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FINAL REPORT

for

technical investigation of a railway accident - derailment of nine freight wagons of the composition of freight train No. 50601 when entering Dupnitsa r.w. station i.w.o. switch No. 10 on 23.01.2016

Министерство на транспорта, информационните технологии и съобщенията
РАЗСЛЕДВАНЕ НА ЖЕЛЕЗОПЪТНИ ПРОИШЕСТВИЯ
RAIU
РЕПУБЛИКА БЪЛГАРИЯ

Ministry of Transport, Information Technology and Communications,
REPUBLIC OF BULGARIA
Railway Accidents Investigation Unit - RAIU

ТРАНСЛИНГВА-ЕВРОПА ЕООД
СОФИЯ
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ВМ

April 2016

FINAL REPORT

for

technical investigation of a railway accident - derailment of nine freight wagons of the composition of freight train No. 50601 when entering Dupnitsa r.w. station i.w.o. switch No. 10 on 23.01.2016

Purpose of the Report and level of responsibility

In accordance with Directive 2004/49/EC of the European Parliament and the Council on Railway Safety in the Community, The Railway Transport Act of the Republic of Bulgaria and Decree No. 59 of 05.12.2006 for management of railway safety, the investigation of the railway events aims to establish the causes for their implementation with view to eliminate and avoid others in future, **without seeking personal guilt and responsibility.**

The investigation was carried out on the grounds of Article 115i, para. 2 of the Railway Transport Act, Article 78, para. 1 of Decree No. 59 of 05.12.2006 and Order No. RD-08-43 / 28.01.2016 of the Ministry of Transport, Information Technology and Communications. There was appointed a Commission to investigate the railway accident.

The Investigation Commission conducted repeated inspections on site, held a confrontation with persons directly involved in the accident. In order to rapidly clarify and establish the circumstances and causes leading to the accident, the Commission for technical investigation involved external experts. The investigation analysed the report findings statements of facts and documents submitted by the Operational Team and other required materials. The Commission seized evidence, based on which it prepared the technical expertise of the speedometer tape recorder type "Hasler" and "Knorr D2" controller on-

board electric locomotive No. 43552.9 servicing freight train No. 50601 on 23.01.2016. In graphical and tabular format was prepared and presented technical expertise of speedometer tape recorder of type "Hasler" and "Knorr D2" valve in "Todor Kableshkov University of Transport" Ltd. laboratory. The Chairman of the Commission adopted technical expertise represented by the contractor "Todor Kableshkov University of Transport" Ltd. and the opinions of external experts on the accident in the performance of their tasks.

1. Established facts and circumstances in the course of investigation.

On 22.01.2016, freight train No. 50601 was prepared for departure from Iliyantsi Station to Dupnitsa station with route Iliyantsi - Voluyak - Razmenna - Batanovtsi - Dupnitsa. The train is composed of 13 full freight wagons , 52 axles, 1011 tons, serviced by electric locomotive No. 43552.9 and locomotive team of locomotive depot Dupnitsa, consisting of driver and assistant locomotive driver. The train was operated by licensed railway undertaking "BDZ Cargo " Ltd.

At 08:25 p.m. at Iliyantsi station a technician-mechanic freight wagons inspector performed a complete “A” test of the automatic train brake and issued a certificate for brake mass. The train departed at 08:45 p.m. from seventh track of Iliyantsi station 15 min earlier than the statutory schedule for train traffic. During the traffic the train stopped irregularly at 09:17 p.m. at 500 m after Brigadir switch point, staying there for a 1 min. and departed again, second irregular stop registered at 10:06 p.m. after Razmenna station, standed for 1 min. and departed againaccording to Speedometer tape of the locomotive. At Delyan station the train was accepted on the second main track at 11:31 p.m. to undergo mandatory short test “D" of the automatic train brake.

The assistant train driver went to the end of the train to purge the main air conduit of the last freight wagon of the train and carried out the short test. After the short test of the automatic brake, the train remained at Delyan station for 13 min. + 3 min. over the regulated downtime due to blocked automatic train brakes on some of the freight wagons . Ambient temperature i.w.o. Delyan station at that time of the day was about minus 10° C.

The train driver undertook actions to start the train and departed from station Delyan at 11:44 p.m. with regular departure signal and order for departure from the duty traffic manager.

After the departure of the train from Delyan, it developed speed of 26 km/h, and later reduced to 18 km/h due to the profile of the track to climb from 11,6 ‰ and then started a continuous slope from 20,6 ‰ downhill.

