

R E P U B L I C OF B U L G A R I A NATIONAL AIR, MARITIME AND RAILWAY TRANSPORT, ACCIDENTS INVESTIGATION BOARD (NAMRTAIB)

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FINAL REPORT

of

Investigation of significant accident – Collision of two employees of SE NRIC by RSPSM No99529459017-0 between the stations Krivodol and Boytchinovtsi on 16.12.2024



Sofia 2025

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.

TABLE OF CONTENTS

№	Title of section	Pg.
1.	Summary	5
	1.1. Brief description of the event.	5
	1.2. Location and time of the event occurrence.	6
	1.3. Factors determining and contributing the event.	6
	1.4. Direct causes and consequences of the event.	7
	1.5. Safety recommendations and addressees to which they are addressed.	8
2.	Investigation	9
	2.1. Decision for starting the investigation.	9
	2.2. Motives for the decision to initiate the investigation.	9
	2.3. Scope and restrictions of the investigation.	9
	2.4. Competences of the persons, involved in the investigation.	9
	2.5. Communication and consultations with the persons and entities, involved in the event.	9
	2.6. Extent of cooperation from the participating entities.	10
	2.7. Methods and techniques of investigation and analysis.	10
	2.8. Difficulties faced during the investigation.	11
	2.9. Interaction with the judicial authorities.	11
	2.10. Other important information for the investigation context.	15
3.	Description of the event	15
	3.1. Information on the event and the context.	26
	3.2. Factual description of the occurred.	31
4.	Analysis of the event	31
		29
	4.1. Participation and responsibilities of the entities, involved in the event.	20
	4.2. Rolling stock and technical facilities.	38
	4.5. Human factor.	38 42
	4.4. Feedback and control mechanisms, including risk and safety management as well as monitoring processes.	43
	4.5. Previous similar cases.	45
5.	Conclusions	47
	5.1. Summary of the analysis for the event causes.	47
	5.2. Undertaken measures after the event occurrence.	48
	5.3. Additional findings.	49
6.	Safety recommendations	50

ABBREVIATIONS, USED IN THE REPORT

FT – Fast train

BDZ PP EOOD – Enterprise for passenger transport, BDZ-Passenger services" EOOD

TOS – Train Operation Schedule

TFCU – Trolley freight crane universal

 $IT-Installation\ trolley$

SE NRIC – State enterprise "National railway Infrastructure Company "(railway infrastructure manager)

STTCC – Single Train Traffic Control Centre

EDE – Electrical Distribution Entity at SE NRIC

OE – Operational entity

 $RS-Railway\ section\ (division\ at\ the\ railway\ infrastructure\ manager)$

RTA – Railway Transport Act

TOU – Traffic organization unit at the railway infrastructure manager

RAEA/NSA – Railway Administration Executive Agency, National Safety Authority of the Republic of Bulgaria

km – Kilometre along the rail track

CDC – Coordination Dispatching Centre at the railway infrastructure manager

MoI – Ministry of Interior

RRI – Route Relay Interlocking

Ordinance No. 56 – on the requirements, conditions and procedure for training candidates for acquiring the qualification required by personnel responsible for the safety of rail transport, or recognition of such qualification and the procedure for conducting the verification examinations of personnel responsible for the safety of transport

Ordinance No 58 – on the rules for the technical operation, train traffic and signalling in the rail transport Ordinance N_{2} 59 – Ordinance on the rail transport safety management

NAMRTAIB – National Air, Maritime, and Railway Transport Accidents Investigation Board (Safety Investigation Body of the Republic of Bulgaria)

NIS - National Investigation Service (pre-trial investigation body at the prosecutor's office)

TF – Task Force

RPO - Regional Prosecutor's Office

SE – Signalling equipment

PT – Passenger train

RTOSART – Rules for the train operation and shunting activity in the railway transport

RRS – Rail Rolling Stock

RTORI – Rules of technical operation of the railway infrastructure of SE NRIC

RRS – Regional railway section – department at the National Safety Authority

RITS - Regional inspection Transport Safety at SE NRIC

RSPSM - Rail self-propelled specialized machine

RDKD – Relay Device for key dependence

RD MoI – Regional Division of the Ministry of Interior

EMC – Emergency Medical Care

SMS – Safety Management System

TOMS – Train operation management system

TOSAMD – Train operation and station activity management Division (division of SE NRIC)

DCCM – Device for communications, connections and messages

UMHAT – University multi-disciplinary hospital for active treatment

PQC – Professional qualification centre at SE NRIC

PQC – Professional qualification centre at Holding BDZ EAD

1. Summary

1.1. Brief description of the event.

By Telegram No. 149/15.12.2024, upon express request from the Vratsa Railway Section, a working train No. 70440 was assigned with parameters: motor tractor TFCU RSPSM No. 99529459017-0 and wagon No. 80523936030-0, Res series, gross weight 60 tons and length 35 meters, with a schedule, departure time from Vratsa station at 08:30 a.m. and arrival at 09:55 a.m. at Medkovets station.

At 07:20 a.m. the train dispatcher conducted a "briefing" with the traffic managers on duty in the Mezdra - Vidin freight section. Around 08:00 a.m. the train dispatcher left the workplace without permission and went to the Sofia RRI to take an exam under the mandatory conditions of Ordinance No. 56 (the staff periodically defends the acquired qualifications). The train dispatcher has not conveyed to the substitute dispatcher the specifics of the organization of traffic in the section.

At 08:04 a.m., the traffic manager on duty at Vratsa station held a conversation with the train dispatcher, who clarified that the motor tractor RSPSM No. 99529459017-0 would first refuel at the "Base" of the Vratsa Railway Station and then FT No. 7620 would depart according to the assigned schedule.

At 08:15 the duty traffic manager at Vratsa station ordered the station switchman at Post No. 2 to move RSPSM No. 99529459017-0 with the wagon from the seventh track to the "Base" of the Vratsa Railway Section and, once they were ready, to move to the fourth receiving-departing track in the station for departure to Medkovets station.

From 08:19 a.m. to 08:27 a.m. the RSPSM was refuelled. At 08:29 a.m. the RSPSM departed with the wagon, moving to the fourth receiving-departing track in the station at 08:30 a.m. From 08:30 a.m. to 08:43 a.m. the RSPSM waited on the fourth receiving-departing track to depart for Medkovets station.

After the arrival of DFT No. 70696 at Beli Izvor station, at 09:47 a.m. The Vratsa - Beli Izvor interstation was free. Train No. 70440 departed from Vratsa station at 09:48 a.m.

Another telephone conversation was held by the FMY with the duty traffic manager at Krivodol station at 09:55 a.m., which after the passage of work train No. 70443 DM RSPSM No. 99529436507-8 from Boytchinovtsi station to Krivodol station, the work group could work "calmly", due to the lack of other vehicles.

Due to the impossibility of simultaneously accepting of two vehicles at Krivodol station, first at 10:18 a.m. on the third track was accepted work train No. 70443 DM RSPSM No. 99529436507-8. At that time, work train No. 70440 RSPSM No. 99529459017-0 was waiting at the entrance signal. The traffic manager on duty arranged the route with regularly open entry and exit signals, and work train No70440 passed at 10:20 a.m. along the second track of Krivodol station without stopping for Boytchinovtsi station.

After the passage of work train No. 70443 DM RSPSM No. 99529436507-8, to Krivodol station, TGL ordered the workers to put the screw spike wrench machine on the line. The remaining workers were divided into two groups of five people, who would remove the old and install the new sleepers, throw ballast and collect the fasteners.

At one point, the screw spike wrench machine refused to work, TGL went to repair the machine and heard one of the workers to announce "A tractor is coming!" That forced them to quickly move the machine to the left of the line, but during the action one of the workers slipped, it hit him on the head with the handle and fell on him. Two of the workers removed the crew spike wrench machine from his chest. The cart on which the machine was mounted remained on the railway track.

The RSPSM driver saw the "Working Group" sign during the movement and sounded the RSPSM whistle, then blew it again when passing the "Pre-crossing Sign".

After the working train No. 70440 RSPSM No. 99529459017-0 entered into a sharp curve on the rail track and moved along it, the driver and the attendant saw the group of workers who were carrying out repairs on the rail track. According to the driver, he saw the working group and at the last moment, when the working group passed, the RSPSM driver stopped.

The majority of the workers on the rail track managed to move away to a safe distance from the line.

After the motor tractor passed, the TGL saw the bodies of the two workers "on the left of the rail track" in a lifeless state. He notified the national emergency number 112 to send an ambulance. He also informed the interested officials.

As a result of the subsequent impact from the passing RSPSM, two of the workers died on the spot. The third injured worker suffered injuries and a contusion, received when the screw spike wrench machine was removed from the rail track. He was taken by ambulance to the MPAL – Montana without life-threatening injuries.

The rail track and the RSPSM did not suffer any damages.

1.2. Location and time of the event occurrence.

The event occurred on 16.12.2024 at around 10:30 a.m. at km 52+744 in the Krivodol - Boytchinovtsi section. The rail track is in a curve, with a radius R=400 m, total length of the curve L=290 m, cant H=100 mm, slope 8 ‰ downhill in the direction of movement of the RSPSM (Fig. 1.1).



Fig. 1.1. Scheme of the place of the accident

1.3. Factors determining and contributing the event.

Causal factors for the occurrence of the event:

- Failure to comply with and miss the route of the RSPSM timetable by the duty traffic manager at Vratsa station and the train dispatcher in the section;
- The RSPSM driver did not react in a timely manner when the working group approached the railway track by reducing speed, including stopping before the working group;

Contributing factors for the occurrence of the accident are:

- Inaccurate coordination between the duty traffic manager at Krivodol station and the TGL located with the working group in the inter-station area;
- Lack of coordination between the duty traffic manager at Krivodol station with the train dispatcher at the section;
- Prolonged unregulated absence of the train dispatcher from the workplace, he did not convey to the replacement dispatcher the features of the train traffic in the section;
- No notification of the TGL by the traffic manager on duty at Krivodol station, after the departure of the RSPSM for the Krivodol Boytchinovtsi interstation;

System factors for the occurrence of the accident:

- Non-compliance with the regulatory documents for the organization of work in the Krivodol Boytchinovtsi interstation;
- Work on the rail track and the overhead contact line between train traffic in the interstation, which is not regulated in writing with "train path windows";
- Permissions for "operational time windows" by train dispatchers and duty traffic managers for work on the railway track and the overhead contact line.



Fig. 1.2. RSPSM with the wagon at the place of the accident

1.4. Direct causes and consequences of the event.

- Non-provided security for the working group (signal operators) at the work site in a curve with a radius of 400 m.
- Untimely activation of the automatic train brake of the RSPSM to reduce the speed of movement after it was established that there was a working group and light track machinery on the railway.

The consequences of the event were two workers being hit fatally by the passing RSPSM and one with injuries and traumas resulting from the removal of the light track machinery from the line.

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

In order to prevent other similar accidents, the Investigation Commission at the NAMRTAIB proposes to the National Safety Authority (RAEA) safety recommendations related to the SE NRIC and RAEA.

- Recommendation 1 proposes that SE NRIC familiarize interested personnel with the content of the report;
- Recommendation 2 proposes that RAEA amend and supplement Ordinance No. 58, Art. 179, Para. 3 regarding the movement of "Specialized machines for maintaining the railway track and the overhead contact line" on the railway infrastructure, to be carried out with included recording speedometers;
- Recommendation 3 proposes that SE NRIC amend and supplement Working Procedure RP 2.55-08 "Instructions for the technical requirements, operation and maintenance of rail self-propelled specialized machines", Chapter Two "Basic technical and operational requirements for RSPSM", Art. 16: "All RSPSM must be equipped with a working recording speedometer";
- Recommendation 4 proposes that the SE NRIC amend and supplement the Working Procedure RP 2.62 "Instructions for the operation of the driver of the RSPSM", to create a new section "Operation of a recording speedometer";
- Recommendation 5 proposes that SE NRIC train all drivers operating the RSPSM in handling the on-board tachograph, setting a circular diagram, adjusting the clock and other manipulations related to the operation of the tachograph;
- Recommendation 6 proposes that SE NRIC control and prevent the movement of RSPSM on the railway infrastructure with a faulty, non-switched tachograph and without a new circular diagram placed in the tachograph for recording movement before starting work;
- Recommendation 7 proposes that SE NRIC restore the position of "Working Group Signalman" in the railway sections in accordance with the required regulatory acts on safety when working on the railway track.

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 in the rail transport.

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 1 (a) and (c) of Directive (EU) 2016/798, art. 115 κ , paragraph 1, item 1 of RTA, and art. 76, par. 1, item 1 and art. 78 paragraph 1 and paragraph 2 of Ordinance No 59 dated 5.12.2006.

The investigation was initiated in view of the circumstances that led to the fatal outcome of two workers and one who suffered injuries and traumas while working on the rail track, resulting from the passage of RSPSM No. 99529459017-0 in the Krivodol - Boytchinovtsi section.

2.3. Scope and restrictions of the investigation.

The scope of the investigation includes an analysis of organizational and human factors, since all employees involved in the accident are part of the State Enterprise "National Railway Infrastructure Company" (SE NRIC). The safety management system related to the safe operation of track machines used for transportation purposes by the railway infrastructure manager, as well as the operation and management of the railway infrastructure, is also covered. This includes repair and maintenance activities on the railway infrastructure in the interstation area. It also encompasses risk assessment with identified hazards, as outlined in the regulatory acts, instructions, and rules of the railway infrastructure manager concerning track repair works.

