



REPUBLIC OF BULGARIA
NATIONAL AIR, MARITIME AND RAILWAY TRANSPORT, ACCIDENTS
INVESTIGATION BOARD (NAMRTAIB)

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FINAL REPORT

of

Investigation of railway accident – derailment of passenger train № 30114, serviced by locomotive 91520044138-3, along Anton – Koprivshtitsa interstation on 11.06.2024



Sofia 2024

OBJECTIVE OF INVESTIGATION AND EXTENT OF RESPONSIBILITY

The National Air, Maritime and Railway Transport Accidents Investigation Board (NAMRTAIB), which is an independent body performs the investigation of significant accidents, accidents and incidents. The National Board is within the Council of Ministers (CM) of the Republic of Bulgaria, and aims to find the circumstances and causes that led to the accidents and incidents occurrence in order to improve the safety and to avoid such in future as the priority is given to avoiding significant accidents.

The investigation, which the NAMRTAIB performed is independent from any judicial investigation, and does not include the determination of fault or responsibility.

The investigation is performed in accordance with the requirements of DIRECTIVE (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway transport safety, the Railway Transport Act (RTA), Ordinance No59 dated 5.12.2006 on the rail transport safety management, as well as per Agreement dated 11.04.2023 on the interaction during investigation of accidents and incidents in the air, maritime and railway transport between the Prosecutor's Office of the Republic of Bulgaria, Ministry of Interior, and the National Air, Maritime and Railway Transport Accidents Investigation Board.

The Investigation reports follow the requirements of REGULATION (EU) 2020/572 of the Commission dated 24 April 2020 on the reporting structure for railway accident and incident investigation reports.

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ABBREVIATIONS, USED IN THE REPORT

ABS – Automatic Block System
FT – Fast train
TDRC – Train Dispatching Radio Connection
TOS – Train Operation Schedule
SE NRIC – State enterprise „National railway Infrastructure Company“(railway infrastructure manager)
TCR JSC – “Transport Construction and Rehabilitation” JSC
EI – Electrical Interlocking
RS – Railway section (division of SE NRIC)
RTA – Railway Transport Act
TOU – Unit for the traffic organization within the structure of TOSAM
RAEA/NSA – Railway Administration Executive Agency, National Safety Authority
km – Kilometre along the rail track
OCL – Overhead contact line (catenary)
„BDZ-Passenger Services“ Ltd. – State railway undertaking for passenger transport
ST – Shunting train
MoI – Ministry of Interior
SL – Shunting locomotive
MMR – Mechanized mid repair
Ordinance № 58 – on the rules for the technical operation, train traffic and signalling in the rail transport
Ordinance № 59 – Ordinance on the rail transport safety management
NAMRTAIB – National Air, Maritime, and Railway Transport Accidents Investigation Board
(Independent Specialized National Investigation Body)
TF – Task Force
SE – Signalling equipment
PT – Passenger train
RRS – Rail Rolling Stock
RTORI – Rules of technical operation of the railway infrastructure of SE NRIC
TOMS – Train operation management system
RD MoI – Regional Division of the Ministry of Interior
TGM – Transport group manager
RITS – Regional inspection Transport Safety at SE NRIC
RLD – Regional local division
RSPSM – Rail self-propelled specialized machine
ECM – Entity in Charge of Maintenance
SMS – Safety Management System
CRW – Construction repair works
TI – Technical inspection
STM – Sleepers tamping machine
TRS – Traction rolling stock
TOSAMD – Train operation and station activity management Division (division of SE NRIC)
DCCM – Device for communications, connections and messages in stations
CDD – Central dispatching division
PQC – Professional qualification centre at SE NRIC
PQC – Professional qualification centre at Holding BDZ EAD
TRIS – Traffic Railway Interlock System
STS – System Traffic Control, part of TRIS

1. Summary

1.1. Brief description of the event.

Pursuant to Telegram 803/28.05.2024 of the General Director of the SE NRIC on 11.06.2024 at 05:33 a.m. by order of the train dispatcher, a train and electrical "window" was authorized to carry out MMR at Koprivshitsa Interstation - Anton, leaving the vehicles from Koprivshitsa station to km 95+300 and returning to Koprivshitsa station by 08:45 a.m.

At 08:45 a.m. the vehicles were collected in the Koprivshitsa station.

At 08:53 a. m., by order of the train dispatcher, the Koprivshitsa - Anton interstation was opened for train traffic.

From 12:30 p.m. to 13:20 p.m., by order of the train dispatcher, the movement of trains at the Koprivshitsa - Anton interstation was stopped for work on the catenary with RSPSM No. 99529463001-8.

At 13:21 p.m., by order of the train dispatcher, the movement of trains in the Anton-Koprivshitsa interstation was restored and the stations were transferred to the CDD.

At 13:40 p.m. train No. 30114 departed from Karlovo station to Mirkovo station. The train consisted of 2 coaches, 8 axles, 94 tons with locomotive No. 91520044138-3.

At 14:36 p.m. train No. 30114 arrived at Koprivshitsa station 2 minutes late. The train was received on the second acceptance-departure track by the dispatching interlock rail system TRIS.

At 14:44 p.m. FT No. 3623 arrived at Koprivshitsa station with 12 minutes delay. The train was received on the first acceptance-departure track through the dispatching interlock rail system TRIS.

At 14:45 p.m. FT No. 3623 left for Stryama station 8 minutes late.

At 14:48 p.m. train No. 30114 left for Anton station 13 minutes late.

At 14:50 p.m., the locomotive crew of locomotive No. 91520044138-3, serving PT No. 30114, noticed a sweep on the railway track at km 98+200 and activated the automatic train brake in "quick stop" mode. At km 98+349, the locomotive and the two passenger coaches derailed. The locomotive driver notified the train dispatcher and the concerned services and persons on the official mobile phone.

8 passengers were traveling in PT No. 30114, the same were transhipped by buses.

As a result of the derailment, there were no injuries to passengers and staff serving PT No. 30114. Material damage was caused to the rolling stock and the railway infrastructure.

At 15:05 p.m., a senior train dispatcher reported to the national emergency number 112. A plan was drawn up by the CDD to tranship the passengers from PT No. 30116 and FT No. 3625.

At 15:22 p.m., the voltage in the catenary in the interstation was turned off.

At 15:23 p.m., by order of the train dispatcher, the Anton-Koprivshitsa interstation was closed for train traffic. The Anton and Koprivshitsa stations were transferred to RLD.

At 15:33 p.m. on 12/06/2024, the movement of trains in the Anton - Koprivshitsa interstation was restored only for passenger trains with a speed of 5 km/h.

At 16:10 p.m. on 13/06/2024, the Anton-Koprivshitsa interstation was opened for freight traffic.



Fig. 1.1. Image of the derailed PT № 30114



Fig. 1.2. Image of locomotive № 91520044138-3 of PT № 30114

1.2. Location and time of the event occurrence.

The event occurred at km 98+349 between the stations Koprivshitsa and Anton stations at 14:52 p.m. on 11.06.2024. The place of the rail track distortion was after tunnel № 5 in right curve with radius $R=550$ meters and inclination 3,40 ‰ in an uphill from km 98+100 to km 98+308 on the traffic direction, the rail track along the interstation is continuously welded track (fig.1.3).

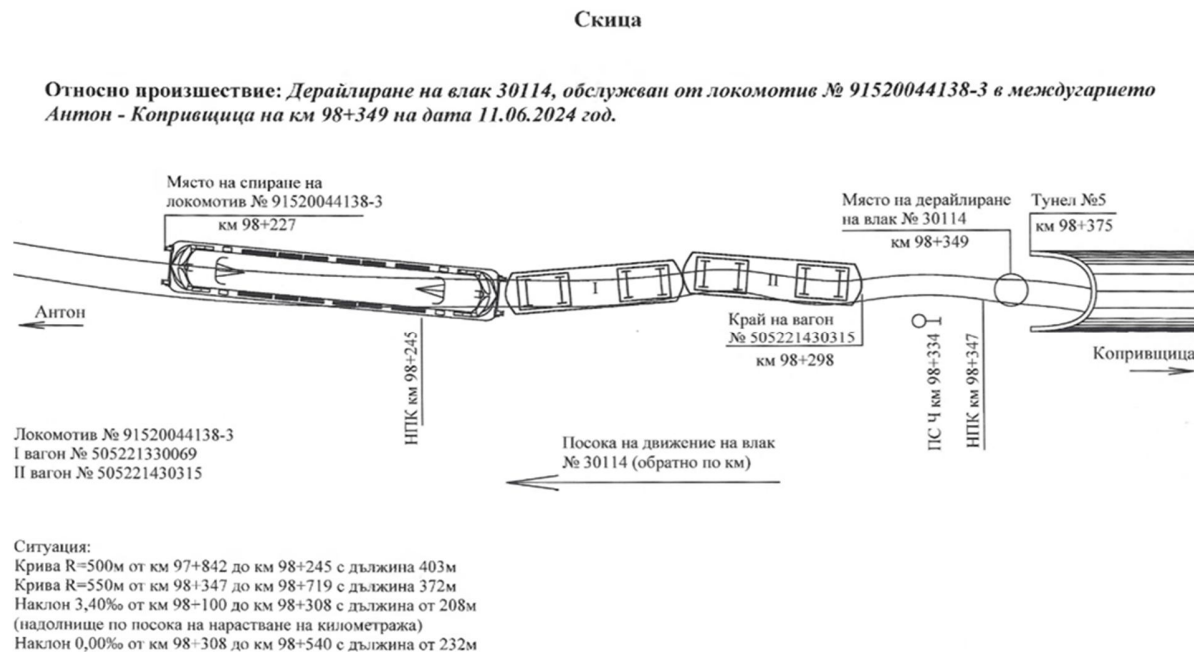


Fig. 1.3. Scheme of the place of derailment of PT № 30114 along Koprivshitsa-Anton interstation

1.3. Factors determining and contributing the event.

A determining factor for the occurrence of the accident was non-observance of the instructions in the norms for replacing sleepers when carrying out medium repairs on a continuously welded track.

A contributing factor to the occurrence of the accident was the replacement of consecutive groups of up to 7 unfit sleepers, non-tamped and non-ballasted. The speed of trains in the repaired section is not limited. The control over the repair and condition of the rail track in the hours of high temperatures is understated.

1.4. Direct causes and consequences of the event.

The direct cause of the accident was the sweeping away of the continuously welded track immediately before the crossing of PT No. 30114.

That led to the derailment of the locomotive and coaches from the composition of PT No. 30114.

1.5. Safety recommendations and addressees to which they are addressed.

In order to prevent other similar accidents, the Chairman of the Investigation Commission proposes to the National Safety Authority (RAEA) safety recommendations related to the SE NRIC and "BDZ Passenger Services" EOOD.

- Recommendation 1, proposes that SE NRIC and BDZ PP EOOD familiarize the interested personnel with the contents of this report;

- Recommendation 2, suggests to the SE NRIC that, when carrying out repair activities in the areas with a non-maintained railway track, the requirements of "Technical norms for the planning, construction and repair of a non-maintained railway track" shall be observed both by the contractors of the repairs and by investors side;

2. Investigation

2.1. Decision for starting the investigation.

Decision to initiate a safety investigation was made by the member of Management Board of the NAMRTAIB in the Republic of Bulgaria, leading the investigation of railway accidents and incidents as per art. 22, paragraph 3 of Directive (EU) 2016/798 of the European Parliament and the Council. Given the severity of the accident and its impact on the railway safety, the investigation was focused on establishing the causes and the analysis, aimed at preventing other accidents of a similar nature at the SE NRIC.

2.2. Motives for the decision to initiate the investigation.

The member of the Management Board of the NAMRTAIB, leading the railway investigation section, took the decision to initiate the investigation based on art. 20, paragraph 2 (a) and (c) of Directive (EU) 2016/798, art. 115к, paragraph 1, item 2 of RTA, and art. 76, par. 1, item 2 of Ordinance No 59 dated 5.12.2006.

The investigation was undertaken considering the sequence of circumstances: replacement of unfit reinforced concrete sleepers, rising air temperature of the rails, which led to the sweeping of the rail track, which was continuously welded track, and the subsequent derailment of passenger train No. 30114, which was running on schedule.

2.3. Scope and restrictions of the investigation.

The scope of the investigation included and analysed the organizational and human factor, the Safety Management System related to the repair and maintenance of the railway infrastructure, including the risk assessment with the registered hazards of the manager of the railway infrastructure, listed in the normative acts.