After running out fromtunnel No. 1 at a speed of 18 km/h, the train entered in a track section with a continuous gradient of descent of 13 ‰ passing to 20,6 ‰. The train driver performed a trial detention of the locomotive controller as declared and found that there was no train braking effect, then continued to gradually reduce the pressure in the main air conduit of the train to fully release the air in the atmosphere and reach the required braking effect. The braking effect was not achieved and the train beganto accelerate with the speed of motion increased to 80 km/h. The train driver informed via the official mobile phone the traffic managers on duty at Dyakovo and Dupnitsa stations to provide free tracks and duty depot master at Dupnitsa locomotive depot that the train had no brakes and downhill speed increased.

The duty traffic manager at Dyakovo station ordered the switchmen on duty at Posts No. 1 and No. 2 to prepare a transit route on the second main track and stand at safe distance from the passing train.

The train passed through the transit Dyakovo station at 11:54 p.m. on the second main track with sparkling wheelsets of the locomotive and several freight wagons of the train, as advised by the switchmen on duty and the traffic manager on duty at the station.

After receiving the information about train No. 50601, the traffic manager on duty at Dupnitsa station ordered by telephoned telegrams the switchmen on duty at post No. 1, No. 2 and No. 3 to reroute the electric locomotive No. 43547 and to prepare a route for the forth diversion receiving-dispatching track towards Golyamo selo station, taking into account the profile of ascend in that direction.

At the time of the accident the employment of tracks in the station was the following: on the first track was accepted passenger train No. 50134, on the second track was accepted passenger train No. 50233, on the third track was accepted passenger train No. 50330 and on the forth track was accepted electric locomotive No. 43547.

Upon entering of the train at 00:04 a.m. in Dupnitsa station, the former passed through switches No. 2, right and No. 4, left with radius R = 300 m and switch No. 10 left, leading to the forth track of radius R = 190 m in cross part, the third freight wagon of the train composition derailed as tilted to the right and over 250 m dragged fourth, fifth, sixth, seventh, eighth, ninth, tenth and eleventh freight wagon , those also derailed and laid on the track with the cargo spilled (cement bags).

Locomotive 43552.9 and the first two freight wagons of the train remained on the fourth track and stopped at 280 meters after switch No. 10, the last two freight wagons remained between switch No. 4 and No. 10 on the track.

After derailment of the train at station, a hot test of the rolling stock was not made by the duty traffic manager and technicians at the station.

2. Officials involved in the case.

2.1 Locomotive team

2.1.1. Driver of electric locomotive No. 43552.9 "BDZ Cargo" Ltd. - 10 years of service;

2.1.2. Assistant driver of electric locomotive No. 43552.9 "BDZ Freight Cargo" Ltd. - 25 years of service;

2.2. R.W station officials:

2.2.1. Traffic manager - Delyan station - an employee at Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 9 years of service;

2.2.2. Traffic manager - Dyakovo station - an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 33 years of service;

2.2.3. Traffic manager - Dupnitsa station - an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 12 years of service;

2.2.4. Post switchman - Dyakovo station - an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 9 years of service;

2.2.5. Post switchman - Dyakovo station - an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 13 years of service;

2.2.6. Post switchman - Dupnitsa station – an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 8 years of service;

2.2.7. Post switchman – Dupnitsa station – an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company - 22 years of service;

2.2.8. Post switchman - Dupnitsa station – an employee of Management of the traffic of trains and station activities - Sofia, National Railway Infrastructure Company – 24 years of service;

2.3. Other officials:

2.3.1. Technician-mechanic, inspector of freight wagons - Iliyantsi station - an employee of Traffic accidents - Sofia Railways – "BDZ Cargo" Ltd. - 20 years of service;

3. Physical state of officials involved in the accident.

Officials involved in the accident were provided the necessary rest periods before starting work, according to the Labour Code and Regulation No. 50 of 28.12.2001 on the working time of managerial and executive staff engaged in providing passenger and freight rail transport.

Officials involved in the accident were given pre-travel (pre-shift) instructions, they have declared that they are alert, rested and had not used alcohol and other drugs.

Officials involved in the accident have valid certificates of psychological examination.

4. Qualifications and appointment.

Officials from SE National Railway Infrastructure Company involved in the accident have the necessary qualifications and skills.