Limitations and delays in the safety investigation were caused by the Forensic Medicine Department in Montana in preparing the assigned forensic medical examinations.

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.

Upon arriving at the scene of the incident, the Commission defined the parameters of the investigation and coordinated its actions with the operational group, which included division managers and transport safety officials from the railway infrastructure manager (SE NRIC).

In accordance with the requirements of Ordinance No. 59, the Task force collected all documents, samples, materials, and written statements from personnel involved in the accident.

These materials and documents were handed over to the member of the Management Board of the NAMRTAIB.

At the scene of the accident, the Safety Investigation Commission conducted interviews with the driver of RSPSM No. 99529459017-0 (type TFCU) and the supervisor of the track construction works (STCW). It reviewed the statements of individuals related to the accident.

Additional documents and materials relevant to the investigation were requested from and provided by SE NRIC. An interview was also conducted with the safety authorities.

2.6. Extent of cooperation from the participating entities.

During the investigation conducted by the Safety Investigation Commission at the NAMRTAIB, the management of the railway infrastructure manager - SE NRIC - provided full cooperation and supplied the complete set of materials and documents requested for the investigation.

Access was granted for technical inspections of RSPSM No. 99529459017-0, as well as of the screw spike wrench machine that was being used on the railway track.

2.7. Methods and techniques of investigation and analysis.

On December 16, 2024, at 11:04 a.m., the member of the Management Board of the NAMRTAIB, authorized to investigate railway accidents, received a written notification via SMS on his mobile phone from the duty central senior dispatcher of the railway infrastructure manager, with the following message:

"At 10:35 a.m., TFCu 52-53 /NRIC/ collided employees of SE NRIC – Vratsa in the Krivodol – Boytchinovtsi section. The train traffic has been suspended."

Later that same day, around 12:00 p.m., the member of the Management Board of the NAMRTAIB, together with external experts, departed for the accident site between Krivodol and Boytchinovtsi and arrived around 15:00 p.m.

Inspections were carried out on the spot where the two workers were struck. Examinations were conducted on RSPSM No. 99529459017-0 and its attached wagon No. 80523936030-0.

An inspection was also performed on the "Work Group Warning" signs that marked the work area at distances of 524 and 414 meters on both sides.

On-site interviews were conducted with the group leader technician (TGL), the operator of RSPSM No. 99529459017-0, the accompanying person on board the RSPSM, and some of the workers present at the scene.

Until the arrival of the pre-trial investigation authorities from the National Investigation Service (NIS) in Sofia, the entire scene - including the positions of the death individuals and the RSPSM - was preserved without any changes.

After the arrival of the pre-trial investigation authorities from the National Investigation Service (NIS) at the place, joint inspections were organized and carried out in cooperation with the member of the Management Board of the NAMRTAIB, who is authorized to investigate railway accidents.

The NIS authorities prepared a protocol following the inspections conducted at the place of the accident.

The Investigation Commission established that an active tachograph was installed in the cabin of RSPSM No. 99529459017-0, equipped with a recorder to log time, distance travelled, speed, and other parameters.

At the time of the accident, the device had recorded numerous data entries.

It was found, however, that the circular recording chart had not been regularly replaced, and the clock on the tachograph had not been synchronized.

In order the information to be correctly recorded and the analogue tachograph to function properly, a circular chart must be inserted at the beginning of the driver's shift operating the RSPSM. While using the machine, the driver must select the correct mode of operation by turning the switch to the appropriate symbol/mode and adjust the tachograph clock accordingly.

For the newer-generation tachographs installed on RSPSMs owned by SE NRIC, the switching between driving mode and other modes is performed automatically when the vehicle starts moving or stops.

At 17:10 p.m. on December 16, 2024, the emergency medical teams, the pre-trial investigation authorities from the National Investigation Service (NIS), and the authorized member of the NAMRTAIB investigating railway accidents concluded their work on the spot. A written authorization was issued to the head of the Task Force to begin restoring rail traffic and capacity in the section between Krivodol – Boytchinovtsi and in the Mezdra – Vidin corridor. RSPSM No. 99529459017-0 was released from the interstation area and moved to Boytchinovtsi station, where it remained under the supervision of the pre-trial investigation (NIS).

On December 19, 2024, the Investigation Commission of NAMRTAIB conducted site inspections in the Krivodol – Boytchinovtsi section, specifically in the area where the incident occurred.

Measurements were taken of the railway track related to the movement of RSPSM No99529459017-0, the distances between the screw spike wrench machine and the personnel working with it, as well as the location of the work group performing track repairs.

On January 8, 2025, the Chairperson of the Investigation Commission at NAMRTAIB received the documentation and materials from the head of the Task Force and continued the investigation of the incident with the aim of drafting a final report.

On January 9, 2025, after obtaining permission from the pre-trial investigation authorities (NIS), the head of the Safety Investigation Commission, together with experts in railway rolling stock (RRS) from the infrastructure manager, conducted braking performance tests on RSPSM No. 99529459017-0. The tests were carried out in two stages in the Krivodol – Boytchinovtsi section, in the collision area where the workers were struck.

- First stage: A brake test was conducted using RSPSM No. 99529459017-0 with attached wagon No. 80523936030-0 Res in the collision area, activating the automatic train brake, and measuring the braking distance.

- Second stage: A brake test was conducted using RSPSM No. 99529459017-0 with attached wagon No. 80523936030-0 Res in the collision area, activating the direct brake, and again measuring the braking distance.

For each of the brake tests conducted, a protocol was prepared with the recorded results, and copies were provided to the pre-trial investigation authorities (NIS).

Before the brake testing began, a circular recording chart was placed in the analogue tachograph of RSM No. 99529459017-0, and the clock was synchronized.

After the tests were completed, the circular chart was removed from the tachograph to read the parameters. It was determined that no data had been recorded - the device was not functioning.

On January 21, 2025, at the building of the National Board for Investigation of Accidents in Air, Water, and Rail Transport (NAMRTAIB), the Investigation Commission took statements from individual interviews with traffic control and station operations personnel at the TOU Sofia. That included the head of department/service at TOU Sofia, the senior traffic dispatcher on duty, the dispatcher for the Mezdra – Vidin freight section, and the dispatcher for the Sofia – Mezdra section, who had temporarily replaced the dispatcher for the Mezdra – Vidin freight section between 08:00 and 10:00 a.m.

On January 24, 2025, the head of the Safety Investigation Commission, together with external experts, conducted interviews in RS Vratsa with the traffic managers on duty who were on shift on December 16, 2024, at the Vratsa and Krivodol stations, both previous and current shifts.

Statements were taken from the personnel of RS Vratsa who were working on December 16, 2024, in the Krivodol – Boytchinovtsi section — including the technician in charge (TGL), the RSPSM operator and attendant and the working group of ten railway workers.

A document check was also conducted to the injured employees from RS Vratsa.

On January 31, 2025, the Chairperson of the Investigation Commission held a working meeting with the commission members (external experts) at the NAMRTAIB building and proposed a structure for the draft final report, which would present the gaps in the regulatory framework and the failure of infrastructure personnel at SE NRIC to comply with them.

On March 10, 2025, the Chairperson of the Investigation Commission held another working meeting with the commission members (external experts) at the NAMRTAIB building to review and adopt their written opinions on the tasks set forth during the investigation.

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 and the Task force assisted the Investigation Commission.

2.9. Interaction with the judicial authorities.

At approximately 10:50 a.m., following a notification received via emergency line 112, the first responders at the place of the accident were the officials from the Boytchinovtsi District Police Department (RPD Boytchinovtsi). Acting on the orders of the District Prosecutor of the District

Prosecutor's Office (DPO) – Montana, they cordoned off and secured the accident site, ensuring the preservation of all evidence related to the transport vehicles and preventing access by unauthorized individuals until the arrival of the pre-trial investigation authorities from the National Investigation Service (NIS) and the safety investigation authority of NAMRTAIB. Within the secured perimeter, only officials of NAMRTAIB, NIS, DPO Montana, and RPD Boytchinovtsi were granted access. The train traffic in the Krivodol – Boytchinovtsi section was suspended.

In accordance with the provisions of the Cooperation Agreement between the Prosecutor's Office of the Republic of Bulgaria, the Ministry of Interior, and NAMRTAIB, effective since April 11, 2023, the investigative actions were coordinated. Upon arrival of the NIS pre-trial investigation authorities, the scene boundaries and sequence of actions were agreed upon jointly with the head of the safety investigation of NAMRTAIB, in order to ensure safe handling and preservation of physical evidence.

Independent and parallel inspections were carried out by both investigating bodies — one focused on safety and the other on pre-trial criminal investigation. The pre-trial investigation was conducted by competent NIS authorities, under the supervision of a supervising Prosecutor from the District Prosecutor's Office – Montana.

The access for media representatives to the place of the accident was restricted.

2.10. Other important information for the investigation context.

2.10.1. Materials provided by the pre-trial proceedings – NIS:

The Chairperson of the Safety Investigation Commission at the NAMRTAIB requested and received materials related to the investigation from the pre-trial authorities – NIS:

By Decree No. 78/17.12.2024 of the National Investigative Service (NIS), a Forensic Medical Examination was commissioned, conducted at the Multiprofile Hospital for Active Treatment "Dr. Stamen Iliev" AD – Montana, to determine the medical condition of the injured railway employee from the Railway Section Vratsa (RS Vrtasa), with the task of answering the following questions:

What injuries and damages were caused to the injured railway employee?

What is the mechanism of causing the sustained damages?

Did the sustained injuries result in:

- prolonged disturbance of consciousness, mutilation of a leg or arm, permanent general health impairment, or life-threatening conditions;
- lasting limitation in the movement of limbs, torso, or neck, permanent non-life-threatening health impairment, or temporary life-threatening health impairment;
- injuries penetrating the cranial, thoracic, or abdominal cavities?

What was the position of the injured person's body at the time of contact with the motor trailer? *Forensic Medical Report Based on Written Evidence No. 3/2025*

The forensic medical examination was prepared based on written records from the interrogation protocols of individuals near the injured person and recollections provided by the injured person.

The injuries and the contused wound were sustained during the rapid removal of the machine from the railway track due to an approaching vehicle. During the process, the injured person slipped and fell on his back. The handle of the machine struck the injured person on the head, causing a lacerated wound approximately 4 cm long on the forehead and left eyebrow. He lost consciousness and did not have a full memory of the accident.

He was transported by an Emergency Medical Service (EMS) vehicle to the "Dr. Stamen Iliev" Multidisciplinary Hospital for Active Treatment – Montana and was accepted to the hospital's Surgical Department for treatment. Complete medical examinations were conducted, and the wound was cleaned and sutured.

Answers to the raised questions:

1. Head injury with: lacerated-contused wound on the upper left part of the forehead, swelling and bruising of the upper and lower eyelids of the left eye, with haemorrhage under the conjunctiva concussion of the brain

- Contusion (bruise) of the chest area with an abrasion near the sternum on the right;

- Contusion of the abdomen with abrasion in its upper part;

- Swelling and bruising on the inner side of the right knee joint, and abrasions on the front surface of the upper half of the right lower leg.

2. The injuries were caused by impacts with or against hard blunt and blunt-edged objects.

There were no specific features of the injuries that allow for precise identification of the objects that caused them, but based on their type, nature, and location, they were consistent with the mechanism described by the injured person and witnesses to the accident during work activity.

3. The described injuries were such that they caused temporary health impairment without being life-threatening.

The provided medical documentation contains no evidence that the head trauma and concussion led to complete loss of consciousness (to the extent of coma), which would constitute a temporary life-threatening health condition.

No evidence was found of injuries that would result in: prolonged disturbance of consciousness, mutilation of a limb, permanent general health impairment, and life-threatening condition, lasting movement impairment of limbs, torso, or neck, permanent non-life-threatening health impairment or temporary life-threatening condition, penetrating injuries to the skull, chest, or abdominal cavities.

In the injured party's testimony, it is noted that since 13.01.2025 he has been receiving treatment at the Psychiatric Dispensary – Vratsa, though the condition/diagnosis is not specified. A psychiatrist would need to determine if this condition is related to the accident that occurred on 16.12.2024.

4. According to witness statements, the injured person was initially standing upright, then fell backward, where he was struck and pinned by the screw spike wretch machine they had been using. He did not come into contact with or was struck by the passing motor trailer on the line.

2. By Decree No. 80/17.12.2024 of the NIS, a forensic medical examination was ordered to determine the cause of death of a railway worker at the "Dr. Stamen Iliev" Multiprofile Hospital for Active Treatment – Montana, with the task of answering the following questions:

1. What injuries and damages were sustained by the individual?

2. What was the mechanism of the inflicted injuries?

3. What was the cause of death of Plamen Alexandrov, and is there a causal link between the injuries and the death?

4. What was the position of the deceased's body at the moment of contact with the motor trailer?

5. To collect blood and urine samples from the body for subsequent testing for the presence of alcohol, sedatives, or narcotics:

Forensic Medical Examination No. 66/2024

Direct cause of death:

- Traumatic shock that developed as a result of multiple injuries, bilateral rib fractures, organ lacerations and internal bleeding, fracture and severance of the spinal column in the lower thoracic region;
- The following traumatic injuries were identified: abrasions, bruises, lacerated-contused wounds, fractures of the chest bones and spinal column, organ lacerations all of which were sustained by the mechanism of impact with or against hard blunt objects with significant force, and bear the characteristics of having been inflicted during life.
- There are no distinctive features of the injuries that allow precise identification of the objects causing them; however, it is most likely that the injuries were caused by impacts from various parts of the moving machine and the equipment used for repair work. The main impact appears to have struck the back of the body in an upright position, followed by a fall onto a hard, uneven surface.
- There is a direct causal link between the sustained injuries and the resulting death.
- Before death, the deceased had not consumed alcohol, and was not under the influence of sedatives or narcotic substances.

