NOTICE

According to the Government Decision no. 716/02.09.2015 for the organization and functioning of Romanian Railway Investigation Agency – AGIFER, as well as to the provisions of the *Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and metro safety,* approved by the Government Decision no.117/2010, Romanian Railway Investigatig Agency performed an investigation of the railway serious accident happened on the 8th Aprilie 2017, at 14,30, in the railway county Timisoara, track section Petrosani – Simeria (electrified double-track line), between the railway stations Banita and Merisor, on the track I, km 62+940, consisting in the derailment of the hauling locomotive EA 759 and of the first 14 wagons from the freight train no.50457 (got by the railway undertaking SC UNICOM TRANZIT SA), leading to the death of the locomotive crew (driver and driver's assistant).

Through the investigation, the information about the accident occurrence was gathered and analyzed, the conditions were establishedd, and causes were determined.

The investigation of Romanian Railway Investigating Agency-AGIFER did not aim to establish the guilty or the responsibility.

Bucureşti, the 3rd April *2018*

Edorsed by
General Manager,
Phd.Vasile BELIBOU

I ascertain the compliance with the legal provisions concerning the investigation and the drafting of this investigation report that I submit for endorsment
Deputy General Manager
Eugen ISPAS

This Notice is part of the Investigation Report of the railway serious accident happened on the 8th Aprilie 2017, at 14,30, , in the railway county Timisoara, track section Petrosani – Simeria, between the railway stations Banita and Merisor, on the track I, consisting in the derailment of the hauling locomotive EA 759 and of the first 14 wagons from the freight train no.50457 (got by the railway undertaking SC UNICOM TRANZIT SA), leading to the death of the locomotive crew (driver and driver's assistant).

INVESTIGATION REPORT

of the railway accident happened on the 8th April 2017,
in the railway county Timişoara, track section Livezeni – Simeria (electrified double-track line),
between the railway stations Băniţa and Merişor

Investigation report
Final edition
The 3rdth April 2018

A. PREAMBEL

A.1. Introduction

Romanian Railway Investigation Agency-AGIFER, hereinafter referred to as AGIFER, runs investigations in accordance with the provisions of *Law no.55/2006* for the railway safety, hereinafter referred to as *Law on the railway safety,* as well as with the *Regulations for the accidents and incident investigation, for the development and improvement of Romanian railway and metro safety,* approved through the Government Decision no.117/2010, hereinafter referred to as *Investigation Regulations.*

The objective of AGIFER investigation is the improvement of the railway safety and the prevention of the railway accidents and incidents.

The investigation is performed indendependet of any inquiry and does not any way to establish the quilty or the responsibility.

A.2. Procesul investigaţiei

According to the art.19, paragraph (1) of *Law for the railway safety,* corroborated with the art.48-(1) from the *Investigation Regulations,* AGIFER, in case of some railway accidents and incidents, has to open investigations and to establish investigation commissions that gather and analize the technical information, establish the occurrence conditions, including the establishment of causes and, if case, issue some safety recommendations in order to prevent some similar accidents and to improve the railway safety.

Taking into account the informative note of the General Inspectorate for the Traffic Safety within Infrastructure Manager CNCF „CFR" SA, as well as the notification sheet of the Regional Inspectorate for Traffic Safety within the Railway County Timişoara, with reference to the railway accident happened on the 8th April 2017, in the railway county Timişoara, track section Livezeni - Simeria (electrified double-track line), between the railway stations Băniţa and Merişor, on the running track I, km 62+890, consisting in the derailment and overturning of the hauling locomotive EA 759 and of 14 wagons from the freight train no.50457, got by the railway undertaking SC UNICOM TRANZIT SA and taking into account that the railway event is classified as serious accident in accordance with the provisions of art.7, paragraph (2), letter a from the Investigation Regulations, AGIFER General Manager decided to open an investigation and appointed the investigation commission.

So, through the Decision no.228 from the 10th April 2017, made by AGIFER General Manager,the investigation commission was appointed. Upon objective reasons, that do necessary the change of the investigation commission, the NOTE no.1110/31 from the 17th January 2018 was issued, the commission that finished the investigation being as follows:

a. Toma Macu MOVILEANU Investigator in chage
b. Eduard STOIAN member,
c. Marian ZAMFIRACHE member,
e. Dan CIUCEA member,
f. Tudor CIOLACU member,
g. Mitu-Costel AFANASE member,
h. Florentina BEZNEA member.

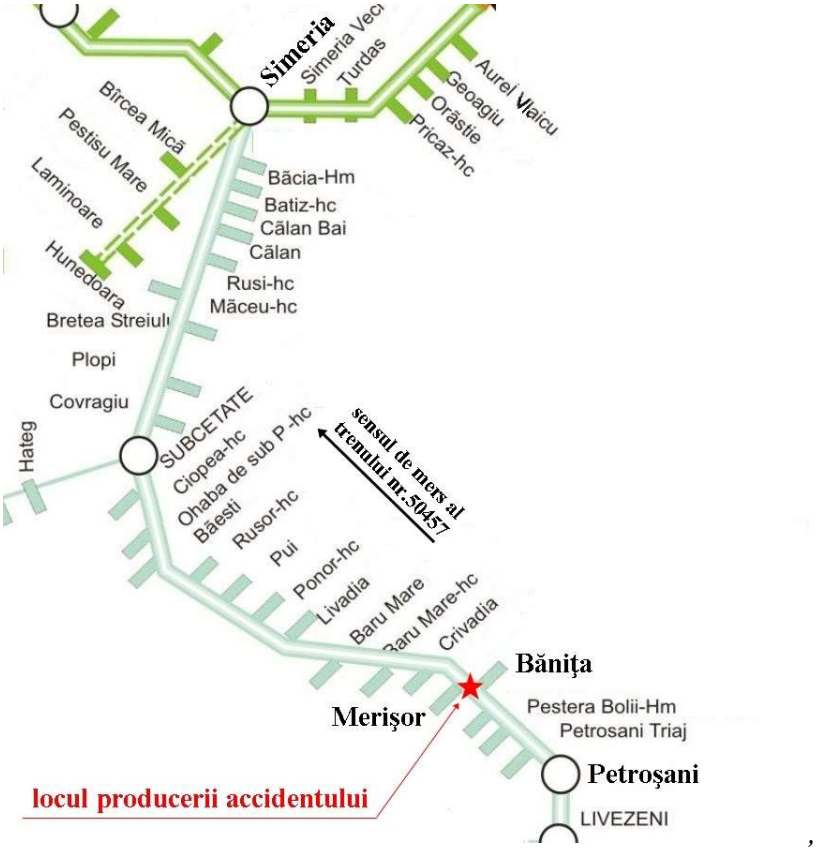
B.SUMMARY OF THE INVESTIGATION REPORT

SUMMARY

The freight train no.50457, hauled by the electric locomotive EA 759, consisting in 16 wagons (got by the railway undertaking SC Unicom Tranzit SA), was dispatched from the railway station Slatina, on the 8th April 2017, at 00:10 o'clock, to Curtici.

On the 8th April 2017, at 14:30 o'clock, in the railway county Timişoara, track section Petroşani - Simeria (electrified double-track line), between the railway stations Băniţa and Merişor, on the track I, km 62+940, the first 14 of the freight train no. 50457 and its hauling locomotive, EA 759, derailed.

The accident site is presented in the picture no. 1.



Sketch no. 1

The freight train no.50457, hauled by the locomotive EA 759, consisted in 16 wagons, the first 3 wagons, in the running direction, were empty, the other 13 wagons were loaded with thunder (scrap metals), with a tonnage of 1033 tons, 64 axles and a length of 249 m.

Accident consequences

Track superstructure

The railway accident generated infrastructure damages, on a length of 77 m on the track I, respectively, 65 m on the track II (rails, normal sleepers, metallic material used for the fastening of the rails on the sleepers, etc.).

Rolling stock

The hauling locomotive EA 759 and 14 wagons of the train no. 50457 were seriously damaged, as follows:

- wagon no.31535494448-2 (the 1st one);
- wagon no.33515373861-2 (the 2nd one);
- wagon no.31535928552-7 (the 3rd one);
- wagon no.33535300220-7 (the 4th one);
- wagon no.33535303557-9 (the 5th one);
- wagon no.33565423333-7 (the 6th one);
- wagon no.33535303547-0 (the 7th one);
- wagon no.33565423334-5 (the 8th one);
- wagon no..33565423379-0 (the 9th one);
- wagon no.33565423287-5 (the 10th one);
- wagon no.33535421205-2 (the 11th one);
- wagon no.33535303598-3 (the 12th one);
- wagon no.33565423357-6 (the 13th one);
- wagon no.31555330294-6 (the 14th one).

Railway equipments

4 concrete poles of the contact line were damaged and the suspension elements of the contact line were destroyed (brackets, arms, porcelain insulators);

Injured persons

The accident led to the death of the locomotive crew (driver and driver's assisstant).

Traffic interuptions

Following this serious accident the train running was closed on both tracks, between the railway stations Băniţa and Merişor, starting with the accident occurrence, on the 8th April 2017, 14:30 o'clock until the the clearing and restoration of the railway infrastructure, on the 14th April 2017, 11:25 o'clock. During this period of time, the train running was as follows:

- the passenger trains ran up to the railway station Pui (the trains from Simeria) and up to the railway station Petroşani (trains from Craiova). Between the railway stations Pui – Petroşani, the passenger trains were cancelled, between these two railway stations the pasengers being transfered with buses;
- the freight trains were cancelled between Călan Băi – Petroşani, being re-scheduled on other routes.

Consequences on the environment

None.

Causes and contributing factors

Direct cause

The direct cause of the accident was the very important increase of the lateral forces acting on the locomotive wheels, it leading to the exceeding of the derailment stability limit. It happened because, the running on a curve, the train speed (92 km/h) exceeded with 130% the maximum speed on the track section (40 km/h).

The increase of the train speed happened following some human errors, following which the angle cock from the first wagon was on „off", the general air pipe being interrupted, and the automatic brakings of the train could not ensure its braking.

Contributing factors

- The physical condition of the locomotive staff was affected by:
  - consumption of alcooholic drinks during the working time;
  - fatigue cumulated between leaving the home and the accident occurrence, this fatigue present in case of the driver that was 67 years old.

Underlying causes

1. Infringement of the provisions of art.1 from the Order of Minister of Transports and Telecommunications no.855/1986 concerning the prohibition for the trasport staff to introduce in the units and to drink alcoholic drinks, as well as of the provisions of art.12, paragraph (1), letter b), from the Instructions for the activity of the locomotive crew no.201/2007, concerning the prohibition to transport and/or drink during the working time alcoholic drinks that can reduce the driving capacity of the locomotive crew.
2. Infringement of the provisions of art.2 from Norms approved by Order of Minister of Transports no.256/2013, concerning the maximum continuous working time accepted in the locomotive for the locomotive crew, in complete team.
3. Infringement of the provisions of art.10 from the Norms approved by the Order of Minister of Transports no.256/2013, according which the railway undertaking requests, 60 minutes at least before the end of the effective driving time of the locomotive, the operative management of the the infrastructure manager or of the administrator to stop the train for the shift exchange.
4. Infringement of the provisions of art.125, paragraph (1) from the Instructions for the activity of the locomotive crew no.201/2007 concerning the strict compliance with the running speeds.
5. Infringement of the provisions of art.75, paragraph (5) from the Regulations for hauling and braking no.006/2005, with reference to the way to use the train braking on track sections with slope over 15‰.
6. Infringement of the provisions of art.70, paragraph (14) from the Instructions for the activity of the locomotive crew no.201/2007 concerning the prohibition to block the release valve of the locomotive brake cylinders.

Root causes

Infringement of the provisions of point 5.14, letter h.2 and of point 5.16 from the Operational procedure code: POSF – 37, part of the safety management system developed by the railway undertaking SC UNICOM TRANZIT SA, concerning:

- the maximum limit of the time resulted from the summing of the working time during the train stop with the working time during the effective locomotive driving;
- sending of operative disposals for the adjustment of the running program, so the train crew on duty or taking rest outside the home to comply with the safety conditions imposed by the Norms approved through the Order of Minister of Transports no.256/2013.

Severity level

According to the accident classification stipulated at art.7 from the *Regulations for the accident and incident investigation, for the development and improvement of Romanian railway and metro safety*, approved through the Government Decision HG 117/2010, taking into account the activity where it happened, the fact is classified as railway serious accident, according to the art.7, paragraph (2), letter a.

Safety recommendations

On the 8th April 2017, at 14:30 o'clockin the railway county Timişoara, track section Petroşani - Simeria (electrified double-track line), between the railway stations Băniţa and Merişor, track I, km 62+940, in the running of the freight train no.50457, got by the railway undertaking SC UNICOM TRANZIT SA, 14 wagons and the hauling locomotive EA 759 derailed.

Following this railway serious accident, the locomotive crew (driver and driver's assistant) died.

Following the investigation, the investigation commission established that the railway serious accident happened because a human error, it being favoured by the physical condition of the locomotive crew, affected by:

- consumption of alcoholic drinks during the working time;
- fatigue accummulated during the time between the leaving of the home and the accident occurrence, this fatigue present in case of the driver that was 67 years old.

Taking into account the findings, the investigation commission considers necessary toissue the next safety recommnedation:

- Romanian Railway Safety Authority – ASFR shall take care that the railway undertaking SC UNICOM TRANZIT SA revise its own safety management system, so, applying all its own procedures, reduce the risks generated by the unsuitable physical condition of the locomotive staff.

C. INVESTIGATION REPORT

C.1. Accident presentation

On the 7th April 2017, the railway undertaking SC UNICOM TRANZIT SA asked the Central Controller for the Traffic Management (hereinafter referred to as RCCT), through the soft application ATLAS-RU, to schedule for running the freight train no.50457, between Slatina – Curtici, and RCCT, through the soft application ATLAS-IM (MEDUSA), approved the running of the freight train no.50457.

The train was scheduled to leave the railway station Slatina on the 7th April 2017, at 22:00 o'clock and to arrive at the destination, in the railway station Curtici, on the 8th April 2017, at 20:48 o'clock.

Because the tonnage stipulated in the working timetable, the train was going to run on the track section Slatina – Piatra Olt as loaded block train, with a tonnage of 1100 tone, 400 m length, hauled with diesel electric locomotive type DA, and in the railway station Piatra Olt, after coupling a group of wagons, brought before in the railway station Slatina, the train was continuing to run with a tonnage of 2000 tons and 600 m length.

Then, the train had scheduled the exchange of the hauling mean, with electric locomotive, type EA, in the railway station Caracal, exchange of the shift of the locomotive crew in the railway stations Caracal, Târgu Jiu, Simeria and technical inspection in transit in the railway station Subcetate. Also, because the hauled tonnage stipulated in the working timetable on the track section Târgu Jiu – Pui, in the railway station Târgu Jiu there was stipulated an uncoupling of a group of wagons, the train going to be hauled in two couples up to the railway station Subcetate.

Upon the approved running schedule, on the 7th April 2017, at 22:00 o'clock, the freight train no.59123, hauled by the diesel electric locomotive DA 021 (got by the railway freight undertaking SC UNICOM TRANZIT SA), consisting in 17 wagons series E, (5 wagons empty and 12 wagons loaded with thunder at TMK ARTROM Slatina), having the tonnage of 995 tons and 263 m length, was dispatched from the railway station Slatina to the railway station Piatra Olt. In the railway station Piatra Olt, the train wagons were coupled at the freight train no.50457.

During the technical inspection in the composition process and of the complete brake tests performed at the railway vehicles forming the freight train no.59123, in the railway station Slatina, there were no technical problems identified, that prevent the train dispatch. All wagons had the automatic and hand brakes working. In the train composition there were 5 wagons were not provided with hand brake since its manufaturing.

As accompanying train documents there were drafted the forms „train consist form", „brake note" and „note for the hand brake allocation".

According to the running order handed over to the driver in the railway station Slatina, the train ran according to the working timetable of the freiht train no.50203C and arrived, in safety conditions, in the railway station Piatra Olt, at 22:39 o'clock.

The freight train no.50457 was dispatched from the railway station Slatina to the ralway station Piatra Olt, on the 8th April 2017, at 00:10 o'clock, consisting in 13 wagons series E, loaded with thunder from TMK ARTROM Slatina, 969 tons, 207 m length. The train was hauled by the locomotive DA 021, after it hauled the freight train no.59123 between Slatina – Piatra Olt and came back as a light one from the railway station Slatina.

During the technical inspection, in the railway station Slatina, in the composition process and of the complete brake test, no problems were identified. The freight train no.50457 had no wagon with the automatic and hand brake out of service. In the train composition there was a wagon that, was not provided with hand brake, since its manufaturing.

As accompanying train documents there were drafted the forms „train consist form", „brake note" and „note for the hand brake allocation".

According to the working timetable handed over to the driver in the railway station Slatina, the train ran according to the working timetable of the freight train no.50205C and arrived, in safety conditions, in the railway station Piatra Olt, at 00:38 o'clock.

After the arrival of the freight train no.50457 in the railway station Piatra Olt, there was performed the shunting for coupling at the train a group of 17 wagons arrived before in the railway station Piatra Olt as train no.59123.

After the performance of the brake continuity test and drafting the "train consist form ", and „note for the hand brake allocation", the freight train no.50457-2, still hauled with the diesel-electric locomotive DA 021, consisted in 30 wagons series E (5 empty wagons, 25 wagons loaded with thunder), tonnage 1964 tons and length 420 m (value recorded in the "train consist form", without added the length of the hauling locomotive) left the railway station Piatra Olt to Caracal, on the 8th April 2017, at 01:31 o'clock.

The train ran safely, with automatic and hand brakes working, 5 wagons being recorded without hand brake, and a wagon not provided, since its manufaturing, with hand brake, was not recorded in this respect.

According to the running order, handed over to the driver in the railway station Piatra Olt, the train ran according to the working timetable of the freight train no.50205C-2 and arrived in the railway station Caracal, at 02:30 o'clock, being stabled on the line 6.

In the railway station Caracal, according to the established running program, the hauling means of the freight train no.50457 was changed (electric locomotive EA replaced the diesel electric one DA) and the shift of the locomotice crew exchanged.

The electric locomotive EA 759 (got by the railway freight undertaking SC UNICOM TRANZIT SA), replacing the hauling mean of the freight train no.50457, arrived in the railway station Caracal on the 8th April 2017, at 01:45 o'clock, hauling the freight train no.50440-1.

On the 8th April 2017, without stipulating the hour, the exterior station movements inspector (IDM) from the railway station Caracal recorded in the alcohol test register the control with the breathalyzer alcohol test device of the locomotive crew (driver and driver's assistant of the railway undertaking SC UNICOM TRANZIT SA) who came for work in the railway station for the driving the hauling locomotive from the freight train no. 50457. The result recorded was *„negative".*

From the recordings in the route sheet of the locomotive EA 759 (series UT, no.70657/2017), opened by the locomotive crew at the work start, for the hauling of the freight train no.50457, the hour of their coming to work, the hour when their physical condition was controled at their start of work

and the hour when the locomotive was taken in transit do not result. In the recordings in the route sheet, in the box corresponding to the locomotive crew condition, at their coming to work, those stated, signing for it, that they are rested and in normal condition.

From the statements of the traction traffic controller of the railway undertaking SC UNICOM TRANZIT SA and of the locomotive crew that delivered the locomotive EA 759 in the railway station Caracal, as well as from the route sheet of the locomotive EA 759 (series UT, no.100328/2017) drafted by the locomotive crew that delivered the locomotive, resulted that the delivery/taking of the shift in the locomotive EA 759, in the railway station Caracal, on the 8th April 2017, was done at *02:00 o'clock*.

At *02:15 o'clock*, the driver, following the technical inspections performed at the locomotive, wrote down in the on-board notebook the suitable condition of INDUSI equipment.

In the form „Daily sheet for the locomotive crew activity – the 7th April 2017", submitted by the railway undertaking, there was recorded that the delivery/taking over of the shift in the locomotive EA 759, in the railway station Caracal, on the 8th April 2017, was done at *02:30 o'clock*.

Delivery/taking over of the locomotive EA 759 was made on line 7, on this line being stabled the freight train no.50440-1, hauled previously by the locomotive EA 759.

According to the statements of the locomotive staff that delivered the locomotive and to the recordings in the on-board notebook, the locomotive EA 759 was delivered in good working condition.

After the arival of the freight train no. 50457 in the railway station Caracal, one performed the shunting for exchanging the train locomotive, replacing the locomotive DA 021 with the locomotive EA 759. After exchanging the hauling means, according to the Unified register for recordings the free lines and operations (hereinafter referred to as RUCLCM), the test for the brake continuity was performed.

The freight train no.50457, hauled by the locomotive EA 759 was dispatched from the railway station Caracal, on the 8th April 2017, at 03:35 o'clock, consisting in 30 open wagons (5 empty, 25 loaded with thunder), tonnage 1964 tons and length 420 m, to the railway station Curtici.

According to the running order, handed over to the driver in the railway station Caracal, the train ran according to the working timetable for the freight train no.50205.

The freight train no.50457 ran in normal safety conditions up to the railway station Târgu Jiu, where it arrived on the 8th April 2017, at 08:36 oclock, being stabled on the line 6.

In the railway station Târgu Jiu, according to the established running program, taking into account the maximum hauling tonnage of the trains, stipulated in the working timetable, on the track section Târgu Jiu – Pui, a group of wagons was uncoupled, the freight train no.50457 going to be hauled between Târgu Jiu – Subcetate in two train sets.

In order to do it, the railway undertaking, SC UNICOM TRANZIT SA asked the presence of a train conductor in the railway station Târgu Jiu.

After the arrival of the freight train no.50457 in the railway station Târgu Jiu, the train conductor made a written request, in the Disposal Register of exterior railway station movements inspector, or the uncoupling of 15 wagons from the train. The shunting plan for the uncoupling of the group of wagons, drafted by the disposing station movements inspector and handed over to the exterior railway station movements inspector, had stipulated the uncoupling of the locomotive from the train, from the line 6, with the group of wagons that had to be uncoupled from the train, stabling of the group of wagons on the line 7 and the running back of the light locomotive, on the line 6, at the test of the wagons, that going to be the first train set of the freight train no.50457.

According to the statements of the train conductor, because of a counting error, the group of wagons shunted and uncoupled from the freight train no.50457 consisted in 14 wagons, instead 15 ones, according to the initial request.

For the performance of the approved shunting, the train conductor uncoupled the group of wagons, that went to be separated from the train, after asking previously the driver to release the automatic brakes of the train wagons, because the coupler of the coupling equipment between the wagons 14 and 15 was streched and he could not uncouple.

After the shunting for re-stablig those 14 wagons, uncoupled from the train, from the line 6 to line 7, the driver's assistant uncoupled the locomotive from the group of wagons on the line 7 and then, after the light locomotive ran back on the line 6, he coupled it at those 16 rested wagons.

Because the train conductor was not authorized to perform the brake tests, the task to perform the brake continuity tests at the freight train no.50457, after the uncoupling of those 14 wagons of the train, was in charge of the driver's assistant of the locomotive EA 759 (authorized in this respect).

Upon the request of the train conductor, the "train consist form" for the freight train no.50457, that went to be dispatched from the railway station Târgu Jiu as a first couple of wagons, was drafted by another train conductor, working for the same railway undertaking, SC UNICOM TRANZIT SA, who was waiting in the railway station Târgu Jiu the arrival of the freight train no.50438-1.

The freight train no.50457, hauled by the locomotive EA 759, left the railway station Târgu Jiu on the 8th April 2017, 10:44 o'clock, consisting in 16 wagons series E (3 empty ones, 13 loaded with thunder), tonnage 1033 tons and 249 m length.

According to the running order, handed over to the driver in the railway station Târgu Jiu, the train no.50457 ran in accordance with the working timetable for the freight train no.23052-1.

The freight train no.50457 ran safely up to the railway station Pietrele Albe, where at 11:50 o'clock, according to the register RUCLCM, stabled on the track II. According to the disposal RC no.24, from the 8th April 2017, 11:15 o'clock, the train was kept in this railway station waiting for the re-opening of the traffic, it being closed for scheduled works.

Through the disposal RC no.27 from the 8th April 2017, 12:34 o'clock, there was established the resuming of the traffic, and through the disposal no.28, issued at 12:49 o'clock, there was established that the freight train no.50457 leave the railway station Pietrele Albe, after passing the passenger train IR no.1728 to the railway station Târgu Jiu, and of the freight trains no.20943-2 and no.80560. It was indicated by the movements inspector of the railway station, through the radio station (hereinafter referred to as station RTF), to the locomotive crew of the freight train no.50457, in order to take the measures for the train leaving preparation.

The freight train no.50457 left the railway station Pietrele Albe on the 8th April 2017, at 13:21 o'clock, after the movements inspector on duty had the confirmation, through the station RTF, from the locomotive staff, that the train was ready for leaving.

According to the data downloaded from the memory of the speed recorder (IVMS) of the locomotive EA 759, 204 m after the departure of the freight train no.50457 from the railway station Pietrele Albe and reaching the speed of 12 km/h, the train stopped unscheduled, and after two short movements in the train running direction, with the speed up to 1 km/h, respectively, 3 km/h, the train continued to run after a total stop of 5 minutes 24 seconds.

This train stop was observed by the movements inspector from the railway station Pietrele Albe, but because the land configuration and the shape of the track on the site, the locomotive being in the tunnel when the train stopped, he could not contact, through the station RTF, the locomotive crew in order to find out the stop reason.

The freight train no.50457 continued to run up to the railway station Strâmbuţa where it was stopped according to the diposal RC no.32, from the 8th April 2017, at 13:17 o'clock, for the passing of the passenger train IR no.1836 to the railway station Târgu Jiu. The freight train no.50457 was stabled in this railway station on the deflecting section 1 and stopped according to the records from the register RUCLCM between the hours 13:37 - 13:45. During the stopping time in the railway station Strâmbuţa, from the information got following the reading and interpretation of the date from the equipment IVMS, of the locomotive EA 759, one found out two short movements of the train, with speeds up to 2 km/h, reversely the train entry in the railway station Strâmbuţa.

The freight train no.50457 left the railway station Strâmbuţa at 13:45 o'clock, and according to the records from the register RUCLCM of the railway station Petroşani, the train stopped between the hours 14:00 – 14:02 in the railway station. In the railway station Petroşani the running order, containing information about the speed restrictions for the track section, had to be handed to the driver.

Actually, the driver being informed that the train should run upon automatic section block (BLA), after the train no.L59131 (light locomotive), and the exit signal from the railway station being on clear aspect, the train continued to run, passing without stop, on the deflecting section 4 from the railway station Petroşani.

From the railway station Petroşani, the freight train no.50457 continued to run without stop, passing through the railway station Băniţa, according to the records from the register RUCLCM of the railway station, on the running line IV, at 14:25 o'clock. The passing of the train through the railway station Băniţa was according to the instructions, and at the visual inspection of the train by the movements inspector on duty, he did not observe anything special in the train running, observing the locomotive staff in the driving cab of the locomotive, on their positions.

The speed of the freight trains, according to the working timetable on the track section Petroşani – Băniţa is 60 Km/h, and on the track section Băniţa – Pui, 40 km/h.

