



INVESTIGATING REPORT

of the fire occurred on the 2nd of August 2012, in the Branch of the Regional center for railway operation, maintenance and repairs Craiova, between the railway stations Costesti and Parvu, at the ballast cleaner type MCB 450-064, running as train no. 98930



*Final edition
The 25th of September 2012*

NOTICE

The fire from the 2nd of August 2012, at 13,10 o'clock, in the running of the train no. 98930, the ballast cleaner MCB 450-064, in the Branch of the Regional center for railway operation, maintenance and repairs Craiova, track section Piatra Olt – Bradu de Sus, between the railway stations Costesti – Parvu (km. 120+700), consisting in the fire in the equipments room, at the electric engine 3, Romanian Railway Investigating Body performed an investigation in accordance with the provisions of the Government Decision no. 117/2010. Through the performed investigation, the information concerning the occurrence of this accident were gathered and analyzed, the conditions were established and the causes determined.

Romanian Railway Investigating Body considers necessary to take corrective measures for the improvement of the railway safety and the prevention of the accidents, therefore it issued in this report a series of safety recommendations

Bucharest, 25th of September 2012

Approved by

Director,
Nicolae SANDU

*I ascertain the compliance with the
legal provisions concerning the investigation
and the drawing up of this investigating report that*

I submit for approval

Chief investigator

Eugen ISPAS

This notice is part of the Report for the investigation of the railway accident happened on the 2nd of August 2012, in the Branch of the Regional center for railway operation, maintenance and repairs Craiova, track section Piatra Olt – Bradu de Sus, between the railway stations Costesti – Parvu (km. 120+700), in the running of the train 98930, consisting in a fire in the engine room of the ballast cleaner MCB 450-064 (belonging to CNCF “CFR” SA)

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I. PREAMBLE

I.1. Introduction

The fire occurred on the 2nd of August 2012, at 13,10 o'clock, in the running of the train no. 98930, the ballast cleaner MCB 450-064 (structural subsystem – railway vehicle) is an accident according to the art. 7, paragraph (1), letter (e) of the **Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety**, approved by Government Decision no. 117/2010, hereinafter referred as, in the investigation report, **“Regulation”**.

Taking into account these above mentioned and according to the art. 19, paragraph (2) of the *Law 55/2006 on the railway safety*, corroborated with the art. 48, paragraph (1) from the **Regulation**, Romanian Railway Investigating Body appointed an investigation commission.

Through the Decision of OIFR director no. 91 bis from the 8th of August 2012, according to the provisions of art. 19, paragraph (2) from the Law no. 55/2006 on the railway safety, corroborated with the art. 48(1) from the Regulation, the investigation commission was appointed, consisting in:

- Ciochină Ștefan - OIFR - main investigator
- Gheorghe Mitică Dumitru - regional inspector Safety Branch of the Regional center for railway operation, maintenance and repairs - investigator
- Popa Petru - central inspector Safety IMCF - investigator
- Padină Constantin - head of the Mechanization Department Branch of the Regional center for railway operation, maintenance and repairs Craiova - investigator

Through the performed investigation, the information concerning the occurrence of this accident were gathered and analyzed, the conditions were established and the causes determined.

OIFR investigation did not aim to establish the guilty or the responsibility.

I.2. Investigation process

Soon after this accident, Romanian Railway Investigating Body was notified, verbally and in writing, in this respect by the Regional Inspectorate for Traffic Safety Craiova, within CNCF « CFR » SA.

After going to the accident place, it found out :

- the ballast cleaner MCB 4500-064, running from the railway station Jiu as train no. 98930 (to the railway station Golesti), was stopped in the railway station Parvu, from the running line Costesti-Parvu ;
- in the secondary driving cab (front cab, from where the vehicle was driven, named also driving cabin 2) and the engine room, containing the equipment blocks D1-D5, all the equipments were in normal condition, without traces of thermic effect from the fire ;
- in the main driving cab (opposite those of driving, named the driving cab 1), the room of the heat engine, the power generator, force and command cables, in the heat engine room and generator, the electric boxes D6-D7, were affected from the thermic point of view ;
- the force cables, between the power generator and the engine M3, was completely carbonized ;
- the force cables from the main generator connections had the insulation carbonized between the connections of the generator and the traction engine M3, and the connection boxes were carbonized ;
- the stone intermediary conveyor belt and the turning belt were thermic affected on about 50% ;
- the line and the equipments in the accident area were not affected ;