3. By Decree No. 79/17.12.2024 of the National Investigative Service (NIS), a forensic medical examination was ordered to determine the cause of death of a railway employee at the "Dr. Stamen Iliev" Multiprofile Hospital for Active Treatment – Montana, with the assignment to answer the following questions:

1. What injuries and damages were sustained?

2. What was the mechanism for the sustained injuries?

3. What was the cause of death, and is there a causal connection with the sustained injuries?

4. What was the position of the victim's body at the moment of contact with the motor trailer?

5. To extract blood and urine samples from the body for further laboratory testing to determine the presence of alcohol, sedatives, and narcotic substances.

Forensic Medical Examination No. 67/2024

Direct cause for the death:

- Traumatic shock, which developed as a result of multiple injuries, fractures of skull bones, accompanied by haemorrhages and lacerations, fractures of ribs on the left side of the chest, laceration of internal organs with significant blood loss, fractures of the bones in the left limb and of the spinal column;

- The following traumatic injuries were identified: abrasions, bruises, lacerated-contused wounds, fracture of the left axillary bone (upper arm bone), fractures of the chest bones and the spinal column, organ lacerations with haemorrhages. All of which were caused by impacts with or against hard blunt objects with significant force, and bear the signs of being inflicted during life;

- There were no distinctive features of the injuries to determine precisely what objects caused them. However, by type, nature, and location, the injuries are entirely consistent with those described under the working conditions - specifically, that the impact struck the left rear side of the body while in an upright position, followed by being thrown and falling onto a hard, flat surface.

- There is a direct causal connection between the sustained injuries and the resulting death.

- Before the death, the deceased had not consumed alcohol and was not under the influence of sedatives or narcotic substances.

3. Description of the event

3.1. Information on the event and the context.

3.1.1. Description of the event type.

In accordance with the daily operational analysis conducted in the office of the senior train dispatcher together with the head of the unit at the Sofia Railway Operations Centre in the SCOC, the electrical systems technician OHCL (employee of the regional operational service of the ED division) who arrived on shift, has declared an "operational window" for cleaning the construction gauge in the Krivodol - Beli Izvor interstation for 16.12.2024, which request was entered in the "Diary for requests for work on OHCL".

At 07:00 a.m. on 16.12.2024, during the same operational analysis, the request was also considered for the declared "operational window" for repair of OHCL at the request of the Sub-district for Operation (OS) Boytchinovtsi.

Taking into account the movement of trains in the Mezdra - Vidin freight - border section, the head of the unit/service at the Sofia Railway Transport Authority assesses that an "operational window" can be allowed in the range from 10:10 a.m. to 11:30 a.m., and transmits this information in the form of an oral order to the traffic manager/train dispatcher of the Mezdra - Vidin freight - border dispatching section.

For the movement of DM type RSPSM from Boytchinovtsi station to Krivodol station, a "Request for a path outside the annual capacity request" No. 2/16.12.2024 was submitted to the TOMS system by the SE NRIC - EDD with "Date and time of submission: 16.12.2024 at 08:05 a.m." with a starting departure time 09:00 a.m. For the purpose, by Telegram No. 159/16.12.2024, for the needs of the SE NRIC on 16.12.2024, a working train No. 70443 DM RSPSM No. 99529436507-8 was assigned by an express request with a departure time 10:15 a.m. from Boytchinovtsi station and arrival time at 10:34 a.m. at Krivodol station.

Another "Request for a path outside the annual capacity request" No. 2958/15.12.2024 has been submitted to the TOMS system by the Vratsa Railway Section with "Date and time of submission: 15.12.2024 at 10:03 a.m." for the movement of a work train from Vratsa station to Medkovets station, movement period on 16.12.2024, with a schedule at 08:30 a.m. in the composition of DM RSPSM No. 99529459017-0 with one wagon No. 80523936030-0 Res with a length of 35 meters and a mass of 60 tons. By Telegram No. 149/15.12.2024 at the express request of the State Enterprise NRIC, a working train No. 70440 was assigned with parameters - RSPSM No. 99529459017-0 with one wagon No. 80523936030-0 Res, with a length of 35 meters and a mass of 60 tons and a schedule: with a departure time from Vratsa station at 08:30 a.m. and arrival at Medkovets station at 09:55 a.m.

Employees on shift in the railway infrastructure on 16.12.2024

- traffic manager/senior train dispatcher on shift;
- traffic manager/train dispatcher on the Mezdra Vidin freight border section;
- traffic manager/train dispatcher on the Sofia Mezdra dispatch section;
- shift traffic manager on duty at Vratsa station;
- shift traffic manager on duty at Krivodol station;
- technician group leader at Vratsa Railway Section;
- group of 14 railway workers at Vratsa Railway Section;
- driver of RSPSM No. 99529459017-0;
- attendant at RSPSM No. 99529459017-0;

At 07:21 a.m. the train dispatcher on the Mezdra – Vidin freight – border section conducted a "briefing" of the traffic managers on duty in the section, informing them that there was a work train No. 70440 assigned to operate from Vratsa station to Medkovets station for work on the Medkovets – Brusartsi interstation (with switched off voltage in the catenary). At Krivodol station the briefing was accepted by the previous shift traffic manager on duty, but a number was given for acceptance with the name of the new shift traffic manager on duty, which took over the duty at 08:00 a.m. The new shift traffic manager on duty as not notified by the previous shift traffic manager on duty at Krivodol station about the operation of the additionally assigned work train No. 70440, as well as about the operation of work train No. 70443 DM RSPSM No. 99529436507-8.

After the briefing, the train dispatcher was notified by the energy dispatcher on duty at the section that "they will request an operational window Krivodol - Beli Izvor" (according to the submitted Request No. 2 requesting a path for DM RSPSM No. 99529436507-8 from Boytchinovtsi station to Krivodol station).

The dispatcher from the Operation Control Center at around 07:55 a.m. once notified the train dispatcher on the Mezdra - Vidin section that after the arrival of the motor tractor RSPSM No. 99529459017-0 with the wagon at the Medkovets station, two "operational windows" would be needed for work on the Medkovets - Brusartsi section with switched off voltage in the catenary, including at Brusartsi station.

In the time range from 08:00 a.m. to 10:00 a.m., the train dispatcher on the Mezdra - Vidin freight - border section went without permission to the Sofia Railway Section to sit an exam under the terms of Ordinance No. 56 and the section was temporarily taken over by the neighbouring train dispatcher on the Sofia - Mezdra section.

At around 08:00 a.m., the attendant of RSPSM No. 99529459017-0 informs the traffic manager on duty at Vratsa station that the RSPSM, before leaving for Medkovets, should refuel at the "Base" of the Vratsa Railway Section.

At 08:00 a.m., the driver of RSPSM No. 99529459017-0 reports to work at the "Base" of the Vratsa Railway Section, where he was told that he should refuel RSPSM No. 99529459017-0 and headed to the seventh track, where the RSPSM was parked in a garage.

At 08:04 a.m., the substitute train dispatcher had a conversation with the duty traffic manager at Vratsa station, specifying that RSPSM No. 99529459017-0 would move to the "Base" of the Vratsa Railway Station to be refuelled, and then would move in the assigned direction after FT No. 7620.

At 08:15 a.m., the duty traffic manager at Vratsa station ordered the station switchman at Post No. 2 to move RSPSM No. 99529459017-0 from the seventh track at Vratsa station to the "Base" of the Vratsa Railway Station and, after refuelling, to withdraw to the fourth receiving-departing track at the departure station.

From the provided recordings of the cameras installed in the "Base" of the Vratsa Railway Station, it is evident that RSPSM No. 99529459017-0 was established on the track at 08:19 a.m., from 08:21 a.m. to 08:27 a.m. it was refuelled and at 08:29 a.m. it departed from the track with wagon No. 80523936030-0, moving in the direction of the fourth receiving-departing track and it was established in front of the receiving building at 08:30 a.m. with readiness to depart in the direction.

In the period from 08:30 a.m. to 08:43 a.m. the duty traffic manager at the Vratsa station did not take any action to comply with the schedule for sending work train No. 70440/RSPSM No. 99529459017-0 to Medkovets station.

At 08:43 a.m. the duty traffic manager at Vratsa station remembered and had a conversation with the train dispatcher, misleading him that RSPSM No. 99529459017-0 had then arrived at the station. In response, the train dispatcher informed him that the assigned work train No. 70440 would move after meeting at Vratsa station at PT No. 70101 with FT No. 7620 and after passing DFT No. 70696.

After the work train No. 70440 missed the path to depart at 08:30 a.m., the duty traffic manager ordered the station switchman at Station No. 2 to overtake the train from the fourth to the sixth track, where it would wait for an opportunity to depart along the route.

Vratsa Station signalling equipment is equipped with a Relay System for Key Dependency (RSD) with a command apparatus at the traffic manager and with an executive apparatus at Post No. 2 to prepare the train or shunting route, manual reversal and locking of the switches along the route is required.

At 09:37 a.m. the duty traffic manager at Boytchinovtsi station called the train dispatcher with a question, "under which number is DM RSPSM No. 99529436507-8 assigned to travel, which would travel to Krivodol station, in response to which received No. 70443".

Due to the lack of prior information, at 09:41 a.m. the duty traffic manager at Krivodol station called the train dispatcher again with a question, "where would DM RSPSM No. 99529436507-8 travel to, and informed that they would take an "operational window" between Krivodol and Beli Izvor for work on the catenary".

After the arrival of DFT No. 70696 at Beli Izvor station at 09:47 a.m., the Vratsa - Beli Izvor interstation was free and working train No. 70440 departed from Vratsa station at 09:48 a.m.

At 09:55 a.m., a group leader technician from the Vratsa Railway Section called the office mobile phone of the traffic manager on duty at Krivodol station, introducing himself as a group leader technician and asking which vehicles would be moving in the Boychinovtsi - Krivodol section for the purpose of working on the railway track. The traffic manager on duty informed that DM RSPSM No. 99529436507-8 was coming from Boytchinovtsi for an "operational window" in the Krivodol - Beli Izvor section. The traffic manager on duty failed to inform the train dispatcher and the traffic manager on duty at Boytchinovtsi station about the conversation with the group leader technician to ensure time for work on the railway track.

It is evident from the written statements of the train dispatchers on duty (incumbent and substitute) that they were not notified of any repair work on the railway track along the Krivodol - Boytchinovtsi section.

At 09:57 a.m., work train No. 70443 DM RSPSM No. 99529436507-8 departed from Boytchinovtsi station.

Meanwhile, work train No. 70440 (departing from Vratsa station at 09:48 a.m.) passed Beli Izvor station without stopping at 10:05 a.m.

Due to the impossibility of simultaneously accepting two vehicles at Krivodol station, at 10:18 a.m., the traffic manager on duty first accepted work train No. 70443 DM RSPSM No. 99529436507-8 from Boytchinovtsi station on a third receiving-departing track, and work train No. 70440 waited at the station's entrance signal. Arranged the route with ECM type signalling equipment and work train No. 70440 TFCU RSPSM No. 99529459017-0 passed at 10:20 a.m. along the second receiving-departing track at Krivodol station without stopping.

At 10:20 a.m., technician OHCL entered in the dispatch order log at Krivodol station a request for permission for a train and "electric window" for work on the catenary with cut-off voltage in the Krivodol - Beli Izvor interstation until 11:30 a.m. By order of the train dispatcher at 10:36 a.m., the requested "operational window" was permitted and the interstation was closed for train movement, with the exception of DM RSPSM No. 99529436507-8, the movement of which was to be ensured up to km 32+700 with return to Krivodol station.

At 10:32 a.m., after receiving an order from the energy dispatcher, the duty traffic manager performed manipulations via the remote control panel at Krivodol station, by switching off disconnectors 01, 07 and 12 of the catenary. At 10:38 a.m., the duty traffic manager handed to the driver of DM RSPSM No. 99529436507-8 and the technician OHCL an order for movement under special conditions, model II-A, together with a key-baton from the SABS, and at 10:45 a.m., DM RSPSM No. 99529436507-8 departed from Krivodol station to work on the catenary between Krivodol and Beli Izvor stations.

As can be seen from the written statement and an on-site interview with the technician group leader at the Vratsa railway section, the same reported to work at 08:00 a.m. on 16.12.2024 at the head of the Vratsa railway section. He received the task for the day, which included replacing and driving in 5 unusable wooden sleepers in the Krivodol - Boytchinovtsi section, saying that there was a TFCU RSPSM No. 99529459017-0 assigned, which was to leave from Vratsa station for Medkovets station at 08:30 a.m. The technician group leader prepared a pre-work briefing, in which he entered the task of replacing and driving in sleepers at km 52+850 along the Krivodol - Boychinovtsi section. After the briefing of the workers at the Vratsa railway section, everyone signed their own signature and loaded the necessary materials and tools into a minibus. Two minibuses headed to the work site – one with workers from the Vratsa railway section (14 people), and the other with materials and tools, and arrived at the Krivodol – Boychinovtsi interstation. Immediately after arrival, the TGL ordered two of the workers to place signs for "Working group workplace", respectively 524 meters away from the Krivodol station and 414 meters away from the Boytchinovtsi station. After signalling, it divided the workers into two groups - one to dig and prepare the sleepers for replacement, and the second to carry the sleepers from the minibus to the replacement site and place them at a safe distance from the railway track. While carrying out these activities, the TGL, hearing a sound signal from the Krivodol station, removed the workers from the line to allow "two locomotives" to pass in the direction of the Boytchinovtsi station. The second group of workers had already prepared the old sleepers for replacement.

