



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE  
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



## INVESTIGATING REPORT

on the railway accident occurred on the 15<sup>th</sup> of November 2010  
on the range of activity of CF Craiova Regional Branch in the flag station Galateni



*FINAL EDITION  
The 4<sup>th</sup> of April 2011*

## NOTICE

With reference to the railway accident occurred on the **15th of November 2010**, at **4:25 a.m.**, on the range of activity of **CF Craiova Regional Branch**, in the **flag station Galateni**, by the **derailment by the second bogie in the running direction of the wagon no. 31835300065-2** (the 3<sup>rd</sup> by locomotive) in the composition of the **freight train no. 60182-1** (belonging to the railway undertaking SC Grup Transport Feroviar SA), on the area of the switch no. 7 from the X end of the flag station, Romanian Railway Investigating Body carried out an investigation, according to the provisions of the Government Decision no. 117/2010. Through the investigation, the information on the respective accident was gathered and analyzed, the conditions were established and the causes determined.

Romanian Railway Investigating Body investigation did not aim to establish the guilty or the responsibility in this situation.

Romanian Railway Investigating Body considers necessary to take corrective measures in order to improve the railway safety and to prevent the accidents, so it included in the report a series of safety recommendations.

Bucharest, the 4th of April 2011

*Approved by*  
Dragoş FLOROIU  
**Director**

*I agree the compliance with the legal provisions  
on the investigation performance and  
drawing up of this Investigation Report,  
that I submit for approval*

**Chief Investigator**  
Sorin CONSTANTINESCU

*This Approval is part of the Report for the investigation of the accident occurred on the 15<sup>th</sup> of November 2010, at 4:25 a.m., on the range of activity of CF Craiova Regional Branch, in the flag station Galateni, by the derailment of the wagon no. 31835300065-2 in the composition of the freight train no. 60182-1.*

## CONTENT

<b>I. Preamble</b>	<b>4</b>
<b>I.1. Introduction</b>	<b>4</b>
<b>I.2. Investigation process</b>	<b>4</b>
<b><u>A. Brief presentation of the accident</u></b>	<b>5</b>
<b>A.1. Brief presentation</b>	<b>5</b>
<b>A.2. Causes of the accident</b>	<b>5</b>
A.2.1. Direct cause	6
A.2.2. Underlying causes	6
A.2.3. Root cause	6
<b>A.3. Severity level</b>	<b>6</b>
<b>A.4. Safety recommendations</b>	<b>7</b>
<b><u>B. Investigating report</u></b>	<b>8</b>
<b>B.1. Description of the accident</b>	<b>8</b>
<b>B.2. The accident circumstances</b>	<b>10</b>
B.2.1. Involved parties	10
B.2.2. Forming and equipments of the train	10
B.2.3. Railway equipments	11
B.2.4. Means of communication	11
B.2.5. Triggering the railway emergency plan	11
<b>B.3. The consequences of the accident</b>	<b>12</b>
B.3.1. Deaths and injuries	12
B.3.2. Material damages	12
B.3.3. Consequences of the accident in the railway traffic	12
<b>B.4. External circumstances</b>	<b>12</b>
<b>B.5. Investigation course</b>	<b>12</b>
B.5.1. The summary of the of the involved staff statements	12
B.5.2. Safety management system	16
B.5.3. Norms and regulations. Sources and references for the investigation	18
B.5.4. Work of the technical installations, of the infrastructure and of the rolling stock	18
B.5.4.1. Data found on the line	18
B.5.4.2. Data found on the installations	19
B.5.4.3. Data found on the operation of the rolling stock and of its technical installations	19
B.5.5. Previous occurrences of similar nature	21
<b>B.6. Analysis and conclusions</b>	<b>21</b>
<b>B.7. The accident causes</b>	<b>23</b>
B.7.1. Direct cause	23
B.7.2. Underlying causes	23
B.7.3. Root cause	23
<b><u>C. Safety recommendations</u></b>	<b>24</b>

## **I. PREAMBLE**

### **I.1. Introduction**

With reference to the railway accident occurred on the **15th of November 2010**, at **4:25 a.m.**, on the range of activity of **CF Craiova Regional Branch**, in the **flag station Galateni**, by the **derailment by the second bogie in the running direction of the wagon no. 31835300065-2** (the 3<sup>rd</sup> by locomotive) in the composition of the **freight train no. 60182-1** (belonging to the railway undertaking SC Grup Transport Feroviar SA), on the area of the switch no. 7 from the X end of the flag station, Romanian Railway Investigating Body carried out an investigation, according to the provisions of the Government Decision no. 117/2010, in order to prevent accident with similar causes, by establishing the conditions and determining the causes.

Romanian Railway Investigating Body investigation did not aim to establish the guilty or the responsibility in this situation, its objective being to improve the railway safety and to prevent railway incidents or accidents.

### **I.2. Investigation process**

On the 15<sup>th</sup> of November 2010 General Inspectorate for Traffic Safety from CNCF “CFR” SA noticed Romanian Railway Investigating Body about the accident occurred on 15<sup>th</sup> of November 2010 at 4:25 a.m., on the range of activity of CF Craiova Regional Branch, in the flag station Galateni in the running of the freight train no. 60182-1 (belonging to the railway undertaking SC Grup Transport Feroviar SA) consisting of the derailment by the second bogie in the running direction of the wagon no. 31835300065-2, the third by locomotive.