Locomotive staff of "BDZ -Cargo" Ltd. locomotive No. 43552.9 possesses the necessary qualifications and the necessary qualifications to manage the relevant locomotive series.

5. Actions of officials before and during the accident.

The officials from SE National Railway Infrastructure Company, excluding the duty traffic manager on duty at Dupnitsa station, immediately before and during the accident acted in accordance with the established regulations and internal rules governing the safety of transport by rail.

The officials from "BDZ Cargo" Ltd. before and during the accident have not acted in accordance with the established regulations and internal rules governing the safety of railway transport.

6. Circumstances preceding the accident in terms of track, signalling equipment, overhead contact system, stock etc.

Meteorological data for weather affecting the visibility of signals:

- Air temperature - in the range of -8 ° C ÷ -17 ° C;
- Clear with no rain;
- Available snow cover from previous snowfall;
- In the night time;

Non-compliance with Plan II-24 for acceptance of freight train No. 50601 at Station in Dupnitsa. According to Plan II-24 the train was supposed to be accepted on the third track.

Track - documentary and technically in operating condition.

Status of the station and inter-station signalling equipment (Relay System for Key Dependencies) and Fire and emergency safety) – in operating condition.

Station switches are manually operated and have been locked for the ordered route of the fourth track.

Catenary – in operating condition before the railway accident.

Train composition station - Iliyantsi.

Communication equipment and telecommunication connections – in operating condition.

Rolling Stock:

The electric locomotive No. 43552.9 was with technical failure in the brake system (on-board controller) and registering speedometer and operating running gear, light and sound signals in accordance with the technical standards and requirements, as evidenced by the submitted technical expertise.

Freight wagon series - "Gabs " - 7 pcs. covered freight wagons for transporting palletized cargo – in operating condition.

Freight car series - "Uacs " - 6 pieces, tank wagons for transporting cement – in operating condition

7. Compliance with procedures and technologies for work in the system of the National Company Railway Infrastructure before and during the incident.

Procedures and technologies for work before and during the accident in the division "Management of the traffic of trains and station activity" - Sofia, which is in the structure of SE National Railway Infrastructure Company, non-compliance with Plan II-24 at Station Dupnitsa.

At the time of the accident employment of tracks in the station Dupnitsa was the following:

1st track - occupied by train No. 50134 arrived at 10:28 p.m. and departed as train No. 50131 at 6:00 a.m.

2nd track - occupied by train No. 50233 arrived at 09:40 p.m. and departed as train No. 50230 at 4:45 a.m.

3rd track - occupied by train No. 50330 arrived at 11:16 p.m. and departed as train No. 50331 at 5:15 a.m.

4th track - occupied by locomotive No. 43547 and subsequently released for the acceptance of train No. 50601.

5th track - occupied by 18 freight wagons filled with coal.

6th track - free.

7th track - occupied by freight wagons for direction Dragoman station.

All this is evident from the report of the Task Force and the annexes thereto as well as Form (DS-3) - diary of trains and vehicles and conducted interviews with the station staff involved in the accident.

8. Compliance with the procedures and technologies for servicing rolling stock in the system of the undertaking before and during the accident.

Freight train No. 50601 was composed at Iliyantsi station provided with the necessary brake mass and the necessary train documents. The train was running according to the schedule of the trains and was operated by the licensed railway undertaking BDZ - Cargo Ltd. The locomotive crew was equipped with a mobile phone communication.

In the examination of the technical documentation for locomotive No. 43552.9 there was not identified and registered absence of violations of the existing regulations for acceptance for Factory and Depot Repair and maintenance of electric locomotives, and technology for the organization and operation.

Upon the inspection of the controller of the automatic braking of the train and the speedometer tape showing the traffic of the train, it was established as follows:

- The Investigation Commission was present at the testing of the recording speedometer type "Hasler" at locomotive depot Stara Zagora on 12.02.2016, and the controller type "Knorr D2" at locomotive depot in Plovdiv on 12.02.2016, and the electric locomotive 43552.9, and there were found deviations from the requirements of the applicable regulations.

9. Condition of rail infrastructure and rolling stock before, during and after the accident.

The parameters of the switches and tracks at Dupnitsa Station were measured monthly by officers of the Railway Section Sofia pursuant to Article 400 of the "Rules of technical operation of the railway infrastructure" of National Railway Infrastructure Company. The following results were recorded: Switch No. 10 – in operating condition;

9.1. Switches

Before the derailment - switch No. 10 – in operating condition, after crossing is damaged;

It was found that the rail infrastructure before and during the accident was documentary and technically in operating condition.