At 09:36 a.m., TGL called the traffic manager on duty at Krivodol station on his mobile phone. According to the detailed report of the telephone conversation provided by the mobile operator A1, TGL introduced himself to the traffic manager on duty as the "technical manager of the Vratsa group" and was located at km 52+850 in the Krivodol - Boytchinovtsi interstation and was going to replace unusable sleepers. In response, he informed "that the fast train had just entered Krivodol station". Continuing the conversation, TGL asked "whether there will be any trains from Boytchinovtsi or Krivodol after the fast train", to which he was replied that DM RSSM No. 99529436507-8 would be moving from Boytchinovtsi station to Krivodol station. After the conversation ended, he told the workers to move away from the line so that FT No. 7620 could pass and, upon the subsequent passage, work train No. 70443 DM RSPSM No. 99529436507-8 would pass to Boytchinovtsi station.

At 09:55 a.m., the TGL conducted a second telephone conversation with the traffic manager on duty at Krivodol station. He replied, "After the passage of work train No. 70443 DM RSPSM No. 99529436507-8 from Boytchinovtsi station, you can work peacefully", due to the lack of other vehicles, and failed to notify him on the passage of work train No. 70440 RSPSM No. 99529459017-0. He again failed to notify the train dispatcher and the duty traffic manager at Boytchinovtsi station about work on the railway track between the stations.

TGL ordered two of the workers to put the trolley on the line and place the screw spike wretch machine on it with the help of two more workers, and divided the remaining workers into two groups of five people - activities to remove the old sleepers and install the new sleepers, and then to throw ballast and collect the fasteners from the old sleepers.

At one point, the screw spike wretch machine stopped working. TGL went to the machine and while trying to repair it, he heard one of the workers that "A tractor is coming!". That forced the TGL with two workers to quickly move the machine from the railway track. During the action, one of the workers slipped and the machine pressed against his body, with the handle hitting him on the head. Two of the workers helped the injured person to remove the machine from his chest. The trolley on which the screw spike wretch machine was mounted remained on the railway track.

As can be seen from the written testimony and the interview conducted with the driver of RSPSM No. 99529459017-0, during the movement along the Krivodol - Boychinovtsi section, he saw the "Working Group" sign and gave a sound signal with the RSPSM whistle, after which he repeated the action when passing the "Pre-crossing sign". Giving a sound signal was also stipulated in the written testimony and the interview with the RSPSM attendant.

After the work train No. 70440 with RSPSM No. 99529459017-0 entered a right curve on the railway track, the driver and the attendant saw the work group on the line, who were carrying out repairs on the railway track. After passing the work group located on the right and left of the railway track, the driver of RSPSM No. 99529459017-0 stopped.

The majority of the workers on the railway track managed to move away to a safe distance from the line.

It is evident from the testimony of one of the workers that while RSPSM No. 99529459017-0 was passing by them, one of the workers "flipped off the line and hit the railing of the culvert".

Subsequently, they saw the lifeless body of the second worker on the side in front of the culvert on the left in the direction of travel, and no one noticed what happened to him.

After seeing the lifeless bodies of the two workers, the TGL called the national emergency number 112 to send an ambulance. A call was also made to the relevant employees and services. It sent a worker to the track to wait for the ambulance vehicles so that they could be oriented to the scene of the accident.

At 11:23 a.m., by dispatcher's order, the Krivodol - Boytchinovtsi interstation was closed to regular train traffic until the completion of the procedural and investigative actions.

The approximate times at which the interested services arrived:

- around 10:50 a.m. - officers of the Boytchinovtsi RPD;

- around 11:30 a.m. - Emergency Medical Service team

- around 11:40 a.m.- Director of the Vratsa Railway Section and Safety Service from the Sofia Railway Inspectorate "Transport Safety";

- around 13:25 p.m. - officers from the Railway Inspectorate "Transport Safety" and TSSE at the NRIC;

- around 13:30 p.m. - Area Inspector from the Sofia Railway Inspectorate;

- around 14:10 p.m. - officers from the ESA Department at the TOSAMD Sofia;

- around 14:50 p.m. - officers from the National Investigation Service;

- around 15:40 p.m. – employees from the HSW inspection at the NRIC.

At 11:30 a.m., an Emergency Medical Service team arrived, the injured worker was provided with medical assistance and was taken by ambulance to the MHAT – Montana.

After the completion of the pre-trial proceedings by the NIS and the head of the safety investigation from the NAMRTAIB, at 17:00 p.m., written permission was given to begin restoring traffic and capacity in the section. The movement of work train No. 70440 TFCU RSPSM No. 99529459017-0 was allowed and it was accepted at 17:45 p.m. at the Boytchinovtsi station, where it was left under the supervision of the pre-trial authorities.

At 18:00 p.m., by order of the train dispatcher, the movement of trains and vehicles on the Krivodol – Boytchinovtsi inter-station route was restored.

3.1.2. Date, punctual time and location of the event.

The event occurred on 16.12.2024 at around 10:30 a.m. at km 52+744 along the Krivodol-Boytchinovtsi interstation. The permanent way is in a curve with radius R=400 m, total length of the curve L=290 m, super elevation H=80 mm, inclination 8 ‰ in a downhill in the movement direction of RSPSM (fig. 3.1).



Fig. 3.1. Route of work train № 70440 to the place of the accident

- - Origin station for the movement of work train N_{2} 70440 Vratsa;
- - Main stations along the train alignment;
- Final destination of movement of work train № 70440 Medkovets;
- Place of the accident, km 52+744;
- - Track that work train № 70440 did not pass;
 - Track that work train № 70440 passed.

3.1.3. Description of the event location:

3.1.3.1.Layout of the accident along the rail network (Fig. 3.2).



Fig. 3.2. Layout of the accident along the rail network

3.1.3.2. Location of the place of the accident (fig. 3.3).



Fig. 3.3. GPS location of the accident

- 3.1.3.3. Meteorological and geographic conditions at the time of the event on 28.05.2024.
- In the light part of the day -10:30 a.m. (as per the data of the logbooks in Krivodol station);
- Air temperature: 6°C;
- Weather clear;
- Wind 14 km/h, Northwest;
- Average relative humidity 55 %;
- There were no registered rains.

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

The construction works were carried out at the time of the accident.

On 16.12.2024, the head of the Vratsa railway section planned to replace 5 unusable wooden sleepers at km 52+740 in the Krivodol - Boytchinovtsi section. The replacement of unusable sleepers was undertaken on the verbal orders of the Head of the District and the Chief Engineer of the Vratsa

Railway Section. Two minibuses headed to the work site - one with 14 railway workers from the Vratsa railway section and one with tools and materials. Immediately after arrival, the TGL ordered two railway workers to place two signs for "Workplace of a group of workers" (Fig. 3.4) to surround the work group, respectively 524 meters from the Krivodol station and 414 meters from the Boytchinovtsi station.



Fig. 3.4. Sign for a workplace of a group of workers

After the signalling TGL created organization and started work on the replacement of the unusable sleepers until the accident occurrence.



Fig. 3.5. Screw spike wretch machine for the fastener

Evident from the explanations of the driver of RSPSM during the movement he saw the sign for the workplace of the group of the workers and gave a sound signal by the locomotive whistle, then he repeated the activity while passing the pre-crossing sign.

After the entering of work train N_{2} 70440 RSPSM N_{2} 99529459017-0 into the curve, moving on it the driver and his attendant saw the work group, which was performing a repair of the rail track.



Fig. 3.6. Location of the accident

3.1.3.5. Fatalities, injuries and material damages:

3.1.3.5.1. Employees of the railway infrastructure manager or railway undertaking.

Two employees with fatal outcome of the infrastructure manager.

One employee with trauma and injuries of the infrastructure manager.

- *3.1.3.5.2. Other persons officially connected with the location of the event. None.*
- 3.1.3.5.3. Passengers: None.
- 3.1.3.5.4. External persons. None
- 3.1.3.5.5. Cargo, luggage or other property. None.

3.1.3.6. Rolling stock, infrastructure and environment.

- Caused damages to the RSPSM № 99529459017-0 none;
- Caused damages to the track none;
- Caused damages to the catenary none;
- Caused damages to the signalling equipment none;
- Caused damages to the environment none;

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

In the period from 10:30 a.m. to 17:00 p.m. on 16.12.2024 the railway infrastructure manager and the railway undertakings generated additional costs for amendment of the train operation schedule and the railway capacity in the section.

- Deviated trains of the railway undertakings none;
- Cancelled trains 6 units 159,70 BGN;
- Assigned trains of the railway undertakings none;
- Delayed trains in total 21 units 3277,30 BGN;
- Costs for rehabilitation means none;
- Total other costs: 3437,00 BGN

3.1.5. Identity of the participants and their functions. Railway infrastructure manager:

The National Railway Infrastructure Company provides equal and non-discriminatory access to all licensed and certified railway undertakings for the transport of passengers and cargo on the railway infrastructure of the Republic of Bulgaria.

Personnel of SE NRIC involved in the accident:

- Senior train dispatcher in TOU Sofia on 16.12.2024 г.;
- Train dispatcher along the section Mezdra-Vidin-border at TOU Sofia on 16.12.2024;
- Traffic manager on duty in Vratsa station on16.12.2024;
- Traffic manager on duty in Krivodol station on 16.12.2024;
- Dispatcher at TCC at permanent way and structures on 16.12.2024;
- Technician Group Leader at Vratsa railway section on 16.12.2024;
- Driver of TFCU RSPSM № 99529459017-0 at Vratsa RS on 16.12.2024.

3.1.6. Description of the respective parts of the railway infrastructure and signalling system: 3.1.6.2. Type of the track, railway switch, rail crossing etc.

The Krivodol - Boytchinovtsi inter-station section is part of the seventh main conventional railway line. The line is electrified. The interstation distance is 17,300 meters. At the time of the accident at km 52+740, the working group was replacing unusable wooden sleepers with new ones. The accident area in the inter-station section, the railway track in the direction of travel is in a right curve with reinforced concrete sleepers ST-4. An exception is one section with a length of 25 m of wooden sleepers on which replacement of unusable sleepers was carried out. The accident occurred at km 52+744 in the area where sleepers were being replaced.

3.1.7.1. Interstation block system, station interlocking, type of signalling and messages. Interstation block system

The train movement in the interstation Krivodol – Boytchinovtsi and in the section Mezdra-Vidinfreight is ensured under the rules of, Semi-automatic block system Stepanoph type"along single railway line – functioning (fig. 3.7).



Fig. 3.7. Extract from TOMS of TOS in Mezdra Vidin section on 16.12.2024

Interlocking

The signalling equipment in Krivodol station is Electrical interlocking ECM type – functioning (fig. 3.8).



Fig. 3.8. Signalling equipment in Krivodol station ECM type.

The signalling equipment in Boytchinovtsi station is a Route-relay Interlocking RRI type WSSBII – functioning (fig. 3.9.).



Fig. 3.9. Signalling equipment in Boytchinovtsi station RRS type – WSSB II <u>Signalling type</u>

The entrance and exit signals in both stations are under the speed signalling – functioning;

<u>Messages</u>

The communications (incoming and outgoing) between the stations Krivodol and Boytchinovtsi is performed through a direct interstation connection DCCM 8 – functioning (fig. 3.10).



Fig. 3.10. Apparatus for a direct interstation connection DCCM 8

Krivodol station and the neighbouring stations and interstation along the section are equipped with a train dispatching radio connection (TDRC), by which assistance are performed the radio connections of the locomotive drivers with the traffic manager on duty, with a train dispatcher, with the single stations and with the trains in the section – functioning (fig. 3.11);



Fig. 3.11. Train dispatching radio connection TDRC in Krivodol station

The shift traffic managers on duty in the stations Krivodol and Boytchinovtsi and the stations in the section are equipped with official mobile phones.

3.1.7.2. Train protection systems.

The stations Krivodol and Boytchinovtsi do not have train protection systems.

RSPSM N_{0} 99529459017-0 is equipped with a disc analogue tachograph type KTCO 1318-27 – non-functioning and unusable at the time of the accident.

3.1.8. Other information related to the event.
3.1.8.1. Train documents of RSPSM № 99529459017-0.
Train documents "Way-bill"(fig. 3.12)
Brake Mass Certificate VP-11 for the composition (fig. 3.13)

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Fig. 3.12. Way-bill of RSPSM №99529459017-0

Fig. 3.13. Brake Mass Certificate

3.2. Factual description of the occurred.

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

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

At 07:21 a.m. the train dispatcher conducted a "briefing" of the duty traffic managers in the Mezdra - Vidin freight - border section, in which he announced that a work train No. 70440 was assigned for movement from Vratsa station to Medkovets station for work on the railway track in the Medkovets - Brusartsi interstation.

