and the train driver who in the driver's cab of the locomotive 441-604 of the train No. 432 was travelling into the domicile after the shift) and the staff of infrastructure manager "IZS" a.d. (outside dispatcher of the station Resnik), the presence of stress was noted, created as a consequence of the respective serious accident.

3.6.3. Design of the equipment that has influence on the interface between user and machine

The station Resnik is designed so that in all parameters satisfies the criteria for safe traffic of trains with the speeds regulated by the Timetable Booklet and safe manipulation of passengers.

According to the designed state, the station Resnik is equipped with electro relay safety-signalling system "Siemens - EI" with which from the central position (station set) is handled by the inside train dispatcher.

With the purpose of regulating the traffic, in the area of the station Resnik main signals have been installed indicating bisemic aspects of a signal. Through the safety-signalling device complete dependence of the aspects of signals indicating the main signals with the positions of switches is achieved.

In the area of the station Resnik, communication between the staff that regulates the traffic on the track and the staff of the traction vehicle is performed by telephone via a local TT connection.

According to the data submitted by "IZS" a.d. (Annex 3 of the Letter No. 1/2019-2257 of 23.08.2019.), for the timetable of drive for 2018/2019. through the station Resnik the maximum permitted speed is 70 km/h, while the limited speed over the switches for drives in switch on the block 1 35 km/h, and on the block 2 40 km/h. The speed over the switches on the main running tracks in direction is 70 km/h.

Operating the locomotive 441-604 is conducted by the train from the driver's cab via commands designed upon locomotive manufacture. The locomotive does not provide automatic safety protection against unintentional opening of the door while the locomotive is moving, nor a mechanism to prevent unintended opening until the speed is allowed when it is possible to open the door, as is the case with the door lock mechanism on wagons for transport of passengers.

3.7. Previous accidents of similar nature

Based on the data submitted by "IZS" a.d., for the period from 01.01.2007. to 25.06.2019. in the area of the infrastructure manager "IZS" a.d., it came to occurrence of the 2 (two) accidents in total of jumping in/jumping out of the railway workers from the train in motion (accidents which are classified in the category of accidents in which the persons were fatally injured or seriously injured caused by the railway vehicles in motion).

In the observed period, in these accidents 2 (two) persons suffered from severe bodily injuries.



In the first case it came to jumping in of the railway worker (locomotive supervisor) into the train in motion, while in the other case it came to jumping of the train dispatcher who was going to work (shift) out of the train in motion. In both cases, the accident occurred due to the personal negligence of the railway workers, who jumped into the train, that is, jumped out of the train.

Review of the accidents occurred is given in Table No. 3.7.1.

Table 3.7.1: Review of accidents occurred in the periods from 01.01.2007. to 25.06.2019.

Serial No.	date	time	Short description	Fatally injured	Seriously injured	Lightly injured	Cause
1	16.02.2007.	06:46	At the station Beograd Spoljna at km 1+001 jumping in of the railway worker (locomotive supervisor) into the train No. 341 in motion.		1		Negligence of the railway worker
2	18.01.2009.	18:11	At the station Grejač jumping of the railway worker off (train dispatcher) the train No. 391 in motion.		1		Negligence of the railway worker

4. Analyses and conclusions

4.1. Final review of the course of events and adoption of conclusions about the occurrence based on facts determined during the investigation and interviews

In the border station Bijelo Polje, on 24.06.2019. the railway undertaking "Srbija Voz" a.d. took over the train No.432 from the Montenegrin undertaking. The locomotive 441-604, owned by "Srbija Voz" a.d., was set up for traction of the train. From the station Bijelo Polje, in the driver's cab of the locomotive 441-604 the train driver of the undertaking "Srbija Voz" a.d. was found who after the finished shift (locomotive 441-604 keeping) was returning to domicile.