Restrictions and delays during the investigation were not allowed.

2.4. Competences of the persons, involved in the investigation.

In accordance with the requirements of Art. 22, paragraph 1 of Directive 2016/798, the Safety Investigation Commission is headed by the member of the Management Board of the NAMRTAIB, the head of the railway investigation department. The members of the commission are independent external experts - qualified persons from higher transport educational institutions, experts in the field of human and organizational factors with qualifications in railway infrastructure, railway rolling stock and operation and management of railway transport.

2.5. Communication and consultations with the persons and entities, involved in the event.

The Commission defined the parameters of the investigation and coordinated its actions with the Task force, which included heads of the divisions and transport safety authorities of the two entities (SE NRIC and BDZ PP EOOD) and the railway company TCR JSC, performing MR of the rail track in the interstation. The Task force collected all documents, samples, materials and the written statements of the personnel of the two entities. The safety authorities at TCR JSC presented the required materials to the Chairman of the Commission for Investigation. At the scene of the accident, the Investigation Commission conducted an interview with the locomotive crew of locomotive No. 91520044138-3, which served PT No. 30114, the transport crew of the train (train manager and conductor), the director of the Sofia Railway Section and the traffic manager on duty at Koprivshitsa station. He got acquainted with the testimony of the persons related to the accident. In the course of the investigation, the Commission additionally requested information about the investigation from SE NRIC, BDZ PP EOOD and TCR JSC. An interview was conducted with the transport safety authorities of the entities.

2.6. Degree of cooperation from the participating entities.

During the investigation carried out by the Safety Commission at NAMRTAIB, the management of the railway enterprise BDZ PP EOOD, SE NRIC and TCR JSC provided full assistance and the necessary set of materials and documents concerning the SMS. A contract, order, technology and linear schedule related to the implementation of the MR on the rail track along Koprivshitsa - Anton interstation were provided.

2.7. Methods and techniques of investigation and analysis.

On 11.06.2024 at 14:59 p.m., the member of the Management Board of the NAMRTAIB with the competence to investigate railway accidents received a written notification by SMS on the mobile phone from the central dispatcher on duty at the manager of the railway infrastructure with the text:

"At 14:50 p.m., train 30114 (BDZ PP) with locomotive 44-138, 2 coaches derailed and both coaches at the Koprivshitsa - Anton interstation. The traffic was suspended."

The member of the Management Board of the NAMRTAIB with the competence to investigate railway accidents with external experts arrived at the scene of the accident, occurred at the Koprivshitsa - Anton interstation, around 16:10 p.m. Several inspections were carried out at the place of derailment of PT 30114. Inspections of the rail track were carried out. An on-site interview was conducted with the locomotive crew of the locomotive and the transport crew of PT No. 30114, with the director of the Sofia Railway Section. Inspections were carried out of the stopped PT No. 30114 in the interstation. Upon arrival at the Koprivshitsa station, checks were carried out on the station diaries and books regarding the movement of the train in the direction of the Anton station. An interview was conducted with the shift manager on duty at Koprivshitsa station.

At 18:35 p.m., the member of the Management Board of the NAMRTAIB gave written permission to the head of the Task force from SE NRIC to start emergency restoration works.

After receiving the documents and materials from the Task force, the Investigation Commission at the NAMRTAIB continued the investigation of the accident until a draft final report was prepared.

2.8. Difficulties faced during the investigation

During the time of the Investigation Commission at the NAMRTAIB did not encounter any difficulties. The representatives of the two entities – SE NRIC, BDZ PP EOOD and the Task force assisted the Investigation Commission.

2.9. Interaction with the judicial authorities.

Not applicable.

2.10. Other important information for the investigation context.

Not applicable.

3. Description of the event

3.1. Information on the event and the context.

3.1.1. Description of the event type.

According to an approved protocol dated 27.03.2024 of the Director General of SE NRIC and a telegram dated 28.05.2024 in connection with a request received from the Sofia Railway Section to carry out an urgent mechanized medium repair of the rail track along Anton - Koprivshitsa interstation from km 91+384 to km 99+047 with a length of 7,663 meters. Train and electric "windows" with disconnection of the voltage in the catenary from 03/06/2024 to 28/06/2024 (excluding Saturdays, Sundays and holidays) are permitted on the Sofia Railway Section under the control of the Sofia Energy Section and the Sofia SST, from 05 :15 a.m. to 08:45 a.m.

Pursuant to the telegram of the Director General of SE NRIC on 11.06.2024 at 05:33 a.m., by order of the train dispatcher, a train and electric "window" was allowed to carry out MR along the Koprivshitsa - Anton interstation, with vehicles leaving the station Koprivshitsa to km 95+300 and return to Koprivshitsa station by 08:45 a.m.

At 08:47 a.m. in the dispatcher's order log at Koprivshitsa station, there was an entry by the technical manager of TCR JSC that the work has been completed, the rail track was straightened, the movement of trains was according to the schedule with a reduction in the speed of movement to 25 km/h from km 95+400 to km 97+400.

At 08:53 a.m., by order of the train dispatcher, the Koprivshitsa - Anton interstation was opened for the movement of all trains and vehicles.

From 12:30 p.m. to 13:20 p.m., by order of the train dispatcher, the movement of trains in the Koprivshitsa - Anton interstation was stopped for work on the catenary with SPSRM No. 995294630018.

At 13:21 p.m., by order of the train dispatcher, traffic in the interstation was restored for regular trains and the Anton and Koprivshitsa stations were transferred to the CDD.

In the Karlovo station on the second track is composed PT No. 30114.

At 1:35 p.m., a technical inspection and sample A of PT No. 30114 was performed.

At 13:40 p.m. train No. 30114 departed from Karlovo station to Mirkovo station. The train consisted of 2 coaches, No. 50522133006-9 and No. 50522143031-5, 8 axles, 94 tons with locomotive No. 91520044138-3. In the section from Karlovo station to Koprivshitsa station, the train run on time according to a telegram dated 28.05.2024 for amending the schedule of train No. 30114.

At 14:36 p.m. train No. 30114 arrived at Koprivshitsa station 2 minutes late. The train was received on the second acceptance-departure track by dispatching interlock system TRIS.

At 14:44 FT No. 3623 arrived at Koprivshitsa station 12 minutes late. The train was received on the first acceptance-departure track by the dispatching interlock system TRIS.

At 14:44 p.m., the train dispatcher through TRIS dispatching interlock system at Koprivshitsa station opened an exit signal for FT No. 3623 and an exit signal for FT No. 30114.

At 14:45 FT No. 3623 departed for Stryama station 8 minutes late.

At 14:48 p.m. PT No. 30114 left for Anton station 13 minutes late.

At 14:50 p.m., the locomotive driver of locomotive No. 91520044138-3, serving PT No. 30114, noticed at km 98+200 a strong sweep of the railway track and activated the automatic train brake in the "quick stop" mode. At km 98+349, derailed the train locomotive with three wheelsets (fig. 3.1), the first coach with the two wheelsets on the second bogie and the second coach with all wheelsets (fig. 3.2).

The locomotive driver sent a signal to the train dispatcher on duty on the service mobile phone.

There were 8 passengers traveling in PT No. 30114. By order of the Sofia passenger transport dispatcher, the head of the train and the conductor together with the passengers moved to the Koprivshitsa station on foot due to the impossibility of access by public transportation. Passengers were taken by bus from Koprivshitsa station.

At 15:05 p.m., a senior train dispatcher called the national emergency number 112.



Fig. 3.1.



Fig. 3.2.

At 15:10 p.m., after permission from RITS Sofia, the senior train dispatcher issued an order for the rehabilitation means to depart from the Sofia and Mezdra stations to the accident site.

At 15:22 p.m., the voltage in the catenary in the interstation was turned off.

At 15:23 p.m., by order of the train dispatcher, the movement of trains at the Anton-Koprivshitsa interstation was stopped. The Anton and Koprivshitsa stations were transferred to RLD.

At 18:35 p.m., the director of TOSAMD Sofia, who is the head of the Task force, after agreeing with the chairman of the Investigation Commission, issued a permit to start emergency restoration works.

At 18:40 p.m., a UNIMOG recovery vehicle was dispatched from Anton station to lift the derailed train.

At 21:30 p.m., a diesel locomotive No. 98520055209-1 was sent from Koprivshitsa station, on which the mobile hydraulic system of UNIMOG was loaded due to the impossibility of UNIMOG getting on the tracks at Koprivshitsa station.

At 21:30 p.m., locomotive No. 92520044138-3 of PV No. 30114 was lifted onto the rails.