At about 3–4 minutes after pasing the freight train through the railway station Băniţa, both the employees of the infrastructure manager and of the railway undertakings present on the track section Livezeni – Subcetate, heard through the station RTF the request of locomotive crew of the freight train no.50457, for the railway station Merisor to ensure clear line because they could not apply the brake.

At short time after the reception of this call, the movements inspector on duty in the railway station Băniţa observed on the device for the command of CED equipment, that some insulated track sections rested occupied, and the traffic participants found out the cut of the power supply in the contact line.

During this period of time, the movements inspector on duty in the railway station Merişor tried to contact the locomotive crew in order to inform them that the freight train no.50457 had ensured the passing through the railway station, but without any answer.

From the inhabitant of that area, and then through the Unique National System for Emergency Calls - 112, there were notifications that in this area a derailment happened.

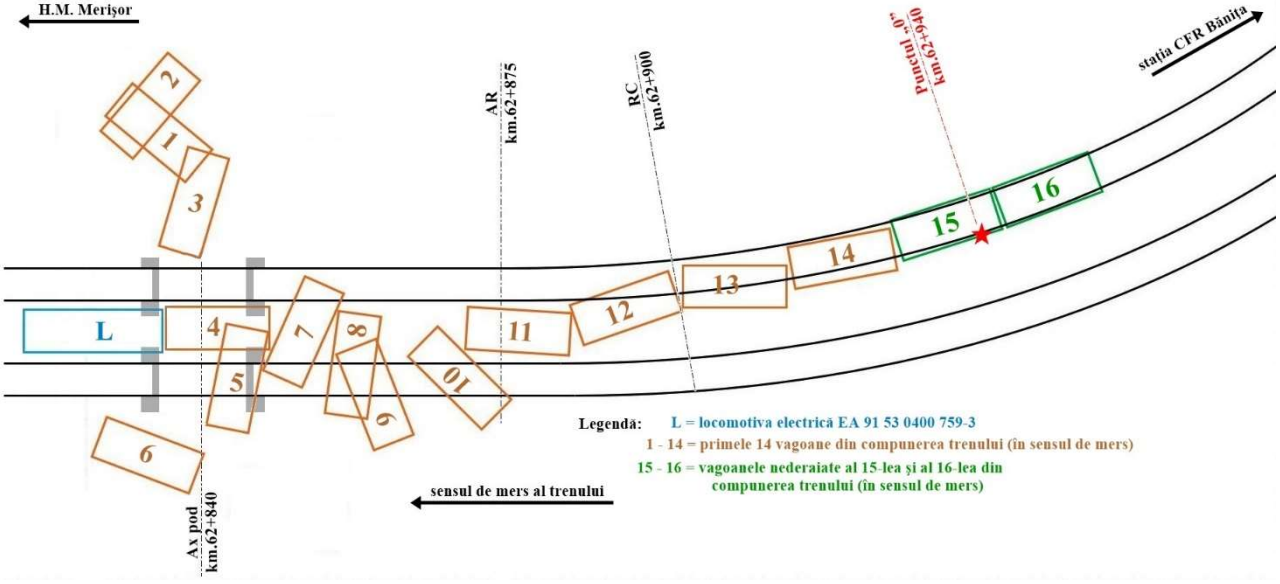
When the staff of the infrastructure manager went on site found out that, at about 14:30 o'clock, between the railway stations Băniţa and Merişor, on track I, km 62+940, the hauling locomotive EA 759 and the first 14 wagons of the freight train no. 50457 derailed and overturned.

All axles of the locomotive EA 759 were derailed, it being between the guideway beams of the bridges corresponding to the tracks I and II – *picture no.1*;

Picture no.1

The first 14 wagons were derailed as follows:

- the wagons no.31535494448-2, 33515373861-2 and 31535928552-7 (first three ones after the locomotive), empty, derailed and thrown, following the inertia generated by the other wagons of the train, on the right side, in the running direction, falling from the bridge in the stream;
- the wagon no.33535300220-7 (the 4th one after the locomotive), loaded, derailed and overturned, staying between those two guideway beams of the bridges;
- the wagon no.33535303557-9 (the 5th one from the locomotive), loaded, derailed and overturned;
- the wagon no.33565423333-7 (the 6th one from the locomotive), loaded, derailed on the left side in the running direction, then it fell from the bridge;
- the next 8 wagons (from the 7th to the 14th) no.33535303547-0, 33565423334-5, 33565423379-0, 33565423287-5, 33535421205-2, 33535303598-3, 33565423357-6 and 31555330294-6, loaded, derailed and overturned to the track II;



Sketch no.2 – Position of the rolling stock after the derailment

The last two wagons, the 15th one (no.33535303642-9) and the 16th one (no.33876735404-0), did not derail, resting on the track at about 96 m from the bridge centre, and to the railway station CFR Băniţa.

At the derailment site the marking of the track on site is curve with right deviation in the running direction, and the gradient in longitudinal section is 18 ‰, slope in the running direction of the train.

Following the railway accident the locomotive crew died (driver and driver's assistant).

This accident generated important damages at the railway infrastructure (77 m on track I , respectively, 65 m on track II), at the hauling locomotive EA 759 and at those 14 wagons derailed.

The traffic between Petroşani – Pui was closed on both tracks, from the accident occurrence on 8th April 2017, at 14:30 o'clock, until the 14th April 2017, at 11:25 o'clock, when the traffic was resumed on the track I, with speed restriction of 30 km/h between the km 60+350 - 63+000.

This accident did not lead at environment damages.

C.2. Accident circumstances

C.2.1. Involved parts

The accident site is in the railway county Timişoara, track section Petroşani – Simeria (electrified double-track line), between the railway stations Băniţa and Merişor, on the track I, km 62+940.

The railway infrastructure and superstructure at the accident site are managed by CNCF „CFR" SA – Railway county Timişoara. The railway superstructure maintenance is performed by the specialized staff from the Line District L6 Băniţa, got by the Section for Line Maintenance L9 Simeria.

The interlocking system (SCB) between the railway stations Băniţa and Merişor is maintained by the staff of the District no.5 SCB Petroşani, got by the Section CT4 Deva – Railway County Timişoara.

The equipments for electric traction at the accident site are managed by CNCF „CFR" SA and maintained by the staff of SC ELECTRIFICARE CFR SA – Electrification County Timişoara – Electrificastion Centre Deva.

The equipments for railway communications of the track section Petroşani – Simeria are managed by CNCF „CFR" SA and maintained by the staff of SC TELECOMUNICAŢII CFR SA.

The locomotive EA 759 is owned by SC UNICOM TRANZIT SA. The maintenance and planned and intermidiary inspections at the locomotive EA 759 were ensured by entities in charge with the maintenance of the motorised rolling stock, with which the railway freight undertaking had concluded maintenance contracts.

The crew of the locomotive hauling the train was got by the railway freight undertaking SC UNICOM TRANZIT SA.

The wagons involved in the railway accident were used by SC UNICOM TRANZIT SA, and their maintenance and repair were ensured by entities in charge with the wagon maintenance upon contracts for service performance.

The wagons involved in the accident were owned by the economic agents GRAMPET SA (1 wagon), TRANS LOG SLOVAKIA (1 wagon), DB RAIL ROMANIA SRL (2 wagons), ARCELOR MITTAL SA (5 wagons), EXPRESS RAIL SLOVAKIA (5 wagons), RAIL CARGO HUNGARIA (1wagon) şi ERMEWA (1 wagon).

C.2.2.Train composition and equipments

The freight train no.50457 consisted in 16 open wagons series E (13 loaded and 3 empty), according to the train documents, it had 249 m length, 683 gross tonnage, 12 hollow shafts, 52 loaded axles, weight automatic braked necessary according to the working timetable 517 t - actually 755 t, the weight hand braked according to the working timetable 145 t - actually 284 t and it was hauled by the electric locomotive EA 759.

C.2.3. Presentation of the railway eqiuipments involved at the accident site

C.2.3.1. Lines

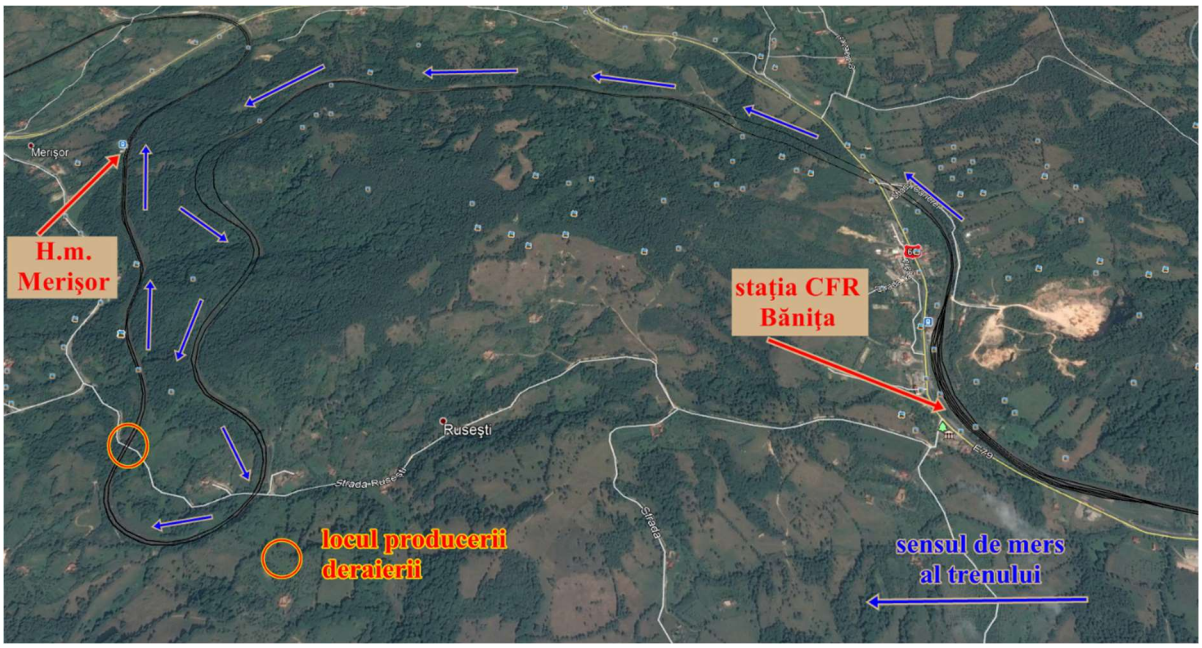
Presentation of the marking of the track on the site

The line between the railway stations Merişor and Băniţa is a double-track one, but with sections where those two running lines are not parallel. The direction of the km of this line is from Merişor to Băniţa.

The running line, track I, between the railway stations Merişor and Băniţa is passing through a hilly area, being a sinuous direction, consisting in 15 curves, whose radius between 185 m and 625 m. The line is passing over 3 bridges (metallic bridges km 62+840 with an opening of 12,60 m and stone arched bridges, from km 63+462 to km 64+415 with opening of 6,60 m, respectively, 5,00 m) and through 5 tunnels with length between 45 m and 656 m.

This running line is preponderantly on rising gradients, with slopes between 2‰ and 19,4‰.

The train ran reversely the line km, so from the railway station Băniţa to the railway station Merişor the route was only rising slopes.



Picture no.3

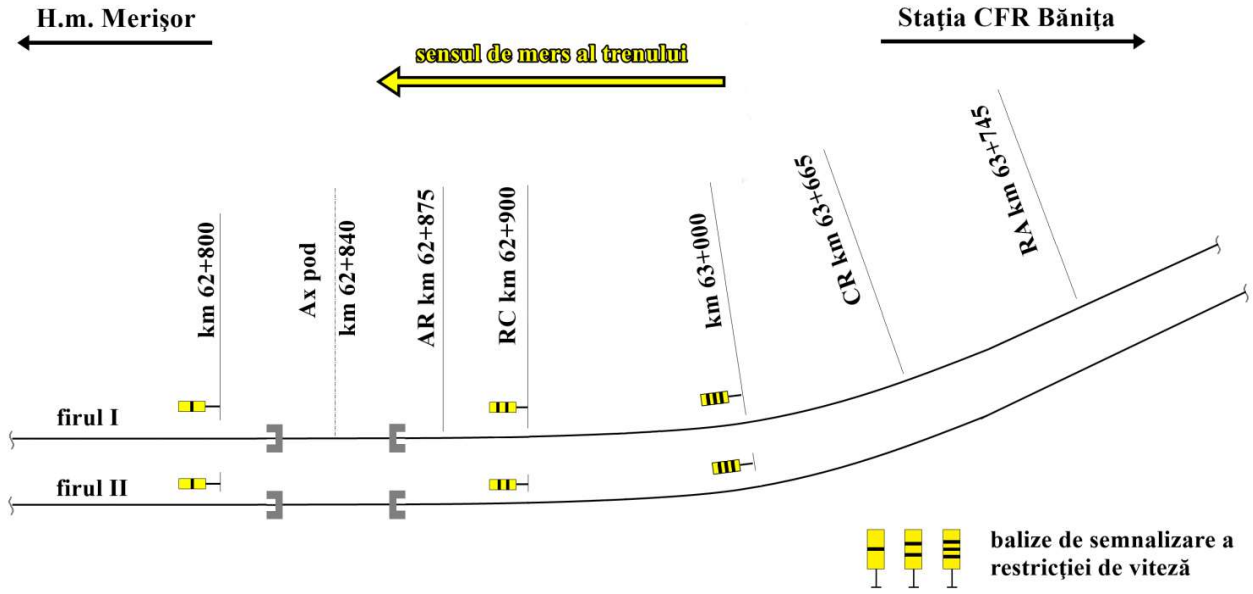
Marking of the track on the site at the derailment site

The railway accident happened within a curve with right deviation (against the train running dirction) whose characteristic elements are: radius **R**=185 m, spread **s**=20 mm cant **h**=35 mm, versine **f**=67 mm.

Within this curve with a constant value of the radius **R**=185 m are connected adjancent straight lines through two connection curves of different lenghts L_{R1}=25 m and L_{R2}=80 m.

The train ran reversely the line km, so in the curve between km 62+875 and km 63+745 the train ran firstly on the connection curve L_{R2}=80 m, ran on the circular curves where the radius is constant R=185 m and then ran on the transition curve L_{R1}=25 m.

In the train running direction, the first derailment mark was identified at about km 62+940, within the connection curve L_{R1}, at 77 m before the bridge abutment of the bridge from km 62+840, to the railway station Băniţa.



Picture no.3 - Merking of the track on the site

Because the route geometry (curves with small radius and high values of the slopes) the maximum running speed of the trains between the railway stations Merişor and Băniţa, the maximum speed of the trains on both tracks is 40 km/h, both for the freight trains and for the passenger ones.

On the running lines from the railway stations Merişor there were introduced speed restrictions of 30 km/h as follows:

- direct line II (line II is continuation of the running line track II between Merişor an Băniţa) between km 61+700 and km 60+800;
- on the direct line III and track I Merişor-Crivadia, between km 61+700 and km 60+350 (line III is continuation of the running line track I between Merişor-Băniţa).

In the running direction of the train involved in the accident (respectively from Băniţa to Merişor) the signaling of these speed restrictions on both tracks started with yellow visual warnings with 3 horizontal black strips, put at km 63+000 on the right side of each running line.

Track longitudinal section at the derailment site

The derailment happened in an area with slope **δ**=18‰, gradient in the train running direction.

Presentation of the track superstructure at the accident site

The track superstructure at the accident site consisted in rail type 49, fitted on wooden sleepers, non-welded track.

The fastening of rails on the sleepers is made both with indirect fastening type K and with elastic fastening type SKL 12.

The curve sitiuated between km 62+875 and km 63+745, where happened the derailment, has check rail next to the interior rail.

C.2.3.2.Signaling

The railway traffic between the railway stations Băniţa and Merişor is upon the positions of the light signals of the automatic section block (BLA).

C.2.3.3. Locomotive

The locomotive EA 759, hauling the freight train no.50457, is got by SC UNICOM TRANZIT SA, has the unified identification mark 91 53 0 400759 – 3 / RO – UTZ and has:

- technical approval – for keeping in operation a railway vehicle that exceeded the normal working time – series AT, no.2980/2014;
- identification card – series CID, no.7698.3/2014;
- matriculation certificate – series CI, no.7698.3/2014.

Main technical characteristics of this type of locomotive are:

- type of current - single phase alternating current
- normal voltage, minimum and maximum in the contact line - 25 kV/19 kV/27,5 kV
- normal frequency - 50 Hz
- axle arrangement - Co' – Co'
- length between the buffers - 19.800 mm
- gauge - 1.435 mm
- axle load - 21 t
- maximum speed - 120 km/h
- minimum radius within curve - 90 m
- main transformer type - TFVL 580
- nominal power - 5100 kW
- electric brake - rheostatic
- equipment for pneumatic brake -automatic type KNORR KE-GPR;
- electric traction engine of direct, ondulatory current, type LJE 108.

The locomotive is written down in the Safety Certificate - Part B of the railway freight undertaking SC UNICOM TRANZIT SA, identification number CSB nr.0006.

The performance of the inspections, planned repairs and accidental repairs was ensured by SC UNICOM TRANZIT SA, in its own subunit, as well as upon maintenance contracts:

- no.UTZ 490bis / 2015, concluded with SC Reloc SA Craiova;
- no.01/02.01.2013, concluded with SC Constantin Grup SRL;
- no.366/18.04.2013, concluded with SC Tehnotrans Feroviar SRL;
- no.114/48/09.12.2015, concluded with Societatea de Reparaţii Locomotive „CFR–SCRL Braşov" SA;
- no.21/2011, concluded with SC Întreţinere şi reparaţii Locomotive şi Utilaje CFR IRLU SA;
- no.110/01.09.2015, concluded with SC Multimodal Service SRL.

C.2.3.4.Wagons

The wagons involved in the accident were got by economic agents GRAMPET SA (1 wagon), TRANS LOG SLOVAKIA (1 wagon), DB RAIL ROMANIA SRL (2 wagons), ARCELOR MITTAL SA (5 wagons), EXPRESS RAIL SLOVAKIA (5 wagons), RAIL CARGO HUNGARIA (1wagon) şi ERMEWA (1 wagon), all rented by the railway undertaking UNICOM TRANZIT SA and with the next characteristics:

- <u>the wagon no.31535494448-2, 1st one of the train:</u>
  - wagon series Eacs;
  - bogie type Y25;
  - distance between the bogie axles: 1,80 m;

- last inspection type RP (periodical repair) was performed on the 29th February 2016, at the economic agent identified with acronym „Pc";

- the wagon no. 33515373861-2, the 2nd one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance betwee the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 10th July 2015, at the economic agent identified through the acronym „DBRYB";
- wagon no. 31535928552-7, the 3rd one of the train trenului:
  - wagon series Ealos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 20th November 2014, at the economic agent identified through the acronym „MRB";
- wagon no. 33535300220-7, the 4th one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 31st January 2012, at the economic agent identified through the acronym „IVC";
- wagon no. 33535303557-9, the 5th one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 14th March 2012, at the economic agent identified through the acronym „IVC";
- wagon no.33565423333-7, the 6th one of the train:
  - wagon series Eas;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 27th June 2013, at the economic agent identified through the acronym „Su";
- wagon no.33535303547-0, the 7th one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 31st January 2012, at the economic agent identified through the acronym „IVC";
- wagon no.33565423334-5, the 8th one of the train:
  - wagon series Eas;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 28th June 2013, at the economic agent identified through the acronym „Su";
- wagon no.33565423379-0, the 9th one of the train:
  - wagon series Eas;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 27th June 2013, at the economic agent identified through the acronym „Su";
- wagon no.33565423287-5, the 10th one of the train:
  - wagon series Eas;

- bogies type Y25;
- distance between the bogie axles: 1,80 m;
- last inspection type RP (periodic repair) was performed on the 14th June 2013 at the economic agent identified through the acronym „Su";

- wagon no.33535421205-2, the 11th one of the train:
  - wagon series Eas;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 30th April 2013, at the economic agent identified through the acronym „TMS";
- wagon no.33535303598-3, the 12th one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type (periodic repair) was performed on the 30th March 2012, at the economic agent identified through the acronym „IVC";
- wagon no.33565423357-6, the 13th one of the train:
  - wagon series Eas;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 13th June 2013, at the economic agent identified through the acronym „Su";
- wagon no.31555330294-6, the 14th one of the train:
  - wagon series Eaos;
  - bogies type Y25;
  - distance between the bogie axles: 1,80 m;
  - last inspection type RP (periodic repair) was performed on the 26th May 2015, at the economic agent identified through the acronym „Db".

C.2.4. Communication means

The communication between the locomotive crew and the movements inspectors was made through the radio station, in normal working condition.

C.2.5. Start of the railway emergency plan

Soon after the accident, the start of the intervention plan for the removal of the damages and resuming of the train traffic was made through the information circuit stipulated in the *Investigation Regulations*, following which at the accident site came the representatives of:

- Romanian Railway Investigation Agency – AGIFER;
- Romanian Railway Authority – AFER;
- Railway Public infrastructure Manager - CNCF „CFR" SA;
- Railway Freight Undertaking – SC UNICOM TRANZIT SA;
- the Prosecutor attached to the Court Haţeg and of the Prossecutor attached to the Tribunal Hunedoara,
- County Police Inspectorate Hunedoara;
- Regional Section of Transport Police Timişoara;
- County Transport Police Hunedoara;
- Transport Police Petroşani;
- County Gendarme Inspectorate „Decebal" Hunedoara;
- County Inspectorate for Emergency Situations „Iancu de Hunedoara";
- Teritorial Labour Inspectorate Hunedoara and Timiş.

For the release of the affected area and recovery of the derailed rolling stock, one used the train with crane EDK 1000 – 125 Tf, from the Section L5 Deva, train with crane EDK 2000 – 250 Tf, from the Section L6 Craiova and train with crane EDK 2000 – 250 Tf, from the Section L1 Braşov.

On the 13th April 2017, at 17:45 o'clock, the derailed rolling stock was removed from the affected area, and on the 14th April 2017, at 11:25 o'clock, the track I, Băniţa - Merişor, was opened with speed restriction of 30 km/h, between km 60+350 - 63+000.

C.3. Accident consequences

C.3.1. Deaths and casualties

The accident generated two deaths within the railway staff, that is locomotive crew, driver and driver's assistant, driving the freight train no.50457.

C.3.2. Material damages

According to the documents submitted by the railway public infrastructure manager, CNCF „CFR" SA and by the railway freight undertaking SC UNICOM TRANZIT SA, the estimated value of expenses generated by:

- bringing and use of the sequences of operations necessary to remove the derailed rolling stock;
- restoration of the railway infrastructure;
- consolidation of the affected railway infrastructure;
- checking of the derailed rolling stock;
- passenger transfer;
- need of specialized staff at the accident site;

is **951,782.48 lei and 321.837, 00 euro (VAT not included).**

C.3.3. Accident consequences for the railway traffic

During the period of time when the traffic was closed on both tracks, between the railway stations Băniţa and Merişor, from the accident occurrence on the 8th April 2017, at 14:35 o'clock and until the release and restoration of the railway infrastructure, on the 14th April 2017, at 11:25 o'clock, the train running was as follows:

- the passenger trains ran up to the railway station Pui (the trains from Simeria) and up to the railway station Petroşani (trains from Craiova). Between Pui – Petroşani, the passenger trains were cancelled, the passengers being transfered;
- the freight trains were cancelled between Călan Băi – Petroşani, being scheduled on other routes.

C.3.4. Consequences of the accident on the environment

None.

C.4. External circumstances

On the 8th April 2017, at about 14:30 o'clock, the visibility at the accident site was good, variable sky, partially clouded, rain conditions, air temperature +16°C. The visibility of the automatic section block signals was according to the provisions of the specific regulations in force.

C.5. Investigation process

C.5.1. Summary of the statements of the involved staff

From the statements of the staff got by the railway undertaking SC UNICOM TRANZIT SA, that on the 7th/8th April 2017participated in the composition,technical preparation and equipping of the freight train no.50457 in the railway stations Slatina, Piatra Olt and Caracal, one can keep in mind the next:

The train driver hauling the train from the railway station Slatina to the railway station Caracal

- received the order to come to work, on the 7th April 2017, to come to the railway station Craiova in order to take the locomotive DA 1021, driving it as a light one to the railway station Slatina for hauling the freight train;
- left the railway station Craiova at 17:26 o'clock as train no.59126, light locomotive DA 1021 and arrived in the railway station at 19:44 o'clock;
- after the arrival in the railway station Slatina, he participated in the preparation of the freight train no.59123, hauling it afterwards with the locomotive DA 1021 to the railway station Piatra Olt;
- from the railway station Piatra Olt, he drove back the light locomotive, DA 1021, to the railway station Slatina, from there hauling the freight train no.50457 to the railway station Piatra Olt;
- in the railway station Piatra Olt he peformend shunting for coupling at the freight train no.50457 the wagons forming the freight train no.59123;
- from the railway station Piatra Olt he continued to haul the freight train no.50457, to the railway station Caracal, where he arrived on the 8th April 2017, at 02:30 o'clock, stabling on line 6;
- all trains were safely hauled;
- following the disposal of the movements inspector from the railway station Caracal, communicated by the station RTF, left the line 6 with the locomotive DA 1021,uncoupled from the freight train no.50457, entrying on the line 7 and coupling at the freight train no.50440, and the locomotive EA 759, of the freight train no.50440 from the line 7, was uncoupled from the train and entered on the line 6, coupling at the freight train no.50457;
- after ensuring the hauling locomotive DA 1021 in the front of the freight train no.50440, occupying the line 7, he left for rest;
- when he passed by the locomotive EA 759 he greeted the driver, this saying him that the driver's assistant is at the railway station for the train documents;
- walking to the railway station, he did not meeet the driver's assistant;
- he knew the driver of the locomotive EA 759, about him he had a good opinion, but he did not know the driver's assistant, this wroking in another working point of the company.

Train conductor who was in charge with the train composition in the railway station Slatina

- according to the work order, on the 7th April 2017, he came in the railway station Craiova, from where, at 17:26 o'clock, he left with the locomotive DA 1021 to the railway station Slatina;
- lin the railway station Slatina he was responsible with the composition of the freight train no.50457 for its dispatching to the railway station Curtici;
- in the railway station Slatina, he took from the company TMK, 30 wagons stabled on the line 9;
- with the locomotive DA 1021, together with a shunter and a train examiner ensured, in the first stage, the dispatching from the railway station Slatina to the railway station Piatra Olt of 17 wagons, from those 30 wagons, as freight train no.59123, and in the second stage, the dispatching of the rests of 13 wagons, as freight train no.50457;
- in the railway station Piatra Olt, he coupled at the freight train no.50457 those 17 wagons from the freight train no.50123, then, the train of 30 wagons was dispatched to the railway station Caracal;

- he arrived with the freight train no.50457 in the railway station Caracal at 02.30, where he stabled on the line 6;
- after ensuring the freight train no.50457 and notifying in this respect the movements inspector from the railway station Caracal, he took measures for uncoupling the locomotive DA 1021 from the train in order to make the exchange with the locomotive EA 759 of the freight train no.50440, on line 7;
- he mentioned that the trains were safely, without finding out problems in this respect;
- he considered that the wagon no.33535421350-6, written down correctly in the train consist form of the freight train no.50123 without hand brake, it was recorded by mistake in the train consist form, drafted in the railway station Piatra Olt for the freight train no.50457-2, as having the hand braked weight of 20 tone.