The dispatcher from the CTC on site notified the train dispatcher that after the arrival of the motor trailer TFCU RSPSM No. 99529459017-0 at Medkovets station, two "windows" would be needed for work in the Medkovets - Brusartsi interstation with switched off voltage in the catenary, including at Brusartsi station (as can be seen from the readings).

In the time range from 08:00 a.m. to 10:00 a.m., the train dispatcher of the Sofia - Mezdra section also took over the management of the Mezdra - Vidin - border dispatch section, as the train dispatcher of the Mezdra - Vidin - border section went without permission to the Sofia Railway Inspection (located in the same building, but one floor below) to take an exam in accordance with the requirements of Ordinance No. 56.

At 08:00 a.m. the driver of the motor trailer TFCU RSPSM No. 995290459017-0 reported to work at the "Base" of the Vratsa Railway Section, where he was told that he should refuel the RSPSM and headed to the seventh track, where the RSPSM was located in the garage.

At 08:04 a.m., via the direct dispatching connection, the train dispatcher had a conversation with the duty traffic manager at the Vratsa station, in which they specified that the RSPSM would first refuel, and would depart after fast train No. 7620.

At 08:15 a.m., the duty traffic manager at the Vratsa station ordered the station switchman at Post No. 2 to over-garage the RSPSM from the seventh track of the station to the "Base" of the Vratsa Railway Section and, once they were ready, to move them to the fourth receiving-departing track.

At 08:19 a.m. the RSPSM was established on the track, from 08:21 a. m. to 08:27 a.m. it refuelled and at 08:29 a.m. it set off with wagon No. 80523936030-0, on which a specialized "HIAB" crane was installed, moving towards the station along the fourth track and stopping at 08:30 a.m.

At 08:43 a.m. the duty traffic manager at Vratsa station remembered to inform the train dispatcher that the RSPSM is at the station, after having been there for 13 minutes. In response to that, the train dispatcher ordered that the same was assigned as working train No. 70440, and that it would move after a meeting at Vratsa station at PV No. 70101 with BV No. 7620 and after passing DTV No. 70696. The opportunity for working train No. 70440 to depart was missed according to schedule at 08:30 a.m. in the direction of Medkovets station. The order of the train dispatcher led to the rerouting of the train for work train No. 70440 from the fourth to the sixth track, where it had to wait for an opportunity to depart from the station.

After the arrival of DFT No. 70696 at Beli Izvor station at 09:47 a.m., at 09:48 a.m. a working train No. 70440 was sent from Vratsa station in the direction of Medkovets station.

At 09:37 a.m. the duty traffic manager at Boytchinovtsi station called the dispatcher on the dispatching line and asked under which number the RSPSM type DM was assigned to move, which would move to Krivodol station, the latter dictated working train No. 70443.

At 09:41 a.m. due to lack of information the duty traffic manager at Krivodol station called the train dispatcher on the direct line to ask where DM RSPSM No. 99529436507-8 would move, the dispatcher informed the duty traffic manager that they would take an "operational window" between Krivodol and Beli Izvor.

At 09:55 a.m., the TGL from the Krivodol - Boytchinovtsi interstation called the duty traffic manager at the Krivodol station on the official mobile phone. They had a conversation, and the TGL was interested in whether vehicles would be moving in the Boychinovtsi - Krivodol interstation. The duty traffic manager, in turn, informed him that DM RSPSM № 99529436507-8 was coming from Boytchinovtsi for a window in the Krivodol - Beli Izvor interstation.

Meanwhile, work train № 70440, which left Vratsa station at 09:48 a.m., continued its movement, passing through Beli Izvor station without stopping at 10:05 a.m.

At 09:57 a.m., work train N° 70443 DM RSPSM N° 99529436507-8 departed from Boytchinovtsi station. Due to the impossibility of simultaneously accepting two vehicles at Krivodol station, first at 10:18 a.m., work train No. 70443 DM RSPSM No. 99529436507-8 was accepted on a third track, and at that time, work train No. 70440 was waiting at the station's entrance signal to be accepted. The traffic manager on duty arranged the route with open entrance and exit signals, and work train No. 70440 passed at 10:20 a.m. along the second main track at Krivodol station without stopping for Boytchinovtsi station.

At 10:20 a.m., a OHCL technician entered in the Dispatcher's Order Log at Krivodol station a request for permission for a "train and electrical window" for work on the catenary with the voltage switched off in the Krivodol - Beli Izvor interstation from 10:30 a.m. to 11:30 a.m. By order of the train dispatcher at 10:36 a.m., the requested "operational window" was allowed and the inter-station section was closed for train movement, with the exception of DM RSPSM No. 995294365078.

At 10:32 a.m., after receiving an order from the energy dispatcher at Krivodol station, disconnectors 01, 07 and 12 of the catenary were turned off.

At 10:45 a.m., DM RSPSM No. 99529436507-8 left Krivodol station to work on the inter-station section Krivodol - Beli Izvor.

At 08:00 a.m., the TGL at the Vratsa railway section went to the head of the Vratsa railway section and received the tasks for the day to replace 5 unusable wooden km 52+850 on the inter-station section Krivodol - Boytchinovtsi. The TGL went to the even room, wrote the work instructions and presented the workers with the work for the day. After familiarizing themselves with the instructions, the workers loaded the necessary materials and tools into a minibus. Two minibuses headed to the work site – one with the workers from the Vratsa railway section (14 people), and the other with the loaded materials and tools, and at around 09:00 a.m. they arrived at km 52+850 in the Krivodol – Boychinovtsi interstation. Immediately after arriving at the site, the TRG ordered two workers to place signs for "Workplace of a group of workers" to enclose the work group at a distance of 524 meters towards the Krivodol station and 414 meters towards the Boytchinovtsi station. No signalmen were provided for the work group. After signalling, the workers were divided into two groups with assigned tasks to perform.

At 09:36 a.m., the TGL called the traffic manager on duty at Krivodol station on his mobile phone, introducing himself as the technical manager of the Vratsa group and located at km 52+850 in the Krivodol - Boytchinovtsi interstation to replace 5 unusable sleepers. In response, he informed "that the fast train has just entered Krivodol station". Continuing the conversation, the TGL asked "will there be any vehicles from Boytchinovtsi or Krivodol after the fast train", to which it was replied that DM RSPSM No. 99529436507-8 would be moving from Boytchinovtsi station to Krivodol station. After the



Fig. 3.14. Screw spike wretch machine

conversation, he ordered the workers to move away from the line for the passage of fast train No. 7620 (departing from Krivodol station at 09:38 a.m.) and the subsequent passage of work train No. 70443 DM RSPSM No. 99529436507-8.

At 09:55 a.m., the TGL had a second telephone conversation with the traffic manager on duty at Krivodol station, who informed him that after the passage of work train No. 70443 DM RSPSM No. 99529436507-8 to Krivodol station, he could work "calmly" due to the lack of other vehicles. Then the TGL ordered two workers to put the screw spike wretch machine on the line with the help of two more workers and began preparations for replacing the sleepers (Fig. 3. 14 and 3.15).



Fig. 3.15. Trolley of the screw spike wretch machine

At one point the screw spike wretch machine refused to work and TGL went and tried to repair the machine. He heard one of the workers say, "A trailer is coming!" That forced the TGL and the two workers to move quickly the machine away from the railway track. During the action, one worker slipped and fell, the handle hit him on the head and the machine pressed against his chest. The TGL and the other worker removed the machine from his chest. The cart on which the machine was mounted remained on the railway track.

The driver of the motor tractor RSPSM No. 99529459017-0 saw the sign for "Workplace of a group of workers" during the movement and gave a sound signal with the RSPSM whistle, after which he repeated the action when passing the pre-crossing sign.

After entering the curve of the railway track and moving along it, they saw the group of workers carrying out repairs on the railway track. After passing the place, the driver of RSPSM No. 99529459017-0 took action to stop. The majority of the workers on the railway track managed to remove quickly themselves from the line. One of the workers saw that while the motor trailer was passing by them, one of the workers "went off the line and hit the railing of the culvert".

Subsequently, they saw the lifeless body of the second worker on the left before the culvert, and no one noticed what happened to him.

The approximate time of the railway accident is around 10:30 a.m.

The TGL, after seeing the bodies of the two workers, promptly called the national emergency number 112 to send emergency medical assistance. A call was made by him to other interested persons and services. He sent a worker to the track to wait for the arrival of the EMC vehicles to direct them to the place of the accident.

At 11:23 a.m., the train dispatcher ordered the Krivodol - Boytchinovtsi interstation to close for train traffic until the completion of the procedural and investigative actions.

3.2.1.2. Rolling stock and technical facilities functioning.

During the movement of RSPSM No. 99529459017-0 with wagon No. 80523936030-0 Res from the Vratsa origin starting station to the place of the accident, the signalling equipment and signalling systems, both at the stations and between the stations, were technically in good condition.

An analogue disk tachograph was installed in the cabin of RSPSM No. 99529459017-0 type TFCU. It is evident that its technical condition at the time of the accident was unusable, did not work - malfunctioned. RSPSM No. 99529459017-0 type TFCU is regularly registered in the Virtual Register of Vehicles. It is evident from the register that RSPSM No. 99529459017-0 type TFCU is owned and maintained by the State Enterprise NRIC.

Wagon No. 80523936030-0, Res series is a specialized platform wagon on which a HIAB excavator is mounted for the needs of the railway infrastructure. The wagon is regularly registered in the Virtual Register of Vehicles. The wagon is owned and maintained by the State Enterprise NRIC.

After the speed and braking tests carried out on 09.01.2025, it was established that the braking system of RSPSM No. 99529459017-0 with attached wagon No. 80523936030-0 Res is in working order and accordingly at the time of the accident the vehicles were technically in working order and were able to stop at a certain pre-signal braking distance.

3.2.1.3. Operational system functioning.

The operational system between the stations Krivodol and Boytchinovtsi, as well as in the section of the seventh main conventional line on 16.12.2024, functioned normally. The subsequent gaps in coordination and untimely exchange of information between the personnel on shift on 16.12.2024 at the Sofia TOSAMD, Sofia Coordination of Train operation Centre, and Vratsa Railway Section preconditioned the cause of the accident occurrence.

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.

At around 10:50 a.m., the Boytchinovtsi DPS authorities, as well as the District Prosecutor of the Montana District Prosecutor's Office, arrived at the place of the accident. The scene of the accident was isolated and guarded by the Ministry of Interior authorities and restricted to the present employees of the railway infrastructure manager. Only the rescue services of the Bulgarian EMS, the Ministry of Interior, the NIS, and the head of the safety investigation at the NAMRTAIB were allowed on site.

3.2.2.2. Actions of the emergency rescue services.

Around 11:30 a.m., teams from Emergency Medical Services and Fire Safety and Civil Protection arrived at the scene of the accident.

The EMS teams on site provided assistance to the injured employee and he was taken by EMS vehicle to the Montana Hospital for treatment.

After the completion of the examinations by the pre-trial investigation authorities from the National Investigative Service, the bodies of the two death employees were taken to the Montana Forensic Medicine Department for forensic medical examinations.

3.2.2.3. Actions of the emergency rehabilitation services Non applicable

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

On 16.12.2024, at around 17:30 p.m., the procedural and investigative actions by the pre-trial investigation bodies of the NIS and the head of the safety investigation at the NAMRTAIB were completed at the Krivodol - Boytchinovtsi interstation. The head of the Task Force from the State Enterprise NRIC was given written permission to restore the train schedule and capacity along the Mezdra - Vidin - border section.

After the completed inspections, the motor tractor RSPSM No. 99529459017-0 with the wagon No. 80523936030-0 of the same was moved from the interstation to Boytchinovtsi station, where it remained under the supervision of the pre-trial investigation of the NIS.

4. Analysis of the event

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

Railway infrastructure manager

Analysis of the movement of the RSPSM № 99529459017-0 on 16.12.2024

Analysis of the movement of a motor trailer RSPSM No. 99529459017-0 with a trailer wagon No. 80523936030-0 from Vratsa station to a stop along the Krivodol - Boytchinovtsi interstation at km 52+865.

The analysis of the movement of RSPSM No. 99529459017-0 was made on the basis of the entries in the logbooks form II-76 of the duty managers at the stations along the route of movement from Vratsa station to the place of the accident at the Krivodol - Boytchinovtsi interstation, the entries in the RSPSM waybill (form MB-1 - Fig. 3.12), the testimony of the driver and the RSPSM attendant, based on the



Fig. 4.1. Analogue tachograph, installed on RSPSM №99529459017-0

calculations for the movement and stopping of the RSPSM at the place of the accident and the brake test carried out at the place of the accident. The exact time of the accident cannot be indicated

An analogue tachograph was installed in the cabin of the RSPSM No. 99529459017-0 for registering and recording information during travel and operation of the machine (Fig. 4.1). During the inspection of the RSPSM at the place of the accident, it was found that a circular diagram was installed in the analogue tachograph, which was not replaced daily, as recorded in the instructions for its use, which is why data from multiple trips were recorded on it, superimposed on each other without the possibility of being deciphered (read) (Fig. 4.2).

RSPSM No. 99529459017-0 with wagon No. 80523936030-0 Res departed as a working train No. 70440 from Vratsa station at 9:48 a.m., as evident from the entry in the machine's waybill (Fig. 3.12, pos. 1), the telephone message recorded in the logbook no. II-76 at Vratsa station (Fig. 4.3) and the entry in the train movement log DP-2 at Vratsa station (Fig. 4.4).