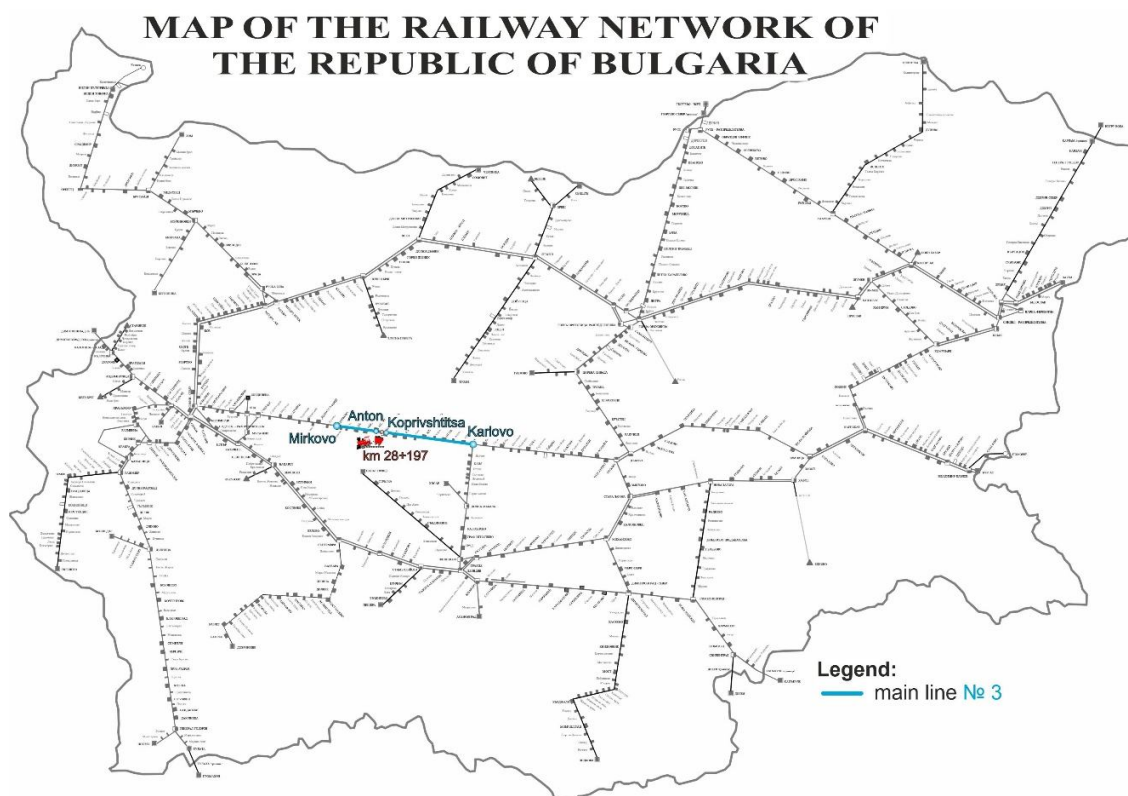


Fig. 3.4. Layout of the place of the accident along the rail network

3.1.3. Description of the place of event:

3.1.3.1. Location of the accident place (fig. 3.5).

Geographic width: 42°42'18.86"N

Geographic length: 24°19'23.86"E

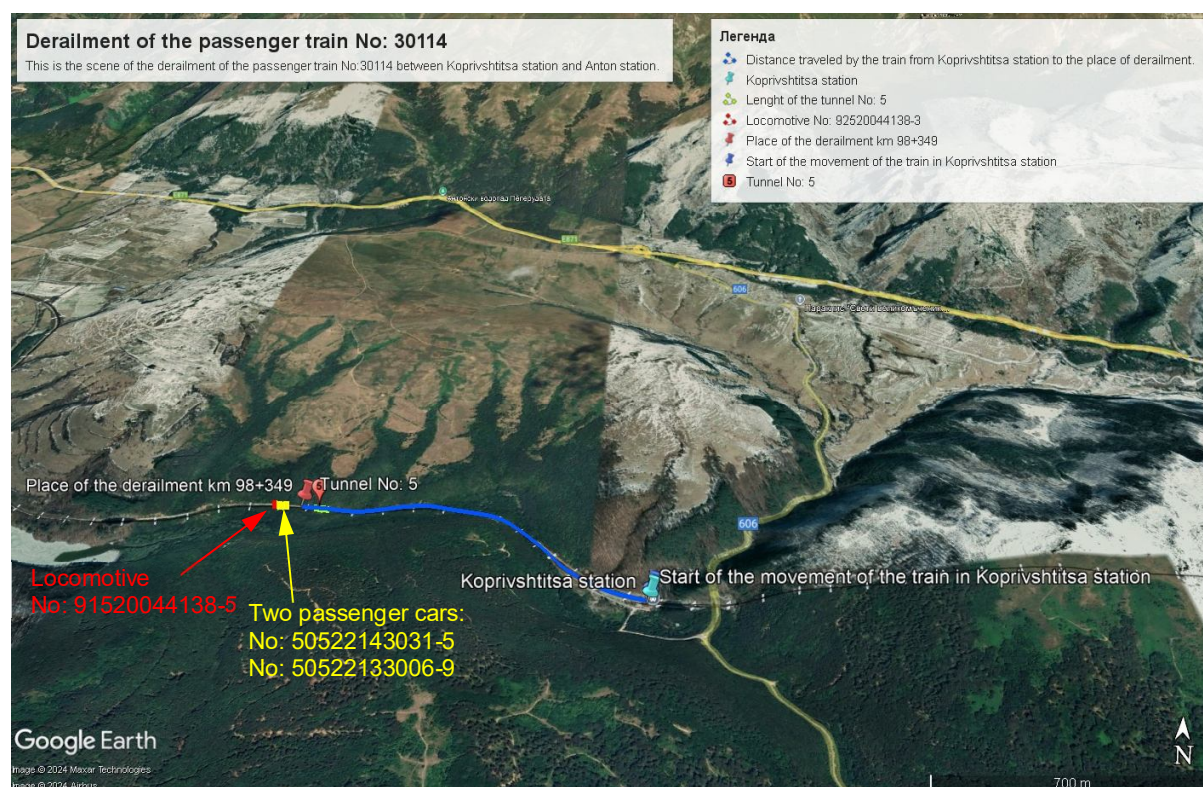


Fig. 3.5. GPS location of the accident along the interstation Koprivshitsa-Anton

3.1.3.2. Meteorological and geographical condition at the time of the event on 06.06.2024.

- In the light part of the day at 14:52 p.m. (under data of the speedometer of the locomotive of PT № 30114);
- Air temperature: 38°C;
- Weather – clear, sunny and hot;
- Wind – no;
- Average relative humidity – 30%;

3.1.3.3. Performance of construction activities on the site or in vicinity.

In accordance with a telegram from the Director General of SE NRIC to carry out MRW on 11.06.2024, by order of the train dispatcher from 05:33 a.m., a train and electric "window" was allowed to carry out MRW under the investor control of the Sofia railway section in the interstation Koprivshitsa - Anton. Screening of the ballast prism from km 96+790 to km 97+000=210 meters was carried out, 22 unfit sleepers from km 98+200 to km 98+350 were replaced, specified by the investor of the site, incl. 7 sleepers at km 98+349 were successively replaced. The repair of the railway track was completed at 08:45 a.m., and in the dispatcher's order log at Koprivshitsa station it was recorded by the relevant officials that the railway track was within norms and the movement of trains could be restored.

3.1.3.4. Fatalities, injuries and material damages:

- *Employees of the railway infrastructure manager or railway undertaking.*
None
- *Other persons officially connected with the location of the event.*
None
- *Passengers.*
None
- *External persons.*
None
- *Cargo, luggage or other property.*
None.

3.1.3.5. Rolling stock, infrastructure and environment.

- Material damages of locomotive № 91520044138-3 amounting to 2790,86 BGN.;
- Material damages of coach № 50522133006-9 B4 amounting to 7158,32 BGN.;
- Material damages of coach № 50522143031-5 B4 amounting to 15862,32 BGN.;
- Material damages, caused to the rail track amounting to 22 216,14 BGN.;
- Material damages, caused to the catenary – none;
- Material damages, caused to the signalling equipment amounting to 2943.23 BGN.;
- Material damages were not caused to the environment;
- Total costs: **50 970,87 BGN.**

3.1.4. Description of other consequences, including the event impact on the usual activity of the participants.

In the period from 14:50 p.m. on 11.06.2024 until 18:10 p.m. on 13/06/2024, the manager of the railway infrastructure and the railway enterprises have generated additional costs for changing the timetable for the movement of trains and the capacity in the section.

- Deviated trains of the railway undertakings – none;
- Cancelled passenger trains – 12 – 942,06 BGN.;
- Cancelled freight trains – 42 – 4495,11 BGN.;
- Appointed trains of the railway undertakings – none;
- Delayed passenger trains – 18 – 4742,50 BGN.;
- Delayed freight trains – 9 – 14938,00 BGN.;

Interlocking

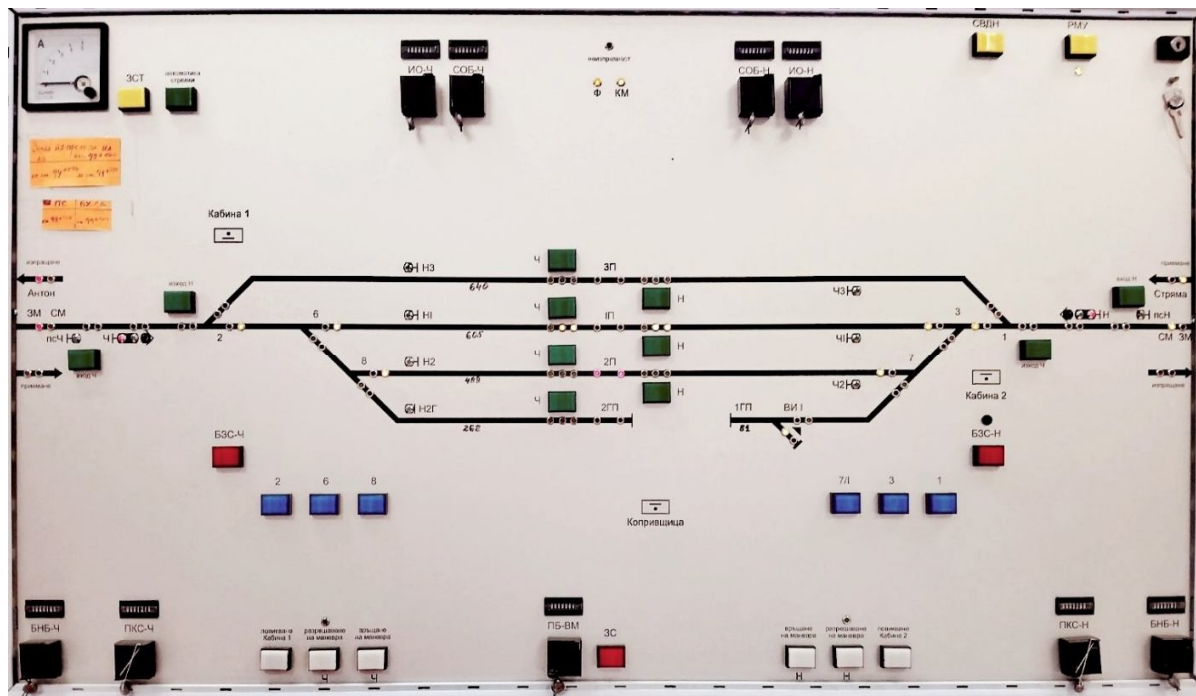


Fig. 3.8. Control panel in Koprivshitsa station RRI-Russian with small stations.

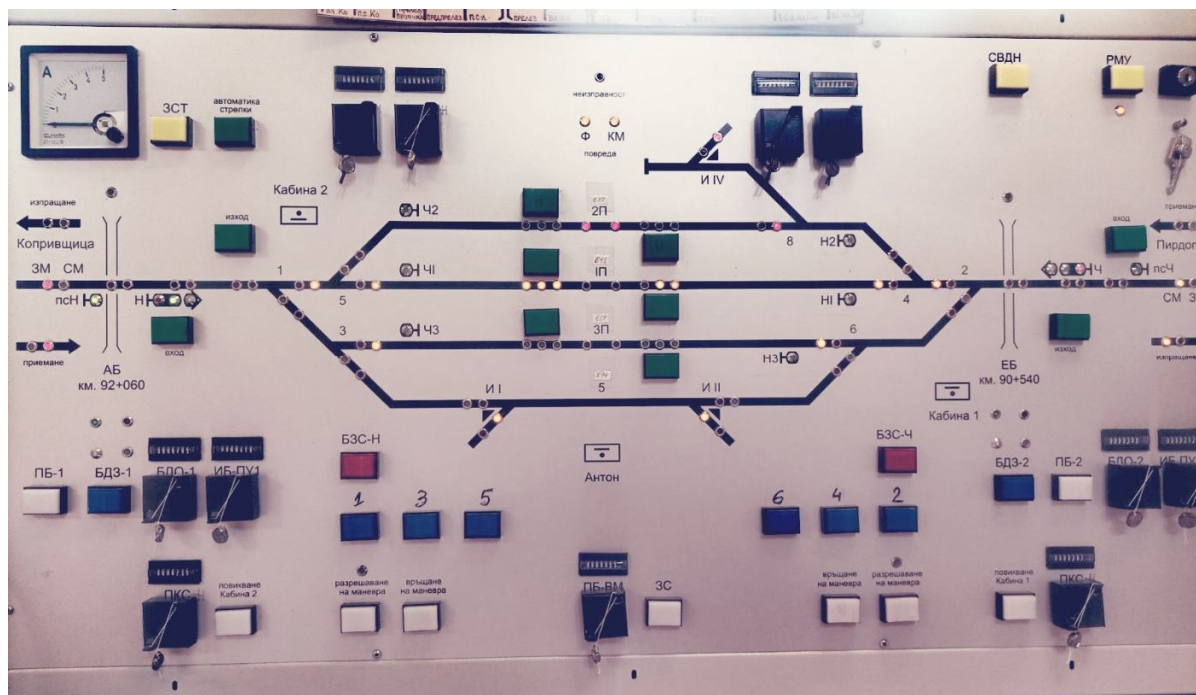


Fig. 3.9. Control panel in Anton station RRI-Russian with small stations.

Type of signalling



Fig. 3.10. Entrance signal along the speed signaling.

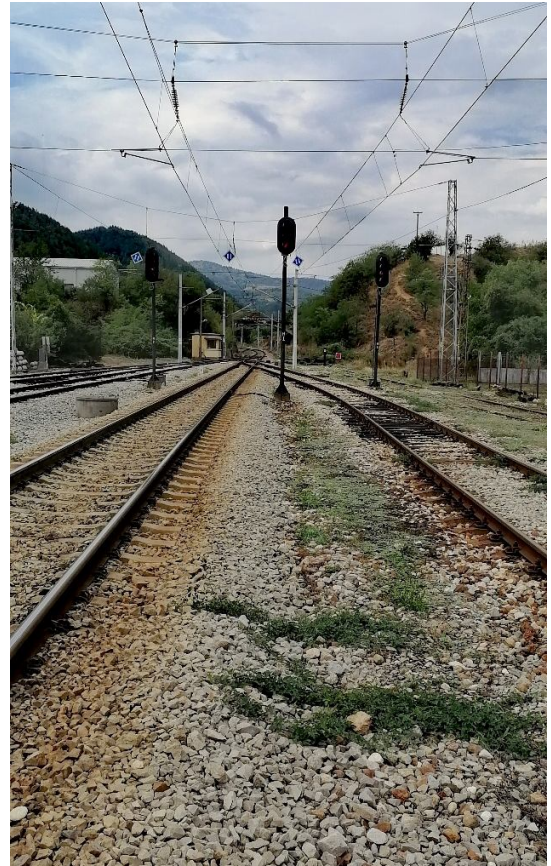


Fig. 3.11. Exit signal along the speed signaling.

3.1.6.3. Train protection systems.

Koprivshtitsa - Anton stations do not have train protection systems. The stations in the section are equipped with a train dispatch radio link (TRD), with the help of which direct radio connections are made between the locomotive driver and the traffic manager on duty, with the train dispatcher, with individual stations and the trains in the relevant railway section - serviceable.

Locomotive No. 91520044138-3, serving PT No. 30114, is equipped with a vigilance device and tape tachograph type "Hasler RT9" and tachometer type "Hasler A16" - serviceable.