Shunter of the wagons helping in the train composition in the railway station Slatina

- according to the work order, received on the 7th April 2017, he came in the railway station Slatina to prepare and dispatch the freight train no. 50123 to the railway station Caracal;
- he participated in the composition, preparation and equipping the freight trains no.59123 and no.50457 from the railway stations Slatina and Piatra Olt, manning them to the railway station Caracal;
- he did not see problems that could affect the train safety;
- in the railway station Caracal he did not meet the crew of the locomotive EA 759, coupled at the freight train no.50457.

The train examiner that made the technical preparation of the train in the railway station Slatina

- he came at about 19:00 o'clock in the railway station Slatina, according to the work order, for the technical preparation and dispatching of a group of 30 wagons;
- be performed the technical inspection during the composition process, in the railway station Slatina, for the freight train no.50123, consisting in 17 wagons, dispatched to the railway station Piatra Olt and no.50457 consisting in 13 wagons;
- he participated in the railway station Piatra Olt, in the coupling of 17 wagons at the freight train no. 50457, these being from the freight train no.59123, performing the continuity test at the freight train no.50457, before its dispatching to the railway station Caracal;
- he did not find out, during the inspections at the freight trains no.59123 and no.50457, problems at the automatic and hand brake of the wagons, he did not record automatic and hand brake off or out of service;
- the wagons non provided, since their manufacturing, with hand brake, were not recorded in the *Brake Note,* because he considered that only the wagons with the hand brake out of service had to be recorded;
- for the wagons found out afterwards, in the railway station Târgu Jiu, one with the hand brake out of service, and the second one with the brake blocks missing, having marks of contact with the brakeblock holder on the wheel, he mentioned that these were in good condition at the inspection moment.

From the statements of the driver, who on the 7th/8th April 2017, in the railway station Caracal, delivered the locomotive EA 759 to the locomotive crew who was going to haul the freight train no.50457, one ca keep in mind:

- on the 7th/8th April 2017 hauled with the locomotive EA 759, from the railway station Ploiești Est to the railway station Caracal, the freight train no.50440-1;
- in the railway station Caracal, the freight train no.50440-1,that was for the railway station Govora, stabled on the line 7, at 01:45 o'clock, going to continue the hauling with the diesel electric locomotive, type DA;
- when the crew came to take the locomotive EA 759, it was coupled at the freight train no.50440, because the freight train no.50457, that the locomotive was going to haul, did not arrive in the railway station Caracal;

- at the shift exchange, the first going in the locomotive was the driver's assistant, then the driver;
- he did not see anything curious about the physical condition and behaviour of the locomotive crew, who came to take the locomotive EA 759;
- they established the time for the shift exchange, 02:00 o'clock;
- he delivered the locomotive wihout many dicussions with the driver whith whom made the shift exchange, because the locomotive was in good working conditions and had no problems to be notified him;
- excepting the inspection hammer, the inventory of the locomotive EA 759 was complet, having also manometer for the performance of the train brake test;
- the locomotive EA 759 had the electric braking working, it being controled at the taking of the locomotive in the railway station Ploieşti Est;
- he drove before the locomotive EA 759, without problems in its working, mentioning that from technical point of view it was one of the best locomotive of the company he works for;
- he was knowing for a long time the driver who came for the shift exchange, having a good impression about him, about his training, considering him a commonsense man, fair and honest;
- he did not know the driver's assistant, coming for the shift exchange, in order to take the locomotive EA 759, he working in another working point of the company.

From the statements of the movements inspector, on duty on the 7th/8th April 2017 in the railway station Caracal, one can keep in mind the next:

- at about 01:00 – 01:30 o'clock in the movements inspector office from the railway station the driver and the driver's assistant came for the control of the physical condition necessary before to start their work, they taking the locomotive EA 759, for the hauling of the freight train no.50457;
- after the controls, the driver and the driver's assistant went and took the locomotive EA 759, hauling the freight train no.59440;
- the locomotive crew took measures to uncouple the locomotive EA 759 from the freight train no.50440 and entered with the locomotive on the line 6, at the group of 30 wagons forming the freight train no.50457;
- at 02:40 o'clock he asked the performance of the continuity test at the freight train no.50457, this test being recorded in the register of records at 03:26 o'clock;
- after notifying the disposing station movements inspector that the continuity test was performed and handing over to the driver the running order, the freight train no.50457 was dispatched from the railway station Caracal, at 03:35 o'clock;
- during the visual inspection at its leaving from the railway station, he did not find anything special;
- during the control of the physical condition of the locomotive crew coming for work, in order to take the locomotive EA 759, in the railway station Caracal, the result of the controls with the breathalyzer was negative, and their behaviour was normal;

From the statements of the staff of the railway undertaking SC Unicom Tranzit SA, that on the 8th April 2017 participated at the preparation of the freight train no.50457 in the railway station Târgu Jiu, one can keep in mind the next:

The train conductor who carried out the shunting for taking out the group of wagons from the train in the railway station Târgu Jiu

- on the 7th April 2017, at about 19:00 o'clock, he received a phone notification to come at work on the 8th April 2017, in the railway station Târgu Jiu, to uncouple a group of wagons from the freight train no.50457, in order to comply with the train hauling tonnage on the track section Târgu Jiu – Petroşani – Pui;
- the hour for coming to work was in accordance with the hour of train arrival in the railway station Târgu Jiu, he was going to be in touch with the train driver;

- he came at work in the railway station Târgu Jiu, on the 8th April 2017, at about 07:30 – 8:00, where the exterior station movements inspector controled his physical condition also with the breathalyser, the result being „able" from safety traffic point of view;
- after the arrival of the freight train no.50457, on the line 6 of the railway station Târgu Jiu, he went to the locomotive and took the train consist form, then he went to the exterior station movements inspector, asking in writing the shunting for uncoupling from the train a group of 15 wagons;
- after the reception of the shunting plan, he went to the train in order to keep stopped, with the hand brakes and drag shoe, of a group of wagons that was going to remain on the line 6 after the uncoupling of those 15 wagons;
- he recorded in the register of the railway station the wagon ensuring, after the restabling of the group of 14 wagons from the freight train no.50457, from the line 6 to the line 7;
- he mentioned that, although the shunting plan stipulated for the uncoupling of these 15 wagons, as he asked, by mistake he uncoupled between the 14th and 15th wagon, remaining on the line 6, 16 wagons;
- he notified the disposing station movements inspector in this respect, afterwards changing in the register the shunting request, to manipulate 14 wagons (not 15 wagons according to the iniatial request) for their uncoupling from the freight train no.50457;
- he did not know who made the change in the shunting instead 15 wagons, initial record, 14 wagons;
- he underlined that he did not operate anyway the uncoupling between the 15th and and the 16th wagons, because he counted wrong , he went directly and uncoupled between the 14th and the 15th wagons;
- at the request to present in detail the stages of the train uncoupling between the 14th and the 15th wagons, he mentioned:
    - he asked the driver the release the train brake because the connection couple between the wagons was streched and he could not loose it;
    - he went under the buffers to uncouple the wagons;
    - he cut the general air pipe, of 5 atm, closing the angle cocks from both wagons (the 14th and the 15th ones), operating the cock handle up, vertically;
    - he released the air coupled hoses;
    - he released the connection coupler of the wagons;
    - he asked the disposing station movements inspector, though the station RTF, to make the shunting route and informed the driver that he could exit with the group of wagons from the line 6, then climbing the stairs of the last wagon from the group of uncoupled wagons and giving shunting signals in this respect;
- he could remember neither how many angle air cocks, type Ackerman, were at the first wagon from the group of wagons on the line 6, nor where in the wagon they were fitted;
- he shunted those 14 wagons from the line 6 to the line 7, occupied by other wagons of another railway undertaking, where he coupled the shunted wagons at the existing ones;
- the driver's assistant uncoupled the locomotive from the group of wagons, and it ran back from the line 7 to the line 6, to be coupled at the group of 16 wagons rested from the freight train no.50457;
- on the line 6 he gave signals for the coupling of the locomotive at the train, and the driver's assistant coupled the locomotive at the train and applied the brake;
- after the coupling of the locomotive at the train, he released the hand brakes, applied before, for ensuring the wagon stop, and removed the drag shoe, used for ensuring of the wagons from the line 6, handed over it at the office of the movements inspector;
- he mentioned that he recorded in the register from the exterior station movements inspector the delivery of the drag shoe, used for ensuring of the wagons from the line 6;
- he informed the driver that he is not authorized either to perform the service in case single driver service or to perform the brake test at the trains, answering him that there was no problem

in this respect, because the driver's assistant is authorized and would perform together the brake tests at the freight train no.50457;
- while he was in the train to release the hand brakes and to remove the drag shoe, he did not see the driver's assisstant going to the rear of the train in order to perform the brake test, but, he mentioned that he heard air release specific to the performance of the brake test;
- he asked a fellow worker, who was waiting in the railway station Târgu Jiu for the freight train no.50438-1, to draft for him the train consist form of those 16 wagons that were going to leave as freight train no.50457;
- on the train consist form of the freight train no.50457, arrived in the railway station Târgu Jiu, at the wagon with which began the group of wagons, for which the train consist form had to be drafted, there was drawn an asterisk (*), in order to indicate it to the fellow worker who was going to draft the train consist form;
- he did not know who encircled, in the train consist form of the train arrived in the railway station Târgu Jiu, the wagon from position 15;
- when the train no. 50457 left the railway station Târgu Jiu he made the visual inspection of the train, without observing safety problems in its running;
- following the disposal of the society management, he did not join the freight train no.50457, continuing to stay in the railway station in order to help his fellow worker who was waiting in the railway station Târgu Jiu the freight train no.50438-1;
- during the shunting activity, preparation and dispatching of the freight train no.50457, he did not find anything special in the acting way and in the behaviour of the locomotive crew involved in these activities;

The train conductor who drafted the train consist form in the railway station Târgu Jiu
- he came at work in the railway station Târgu Jiu, on the 8th April 2017, at about 09:30 o'clock, following the phone order received on the 7th April 2017, at 19:38 o clock;
- in the railway station Târgu Jiu he was responsible for the preparation of the freight train no.50438-1, uncoupling wagons from the train in order to meet with the train hauling tonnage for the track section Târgu Jiu – Petroşani – Subcetate;
- when he presented at the office of the exterior station movements inspector, the movements inspector informed him that the freight train no.50438-1 should be received in the railway station after the clearing the line 6, occupied by the freight train no.50457;
- waiting for the train, that he had to prepare, he met the train conductor who was responsible with the uncoupling of 14 wagons from the freight train no.50457, who asked for help in drafting the train consist form for this train and so be able to end sooner the train preparation and dispatching;
- the train conductor who prepared the train, indicated him in the train consist form of the train that the group of 16 wagons, rested on the line 6, arrived in the railway station Târgu Jiu, those going to form the train;
- he made the visual inspection of the wagons on site, identifying them in the train, without finding problems at their coupling and at the position of the changeovers handles;
- he drafted the train consist form for the freight train no.50457, for which he calculated also the braked weight percentage, that he submited to the exterior station movement inspector for checking;
- after the approval given by the movements inspector for the train consist form, he handed over the train consist form to the train conductor who prepared the freight train no.50457, that, together with the other documents of the train, be delivered to the driver;
- he mentioned that in the train consist form of the freight train no. 50457 arriving in the railway station Târgu Jiu, there were not recorded automatic or hand brake failures;
- he also mentioned that he did not participate either in the shunting of the wagons uncoupled from the freight train no.50457 or in the preparation of the train for dispatching, because he was not asked to perform this service, helping only in the drafting of the train consist form;

- during this period of time he did not meet the locomotive crew of the freight train no.50457;
- after the freight train no.50483-1 arrived in the railway station Târgu Jiu, he prepared it, helped also by the train conductor, who prepared the freight train no.50457;
- ne mentioned that the train conductor who prepared the freight train no.50457, received the disposal to stay in the railway station Târgu Jiu in ordr to help at the preparation of the freight train no.50438-1, then to leave with this train according to schedule;
- after the departure of the freight train no.50438-1, he rested in the railway station Târgu Jiu to prepare the train that was going to consist in the wagons remained in the railway station, but he found out afterwards about the accident occurrence in the hauling of the freight train no.50457;
- when he came at work he was not control by the movements inspector regarding the consumption of alcoholic drinks.

The train examiner was asked to perform the technical inspection in the composition of the trains in the railway station Târgu Jiu

- on the 7th April 2017, at about 20:30 o'clock, he was informed that on the next day, the 8th April 2017 to come to the railway station Târgu Jiu to perform the technical inspection at the composition of the trains that were going to consist in wagons uncoupled from the freight trains no.50457 and no.50438-1, following their preparation to comply with the running tonnages;
- he arrived in the railway station Târgu Jiu on the 8th April 2017, at 14:18 o'clock, with the passenger train IR no.1823;
- when he arrived in the railway station Târgu Jiu, the freight trains no.50457 and no.50438-1 had left the station;
- he waited in the railway station Târgu Jiu the arrival of an electric locomotive in order to be able to perform the shunting and composition of trains;
- at about 15:00 – 15:30 o'clock he found out about the occurence of the accident in the hauling of the freight train no.50457.

From the statements of the staff of the railway infrastructure manager, responsible for the running of the freight train no.50457, on the 8th April 2017, on the track section Târgu Jiu – Petroşani – Băniţa – Merişor, one can keep in mind the next:

Exterior railway station movements inspector fom the railway station Târgu Jiu, on duty on the 8th April 2017

- at 8:10 o'clock the train conductor of SC UNICOM TRANZIT SA came in the office of the movements inspector, he was checked with the breathalyser, an he was responsible to take the freight train no.50457;
- afterwards in the office of the movements inspector came also the train conductor of SC UNICOM TRANZIT SA, responsible for taking of the freight train no.50438-1;
- the freight train no.50457 stabled in the railway station Târgu Jiu on the deflecting section 6;
- after the analysis of the train consist form, the train conductor wrote down in the disposal register from the office of the exterior station movements inspector, the uncoupling of a group of 14 wagons from the freight train no.50457;
- initialy, the train conductor, after the analysis of the train consist form, asked the uncoupling of 15 wagons of the train, and after leaving the site, he changed the request for the uncoupling of 14 wagons;
- he did not know the reason for which the train conductor made this change;
- at 08:55 o'clock he sent the written request to the disposing station movements inspector (phone note no.16/34), who sent the writen disposal for re-stabling 14 wagons, on the end Y of the railway station, from the line 6 to the line 7 occupied (phone note no.35/17);
- he drafted the shunting plan that he handed over to the train conductor;
- the train conductor signed for the reception of the shunting plan, and at 09:04 o'clock, he recorded that he took the drag shoe no. 6, from the office of the movements inspector for keeping stopped the group of 16 wagons, that was going to be ensured on the line 6, during the shunting of those 14 wagons;

- at 09:20 o'clock the train conductor recorded in the office of the movements inspector the ensuring of the group of 16 wagons on the line 6, informing the disposing station movements inspector that the shunting at the end Y of the railway station for restabling those 14 wagons from the line 6 to the line 7 could be done;
- the shunting for restabling those 14 wagons from the line 6 to the line 7 was performed, then the locomotive ran back as a light one on the line 6, occupied by the group of wagons rested from the freight train no.50457;
- the train conductor went on site for drafting the train consist form, together with the train conductor from the freight train no.50438-1;
- those two train conductors came in the office of the movements inspector with the train consist form, but he mentioned that the train consist form was drafted by the train conductor from the freight train no.50438-1;
- he checked the train consist form, signed and stamped it, then he drafted the note for the allocation of the hand brakes and the running order;
- after the train preparation, the train conductor brought at the office of the movements inspector the drag shoe no.6, without recording its deleivery;
- he mentioned that the driver, appointed to drive of the freight train no.50457, came at the office of the movements inspector with the route sheet of the locomotive for its filling, signing and stamping;
- from the office of the movements inspector, the route sheet of the locomotive was taken by the driver, and the other train documents were taken by the train conductor;
- he informed the local movements inspector about the analysis for the train departure, mentioning that the driver should inform him, by station RTF, when he was ready for departure;
- at the visual inspection of the freight train no.50457, performed at the train leaving from the railway station, he did not find anything special, the train being signalled according to the instruction;
- he did not see anything special in the behaviour of the driver, when he came in the office of the movements inspector with the locomotive route sheet;
- he did not communicate with the driver's assistant, he saw him on the platform, going to the train, but without seeing something curious in his behaviour;
- the train conductor of the freight train no.50438-1, was neither checked at the work start or recorded in the checking register;
- he did not see anything special in the behaviour of those two train conductors;

The local movements inspector from the railway station Târgu Jiu on duty on the 8th April 2017

- kept in touch with the close railway stations and with the traffic controller operator with reference to the running of the freight train no.50457, informing in this respect the disposing station movements inspector;
- he recorded the data about the train running in the register RUCLCM and made changes in the soft application CRONOS;
- according to the disposal of the traffic controller, from the freight train no.50457, in the railway station Târgu Jiu, a group of wagons was uncoupled in order to meet with the maximum hauling tonnage, according to the working timetable for the track section Târgu Jiu – Livezeni;
- the uncoupling of the wagons was made by shunting for restabling a group of 14 wagons from the line 6 to the line 7;
- after the shunting, for the uncoupling of the group of wagons, he received from the exterior station movements inspector the analysis for the train departure, then informed the traffic controller operator that the train was ready for departure;
- according to the disposal of the traffic controller operator, the freight train no.50457 was dispatched from the line 6, after the arrival of the passenger train IR no.1824;

- he heard the discussion, in the station RTF, between the disposing station movements inspector, who informed that the shunting signal is on clear position and the driver, who confirmed the reception;

The disposing station movements inspector from the railway station Târgu Jiu on duty on the 8th April 2017

- he informed, through the station RTF, the locomotive crew of the freight train no.50457, about the entry order in the railway station Târgu Jiu on the deflecting section 6;
- the train stabled in the railway station, at 08:36 o'clock, and according to the disposal of the traffic controller, a group of wagons was going to be uncoupled (through the splitting of the train in two couples);
- at 09:00 o'clock, the exterior station movements inspector, through the phone note no.16/34, aked the train conductor the splitting of the freight train no.50457 in two couples, one with 16 wagons and the second one in 14 wagons from the locomotive, that had to was going to leave in the railway station;
- the exterior station movements inspector informed him verbally that initially the train conductor asked the train splitting in two couples of 15 wagons each of them, then he change the first ask, that is the train splitting in two couples of 16 wagons and 14 wagons;
- at 09:02 o'clock, through the phone note no.35/17, sent to the exterior station movements inspector the disposal to draft the shunting plan for the freight train no.50457, asking for the ensuring on the line 6 of the group of 16 wagons from the rear of the train, from the end X of the railway station, for the shunting of the group of 14 wagons from the locomotive, the shunting was going to be done on the end Y of the railway station, from the line 6 to the line 7 occupied with ensuring, the light engine going to run back on the line 6 at the coupleof 16 wagons, with which the train was going to continue the running;
- afterwards, the exterior station movements inspector informed him that the group of 16 wagons from the line 6 is ensured, and the train conductor informed through the station RTF that he is ready for starting the shunting for re-stabling those 14 wagons;
- he mentioned that he communicated, through the station RTF, to the train conductor and the driver the shunting plan, they confirming the learning of the shunting plan;
- the shunting for re-stabling those 14 wagons was performed from the line 6 to the line 7 occupied and running back of the light locomotive on the line 6 at the group of 16 wagons, with which the freight train no.50457 was going to cotinue the running;
- at about 10:30 o'clock, the local movements inspector informed him that he received from the exterior station movements inspector the analysis for the departure of the freight train no.50457, the train being ready for departure;
- the train left the railway station Târgu Jiu at 10:44 o'clock;
- he did not see on the light panel a difficult running of the train when it left the railway station;

The movements inspector from the railway station Pietrele Albe on duty on the 8th April 2017

- the freight train no.50457 stabled in the railway station Pietrele Albe, on the line II, at 11:50 o'clock;
- according to the disposal of the traffic controller operator no.24, the freight train no.50457 was going to wait in the railway station Pietrele Albe the resuming of the traffic;
- he informed, through the station RTF, the driver of the freight train no.50457, that it should wait in the railway station the traffic resuming, and this confirmed the understanding;
- during the traffic closing, he cleaned the platform of the railway station, and up to the traffic resuming he had no discussion with the locomotive crew from the freight train no.50457;
- during the stop of the freight train no.50457 in the railway station Pietrele Albe, he could not see the hauling locomotive because the line configuration in the railway station (curve), so he could not observe during this period of time if the locomotive crew got off or not from the locomotive;

- through the disposal of the traffic controller no.27, at 12:34 o'clock, the traffic resuming was disposed, and through the disposal of the traffic controller no.28, at 12:39 o'clock, the freight train no.50457 was allowed to leave the railway station Pietrele Albe, after passing through the railway station, reversely, the passenger train IR no.1728 and the freight trains no.20941-2 and no.80560;
- he informed about it, thorugh the station RTF, the locomotive crew of the freight train no.50457, to prepare the train for departure, and the driver confirmed the understanding;
- after the freight train no. 80560 passed, he asked the driver of the freight train no.50457 to communicate if the train was ready for departure, this informed him that the train could be dispatched;
- the freight train no.50457 was dispatched from the railway sation Pietrele Albe at 13:21 o'clock;
- the train stopped in the railway station 91 minutes, and before the train departure he did not see if the locomotive crew had performed the brake test (continuity test) and he did not hear acoustic signals in this respect;
- at the visual inspection made at the departure of the freight train no.50457, from the railway station Pietrele Albe, he did not see anything special that can put in danger the traffic safety;
- after the departure of the train from the railway station and the the last wagon passed the office of the movements inspector, he noticed that the freight train no.50457 stopped about 1 – 2 minutes, supposing that the stop was to perform the effectiveness test of the train brake;
- he mentioned that when the train stopped, after its departure from the railway station, the hauling locomotive was in the tunnel, having no radio signal, so he could not contact the locomotive crew and also this crew could not contact him, consequently he did not know the right reason of the train stop;
- excepting the staff of track team, working in the railway station Pietrele Albe, he did not see other persons in the railway sation;

The movements inspector from the railway station Strâmbuţa on duty on the 8th April 2017

- at 13:37 o'clock, the freight train no.50457 stabled in the railway station Strâmbuţa, on the deflecting section 1;
- according to the disposal of the traffic controller RC no.32, the freight train was to wait in the railway station the passing, reversely, of the passenger train IR no.1836;
- the freight train no.50457 stabled in the railway statioin Strâmbuţa, the locomotive stopping in front of the office of the movements inspector;
- because he was on the platform for the train visual inspection at its arrival, he was asked by the driver of the freight train, how long they would stop in the railway station;
- he informed him that the train should leave the railway station after passing, reversely, the passenger train IR no.1836;
- the passenger train IR no.1836 passed through the railway station Strâmbuţa at 13:39 o'clock, then he drafted the exit route from the deflecting section 1 for the freight train no.50457;
- the freight train no.50457 left the railway station Strâmbuţa at 13:45;
- at the visual inspection of the freight train no.50457, at its departure from the railway station Strâmbuţa, he did not see anything special;
- he did not hear any communication through the station RTF between the locomotive crew of the freight train no.50457 as long as the train stopped in the railway station Strâmbuţa and not after;
- during the stop of the freight train no.50457 in the railway station Strâmbuţa he did not see strange persons close the train;

The movements inspector from the railway station Livezeni on duty on the 8th April 2017

- at 13:45 oclock, he received the approval for the departure of the freight train no.50457 from the railway station Strâmbuţa, then he made the passing route of the train on the running line II, with speed restriction of 30 km/h;
- he communicated, through the station RTF, to the driver of the freight train no.50457 that the passing route through the railway station Livezeni, on the direct line II, is ensured with speed restriction of 30 Km/h, he receiving the confirmation of understanding;
- at the visual inspection of the train, he did not see anything special, the train passing safely, signalled according the instruction;
- he informed the driver that the train passed safely and signalled according to the instruction through the railway station Livezeni, answering him that he understood;
- he sent the approval for the departure of the train from the railway station Petroşani and recorded the running data in the register RUCLCM and uploaded them in the soft application CRONOS;
- he heard, in the station RTF, his fellow movements inspector from the railway station Petroşani that communicated to the driver of the freight train no.50457, that the train had the route for entry in the railway station on the deflecting section 4, to notify the speed restriction, then he would continue to run to the railway station Băniţa;
- he did not afterwards hear other communications of the locomotive staff from the freight train no.50457, through the station RTF;
- at the visual inspection of the freight train no.50457, he saw the driver, whom he knew by sight, about face's physiognomy, without seeing something curious in his behaviour;
- he observed 2 persons in the driving cab (driver and driver's assistant);
- the dicussions he had through the station RTF with the driver were strictly about the work;
- the time elapsed between the leaving of the freight train no. 50457 from the railway station Strâmbuţa and its arrival in the railway station Livezeni was 5 minutes, according to the running plan;

The exterior station movements inspector from the railway station Petroşani on duty on the 8th April 2017

- at about 14:00 o'clock, he heard at the station RTF the disposing station movements inspector, informing the driver of the freight train no.50457, that the train could pass through the railway station Petroşani, on the deflecting section 4 ;
- he went to inspect visual of the train only after the locomotive and a few wagons passed already by the office of the movements inspector;
- because for the freight train no.50457, the exit signal of the railway station was on clear position (two lights yellow, the train running upon automatic block section, after the train no.L59131, light locomotive) the train did not stop in the railway station and he could not hand over the driver the running order with the speed restrictions, non-stipulated in the Journal for the Speed Restriction Notifications - BAR, on the hauling track section;
- he mentioned that he had contacted through the station RTF the driver of the freight train no.50457, this ensuring him that he knew the speed restriction that had to be notified through the running order, because it is an older one, for a long time in force;
- he mentioned that the driver was informed that it is necessary to receive the running order in the railway station Petroşani;
- he did not know the reason for which the driver did not stop to receive the running order and he did not ask him why he had not stopped;
- he did not informe anybody that the train had not stopped in the railway station Petroşani and he had not been able to hand over the running order to the driver;
- he mentioned that he had to notify the disposing station movements inspector that he had not been able to hand over the running order to the driver because the freight train no.50457 hand not stopped in the railway station;

- he came lately at the visual inspection of the freight train no.50457, after the passing of the locomotive by the office of the movements inspector and he could not see the locomotive crew, only observing that the train was signalled according to the instruction;
- he did not hear in the station RTF other communications of the locomotive crew of the freight train no.50457;
- he knew by sight the driver of the freight train no.50457, because he had met him in the railway station Petroşani, hauling other trains, but he did not know the driver's assistant;

The local movements inspector from the railway station Petroşani on duty on the 8th April2017:

- he informed the disposing station movements inspector that he received from the railway station Livezeni, at 13:50 o'clock, the approval for departure of the freight train no.50457 and that the train was in transit in the railway station Petroşani;
- he informed the exterior station movements inspector that the freight train no.50457 would arrive in the railway station Petroşani on the deflecting section 4;
- he mentioned that the freight train no.50457 stabled on the deflecting section 4 of the railway station Petroşani, at 14:00 o'clock and left at 14:02 o'clock (when the train passed the exit signal X4), recording the data in the register RUCLCM and uploading these data also in the soft application CRONOS;
- he did not know either if the freight train no.50457 had stopped in the railway station Petroşani or if the driver reveived the running order, but because the train was between the hours 14:00 – 14:02 between the shunting limit signals of the deflecting section 4 (the train length was 249 m, and the line length was 741 m) he considered that the train was stabled in the railway station, consequently he registering the data;
- he mentioned that he had to be better informed in this respect;

The disposing station movements inspector from the railway station Petroşani on duty on the 8th April 2017

- the local movements inspector informed him that at 13:50 o'clock, the railway station Livezeni had inputted in the soft aplication the approval for the departure of the freight train no.50457;
- he made the entry route for the freight train no.50457 on the deflecting section 4, informing by the station RTF the driver that he had the entry route on the deflecting section 4, going to have the exit signal from the railway station on clear position when the automatic block section would be clear, it being occupied by the train no. L59131 (light locomotive);
- the driver of the freight train no.50457 informed him that he had understood those communicated through the station RTF;
- he informed the exterior station movements inspector about the arrival on the deflecting section 4 of the freight train no.50457 in order to hand over the driver the running order with the speed restrictions non-included in the BAR;
- after the clearance of the automatic block section, by the leaving of the train no. L59131, he put the exit signal from the deflecting section 4 on open position (two lights yellow) for the freight train no.50457;
- he informed the driver, through the station RTF, that the exit signal from the deflecting section 4 was on clear position, wished him safe journey, and the driver had answered that he received it and thanked him;
- he mentioned that the freight train no.50457 stabled in the railway station Petroşani, between the hours 14:00 – 14:02;
- the data about the running of the freight train no.50457 were recorded in the register RUCLCM and uploaded in the soft application CRONOS by the local movements inspector;
- the assertion that the freight train no.50457 stabled in the railway station Petroşani, between the hours 14:00 – 14:02 was based on the fact that during this period of time the train was

between the shunting limit signals of the deflecting section 4 from the railway station (the train had 249 m length, and the line length is 741 m);
- he supposed that clearing the exit signal from the deflecting section 4 for the freight train no.50457, communicating it to the driver, it did not any more stop in the railway station, non-realizing in this situation if the train stopped or not in the railway station;
- he did not know that the freight train no.50457 had not stopped in the railway station Petroşani and the running order was not handed over the driver;
- he mentioned that the disposing station movements inspector and the exterior station one had, through the station RTF, to inform the driver that in the railway station Petrosani he would receive the running order;
- he mentioned that he informed the driver that in the railway station he was going to receive the running order and that confirmed the understanding;
- the communication with the driver of the freight train no.50457 was normal and he had not seen anything curious;
- after the deoarture of the freight train no.50457 from the railway station, he had not heard other conversations made through thestation RTF by the locomotive crew;

The movments inspector from the railway station Băniţa on duty on the 8th April 2017:
- at 14:02 o'clock, he received from the railway station Petroşani the departure approval for the freight train no.50457;
- the train was going to run upon automatic block section, after the train no.L59131 (light locomotive), that had passed through the railway station Băniţa at 14:16 o'clock;
- after the passing of the train no..L59131, he made the entry route on the direct line IV for the freight train no.50457, and after the clearance of the automatic block section by the leaving of the train no.L59131, he make the exit route for the freight train;
- he informed, through the station RTF, about it the driver of the freight train no.50457, who confirmed the understanding;
- as soon as the automatic block section was cleared, he made the exit route for the freight train no.50457, informing the driver that he had, in the railway station Banita, passing route on the running line IV;
- the freight train passed through the railway station Băniţa at 14:25 o'clock;
- at the visual inspection of the freight train no.50457 he had not found out anything unusual in its running, the train being signalled according to the instruction, and the locomotive crew being in the driving cab, each of them at his position;
- at the passing of the train through the railway station, the locomotive crew greeted him, they signalling also with the locomotive horn;
- from the discution, had through the station RTF, with the locomotive crew and observing them in the driving cab, at the train visual inspection, he had not found anything unusual in their behaviour;
- at about 14:30 o'clock, about 5 - 6 minutes after the passing of the freight train no.50457 he railway station Baniţa, he heard the driver, through the station RTF, asking the railway station Merişor to ensure route for the freight train no.50457 to the railway station Baru Mare, because he was not able to stop the train;
- he called the railway station Merişor in order to find out if the movements inspector heard the call of the driver made by radio, by he was out of office, to make the visual inspection of the train no. L59131;
- about 1 – 2 minutes after hearing in the station RTF the call of the driver of the freight train no.50457, he observed on the command panel that some insulated track section rested occupied;
- he informed, be the station RTF, the driver of the train no.L39561 (light locomotive) to stay stopped, because he could not make entry route in the railway station, having occuied track sections, the driver notifying him that the power supply for the contact line was cut;

- he tried to call the area power supply controller, then he called the maintenance signalling worker on duty to whom he notified the problem;
- he called the track foreman who informed him that an inhabitant informed him that between the railway stations Băniţa and Merişor a train derailed;
- he informed the station manager and the traffic controller operator about the interruptions and the information received;
- he heard at the station RTF, many times, the movements inspector from the railway station Merişor who tries to contact the locomotive crew of the freight train no.50457;
- he heard him one time, at the station RTF, the driver of the freight train no.50457, asking for free route because he could not stop the train;
- when he asked for free route, the driver voice did not sound nervous and he did not say the cause for which he could not stop the train;
- he could not know if the voice asking for free route was certainly driver's voice, but he mentioned that he heard the same voice in the direct discutions had with the locomotive crew of the freight train no.50457;

The movements inspector from the railway station Merişor on duty on the 8th April 2017

- at 14:28 o'clock, the train no.L59131 (light locomotive) passed through the railway station Merişor, when he was on the platform for the train visual inspection;
- when he came back in the office, he sent to the railway station Crivadia the departure approval for the train no.L59131, then making the entry route for the freight train no.50457, on the direct line III, the train going to run upon automatic block section, after the train no.L59131;
- he tried to inform the driver of the freight train no.50457 about it, but he did not receive any confirmation from him;
- he mentioned that because the land and track configuration (4 tunnels between the railway stations Băniţa and Merişor), radio contact is not along whole route, he going to repeat the call when the train would be close to the railway station Merişor;
- he was called by the area power supply controller to tell him which trains there were on the hauling section because the power supply of the contact line was cut, because automatic protection was enabled, then he was called by the traffic controller operator, who asked him about the problems in that area because, he was informed by the national unique system emergency calls 112, that a train derailed in the area;
- during this period of time he called many times, through the station RTF, the locomotive crew of the freight train no.50457, without answers;
- he sent to the station manager the information received and that it is not possible to contact the locomotive crew of the freight train no.50457;

The movements inspector from the railway station Crivadia on duty on the 8th April 2017

- the freight train no.50457 was going to be the third train that had to pass through the railway station Crivadia, upon automatic block section, but it did not receive the departure approval from the railway station Merişor;
- he heard at the station RTF the movements inspector from the railway station Merişor that informed the driver of the freight train no.50457 that he had entry route on the direct line, then he would continue the running upon automatic block section, and afterwards he heard him many times at the radio station asking the driver about the problems had with the train;
- he did not contact the locomotive crew of the freight train no.50457, because they was not in his activity area, and the train driver did not hear him through the station RTF;

From the statements of the locomotive crew who on the 8th April 2017, when the accident occurred, was in the locomotives of trains running on the hauling section Petroşani – Crivadia, one can keep in mind the next:

The locomotive crew from the locomotives of the **train no.27757**

- the train no.27757 consisted in two electric locomotives type EA, that according to the schedule were running to the railway station Simeria;
- the station RTF from both locomotives were working;
- closing up the railway station Crivadia, they heard at the station RTF the request of the driver from the freight train no.50457, sent to the railway station Merişor, to ensure free route to the railway station Baru Mare, because the train remained without brake;
- afterwards they heard many calls of the movements inspector from the railway station Merisor at the station RTF, but without answers from the locomotive crew of the freight train no.50457, than they did not heard any communication with the freight train no.50457;
- the request of the locomotive crew of the freight train no.50457, to have ensured free route to the railway station Baru Mare,was done once, and in the voice of the person who made the request one could observe something nervous;
- taking into account the land configuration along this hauling section, he mentioned that:
- when they leave the railway station Băniţa they use the locomotive as a hauling one at the exit from the railway station over the switches at the entry in the first tunnel, then because there is the first track section with gradient, they perform the effectiveness test of the automatic brakes and according to the train answer at the braking, they shall drop the pressure in the general air pipe, so the train speed be kept under 40 km/h;
- if the train is in transit throught the railway station Băniţa (without stop), the train speed shall be decrease from 60 km/h to 40 km/h, the train going to run pass by the front of the movements inspector office from the railway station Băniţa, from inertia, without using the locomotive as a hauling one to the track section with gradient, just following to keep the train speed under 40 km/h;
- they mentioned also that, on the hauling section Petroşani – Băniţa, because the land configuration (slope on the running direction) there is no need to use the automatic brake, it being used only if the train leaves the railway station Petroşani (not in transit), then being necessary to make a effectiveness test of the train brake, or in case of danger;
- because the automatic brake of the train is the main braking system, one suposes that it did not work, remaining without air in the braking system, generated maybe by the failure of the air brake compressor;

The locomotive crew of the train no.L59131 (light locomotive)

- at about 14:00 o'clock they were routed from the railway station Petroşani, as train no.L59131 (light locomotive), to drive to the railway station Călan Băi, an electric locomotive type EA;
- being between the railway stations Peştera Bolii and Băniţa, they heard in the station RTF the movements inspector fom the railway station Petroşani asking the driver of the freight train no.50457 if it is necessary to ensure the passing of the train through the railway station (without stop) ,the driver said yes, so the driver was informed that the train would pass through the railway sation Petroşani, on the deflecting section 4, with 15 km/h at the exit from the railway station;
- they did not hear other discussions of the locomotive crew from the freight train no.50457, only afterwards, when, maybe the movements inspector from the railway station Merişor asked insistently, through the station RTF, why the train delayed and if there were problems in its hauling, but no answer;
- afterwards, somebody whose identity is not known, asked through the station RTF to make free route for the freight train no.50457, because it could not be stopped;
- they mentioned that this intervention was not done by the locomotive crew of the freight train no.50457, because they knew their voice;
- they tried to contact the locomotive crew of the freight train no.50457, but they could not do it, the driver phone rang but he did not answer, and the phone of the driver's did not ring;

- from his experience, he mentioned that in order to drive safely a train on a such track section, at the passing through the railway station Băniţa, it is necessary to perform the effectiveness test of the train brake, in order to ensure the train brake, and at the train running on a running line, to the railway station Merişor, speed between 30 – 35 km/h, it is necessary to apply a brake in order to keep the train at a speed to 35 km/h;
- because the basic brake in the train hauling is the automatic one, he considered that its non-working was the cause of the impossiblity to apply the train brake, following the air lost in the brake equipment;
- he adverted on performing the brake tests;

The locomotive crew of the train no.39561

- the train no.39561 consisted in two locomotives, one electric type EA, hauling the train, and a diesel electric one type DA, dead one;
- both locomotives were working and routed for program from the railway station Petroşani to the railway station Călan Băi;
- the train no.39561 was waiting in the railway station Petroşani the passing of the freight train no.50457, it going to leave upon automatic block section after that;
- the drivers of those two trains greeted each other through the station RTF, because they knew each other, being neighbours;
- the discution with the driver of the freight train no.50457 was a normal one, without leaving the impression of something curious;
- because those two trains had the same running direction, the locomotive crew of the freight train no.50457 could not be seen from front, being seen only the driver's assistant from lateral side, who was on his position in the driving cab, on the left side of the driver, without seeing something unusual at their condition;
- the train no.39651 left the railway station Petroşani upon automatic block section, after the freight train no.50457, and at the entry signal in the railway station Băniţa stopped because closing to the signal, the open position changed, becoming a close one;
- after a minit from the train stop at the entry signal of the railway station Banita, there was no power supply in the contact line;
- along the route, they heard the movements inspector from the railway station Băniţa when he informed the driver of the freight train no.50457 that he had the passing route through the railway station on the direct line IV;
- closing to the railway station Băniţa, they heard the driver of the freight train no.50457 asking through the station RTF, at the railway station Merişor, to ensure for the train the clear route to the railway station Baru Mare, because they lost the air and they could not brake;
- the driver of the freight train no.50457 did not stipulated the reason for which they lost the air in the braking system, and the voice did not seem hurried;
- afterwards they heard in the station RTF the request the movements inspector from the railway station Merişor to the locomotive crew of the freight train no.50457, but without any answer from them;
- from the moment of the call of the diver from the freight train no.50457 to the railway station Merişor and until the cut of the power supply in the contact line elapsed about 3 minutes;

The locomotive crew of the train no.L60274 (light locomotive)

- when the freight train no.50457 passed on the direct line IV, through the railway station Băniţa, they were in the railway station, on the deflecting section 3, driving the locomotive EA 024, that ran as train no.L60274, light locmotive, on the track section Subcetate – Târgu Jiu;
- they heard the movements inspector of the railway station Băniţa who informed, through the station RTF, the locomotive crew of the freight train no.50457 that the train had passing

through the railway station, on the direct line IV, and the locomotive crew communicted the understanding;
- at the passing of the freight train no.50457 through the railway station Băniţa, it coming from the oposite direction, they saw each other, with the locomotive crew, greeting, fellow-like, lifting the hand and giving the signal with the locomotive horn;
- the locomotive crew of the freight train no.50457 had a normal attitude, each of them being on his position in the locomotive;
- about 3 - 4 minutes after the passing of the freight train no.50457 through the railway station Băniţa, they heard that someone asked through the station RTF, the railway station Merişor (3 times), then they heard nothing;
- they did not heard any answer at the request, only an interference at the station RTF;
- about 5 - 6 minutes after the passing of the freight train no.50457 through the railway station Băniţa, the power supply in the contact line desappeared, it being observed by the locomotive crew of another train that waited at the entry signal of the railway station Băniţa from the railway station Petroşani.

From the statements of the track staff, who on the 8th April 2017 were in the driving cab of the locomotive of the train no.27757, one can keep in mind:

- on the 8th April 2017 they were on duty for the track inspection, and when they came back home they got in the driving cab of the locomotive of the train no.27757;
- they left the railway station Banita with the train no.27757, at about 13:50 o'clock, and at the automatic block section, being followed by the light locomotive and then by the freight train no.50457;
- at about 14:30 o'clock, after passing the railway station Crivadia, they heard at the station RTF the driver of the freight train no.50457, asking the railway station Merişor passing route on the direct line, because he could not any more stop the train;
- the driver made one call to the railway station Merişor and they did not hear him saying the reason for which he could not stop the train.

From the statements of the locomotive crew who on the 8th April 2017 was asked to ensure the shift exchange (staff T), hauling the freight train no.50457, one can keep in mind:

- on the 8th April 2017, at about 09:00 o'clock, they were informed they would be asked to ensure the shift exchange (staff T) for the freight train no.50457, the echange going to be done in the railway station Petroşani, when the locomotive would leave the train set in the railway station Subcetate and run back as light locomotive in the railway station Tărgu Jiu;
- at about 10:00 o'clock, they received from operator T (traction) the disposal no.479 for the order abve mentioned;
- they were in touch with the driver of the freight train no.50457 in order to get information about the train running and to know with approximation the hour of the shift exchange;
- they spoke last time with the driver of the freight train no.50457 when he was in the railway station Pietrele Albe, waiting for the opening of the line for the train dispatching, when they found out that the train set no. 50457 would be left in the railway station Pui, from where the locomotive would run back as a light one;
- the phone discussions with the driver of the freight train no.50457 were normal, friendly, without observing something unusual in his attitude;
- the driver and the driver's assistant asked for the shift exchange T met each other in Haţeg, from where they went together by personal car to Petroşani;
- at about 14:30, being in the locality Pui, because the railway station is close to the road, they went to the railway station in order to get information about the running of the freight train no.50457;
- in the railway station Pui, the movements inspector on duty informed them about the accident happened in the running of the freight train no.50457, telling them that the locomotive staff did not answer at the calls made through the station RTF;

- they tried to call the locomotive crew of the freight train no.50457, but no answer;
- from his experience as driver, concerning the track section Târgu Jiu – Petroşani – Subcetate, he mentioned:
  - in order to keep stopped the train in the railway sation Pietrele Albe, it is necessary to ensure the braked weight percentage both with automatic and with hand brake, and before the train departure the brake system of the train is supplied with air, the train being kept stopped with the straight air brake;
  - on the track section Pietrele Albe – Petroşani – Băniţa, the stabling of the train in the railway station is made by hauling, after performing previuosly a short brake so afterwards the train can be stopped at a fixed point;
  - at the passing through the railway station Băniţa, without the train stop in the station, one performs an effectiveness test of the train brake after 1/3 of train is on the running line, then don't release the brake of the train along all distance to the railway station Pui, where the slope allows it;
- he considered that the accident in the running of the freight train no.50457 happened because the failure of the automatic brake;

From the statements of the staff of the railway freight undertaking SC Unicom Tranzit SA, who during the period of time the 7th – the 8th April 2017, was responsible with the programming and monitoring of the running of the freight train no.50457, one can keep in mind:

Traffic controller on duty on the 7th April 2017:

- at the taking of the work he had the first information about the need to compose a freight train, loaded with thunder at TMK ARTROM Slatina, for Curtici;
- after processing the information about the stage of the wagon loading, he organized the train programming and driving;
- he established with the area responsible the staff for the train preparation and composition;
- he scheduled the locomotive running, that hauled the train between Slatina – Caracal (diesel electric locomotive type DA);
- taking into account the train tonnage and the hauling track section, he established the running program, the wagon hauling, in two couples between Slatina – Piatra Olt;
- the freight train no.50457 was scheduled to leave the railway station Slatina at 22:00 o'clock, having established:
  - SMR – change of the hauling mean in the railway station Caracal, diesel electric locomotive DA with electric one EA;
  - RTT – transit technical inspection at the railway station Subcetate;
  - SPT – exchange shift (traction staff) in the railway stations Târgu Jiu, Petroşani, Simeria;
- taking into account the hauling tonnage of the trains on the track section Târgu Jiu – Petroşani – Pui, he established in the running program, the uncoupling of wagons in the railway station Târgu Jiu, with the hauling of two couples and their re-coupling in the railway station Subcetate;
- after the programing of the running of the freight train no.50457 he sent by e-mail, to all the interested factors, all the identification data on the train running;

Traction traffic controller on duty on the 7th April 2017:

- he notified at 16:25 o'clock, through the phone disposal no.436, the locomotive crew who was going to come at work in the railway station Caracal for hauling the freight train no.50457;
- the communication was that the locomotive crew be present in the railway station Caracal not before 00:30 o'clock, on the 8th April 2017;
- he contacted the locomotive crew, who in the railway station Caracal had to deliver the locomotive to the locomotive crew who was going to haul the freight train no.50457, between Caracal – Curtici, informing them verbally about this staff exchange.

Traction traffic controller on duty on the 7th/8th April 2017:

- at the work start he got information about the locomotive crew ordered for the hauling of the freight train no.50457, both about that existing at the train departure from the railway station Slatina, and about that who was going to make the shift exchange in the railway station Caracal;
- he got information about the hour of the locomotive crew arrival in the railway station Caracal for the shift exchange;
- he was informed that at 02:00 o'clock the shift exchange, the locomotive crew taking the electric locomotive in the railway station Caracal for the hauling of the freight train no. 50457 between Caracal – Curtici;
- he filled all data both in the activity sheet of the locomotive crew and in the register for the train running;
- at the shift exchange the freight train no.50457 was in the railway station Craiova.

Traction traffic controller on duty on the 8th April 2017:

- when he started the work, the freight train no.50457 was in traffic;
- at about 10:10 o'clock he discussed with the responsible of the working point Curtici about the locomotive crew of the train scheduled for running in that area, establishing:
  - the disposal no. 479 was issued at 10:30, for the staff who in the railway station Petroşani was going to make the shift exchange from the freight train no.50457, after leaving the first couple of the train in the railway station Pui and the running back of the locomotive as a light one for the second couple;
  - the disposal no.480 was issued at 10:35 o'clock, for the begining of the rest in the railway station Petroşani (at the running back of the locomotive as a light one, after leaving the the first couple in the railway station Pui) for the locomotive staff hauling the freight train no.50457, they going to ensure the hauling of the freight train no.50442, with the locomotive EA 507, scheduled for running between Curtici – Cătuşa;
- at about 14:30 o'clock, he was called by the traffic controller RC Deva asking him to call the locomotive crew hauling the freight train no.50457, who did not answered at the station RTF;
- the locomotive staff did not answer at the phone calls;
- after short time, he was notified by the traffic controller RRC Timişoara about the accident consisting in the derailment of the freight train no.50457;
- he sent to the comppany management the information received about the accident happened.

Traffic controller on duty on the 8th April 2017:

- at about 13:00 o'clock he was informed by the traffic controller RC Deva that because the occupancy of the lines from the railway station Subcetate, the coupling of the wagons from the second couple of the freight train no.50457 would by done in the railway station Pui;
- he made all the steps to do all changes at the running program, changes necessary so the coupling of the second couple of the freight train no.50457 be made in the railway station Pui;
- at about 14:45 o'clock he was called by the traffic controller RC Deva to contact the locomotive crew of the freight train no.50457, that did not answer at the calls made at the station RTF;
- the locomotive crew did not answer at the phone calls;
- shortly he was informed by the traffic controller RRC Timişoara about the accident consisting in the derailment of the freight train no.50457;
- he was contacted by ISU Petroşani, asking for information about the load of the wagons of the freight train no.50457 and personal data about the locomotive crew of the train;
- He sent to the company management the information got about the accident.

Head of the Transport Section Curtici:

- on the 7th April 2017 received by e-mail the running program of the trains, where there was also the freight train no.50457, scheduled to run between Slatina – Curtici, with depatrture o the 7th April 2017, at 22:00 o'clock;
- at about 16:00 o'clock, the traffic controller T called him in order to discuss about the locomotive crew that be present in the railway station Caracal in order to take over the locomotive EA 759, for the hauling of the freight train no.50457;
- knowing that because the tonnage on the hauling section Târgu Jiu – Petroşani – Subcetate, in the railway station Târgu Jiu it is necessary the wagon uncoupling and the train dispatching in two couples, at about 17:00 o'clock he called the train conductor, who was asked to be present in the next morning in the railway station Târgu Jiu in order to perform those activities;
- at about 21:00 o'clock, he called and asked another train conductor, who had to to perform also in the morning of the next day, in the railway station Târgu Jiu, the same type of activity, but at the freight train no.50438-1;
- at about 21:30 o'clock he called the train examiner who received the disposal to be present in the morning of next day, on the 8th April 2017, in the railway station Târgu Jiu, for the technical inspection of the trains consisting in the wagons from the freight trains no.50457 and no.50438;
- on the 8th April 2017, at about 09:00 o'clock he called the locomotive crew of the freight train no.50457 in order to find out the stage of the train preparation in the railway station Târgu Jiu and to inform him that the shift exchange would be done in the railway station Petroşani, at the running back as light locomotive, after leaving the first couple of the train in the railway station Subcetate;
- he called the locomotive crew who was going to make the shift exchange (locomotive crew) of the freight train no.50457, informing them that the shift exchange would be done in the railway station Petroşani, when the light locomotive would run back from the railway station Subcetate;
- at about 09:30 he informed the traffic controller T about the discussions had before, in order be able to dispose consequently;
- at about 11:30 o'clock the traffic controller informed him, that because the lines from the railway station Subcetate were occupied, the coupling of the wagons at the freight train no.50457 sould be done in the railway station Pui, and the driver was notified consequently;

C.5.2. Safety management system

A. Safety management system of the railway public infrastructure manager

When the accident happened CNCF „CFR" SA, as manager of the railway public infrastructure had implemented its own railway safety management system , according to the provisions of the Directive 2004/49/CE for the safety on community railways, of the Law no.55/2006 for railway safety and of the Minister of Transports' Order no.101/2008 for the granting of the safety authorization to Romanian railway infrastructure manager/administrators, getting:

- Safety Authorization – Part A identification no. ASA09002 – through which Romanian Railway Safety Authority confirmed the acceptance of the safety management system of the railway infrastructure administrator;
- Safety Authorization – Part B identification no. ASB15003 – through which Romanian Railway Safety Authority confirmed the acceptance of the disposals adopted by the railway infrastructure administrator for the compliance with the specific requirements necessary to guarantee the railway infrastructure safety, in the design, maintenance and operation, including , if case, the maintenance and operation of the system for the traffic control and signalling.

When the accident happened the safety management system consisted in, mainly:

- statement of safety politics;
- management manual;
- general qualitative and quantitative objectives of the safety management;
- operational procedure issude/updated according to EU Regulations no.1169/2010.

According to the Annex 3 of the Law no. 55/2006, on the railway safety, in the Railway County Timisoara the „General qualitative and quantitative objectives of the safety management" for the period of time 2014 – 2017 were distributed, and through the Decision no.1/3/487/2015 the department heads from the Railway County Timisoara were approinted as responsibles for the Railway Safety Management System in the Railway County Timosoara within the division/department they manage.

B. The safety management system of the railway undertaking

When the accident happened, SC UNICOM TRANZIT SA, as railway undertaking, had implemented its own railway safety management, in accordance with the provisions of Directive 2004/49/EC for the community railways, of the Law no. 55/2006 for the railway safety and of the Minister of Transports' Order no.535/2007 (amended by the Order of Minister of Transports and Infrastructure no. 884/2011 and by the Order of Minister of Transports and Infrastructure no. 2179/2012) for the granting of the safety certificates, necessary for the performance of Romanian railway transports, getting the next documents:

- Safety Certificate – Part A identification CSA no.0023, through which Romanian Railway Safety Authority, confirms the acceptance of EU safety management system of the railway undertaking, in accordance with the Directive 2004/49/EC and with the national legislation;
- Safety Certificate - Part B identification CSB no.0006, through which Romanian Railway Safety Authority confirms the acceptance of the disposals adopted by the railway undertaking for the compliance with the specific requirements necessary for the safety operation on the relevant network, according to the Directive 2004/49/EC and with the applicable national legislation.

In the annexes I and II of the safety certificate part B, there were stipulated both the track section where the accident happened and the train hauling locomotive.

When the accident happened, SC INICOM TRANZIT SA got also:

- Certificate of Entity in Charge with the Maintenance no. RO/30/0013/0001 for the wagons, through which Romanian Railway Safety Authority – ASFR confirms the acceptance of the EU management system of the entity in charge with the maintenance (ERI), in accordance with the Directive 2004/49/EC and with the Regulations (EU) no. 445/2011;

- Certificate of Entity in Charge with the Maintenance no. RO/ERIV/L/00160020 for the motorised vehicles, through which Romanian Railway Safety Authority-ASFR confirms the acceptance of the management safety of an entity in charge with the maintenance, in accordance with the Directive 2004/49/EC and with the Order of the Minister of Transports no. 635/2015.