As a result of the accident were found multiple failures in railway switches No. 10, 12, 14 and 16, railway switches between No. 14 and 22 and part of the fourth track, described in Item. 10.4.

9.2. Signalling equipment

Relay management of key dependency – in operating condition.

9.3. Rolling stock

Before the accident electric locomotive No. 43552.9 of freight train No. 50601 was without stated faults.

As a result of the accident there were no additional damages incurred to the locomotive.

Before the accident the freight wagons of train No. 50601 were roadworthy, as a result of the derailment damages to the majority of wagons that are described in Item. 10.5.

10. Consequences from the accident.

10.1. Fatalities - none;

10.2. Seriously injured persons - none;

10.3. Damages and failures of the rolling stock - none:

10.3.1. Electric locomotive - none:

10.4. Damages to the railway infrastructure:

10.4.1. Track and structures:

Costs for rehabilitation of the track and switches No. 10, 12, 14 and 16 amounted to 54,535.81 BGN, VAT excluded.

The cost of lifting the derailed freight wagons on track in the station to restore traffic amounted to 3,300 BGN, VAT excluded.

10.4.2. Signalling equipment and communications, radio communications and power supply

Costs for rehabilitation of signalling equipment - cables, ground semaphores, junction boxes and concrete shafts amounted to 41,842.4 BGN, VAT excluded.

10.4.3. Catenary:

Costs incurred by Regional division - "Energy Sections Sofia to SE National Railway Infrastructure Company for rehabilitation of damages in the station caused by the derailment amounted to 8,075 BGN VAT excl..

10.4.4. Other damages - none.

10.5 Damage to freight wagons and spilled cargo:

Freight wagon No. 815293260809 derailed - subject of reject

Freight wagon No. 815293263001 derailed - subject of reject

Freight wagon No. 815293262945 derailed - subject of reject

Freight wagon No. 315293262814 derailed - subject of reject

Freight wagon No. 315218112268 derailed - subject of reject

Freight wagon No. 315218110650 derailed - subject of reject

Freight wagon No. 315218116426 derailed - subject of reject

Freight wagon No. 315218115642 derailed - subject of reject

Freight wagon No. 315218122119 derailed - subject of reject

10.6. Interruption of the traffic:

Following the derailment of a freight train No. 50601 at Dupnitsa Station, no interruption of the train traffic was recorded, but the speed of the traffic of departing and arriving trains i.w.o. Dyakovo station was reduced to 15 km/h when passing by switches No. 2 and 4 at the station.

10.7. Train delays:

10.7.1. Delayed trains

10.7.1.1 Passenger trains

- train No. 50230 – "BDZ Passenger Services Ltd." - 18 min;
- train No. 50509 - "BDZ Passenger Services Ltd."- 87 min;

10.7.2. Cancelled trains – none;

10.7.3. Assigned trains – none;

10.7.4. Costs for changing the train timetable: none

10.8. Traffic of rehabilitation equipment.

10.8.1. Rehabilitation train.

At 4:57 a.m. on 23.01.2016, at the accident site to lift the derailed freight wagons arrived from Sofia station to Dupnitsa station, a rehabilitation train composed of "railway crane EBC 300-No.75" and "railway crane EBC 300 -No.76 of SE National Railway Infrastructure Company.

10.8.2. Other rehabilitation equipment.

At 01:00 a.m. on 23.01.2016 at the site of the accident was sent a specialized truck Unimog from Sofia station to station Dupnitsa from SE National Railway Infrastructure Company.

11. Analysis of the reasons that lead to the railway accident.

From the inspections, required additional materials and technical expertise of the recorder of speedometer type "Hasler" and the controller type "Knorr D2", the Technical investigation Commission established the following:

- the derailment of freight wagons of freight train No. 50601 happened at 0:04 a.m. i.w.o. switch No. 10, left with radius of R = 190 m;

- the speed of the train at the time of the derailment was 82 km/h where permissible speed deviation was 40 km / h.;
- after the derailment of train No. 50601 at Dupnitsa Station was not performed a hot test of automatic braking system of the train.