At the Lajkovac station, on 25.06.2019. at 5:24 a change of train drivers was performed. The train driver employed at the railway undertaking "Srbija Voz" a.d. came into possession of the locomotive 441-604 for who it was planned to perform the service of traction of the train No. 432 to the station Topčider (train driver who received a shift at the station Lajkovac and was on duty on train No. 432 at the time of this serious accident). The train driver who received the shift at the Lajkovac station received an acquaintance/colleague - the train driver employed by the railway undertaking "Srbija Kargo" a.d. in the driver's cab of the locomotive 441-604 of train No. 432. who had to travel from Lajkovac station to Rakovica station for the reason of transport to work. In the driver's cab there was still the train driver employed at the railway undertaking "Srbija Voz" a.d. who after the finished shift (locomotive 441-604 keeping), from Bijelo Polje was returning to domicile.

Considering that train No. 432 did not have to deal with the manipulation (entry and exit) of passengers at Resnik station, due to the traffic situation at Resnik station, it was not possible to set the driving route for train No. 432 for passage of the train through the station, but first the drive route was set for the entrance of the train No. 432 into the third station track, and when the conditions were met (after the dispatch of the train No. 8303 from the first station track and received check-out for the same), for train No. 432 the driving route for the exit from the third station track was formed.

During the approach of train No. 432 to the Resnik station, the pre-signal of the Resnik station PCu 91 showed the aspect of a signal 13: "Expect stop", and the entrance signal Cu 91 the aspect of a signal 8: "Speed limit, expect stop". The train driver adjusted the speed of the train to the aspects of the signal of the main signals (pre-signal and entrance signal of the Resnik station), which he passed by.

Based on the aspects of signal that showed the pre-signal PCu 91 and the entrance signal Cu 91 of the Resnik station, the train driver estimated that it would be necessary to stop the train at the Resnik station. He communicated this assessment to the persons present in the driver's cab of the locomotive. According to the statements made by the train driver of train No. 432 and the train driver who was returning to work in the locomotive 441-604 driver's cab, at the CINS premises, the possibility to stop train No. 432 at the Resnik station also suited the train driver employed at of the railway undertaking "Srbija Voz" a.d. who was returning from work into domicile and the train driver employed at the railway undertaking "Srbija Kargo" a.d., who was travelling to work, for the reason that it was more suitable for them to exit from the train in the station Resnik then the station Rakovica, where the train No. 432 had the regular handling due to manipulation of passengers (entering and exiting).

After entering the Resnik station, the train No. 432 was moving through the third station track at a speed that (according to the data registered with the speedometer on the locomotive 441-604) decreased from 32.5 km/h to 22.5 km/h.

During the movement of train No. 432 on the third station track, the train driver employed at the railway undertaking "Srbija Kargo" a.d. who was traveling to work left the driver's cab of the locomotive 441-604, entered the engine compartment of the locomotive, opened the door of the engine compartment (door on the left side of the locomotive, viewed in the direction of train movement), went out of the locomotive and stepped on the outside part of the locomotive box, facing the locomotive (back to the platform), holding hands on the side holders located next to the door on the outside part of the locomotive box, probably intending to get off the locomotive and cross to the platform after stopping train No. 432. Being in that position, he falls from the step into the space between the second station platform and the third station track, that is, into the space between the second station platform and the train in movement. On that occasion, he suffered severe bodily injuries from the moving train, as a result of which he died on the spot.

4.2. Discussion - Analyses of facts determined during the investigation and interviews with the view to drawing conclusions regarding the causes of the serious accident and effect of rescue services

4.2.1. Analyses of the train movement

The train No. 432 operated regularly on the route Bar - Topčider. All prescribed accompanying documents have been submitted for the train. Part III - train staff of the travel document for train No. 432 contains data for the driver of the train locomotive 441-604 and the conductor on the train, as well as the stations to which he will be on the train. Data for the train driver employed by the railway undertaking "Srbija Voz" a.d. who was returning to domicile after the shift (keeping of locomotive 441-604) were not registered in the travel document, although he was in the driver's cab of the locomotive 441-604 of train No. 432, which is contrary to the provisions of Rulebook 2, Traffic Rulebook ("Official Gazette ZJŽ " No. 3/94, 4/94, 5/94, 4/96 and 6/03) and 243 Rulebook for traction of trains on JŽ ("Official Gazette ZJŽ " No. 6/91) (see Points 3.3.4. and 3.3.5.).