Locomotive No. 91520044138-3 is equipped with TDRC

3.1.7. Other information referring the event.

3.1.7.1. Train documents of PT № 30114.

Fig. 3.12. Way-bill of locomotive № 91520044138-3 of PT № 30114 – front part

Fig. 3.13. Way-bill of locomotive № 91520044138-3 of PT № 30114 – rear part

ПРИДРУЖИТЕЛЕН ЛИСТ НА ВЛАК № 30114

Презован: 5411 00-Е00А
 на-ана гара: КАРИВВО
 Дата: 11.06.2024
 Час на тръгване: 13.50

Крайна гара: Мирково
 Дата: 11.06.2024
 Час на пристигане: 15.50

Гари и станции	Прекъсване		Трайка	Забележки	Послой и полове и др. работи	Състав и тежест на влака					Средна скорост	Използвана мащабирана мащабирана	
	час	мин				час	мин	вагон	вагон	вагон			вагон
КАРИВВО	13	50	13	50		2	8	82	12	94	76	71	134
СВЛАТ	13	56	13	56									
ХРИСТО ДИМИТРОВ	13	57	13	57									
КРИСУРА	14	07	14	07									
КОПРИВАНИЦА	14	34	14	34									
КМ 98 4500	14	30	14	30									

1. Състояние на спирачката на локомотива/вагона: нормално
 2. Поставено подравнение на напрежение: ДА
 3. Часовици счестени: КАРИВВО Дек. р-т: КАРИВВО Н-к влак: КАРИВВО Мащ: КАРИВВО
 Дата: 11.06.2024 Час: 13.50
 Дата: 11.06.2024 Час: 13.50
 Дата: 11.06.2024 Час: 13.50
 Дата: 11.06.2024 Час: 13.50

Важно: КАРИВВО

Fig. 3.14. Accompanying sheet of PT №30114 – front part

СЪСТАВ НА ВЛАКОВАТА БРИГАДА

Локомотив: КАРИВВО Машина: КАРИВВО Поставено: КАРИВВО Работи по: КАРИВВО
 44-138 Георги Димитров Иван Стойков К. К. К. К.
КАРИВВО КАРИВВО КАРИВВО

Друг персонал, обслужващ влака:
 Име, равненик, длъжност: КАРИВВО Структура: КАРИВВО Моб. телефон: КАРИВВО Име, равненик, длъжност: КАРИВВО Моб. телефон: КАРИВВО

СЪСТАВ НА ВЛАКА

Видет	Код от 100	Видет		Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	Скорост	
		Скорост	Скорост															
КАРИВВО	13	50	52	У	А	67	41	Е	47	26	13	50	52	У	А	67	41	Е
КАРИВВО	13	50	52	У	А	67	41	Е	47	26	13	50	52	У	А	67	41	Е
КАРИВВО	13	50	52	У	А	67	41	Е	47	26	13	50	52	У	А	67	41	Е

Санитарно-хигиенно състояние: КАРИВВО
 Кратко описание: КАРИВВО
 Према: КАРИВВО Према: КАРИВВО

Fig. 3.15. Accompanying sheet of PT №30114 – rear part

УДОСТОВЕРЕНИЕ ЗА СПИРАЧНАТА МАСА

Гара: КАРИВВО
 Дата: 11.06.2024
 Влак №: 30114

Маса на влака: 94 t
 Спирачен процент: 70 %
 Необходима спирачна маса: 94 t

Mg	R	P	G	Спирачна маса, t	Оси, бр.	Спирачна маса, t	Оси, бр.	Забележка
Начална/Остатъчна маса/оси	134	8						
Допълнителна маса/оси								
Всичко: налична спир. маса/оси	134	8						

Неплътност на локомотива: 0.1 bar/min
 Неплътност на влака: 0.2 bar/min (band 5 min)
 Влака натегнат/поставен: КАРИВВО
 Дежурен ръководител движение: КАРИВВО Извършил проба на спирачките: КАРИВВО

Забележки: Неуспоредно се зачертава
 *Автоматична влакова спирачка
 **Ръчна спирачка

39

Fig. Brake mass certificate of PT № 30114 – front part

3.2. Factual description of the occurred.

3.2.1. Immediate sequence of events that led to the accident, including:

3.2.1.1. Actions that the involved in the event persons undertook.

At 05:30 a.m. at the Koprivshitsa station, the technical manager of TCR JSC entered in the dispatcher's order log a request for permission for a train and electric "window" to carry out MRW with a track repair column (TRC) in the Koprivshitsa - Anton interstation;

At 05:33 a.m., by order of the train dispatcher at the Sofia railway section, the movement of trains at the Koprivshitsa - Anton interstation was suspended, a train and electric "window" was allowed to perform MRW at the interstation;

At 05:38 a.m. an Order No. II-A was issued for the movement of TRC under special conditions up to kilometre 95+000 in the Koprivshitsa - Anton interstation;

At 08:46 a.m. after completion of work, TRC was accepted on the third track at Koprivshitsa station. At 08:47 a.m. in the dispatcher's order log at Koprivshitsa station, the technical manager of TCR JSC wrote that the work was complete, the rail track was straightened, the gauge was open, the movement of trains in the intermediate station from km 95+400 to km 97+400 was at a speed of up to 25 km/h;

At 08:53 a.m., by order of the train dispatcher at the Sofia Railway Traffic Management Unit, the Koprivshitsa - Anton interstation was opened for the train traffic and the Koprivshitsa station crossed over to CDM;

At 10:55 a.m. in the dispatcher's order log at the Koprivshitsa station, the technical manager of TCR JSC requested permission for a train and electrical "window" to work on the catenary up to km 97+000 between the Koprivshitsa - Anton station;

From 12:30 p.m. to 13:20 p.m. by order of the train dispatcher at the Sofia Railway Station, the Koprivshitsa - Anton interstation was closed to train traffic for work on the catenary with SPSRM-99529463001-8;

At 12:35 p.m., RSSM-99529463001-8 departs from the second track of Koprivshitsa station for work up to kilometer 97+000;

At 13:15 p.m. after completion of work, SPSRM -99529463001-8 was accepted on the second track at Koprivshitsa station;

At 13:21 p.m., by order of the train dispatcher at the Sofia Railway Station, the interstation was opened for train traffic and the Anton and Koprivshitsa stations were transferred to CDD;

In the time period from 08:53 a.m. ÷ 14:50 p.m., the following trains passed through the Anton - Koprivshitsa interstation:

- FT No. 3621, 3620, 3692 and 3623;
- PT Nos. 30121 and 30122;
- DFT No. 30570, 30624, 30602, 30626, 30623 and 30620;

At 14:50 p.m. at km 98+349 in the Koprivshitsa - Anton interstation, the train locomotive and the two coaches of PT No. 30114 derailed;

At 14:55 p.m., after an inspection by the locomotive crew of locomotive No. 91520044138-3 serving PT No. 30114, the locomotive driver sent a signal to the train dispatcher on duty at TOU Sofia on the official mobile phone;

At 14:58 p.m., the senior train dispatcher on duty at TOU Sofia, after realizing that there were no injured passengers and staff, notified the senior dispatcher at CDD about the accident;

At 15:05 p.m., the senior train dispatcher at TOU Sofia sent a signal to the national emergency number 112;

Dispatchers in CDM created an organization for transshipment of passengers from PT No. 30116 and BV No. 3625;

At 15:10 p.m., the senior train dispatcher at the Sofia Railway Section issued an order for the departure of the recovery vehicles from Sofia station and Mezdra station to the scene of the accident;

At 15:22 p.m., the energy dispatcher notified the train dispatcher at the Sofia railway station that the voltage in the catenary in the interstation was off;

At 15:23 p.m., by order of the train dispatcher at the Sofia railway section, the Anton-Koprivshitsa interstation was closed and the Anton and Koprivshitsa stations were transferred to RLD;

At 15:25 p.m., the dispatcher of passenger transport ordered the conductor together with the passengers from PT 30114 to move to the Koprivshitsa station on foot due to the inaccessible area for public transport;

At 18:28 p.m., a work train with recovery materials to assist recovery activities departed from the second track at Koprivshitsa station;

At 18:35 p.m., the head of the Task force on site issued permission to start emergency recovery activities.

3.2.1.2. Rolling stock and technical facilities functioning.

Up to the time of the accident, locomotive No. 91520044138-3, serving train No. 30114 and coaches No. 50522133006-9 B4 and No. 50522143031-5 B4 were technically sound. The locomotive and the coaches are regularly registered in the European Vehicle Register (EVR).

3.2.1.3. Operational system functioning.

The operational TRIS&STS train traffic management system between Koprivshitsa and Anton stations before and after the accident was functional and normally operating. The train traffic was suspended daily between 05:15 a.m. and 08:45 a.m. due to Mechanized Medium Repair of the railway track. The train traffic between Koprivshitsa and Anton stations was carried out on a single-track railway line.

After the occurrence of the accident, the TRIS&STS operational system for managing the train traffic between Koprivshitsa and Anton has not been functioning since 14:50 p.m. on 11.06.2024 until 04:33 a.m. on 12.06.2024.

3.2.2. Sequence of the events from the beginning of the occurrence until the end of the rescue services actions:

3.2.2.1. Undertaken measures for protecting and guarding the event location.

Not applicable.

3.2.2.2. Actions of the emergency rescue services.

Not applicable.

3.2.2.3. Actions of the emergency rehabilitation services

At 15:10 p.m., the senior train dispatcher at the Sofia TOU issued an order for the departure of the UNIMOG recovery vehicles from Sofia station and Mezdra station to the scene of the accident;

At 15:22 p.m., an energy dispatcher at the Sofia TOU submitted a notification of a switched off voltage in the catenary in the interstation;

At 15:23 p.m., by order of the train dispatcher at the Sofia TOU, the Anton-Koprivshitsa interstation was closed to train traffic. The Anton and Koprivshitsa stations pass to RRM;

At 18:35 p.m., the head of the Task force on site issued permission to start emergency recovery activities;

At 18:40 p.m., an UNIMOG recovery vehicle departed from Anton station for the interstation on rails to lift the derailed train;

At 21:30 p.m., a diesel locomotive No. 98520055209-1 was sent from Koprivshitsa station, on which a mobile hydraulic system of UNIMOG was loaded at Koprivshitsa station;

At 21:30 p.m., locomotive No. 92520044138-3 was lifted onto the rail track;

At 23:40 p.m., coach No. 505221430315 was lifted onto the rail track;

At 02:00 a.m., coach No. 505221330069 was lifted onto the rail track;

At 03:55 a.m. the composition of PT No. 30114 was moved to the Anton station;

At 04:33 a.m. on 12/06/2024, the traffic between Anton and Koprivshitsa stations was restored only for passenger trains from km 98+200 to km 98+375 = 175 m at a speed of 5 km/h;

At 18:10 p.m. on 13/06/2024, the Anton-Koprivshitsa interstation was also opened for freight traffic.

3.2.2.4.Actions that SE NRIC and BDZ PP EOOD undertook for recovering the schedule and capacity along the railway line

On 11.06.2024, at around 18:35 p.m., after the completion of the inspections by the Safety Investigation Commission at NAMRTAIB in the Anton - Koprivshitsa interstation, written permission was given to the head of the Task force to undertake emergency recovery actions and restore the schedule and the capacity of the railway line;

At 03:55 a.m., train No. 30114 from the interstation was moved to Anton station;

At 04:33 a.m. on 12/06/2024, by order of the train dispatcher at TOU Sofia, the traffic between Anton and Koprivshitsa stations was restored only for passenger trains;

At 18:10 p.m. on 13/06/2024, by order of the train dispatcher at the Sofia TOU, the Anton-Koprivshitsa interstation was also opened for freight traffic.

4. Analysis of the event

4.1. Participation and responsibilities of the entities, involved in the event

4.1.1. Railway undertaking.

Analysis of the movement of PT № 30114.

The analysis of the train movement was made for the section of movement in which it was served from its departure from the Karlovo station, emphasizing its movement from its departure from the Koprivshtitsa station until its derailment at km 98+349.

The decryption was made on the basis of the data recorded on the speedometer tape of locomotive No. 91520044138-3, at the head of PT No. 30114 on 14.06.2024.