The Commission for technical investigation performed control test of recording speedometer removed from locomotive No. 43552.9 type RT9 with factory No. F02.097 in departmental laboratory of the locomotive depot in Stara Zagora. From the conducted reference test was established that the registered speedometer correctly registered the vehicle speed, real time, time-distance and idle time, but did not register the pressure in the control pipe (BIP) of the train. In this connection was held further investigation, which established the following:

The registration speedometer passed the regular bench trials in a department laboratory at locomotive depot in Stara Zagora on 14.11.2014. After regular inspection was issued a report stating the speedometer is in operating operation, and the same was mounted on locomotive No. 43552.9. for the time period until 10.06.2015 the speedometer worked without problems and correctly accounted all the parameters, including the pressure in the main air conduit. After 24.06.2015 the speedometer stopped to register the pressure in the main air conduit of the train. In the interval from 10.06.2015 until 24.06.2015 there were no data whether the speedometer registered or not the pressure in the main air conduit. The absence of registration of air pressure in the main air conduit led to the absence of objective control over the operation of the automatic brake and the actions of the driver, which hindered the work of the Commission for technical investigation. Therefore indirect methods were used to analyse the events that preceded the accident. The Commission for technical investigation also performed testing of the controller dismantled from locomotive No. 43552.9, type "Knorr D2" with factory No. 024 for bench test and diagnostics of brakes in locomotive depot Plovdiv. The tests revealed that the locknut of the pressure regulator of controller was not tightened and fixed. Also certain requirements of the requirements of the "*Rules for repair and testing of brake systems for railway rolling stock of BDZ*" and more specifically for checks on density and release stage and stopping and shock filling the Commission for technical investigation made a detailed visual inspection on site and part of the derailed freight wagons available due to the rehabilitation work, and found that the brakes on some of them did not act during the movement from Delyan to Dupnitsa station: freight car No. 82529326080-9 - third after the locomotive (Fig. 1, 2), freight wagon No. 82529326300-1 – fourth after the locomotive (Fig. 3, 4), freight wagon No. 82529326294-5 - fifth of the locomotive (Fig. 5, 6), freight wagon car No. 31521811226-8 - seventh after the locomotive (Fig. 7, 8), although the marked in the brake

table with activated braking systems. The brake of freight wagon No. 31529326281-4 - sixth after the locomotives acted (Fig. 9, 10, 11) and that of freight wagon No. 31521811065-0 - eighth after the locomotive was isolated at the station Iliyantsi origin station (Fig. 12, 13). Wagons 9, 10 and 11 after the locomotive were not available at the inspection at Dupnitsa station and the state of their brakes was unable to be assessed. From the examples and calculations made, it became clear that the train was not provided with brake mass in its departure from Delyan station to Dupnitsa station, even assuming that the missing freight wagons were running with brake systems.