At the Lajkovac station, the train driver on the locomotive 441-604 of train No. 432 was changed. From the locomotive 441-604 the train driver who finished the shift exited, and in the cab were left the train driver employed at the railway undertaking "Srbija Voz" a.d. who received the shift at the station Lajkovac on the train No 432, the train driver employed at the railway undertaking "Srbija Voz" a.d., who after the finished shift (locomotive 441-604 keeping) was returning into domicile from Bijelo Polje and the train driver employed at the railway undertaking "Srbija Kargo" a.d. who was travelling to work (who was received at the station Lajkovac in the driver's cab by the train driver of the locomotive 441-604 of the train No.432, who received the shift at the station Lajkovac).

Data for the train driver who took over the shift at the Lajkovac station (the train driver employed by the railway undertaking "Srbija Voz" a.d. who received the shift at the Lajkovac station and was on duty on train No. 432 at the time of this serious accident) and the station to which he will be on the train are entered in the travel document.

On the route between Lajkovac and Resnik stations, there were three persons in the driver's cab of locomotive 441-604 of train No. 432, which is in accordance with the maximum number of persons that may be in the driver's cab of locomotive series 441.

During the movement of train No. 432 between stations Bela Reka and Resnik, aspects of signal which, at the time of passing of the train No. 432, showed a pre-signal PCu 91 (aspect of a signal 13: "Expect stop") and entrance signal of station Resnik Cu 91 (aspect of a signal 8: "Limited speed, expect stop") pre-signaled that the next main signal (output signal Ao 3 of the station Resnik) shows an aspect of a signal for prohibited driving. Passing by the pre-signal PCu 91 and the entrance signal Cu 91 of the Resnik station, the influence of the active track balise of 1000 Hz was registered on the registering speedometer of the locomotive 441-604 with the use of the "Acknowledge" button (see point 3.4.4.). From the driver's point of view, the aspect of a signal of the entrance signal Cu 91 allowed further driving, but also provided information that, at the moment when the train passes by it, the output signal Ao 3 prohibits further driving and that there is a possibility that the train driver will have to stop the train at the station.

By analyzing the data registered by the registration speedometer of the locomotive 441-604 (Point 3.4.4.), the train driver harmonized the train speed with the aspects of signal showing the pre-signal PCu 91 and the entrance signal Cu 91 of the Resnik station, by reducing the train speed from 63 km/h at 23.5 km/h, after which he continued to drive the train with a gradual increase in speed to 32.5 km/h, then a gradual decrease in speed to 22.5 km/h, when, at the time of the serious accident, he introduced the fast braking and stopped the train.

In accordance with the traffic situation at Resnik station, for the train No. 432, instead of the drive route for passing the train through the station, the first drive route was formed for the train entrance at the third station track, which resulted in the previously described indication of the pre-signal PCu 91 and the Cu 91 entrance signal at the station Resnik. After the conditions were met (train No. 8303 was dispatched from the first station track and for the same check-out was received), a drive route was formed for train No. 432 to exit the third station track, by which on the exit signal Ao 3 the the aspect of a signal changed, starting to show the permitted driving. This change, the train driver could not see for the reason that in the moment of change of the aspect of a signal on the exit signal he already passed by the entrance signal, from the place where the train was located he could not observe the exit signal.

Since for the train No. 432 the drive route has been formed for the exit from the third track, and the train No. 432 has not yet passed the station facility or the train dispatcher's office, the outside train dispatcher of the Resnik station has left the office so that he could observe the passage of the train No. 432. There is no information that the outside train dispatcher gave any aspects of signal or showed any gesture on the basis of which it could be interpreted that train No. 432 should stop at the height of the train dispatcher's office.

During the train drive of the train No. 432 on the third station track towards Rakovica station, on the section of the third track near the covered part of the second station platform, at a speed of 22.5 km/h (according to the data registered by the locomotive registration speedometer 441-604) through the door of the engine compartment on the left side of the train locomotive (when viewed in the direction of the train movement), it came to jumping of a railway worker a train driver employed by the railway undertaking "Srbija Kargo" a.d.