The registration of the main and most important parameters of the movement of the locomotive, respectively of the train, in speedometer installations "Hasler" system was done by recording on the speedometer control tape:

- Track speed (V-S);
- Astronomical time by graphing and printing on the tape, as well as travel and stay time (T chart);
- Distance travelled for individual track sections (through perforations on the tape – 2.5 mm = 0.5 km);

The following additional parameters can also be registered on the speedometer tape of RT9 type devices (such as those on locomotive no. 91520044138-3):

- Pressure in the main air duct;
- Direction of movement;
- Turning on the rheostat brake;
- Activation of the automatic brake (pneumatic registration);

The speedometer tape is checked to determine:

- Has the prescribed maximum speed of the train been observed;
- Is the speed limited to the prescribed speed when crossing a section that must be crossed at a limited speed;
- Is the duration of reduced speed movement respected, i.e. to travel a distance equal to the length of the reduction plus the length of the entire train;
- Are there any unplanned stops on the intermediate station;
- Are there any slippages of the locomotive;
- Has a pressure drop been registered in the main air brake duct when performing the various tests;
- How the train's automatic air brake was used and how the rheostat brake was used;
- Availability of additional registrations in accordance with those provided for each series of TRS (traction rolling stock);
- Availability of all records for the relevant TRS.

The speedometer control tapes can also be used for other clarifications in the movement of trains, namely:

- Delays in departure and arrival;
- Stopping in front of closed signals and in stations;
- When calculating energy consumption, etc.

Speedometer control tapes are considered a valuable objective document in the investigation of transport safety accidents and railway accidents.

Any falsification of the speedometer tape, intentional destruction or deliberate impact of the clock or recording mechanism is considered a transportation safety violation.



Fig. 4.1. Tape tachograph



Fig. 4.2. Tachometer

Locomotive No. 91520044138-3 is equipped with a "Hasler" type speedometer installation consisting of a three-phase alternating current collector converter (geber) driven by one of the locomotive's wheelsets. The resulting three-phase voltage with a variable frequency depending on the speed of movement drives the mechanical speedometer synchronous electric motors mounted on it. One speed measuring device is installed in each of the locomotive cabins: the recording device (tape tachograph) RT9 in cabin No. 1 (fig. 4.1) and the non-recording device (tachometer) A16 in cabin No. 2 (fig. 4.2). The two speedometers have a range of 0÷150 km/h.

The tape tachograph measures and indicates on a well-defined dial the following data during the movement of the locomotive:

- Track speed in km/h;
- The time in hours and minutes;
- The whole passed section in km (odometer);

The tachometer measures and displays on a clear dial the same data that the tape tachograph displays, without the distance travelled and without recording the information. It is electrically connected to the tachograph, and if the power cable is interrupted, the two devices stop recording the speed of movement.

The recording equipment of the RT9 tachograph records the following basic parameters:

- Track speed in km/h;
- Astronomic time as for the travelling time as well as for the stay time;
- The passed track for separate track sections;
- Other parameters for the locomotive movement.

The recording (speedometer) tape is made of waxed paper. It has linear fields for recording the information transmitted by the tape tachograph (Fig. 3). The speedometer tape is a valuable objective source of data for the precise determination of the beginning, course and end of movement-related processes.

On the speedometer tape are registered:

- The track speed in km/h;
- Astronomic time;
- Travelling time;

- Staying time;
- The passed track for separate track sections;
- The air pressure in the main air duct (MAD);
- Other data (non obligatory)

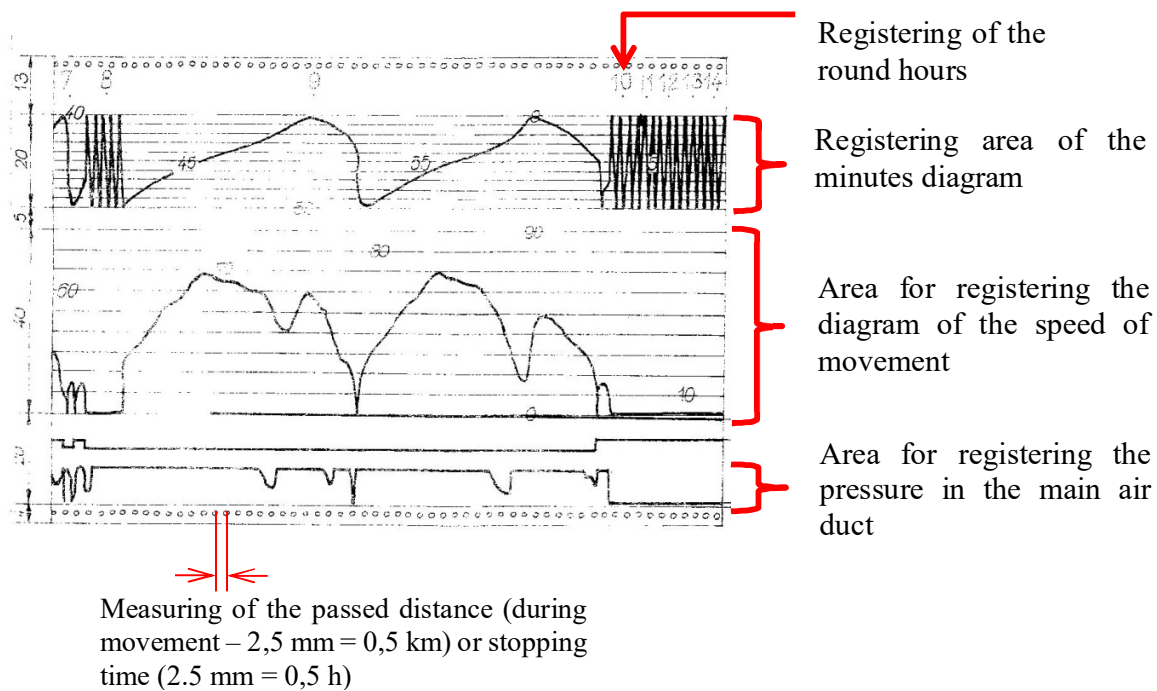


Fig. 4.3.

Help lines are placed on the graph, facilitating the analysis. The values of the individual parameters (travel speed, time and pressure of the air in the main air duct) have been reported against the actual zero position of the respective squeals, since a certain shift is observed with respect to the original reference lines drawn on the speedometer tape (Fig. 4.4)

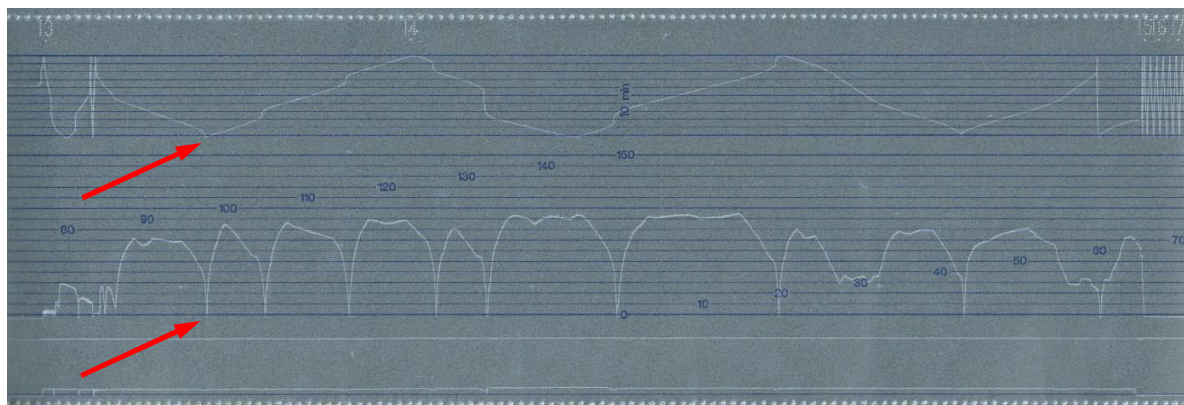


Fig. 4.4.

After making several shunting movements and performing sample D (fig. 4.5, item 1), train No. 30114 departed from Karlovo station at 13:42:50 p.m. (fig. 4.5, item 2), accelerated to a speed of 31 km/h (fig. 4.5, pos. 3), then held with the automatic train brake, reducing the pressure by about 1.0 bar to 4.0 bar and immediately released the brake, restoring the pressure to 5.0 bar, as a result of which the speed decreased to 0 km/h and at 13:44 p.m. the train stopped after traveling about 300 meters (Fig. 4.5, item 4). Almost immediately, the speed began to increase again, reaching 30 km/h, and again immediately after that it began to decrease, that time without applying the train brake, which was why the line of decreasing speed was less inclined to the horizontal (Fig. 4.5, item 5). The speed of movement decreased to 10 km/h, after which an acceleration was observed, as a result of which its value reached 76 km/h and with some reduction to 70 km/h it was maintained between 72 and 76 km/h for the biggest part of the traffic along the Karlovo - Sopot interstation.

From Karlovo station to Koprivshitsa station, the locomotive driver of PT 30114 observed the speeds for movement according to the schedule and the reductions on the rail track.

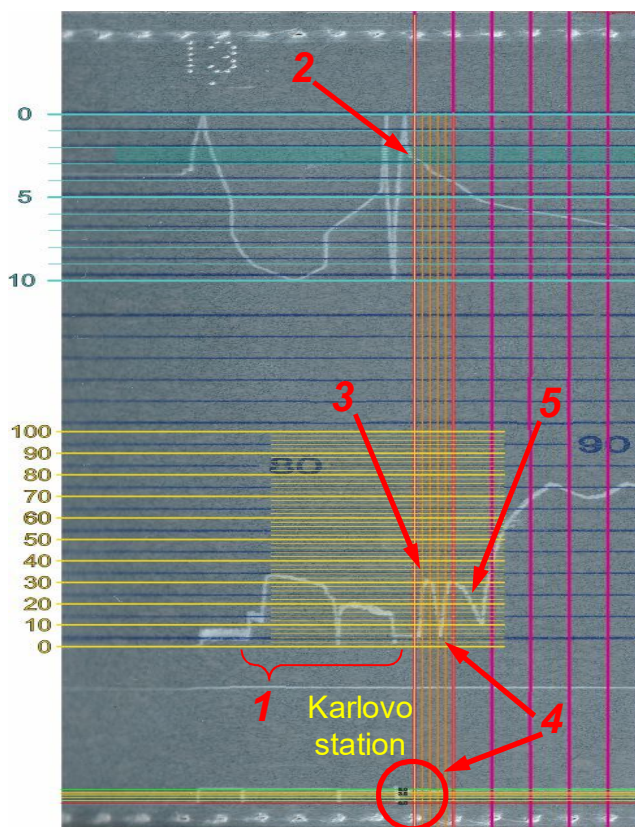


Fig. 4.5.

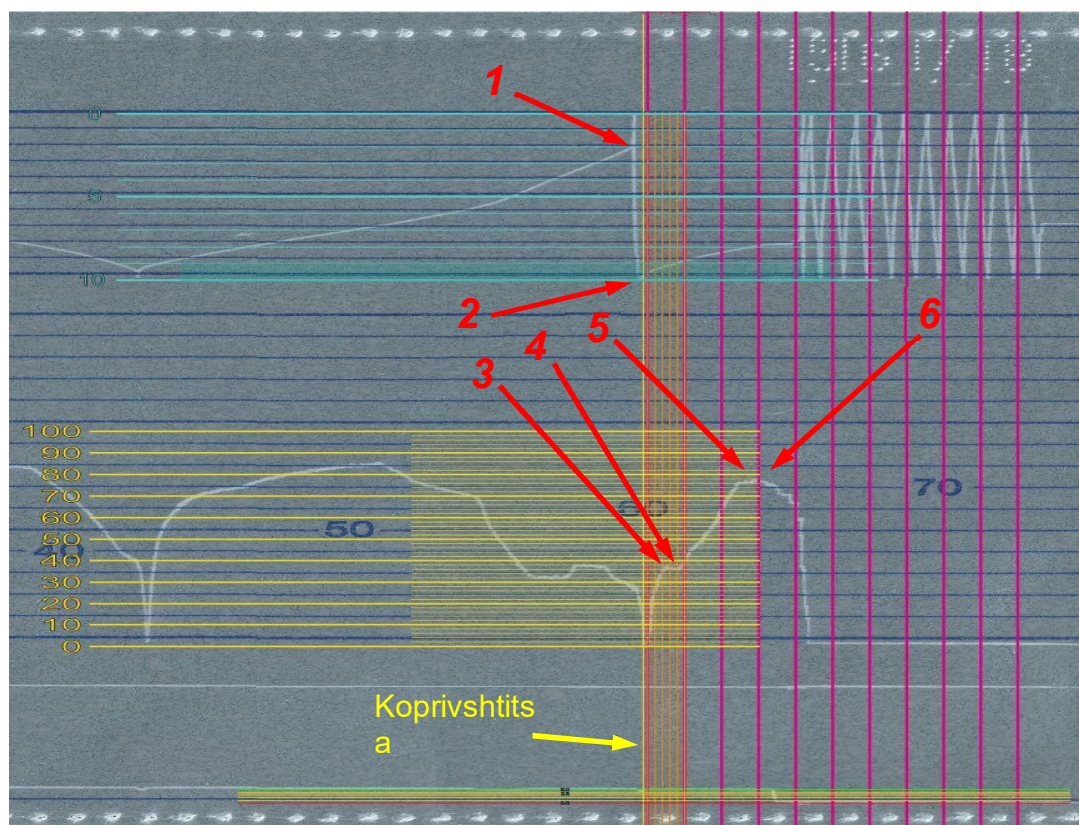


Fig. 4.6.