As, following the investigation, one found out that the railway accident happened because the physical condition of the locomotive crew was unsuitable, the commission checked the procedures of SC UNICOM TRANZIT SA, part of its own safety management system, concerning;

- order, ensuring and monitoring of the locomotive crew;
- drafting, sending, workflow and analysis of the running program,
- organization and workflow of the traffic safety control;
- organization and workflow of the maintaining professional skils.

Following the analysis of the operational procedures of the railway undertaking, as well as of their application in case of the investigated accident, one found out that, as for the locomotive crew driving the freight train no. 50457 when the accident happened, have not been complied with the provisons from the point 5.14, letter h.2 and of the point 5.16 from the operational procedure code POSH-37, concerning:

- maximum time resulted from the summing of the working time during the train stop with the working time during the effective locomotive driving;
- sending of the disposals for the adjustment of the running order, so the locomotive crew and the train one on duty or during rest, outside the home, comply with the safety requirements imposed by the Norms approved through the Order of Minister of Transports no. 256/2013.

Taking into account these above mentioned, the investigation commission considers that the accident occurrence was influenced by the infringement of the provisions about the order, ensuring and monitoring of the locomotive crew, from the operational procedure code POSF-37.

C.5.3. Norms and regulations. Sources and references for investigation

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

Norms and regulations

- Regulations for the Railway Technical Operation no.002 approved through the Order of Minister of Public Works, Transports and Lodgings no.1186 din 29.08.2001;
- Signalling regulations no. 004/2006 approved through the Order of the Minister of Transports, Constructions and Tourism no. 1482/2006;
- Regulations for train running and shunting of the railway vehicles no. 005, approved through the Order of Minister of Transports, Constructions and Tourism no. 1816 from the 26th October 2005;
- Regulations for the hauling and braking no. 006/2005 approved through the Order of Minister of Transports, Constructions and Tourism no. 1815/2005
- Instructions for the locomotive crew activity approved through the Order of Minister of Transports, Constructions and Tourism, no. 2229/2006
- Instructions for the technical inspection and maintenance of wagons in operation no. 250/2005;
- Order of the Division Wagon Traction no. 17DA/610/1987 for the maintenance and operation of the equipment INDUSI-DSV;
- Regulations for the investigation of accidents and incidents, for the development and improvement of Romanian railway and metro safety, approved through the Government Decision no.117/2010;
- Law no. 55/2006 on the railway safety;
- Instructions for the use of the testing and recording trains no. 329/1995;
- Instruction for the establishment of terms and order for the track inspection performance no. 305/1997;
- Instruction of norms and tolerances for the track construction and maintenance – lines with standard gauge - no.314/1989;

- Order no. 1260/1390/2013 for the approval of methodological norms for the medical examination of the staff with responsibilities in the transport safety and the examination periodicity;
- Order of the Minister of Transports and Telecommunications no. 855/1986 on some measures for the reinforcement of the dicipline in the units of the Minister of Transports and Telecommunications;
- Order of Minister of Transports no. 256/29.03.2013 for the approval of Norms for the continuous maximum service accepted for the locomotive, performed by the locomotive staff in Romanian railway system;
- Order of Minister of Transports and Infrastructure no. 815/2010 from the 12th October 2010 for the approval of the norms for the implementation and development of the system for maintaining the professional competencies of the staff with responsibilities in traffic safety and for other staff categories that perform specific activities in Romanian railway transports and for updating the list of jobs with responsibilities in the traffic safety, Order of the Minister of Transports, Constructions and Tourism no. 2262/2005 concerning the authorization of the staff with responsibilities in the traffic safety that will go to perform on his own responsibility activities specific to the railway transport;
- Railway Norm – "Railway vehicles. Types of planned inspections and repairs. Norms of time or norms of km run for the performance of the planned inspections and repairs" approved through the Order of Minister of Transports and Infrastructure no.315/2011;

Sources and references
- statements and questionnaires of the staff involved in the railway accident occurrence;
- minutes of technical finding for railway infrastructure, involved rolling stock and those for checking and reading of the records IVMS and those for the electronic single phase meter for power supply, type CEL;
- photos and videos from the accident site;
- copies of the documents enclosed to the investigation report;
- addresses of SC UNICOM TRANZIT and CNCF „CFR" SA on the performance of the activities;
- documents about the Safety Management System of the railway freight undertaking SC UNICOM TRANZIT SA;
- modern brakes for the locomotives – Minister of Transports and Telecommunications – Center for documentation and technical publications, edition 1971;
- Book of the driver of the electric locomotives - Minister of Transports and Telecommunications – edition 1980;
- Train braking – SNCFR – General Division of Rolling Stock, Railway Publishing House, edition 1998.

C.5.4. Working of the technical equipments, infrastructure and rolling stock

C.5.4.1. Data about the lines

Presentation of the railway infrastructure and superstructure affected by the derailment of the rolling stock

The running of the derailed rolling stock on the track I between the railway stations Băniţa and Merişor was affcted:

on the track I:

a) *Concerning the track bed:*
   - Part of the route from the track bed adjacent to the abutment bridge to the railway station Băniţa, of the bridge from km 62+840, on about 77 m;

b) *Concerning the bridge from km 62+840:*
   - The right side (on the train running direction) of the top of the abutment lateral wall that support the embankment from the railway station Băniţa;

Picture no.4

- elements of the track superstructure, respectively the bridge beams (wooden sleepers), parts of the system for the fastening of the bases of rails on the bridge beams and rails;

<u>on the track IIe</u>

- the part of the route from the route from the track bed adjacent to the bridge abutment to the railway station Băniţa, of the bridge fom km 62+840 on about 65 m.

<u>Presentation of the derailment consequences on the track I</u>

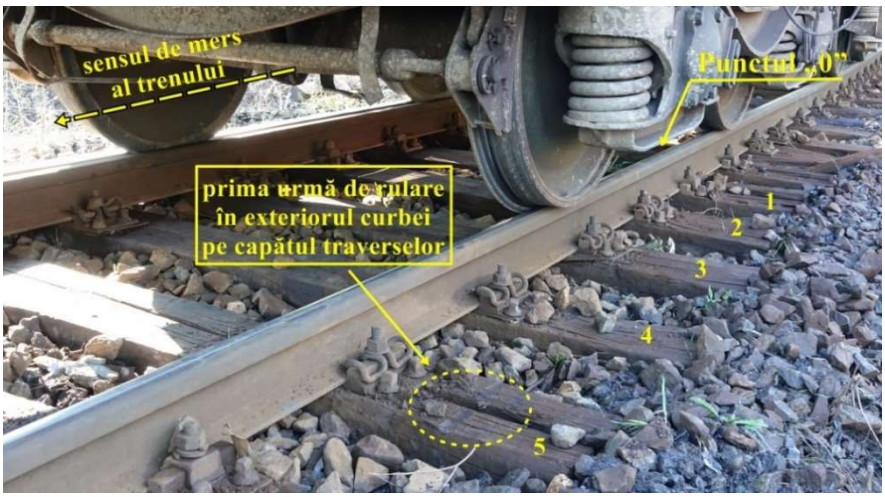
In the running direction of the train, at km 62+940, between the rails, on the surface of the end of the vertical screw bolt of the system type K for the fastening of the base of the exterior rail of the curve on the metallic plate, one identified a hit mark. This mark was noted with „0”.

<u>NOTE</u>

Taking into account the damages at the railway superstructure, corresponding to the tracks I and II between the railway stations Merişor and Băniţa, following the derailment of the rolling stock, the investigation commission considers that it is not possible to say exactly if the mark identified in the point „0” is the derailment start, or it is its consequence.

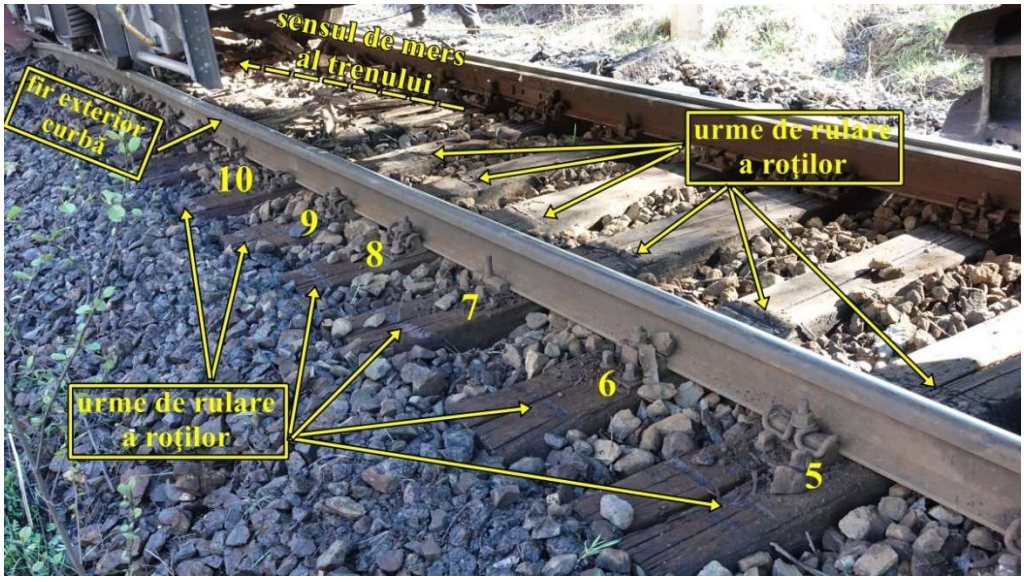
Starting with the sleeper fom the point „0”, in the running direction of the train, between the rails at 4 consequtive sleepers, there were identified hit marks of the elements of the system for the fastening on the sleepers of the base of the exterior rail of the curve.

Pictures no.5 - 6 Sleepers 1-4 - between the rails, marks of hit of the metallic elements for the fastening of the base of exterior rail of the curve on sleepers



Picture no.7 Sleepers 1-4 - ends of the sleepers from the curve exterior rail
Sleeper 5 - first mark of fall and running outside the running track, to the exterior of the curve

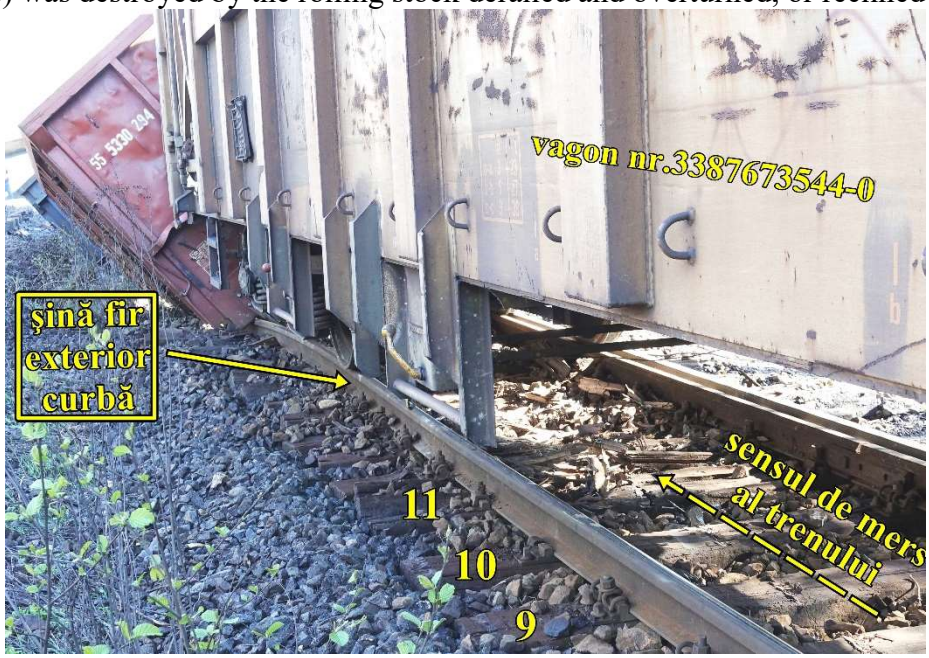
On the next consequtive 6 sleepers, on both sides of the curve exterior rail, there were identified marks of the the wheels flange running on the upper faces of the sleepers.



Picture no.8 Group of 6 sleepers (sleepers 5-10) – marks of wheel running, on both sides of curve exterior rail

The marks left on the upper faces of the sleepers between the rails, by the wheels flange, are directed to the centre of the track, and those outside the track are on the ends of the speepers and directed to the track II.

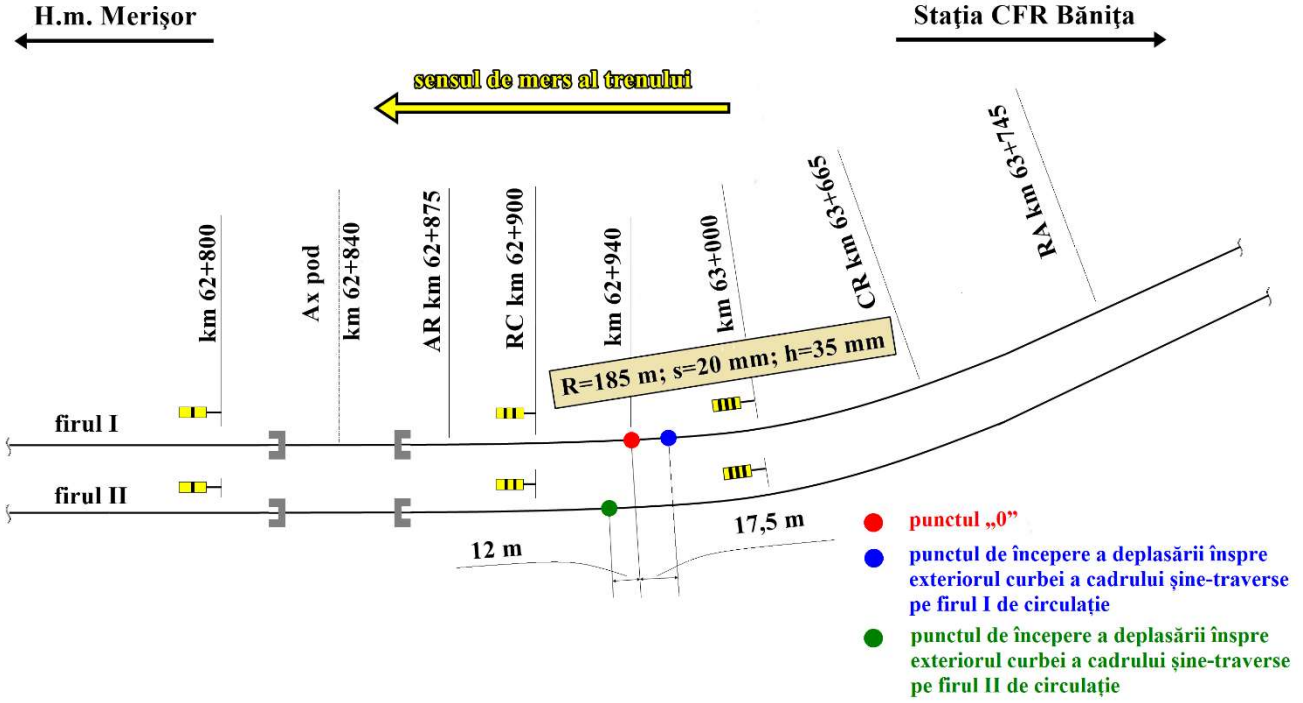
Starting with the 11th sleeper, the track superstructure (sleepers, rails, joint ensembles, small track materials) was destroyed by the rolling stock derailed and overturned, or reclined to the track II.



Picture no.9 Group of sleepers 9 - 11

On the area affected by the rolling stock derailed, presented before, is the wagon no.33876735404-0 (the 15th of the train), the first wagon non-derailed.

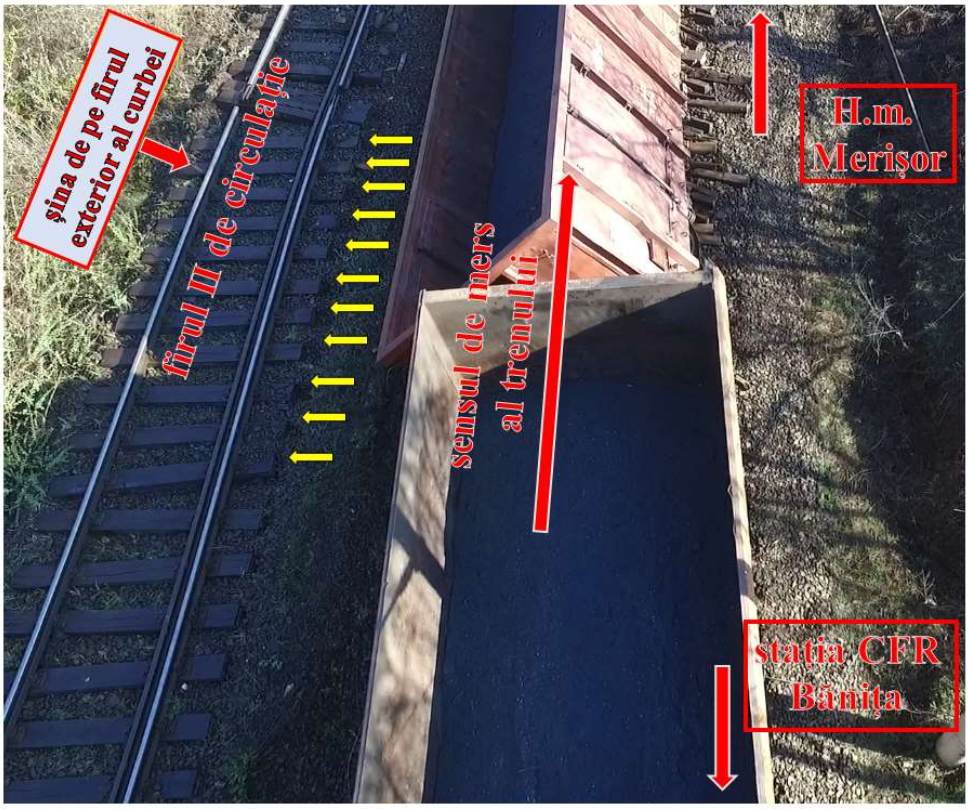
In the train running direction, to the point marked with „0", the frame rails – sleepers was buckled to the exterior of the track, on a length of about 17,5 m.



Sketch no.4

In the running direction of the train, at about 12 m from the point „0" (km 62+940), on the track II begin marks of movement to the curve exterior and the destruction of the track superstructure,

because the movement direction to the track II, generated to the rolling stock derailed during the running on a curve within the track I.



Picture no.10 Rail II Băniţa-Merişor – at the ends of the sleepers inside the curve, there are hollows generated by the movement of the frame rail-sleepers to exterior of the curve

Controls and measurements at the track superstructure, on the track I Merişor-Băniţa:

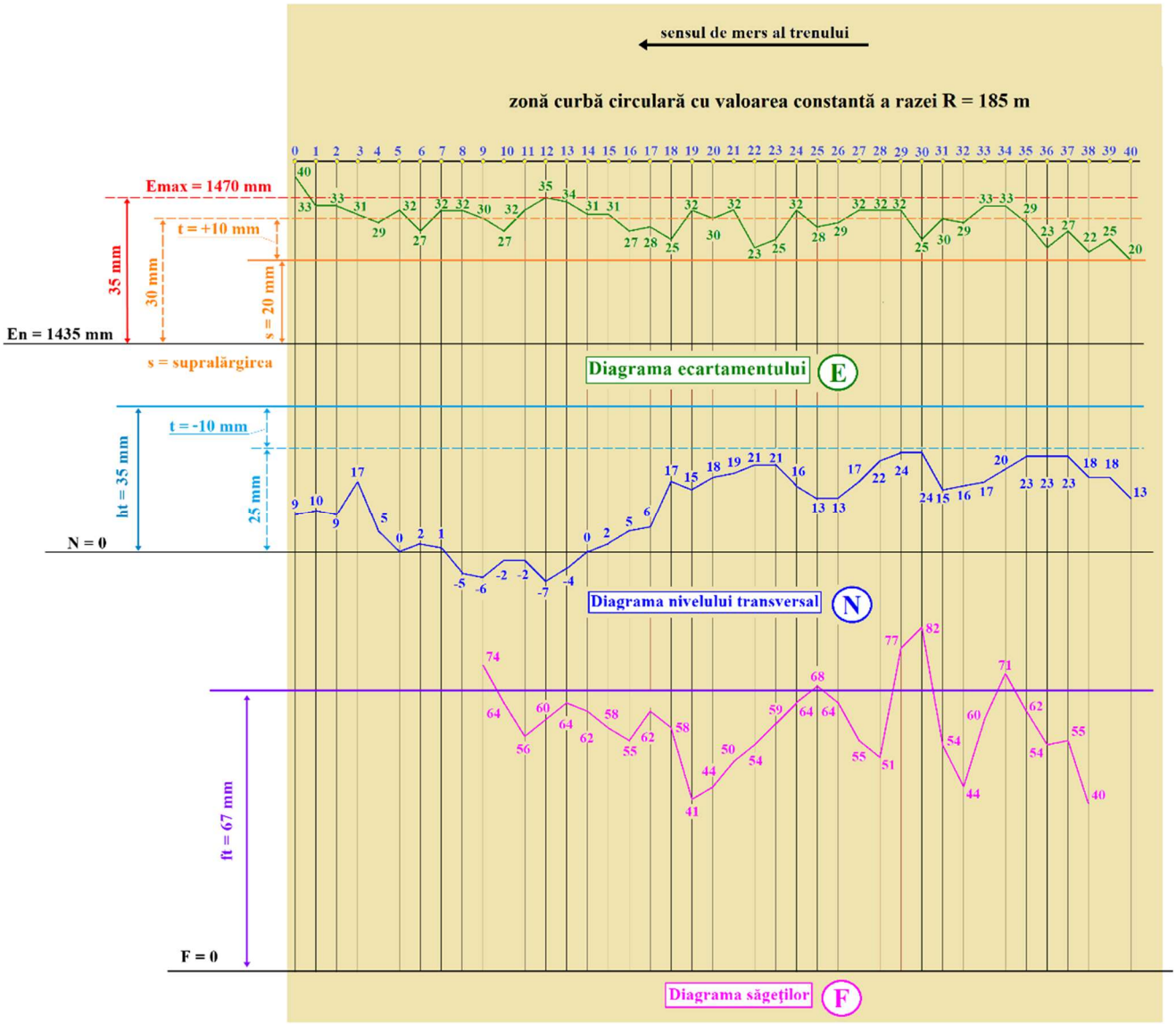
From the point „0", reversely the train running, 40 points were marked on the site, at equidistance of 2,5 m (basis for the measurement of the track twist), where the gauge and the cross level of the track were checked, staticaly, with the track gauge for the track measurement and for the checking of the track direction through the measurement of the curve deflection in the middle of the chord of 10 m.

For the track gauge, the subunit responsible for the railway infrastructure maintenance got a valid metrological checking bulletin (last metrological checking before the serious accident occurrence was made on the 8th March 2016).

All the resulted measurement points were within the circular curve (constant value of the radius is R=185 m).

Also, on the exterior rail of the curve, one performed vertical and horisontal reading with the device for the determination of the vertical and lateral wears of the rail.

Taking into account that the lateral movement of the frame rails-sleepers to the exterior of the curve (the track was buckled) was starting at 17,5 m before the point „0" (reported to the running direction of the train), the measurement of the track versine in the middle of the chord of 10 m, on the marked area, was performed at the end of the chord, starting with the point 7.



Picture no.5 – Values of the track geometry parameters

Analysis of the values of the measured geometric parameters emphasized the next:

Concerning the track gauge:

In the most part of the measured points, the gauge was over the maximum value of the tolerance accepted by the provisions of the Intstructions of norms and tolerances for the track construction and maintenance-lines with standard gauge, no.314/1989, respectively +10 mm (tolerance applicable for the gauge spread s=20 mm). Excepting the point „0" the maximum value of the track gauge was not exceeding 1470 mm (Instruction of norms and tolerances for the track construction and maintenance-lines with standard gauge no.314/1989).

Concerning the cross level of the track:

The measured values of the cross level of the track reveal that it should be within the difference delimitated by the tolerance de ±10 mm against the value of the theoretical cant h_t=35 mm.

The negative values of the cross level (level of the exterior rail of the curve under the interior one) are a consequence of the movement to the curve exterior of the frame rails - sleepers.

Concerning the track direction:

In the analyzed area there are points with the accepted values of the accepted tolerances between the close versines, as well as between the maximum and minimum versines are over those accepted by

the provisions of Instruction of norms and tolerances for the track construction and maintenance – lines with standard gauge, no.314/1989 for the curve radius R=185 m and maximum running speed 40 km/h.

In addition to those presented and concerning the track geometry parameters, the investigation commission underline that, the last checking of the track geometry on the running line I between Merişor-Băniţa, before the occurrence of the railway serious accident, was performed with the testing and recording car on the 29th March 2017.

At this checking the quality scores registered between km 62+000 and km 63+000 was 300 points/km, it correspondig to the qualifying „GOOD 2".

Between the performance of the checking and the accident occurrence, in this area the were no works for the railway infrastructure maintenance.

C.5.4.2. Data about the railway equipments

Interlocking system (SCB)

This accident did not affect the interlocking system, the accident happening on the running line, in an area where there were no light signals of the automatic block section (BLA).

The interlocking system equipment was working, without influencing or be affected by the railway accident occurred following the rolling stock derailment.

Fixed equipment – railway traction (IFTE)

The accident generated the next damages at the contact line:

Track I of the running line Baniţa – Merişor:

- pole of the contact line - LC no.25 (metallic pole put in the metallic bidge abutment) destroyed together the elements for the support of the catenary suspension (braket, arms, procelain insulators);
- concrete pole LC no.27 broken, and the elements for the support of the catenary destroyed (braket, arms, porcelain insulators);
- between the poles LC no.23 and 31, the elements of the catenary suspension (braket, arms, porcelain insulators) destroyed, the catenary suspension being distroyed and fallen on the site;
- the catenary suspension destroyed on about 155 m, between the poles LC no.21 and 33;
- the catenary suspension dislocated on the whole anchoring area betwen the poles LC no.94 and 51 (about 928 m), the balancing devices from the poles LC no.51 and no.94 being fallen;
- the catenary suspension disturbed in the section SX1 Merişor.