This accident did not generate injuries and fatalities

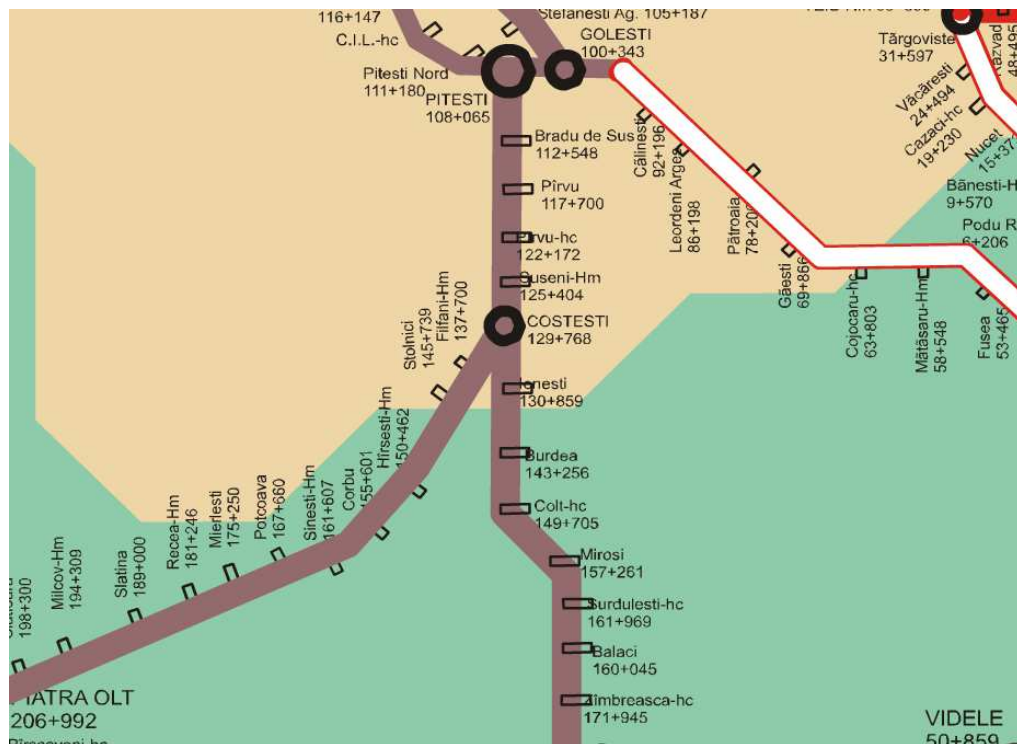
At the accident place were present the representatives of:

- Inspectorate for Emergency Situations „Capitan Puica Nicolae” of Arges District ;
- Operative Department of the Railway Transport Police;
- Romanian Railways CNCF „CFR” SA

A. ACCIDENT BRIEF PRESENTATION

A.1. Brief presentation

On the 2nd August 2012, at 13,10 o'clock, according to the request no. 166/01.08.2012 of the Mechanization Department of the Branch of the Regional center for railway operation, maintenance and repairs Craiova, the balast cleaner MCB 450-064 (belonging to CNCF „CFR” SA) run as light one, as train 98930, between Jiu-Craiova-Brad de Sus-Golesti, being driven by a complete crew (specialist driver MGC, driver I and electrician).



ACCIDENT POSITION

It left the railway station Jiu at 7:50 o'clock, the drivers being in the main driving cab (front one) and the electrician in the secondary driving cab (back one), arrived in the railway station Craiova at 8:40 o'clock, stopping 5 minutes, when the crew changed the driving cab and made an inspection of the vehicle, being in suitable condition. The train left at 8:45 o'clock the railway station Craiova, the crew monitoring the also the positions of the on-board equipment, without observing the current or voltage fluctuations, and run up to the railway station Balș, where stopped at 9:30 o'clock. The train stopped 60 minutes, when the crew made an inspection of the vehicle, being in suitable condition.