Train No. 30114 arrived at Koprivshitsa station at 14:38 p.m. (Fig. 4.6, item 1) and stayed at the station until 14:50 p.m. for 12 minutes to meet train No. 3623. Train No. 30114 departed from Koprivshitsa station at 14:50 p.m. (Fig. 4.6, pos. 2), accelerated to about 37 km/h for about 55 seconds, traveling about 250 meters (Fig. 4.6, pos. 3), after which the speed decreased to 36 km/h for about 150 meters (Fig. 4.6, pos. 4) and started to increase again. The speed of train No. 30114 increased and reached its maximum value of 77 km/h 2 minutes after the departure from Koprivshitsa station, it was traveling about 1500 meters (fig. 4.6, item 5). From that moment on, the speed started to decrease gradually, reaching a value of 74 km/h in about 200 meters (Fig. 4.6, item 6).

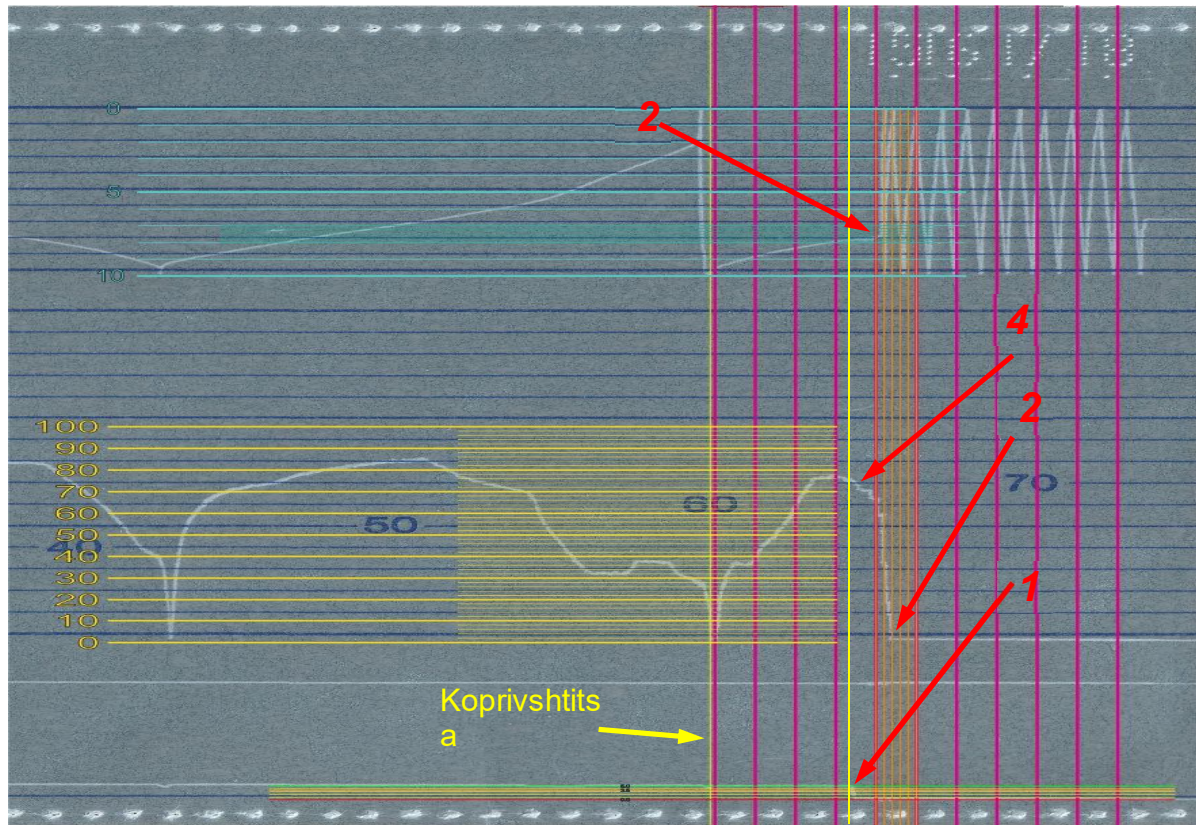


Fig. 4.7.

At 14:52:10 p.m., the engine driver initiated a *rapid arrest* with the automatic train brake, reducing the pressure in the main air duct to 0.0 bar (Fig. 4.7, item 1). The speed of movement quickly decreased to 0 km/h and at 14:52:30 p.m. the train stopped (Fig. 4.7, pos. 2), having travelled 2200 meters from its departure from Koprivshitsa station (Fig. 4.7, pos. 3).

During the analysis of the movement of train No. 30114, it was established that from the moment of activation of the automatic train brake, the speed graph periodically changed stepwise. This is a clear sign that at that moment the locomotive has derailed, and due to the impacts on the sleepers and other elements of the rail track, the graph got that look (Fig. 4.8, item 1). The locomotive derailed at a speed of 74 km/h (fig. 4.7, pos. 4, fig. 4.8, pos. 2). Also, the derailment of the locomotive and the resulting vibrations caused the screeds to jump and the readings of the recording device in terms of distance travelled and time did not strictly correspond to the actual ones, which in that case recorded a longer distance than that actually travelled.

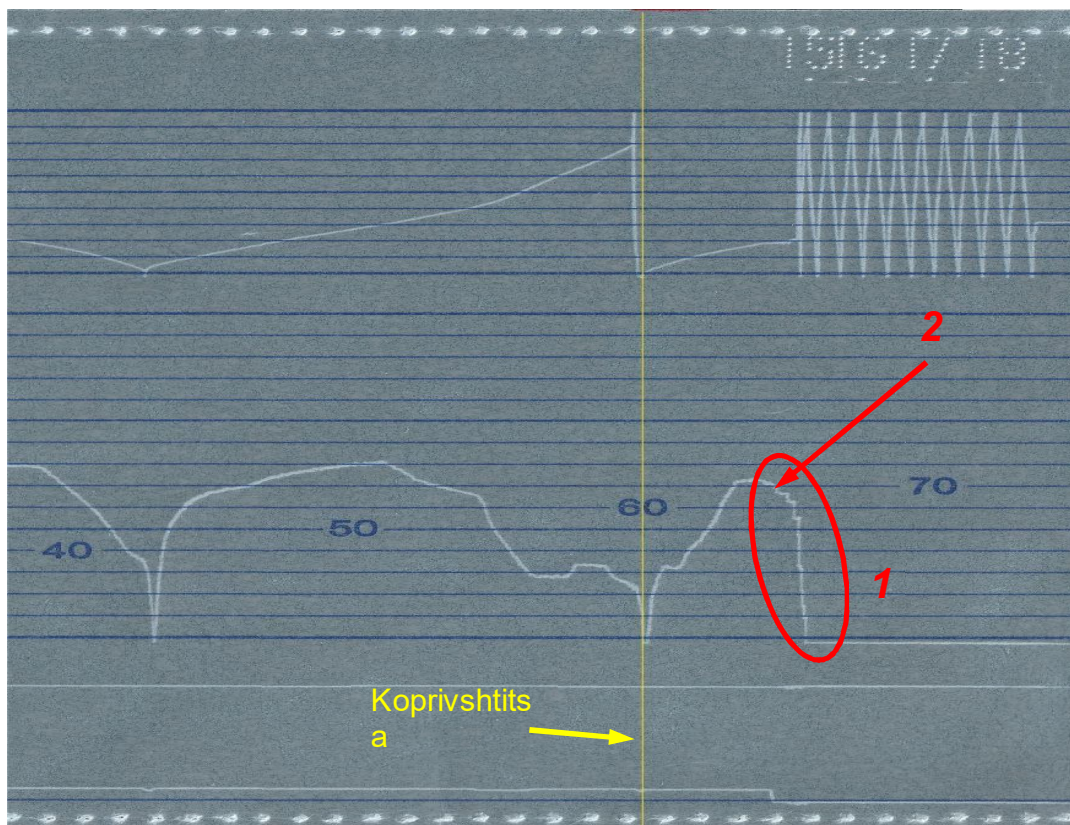


Fig. 4.8.

Infrastructure manager.

Analysis of the railway infrastructure condition

On 11.06.2024, a window was given from 05:33 a.m. to 08:45 a.m. to carry out medium repairs of the continuously welded track in the Anton station - Koprivshitsa station interstation. In parallel with the work of the screening machine, around km 96+900, replacement of unfit reinforced concrete sleepers was being carried out in a section of the rail track around km 98+300. Visibly, the place has a highly hardened ballast prism and hidden sags/twists of the rail track.

According to the requirements of the Technical Norms for the layout, construction and repair of a continuously welded track, the conditions for replacing of reinforced concrete sleepers have not been met. When working on the rail track in a "window", it is allowed to replace groups of two side-by-side sleepers with SKL-14 fasteners and up to three sleepers with K fasteners. In that case, the norms were violated and groups of 5 and 7 pieces were replaced. The speed of the trains was not limited. Newly replaced sleepers were not ballasted and padded.

After the end of the "window", despite the increase in daytime temperatures, the supervision of the continuously welded track has not been increased.

From the prepared sketch and the site inspection, it was established:

1. After tunnel No. 5 = km 98+375 in the direction of train movement and curve with $R = 550$ m;
2. Place of derailment of PT No. 30114 at km 98+349, 2 m before the BTC curve side. Koprivshitsa, sweeping the rail track in a straight section;
3. BTC at km 98+245, right curve in the direction of train movement with $R = 500$ m;
4. Slope 3.40 ‰ from km 98+100 to km 98+308 = 208 m uphill in the direction of train movement;
5. Place of derailment at a slope of 0 ‰ at km 98+349 2 m in front of the BTC on a curve side d. Koprivshitsa (left in the direction of train movement);
6. Reduction of $V=25$ km/h from km 95+400 to km 97+400 (area of medium repair);

7. Sequential replacement of reinforced concrete sleepers in groups of 3, 4 and 7 in an area with highly hardened ballast prism, with visually visible hidden gaps;
8. The speed of trains in the Anton - Koprivshitsa interstation is 80 km/h for passenger and 70 km/h for freight trains.

Probable cause of derailment of train No. 30114 was the sweeping of a non-maintained railway track before the train passes due to the following circumstances:

1. Replacement of reinforced concrete sleepers in groups of 3 to 7 pieces (in a row) in the section area with highly hardened ballast prism, with visually visible hidden sags of the railway track, that has reduced the resistance against the lateral displacement of the railway track and the frictional resistance between ballast and sleepers in the lower part;
2. Increase in the temperature of the air to 39°C, respectively of the rails around 59°C, which led to an increase in the longitudinal forces of the rails;
3. The speed of the trains was not limited, despite the impaired stability of the rail track.

4.1.2. Entities in charge of the technical maintenance

Infrastructure manager

SE NRIC has a Certificate of a structure responsible for maintenance with EIN BG /31/0020/0003, valid from 01.07.2020 to 30.06.2025.

SE NRIC has a Certificate of a structure responsible for vehicle maintenance with EIN BG/31/0023/0001, valid from 22.03.2023 to 21.03.2028.

Railway undertaking

"BDZ-Passenger Transport" EOOD holds a Certificate of a structure responsible for maintenance with EIN BG /31/0021/0001, valid from 19/04/2021 to 18/04/2026;

4.1.3. Manufacturers or providers of rolling stock and railway products.

Non-applicable.

4.1.4. National Safety Authority.

Railway Administration Executive Agency is the National Safety Authority for railway transport in the Republic of Bulgaria.