On the track II of the running line Baniţa – Merişor:

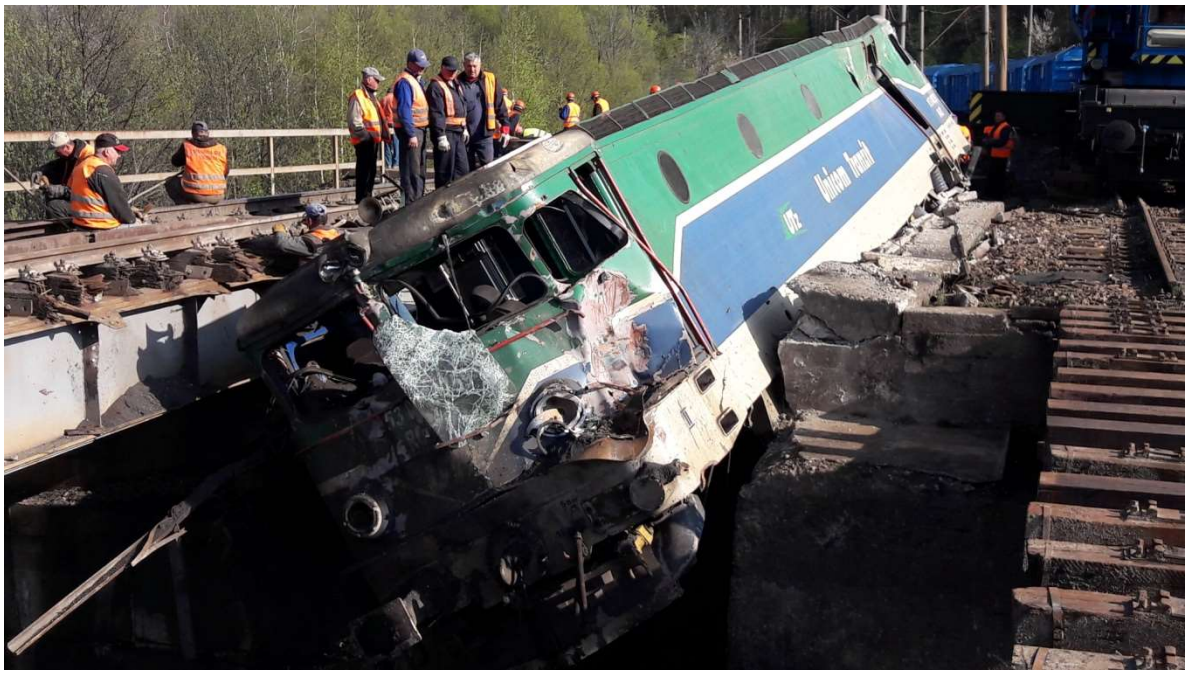
- concrete pole LC no.26 broken, and the elements for the support of the catenary destroyed (braket, arms, porcelain insulators);
- concrete pole LC no.24 hit and reclined;
- at the poles LC no.22, no.24, no.28 and n.30 the elements for the catenary suspension damaged (braket, arms, porcelain insulators);
- the catenary suspension destroyed on about 79 m between the poles LC no.26 and 30;
- the catenary suspension disturbed in the whole anchoring area between the poles LC no.95 and 50 (about 928 m),the balancing devices from the poles LC no.50 and 95 being fallen;
- the catenary suspension being disturbed in the section SX3 Merişor.
  Also, in order to allow the work of the cranes EDK, the poles LC no.23,29,30 and 31 were removed.

C.5.4.3. Data about the working of the rolling stock and of its technical equipments

C.5.4.3.1. Findings at the locomotive

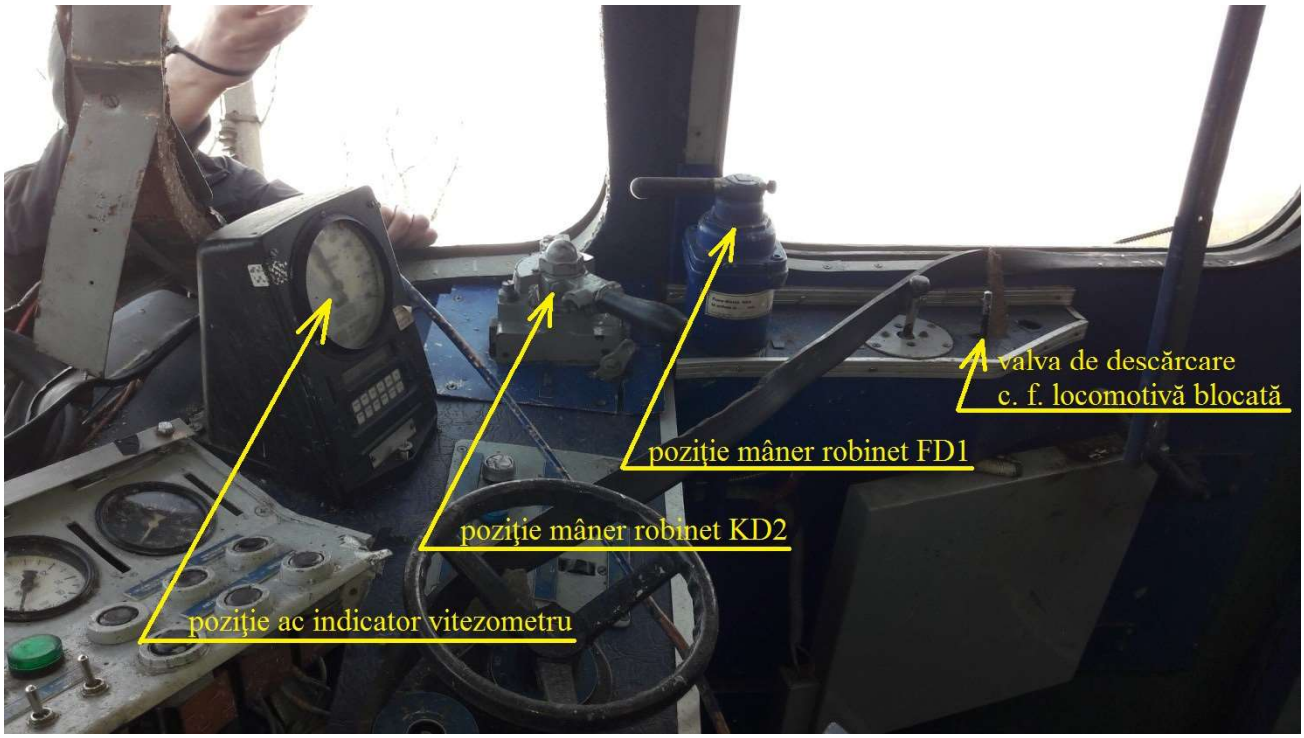
Findings at the locomotive on the accident site:

- the loocmotive was between the guideway beams of the bridges from those two tracks from km 62+840, reclined at 30º,leant on the bridge abutments from the railway station Merişor;



Picture no.11

- bogie I, the front one on the train running direction, was between the front bridge abutments from both tracks;
- the tyres of the wheelsets from the bogie I had marks of overheating, and on the running tread had flats and congestions of melted material on the whole running tread;
- bogie II, the second in the train running direction was detached from the locomotive and felll between the front bridge abutments from both tracks;
- the tyres of the of wheelsets of the bogie II had marks of overheating, at the axle 4 having on the running treads flats and congestions of melted materials on whole running tread, and at the axles 5 and 6 flats and spread of melted material on whole running surface of the tyres;
- the locomotive body had the windows broken at both driving cabs and at the engine room, and the frame of the locomotive body hit and distorted following the hard contact with the concrete reinforcement of the bridge abutment;
- the covers from the locomotive roof were dislocated, the first two fell in front of the locomotive , at about 10 m from the locomotive;
- in the driving cab I (*picture no.12*) one found out:
  - the speed recorder with the hand of analog speedometer, blocked at the speed of 86 km/h;



Picture.no.12

- the device DSV (safety and vigilance device) sealed;
- the driver's automatic brake valve KD2, with the handle on the position IV for normal braking, on the level 8;
- the driver's straight air brake FD1, with the handle on released brake;
- the cock of the emergency signal closed and ensured;
- the insulating valve of the driver's automatic brake valve KD2 with the handle sealed in supply position;
- the release valve of the locomotive brake cylinders, blocked with a piece of wood on isulated position, not-allowing the locomotive automatic braking;
- the reversing gear on the position ahead, with the operation handle dislocated from its support, at 9 m, îin front, outside the locomotive;
- the running switch, on „F" position, for electric braking;
- the equipment from the driving cab (measurement and control devices) dislocated from its fastening places;
- the running switch, on neutral position „zero";

▪ in the driving cab II of the locomotive, one found out:
- the driver's automatic brake valve KD2, with the handle on the position III, locked;
- the driver's straight air brake FD1, with the handle on the released brake position;
- the reversing gear, on ‚lock" position;
- the running switch, on neutral position „0", having the operation wheel dislocated;
- the release valve of the locomotive cylinders, open, in normal working position;
- the driving cab affected by the freight coming from the wagons (thunder), and the equipment from the driving cab (measurement and control devices) dislocated from their fastening places;

▪ the engine room had the halls hardly accessible, because the body walls distorted and detachments of some parts, and the floor affected with oil;
▪ the pneumatic devices from the engine room was in normal working condition with reference to the position of the changeovers and of the air cocks;

Handle of the chengeover M-P-R
Picture no.13

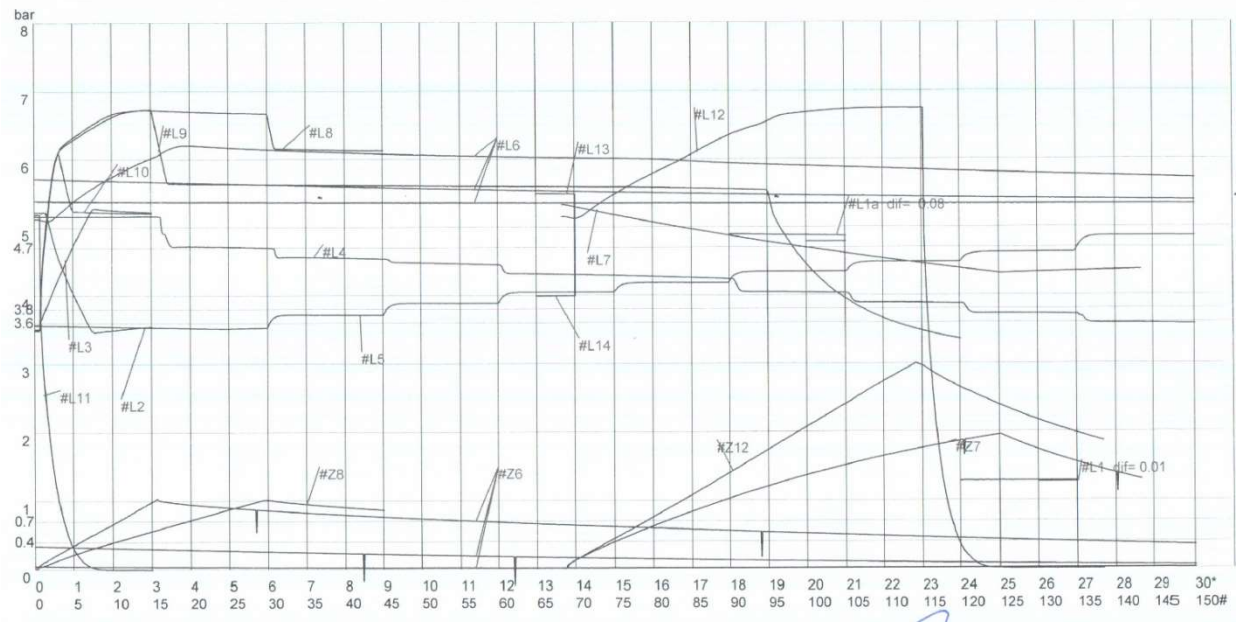
Handle for making the changing traction-hauled
Picture no.14

Findings at the Working Point Warehouse Feteşti:

- at the bogie no.1:
  - the brake rigging affected following the derailment, having the brake cylinders distorted and the bars of the brake rigging broken and distorted;
  - the tyres from all 6 wheels had the paint overheated and on all running surface had flats and congestions of melted material;
  - the tyres had no marks of turn on the wheel centre, being identified the applied marks;
  - the brake blocks had overheated marks, being between the accepted wear limits;
- at the bogie no.2:
  - the findings were the same as at the bogie no.1, mentioning that the wheels of the wheelset no.5 and 6 were less affected with reference to the overheating and to the material deposits on the running surface;
  - one performed measurements at the tyres of the wheels from the wheelsets, finding out that these were according to the instruction regulations;
- one checked the continuity of the brake resistances, that answered;
- the contactors and the relays of the control circuits, the compressor and dynamic brake were checked, these having no visible failures;
- in the engine room one found out oil drained from the cooling circuit of the transformer, the device blocks dislocated and distorted, air pipes broken, air reservoirs removed and damaged, the electric cables removed and cut, so one could not perform functional testst at the electric and pneumatic equipments;
- in order to test on the testing bench, the next parts were disassembled from the locomotive, from the air pipe of the locomotive braking system: main air compressors (2 pieces), the driver's straight air brake FD1 (2 pieces), the driver's automatic brake valve KD2 (2 pieces), pressure identification device (2 pieces), triple normal valve, safety valves of 11 kgf/cm^2 (2 pieces), electric air pressure regulators 8 – 10 atm.

Finding of the parts of the airsystem, disassembled from the locomotive brake system, checked by CFR SCRL Braşov SA – Section Locomotive Repairs Braşov:

- the checking of these parts was made in accordance with the regulations from the Technological sheets E-P, specific to each part, drafted in 1997 by Romanina Railway Register – REFER SA;
- **the driver's straight air brake FD1,** from both driving cab, were checked on the testing bench. Following the measurements performed at the the driver's straight air brake FD1, from the driving cab I (the driving cab where the locomotive was driven in the hauling of the freight train no.50457), getting a pressure in the brake cylinders, of 2,2 bar, during a filling time of 6,65 s the stipulated values being 2,1 $\pm$ 0,1 bar, during a filling time of 6 – 8 s, for the the driver's straight air brake checked after the rapairs and şi 7 – 12 s for checking in operation.
- **the driver's automatic brake valve KD2** of both driving cabs were checked on the testing bench, the diagram of each driver's automatic brake valve was represented. As for the the driver's automatic brake valve KD2 from the driving cab I of the locomotive (driving cab where the locomotive was driven in the hauling of the freight train no.50457) curves L_4 and L_5 from the diagram, presented the working in operation, position IV, application of the brake and its release,gradually, they coresponded without the level 5, at the application of the brake, respectively the level 1 at the brake release – *picture no.6*



Picture no.6

- at the driver's automatic brake valve KD2 of the driving cab II on found out loss of air at the valve FK7227, and the the visual checking one found out that the valve rod was bent and the operation lever broken (failure appeared following a mechanical hit during the accident). It was represented the **Brake** leakage **test**., emphasizing the loss values. Taking into account that in these conditions one could not continue to perform the checking and representing the other curves on the diagram the valve FK7227 was replaced, then was represented the diagram with all working curves.
- **the normal tripple valve (commend valve V5)** was appropriate at the performed tests and checking. So, one checked:
  - the accepted air losses, maximum 0,1 bari, in 5 minutes.
  - time for filling the auxiliary air eservoir, coresponding to the stipulated value of 150 s;
  - the braking time, with the changeover GPR on position freight, was 45 s against 50 – 55 s the stipulated value;
  - the release time, with the changeover GPR on position freight, was 48 s against 55 – 60 s the value stipulated;

- the gradually braking at 15 s, where one found out that for the level I a drop in pressure of 0,3 bar, and for the other braking levels 0,15 bar for each braking level, according to the stipulated values;
- the pressure in the main pipe for the complete braking, eqaul with the pressure from the auxiliar reservoir, at value of 3.6 bar, according to the value stipulated.

- **pressure identification devices** were appropriate both from the point of view of tighteness and of the pressure checked on the testting bench. So, one checked :
  - tighteness of the chamber CB (an inferior piston), supplying the chamber CB with compressed air at a pressure of 3.6 bar, without observing air losses;
  - the tightness of the chamber R (in the guiding piston), supplying the chamber R with compressed air at a pressure of 10 bar, finding out that for 3 minutes the pressure did not increase in the brake cylinder;
  - the tightness in the chamber of the superior small piston, where, after the supplying with compressed air of 3,6 bar of the chamber CB and with 10 bar of the chamber R, one found out that there were no air losses;
  - the tightness of the chamber F (lateral piston),where, after supplying the chambers CB and R with air, with the switching GPR on position R, one did not observe air loss for 3 minutes, and the position of the changeover on position G (freight) and the operation of the driver's automatic brake valve on position quick braking, one din not observe air loss for 15 s;
  - on the testing bench, following the checking, for both pressure identification device the pressure of the air in the brake cylinders was 1,7 bar at the application of a complete brake of and 2,0 bar at the application of a quick brake, the stipulated values in both situations, being of 2,1 $\pm$ 0,2 bar.
- **compressor pressure governor** was checked on the testing bench, finding that it orderes the compressor start at a pressure of 8,5 bar, respectively its stop at a pressure of 10,5 bar, the values stipulated being of 8 – 10 bar;
- **safety valves of 11 kgf/cm^2** were checked on the testing bench at a pressure of 10 bar (maximum pressure accepted by the fixed air equipments of the repair workshop), without observing air looses, and then, fitted on a locomotive in the workshoop, they were checked at a pressure of 12 bar, without the valves enter in operation ;
- **the main compressors type 3EC2** for the air locomotive generation, were fitted on a locomotive in the workshop, in order to perform the air flow tests, whre one could observe that the time for the filling of the main air reservoir from 0 to 10 bari was done in 3 minutes 15 seconds, the compressor stopping at the pressure of 10,8 bar after 3 minutes 35 seconds. The value stipulated is 4 minutes 40 seconds.
- in order to perform the tests one used the locomotive EA 562, being at this moment in the repair workshop and whose device for air gneration and storage was the same with those of the locomotive EA 759;
- the values identified during the tests at the pneumatic parts of the braking equipment and that were not between the stipulated limit values, did not infleuence negatively the locomotive braking , the locomotive having the equipment for the pneumatic brake operation in normal working condition.

Finding of INDUSI box, made at SC Softronic SRL Craiova:

- plate IVMS – DSV (IVMS – DSV – 110/144 V, series 608/2001) had the transformer IVMS 110V BM removed;
- bush of the inductor PC I, out of the analog module din modulul analogic;
- the block BM was found braked;
- the block relay brake was checked on the testing bench, being found out the next values:
  - valve NK – 1,1 bar – braking;
  - valve NK – 1,5 bar – realease of the brake.

Findings on the history and maintenance of the locomtive:

- the locomotive was manufactured on the 29th November 1986 at Întreprinderea Electroputere Craiova.

- Last inspections and repairs performed at the locomotive:
  - overhaul type RG, on the 3rd March 2015, performed by SC Constantin Grup SA, from this date the locomotive ran 198.189 km to the accident occurrence;
  - last inspection type R2, on the 29th January 2016, perfoemd by SC Constantin Grup SA, from this date the locomotive ran 118.471 km to the accident occurrence;
  - last inspection type R1, on the 13th September 2016, performed by SC Unicom Tranzit SA – Work Point Feteşti Warehouse, from this date the locomotive ran 56.102 km to the accident occurrence;
  - last inspection type RT, on the 5th December 2017, performed by SC Unicom Tranzit SA – Work Point Warehouse Feteşti, from this date the locomotive ran 26.297 km to the accident occurrence;
  - last technical intermediary inspection in a traction unit, before the serious accident occurrence, was performed on the 5th April 2017, in the Depot Craiova, by Societatea Întreţinere şi Reparaţii Locomotive şi Utilaje - CFR IRLU SA – Secţia IRLU Craiova;
- the planned inspections were performed meeting with the regulated inspection cycle, the locomotive being also within the time limit concerning the due on the repairs;
- from the analysis of the unified working orders, of the minutes for delivery-receiving and of orders for the performance of additional works, drafted at the start of the locomotive inspections, results that the locomotive had not, within the operation time before the accident, technical problems that could affect the safety traffic. The deficiencies appeared and signaled were punctually removed;
- the last intervention at the locomotive performed in a traction unit, before the accident, was on the 5th April 2017, in the Depot Craiova, by IRLU Craiova, where there was issued:
  - order for the performance of the roof inspection (RAc) and of the intermediary inspection within the technological process of the locomotive (PTAE), due within 7 days;
  - order for additional works, for the repair of the main switch type IAC burst and for the checking of the compressor no.1, that did not work.
- the orders and the works performed were recorded in the Register of the Master Mechanic at the position no.153, the locomotive being kept in the workshop from the 4th April 2017, 08:00 o'clock until the 5th April 2017, at 15:00 o'clock. The repair of the main switch, type IAC, consisted in its replacement, and for the working of the compressor no.1 there was necessary the rectifier from the contactor S7.1 for the power supply of the electromotive for the compressor operation;
- from the on-board notebook of the locomotive resulted that after the performance of the repairs and inspections type RAc and PTAE, from the 5th April 2017, at IRLU Craiova, the locomotive behaviour was a normal one in operation, previously the locomotive crew recording in the on-board notebook oil losses at the compressors and spalling tread at the wheels of the axles 5 and 6, but without to report the need to take the locomotive in a traction unit for repair.These findings did not affected the locomotive safe working;
- the locomotive drive, hauling the train when the accident occurred, had the sheet of the on-board notebook filled for the locomotive delivery at the shift exchange. At all three boxes from the sheet of the locomotive, *Electric part, Electric drive part and the Mechanic part*, the driver recorded as a general characteristic of their working „GOOD", and in the box *Findings about the locomotive behaviour in the operation* he recorded *„NORMAL".*

Analysis and interpretation of the data from th speed recorder device, type IVMS, of the locomotive EA 759, hauling the freight train no.50457, on the 8th April 2017,from the train arrival in the railway station Târgu Jiu and to the accident occurrence:

According to the hour indicated by the speed recorder device resulted:

- the train arrived in the railway station Târgu Jiu at 08:41'18" o'clock, where it stopped until 09:23'10" o'clock;
- between the hours 09:23'10" – 09:36'49" the locomotive performed 4 shuntings;
  - from the statements and questionnaires of the heard staff resulted that the these shuntings were made to uncouple those 14 wagons, from the line 6 to the line 7 and the running back of the locomotive at the train;

- the shuntings were performed meeting with the speed and shunting conditions;

- between the hours 09:36'49" – 10:44'28" the locomotive stopped;
- the freight train no.50457 left the railway station Târgu Jiu at 10:44'28" o'clock and arrived in the railway station Pietrele Albe at 11:52'02"o'clock;
- from the railway station Târgu Jiu and to the km 67+700, 90 m after the centre of the railway station Băniţa, the marking of the track on site, on the train running direction, was on slope;
- between the railway stations Târgu Jiu – Pietrele Albe the traffic conditions were met with, excepting the exceeding of some speed peak in some speed restriction areas:
  - 51 km/h in an area with speed restriction of 50 km/h, on the running track I of the railway station Parângu;
  - 31 km/h in an area with speed restriction of 30 km/h, between the railway stations Valea Sadului and Meri;
  - 35 km/h in an area with speed restriction of 30 km/h, on the direct line II from the railway station Lainici, including the running line to the railway station Pietrele Albe;
- between the hours 11:52'02" – 13:15'53" the locomotive stopped in the railway station Pietrele Albe;
- at 13:15'53" o'clock the freight train no.50457 left the railway station Pietrele Albe, and after running 204 m, speed 12 km/h, at 13:17'12" o'clcok the train stopped;
- the train stopped unscheduled between the hours 13:17'12" – 13:23'08", the interval of time when on the speed curve there are two speed variations:
  - first at 13:19'16" o'clock, on 30 m, with a speed to 1 km/h;
  - the second one at 13:20'23" o'clock, on 30 m, with a speed to 3 km/h;
- after the unscheduled stop, the freight train no.50457 left at 13:23'08" o'clock, arriving in the railway station Strâmbuţa at 13:40'20" o'clock;
  - between the railway stations Pietrele Albe and Strâmbuţa, excepting the unscheduled stops, above mentioned, the freight train no.50457 ran meeting with the running conditions, the maximum running speed of the train being 27 km/h, and the speed according to the working timetable was 50 km/h;
- the train stopped in the railway station Strâmbuţa, between the hours 13:40'20" - 13:43'23", when, on the speed curve, 9" after the train arrival in the railway station, during 19", there were two speed variations up to 2 km/h, on 60 m reversely the train entry in the railway station;
- at 13:43'23" o'clock, the freight train no.50457 left the railway station Strâmbuţa, reaching a maximum speed of 40 km/h between the railway stations Strâmbuţa and Livezeni (the speed stipulated in the working timetable being 50 km/h) and a maximum speed of 42 km/h between the railway stations Livezeni and Petroşani (the speed stipulated in the working timetable being 60 km/h);
- the freight train no.50457 passed without stop through the railway station Petroşani, at 14:01'49" o'clock;
- after the train passed through the railway station, at 14:01'49" o'clok and until 14:13'35" o'clock, the train continued to run with the speed up to 42 km/h, the running speed stipulated in the working timetable, between the railway stations Petroşani and Băniţa being 60 km/h, also complying with the speed restriction of 30 km/h between the railway stations Petroşani and Petroşani Triaj;
- between the hours 14:13'35" - 14:19'40" the freight train no.50457 ran on the section with speed restriction of 30 km/h, length 2900 m, between the branch line Petroşani Triaj and the railway station Băniţa, where there were found out 4 peaks of the speed exceeding, 3 with the speed of 31 km/h and 1 with the speed of 32 kmh;
- between the hours 14:19'40" - 14:24'13" the train ran between the end of speed restriction of 30 km/h, to the railway station Băniţa, the train speed on this section reaching the maximum of 50 km/h, speed stipulated in the working timetable being 60 km/h;
- at 14:24'13" o'clock the train passed through the railway station Băniţa without stopping, with the speed of 33 km/h, the train speed at that moment decreasing;
  - the running speed stipulated in the working timetable, from the railway station Băniţa to the railway station Pui, was 40 km/h;

- 90 m after the centre of the railway station Băniţa, on the train running direction, to the railway station Merişor, the marking of the track on site is increasing gradient;

- after 14:24'13" o'clock, the hour when the train passed through the railway station Băniţa, the train speed continued to decrease, reaching at 14:24'28" o'clock, after running 290 m, 29 km/h;
- at 14:24'28" o'clock, the train speed increased continuously, reaching after running 3944 m, at 14:28'42" o'clock, 92 km/h, as follows:
  - between the hours 14:24'48" - 14:25'26", on 348 m, the train speed increased from 29 to 40 km/h, the maximum speed stipulated in the working timetable being 40 km/h;
  - between the hours 14:25'26" - 14:26'08", on 580 m, the speed train incresed from 40 to 60 km/h, the maximum speed stipulated in the working timetable being 40km/h;
  - between the hours 14:26'08" - 14:28'23", on 2784 m, the train speed increased from 60 to 89 km/h, the maximum speed stipulated in the working timetable being 40 km/h;
  - between the hours 14:28'23" - 14:28'31", on 174 m, the train speed was 89 km/h, the maximum speed stipulated in the working timetable being 40 km/h;
  - between the hours 14:28'31" - 14:28'42", on 290 m, the train speed increased from 89 to 92 km/h, the maximum speed stipulated in the working timetable being 40 km/h;
  - during this period of time, on the recording IVMS, one could find out:
    - at the speed of 60 km/h, at 14:26'08" o'clock, the air pressure in the main pipe decreased under 1,1 bar (value at which the braking relay block gives information that the locomotive is in braking condition if a quick or emergency brake is applied);
    - between the hours 14:27'40" - 14:27'41", at the speed of 81 km/h, the air pressure in the main pipe increased over 1,5 bar (value at which the braking relay block gives the information that the re-supply of the general air pipe was ordered after a quick or emergency braking application);
    - at 14:27'59" o'clock, at a speed of 84 km/h, the safety and vigilence device-DSV started to operate;
    - between the hours 14:28'20" - 14:28'25", at a speed 88 - 89 km/h, the air pressure in the general pipe increased over 1,5 bar (value at which the braking relay block gives the information that the re-supply of the general air pipe was ordered after a quick or emergency braking application);
    - at 14:28'26" o'clock, at a speed of 89 km/h, there was registered the influence of the inductor of 1000 Hz afferent to the light signal BL 12 of the automatic block section, without the operation of the button „ATTENTION INDUSI";
  - between the hours 14:28'42" - 14:29'53", on 116 m, the train speed was 92 km/h, the maximum speed stipulated by the working timetable being 40 km/h;
  - after 14:29'53" o'clock the train speed decresed suddendly, on 30 m, from 92 km/h to 0 km/h.