After the serious accident, the train No. 432 stopped on 44 m before passage by the station facility, that is, the train dispatcher's office.

4.2.2. Analyses of serious accident participants behaviour

The train driver of the train No. 432 who operated the train locomotive 441-604 at the time of occurrence of the respective accident, employed at the railway undertaking "Srbija Voz" a.d., received the shift at the station Lajkovac. The train driver was professionally trained, medically fit and he had the stipulated rest before coming to service (see Points 3.6.1. and 3.6.2.). The data on the train driver and the station until he would do the service are entered into the Travel document (S-56) of the train No. 432. The train driver, during the reception of his shift at the driver's cab of the locomotive 441-604 of the train No. 432, has found the colleague the train driver employed at the railway undertaking "Srbija Voz" a.d., who was returning to domicile after his shift from Bijelo Polje. After the reception of the shift, in the driver's cab he received his colleague the train driver, employed at the railway undertaking "Srbija Kargo" a.d., who was travelling to work. Based on the data of the speedometer tape of the locomotive 441-604 of the train No. 432, it can be seen that the train driver on the section from the pre-signal PCu 92 to the place where he



stopped the train after the serious accident, has adjusted the manner of driving and the speed of the train to the aspects of a signal that indicated the main signals by which he passed and according to the documentation of the Timetable Booklet.

The train driver employed at the railway undertaking "Srbija Voz" a.d., who was returning to domicile after the finished shift, was in the driver's cab of the locomotive 441-604 of the train No. 432 from the station Bijelo Polje. By the railway undertaking "Srbija Voz" a.d. for the train driver was submitted the Document of the traction vehicle staff (form EV-1) No. T-179 with the data that he came to service on 24.06.2019. at 19:18 (which is verified by the seal of the "Traction of Trains Užice, Traction Supervisor Bijelo Polje" and signed) that he finished the shift (locomotive 441-604 keeping) in the period from 19:30 to 22:30 and that he was returning to domicile on the route Bijelo Polje - Topčider with arrival from the station Bijelo Polje at 23:15, and by arriving at the station Topčider at 10:45. In the Document of the traction vehicle staff (form EV-1), Section 4, the termination of the shift was entered the time 22:30, and in the Section 5, termination of the work of the train driver was entered the time 10:45. These sections are verified with the signature. According to provisions of the 243 Rulebook for traction of trains on JŽ ("Official Gazette ZJŽ, No. 6/91), (see Point 3.3.5.), the train driver who travels has the right to stay in the driver's cab of the locomotive 441-604 of the train No.432. According to his own statement, the train driver who was returning to domicile in the driver's cab of the loc. 441-604 of the train No. 432 was planning to exit the train at the station Rakovica, where the train No. 432 has to be handled for manipulation (entering and exiting) of passengers. However, due to the possibility that the train No. 432 for the traffic reasons can be stopped, he changed the plan and decided to exit the locomotive 441-604 of the train No. 432 at the station Resnik.