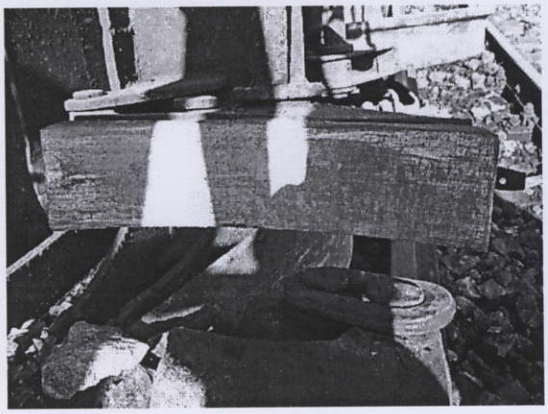


Fig. 1

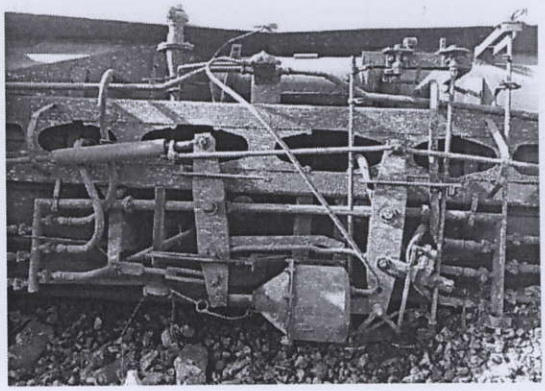


Fig. 2

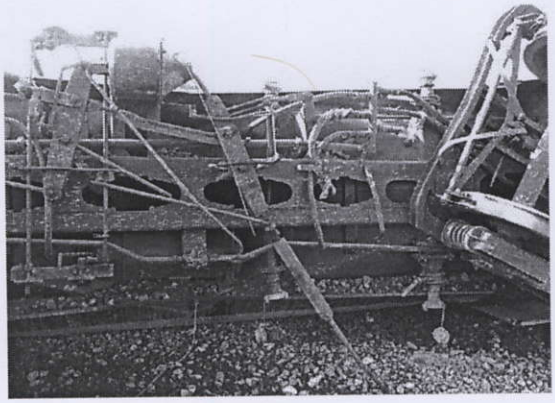


Fig. 3

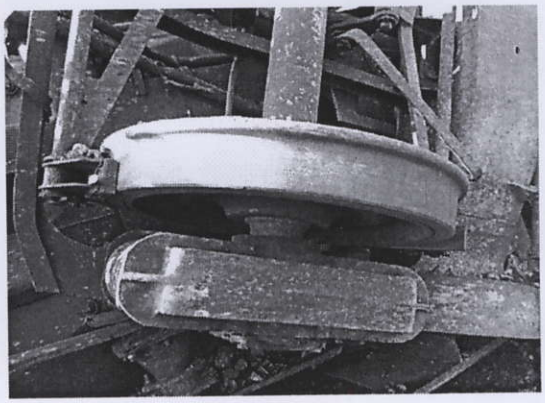


Fig. 4

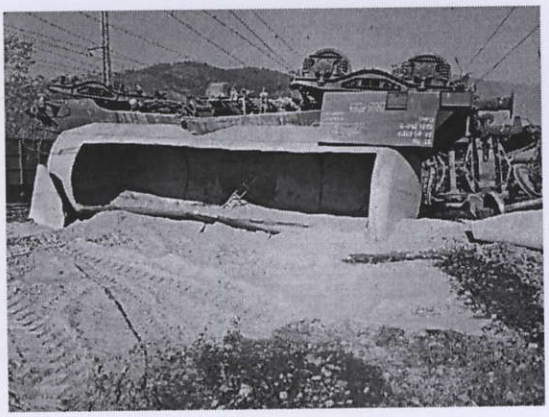


Fig. 5

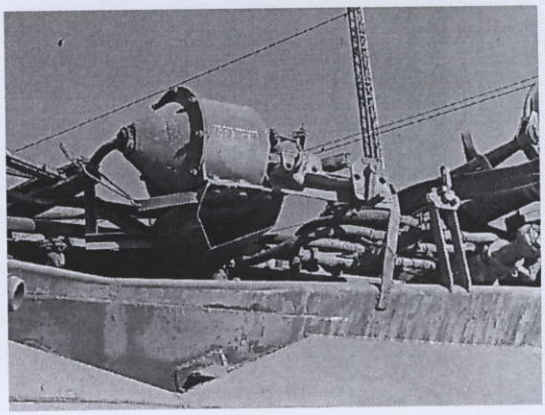
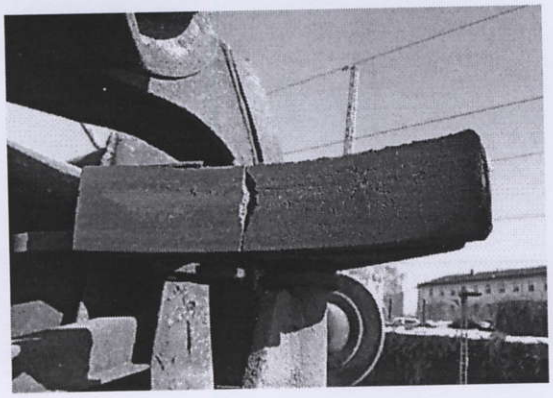
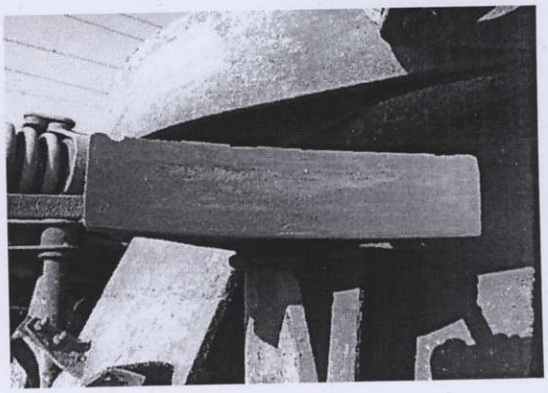