Between the railway stations Costești and Parvu (120+700 km), the electrician from the main driving cab (opposite the driving) felt smoke. He took measures for notifying the driving crew from the front driving cab, both by signals of the on-board bell and by hand signals, hand out the balast screamer window, and the specialist driver took measures for the quick stop of the cleaner and ensurance against run away, Then, the operation staff of the balast cleaner MVB 450-064 used the extinguisher in the area of the traction engine M3, and in because the smoke continued, the specialist driver notified by mobile phone the direct head and by the RER equipment asked the specialized intervention of the firemen. The firemen arrived at about 13:45 o'clock, and at about 14:45 o'clock

the fire was extinguished. At 14:25 it was routed from the railway station Parvu, to the running line Costesti-Parvu, the assistance DA 824, belonging to SNTFM, that after the fire extinguish and taking the protection measures that ensure the security, stopping of the balast cleaner in the railway station Parvu, at 15,21 o'clock

A.2 Accident causes

A.2.1 Direct cause

Short-circuit between the conductor, situated between a main pole and a reversing pole, of the traction engine no. 3 and the brush collar support

A.2.2 Underlying causes

Non-performance of the works for the removal of the oil deposits (fuel, greases) from the hard-to-reach constructive areas of the balast cleaner, where they can appear.

Contributing factors

Non-compliance with the deadline established for the works specific to the repair type at the balast cleaner (due for repair type RG in 1995 and 2005 years, and for the repair type RK in 2000), led to an advanced wear at the equipments and generator sets, generating:

- decrease of the electrical strength of the insulating material at the conductors between the poles of the traction engine no. 3;
- oil leakages through the sealing areas of the hydraulic parts of the diesel engine and their deposit in hard-to-reach points.

A.2.3. Root causes

None.

A.3. Severity level

According to the provisions of art. 7, paragraph (1), letter. e from the *Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety*, approved by the Government Decision no.. 117/2010, the fire is defined as accident.

A.4. Safety recommendations

None

This investigation report will be sent to Romanian Railway Safety Authority, to SC Track Mechanization Department and to 34 the public railway infrastructure manager CNCF „CFR” SA

B. INVESTIGATING REPORT

B.1. Accident presentation

On the 2nd of August 2012, at 13,10 o'clock, according to the application no. 166/01.08.2012 of the Mechanization Department of the Branch of the Regional center for railway operation, maintenance and repairs Craiova, the balast cleaner MCB 450-064 (belonging to CNCF „CFR” SA) run light, as train 98930, between Jiu-Craiova-Bradul de Sus-Golesti, being driven by a complete crew (specialist driver MGC, driver I MGC and electrician).

It left the railway station Jiu at 7,50 o'clock, the drivers being in the main driving cab (front) and the electrician in the secondary driving cab (back), arrived in the railway station Craiova at 8,40 o'clock, stopping 5 minutes, when the crew changed the driving cab and made an inspection of the vehicle, it being in suitable condition. The train left at 8,45 o'clock from the railway station Craiova, the crew monitoring also the positions of the on-board equipments, without observing the current or voltage fluctuations, and run up to the railway station Bals, here it stopped at 9.30 o'clock. The train stopped 60 minutes, when the crew made an inspection of the vehicle, it being in suitable condition.

From the railway station Bals (218+818 km) the train left at 10.30 o'clock, passed through the railway station Costesti at 12,48 o'clock, and at about 13,10 o'clock, between the railway stations Costesti and Parvu (120+700 km), the electrician from the main driving cab (opposite driving cab) felt smoke. He took measures for notifying the driving crew from the front driving cab, both by signals of the on-board bell and by hand signals, hand out the balast cleaner window, and the specialist driver took measures for the quick stop of the vehicle and ensurance against run away. Then, the operation staff of the balast cleaner MCB 450-064, in order to ventilate, used the extinguishers in the area of the engine M3, and because the smoke continued, the specialist driver notified by mobile phone the direct head and the by radio equipment asked the specialized intervention of the firemen. The firemen arrived at about 13,45 o'clock, and at about 14,45 o'clock the fire was extinguished. At 14,25 one routed from the railway station Parvu, to the running line Costesti-Parvu, the assistance DA 824, belonging to SNTFM „CFR Marfa” SA, that after the fire extinguish and the protection measures taking for the security ensurance, stops the balast cleaner in the railway station Parvu, at 15,21 o'clock.

No victims.



Effect of burning inside the engine room



Effect of burning inside the engine room

At 15,24 o'clock the running line Costesti – Parvu was open again.