<u>Remarks about the information supplied by Single Phase Electronic Meter of Power Supply type CEL:</u>

- Softronic SRL, the designer and the supplier of the single phase electronic contor meter of power supply, type CEL, equipping the locomotive EA 759, done the next remarks on the reading and analysis of the information supplied by CEL equipment:
  - the locomotive is equipped with the power supply meter series CRL407, that does not emphasize the traction condition against the electric braking condition;
  - from the analysis of the curve of the power supply consumption, one could not put in evidence some operation modes of the auxiliary consumers of the locomotive, as the compressor or the fans of the auxiliary services;
  - the analysis of the consumption curve is not useful to put in evidence the locomotive stop or the working, or the condition of other equipments of the locomotive.

C.5.4.3.2. findings at the wagons

Findings at the non-derailed wagons:

- following the accident, fom those 16 wagons of the train no.50457, 14 ones derailed and overturned the last two wagons rested on the line (no.33876735404-0 and 33535303642-9);
- at those two wagon the changeovers „Freight – Passenger" and „Empty – Loaded" were on the right positions corresponding to the type of train and the loading condition, respectively on M and Î, and the automatic brake was working;
- the coupler of the coupling equipments between those two wagons, was properly fastened for the freight trains;
- the braking blocks had the thickness over the limit accepted by the Instruction no.250/2005;
- on the running surfaces of the wheels from those two wagons and on the braking blocks of those wagons there were no characteristic marks, generated by the overheating, scaled or flat wheels;
- those two wagons that did not derail were weighted on the 3rd May 2017, at REVA SA Simeria. Following the weighing one did not not find out exceeding of the loading limits written on the wagons.

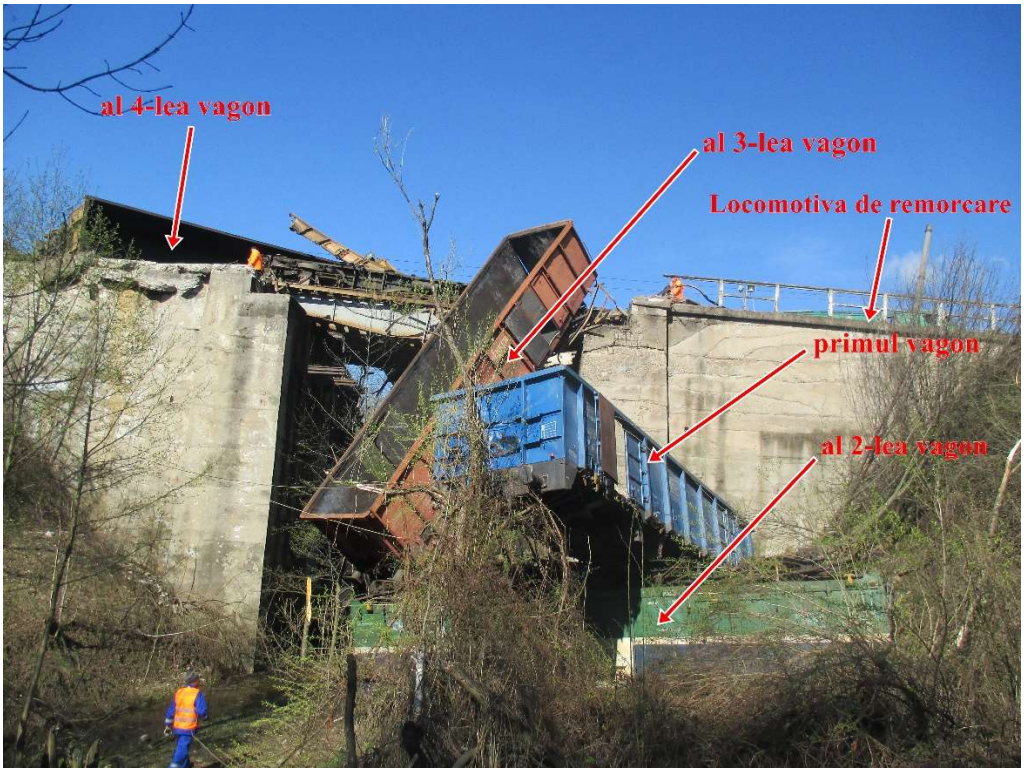
Fidings at the derailed wagons, on the accident site:

- Wagon no.31535494448-2, 1st one of the train:
  - derailed and overturned on the right side, in the train running direction, fallen in the stream under the bridge, above the second wagon, perpendiculary on the track centre (with the wagon body up);
  - the angle air cock being at the oposite end against the track (upstream) was on the wagon, on position „closed", without finding hit marks on the operation handle;

Pictures no.15–16 – angle air cock from the first wagon

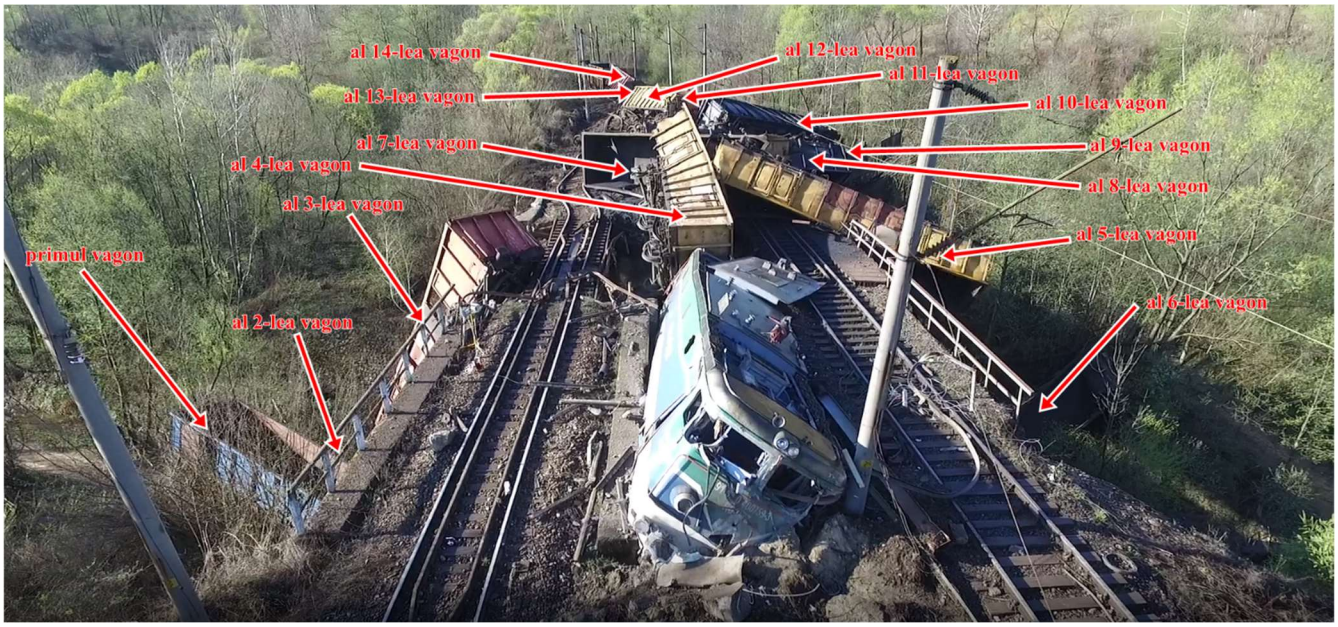
- wagon no.33515373861-2, the 2nd one of the train:
  - derailed and overturned on the right side in the train running direction, fallen in the stream under the bridge, reclined at 45^{o} against the track centre, having the wagon body down and the bogies up, all axles being detached from the wagon;
  - above this wagon was the firs wagon of the train;
- wagon no.31535928552-7, the 3rd one of the train:
  - derailed and fallen from the bridge, with an end leaning on the bridge abutment to the railway station Merişor and with the another one leaning on the end of the second wagon, that was on the stream bank;
- wagon no. 33535300220-7, the 4th one of the train:

- derailed, overturned at 90 º behind the locomotive and leant between those two guideway beams of the bridge;



Picture no.17 - Position of the first 4 wagons derailed

- wagon no.33535303557-9, the 5th one of the train:
  - derailed and overturned on the left side in the running direction, being perpendicularly on the track II, half on the bridge and theanother half suspended above the stream;
- the wagon no.33565423333-7, the 6th one of the train:
  - derailed and fallen from the bridge on the left side in the running direction, in the stream;
- wagon no.33535303547-0, the 7th one of the train:
  - derailed and overturned, being at 45º between those two tracks, on the bridge abutment;
  - the bogie to the track I jumped, and the bogie to the track II still at the wagon but with one of the axles detached;
- wagon no.33565423334-5, the 8th one of the train:
  - derailed and overturned perpendicularly between those two tracks, close to the bridge pickings;
  - all those 4 axles of the wagon were detached from it;
- wagon no.33565423379-0, the 9th one of the train:
  - derailed and ovrturned perpendicularly on the track II;
  - 3 axles of the wagon detached;
- wagon no.33565423287-5, the 10th one of the train:
  - derailed and overturned at 90º perpendicularly on the track II;
  - all 4 wagon axles were detached from it;
- wagon no.33535421205-2, the 11th one of the train:
  - derailed and overturned at 90º along the track II;
  - one of the axles of the first bogie, in the running direction, detached from the wagon;
- wagon no.33535303598-3, the 12th one of the train:
  - derailed and overturned at 30º to the track II;



Picture no.18 **–** Position of the train vehicles after the accident occurrence

- wagon no.33565423357-6, the 13th one of the train:
  - derailed and overturned at 45º to the track II;
- wagon no.31555330294-6, the 14th one of the train:
  - derailed and overturned at 45º to the track II.
    On the running surfaces of the wheels from the last 3 wagons derailed (the 12th, 13th and 14th ones of the train), axles that did not detached from the wagons, following the accident, there were not found out any characteristic marks generated by the overheating, scaled or flats wheels.

Findings at the wheelsets and air distributors from the wagons derailed:

- on the 28th June 2017, at the Working Point Warehouse Feteşti got by UNICOM TRANZIT SA, the technical condition of the wheelsets from the first 11 wagons from those 14 wagons derailed were checked (the other 3 wagons of the train were rerailed and rested in the railway station Băniţa), where one could find out:
  - the geometrical elements of wheels were measured, finding that them were between the limits accepted for the operation of the wagons, stipulated in the specific regulations in force;
  - all those 4 wheelsets from the wagon no.33565423333-7 (the 6th one of the train) were twisted, it being found visually;
  - as for 8 axles, one could not identify the wagons they were belonging (neither on site nor in the documents got by the keeprs and sent to SC UNICOM TRANZIT SA) were collected identification data and measured the same geometrical elements as the other axles, finding that also them were between the limits accepted for the operation of the wagons, stipulated in the specific regulations in force;
  - following the visual checking of the running surfaces of the axles checked, one found that those had no characteristic marks generated by the overheating , scaled or flats wheels;
- at this occasion also the air distributors of those 14 wagons derailed were visually checked, finding that, two of them were very deteriorated (broken), and the other 12 air distributors were in a good condition. As a result, one asked that those 12 distributors be sent by SC UNICOM TRANZIT SA at an authorized economic agent for checking on testing bench, to which be present AGIFER representatives;
- on the 27th July 2017, one checked, on the testing bench, at the premises of FRIREP SA Paşcani those 12 distributors, when there were found out:
  - two of the distributors could not be checked on the testing bench, because the damages resulted following the derailment (at one of them there was found the pressure relay KE1c broken, having

air losses and the changeover M-P broken, and at the another one, air losses at the descharge valve and the insulating cock with the supplier that could not supply the air distributor);
- 8 from the air distributor were functional suitable following all functional tests;
- one distributor was functional suitable at 15 tests and it was not suitable at the sensitivity tests (losses over 0,15 bar);
- one distributor was not suitable at 13 tests and was suitable at the test AE 0,8, test CE 0,8 (non-ordered braking) and at the tests CSBG (braked in 40 s against 20-28 s).

Findings at the angle cock with coupled hose, from the wagon no.31535494448-2 (first in the train composition):

- as, at the accident site the angle air cock of the first wagon, situated in the opposite end against the line (în upstream,) was on the wagon on the position „closed", without finding hit marks on the operation handling, this cock being unfitted together with the couple hose for further findings;
- on the 17th August 2017, at SCRL BRASOV SA – Section for Locomotive Repairs Timişoara, one performed checking and tests at these parts, finding:
  - at the visual checking:
    - the front cock had a hit mark at the lateral side of the flange to the wagon, site oposite the operation handle;
    - the part cut from the general air pipe, fitted at the angle cock, was bent following the hit distinguished on the cock flange;
    - the hose of the couple hose had no visibal scalings;
    - the head of the couple hose had no cracks;
    - the cock was on closed position, with the blocking lever in the support corresponding this position;
    - both the handle and the blocking lever had no mechanical hits;
    - after checking the tightness, one found out that the cock handle could be easy operated, but only after the operation of the blocking lever;
  - in order to be able to check under pressure the ensemble cock – couple hose, one made a fillet at the free end of the pipe cut from the general pipe, at which there was fitted with an another r couple hoses;
  - the couple hose newly fitted was coupled at the fixed air device of the depot, and on the couple hose from the cock one fitted a control manometer:
    - if the cock was kept with the handle on close position, the hand of the manometer rested on „zero";
    - after the opening of the cock, the pressure indicated by the hand was 7 atm., pressure indicated also at the manometer of the fixed air device of the depot;
    - one checked the tightness of the air cock and of the afferent flanges with water and soap, finding small losses of air at the fillet between the pipe cut from the general pipe of the wagon and the afferent flange, these being generated by the hit existing on the flange;
  - in order to check the tightness, the ensemble cock – couple hose of air, it was fitted at the general pipe of 5 atm. of the electric locomotive EA 694, when, having fitted on the couple hose the control manometer, the next checkings were performed:
    - on the supply position of the cock KD2 of the locomotive, the manometer indication was 5 atm.;
    - following the performance of the complete braking, the manometer indication was 3,4 atm.;
    - after the performance of the quick braking, the air pressure indicated by the manometer was 0,0 atm;
    - putting the cock KD2 on neutral position, one could observe a decrease of 0,25 atm./minute. The air losses were found at the flange of the control manometer;
    - one checked the air losses of the locomotive, coupling the ensemble cock-halfcoupling between those two half-couplings at 5 atm. of the locomotive, without being found air losses at the manometer from the driving cab during 1 minute;

- one checked the ensemble cock – half-coupling, gravitationally with balls of 20,5 mm and 19,5 mm (introduction of the ball at one end, that shall go out at the another end) finding that those two balls passed through this ensemble in both directions.

Findigs at the automatic brake condition of the wagons of the train no.50457 before the accident:

- from the analysis of the documents submitted by the railway undertaking resulted:
  - all those 16 wagons of the freight train no.50457 ran between the 1st-31st March 2017 in the composition of those two freight trains;
  - each time these wagons ran with the automatic brake in operation;
  - in the running of the above mentioned trains, at none of those 16 wagons was found problems in the working of the automatic brake.

Findings at the wagons of the freight train no.50457, rested in the railway station Târgu Jiu:

- because the maximum tonnage accepted fro the freight trains hauled with locomotive type EA on the track section Târgu Jiu – Pui was 1200 tons/train, and the initial tonnage (1964 tons) of the train no.50457 exceeded this limit, in the railway station Târgu Jiu it was dispatched to the railway station Subcetate, after the uncoupling of 14 wagons, that were going to be dispatched further like a second couple;
- following the accident and closing of the above mentioned track section those14 wagons rested in the railway station Târgu Jiu;
- on the 25th April 2017, in the railway station Târgu Jiu these wagons were checked from technical point of view, finding:
  - the couplers of the couplig equipments between those 14 wagons were poperly fastened for the freight trains;
  - the automatic brake was working at all 14 wagons;
  - the changeovers „Freight – Passenger" and „Empty – Loaded" of the automatic brakes were on the positions suitable to the train type (position „Freight") and to the loading condition („Empty" for 2 wagons and „Loaded for the other 12 wagons);
  - 4 wagons were not provided, from the manufaturing process, with hand brake;
  - at one of the wagons the hand brake was inactive, the cinematic chain being interrupted;
  - at one of the wagons were missing two braking blocks, each one at the wheels no.6 and no.8.

C.5.5. Interface man-machine-organization

Interface man – machine

The locomotive crew took the locomotive EA 759, on the 8th April 2017, at 02:00 o'clock, but they did notrecorded in the route sheet of the locomotive the hour and the minute of the previous delivery or stabling of the locmotive - columns 19-26, and they did not input in the memory of the speedrecorder, type IVMS, their own identification data (driver and driver's assistant code) and the hauled train number.

During the technical checking performed at the locomotive, when they took it, in accordance with the Order of the Direction of Wagon Traction no.17DA/610/1987, concerning the maintenance and operation of the equipment INDUSI – DSV, the driver recorded at 02:15 o'clock, in the on-board notebook of the locomotive EA 759, the suitable condition of the equipments INDUSI and DSV.

From the analysis of the way the driver drove the locomotive, that hauled the freight train no.50457, resulted:

- the speed restrictions on the track section Târgu Jiu – Băniţa were not completely met, registering exceeding of the maximum accepted speeds with values between 1 and 5 km/h, although, after the railway station Valea Sadului one could see caution in the driving of the locomotive, the train speed being 10 km/h at least under the running speed of the train stipulated in the working timetable;

- the valve for the discharge of the brake cylinders of the locomotive, hauling the train, was blocked, that made that the automatic brake of the locomotive not work;
- after passing the railway station Băniţa, the train ran on a track section with slope, with a gradient over 15 ‰, having the brake released;
- one applied and released the brake repeatedly, at short times, operating both the automatic brake (the driver's automatic brake valve KD2), and the straight brake (the driver's straight air brake FD1);
- using simultaneously the pneumatic and the electric brakes, the effects of those braking systems overlaped, it generating the blocking of the locomotive wheels.

Interface man - organization

a. physical condition of the locomotive staff:

When the accident happened, both the driver and the driver's assistant from the locomotive EA 759, got the medical and phsycological approvals necessary for this job, valid and without remarks.

The locomotive crew of the freight train no.50457 on the 8th April 2017, got valid driving licences and authorizations for driving freight trains.

Also, the locomotive crew of the freight train no.50457 from the 8th April 2017, worked upon arrangement of shifts.

According to de disposal no.436, the locomotive crew come at the work in the railway station Caracal, taking the locomotive EA 759, on the 8th April 2017,at 02:00 o'clock.

Before this order, the driver had 76 hours rest at home, and the driver's assistant had 100 hours of rest at home.

For coming at work, the driver cover, from his home to the railway station Caracal, 135 km, and the driver's assistant 116 km. The operational procedure code POSF – 37 of the railway undertaking SC UNICOM TRANZIT SA, at point 5.8, regulates that, generally, the disposal for the presentation of the ordered staff is drafted so the the staff trips do not exceed 75 km + max 10%, against the home.

In the railway station Caracal the railway undertaking SC UNICOM TRANZIT SA has arranged a dormitory for its staff, this space being rented from the Railway County Craiova, upon the renting contract no.395/29.06.2015, valid until the 1st July 2020. From the documents submitted by the railway undertaking does not result that the locomotive crew, before to take the locomotive EA 759, had rest in the dormitory.

According to the running program drafted for the freight train no.50457, from the 8th April 2017, the shift exchange was stipulated to be done in the railway station Târgu Jiu.. It was not done. When the freight train no.50457 left the railway station Târgu Jiu, at 10:44 o'clock, the locomotive staff was between the limits imposed by the regulations in force with reference to the maximum continuous working time accepted for the locomotive. At 14:30 o'clock,when the accident happened, the locomotive staff exceeded the maximum continuous working time with about 30 minutes.

From the information got by the investigation commission, does not result that the locomotive crew notified the traction traffic controller 3 hours before the end of the maximum continuous working time for the locomotive, for the organization of the shift exchange, as it is regulated at the point pct.5.15, the 9th paragraph of the operational procedure SC UNICOM TRANZIT SA code POSF – 37, or notified 60 minutes at least before the end of the maximum continuous working time accepted for the locomotive, through the station RTF, the movements inspector of the closest station, in the running direction, as well as through the phone the traction traffic controller of the railway undertaking, about the need to stop the train for the shift exchange, as it is stipulated at point 5.18 of the same procedure.

The forensic report of necropsy, drafted by the County Department of Forensic Hunedoara – The Forensic Surgery Petroşani, following the forensic expertise made at the locomotive staff, after the

accident, put in evidence that the ***blood bleeded from the driver contained 0,15 g ‰ ethyl alcohol***, and ***the blood bleeded from the driver's assistant contained 2,5 g ‰ ethyl alcohol.***

The report also emphasizes that the death of those two drivers (driver and driver's assistant) was violent, the traumatic injuries found out at the forensic expertise were generated by a railway accident and between the traumatic injuries and the death there is a direct cause connection.

When the accident happened the driver was 67 years old and the driver's assistant 51 years old.

b. training of the locomotive staff and administrative sanctions received

The locomotive staff got the authorizations and the licences necessary, in accordance with the activity carried out .

The driver had signed the affidavit of knowing/recognition of the track section Curtici – Petroşani – Caracal - Curtici on the 25th January 2017, being authorized to drive the locomotive on this track section. Before the accident, his last shift on this track section, according to the route sheet, series UT, no.0639, on the 28th March 2017, and from the beginning of the year he had 7 train haulings on this track section.

Also the driver's assistant had signed the affidavit for knowing/recognition the track section Curtici – Petroşani – Caracal – Curtici on the 13th January 2017

Both the driver and the driver's assistant competences were assessed during the year 2016, respectively 2017, practicaly and theoreticaly.

During the last 12 months, before the accident, the driver got at 45% from the job competences, identified in the „*Individual sheet for the professional theoretical training*" the mark „A"- maximum competence, at the rest of the competences getting the mark „B"- *medium competence*, and according to „*Individual sheet for professional practice training*", for 27% of the job competences got the mark „A", and at the rest of the competences got the mark „B".

According to the Certificate for periodical confirmation of the general professional competences, issued by the National Centre for Railway Qualification and Training – CENAFER, at 23% from the competences got the mark „C"- *minimum competences*, and for the rest of the competences got the mark „B".

The driver's assistant, from the time of his activity at SC UNICOM TRANZIT SA (July 2016), according to„*Individual sheet for the professional theoretical training*" got the mark „C,"- *minimum competence at* 17 % from the competences, in the other cases he got the mark „B"- *medium competence*. According to the Conform „*Individual sheet for professional practice training*" at a competence he got „C", and at the rest of competences he got the mark „B".

From the checking of the documents submitted by the railway undertaking one found out that there are cases of practical training meetings for the locomotive staff for which there was not possible to prove that when the practical training was, the locomotive staff was monitored in this respect. Exemple as for the driver who, although on the 24th March 2017 had in " *Individual sheet for professional practice training*" with the mark granted for some competences, from the route sheet of the locomotive, drafted by the driver for the service ran at that date, does not result the presence in the locomotive of a person that was in the respective train.

On the 15th December 2015, the driver was punished , his salary being cut with 5% for one month – December 2015, according to the provisions of art.70.3, letter c, from the Inner Regulations, corroborated with the provisions of art.248, paragraph 1, letter c, from the Law 53/2003 republished – Labour Code, for the non-compliance with the provisions/work instructions/job duties or tasks from the job description (uncontrolled emergency braking , generated by the equipment INDUSI, following the non-compliance by the driver of the control speed V2, under 40 km/h at the freight train, at the locmotive passing over the track magnet of 500 Hz, active).

C.6. Analysis and conclusions

C.6.1. Conclusions about the technical condition of the track superstructure

Taking into account the line characteristics presented in the chapter *C.5.4.1. Data finded out about the lines*, one can state that the technical condition of the line superstructure did not influence the accident occurrence.

C.6.2. Conclusions about the technical condition of the rolling stock and its behaviour

C.6.2.1. Analysis and conclusions on the locomotive technical condition

From the analysis of the locomotive activity, before the accident, through the analysis of the unified orders for inspections, of the additional orders, issued by the locomotive crew, for the removal of the accidental failures appeared in the locomotive operation, and of the records from the on-board notebook, wrote down by the locomotive crew, does not result that during the time before the accident, the locomotive should have deficiencies that had affecetd its good working.

From the data supplied by the speed recorder, resulted that, when the accident happened the locomotive exceeded the maximum accepted speed with 130% (92 km/h, against 40 km/h). It made, that within the investigation process, a special attention be paid to the checking of the locomotive braking system.

So, the pneumatic devices for the air production, those for the command, taking over and sending of the orders in the locomotive braking processe were checked. The checking performed revealed that the devices checked worked normally when the accident happened.

The tyre condition found out after the accident revealed that the locomotive answered at the braking orders received, being submitted to a pronounced braking process.

Because after the accident the handle for the operation of the driver's automatic brake valve KD2, of the locomotive automatic brake and implicitly of the train was found on the position IV for normal braking, on the level 8, and the valve for the release of the brake cylinders of the locomotive was found blocked, it leading to the conclusion that the automatic brake of the locomotive, operated through the handle of the valve KD2 had no effect for the locomotive braking (the locomotive braking being prevented by the blocking of the valve for the release of the braking cylinders). In these conditions of the train braking, the air pressure decrease ordered from the general pipe led only to the air exit in the atmosphere, without generating the increase of the air pressure in the braking cylinders of the locomotive.

If the valve for the release of the brake cylinders of the locomotive blocked, the only pneumatic brake that could act on the loocmotive was the straight locomotive brake. The handle of the cock of driver's straight air brake FD1 acts through slide, without having blocking levels on certain positions, the air pressure in the locomotive brake cylinders being proportional to the position of the cock handle, between the brake released and the complete brake.

We underline that, at the general impact in the moment of the accident, through the locomotive stop between the bridge abutments, the handle of the the driver's straight air brake FD1 could slide from the position „braking" to the position „brake release", as it was identified after the accident.