The train driver employed at the undertaking "Srbija Kargo" a.d. who was coming to work, was from the station Lajkovac in the driver's cab of the locomotive 441-604 of the train No.432 of the railway undertaking "Srbija Voz" a.d. and for the drive in the driver's cab of the locomotive 441-604 did not have the prescribed License for drive on the traction vehicle, which is contrary to the provisions of the Rulebook 2, Traffic Rulebook ("Official Gazette ZJŽ" No. 3/94, 4/94, 5/94, 4/96 и 6/03) and 243 Rulebook for traction of trains on JŽ ("Official Gazette ZJŽ" No. 6/91) (see Points 3.3.4. and 3.3.5.). From the undertaking "Srbija Kargo" a.d., for the train driver the Labour Contract was submitted, No. 1/2017-13-71 of 28.02.2017. Annex No. 5 of the Labour Contract No.1/2017-13-71 of 28.02.2017., No. 1/2018-6500-28/2018-6888 of 28.12.2018. and the Data on work engagement of the train driver in the last 72 hours before the occurrence of the serious accident, from which it can be seen that the train driver was employed on indefinite time period at the railway undertaking "Srbija Kargo" a.d., Sector for traction of trains and TKP, OJ for traction of trains and TKP Belgrade and that he was planned to work on 25.06.2019. from 07:00 with the place of registry at the station Belgrade Marshalling Yard. Also, to the train driver was, by his employer "Srbija Kargo" a.d., according to the Article 118 of the Labour Law ("Official Gazette RS" No. 24/2005, 61/2005, 54/2009, 32/2013, 75/2014, 13/2017 - decision US, 113/2017 and 95/2018 - authentic interpretation) and Articles 42 and 45 of the Collective Agreement of the joint stock company for railway transport of goods "Srbija Kargo" Belgrade ("Official Gazette ŽS" No. 27/18 and 62/18) issued Decision on reimbursement of expenses of transportation No. 17/2019-222-335 of 17.05.2019. according to which he had the right on reimbursement of expenses of transportation for coming to and returning from work on the route Lajkovac - Belgrade, according to the price of the bus fare. According to the submitted data, the train driver did not have the right, nor the need, for the drive on the traction vehicle (locomotive 441-604) of train No. 432. Also, driving in the locomotive driver's cab of another railway undertaking cannot be considered a regular route from the place of residence to the place of work. The supervisor of the train driver (Head of the section for traction of trains and TKP Belgrade, "Srbija Kargo" a.d.) in a conversation

with members of the MUP RS, Police Department for the City of Belgrade, the Criminal Police Directorate, the Department for Investigative and Operational Affairs, stated that the train driver had the obligation to personally call the dispatcher at the Belgrade Marshalling Yard on 25.06.2019. and that according to the timetable, which was written on 24.06.2019., until 14:00 he was supposed to work on pushing the trains at the Resnik station. The train driver with whom he should change the shift has in the telephone conversation with the members of MUP RS, Police Department for the City of Belgrade, the Criminal Police Directorate, the Department for Investigative and Operational Affairs, stated that he had spoken with the colleague with whom he should change the shift on 24.06.2019. at about 22:00 to deal about the reception of shift at the station Resnik, and that the colleague called him on 25.06.2019. about 05:45 saying that he went with the train from Bar to Belgrade and that about 06:15 he was supposed to be in Resnik where they should shift.

Data for the train driver employed by the railway undertaking "Srbija Voz" a.d. who, after the completion of the shift (keeping of the locomotive 441-604) from the Bijelo Polje station, returned to the domicile and the train driver employed by the railway undertaking "Srbija Kargo" a.d. who traveled to work from the Lajkovac station, for the train No. 432, which operated on 24/25.06.2019., were not entered in the Travel Document (S-56), which is contrary to the provisions of Rulebook 2, Traffic Rulebook ("Official Gazette of ZJŽ" No. 3/94, 4/94, 5/94, 4/96 and 6/03) and 243 of the Rulebook for traction of trains on JŽ ("Official Gazette of the ZJŽ" No. 6/91), (see Points 3.3.4. and 3.3.5.).

From "IŽS" a.d. a video recording (video) of surveillance cameras installed in the Resnik station on the roof structure of the entrance to the underpass was provided (see Figure 2.1.2.1.). The cameras are positioned so that the video can show the left part of train No. 432 (viewed in the direction of train movement) from the moment of passing of the train past where the cameras were placed. The video shows that at the moment when the train No. 432 (train locomotive 441-604) appears in the frame, the train driver employed by the railway undertaking "Srbija Kargo" a.d. traveling to work stands on the outside of the door of the locomotive engine compartment with his face turned toward the locomotive (back facing the second platform), holding with both hands by the holders placed on each side of the door of engine compartment of the locomotive, with his left foot resting on the step below the locomotive engine compartment, while he protruded his right leg back a short distance from the platform. At one point, with the foot of the right leg he touches the platform, the foot of the left leg falls from the stair to the platform and due to the movement of the train, he falls with all his body first on the platform and then to the space between the platform and the track, that is, between the platform and the train locomotive. The train driver of the locomotive 441-604 of the train No. 432 and the train driver who in the driver's cab of the locomotive 441-604 was travelling into the domicile after the shift were observing this event all the time, and the train driver of the locomotive 441-604 of the train No. 432 from the driver's cab of the locomotive with the protruded head through the side window of the driver's cab, and the train driver who in the driver's cab of the locomotive 441-604 of the train No. 432 was travelling into the domicile after the shift by standing in the locomotive on the side door of the locomotive's engine compartment.