B.2. Accident circumstances

B.2.1. Involved parties

2.1.1 The involved staff belongs to CNCF „CFR” SA – SC „Mechanization Track Maintenance S.A. The balast cleaner MCB 064 belongs to CNCF „CFR” SA – S..I.M.C Craiova.

2.1.2 The infrastructure, where the accident happened, belongs to CNCF „CFR” SA and is maintained by the staff of the Track Section L1 Pitesti.

2.1.3 The interlocking system (SCB) from the railway stations Costesti and Parvu is administrated by CNCF „CFR” SA and maintained by CNCF „CFR” SA – Regional Branch Bucuresti and maintained by the staff belonging to the Section CT 3 Rosiori.

2.1.4 The communication equipment between the railway stations Costesti and Parvu is administrated by CNCF „CFR” SA and maintained by the employees of SC TELECOMUNICATII CFR SA

The investigation commission questioned the specialist driver of the balast cleaner, the driver I of the balast cleaner and the electrician from the balast cleaner, involved in the fire location.

B.2.2.Composition and the equipments of the train

The balast cleaner MCB 450-064 belongs to the Branch of the Regional center for railway operation, maintenance and repairs Craiova.

B.2.3. Railway equipments

The involved railway infrastructure, that is the running line between the railway stations Craiova and Golesti, is administrated by CNCF „CFR” SA - Branch of the Regional center for railway operation, maintenance and repairs Craiova, and maintained by the staff of the Track Section L1 Pitesti.

The running line is a straight one, made of rail type 65, reinforced concrete T13.

The running speed on the line is 80 km/h for the passenger trains and 70 km/h for the freight ones.

The line is un-electrified one.

B.2.4. Communication means

The communication between the staff from the driving cab of the ballast cleaner and the movements inspectors was ensured through radio-telephone equipments.

B.3. Accident consequences

B.3.1. Fatalities and injuries

None

B.3.2. Material damages

- at the balast cleaner according to the estimation no. S2/1/439/04.09.2012 of S.I.M.C. Craiova – 12910,36 lei;
- at the lines – none;
- at the equipments – none
- **TOTAL – 12910,36 lei**

B.3.3. Consequences of the accident in the traffic

Following this accident 3 trains had a delay of 311 minutes.

B.4. External circumstances

On the 2nd of August 2012, when the accident happened, the visibility was good, cloudless sky, without wind and the air temperature 40⁰ C.

The accident happened in the area of the km 120+700, straight line, line made of rail type 65, sleepers BA type T17, welded track

The visibility of the light signals was in accordance with the provisions of the specific regulations in force

B.5 Investigation course

B.5.1 Summary of the involved staff testimonies

B.5.1.1 Summary of the testimonies of the undertaking staff and of the witnesses

- **the specialist driver of the balast cleaner** MCB 450-064, that ensure the driving on the 2nd of August 2012, stated as follows:
 - at the leaving from the workshop, he inspected the railway vehicle from the safety traffic point of view and it was suitable;
 - in the railway station Craiova, he stopped 5 minutes and performed a visual inspection of the vehicle
 - at the leaving from the railway station Craiova, he followed the route, the signals and the measuring and control devices from the driving cab II, being according to a right operation;
 - during the running between Plaiul Vulcanesti and Pielesti, the down-grade being the higher, he could not observe the current or voltage flucruations on the on-board equipments;
 - at the stop in the railway station Bals, he performed a visual inspection of the vehicle and did not observe any failure;
 - between Costesti and Parvu, he was notified by his colleague from the oposite driving cab, by the bell, and with the head out the window he observed that he received stop signals;
 - he applied the emergency braking and tried to extinguish the fire from the traction engine area with the extinguishers and non getting it, he notified the direct head by mobile phone, and by the radio equipment he notified the railway station Parvu, asking for firemen, that arrived at about 13,45 hour;