Fig. 4.2. Circular diagram of RSPSM № 99529459017-0, taken from the analogue tachograph at place of the accident

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Fig. 4.3. Log-book for tele- phonograms Sample II-76 in Vratsa station for communication with Beli Izvor station

The train passes Beli Izvor station without stopping at 10:05 a.m., as reflected in the telephone logbook form II-76 of the traffic manager on duty at Beli Izvor station (Fig. 4.5), as well as in the train traffic logbook form DP-2 at Beli Izvor station (Fig. 4.6) and in the telephone logbook form II-76 of the traffic manager on duty at Krivodol station.

Working train No. 70440 was waiting at the entrance signal at Krivodol station to receive working train No. 70443 DM RSPSM No. 99529436507-8 at the station, at Krivodol station it is not allowed to receive two trains at the same time. After opening the entrance and exit signals at Krivodol station, working train No. 70440 RSPSM No. 99529459017-0 with wagon No. 80523936030-0 Res passed through Krivodol station without stopping and continued its movement in the Krivodol - Boytchinovtsi

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Fig. 4.4. Log-book for the train operation Sample DP-2 in Vratsa station

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Fig. 4.5. Log-book of telephone-grams Sample II-76 in Beli Izvor station for communication with Krivodol station

interstation, reflected in the telephone message log-book Sample II-76 of the traffic manager on duty in Krivodol station.

Upon entering the curve of the railway track, the RSPSM driver and his attendant saw the sign "Workplace of a group of workers" (Fig. 3) and gave a sound signal with the machine's whistle. Shortly after, they saw the pre-crossing sign (Fig. 4) and again gave a signal with the machine's whistle.



Fig. 4.6. Log-book for the train operation Sample DP-2 in Beli Izvor station

Work train No. 70440 consisting of RSPSM No. 99529459017-0 and wagon No. 80523936030-0 approached the place where a work group was working at km 52+740 (Fig. 1.1), the driver did not take any action to reduce the speed, although he saw the workers on the line. The workers, seeing the approaching vehicle, ran away, but the screw spike wretch machine together with the trolley remained on the line. Two workers removed the machine, but the trolley remained on the line, two other workers took up the task of removing the trolley, they failed and RSPSM No. 99529459017-0 hit it and threw it to the left of the line. When the driver heard a blow, around km 52+744 he took a *quick stop* with the automatic train brake. The train slowed down and stopped at km 52+865, shortly before the level crossing at km 52+882. According to the cited data from the sketch of the accident scene (Fig. 1.1), from the moment the train made a *quick stop* until it came to a final stop, the braking distance was about 121 meters. After stopping, the driver released the brake, reversed the machine and moved the train back, traveling about 70 meters to km 52+795, thus erasing the traces of the final position after the first stop.

Working train No. 70440 is provided with the necessary brake mass (Fig. 3.13).

On 09.01.2025, the Investigation Commission at the NAMRTAIB with representatives of the railway infrastructure manager carried out speed-braking tests of RSPSM No. 99529459017-0 and wagon No. 80523936030-0 at the Krivodol - Boytchinovtsi interstation in the accident area. The results of the performed tests were drawn up in two protocols.

During the performed tests, it was established:

- In Protocol No. FOS-06.01.040 reflects the results of the speed-braking test of the automatic train brake, carried out with RSPSM No. 99529459017-0 and wagon No. 80523936030-0. During the test performed from the moment of holding with the automatic train brake from km 52+633 to the final stop at km 52+786, a braking distance of 153.30 m was measured at a speed of 50 km/h;
- Protocol No. FOS-06.01.050 reflects the results of the speed-braking test of the direct brake of RSSM No. 99529459017-0, carried out with RSPSM No. 99529459017-0 and wagon No. 80523936030-0. During the test performed from the moment of holding with the direct brake from km 52+741 to the final stop at km 52+808, a braking distance of 67.20 m was measured at a speed of 58 km/h;

<u>Note:</u> The tests were carried out after the RSPSM and the wagon had been at Boytchinovtsi station for more than 20 days, exposed to winter weather conditions with snowfall and negative air temperatures.

Analysis of the work of working group on permanent work and structures.

The work on the Krivodol - Boytchinovtsi interstation was carried out without interrupting the train traffic, no "operational window" for the work was regulated (permitted). The TGL did not submit a written request to the Krivodol station to carry out work on the railway track on 16.12.2024.

Arriving at the workplace around km 52+740 with two minibuses (one with workers, the other with tools and materials) according to the testimony of the working group technician, they began work after the passage of DM RSPSM No. 99529436507-8 for Krivodol station.

Two workers placed signs "Workplace of a group of workers" at km 52+216 on the Krivodol station side and at km 53+154 on the Boytchinovtsi station side. According to the working group technician, no signals for a short-term speed reduction and signalmen guarding the working group were placed.

- The place of work on the railway track for the replacement of 5 unusable wooden sleepers is in the area of km 52+740;

- Parameters and structure of the railway track:

- Circular right curve with R = 400 m, cant 80 mm, longitudinal slope 8 % - descent

- Jointed track with supported joints, rails type S 49 kg/m and length 25 m;

- Reinforced concrete sleepers ST-4 with fastening PAK-68 "I", as an exception there is one section with a length of 25 m of wooden sleepers and fastening "K", the section passes through a culvert with metal railings on both sides (the accident site);

- Near the place of work there is a railway crossing at km 52+872, equipped with ALCS, with a pre-crossing indicator at km 52+472 on the side of Krivodol station;

- The work on the connecting fastener was carried out with a screw spike wretch machine weighing about 120 kg and a trolley to it weighing about 40 kg.

During the movement of work train No. 70440 in the Krivodol - Boytchinovtsi section, according to the driver's testimony, he whistled the working group indicator and the pre-crossing indicator twice. "The indicator obliges the locomotive driver to signal "Attention!" repeatedly at intervals of 3-5 s until entering the workplace area".

Before the work train passed, the screw spike wretch machine was damaged. For that reason, the technician-head of the group tried to repair the damage of the machine. At that time, one of the workers shouted "A trailer is coming! " The TGL with the two workers working with the machine quickly removed it at a clearance distance to the left of the outer left rail. While carrying the machine, one of the workers slipped and was pressed by the machine in the chest area.

When the screw spike wretch machine was being moved from the line, the machine's trolley, which was used to move it along the rails, remained on the rails. Seeing that the trolley was on the rails and the trailer was approaching, two workers decided to remove it from the line. They failed to remove it and at that moment the trailer hit one worker on the left and the trolley, which the second worker was holding on to on the right. As a result of the collision, the trolley turned to the left and dragged the second worker. He flew over the line, hit the railing of the culvert and fell, at km 52+752. The first worker fell to the left of the line on the slope of the ballast prism before the culvert as a result of the collision from the trailer.

Analysis of the work of the personnel in the train operation management

The senior train dispatcher at 07:00 a.m. on 16.12.2024 of the operational analysis, conducted jointly with the head of the unit/service, operational-dispatching at the Sofia TOU, declared the "operational window" in question for the repair of the catenary at the request of the EDD Boytchinovtsi. The head of the unit/service, operational-dispatching at the Sofia TOU assessed that an "operational window" could be allowed in the time range from 10:10 a.m. to 11:30 a.m., and orally ordered the train dispatcher of the Mezdra - Vidin - border section. For the movement of work train No. 70443 DM RSPSM No. 99529436507-8 from Boytchinovtsi station to Krivodol station, request No. 2/16.12.2024 has been submitted to the SAMSU from the EDD on 16.12.2024 at 08:05 a.m. with a departure time of 09:00 a.m.

For the purpose, by telegram No. 159/16.12.2024 for the needs of the State Enterprise NRIC on 16.12.2024, upon request, a work train No. 70443 DM RSPSM No. 99529436507-8 was assigned with a departure time from Boytchinovtsi station at 10:15 a.m. and arrival at Krivodol station at 10:34 a.m.

A request No. 2958/15.12.2024 was also submitted to the SAMSU by the Vratsa Railway Section on 15.12.2024 at 10:03 a.m. for the movement of a work train from Vratsa station to Medkovets station on 16.12.2024 with departure time at 08:30 a.m., consisting of RSPSM No. 99529459017-0 and wagon No. 80523936030-0, length 35 meters and weight 60 tons.

By telegram No. 149/15.12.2024, at the request of the Vratsa Railway Section, a working train No. 70440 was assigned, consisting of RSPSM No. 99529459017-0 and wagon No. 80523936030-0, 35 meters long and 60 tons in weight, with a starting time of departure from Vratsa station at 08:30 a.m. and arrival at Medkovets station at 9:55 a.m.

The train dispatcher of the Mezdra - Vidin section informed the "briefing with the traffic managers on duty" that in addition to the regular trains, work trains No. 70443 DM RSPSM No. 99529436507-8 from Boytchinovtsi station to Krivodol station and No. 70440 TFCU RSPSM No. 99529459017-0 and wagon No. 80523936030-0 with the Vratsa - Medkovets route were assigned. The same person arbitrarily left his workplace from 08:00 a.m. to 10:00 a.m. without informing the substitute dispatcher of the Sofia - Mezdra section what provisions followed from the briefing. The substitute train dispatcher of the Mezdra - Vidin section, when managing the movement of trains, adhered to compliance with the TOS. According to the written testimony, he was not informed for the movement of the two working trains.

According to the written statements of the two train dispatchers on duty, they were not informed that repair work would be carried out on the railway track in the Krivodol - Boytchinovtsi section.

The coordination, control and information dispatcher in Sofia at the "Permanent way and Structures" Division attended the briefing conducted by the head of a unit/service at the Sofia TOU. At the briefing, the same person asked questions regarding the movement of RSPSM No. 99529459017-0 and wagon No. 80523936030-0 from Vratsa station to Medkovets station and the provision of operational, train and electrical "operational windows" in the Medkovets - Brusartsi section and at Brusartsi station. After the briefing, the same person did not follow the movement of RSPSM No. 99529459017-0 and wagon No. 80523936030-0 from Vratsa station to Medkovets station. He learned about the accident from the senior train dispatcher, which shows that he did not express any interest in the movement of the working train in the section. That demonstrates the duplication of several levels of dispatchers in the railway track, what is their efficiency in the operation.

During the duty of the dispatching apparatus and the duty traffic managers in the State Enterprise NRIC, coordination, communication and control were not carried out regarding the movement of the working train No. 70440 RSPSM No. 99529459017-0 with wagon No. 80523936030-0 to Medkovets station.

The duty traffic manager at Vratsa station, after refuelling RSPSM No. 995294590170, ordered the train to move to the fourth receiving and dispatching track in the station. After overrunning RSPSM No. 99529459017-0 with wagon No. 80523936030-0 at 08:29 on the fourth track at 08:43 the duty manager reported to the train dispatcher that the trailer was ready to depart after having stayed on the track for 13 minutes, which meant that the route for the departure of work train No. 70440 was missed according to the schedule after FT No. 7620.

The driver of the RSPSM No. 99529459017-0 did not inform the duty manager at Vratsa station in a timely manner that the RSPSM needed to be refuelled. After refuelling the RSPSM, the same vehicle, together with the attached wagon, was refuelled on the fourth track at Vratsa station. The driver and his attendant did not notify the duty traffic manager at Vratsa station of their readiness to depart according to the schedule.

The working hours of the duty traffic managers at Krivodol station according to the approved schedule did not correspond to the actual working hours. The duty traffic manager at Krivodol station, previous shift, during the briefing with the train dispatcher, met and sent off BV No. 7621 at around 07:25 and did not attend the briefing conducted by the train dispatcher at the section. For the reason, he did not hand over to the duty traffic manager, new shift, and the assigned emergency vehicles in the TOS for the day. At 09:55 a.m. the duty traffic manager at Krivodol station received a call on his work mobile

phone. A male voice from the TGL called, he was interested in whether any vehicles would be moving on the Boytchinovtsi - Krivodol section. In turn, he was informed that the DM RSPSM was coming from Boytchinovtsi for a window on the Krivodol - Beli Izvor section. According to the written testimony of the duty traffic manager, he was not notified on the presence of a working group along the section, of the type of upcoming work, as well as of the time of the work. The duty traffic manager at Krivodol station did not take any action to notify the TGL and the driver of the working train No. 70440 about the working group on the Krivodol - Boychinovtsi section, which would have drawn the attention of the driver of the working train. He did not also notify the train dispatcher.

4.1.3. Entities in charge of the technical maintenance. Infrastructure manager

• 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. Scope of activities of a structure responsible for maintenance, Vehicle category: freight wagons, passenger coaches and RSPSM, owned by SE NRIC;

4.1.4. *Manufacturers or providers of rolling stock and railway products.* Non-applicable.

4.1.5. National Safety Authority.

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

4.1.6. Notified bodies or Risk assessment bodies.

Notified body or Risk assessment body (NoBo) for the Republic of Bulgaria is "TINSA" EOOD. The company 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, issued by RAEA and valid from 15.07.2021.

Scope of the permit

<u>Subsystems:</u>

- 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 the assessment activities

Structure fields of the railway system:

- Infrastructure;
- Energy;
- Control, command and signalling along the railway lines;
- On-board control, command and signalling;
- Rail Rolling Stock.

Functional fields of the railway system:

- Traffic Operation and Management;
- Maintenance;
- Telematics applications for freight and passengers.