The appearance of the video surveillance sequences immediately before the occurrence of the respective serious accident is given in Figure 4.2.2.1.

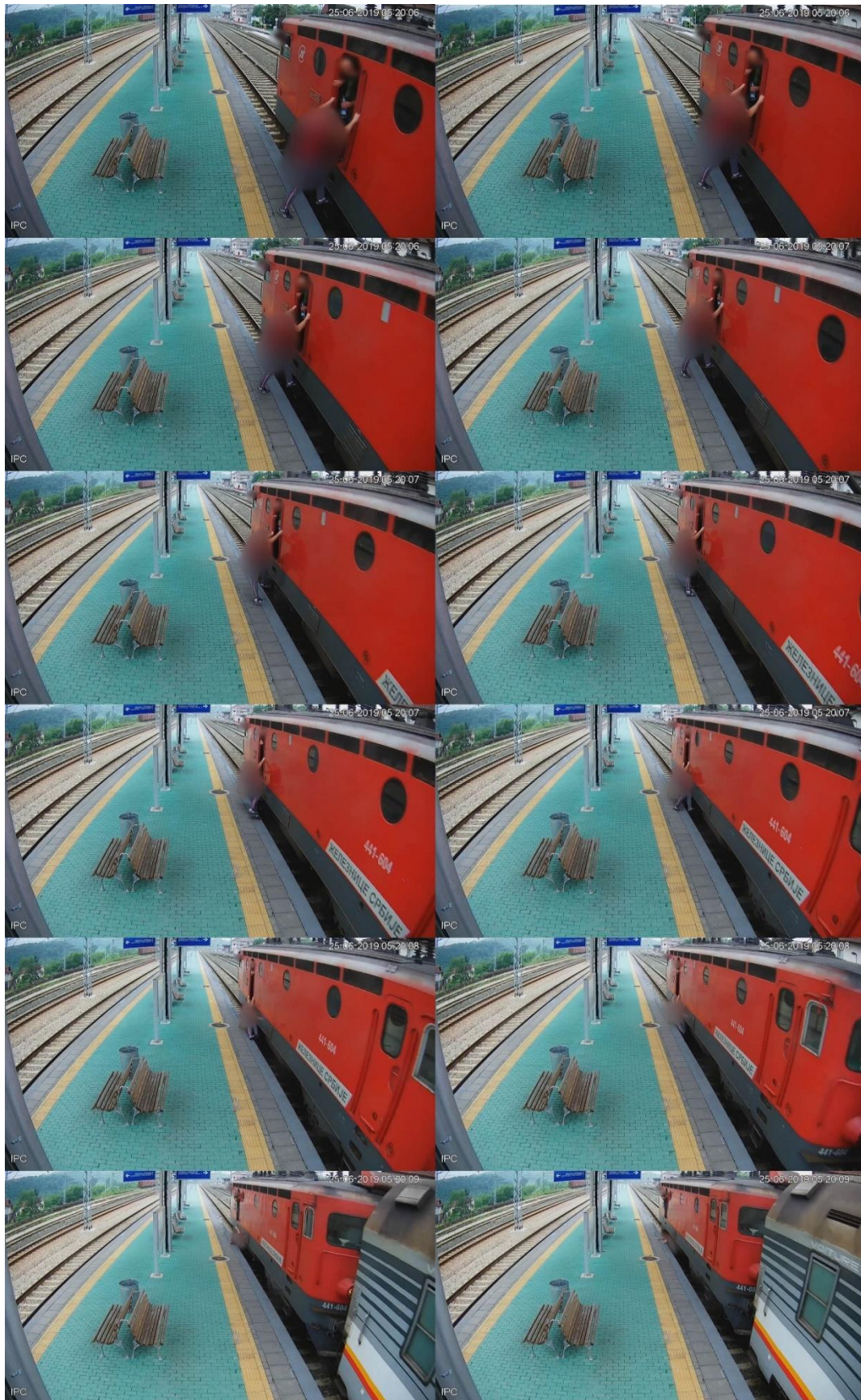


Figure 4.2.2.1: Video surveillance sequences immediately before the occurrence of the serious accident
(source: “IŽS“a.d.)