- between Jiu and Costesti , no protection became active and no problems appeared in the vehicle working;
 - he undelined that in the secondary driving cab was a barrel with 200 l oil, that he had to take to the track section L1 Pitesti with the accompanying documents;
 - at the firemen arrival, he stopped the oil overflowing by turn off the cock.
- **the driver I that ensured the driving** of the balast cleaner MCB 450-064, on the 2nd of August 2012, stated as follows:
- at the leaving from the workshop, he inspected the railway vehicle from the safety traffic point of view and it was suitable;
 - in the railway station Craiova, he stopped 5 minutes and performed a visual inspection of the vehicle;
 - at the leaving from the railway station Craiova, he followed the route, the signals and the measuring and control devices from the driving cab II, being according to a right operation;
 - during the running between Plaiul Vulcanesti and Pielesti the down-grade being the higher, he could not observe the current or voltage fluctuations on the on-board equipments;
 - at the stop in the railway station Bals, he performed a visual inspection of the vehicle and did not observe any failure;
 - between Costesti and Parvu, he was notified by his colleague from the oposite driving cab, by the bell, and with the head out the window he observed smoke at the traction engine;
 - he stopped and took the supplied extinguishers and tried to extinguish the fire at the traction engine;
 - he could not extinguish the fire and waited for the firemen;
 - between the railway stations Jiu and Costesti, there were no problem in the vehicle working;
 - in the secondary driving cab there was a barrel with oil, that had to be carried to the track section L1 Pitesti, with the accompanying documents;
- **the electrician** on the balast cleaner MCB 450-064 on the 2nd of August 2012, stated as follows:
- at the leaving from the workshop, he inspected the electric part of the railway vehicle and it was suitable;
 - from the railway station Craiova he surveilled and monitored the on-board devices from the driving cab I;
 - at the stop in the railway station Bals, he performed a visual inspection of the electric equipment and it was suitable;
 - between Costesti and Parvu, at the km 120+60 he felt smoke and notified his colleagues from the driving cab 2, by the bell from the driving cab 1;
 - he tried to extinguish the fire from the traction area engine, with the provided extinguishers;
 - the specialist driver asked by phone and radio equipment the firemen intervention;
 - between the railway stations Jiu and Costesti, there were no problem in the vehicle working;
 - in the secondary driving cab there was a barrel with 200 l oil, that had to be handed over to the track section L1 Pitesti;

B.5.2. Safety management system

In the carrying out of its duties and responsibilities , the railway infrastructure administrator CNCF “CFR” SA and the undertaking SNTFC “CFR Calatori” SA had drawn up and implemented their own railway safety management system,

B.5.3 Norms and regulations. Sources and references for the investigation

In the investigation of the railway accident one took into account :

- minutes concluded in the commission at the accident place, concerning the condition of the rolling stock, lines and equipments;
- photos taken soon after the railway accident by the members of the investigation commission;
- statements of the specialist driver, driver I and electrician of the balast cleaner;
- minutes concluded by the investigation commission members, after the accident;
- documents concerning the vehicle maintenance and repair, supplied by the persons in charge with its maintenance;
- inspection and interpretation of the technical condition of the elements involved in the accident;

B.5.4 Working of the rolling stock

B.5.4.1 Data found out on the balast cleaner MCB 450-064

B.5.4.1.1 Data resulted from the inspections performed on the 6th of August 2012, without disassembly, by the investigation commission and the staff in charge with the maintenance and repair, from the Section for the Track Mechanization Maintenance Craiova, recorded in a minute (part of the investigation file) and photos (taken by the investigation commission)

Following the inspection made by the investigation commission at the balast cleaner, one found out:

- at the traction engine M3, driving cab 1, cable A3 cut and with the insulation carbonized, and the cables A34, A33 and B30 with the insulation carbonized, being protected with metallic tubes type COPEX;
- the plate of connections, for the power supply of the traction motor M3, destroyed by the fire, was missed;
- the collector brushes of the traction motor M3 had corresponding sizes and sufficient pressure in the collector;
- force and command cables from the driving cab 1 are destroyed from the technological point of view;
- the insulation from between the collector and the rotor axle destroyed;
- fuses and circuit contact makers M3 in suitable condition;
- 4 accumulators of 180 Ah destroyed;
- the electric box no. 6 – driving cab 1 destroyed;
- the electric box no. 7 – driving cab 1 destroyed;
- room of the technologic and heat engine of the driving cab 1 destroyed;
- windscreen driving cab 1-2 broken;
- doors for the access at the driving cab 1-2 destroyed;
- heat engine 5% affected;
- control desk of the technologic destroyed;
- cooler of the heat engine from the right side, driving cab 1 destroyed;
- side windows 4 pieces engine room driving cab 1 – back.