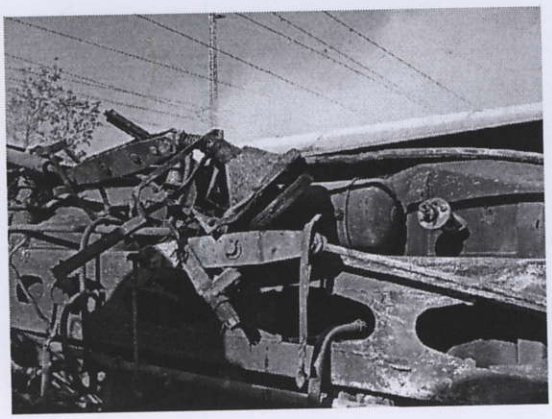
Fig. 6

Fig. 7

Fig. 8







The Commission for technical investigation conducted detailed interviews with the officials involved in the accident and found that in carrying out the reduced test (test D) at Delyan station did not meet the requirements of current legislation on rail transport, namely:

▪ The assistant train driver has not accomplished purging of the main air conduit from the tap to the last freight wagon, which did not meet the requirement of Article 320, para. 1, p. 1, of the *Rules for traffic of trains and shunting in railway transport.*

- The Assistant train driver signalled detention without checking and verifying whether the brake of the last freight wagon was loosened, which did comply with the requirement of Article 320, para. 1 pt. 2 of the *Rules for traffic of trains and shunting in railway transport.*

▪ The assistant train driver examined the effect of the brake only visually, not by tapping with a hammer, which did not meet the requirement of Article 308, pt. 6, letters (b). (bb) and (aa) of *Rules for traffic of trains and shunting in railway transport.*

▪ The assistant train driver did not verify in undisputable manner whether the brake of the last freight wagon was loosened, which did comply with the requirement of Article 320, para. 1 pt. 4 of *Rules for traffic of trains and shunting in railway transport* and has not signalled for the end of the test.

▪ Following the test "D" (short test) the train driver initiated the start, but then realized that the brake of the train was not released. Despite the situation and the severe weather conditions and the instructions of article 20, para. 1 of the *Instructions for operation of the driver, locomotive and locomotive with automatic train brakes* for the times to release the brakes depending on their mode of operation, the train driver did not wait for the necessary time to release and charge the braking system. He went down and checked the freight wagons to find the reason why the train did not start (according to his statement). He did not find such and got on-board the locomotive in the fastest way (again according to his statement) and made a second attempt to start - this time successful. All these actions are carried out within nine minutes recorded on Speedometer tape. There remain serious doubts that during the visual inspection of freight wagons the train driver has manually released the first few freight wagons to enable the departure of the train, thus leaving freight wagons third, fourth, fifth and seventh of the composition of the train with released yet unloaded braking system. Taking into account the cold weather (below -10 °C) and the fact that the functional valves were hardly operational at these temperatures, and also that they are more easily transferred to "hold" than to "release", it can be argued that undercharging them is one of the major prerequisites for this train to move from station Delyan without being provided with brake mass and not be released into the long downhill.

The detailed and comprehensive analysis of the accident showed that at the time of activation of the brake system at the beginning of the long slope downhill significant part of the freight wagons were with no effective braking system - a circumstance that led to a reduction in braking power available and that the train has not been brought under control and has subsequently i.w.o. inlet switches at station Dupnitsa. The conclusion that can be drawn is that the train departed from station Delyan without provided brake mass contrary to the provisions of Article 260, para. 1 pt. 4 of *Regulation No. 58 for the rules for technical operation, traffic of trains and railway signalling and article 340 pt. 4,, of the Rules for traffic of trains and shunting on railways ".*

Following the discussions with the train driver, the Technical Commission for investigation also found that the latter has not complied with the technology to manage long train in downhill at low temperatures. After the departure of the train from station Delyan in a profile of ascent and transit into a profile of descent to tunnel No. 1, leaving the tunnel around km 74 + 570 between stations Delyan and Dyakovo, the train driver