The position of the running switch of the locomotive (F – for electric brake), found out after the accident, indicates that the driver operated the electric brake system (dynamic).

The flats, found out on the running surfaces of the locomotive tyres, indicate an overlapping between the pneumatic brake and the electric one, and taking into account these above mentioned, one can conclude about the locomotive, in the braking process of the train, before the accident, two braking systems operated (pneumatic brake – by the operation of the straight brake and of the electric one).

Taking into account the findings, checkings and measurements performed at the locomotive EA 759, hauling the freight train no.50457, presented in the chapter *C.5.4.3.1. Findings about the locomotive,* as well as the above mentioned considerations, one can conclude that the technical condition of the locomotive did not favour the accident occurrence.

C.6.2.2. Analysis and conclusions on the technical condition of the wagons

Taking into account the findings, checkings and measurements performed at the wagons of the freight trains no.50457, after the accident, as well as the data about the previous running of the wagons of the above mentioned train, presented in the chapter *C.5.4.3.2. Findings about the wagons*, one can conclude the next:

- because of the derailment and the overturning of the first 14 wagons of the train and of the freight (bulk cargo – thunder) one could not check the loading way of those wagons. However, because at those two wagons non-derailed one did not find exceeding of the loading limits written down on the wagons, the investigation commission suposes, reasonably,that neither at those 14 wagons were before the accident nonconformities about their over-loading;
- because:
  - one the running surfaces of the whesets from the last two wagons of the train and on the braking blocks of the wagons there were no characteristic marks generated by the overheating and neither scaled or flats wheels;
  - on the running surfaces of the whesets of the train wagons there were no characteristic marks generated by the overheating and neither scaled or flats wheels;
  - the angle air cock from the fist wagon of the train, was at the wagon on the position „closed", without finding hit marks on the operation handle;
  - at the checking performed afterwards at the air cock there was found that it had no hits on the operation handle, it could by right operated and properly sealing,

  the investigation commission considers that, at the descending of the slope existing after the railway station Băniţa, the air cock from the first wagon, situated to the hauling locomotive, was operated on the position „close" (the operation handle on vertical position) and, consequently, the general air pipe of the train was interrupted from this cock. So, when the driver tried to reduce the train speed on this slope, operating the automatic brake, the automatic brakes of the wagons did not come into action, consequently one could not achieve the braked weight percentage necessary to keep the speed to the accepted limit (40 km/h), on the track section where the accident happened;
- the result of the checking of the air distributors, from the train wagons, that could be checked on the testing bench, or in operation, did not indicated very important deficiencies in their working.

As a conclusion, the investigation commission considers that, neither the technical condition of the wagons of the freight train no.50457 nor the goods from these wagons influence the derailment occurrence.

The investigation commission also considers that the accident was generated by the interruption of the general air pipe between the hauling locomotive and the first wagon, it being confirmed by the position „close" of the handle for the operation of the wagon air cock.

C.6.3. Analysis and conslusion abou the activity of the locomotive crew

The driver, who was 67 years old and the driver's assistant 51 years old when the accident happened, started the work in the railway station Caracal, on the 8th April 2017, at 02:00 o'clock, after covering 135 km, respectively 116 km, from the home.

In the railway station Caracal, the locomotive crew took the locomotive EA 759 for hauling the freight train no.50457, between Caracal – Curtici.

At the work start, the locomotive crew was checked by the exterior station movements inspector fom the railway station Caracal, with the breathalyser and from point of view of the physical condition. The result of the checking was „negative" at the checking with the breathalyser and „able" from point of view of traffic safety.

In the route sheets, in the box corresponding to the locomotive crew condition at the work starting, those stated, upon sign, that they were rested and in normal condition

After the work start, performance of the shunting for the locomotive coupling at the train and of the brake continuity test, the crew of the locomotive EA 759, hauled the freight train no.50457 from the railway station Caracal to the railway station Târgu Jiu, without finding out in their activity deviations from the specific regulations in force.

In the railway station Târgu Jiu, after some shunting movements, for the uncoupling of a group of wagons , the locomotive was coupled by the driver's assistant, at the group of wagons with which the locomotive was going to leave, the driver having the task to check if the locomotive coupling at the first wagon was made in accordance with the specific regulations in force.

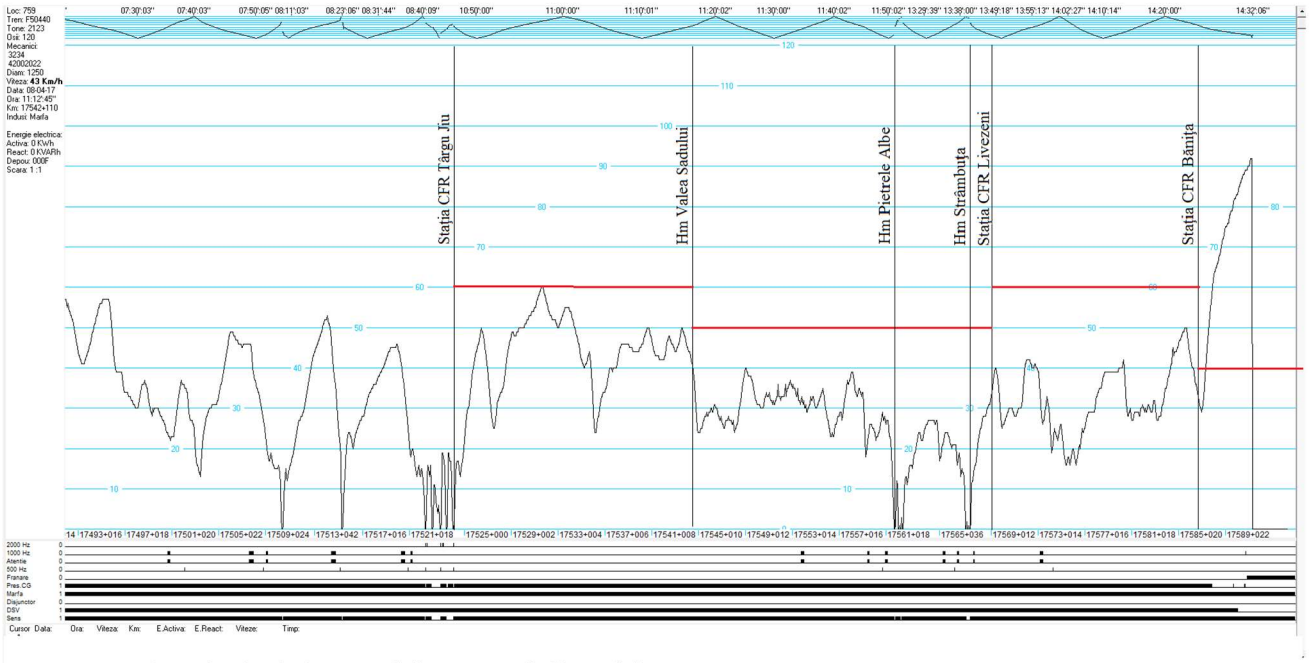
The performance of the continuity test of the train brake, in the railway station Târgu Jiu, necessary to be performed folowing the interruption of the general air pipe, was in the responsibility of the driver's assistant, as authorized agent of the railway undertaking. The train conductor, who managed the shunting for the uncoupling of the wagons, was not authorized in this respect.

In the railway station Pietrele Albe the train stopped 91 minutes. Before to receive the order of departure, the locomotive crew confirmed to the movements inspector from the railway station that the train was ready for departure. It implied also that the continuity tests of the brake was performed, folowing the train stop in the railway station over 30 minutes. The locomotive crew is responsible for performance of this test.

From the railway station Târgu Jiu and up to the accident occurrence, the locomotive crew hauled the freight train no.50457, with the locomoive EA 759, without mentioning any problems in the train hauling or in the locomotive functioning, although, after the train departure from the railway station Pietrele Albe, it had a stop unscheduled, 204 m after the departure, and the speed restrictions from the track section were not completely met, being registered exceeding of the train speed with values between 1–5 km/h.

The gradient profile of the track Târgu Jiu – Băniţa had a maximum gradient of 16,5‰, slope in the train running direction, it imposing the use for the train hauling of the locomotive in traction condition, and if there was need to decrease the speed, the close of the switch and, if case, application of the brake

From the reading and interpretation of the data supplied by the speed recorder, taking into account the train speed from the working timetable, one could fiind out vigilence in the locomotive driving, generated both by the speed restrictions on site and by the train running upon automatic section block. The real speed of the train, after the railway station Valea Sadului, was smaller with over 10 km/h against the sped stipulated in the working timetable, and after the railway station Pietrele Albe, the real speed of the train was smaller with over 20 km/h against the speed stipulated in the working timetable – *picture no.7*.



Picture no.7

Close to the railway station Băniţa (up to the railway station Băniţa the maximum speed stipulated in the working timetable is 60 km/h, and from the railway station Băniţa 40 km/h), the driver took the measures to decrease the train speed, so, the train passed through the railway station with a speed of 33 km/h. At that moment the train ran on slope, continuing this running still 90 m. After passing the slope peak, the train speed decreased continously on 200 m, to 29 km/h, in that point 80% of the train being on slope (train length was 249 m) – *picture no. 8*.

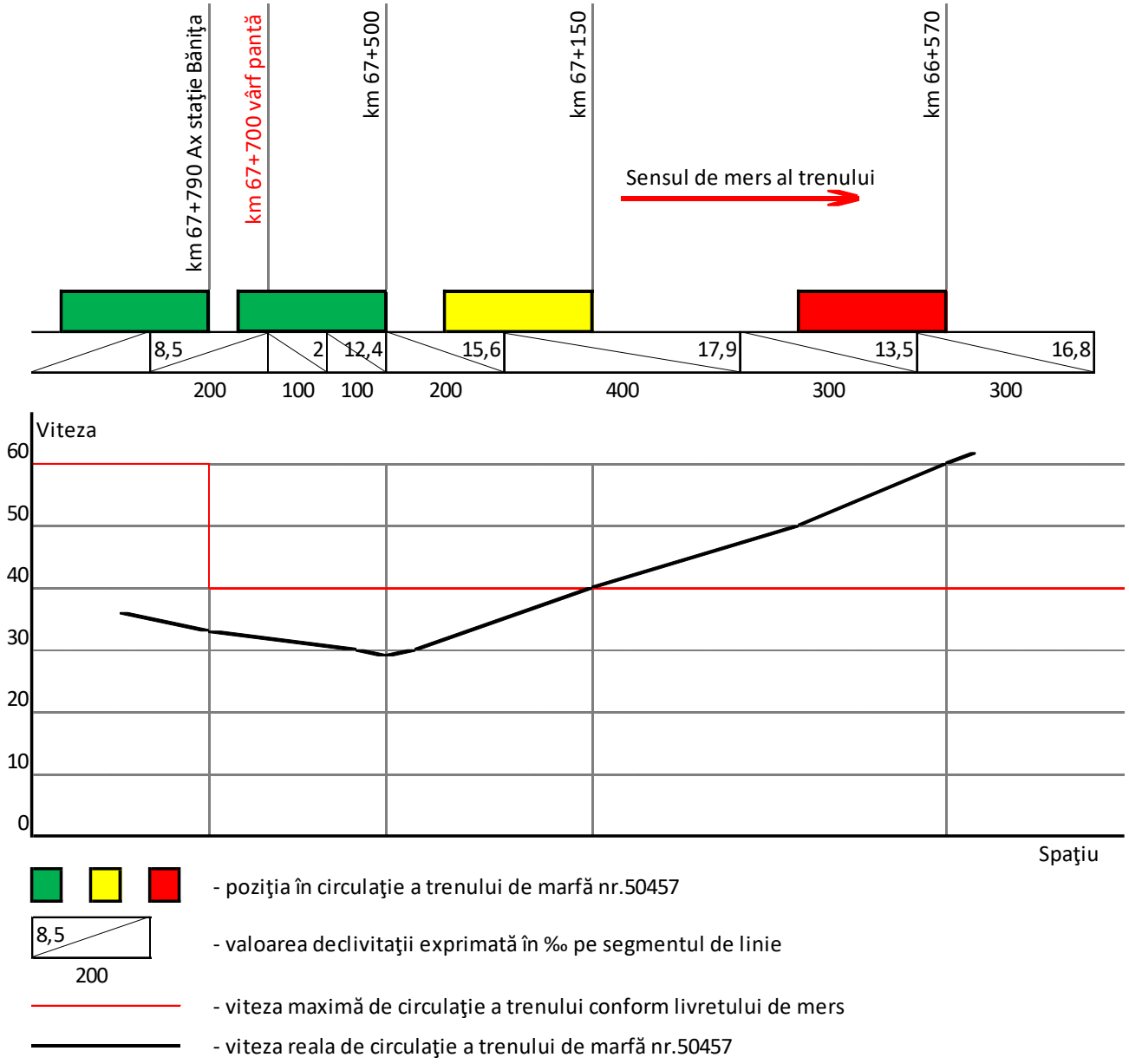
From 29 km/h the train speed started to increase, reaching after 348 m, in 38 seconds, 40 km/h, the maximum speed stipulated in the working timetable, and after 580 m, in 42 seconds, the speed reached 60 km/h.

For this period of time, the records supplied by the speed recorder equipment, type IVMS, do not offer information about the driver actions for the speed decreasing.

At the speed of 60 km/h, from the same records, one could see a decrease of the train acceleration, simultaneously with the decrease, under 1,1 atm of the air pressure from the general pipe, following a quick braking applied by the driver.

Because, from that moment one could find both decreases of the air pipe in the general pipe under 1,1 atm, and attempts to re-supply the general air pipe, in two cases the pressure increasing over 1,5 atm, one can conclude that the driver, until the accident:

- applied the brake and released it at short times through the operation of the automatic brake (the driver's automatic brake valve KD2), without braking the train because the general air pipe was interrupted (because the front cock from the first wagon, after the locomotive, was closed), and the release valve of the locomotive brake cylinders was blocked;
- operated the straight brake (driver's straight air brake FD1) and the automatic brake (the driver's automatic brake valve KD2);
- used simultaneously the pneumatic brake (locomotive straight brake) and the electric one, overlapping the effects of those two braking systems, it favouring the blocking of the locomotive wheels.



Picture no.8

Because the forensic report on the locomotive crew when the accident happened, put in evidence a certain alcohol concentration in blood, both at the driver and at the driver's assistant, and taking into account the result "negative" of the checking with the breathalyser at the shift exchange (in the railway station Caracal), the investigation commission considers that the locomotive crew drank alcohol during the working time

All these last interventions were performed by the locomotive crew under the influence of the alcoholic drinks and the fatigue accumulated during the time, between the home leaving and the accident occurrence.

The train speed increase happened because a human errors, following which the air cock from the first wagon was on the position „close", the general air pipe interrupted, and the automatic brakes of the train not ensuring the train braking. These errors were influenced by the unsuitable physical condition of the locomotive crew.

C.6.4. Analysis of the accident occurrence

From the findings at the accident site, about the technical condition of the infrastructure and of the rolling stock involved, about the activity of the locomotive crew, as well as about the statements of the staff involved, one can conclude:

- in the shunting of those 14 wagons of the freight train no.50457, performed in the railway station Târgu Jiu, the train conductor ensured with the hand brake and with the drag shoe the group of 16 wagons, that rest on the line 6;
- then, because the train conductor could not uncouple the coupler, asked the driver to release the automatic brakes of the wagons;
- forwards, the train conductor operated the angle air cocks of the 14th wagon (no.33876735306-7) and from the 15th wagon (no.31535494448-2) on the position „close", uncoupled the half-couplings between those two wagons and un-coupled the coupler between them ;
- releasing the automatic brakes of the wagons, following the request of the train conductor to uncouple the coupler between the 14th and the 15th wagons, during the shunting of those 14 wagons, the wagons rested on the line 6 were ensured only through the hand brakes and the drag shoe;
- after the shunting of those 14 wagons from the line 6 to the line 7, the locomotive ran back on the line 6, at those 16 wagons rested on the line;
- the locomotive coupling at the train and at the main air pipe (at those 16 wagons) was performed by the driver's assistant, the driver being responsible to check if the coupling of the locomotive at the first hauled wagon was made in accordance with the specific regulations in force;
- because the train conductor was not authorized to perform the brake tests, the tasks of the agent of the railway undertaking, authorized to perform the brake tests, after the uncoupling of those 14 wagons from the train, were in charge of the driver's assistant. At the same time, for the performance of the brake test, the driver had the task to monitor on the on-board equipments the decrease of the pressure in the general pipe of the train and the increase of the air pressure in the locomotive brake cylinders;
- the gradient profile of the track between Târgu Jiu – Băniţa had a maximum gradient of de 16,5‰, (slope in the running direction of the train involved);
- the train consisting in 16 wagons and the locomotive EA 759 ran from the railway station CFR Târgu Jiu to the railway station Băniţa, without the locomotive crew claimed running problems. However, from the reading and interpretation of the data suplied by the speed recorder IVMS of the locomotive resulted exceeding of the maximum accepted speeds with values between 1-5 km/h in the area with existing speed restrictions on this area;
- because from the railway station Băniţa the maximum speed of the freight trains was 40 km/h, against 60 km/h , the maximum accepted speed for the freight train between Petroşani – Băniţa, according to the data supplied by the same records, the train speed decreased from 50 km/h to 29 km/h, then the train ran on a track with slope to the railway station Merişor (the longitudinal section of the track between Băniţa - Merişor had the gradient 18‰, slope in the running direction of the train involved);
- in these conditions , after the passing of the train through the railway station Băniţa, the train speed increased linearly from 29 km/h to 60 km/h, on 928 m, in 80 de seconds. The records supplied by the speed recorder IVMS of the locomotive, for this period of time, do not offer information about the actions of the driver to decrease the train speed;
- because the general air pipe of the train was interrupted between the locomotive and the first wagon of the train, the train wagons were not contributing at the train braking, the braked weight percentage ncessary not being ensured;
- because the release valve of the locomotive brake cylinders was blocked, the only pneumatic brake that could act on the locomotive was the straight brake of the locomotive;
- in these conditions, at 60 km/h, although the speed recorder recorded a pressure decrease in the general air pipe under 1,1 atm., the acceleration decreased (the speed variation changed from a linear one to one curved), without decrease the train speed;

- forwards, in the conditions of the speed increase, according to the same records, one found out some attempts to re-supply the general air pipe;
- the re-supply of the general air pipe could not be done because both to the braking attempts (it leading to its emptying), and to the emptying generated by the non-ordered emergency brake DSV and INDUSI);
- in this conditions, at km 62+940, when the train speed reached about 92 km/h, running on a curved track, the lateral forces acting on the locomotive wheels increased very much, it leading to the exceeding of the derailment stability limit and finally, to the locomotive derailment;
- the derailment of the first 14 wagons is a consequence of the locomotive derailment.
- after the derailment, the locomotive ran on a tangent direction at the curve, stopping between the abutments of the bridges (from km 62+840), to the railway station Merişor.

D. CAUSES

D.1. Direct cause

The direct cause of the accident was the very important increase of the lateral forces acting on the locomotive wheels, it leading to the exceeding of the derailment stability limit. It happened because, the running on a curve, the train speed (92 km/h) exceeded with 130% the maximum speed on the track section (40 km/h).

The increase of the train speed happened following some human errors, following which the angle cock from the first wagon was on „off", the general air pipe being interrupted, and the automatic brakings of the train could not ensure its braking.

Contributing factors:

- The physical condition of the locomotive staff was affected by:
  - consumption of alcooholic drinks during the working time;
  - fatigue cumulated between leaving the home and the accident occurrence, this fatigue present in case of the driver that was 67 years old.

D.2. Underlying causes

1. Infringement of the provisions of art.1 from the Order of Minister of Transports and Telecommunications no.855/1986 concerning the prohibition for the trasport staff to introduce in the units and to drink alcoholic drinks, as well as of the provisions of art.12, paragraph (1), letter b), from the Instructions for the activity of the locomotive crew no.201/2007, concerning the prohibition to transport and/or drink during the working time alcoholic drinks that can reduce the driving capacity of the locomotive crew.
2. Infringement of the provisions of art.2 from Norms approved by Order of Minister of Transports no.256/2013, concerning the maximum continuous working time accepted in the locomotive for the locomotive crew, in complete team.
3. Infringement of the provisions of art.10 from the Norms approved by the Order of Minister of Transports no.256/2013, according which the railway undertaking requests, 60 minutes at least before the end of the effective driving time of the locomotive, the operative management of the the infrastructure manager or of the administrator to stop the train for the shift exchange.
4. Infringement of the provisions of art.125, paragraph (1) from the Instructions for the activity of the locomotive crew no.201/2007 concerning the strict compliance with the running speeds.
5. Infringement of the provisions of art.75, paragraph (5) from the Regulations for hauling and braking no.006/2005, with reference to the way to use the train braking on track sections with slope over 15‰.

6. Infringement of the provisions of art.70, paragraph (14) from the Instructions for the activity of the locomotive crew no.201/2007 concerning the prohibition to block the release valve of the locomotive brake cylinders.

D.3. Root causes

Infringement of the provisions of point 5.14, letter h.2 and of point 5.16 from the Operational procedure code: POSF – 37, part of the safety management system developed by the railway undertaking SC UNICOM TRANZIT SA, concerning:

- the maximum limit of the time resulted from the summing of the working time during the train stop with the working time during the effective locomotive driving;
- sending of operative disposals for the adjustment of the running program, so the train crew on duty or taking rest outside the home to comply with the safety conditions imposed by the Norms approved through the Order of Minister of Transports no.256/2013.

D.4. Additional remarks

1. From the analysis of the running of the freight train no.50457, from the register records and from the minutes for the reading and interpretation of the data supplied by the speed recorder, as well as from the statements of the exterior station movements inspector from the railway station Petroşani, resulted that the freight train, that had, according to the working timetable, stop in the railway station Petroşani, where the driver had to be handed with the running order with the speed restrictions, was recorded in the register records with stop in the railway station, between the hours 14:00 – 14:02. Actually, the train did not stop, passing through the railway station Petroşani without the driver be handed over with the running order. It was possible because the infringement of the next provisions of the Regulations for the train running and shunting of the railway vehicles no.005, approved through the Order of Minister of Transports, Constructions and Tourism no.1816/2005:
   - art.175, paragraph (1), concerning the reception in the railway station of the freight trains with the exit signal on danger position. Actually, the train was received with the exit signal on clear position. It was found following the reading and interpretation of the data supplied by the speed recorder, the inductor 1000 Hz of the entry light signal nont being active and so not being necessary either the operation of the button ATENTION of the equipment INDUSI from the locomotive;
   - art.207, letter g, concerning the running of the trains upon automatic section block, through which the disposing station movements inspector had to be sure that the train stabled. Actually, the disposing station movements inspector and the local one acted upon intuition, supposing that, taking into account the train length, the length of the stabling line and the time for the passing of the train through the station, the train could have the time necessary to stop;
   - art.155, paragraph (1), letter a concerning the positioning of the movements inspector when the train entered the station;
   - art.207, letter f concerning the meeting and the visual inspection of the train up to its stabling, by the movements inspector;
   - point 34 from the Annex 1 concerning the handing of the running order for the driver notification about of the speed restrictions.
2. Infringement of the provisions of art.5, paragraphs (2) and (5), letter a, chapter III from the Annex 2 of the Regulations for the train running and shunting of the railway vehicles - no.005/2005 concerning the duties of the movements inspector, concerning the filling and the handling of the route sheet when at the work start of the locomotive crew in the railway station, that is he did not

fill the hour and the minute of checking and coming of the locomotive crew at the work, leaving to him the filling of the route sheet.

3. Infringement of the provisions of art.9, paragraph (1), letter o from the Instructions for the activity of the locomotive crew no.201/2007, concerning the obligation of the locomotive crew to perform all the operations stipulated by the specific instructions for the operation of the softs and of the systems for the traffic safety, uploaded on-board, that is the locomotive crew did not input their identification data and the data of the hauled train.
4. Infringement of the provisions of art.15, paragraph (1), letter c and of art.19, paragraph (1), letter d, chapter II from the Annex 1 of the Instructions for the activity of the locomotive crew no.201/2007, concerning the duties of the locomotive crew to fill the route sheet, that is they did not fill the hour and the minute of the delivery or previous stabling of the locomotive, and after the arrival in the railway station Târgu Jiu they did not fill the hour of the departure from the station and other stops of the train.
5. The printed form *Locomotive route sheet,* provided by SC UNICOM TRANZIT SA to its own locomotive staff, does not comply with the form approved through the art.1, paragraph (2) from the Annex 1 of the Instructions for the activity of the locomotive crew, no.201, where it is stipulated that, the route sheet form is unique for all railway undertakings, the model being presented in the annex. The route sheet form provided by the railway undertaking has not all the columns numbered, although the regulations for the filling of the locomotive route sheet make clear reference at the number of the column.

E. MEASURES TAKEN

In addition to the Safety Management System, the railway undertaking, SC UNICOM TRANZIT SA, bought a soft for the monitoring of the locomotive activity, called „FERODATA", when the accident happened the soft was in testing process. For the implementation of this soft, the railway undertaking drafted an operational procedure code PO–07 „Implementation and capitalization of the soft FERODATA", in force from the 14th July 2017.

The soft „FERODATA" has two parts:

- Operation of the fleet and the progress of the running program;
- Maintenance of the locomotive stock.

Within the part „operation of the fleet and the progress of the running program" one can do „continous monitoring of the working time (both cummulated and splitted in driving time/ time for serving) for the locomotive crew/train crew".The soft offers the facility to see the working time of each locomotive crew/train crew, with the comparative presentation on a time bar, of the driving hours with the hours for serving in parking state, as well as of the maximum accepted work for single driving or complete crew .

F. SAFETY RECOMMENDATIONS

On the 8th April 2017, at 14:30 o'clockin the railway county Timişoara, track section Petroşani - Simeria (electrified double-track line), between the railway stations Băniţa and Merişor, track I, km 62+940, in the running of the freight train no.50457, got by the railway undertaking SC UNICOM TRANZIT SA, 14 wagons and the hauling locomotive EA 759 derailed.

Following this railway serious accident, the locomotive crew (driver and driver's assistant) died.

Following the investigation, the investigation commission established that the railway serious accident happened because a human error, it being favoured by the physical condition of the locomotive crew, affected by:

- consumption of alcoholic drinks during the working time;
- fatigue accummulated during the time between the leaving of the home and the accident occurrence, this fatigue present in case of the driver that was 67 years old.

Taking into account the findings, the investigation commission considers necessary toissue the next safety recommnedation:

- Romanian Railway Safety Authority – ASFR shall take care that the railway undertaking SC UNICOM TRANZIT SA revise its own safety management system, so, applying all its own procedures, reduce the risks generated by the unsuitable physical condition of the locomotive staff.

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This investigation report will be sent to the National Safety Authority, national public infrastrucure manager CNCF „CFR" SA and to the freight railway undertaking UNICOM TRANZIT SA.

Investigation commission

▪ Toma MOVILEANU	investigator AGIFER	- investigator principal;
▪ Eduard STOIAN	şef serviciu IAF AGIFER	- membru;
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▪ Tudor CIOLACU	investigator AGIFER	- membru;
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▪ Florentina BEZNEA	psiholog AGIFER	- membru;