On the 9th of August 2012, following the dismantling of the traction engine M3, the investigation commission gathered and together the staff in charge with the maintenance and repair of the Section for the track mechanization maintenance Craiova, found out the data recorded in a minute (part of the investigation file):

- electric connection between those 2 poles from the stator circuit, with the mica insulation broken and the electric cable cut about 90%, The cut section had traces of flame (melted copper wire), the same traces being also on the brush collar (at the spring of a brush collar);

- the electric connection from the same charbon brush, above mentioned, cut, with traces of flame between those two parts (melted copper wires);
- in the box D4, the fusibles and the relays, that ensure the protection of the engine circuit, were in suitable condition.

B.5.4.1.2 Data resulted from the analysis of the documents asked from the undertaking

- the ballast cleaner was put into service in 1990;
- the last inspection “RT” was made on the 23rd of May 2012 in the Section for the Track Mechanization Maintenance Craiova;
- the vehicle was not submitted to a repair type RG (scheduled for 1995 and 2005) or RK (scheduled in 2000);
- the traction engine M3 of the vehicle, at the incident occurrence, was assembled from the manufacturing flow by the manufacturer.

B.6 Analysis and conclusions

B.6.1 Analysis of the incident occurrence

Between Jiu and Costesti, the ballast cleaner MCB 450-064 worked normally, without be signaled the coming in service of the protection

Following the appearance of some mechanic wears at the electric insulation of the conductor between two poles of the stator circuit of the traction engine M3, respectively because the vibrations and the rolling stock ageing, the dielectric capacities of the insulation were reduced, followed by a short-circuit between this conductor and the electric connection of a collecting brush (charbon), it leading to the partial cut of the conductor and the connection cut.



Photo – the junction wire between the main pole and the reversing pole cut



Photo - support of the brush collar with the flexible connection of the collecting brush cut and melting traces

The railway vehicle continued to run on a straight line in these conditions and another short-circuit between the partial cut conductor and the brush collar appeared, it leading to the local melting about 90% and the brush collar melting (on the part for the transmission of the force from the spring to the brush)

In these conditions, the insulation of the cables from the traction engine M3 (A33, A34, A38 and B30), by influence, leading to the burn of the terminal connections plate, of the insulation of whole force cables up to the alternator type GSA TH 62-4.



Photo – cable insulation at the exit from the electric engine, burn



Photo – the insulation of the electric engine cables burn, and the terminal connection plate missing because the burning

Then, the argus tubes for the hydraulic oil supply for the mechanical ventilation of the traction engine M3, the argus tubes for the regulator and the oil from them, the argus tubes from the hydraulic group, pre-grasing tube of the heat engine, in the box D7 and D6 the cables insulation and the working cab, then the access door melted outside the working cab, burning the cables from the accumulator batteries together with two accumulators, the argus tubes from the hydraulic oil tank, the rubber belt and the fix belt, the fire spreading to the driving cab 2.

The supply and command cables, accumulator batteries had no short-circuit traces, cuts or local melting, having their insulation burn because the spread fire

B.7. Accident causes

B.7.1 Direct cause

Short-circuit between the conductor, situated between the a main pole and a reversing pole, of the engine no. 3 and the brush collar support

B.7.2 Underlying causes

Non-performance of the works for the removal of the oiler deposits (fuel, greases) from the hard-to-reach areas of the balast cleaner where they can appear.

Contributing factors

Non-compliance with the deadline established for the works specific to the repair type at the balast cleaner (due to repair type RG in 1995 and 2005 years, and the repair type RK in 2000), led to an advanced wear at the equipments and generator sets, generating:

- decrease of the electrical strength of the insulating material at the conductors between the the poles of the engine no. 3;
- loss of oil through the sealing areas of the hydraulic parts of the diesel engine and their deposit in hard-to-reach points.

B.7.3. Root causes

None.

A.4. Safety recommendations

None

This investigation report will be sent to Romanian Railway Safety Authority, to SC public railway infrastructure manager CNCF „CFR” SA

Investigation commission

- | | | |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------|
| ▪ Ciochină Ștefan | - OIFR | - main investigator |
| ▪ Gheorghe Mitică Dumitru | - regional inspector SC T Branch of the
Regional center for railway operation, maintenance and repairs | - investigator |
| ▪ Popa Petru | - central inspector SC IMCF | - investigator |
| ▪ Padină Constantin | - head of the Mechanization
Department Branch of the Regional center for railway operation,
maintenance and repairs Craiova | - investigator |