4.1.5. Notified bodies or Risk assessment bodies.

"TINSA" EOOD owns Permit No. 002-2 for carrying out activities to evaluate activities of a subsystem or a part of a subsystem with the requirements of the national safety rules or with the technical rules, valid from 15.07.2021.

Scope of permission

Subsystems:

- Energy;
- Infrastructure;
- Control, command and signalling;
- Rolling stock - freight wagons;
- Rolling stock - locomotives and passenger rolling stock.

"TINSA" EOOD holds Certificate No. BG/36/0021/0001 for an assessment body for performing an independent assessment of the implementation of the risk management procedure and its results, valid from 05.02.2023 to 02.04.2026.

Scope of evaluation activities

Structural areas of the railway system:

- Infrastructure;
- Energy;
- Control, command and signalling on railway lines;
- On-board control, command and signalling;
- Rolling stock.

Functional areas of the railway system:

- Traffic operation and management;
- Maintenance;
- Telematic applications for freight and passengers.

Assessing the overall coherence of risk management:

- The organization;
- The methodology;
- Technical aspects necessary to assess the compliance and completeness of the risk assessments and the safety level of the system.

4.1.6. Certifying bodies of the entities in charge of the technical maintenance.

The Railway Administration Executive Agency as the National Safety Authority for railway transport performs certification of the entities in charge of the vehicles maintenance (ECM) in accordance with Directive 2004/49/EC and Regulation (EU) 445/2011, as per Ordinance No 59 on the railway transport safety management and on the maintenance functions in accordance with Directive 2004/49/EC and Regulation (EU) 445/2011.

From June 16, 2020 the RAEA performs certification of the ECM as per the Commission Implementing Regulation (EU) 2019/779 of 16 May 2019 laying down detailed provisions on a system of certification of entities in charge of maintenance of vehicles pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 445/2011.

4.1.7. Persons or entities involved in the event, documented or not in the respective safety management systems or indicated in register.

Railway infrastructure

- SE NRIC implements Safety Procedure SP 2.09 "Methodology for determining, assessing and managing of the risk" version 05 effective from 01.03.2019, part of the SMS.

Railway undertaking

- BDZ PP EOOD implements the Procedure of "Integrated Management System" - P-2-15, "Management of Safety of Passenger Transportation. Monitoring and information" from 25.03.2024, and Safety Risk Assessment Methodology in BDZ PP EOOD from 23.02.2012.

4.2. Rolling stock and technical facilities.

4.2.1. Factors, deriving from the design of the rolling stock, railway infrastructure or technical facilities.

Non-applicable.

4.2.2. Factors deriving from the installation and placing into service of the rolling stock, railway infrastructure and technical facilities.

Non-applicable.

4.2.3. Factors deriving from manufacturers or another provider of railway products.

Non-applicable.

4.2.4. Factors, deriving from the technical maintenance and/or modification of the rolling stock or the technical structures.

Non-applicable.

4.2.5. Factors due to the entity in charge of the technical maintenance, workshops for technical maintenance and other technical maintenance service providers.

Non-applicable.

4.2.6. Other factors or consequences considered as involved within the investigation objectives.

Non-applicable.

4.3. Human factor

4.3.1. Individual human characteristics:

4.3.1.1. Training and development, including skills and experience.

Railway undertaking:

- Locomotive driver I-st person of locomotive № 91520044138-3:

Certificate of qualification No. 23020 acquired qualification for "Locomotive driver", training conducted in the period 05.10.2020÷29.01.2021, training institution PQC - BDZ, issued by RAEA;

Locomotive driving license BG 71 2021 0107, issued by RAEA;

Certificate No. V-166 for holding the position of "Locomotive driver" in BDZ PP EOOD, issued on 14.01.2021.

Additional certificate No. 000007652491 from BDZ PP EOOD for rolling stock for which the driver is allowed to drive - Electrical series 43, 44, 45.00 and EMU series 30/31.00 from 07.05.2024 on the national railway infrastructure of the Republic of Bulgaria until 05.04.2027.

- Locomotive driver II-nd person of locomotive № 91520044138-3:

Certificate of qualification No. 22796 acquired qualification for "Locomotive driver", training conducted in the period 24.08.÷11.12.2020, training institution PQC - BDZ, issued by RAEA;

Locomotive driving license BG 71 2021 0114, issued by RAEA;

Certificate No. V-183 for occupying the position of "Locomotive Driver" in BDZ PP EOOD, issued on 16.06.2021.

Additional certificate No. 000007697634 from BDZ PP EOOD for rolling stock for which the driver is allowed to drive - Electrical series 42, 43, 44, 45.00 and EMU series 30/31.00 from 03.12.2021 on the national railway infrastructure of the Republic of Bulgaria until 02.12.2024.

Railway infrastructure:

- Chief Engineer at Sofia Railway Section:

Diploma No. 047613, professional qualification "Civil Engineer", training conducted in the period 1994÷26.01.1999, training institution UASG - Sofia;

Certificate No. 9 for occupying the position of "Chief Engineer" in the Sofia Railway Section from 23.06.2011.

- Transport construction technician in the Sofia Railway Section:

Certificate of qualification No. 19391, acquired legal capacity "Construction technician for maintenance and repair of railway lines and facilities", conducted training in the period 12.12.2016 ÷ 03.05.2017, training institution PQC at DP SE NRIC, issued by RAEA;

Certificate No. 911 for holding the position "Transport Construction Technician" in the Sofia Railway Section from 19.06.2017.

4.3.1.2. Medical and personal circumstances, which influence the event, including the presence of physical and psychological stress.

Railway undertaking:

- Locomotive driver I-st person of locomotive № 91520044138-3:

Card for periodic medical examinations dated 06.03.2024, issued by the Multidisciplinary Transport Hospital - Plovdiv;

Conclusion: fit for a locomotive driver.

Psychological certificate No. 213/15.02.2021, issued by the Psychological Laboratory for Railway Transport in Plovdiv to the National Multidisciplinary Transport Hospital - Sofia for a locomotive driver.

Conclusion: allowed for a period of 5 years.

- Locomotive driver II-nd person of locomotive № 91520044138-3:

Card for periodic medical examinations dated 12.03.2024, issued by the Multidisciplinary Transport Hospital - Plovdiv;

Conclusion: suitable for Locomotive Driver;

Psychological certificate No. 866/25.09.2020, issued by the Psychological Laboratory for Railway Transport in Plovdiv to the National Multidisciplinary Transport Hospital - Sofia for Assistant Locomotive Driver.

Conclusion: allowed for a period of 5 years.

Railway infrastructure:

- Chief Engineer in Sofia Railway Section:

Single health information file dated 14.02.2023, issued by the Office of Labour Medicine at the NRIC;

Conclusion – fit for chief engineer;

- Transport Construction Technician in Sofia Railway Section:

Single health information file from 26.08.2024, issued by the National Multidisciplinary Transport Hospital - Sofia.

Conclusion - transport suitable for a head of group.

4.3.1.3. Fatigue.

Railway undertaking:

- Locomotive driver I-person of locomotive No. 91520044138-3:

Rest: from 10.06.2024 hour 22 minutes 10 to 11.06.2024 hour 12 minutes 50

Started work: 11.06.2024 hour 12 minutes 50 – (26 hours and 35 minutes)

- Locomotive driver II person of locomotive No. 91520044138-3:

Rest: from 08.06.2024 hour 20 minutes 25 until 11.06.2024 hour 12 minutes 50

Started work: 11.06.2024 hour 12 minutes 50 – (66 hours and 25 minutes)

Railway infrastructure:

- Chief Engineer at Sofia Railway Section:

Rest: from 10.06.2024 hour 16 minutes 45 to date 11.06.2024 hour 08 minutes 00

Started work: 11.06.2023 hour 08 minutes 00 – (20 hours and 15 minutes)

- Transport construction technician at the Sofia Railway Section:

Rest: from 10.06.2024 hour 16 minutes 45 to date 11.06.2023 hour 05 minutes 00

Started work: 11.06.2024 hour 05 minutes 00 – (17 hours and 15 minutes)

4.3.1.4. Motivation and attitudes

Non-applicable

4.3.2. Work related factors:

4.3.2.1. Tasks planning.

Railway infrastructure:

- SE NRIC –manager carries out maintenance, repair and operation of the railway infrastructure.

Prepares a year-round timetable for the movement of all categories of trains on the main and secondary railway lines. Prepares schedules and timetables for additionally requested trains and vehicles submitted by the railway undertakings for movement on the railway network.

Railway undertaking:

• "BDZ-Passenger Transport" EOOD - a national railway carrier that transports passengers according to an approved Train Movement Schedule and Plan for composing the trains under a contract for the carriage of passengers with the state.

4.3.2.2. Constructive particularities of the facilities that influence the connection human-machine.

Non-applicable.

4.3.2.3. Communication means.

The communication links in Anton and Koprivshitsa stations are carried out with the DCCM 8. Both stations are equipped with a train dispatch radio link (TDRC) devices for establishing direct radio communication with the locomotive drivers in the section;

In the two cabins of locomotive No. 91520044138-3, serving PT No. 30114, TDRC devices are installed for direct radio communication from the locomotive driver to the traffic managers on duty at the stations in the section;

The operational staff working on a shift basis in the SE NRIC and BDZ PP EOOD are provided with service mobile phones in case of emergency need for quick communication.

4.3.2.4. Practices and processes.

Non-applicable.

4.3.2.5. Operation rules, local instructions, staff requirements, prescriptions for technical maintenance and applicable standards.

Railway infrastructure

- SE NRIC implements national and departmental normative acts, part of SMS, relevant to the activities of the manager of the railway infrastructure.

- Instruction for repair and maintenance of continuously welded track.

Railway undertaking

- BDZ PP EOOD implements national and departmental normative acts, which are part of the SMS, applicable to the enterprise's activities.

- Instructions for the work of a locomotive driver and assistant locomotive driver in "BDZ-Passenger Transport" EOOD.

4.3.2.6. Working time of the involved personnel.

- In accordance with the requirements for the implementation of Ordinance No. 50 of 28.12.2001. and the Labour Code, the personnel involved in the accident at the SE NRIC worked a full work week, an eight-hour day. The personnel involved in the accident of BDZ PP EOOD works on a 12-hour work shift, for which a total calculation of working time is applied.

4.3.2.7. Risk treatment practices.

Railway infrastructure

- SE NRIC applies safety procedure SP 2.09 „Methods of evaluation, assessment and management of the risk „version 05 effective from 01.03.2019, which is part of the SMS.

Railway undertaking

- "BDZ-Passenger Transport" EOOD implements the following procedures:

- Methodology for safety risk assessment in BDZ PP EOOD;

- Quality procedure PK-2-15 "Safety management of passenger transport. Monitoring and exchange of information";

- Register of hazards during operation, repair and maintenance of road transport in BDZ PP EOOD.

4.3.2.8. Context, machinery, equipment and indications for shaping the working practices

Non-applicable.

4.3.3. Organizational factors and tasks:

4.3.3.1. Planning of the working force and the working load.

BDZ PP EOOD and SE NRIC in accordance with the requirements of the European and national normative acts, the entities have approved methodologies and models of good European practices and professional experience. The work is planned and related to the staff directly responsible for the safety and operation of railway transport in accordance with the norms prescribed in the SMS.

4.3.3.2. Communications, information and teamwork.

Non-applicable

4.3.3.3. Recruitment, staffing requirements, resources.

Railway undertaking:

● In BDZ PP EOOD, the selection of personnel is carried out according to an established "Human Resources Management System", which includes:

- o Recruitment and selection rules;
- o Rules for appointment and changes in employment relationships;
- o Rules for staff training and development;
- o Rules for ensuring HSWC, Ecology, and organization of the activity of STM.

The entity's personnel are selected and appointed with the relevant legal capacity, professional qualification and skills for working in the management and executive staff.

Railway infrastructure.

- SE NRIC has an approved "Strategy for Human Resources Management 2021÷2025".

In the SE NRIC, the selection of personnel is carried out according to the established "Rules for recruitment, selection and appointment of personnel in the central administration of the SE NRIC" in force from 01.12.2020.

The recruitment, selection and appointment of personnel is carried out by the "Human Resources Management" department, which is responsible for:

- Recruitment;
- Maintaining a database of the personnel;
- Creation of a system of selection techniques for recruitment;
- Carrying out the selection together with the head of the unit;
- Documenting the process and communicating with staff;
- Appointment.

4.3.3.4.Implementation management and supervision.

Non-applicable

4.3.3.5.Compensation (remuneration).