initiated the first detention with the controller to ascertain the condition of the brake system (effective brake test, according to his statements). Due to the malfunction of the speedometer registering pressure in the ir conduit, the objective assessment of his actions is not feasible. He performed the first brake activation after the tunnel, reducing the pressure in the BIP by 0,4 bar, the pressure reached a value of 4,6 bar (according to his statements). His actions did not meet the requirements of Article 21, para. 1 pt. 1 of the "Instructions for work of the driver, locomotive and locomotive with automatic train brakes" (the first stage should be done by reducing the pressure in the BIP by minimum of 0,5 bar) and moreover Article 28 of these Instructions (Under brake control the first braking degree is done by lowering the operating pressure in BIP by 0,8 bar ... to prevent any icing of friction units). The result from the first brake activation was nil, so the train driver made subsequent detention with the controller for automatic braking, but gradually, degree by degree instead of quick (emergency) stopping the train. All that has failed and the speed of the train began to increase with each passing second, reaching 80-82 km/h. All those mistakes led to the exhaust of the brakes on the train, which in turn, together with insufficient brake mass led to the loss of control on the train and its derailment. After the train driver, in carrying out effective brake test, has found insufficient braking effect, he took all the possible measures to stop the train, according to Article 336, para. 2 pt. 1 of the *„Rules for the traffic of trains and shunting on railways"*. After the derailment of the train at Dupnitsa station, the train driver did not require from the traffic manager on duty at the station and technician-mechanic inspector to perform a hot test to the freight wagons in order to establish the reason for the loss of control, which is a violation of the requirement of Article 323, para. 2 of the *"Rules for the traffic of trains and shunting on railways"*.

12. Cases for the accident.

The immediate cause for the derailment of nine freight wagons from the composition of freight train No. 50601 at entering Dupnitsa station is: insufficient braking effect of the automatic train brake leading to excess of permitted speed for the train entering the station diversion track in Dupnitsa. The causes for the insufficient braking effect are: non-compliance with the provisions of the current legislation in rail transport, with reference to the short test (test "D") of automatic train brake at station Delyan and non-compliance with the technology for management of freight train in long downhill at low air temperatures.

The low temperatures affected the operation of the automatic train brake, but they were not decisive, the accident could have been prevented with a short test at station Delyan in accordance with the legal requirements.

Compliance with Plan II-24 for acceptance of freight train No. 50601 at Station Dupnitsa on the third track could prevent the derailment of the train by creating a quick and timely organization to evacuate the track and accepting the train under the plan, which at the time was occupied by the composition of passenger train No. 50330 arriving at the station at 11:16 p.m. and departing the next day, as passenger train No. 50331 at 5:15 p.m.

13. Recommendations and suggestions for activities preventing other accidents of a similar nature.

1. The "Holding BDZ" EAD through Vocational Training Center (VTC) to organize periodic training to refresh the knowledge of the staff directly related to the transport safety on the current (operational) regulatory provisions.

2. The "Holding BDZ" EAD to organize periodic checks and tests of direct and train controller and registering speedometers of locomotives of all series, and regularly to read and follow the speedometer tapes of locomotives with strictly monitoring the registration of all parameters.

3. The "Holding BDZ" EAD to take action for the design, construction and implementation of electronic stands for testing of brake units in main locomotive depots of BDZ EAD.

4. The "Holding BDZ" EAD to design, to construct and to implement a computer stand in both companies for inspection and testing of registering locomotive speedometers.

5. The "Holding BDZ" EAD to organize the implementation of all the locomotive devices to record digitally and store all the data on the status of the locomotive.

6. The "Holding BDZ" EAD to assign the construction of simulator for training and testing the practical skills of the train drivers in brake control.

7. We do suggest to the SE National Railway Infrastructure Company to amend and integrate the text of the Regulations for railway transport - Part II - Article 334 of the Rules for the traffic of trains and shunting on railways, as follows:

1. The existing text of article 334 to become paragraph 1.
2. Adding new paragraph 2 with the following text:

"(2) **The** train drivers upon departure of a freight train from a profiled station must verify the effectiveness of the train brake at a temperature below minus 10 ° C."

In connection with Article 94, para. 4 of Regulation No. 59 of 5.12.2006 on the management of the railway safety, the addressees of the safety recommendations are obliged to notify the Chairman of the Commission for Investigation at the Ministry of

Transport, Information Technology and Communications on the actions taken for the implementation of the recommendations.

Chairman:

..... **(Boycho Skrobanski)**
State Inspector with Directorate Unit for investigation of accidents in r.w. transport

Members:

1 .....**(Vasko Nikolov)**
External Expert

2 ..... **(Dobrinka Atmadzhova)**
External Expert

3 ..... **(Georgi Maloselski)**
External Expert

I, the undersigned, Ventseslava Mihailova Mishlyakova certify the truthfulness of the translation made by me from Bulgarian into English of the enclosed document. The translation consists of 18 pages.

Sworn translator: Ventseslava Mihailova Mishlyakova