4.2.3. Review of the locomotive and documentation of locomotive maintenance

Based on the data submitted from “Srbija Voz” a.d. (see Point 3.4.4.) the train locomotive 441-604 of the train No. 432 was regularly maintained and on the locomotive no defects were observed that could have affected the occurrence of this serious accident.

4.3. Conclusions on the serious accident causes

4.3.1. Direct and immediate cause of the serious accident

Direct and immediate cause of the occurrence of this serious accident is that the train driver employed at the railway undertaking “Srbija Kargo” a.d., who was in the train locomotive 441-604 of the train No. 432 of the railway undertaking “Srbija Voz” a.d., was exiting the train locomotive at the moment of train movement, which created the dangerous situation relating to the occurrence of the serious accident.

The train driver employed at the railway undertaking “Srbija Kargo” a.d., who was travelling to work, did not have the right to travel in the driver’s cab of the locomotive 441-604 of the train No. 432 of the railway undertaking “Srbija Voz” a.d. according to any criteria defined in the Rulebook 2, Traffic Rulebook (“Official Gazette ZJŽ” No. 3/94, 4/94, 5/94, 4/96 and 6/03 and 243 Rulebook for the traction of trains on JŽ (“Official Gazette ZJŽ”, No. 6/91).

“Srbija Kargo” a.d. has to the train driver (fatally injured in this serious accident) in accordance with the Labour Law (“Official Gazette RS” No. 24/2005, 61/2005, 54/2009, 32/2013, 75/2014, 13/2017 - decision US, 113/2017 and 95/2018 - authentic interpretation) (see Point 3.3.2.) issued Decision on transportation to work (see Point 4.2.2.), according to which the train driver had the right for reimbursement of expenses of the bus transportation, so that the ride in the driver’s cab of the locomotive of another railway undertaking cannot be considered a regular route from the place of residence to the place of work (see Point 3.3.3.)

4.3.2. Basic causes deriving from skills, procedures and maintenance

N/A

4.3.3. Main causes deriving from legal framework and safety management system application

N/A

4.3.4. Additional observations on deficiencies and shortcomings established during the investigation, but without relevance for conclusions about the causes

In the statements given on the hearing at the premises of CINS, the participants to this serious accident state that it is a common case that in the driver’s cab of the traction vehicle colleagues going to work are received, even though according to provisions of the Rulebook 2. Traffic Rulebook (“Official Gazette ZJŽ” No. 3/94, 4/94, 5/94, 4/96 and 6/03) and 243 Rulebook for



traction of trains on JŽ (“Official Gazette ZJŽ” No. 6/91) they have no right to ride in the traction vehicle and it is a regular occurrence that in the Travel document all the persons that are in the driver's cab of the traction vehicle are not entered, in the manner prescribed, which is contrary to the provisions of the Rulebook 2. Traffic Rulebook (“Official Gazette ZJŽ” No. 3/94, 4/94, 5/94, 4/96 and 6/03) and 243 Rulebook for traction of trains on JŽ (“Official Gazette ZJŽ” No. 6/91).

5. Measures taken

After the occurrence of the respective serious accident, “Srbija Voz” a.d., Sector for traction of trains has, by Act No. 18/2019-266 of 05.07.2019. issued the Order 8/2019 of Director of Sector for traction of trains on conducting extraordinary/additional training of employees of all Sections and Organizational Units for more fields relating to improvement of the railway traffic safety level (analyses of the accidents occurred with a special reference on the role of human factor, knowledge of rolling stock, knowledge of regulations and behaviour of participants in specific accidents).

6. Safety recommendations

CINS has no safety recommendations for this serious accident.