Railway undertaking:

● BDZ PP EOOD has approved "Internal rules for wages" effective from 01.07.2013, which regulate the general conditions for the organization of wages:

- Formation and distribution of funds for salary in the company;
- Determination and amendment of the basic salaries by position;
- Determination of the types and amounts of additional and other remunerations;
- Regulation of the order and manner of payment of staff salaries.
- Determination of minimum values and/or ranges of basic salaries.

Railway infrastructure.

● SE NRIC has approved "Internal rules for wages" in force from 01.09.2014, which regulate issues related to the wages of the company's personnel:

- General provisions for the organization of the salary in the entity;
- Determining and distributing the funds for wages - sources, order and way of forming the remuneration;
- Determination and amendment of wages and additional remuneration;
- Regulation, order and method of payment of wages.

4.3.3.6.Leadership, powers related issues.

Non-applicable.

4.3.3.7.Organizational culture.

Non-applicable.

4.3.3.8.Legal issues (including the respective European and national rules and provisions).

Non-applicable.

4.3.3.9.Regulatory framework conditions and safety management system application.

Railway undertaking.

- Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety;
- Commission Delegated Regulation (EU) 2018/762 of 8 March 2018 establishing common safety methods on safety management system requirements pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulations (EU) No 1158/2010 and (EU) No 1169/2010;
- COMMISSION IMPLEMENTING REGULATION (EU) 2019/779 of 16 May 2019 laying down detailed provisions on a system of certification of entities in charge of maintenance of vehicles pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 445/2011;
- COMMISSION IMPLEMENTING REGULATION (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009;
- Railway Transport Act;
- ORDINANCE No 59 dated 5.12.2006 on the railway transport safety management

Railway infrastructure.

- Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety;
- Commission Delegated Regulation (EU) 2018/762 of 8 March 2018 establishing common safety methods on safety management system requirements pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulations (EU) No 1158/2010 and (EU) No 1169/2010;
- COMMISSION IMPLEMENTING REGULATION (EU) 2019/779 of 16 May 2019 laying down detailed provisions on a system of certification of entities in charge of maintenance of vehicles pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 445/2011;
- COMMISSION IMPLEMENTING REGULATION (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009;
- Railway Transport Act;
- ORDINANCE No 59 dated 5.12.2006 on the railway transport safety management

4.3.4. Environmental factors:

Non-applicable.

4.3.4.1. Labour conditions (noise, illumination, vibrations).

Non-applicable for SE NRIC and BDZ PP EOOD.

4.3.4.2. Meteorological and geographic conditions.

Described in detail in item 3.1.3.2.

4.3.4.3. Construction works, performed on the spot or in very proximity.

Described in detail in item 3.1.3.3.

4.3.5. Any other significant factor for the investigation objectives.

Non-applicable.

4.4. Feedback and control mechanisms, including risk and safety management, as well as monitoring processes:

4.4.1. Regulatory framework conditions.

Commission Delegated Regulation (EU) 2018/761 of 16 February 2018 establishing common safety methods for supervision by national safety authorities after the issue of a single safety certificate or a safety authorisation pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 1077/2012

Commission Delegated Regulation (EU) 2018/762 of 8 March 2018 establishing common safety methods on safety management system requirements pursuant to Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulations (EU) No 1158/2010 and (EU) No 1169/2010

ORDINANCE No 59 dated 5.12.2006 on the railway transport safety management.

4.4.2. Processes, methods and results from the activities on the risk assessment and monitoring that the involved entities performed:

Railway undertaking.

- "BDZ-Passenger Transport" EOOD implements the Quality Management System PK 2-15 "Safety Management of Passenger Transportation. Monitoring and exchange of information." In section 6.7. "SMS implementation control, item 6.7.2. "Periodic control of the implementation of the SMS is carried out through internal audits: monthly and complex. Comprehensive audits are conducted once a year of all safety-related structures."

- In accordance with the requirements of the "Methodology for safety risk analysis and assessment in force from 23.02.2012", the railway enterprise BDZ PP EOOD prepares and presents monthly reports for the current year, as well as a complex (annual) audit report for the previous year regarding risk monitoring.

Railway Infrastructure Manager

SE NRIC applies Safety Procedure SP 2.09 "Methodology for identification, assessment and risk management" version 05 in force from 01.09.2019, which is part of the SMS.

4.4.2.1. Entities in charge of the technical maintenance.

Railway undertaking

- "BDZ-Passenger Transport" EOOD has a Certificate of a structure in charge of maintenance with EIN BG /31/0021/ 0001, valid from 19.04.2021 to 18.04.2026.

Railway infrastructure

- SE NRIC has a Certificate of a structure in charge of maintenance with EIN BG /31/0020/ 0003, valid from 01.07.2020 to 30.06.2025.

- SE NRIC has a Certificate of a structure in charge of maintenance of vehicles with EIN BG/31/0023/ 0001, valid from 22.03.2023 to 21.03.2028.

4.4.2.2. Producers and all other participants.

Non-applicable.

4.4.2.3. Reports for independent risk assessment.

No assessment has been made by an Independent Assessor (AsBo) of any changes in operating conditions or factors relevant to the occurred accident.

4.4.3. Safety management system of the involved:

Railway undertaking.

- "BDZ-Passenger Transport" EOOD implements the "Methodology for Analysis and Assessment of Safety Risk", which is part of the SMS.

Railway infrastructure.

- SE NRIC implements a safety procedure SP 2.09 "Methodology for determining, assessing and managing the risk" version 05 effective from 01.09.2019, which is part of the SMS.

4.4.4. Safety Management System of the entities in charge of the technical maintenance.

Railway undertaking.

- "BDZ-Passenger Transport" EOOD implements an approved "Safety Management System" effective from 27.09.2022, which regulates the technical maintenance of traction and non-traction rolling stock.

Railway infrastructure

- SE NRIC implements Safety Procedure WP 7.01 "Regulations for maintaining the signalling system (Signalling equipment)", which is part of the SMS;
- SE NRIC implements approved "Rules for current maintenance of a rail track" in force from 2021.

4.4.5. Results from the supervision, performed by the National Safety Authority.

The results of the performed audits and inspections regarding the functioning of the Safety Management System of SE NRIC and "BDZ-Passenger Transport" EOOD in accordance with the requirements of Regulation (EU) 2018/761, Regulation (EU) No. 1169/2010, Regulation No. 56 and Ordinance No. 59 to satisfy the specific requirements of European legislation and national rules for the design, maintenance and operation of the managed railway infrastructure, show that the companies maintain an SMS and can fulfil the requirements provided for in the relevant legal acts.

● Railway infrastructure:

1. In the period from 25.04.2023 to 05.05.2023, the National Safety Authority (RAEA) carried out an annual planned supervision of the SMS of SE NRIC for the renewal of the Safety Certificate in accordance with Delegated Regulation (EU) 2018/762 of the Commission for the establishment of common safety methods in relation to the requirements for SMS according to Directive (EU) 2016/798, no inconsistencies were found.

2. In the period from 22.04.2024 to 15.05.2024, the National Safety Authority (RAEA) carried out an annual planned supervision of the SE NRIC to establish common safety methods in relation to the requirements of the SMS according to Directive (EU) 2016/798 no discrepancies were found.

● Railway undertaking:

In the period from 08/02/2021 to 19/02/2021, the National Safety Authority (RAEA) carried out a scheduled annual audit of the SMS of "BDZ-Passenger Transport" EOOD.

In the period from 22.11.2022 to 09.12.2022, the National Safety Authority (RAEA) conducted an audit under the SMS for the issuance of a unified safety certificate of "BDZ-Passenger Transport" EOOD.

In the period from 23.10.2023 to 03.11.2023, the National Safety Authority (RAEA) carried out a planned annual audit of the SMS of "BDZ-Passenger Transport" EOOD.

4.4.6. Permits, certificates and assessment reports, provided by the National Safety Authority or other Conformity Assessment Bodies

4.4.6.1. Safety Authorization of the involved infrastructure manager.

● SE NRIC has a renewed Safety Authorization No. BG 21/2023/0001, valid from 01/07/2023 to 30/06/2028;

4.4.6.2. Safety certificates of the involved railway undertaking.

● „BDZ-Passenger Transport" EOOD has a Single Safety Certificate with IN EU BG 10 2022 0298, valid from 31/12/2022 to 30/12/2027;

4.4.6.3. Certificate of Assessment body for risk assessment.

"TINSA" Ltd. holds Certificate EIN BG/36/0021/0001 of an assessment body for performing an independent assessment on the implementation of the risk management procedure, valid from 02.05.2021 to 02.04.2026.

4.4.6.4. Authorizations for placing in service of permanently fixed equipment and permits for placing on the market of vehicles.

Non-applicable

4.4.7. Other system factors.

Non-applicable.

4.5. Previous similar cases.

In 2022, NIB - BG carried out an investigation of a similar nature - derailment of wagons from DFT No. 30592 between Yana and Kremikovtsi stations as a result of high temperatures in the tracks and sweeping of the rail track under the moving train;

In 2021, NIB - BG carried out an investigation of a similar nature - derailment of carriages of shunting train No. 50890 between Kocherinovo and Boboshevo stations as a result of high temperatures in the tracks and sweeping of the rail track under the moving train.

5. Conclusions

5.1. Summary of the analysis for the event causes.

The Investigation Commission made several inspections at the scene of the accident.

The Investigation Commission carried out inspections of locomotive No. 92520044138-3, serving PT No. 30114, and the two coaches of the train. Analysed documents and materials provided by the Task force.

It requested and received additional documents and materials from the manager of the railway infrastructure (SE NRIC) and the railway enterprises (BDZ PP EOOD and TCR JSC).

The Investigation Commission analysed the facts and circumstances of the occurrence of the accident, the current normative and sub-normative acts, instructions on the safety of transport, as well as the repair and maintenance of a continuously welded track, which are part of the SMS of the of the railway infrastructure manager (SE NRIC).

From the inspections, findings and analyses, the Commission of Investigation established the reasons for the occurrence of the accident at the Koprivshitsa - Anton interstation on 11.06.2024:

- The requirements of the "Technical standards for the planning, construction and repair of a continuously welded rail track" by the railway company TCR JSC, performing MSR in the Koprivshitsa - Anton interstation, have not been complied with;

- In Contract No. 111227/19.04.10124, concluded between SE NRIC and TCR JSC, for an urgent MSR from km 91+384 to km 99+047 in the Anton-Koprivshitsa interstation in the area of the Sofia railway section, no text is included, which mentions that the repair will be carried out in a section with a continuously welded track;

- No investor control was carried out by the manager of the railway infrastructure (SE NRIC) for the activities carried out on the rail track in the area of the accident on 11.06.2024.

5.2. Undertaken measures after the event occurrence.

The Safety Investigation Commission at NAMRTAIB completed its on-site work in the shortest possible time and gave written permission to the railway infrastructure manager to restore railway services and capacity in the section and Koprivshitsa - Anton interstation.

Transportation safety structures put the derailed rolling stock of PT No. 30114 back on the tracks.

The composition of PT No. 30114 was moved to the Anton station.

TCR JSC, together with SE NRIC, carried out urgent repair and restoration activities on the damaged section of the railway track to restore the traffic and capacity.

5.3. Additional findings.

Non-applicable.

6. Safety recommendations

In order to improve the safety in the rail transport, the Investigation Commission at NAMRATIB proposes to the Railway Administration Executive Agency (RAEA) the following safety recommendations adapted to SE NRIC and BDZ PP EOOD.

- Recommendation 1, proposes that SE NRIC and BDZ PP EOOD familiarize the interested personnel with the contents of this report;
- Recommendation 2, suggests to the SE NRIC that, when carrying out repair activities in the areas with a non-maintained railway track, the requirements of "Technical norms for the planning, construction and repair of a non-maintained railway track" shall be observed both by the contractors of the repairs and by investors side.

With reference to the requirements of art. 24, paragraph 2 of Directive (EU) 2016/798, and art. 91, paragraph 3 of Ordinance No 59 dated 5.12.2006, the member of the Management Board of NAMRATIB on 16.10.2024 provides a final report that contains information on the investigation of the accident with formulated and agreed safety recommendations in order to improve safety in railway transport.

In accordance with Art. 26, paragraph 3 of Directive (EU) 798/2016, that the National Safety Authority (RAEA) and other bodies or structures to which the safety recommendations are addressed, to report regularly to the member of the management board of the NAMRATIB on the measures taken or planned as a result (sequence) from the recommendations.

Chairperson:

Dr Eng. Boycho Skrobanski

Deputy President of the NAMRTAIB AB