Assessment of the overall coordination of the risk management:

- Organization;
- Methods ;
- Technical aspects, necessary for the conformity assessment and the completeness of the risk evaluation and the safety level in the system.

4.1.7. 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.

4.1.8. 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.

•SE NRIC maintains a permanent Railway Infrastructure Register (RINS) at the ERA, which records data including all components of the ERA railway infrastructure.

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 factors

4.3.1. Individual human characteristics:

4.3.1.1. Training and development, including skills and experience.

Railway infrastructure:

• Traffic Manager/Senior Train Dispatcher at Sofia TOU on 16.12.2024:

Certificate of Competence No. 12843, acquired qualification "Traffic Manager", training conducted in the period 26.04. ÷ 29.10.2010, training institution CPC at SE NRIC, issued by EA "Railway Administration";

Certificate No. 5130 for holding the position of "TM/Senior Train Dispatcher" at TOSAMD Sofia from 01.05.2020.

• Traffic Manager/Train Dispatcher at Sofia TOU on 16.12.2024:

Diploma No. 22284, professional qualification "Traffic Manager", training conducted in the period 1984÷1987, training institution VNVTU "Todor Kableshkov", issued by VNVTU "Todor Kableshkov"

Certificate No. 5195 for holding the position of "Traffic Manager Train Dispatcher" at TOSAMD Sofia, issued on 01.10.2020.

• Traffic Manager at Vratsa Station on 16.12.2024:

Diploma No. 21886, professional qualification "Traffic Manager", training conducted in the period 1983÷1986, training institution VNVTU "Todor Kableshkov", issued by VNVTU "Todor Kableshkov"

Certificate No. 5792 for holding the position of "Traffic Manager" at TOSAMD Sofia, issued on 01.03.2022

• Traffic Manager at Krivodol Station on 16.12.2024:

Certificate of legal capacity No. 11566, acquired legal capacity "Traffic Manager and Commercial Operation", training conducted in the period 09.10.1989 ÷ 09.05.1990, training institution CPPQQ at SF BDZ, issued by Company BDZ;

Certificate No. 5085 for holding the position of "Traffic Manager" at TOSAMD Sofia from 31.12.2019;

• Dispatcher in the Central Traffic Control Centre at the Permanent way and Structures Division on 16.12.2024;

Diploma No. 000038, professional qualification "Operation and Repair of Railway Infrastructure", training conducted in the period 1986÷1991, training institution VNVTU "Todor Kableshkov", issued by VNVTU "Todor Kableshkov"

Certificate No. IV-186 for holding the position of "Head of Unit RZKKI Sofia" at the PDWSD issued on 14.03.2022

• Technician Group Leader in Vratsa Railway Section on 16.12.2024:

Certificate of Legal Competence No. 21232, acquired qualification "Construction Technician in PRZLS", training conducted in the period 09.07. ÷ 30.11.2018, training institution CPC at SE NRIC, issued by EA "Railway Administration";

Certificate No. 480 for holding the position of "Group Leader Technician" at RS Vratsa from 30.01.2019;

• Driver of RSPSM No. 99529459017-0 at Vratsa RS on 16.12.2024:

Certificate of qualification No. 6865, acquired qualification "Driver of RSPSM", training conducted in the period 10.04. ÷ 09.08.2006, training institution CPC at SE NRIC, issued by EA "Railway Administration";

Certificate No. 657 for holding the position "Railway Machinery/Trailer Driver" at Vratsa Railway Section from 09.07.2013

Additional certificate No. 71 2016 0392 from SE NRIC for rolling stock for which the driver is allowed to drive - series TFCU from 14.02.2023 on the national railway infrastructure of the Republic of Bulgaria from 02.03.2023 to 28.02.2026.

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

• Traffic manager/senior train dispatcher at the Sofia TOU:

Single health information file No. 2273 dated 26.06.2024, issued by the National Multidisciplinary Transport Hospital - Sofia;

Conclusion: fit for traffic manager/senior train dispatcher.

Psychological certificate No. 1212/21.11.2023, issued by the Psychological Laboratory for Railway Transport Sofia at the National Multidisciplinary Transport Hospital - Sofia for traffic manager/senior train dispatcher.

Conclusion: admitted for a period of 5 years.

• Traffic manager/train dispatcher at the Sofia TOU:

Single health information file No. 2441 dated 01.07.2024, issued by the National Multidisciplinary Transport Hospital - Sofia;

Conclusion: fit for traffic manager/train dispatcher;

Psychological certificate No. 1307/19.12.2023, issued by the Psychological Laboratory for Railway Transport Sofia at the National Multidisciplinary Transport Hospital - Sofia for traffic manager/train dispatcher.

Conclusion: admitted for a period of 3 years.

• Traffic manager at Vratsa station on 16.12.2024:

Single health information file No. 3513 dated 04.11.2024, issued by the National Multidisciplinary Transport Hospital - Sofia;

Conclusion: fit for traffic manager;

Psychological certificate No. 298/07.03.2023, issued by the Psychological Laboratory of Railway Transport Sofia at the National Multidisciplinary Transport Hospital - Sofia for traffic manager.

Conclusion: admitted for a period of 3 years.

• Traffic manager at Krivodol station on 16.12.2024:

Single health information file No. 3476 dated 30.10.2024, issued by the National Multidisciplinary Transport Hospital - Sofia;

Conclusion - fit for traffic manager;

Psychological certificate No. 635/17.06.2022, issued by the Psychological Laboratory of Railway Transport Sofia at the National Multidisciplinary Transport Hospital Sofia for a traffic manager.

Conclusion: admitted for a period of 3 years.

• Dispatcher in the Central Traffic Control Centre at the PWSD on 16.12.2024;

Card dated 28.01.2025 for mandatory, preliminary and periodic medical examinations of workers and employees at the State Enterprise NRIC, issued by the National Multidisciplinary Transport Hospital Sofia for a dispatcher in the Central Traffic Control Centre.

Conclusion - fit for a dispatcher in the Central Traffic Control Centre.

• Technician group leader in the Vratsa Railway Section on 16.12.2024:

Card for assessment of physical fitness No. 395 dated 25.03.2025 issued by the National Multi-Profile Transport Hospital - Sofia;

Conclusion - fit for a group leader technician, for one year

• Driver of RSPSM No. 99529459017-0 at the Vratsa Railway Section on 16.12.2024:

Single health information file dated 13.06.2024, issued by the National Multi-Profile Transport Hospital - Sofia for a railway train driver;

Conclusion - fit for a RSPSM driver;

Psychological certificate No. 1210/31.10.2022, issued by the Psychological Laboratory of Railway Transport Sofia at the National Multi-Profile Transport Hospital Sofia for a RSPSM driver. Conclusion: admitted for a period of 5 years.

conclusion. admitted for a period of

4.3.1.3.Fatigue.

Railway infrastructure:

• Traffic Manager/Senior Train Dispatcher at Sofia TOU on 16.12.2024: Break: from 15.12.2024 hour 19 minutes 00 to 16.12.2024 hour 06 minutes 50 Started work: 16.12.2024 hour 06 minutes 50 – (11 hours and 50 minutes)

• Traffic Manager/Train Dispatcher at Sofia TOU on 16.12.2024: Break: from 13.12.2024 hour 19 minutes 00 to date 16.12.2024 hour 06 minutes 50 Started work: 16.12.2024 hour 06 minutes 50 – (63 hours and 50 minutes)

• Traffic Manager at Vratsa Station on 16.12.2024:

Break: from 08.12.2024 hour 07 minutes 00 to date 16.12.2024 hour 07 minutes 00 Started work: 16.12.2024 hour 07 minutes 00 – (192 hours and 00 minutes)

• Traffic Manager at Krivodol Station on 16.12.2024:

Break: from 14.12.2024 hour 07 minutes 00 to date 16.12.2024 hour 07 minutes 55 Started work: 16.12.2024 hour 07 minutes 55 – (72 hours and 55 minutes)

• Dispatcher at the Central Traffic Control Centre at PWSD of 16.12.2024; Break: from 13.12.2024 hour 17 minutes 00 to date 16.12.2024 hour 07 minutes 00 Started work: 16.12.2024 hour 07 minutes 00 – (62 hours and 00 minutes)

• Technician group leader at the Vratsa Railway Station on 16.12.2024: Break: from 13.12.2024 hour 17 minutes 00 to date 16.12.2024 hour 08 minutes 00 Started work: 16.12.2024 hour 08 minutes 00 – (63 hours and 00 minutes)

• Driver of RSPSM No. 99529459017-0 at the Vratsa Railway Station on 16.12.2024 Date: Break: from 13.12.2024 at hour 17 minutes 00 to 16.12.2024 at hour 08 minutes 00 Started work: 16.12.2024 at hours 08 minutes 00 – (63 hours and 00 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 of the railway infrastructure, carries out maintenance, repair and operation of the railway infrastructure. Prepares a year-round schedule 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. Carries out current maintenance of the railway infrastructure and facilities with regulated "operational windows".

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

4.3.2.3. Communication means.

Communication links between the traffic manager on duty at the stations in the Mezdra - Vidin section, as well as with the train dispatcher, are carried out via a direct connection DCCM-8.

The operational staff working in shift mode at the State Enterprise NRIC are provided with official mobile phones for emergency and urgent 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 applies national and departmental regulations part of the SMS, relevant to the activities of the railway infrastructure manager:

- Working procedure RP 5.01-08 Rules for interaction between the operational services of SE NRIC and railway undertakings/carriers in the daily planning and management of trains on the railway infrastructure of SE NRIC;

- Working procedure RP 5.01-07 Instructions for work of a switchman/posts at the operational points of SE NRIC;

- Working procedure RP 5.01-04 Instructions for work of the traffic manager on duty at the operational points of SE NRIC;

- Instruction VND - 1 for interruption and restoration of the operation of railway infrastructure sites managed by SE NRIC, when carrying out reconstructions, modernizations, renewals, rehabilitations and repairs;

- Instruction VND-130 for the movement of trains during reconstruction, modernization, renovation (renewal), rehabilitation and replacement (repair) within the framework of maintenance of railway infrastructure sites managed by SE NRIC.

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:

Part of the personnel works full-time, 8-hour working day, 40-hour working week and 12-hour work shifts for which a summed calculation of working hours 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 06 in force from 01.09.2021, part of the SMS;

• SE NRIC applies a Program for carrying out a risk evaluation for the health and safety of workers and employees in force from 09.09.2024, part of the SMS;

• SE NRIC applies a Methodology for quantitative risk evaluation in force from 02.09.2024, part of the SMS;

• SE NRIC applies Instructions, Rules and Orders in relation to assigned work of employees in the operating divisions, as well as work performed by External Contractors under specific circumstances and hazards, consistent with the specific requirements for repair and maintenance of the railway infrastructure, part of the SMS.

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.

SE NRIC, in accordance with the requirements of European and national regulations, have approved methodologies and working models of good European practices in accordance with professional experience. The work is planned and relevant in accordance with the rules set out in the SMS for the personnel directly responsible for the safety and operation of railway transport.

4.3.3.2. Communications, information and teamwork.

Non-applicable.

4.3.3.3. Recruitment, staffing requirements, resources.

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 infrastructure

• SE NRIC has approved "Internal rules for wages" in force from 01.09.2024, 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 salaries.

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 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:

4.3.4.1.Labour conditions (noise, illumination, vibrations). Non-applicable.

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 Infrastructure Manager.

• SE NRIC applies Safety procedure SP 2.09 "Methods of evaluation, assessment and management of the risk, version 06 in force from 01.09.2021, part of the SMS;

• SE NRIC applies a Methodology for quantitative risk evaluation in force from 02.09.2024, part of the SMS;

• SE NRIC implements a Program for minimizing the risk to safety and health at work in force from 16.08.2024, part of the SMS;

• SE NRIC applies a Program for carrying out a risk evaluation for evaluation of the work places and professional risks in force from 16.08.2024, part of the SMS;

• SE NRIC implements "Safety Rules for Current Railway Track Maintenance" in force from 2021;

The State Enterprise NRIC has approved regulatory acts, instructions and rules that outline risk management and evaluation, but the control over implementation by the safety structures in the company is formal.

4.4.2.1.Producers and all other participants. Non-applicable.

4.4.2.2. 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:

Railway infrastructure.

• The Safety Management System (SMS) has been developed and described on the basis of the transposed European regulatory acts – DIRECTIVE (EU) 2016/798, DELEGATED REGULATION (EU) 2018/762, IMPLEMENTING REGULATION (EU) 2019/779 and IMPLEMENTING REGULATION (EU) No. 402/2013 in the national legislation relevant to railway undertakings and railway infrastructure:

- Railway Transport Act;

- ORDINANCE No. 59 on safety management in railway transport;

- Safety Procedure SF. 2.52 "Procedure for the development and implementation of the safety management system with regard to the management function" of 06.06.2018, which regulates the steps to achieve the set goals.

- SMS implementation policies are outlined in the "Strategy for the Development of the Safety Management System" in force since 2018.

4.4.4. Safety Management System of the entities in charge of the technical maintenance. <u>Railway infrastructure.</u>

The safety management system also includes a system for certification of the structures (entities) responsible for the technical maintenance of the vehicles of SE NRIC and the railway undertakings in accordance with the requirements of Commission Implementing Regulation (EU) 2019/779 of 16 May 2019 establishing detailed provisions on a system for certification of entities in charge of the maintenance of vehicles in accordance with Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) 445/2011, transposed into national legislation.

• SE NRIC holds a Certificate of an Entity in Charge of Maintenance with EIN BC/31/0023/0001, valid from 22.03.2023 to 21.03.2028. Scope of activities of the structure in charge of maintenance, Vehicle category: freight wagons, passenger coaches and RSPSM;

• SE NRIC holds a Safety Certificate IN EC BG 21 2023 0001, valid from 01.07.2023 to 30.06.2028.

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.

3. In the period from 07.12.2024 to 23.12.2024, the National Safety Authority (NSA) carried out an extraordinary safety inspection of SE NRIC in connection with the implementation of the SMS requirements according to Directive (EU) 2016/798, in view of the significant accidents that occurred in the company.

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

Safety Authorization of the involved infrastructure manager.

• SE NRIC has a Safety Authorization IN EC BG 21/2023/0001, valid from 01/07/2023 to 30/06/2028 as per article 12, item 1 of Directive (EU) 2016/798.

4.4.6.1.Safety certificates of the involved railway undertaking. Non applicable.

4.4.6.2. 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.

4.4.6.3. 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.

Previous similar cases NIB – BG has performed an investigation of two cases.

4.5.1. Run-over of two employees by shunting locomotive No. 98522051522-7, between Section point No. 4 and Iliyantsi station on 07.11.2023 during work.

Around 09:45 a.m. a working group of three workers from the railway infrastructure manager (SE NRIC) arrived by road transport in the area of SP 4. The working group was tasked by the section manager to cut bushes and vegetation, clean the gauge between the rails, they carried a brush cutter and a chainsaw. Without notifying the traffic manager on duty, they set off for the SP 4 – Iliyantsi interstation to start work. From km 0+180, two of the workers started mowing grass in the track gauge of the railway track with the motorized brush cutter, and the third worker walked about 30 meters in front of them. For the performance of the activity, they were instructed to observe safety and health at work.

Around 10:00 a.m., after completing the shunting work in the industrial branch of Toplivo AD, the shunting locomotive departed in the direction of SP 4 to Iliyantsi station. The locomotive driver of

locomotive No. 98522051522-7 reported via the radio station in the locomotive to the duty traffic manager in SP 4 that the shunting work had ended and only the locomotive was returning to SP 4.

At 10:02 a.m., the duty traffic manager of SP 4 prepared the route for the shunting locomotive to pass without stopping, by opening the entry and exit signals for the third track of SP 4 in the direction of Iliyantsi station.

At 10:10 a.m., the shunting locomotive No. 98522051522-7 passed without stopping on SP 4 towards Iliyantsi station, the track was in a left curve with a radius of 250 meters with reduced visibility, given the design capabilities of the locomotive.

At around 10:12 a.m. at km 0+320, the locomotive caught up with the workers on the line with the motor scythe and one after the other hit and killed the two workers working in the rail gauge.

4.5.2. Run-over and collision of two employees of fast train No. 2654 between the stations Telish - Gorni Dabnik on track No. 2 on 06.06.2024 during work.

Due to an emerging production need, the director of the Vratsa Railway Section issued an order for the implementation of major construction and repair activities on the railway track with THM RSPSM No. 99529423013-2 on 06.06.2024 from 21:30 p.m. to 06:00 a.m. in the Telish - Gorni Dabnik track No. 1. In addition to the two train drivers, the chief engineer and the head of the transport group at the Vratsa Railway Section were traveling in the RSPSM.

THM RSPSM No. 99529423013-2 arrived at the work site at around 21:50 p.m. The accompanying chief engineer and transport group leader travelled with one driver in the first cabin of the RSPSM. The transport group leader got off the RSPSM to the left in the direction of travel towards track No. 2. The chief engineer remained in the cabin to verify the data entered in the RSPSM computer with those of the project. The two drivers began preparations for bringing the machine from transport to working position.

FT No. 2654 run daily in the direction Mezdra - Varna - Mezdra. When the train was moving along the current track No. 2, after exiting a left curve, the locomotive crew saw the white lights of THM RSPSM No. 99529423013-2 on the current track No. 1 and gave the signal "Attention". At the moment of passing FT No. 2654 with THM RSPSM No. 99529423013-2, the locomotive crew heard a blow from the front of the locomotive and the locomotive driver stopped quickly the train. The train stopped at 22:03 p.m. When the locomotive crew inspected the locomotive, they found minor damage on the left side of the front of the locomotive and parts of a signal orange vest with blood on the plough.

The two THM/RSPSM drivers saw the chief engineer lying next to the RSPSM in serious condition, and they also saw blood and remains of the body of the transport group leader on track No. 2

5. Conclusions

5.1. Summary of the analysis for the event causes.

The Investigation Commission conducted several inspections of the accident site. Conducted inspections of RSPSM No. 99529459017-0 with attached wagon No. 80523936030-0 at the place of the accident, as well as at the "Base" of the Vratsa Railway Section. Inspections of the screw spike wretch machine and the trolley to it were carried out at the Vratsa Railway Section. The documentation and the Instruction for operation and technical maintenance of the screw spike wretch machine were requested and received.

The requirements for the appointment of a working train No. 70440, presented by the Vratsa Railway Section on 13.12.2024 for movement on 16.12.2024, were met.

A timetable was developed for the movement of the train with a departure time of 08:30 a.m. from the Vratsa station and arrival at 9:55 a.m. at the Medkovets station.

The timetable for the movement of the train was not complied with, taking into account the technological and organizational causes that arose, cited in the analysis of the report.

The shift traffic managers on duty along the route of work train No. 70440 were not notified of its movement. During the briefing conducted by the train dispatcher of the section, the duty traffic manager at Krivodol station at the same time ensured the acceptance and dispatch of FT No. 7621, with which the duty traffic manager of the old shift did not hand over the assigned vehicles for movement to the duty traffic manager of the new shift.

Poor communication between the duty traffic manager at Vratsa station and the driver of the RSPSM, which led to the failure to fulfil the schedule for the movement of work train No. 70440.

Disinterest on the part of the dispatcher at the Vratsa Railway Section regarding the movement of the RSPSM along the route.

The titular train dispatcher left the workplace arbitrarily and did not notify the replacement about the assigned additional work trains and "operational windows" in the section.

The dispatcher of the Coordination Dispatching Centre (CDC) did not promptly monitor the movement of the work train No. 70440. He did not notify the substitute train dispatcher about the movement of the work train. Given the implementation of the Traffic Operation Schedule (TOS), the substitute train dispatcher missed the movement of the work train to depart according to schedule.

The organization of work was not created in accordance with the regulatory acts regulating the work on the railway by the Technical Group Leader (TGL) in view of compliance with the activities on the repair of the railway track and labour safety.

The traffic managers on duty at the two adjacent stations were not notified in advance about the activities carried out on the railway track in the Krivodol - Boytchinovtsi interstation, and in turn did not notify the train dispatcher.

At the time of the accident, the participants in the accident did not comply with the provisions of the General Director of the State Enterprise NRIC cited in an order dated 29.01.2024, which regulates the operational activities for the order and manner of carrying out repairs on the railway track between stations.

Working on the railway track with light road mechanization requires, in addition to signalling at the workplace, signalmen to protect the working group during work.

When approaching the place where the working group was working at km 52+740, no actions were taken to reduce the speed of the RSPSM. The workers, seeing the approaching motor trailer, were removed from the line quickly and chaotically. The TGL with two workers carried quickly the screw spike wretch machine, with one of them receiving an injury, the trolley remained on the line. Then two other workers took up the task of removing the trolley, but they failed and the trailer hit the trolley and both workers.

The Commission reviewed the documents and materials in the course of the investigation, analysed the materials provided by the National Investigation Service (NIS), the Task force and additionally requested materials. It established violations of the personnel in the performance of their official duties. There were established violations of the current regulatory acts on safety, in the organization of train traffic, as well as in the organization of work on the railway track.

Ordinance No. 58:

- Article 468. "Sign "Workplace of a group of workers"

- para.3 "The visibility of the sign under para.1 is not less than 200m. The sign obliges the locomotive driver to signal "Attention!" repeatedly at intervals of 3-5 s until entering the workplace area. Depending on the overall conditions, the signboard may be of reduced size." **RTOSA:** art. 250, para. 1, item 1 and para. 2, item 3

- para. 1 "When servicing trains, the locomotive crew is obliged:

- I.1 "to monitor whether the route is clear, to observe the signals and signs on the track in the visibility area, by following their signal indications and to react promptly when they change;"

- Para. 2 "when servicing a train, the driver is obliged:

- I. 3 "to drive the train with increased vigilance, and if necessary, to reduce speed in deteriorated weather and other conditions that reduce the visibility of signals."

Ordinance No. 13:

- Art. 11 "Everyone working in railway transport is obliged to take care of his safety and health, as well as the safety and health of other persons affected by his activity in accordance with the requirements of this ordinance, the regulatory acts on health and safety at work, the regulatory acts on railway transport and the instructions of the employer."

- Art. 71, para. 2, item 2:

- Para. 2: "provide security for the working group;"

Order 3-181/29.01.2024 of the General Director of SE NRIC

- I. 4.2 "in between stations, the work supervisor, before starting work, informs the traffic manager on duty at one of the two neighbouring stations at the work site, the duration and type of work. The traffic manager on duty notifies the neighbouring station, and if necessary, the locomotive crews of the passing trains;"

- T.4.3 "the traffic manager on duty informs the work supervisor about the movement of trains outside those mentioned in the timetable;"

- T.5 "The work site is opened after it's signalling and the security of the work group is ensured. The signalmen and the work supervisor monitor the approach of vehicles and the indications of the traffic semaphores in the work area;"

- T.5.1 "when working under conditions that do not allow visibility to be greater than 800 meters (fog, snow, rain, night time or during the day in curves) the leader of the working group takes measures to preserve the life and health of the workers, by strengthening the security with signalmen on both sides of the workplace;"

- I.6 "when opening the workplace, the leader of the work organizes the placement of materials, tools and machines in such a way as not to hinder the movement of the workers and their rapid release from the railway track when giving a signal for an approaching vehicle;"

5.2. Undertaken measures after the event occurrence.

Measures that SE NRIC undertook after the event occurrence

1. An extraordinary briefing was held for the personnel performing repairs and maintenance of the railway track and facilities;

2. On 20.12.2024, an "Extraordinary alarm bulletin" was prepared and distributed with a description of the cases of violation of technological rules, as well as labour discipline, as a result of which transportation safety events were performed. These cases show gross violations by employees in the operational divisions of SE NRIC of labour discipline and technological rules, as well as of the regulatory documents in railway transport, regulating the provision of train traffic and transportation safety in the performance of their official duties;

3. An order was issued by the Director General of SE NRIC dated 17.12.2024, which ordered the performance of the types of work on the railway track in accordance with the requirements of the regulatory framework;

4. On the basis of a prescription of the RAEA and a letter from the Sofia Railway Transport Authority -64/14.01.2025, an official meeting of the operational personnel related to transport safety was held to familiarize themselves with the accident that occurred and to discuss the causes that caused the accident;

5. In connection with the serious railway accidents that occurred, the Sofia Train Operation and Station Activity Management Division organized and conducted training for the operational personnel, which reviewed and confirmed the obligations of the employees regarding ensuring the safety of train movement and shunting work, the method of action in the event of a failure of the signalling equipment, changing the method of train movement, actions in the event of various failures of the infrastructure facilities, etc.

5.2. Additional findings.

There have not been established any.

6. Safety recommendations

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

- Recommendation 1 proposes that SE NRIC familiarize interested personnel with the content of the report;
- Recommendation 2 proposes that RAEA amend and supplement Ordinance No. 58, Art. 179, Para. 3 regarding the movement of "Specialized machines for maintaining the railway track and the overhead contact line" on the railway infrastructure, to be carried out with included recording speedometers;
- Recommendation 3 proposes that SE NRIC amend and supplement Working Procedure RP 2.55-08 "Instructions for the technical requirements, operation and maintenance of rail self-propelled specialized machines", Chapter Two "Basic technical and operational requirements for RSPSM", Art. 16: "All RSPSM must be equipped with a working recording speedometer";
- Recommendation 4 proposes that the SE NRIC amend and supplement the Working Procedure RP 2.62 "Instructions for the operation of the driver of the RSPSM", to create a new section "Operation of a recording speedometer";
- Recommendation 5 proposes that SE NRIC train all drivers operating the RSPSM in handling the on-board tachograph, setting a circular diagram, adjusting the clock and other manipulations related to the operation of the tachograph;
- Recommendation 6 proposes that SE NRIC control and prevent the movement of RSPSM on the railway infrastructure with a faulty, non-switched tachograph and without a new circular diagram placed in the tachograph for recording movement before starting work;
- Recommendation 7 proposes that SE NRIC restore the position of "Working Group Signalman" in the railway sections in accordance with the required regulatory acts on safety when working on the railway track.

With reference to the requirements of art. 24, paragraph 1 of Directive (EU) 2016/798, and art. 91, paragraph 1 of Ordinance No 59 dated 5.12.2006, the member of the Management Board of NAMRATIB on 08.04.2025 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 when carrying out repair activities on the railway infrastructure and complying with the vehicle movement schedule of the railway infrastructure manager.

The addressees of the draft final report are given the opportunity, as appropriate, to express their opinions and positions on the draft final report in writing to the Deputy Chairman of the Management Board of NAMRATIB by 25.04.2025.

Chairperson:

Dr. Eng. Boycho Skrobanski

Deputy President of the NAMRTAIB AB