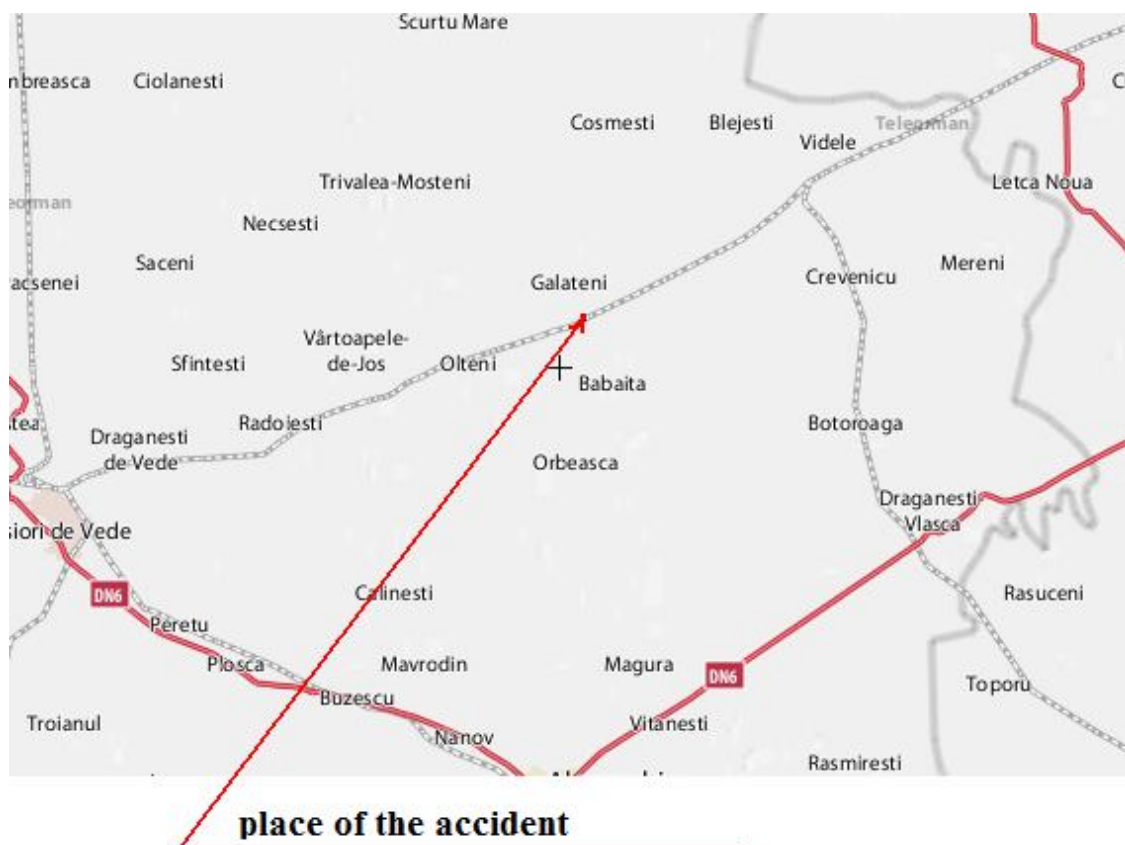
Given that the happenings are defined as accident under the art. 3, paragraph 1 of Law no. 55/2006 on the railway safety and that this accident is relevant for the railway system, under the art. 19, paragraph (2) of the Law no. 55/2006 on the railway safety, corroborated with the art. 48, paragraph (1) of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010, Romanian Railway Investigating Body decided to start an investigation. So, through the decision no. 37 from the 15<sup>th</sup> of November 2010, of the OIFR Director, the investigation commission was appointed, consisting in:

- Zamfirache Marian        - main investigator,
- Stoian Eduard            - investigator,
- Țena Lucian               - investigator,
- Popescu Nicolae         - investigator.

## **A. BRIEF PRESENTATION OF THE ACCIDENT**

### **A.1. Brief presentation**

On the **15<sup>th</sup> of November 2010**, at **4:25a.m.**, on the range of activity of **CF Craiova Regional Branch**, in the **flag station Galateni**, a railway accident occurred consisting of **the derailment by the second bogie in the running direction of the wagon no. 31835300065-2** (the third by locomotive) in the composition of the **freight train no. 60182-1** (belonging to the railway undertaking SC Grup Transport Feroviar SA), on the area of the switch no. 7 from the X end of the flag station.



The freight train no. 60182-1 was composed of 34 wagons (all loaded with billets), 136 axles, 2569 gt, length 549 m and was towed with the locomotive EA 40 0509-6 and with the pushing locomotive EA 40 0462-8 (both belonging to the railway undertaking SC Grup Transport Feroviar SA). Also, the train had in its composition the secondary locomotive DA 60 1583-2, belonging to the same railway undertaking.

The wagons in the composition of the freight train no. 60182-1 were sent from the railway station CFR Calarasi Nord, having as destination the railway station CFR Zalau Nord.

The last technical inspection (before the accident) of the train 60182-1 should have been done in the railway station CFR Ploiesti Triaj, from where was sent on the 15<sup>th</sup> of November 2010, at 1:30a.m. to Chitila. Then the train ran without stop between Ploiesti Triaj – Chitila – Chajna – Videle, until the entry in the flag station Galateni, where, crossing over the switch no. 7, occurred the derailment by the second bogie in the running direction of the wagon no. 31835300065-2 (the third in the composition of the train).

There were no deaths or injuries.

## **A.2. Direct cause, contributing factors and root causes**

### **A.2.1. Direct cause**

**The direct cause** of the accident is the axial movement of the wheel no. 6 bandage on the wheel rim, which led to the derailment of the mounted axle corresponding to wheels no. 5-6 of the wagon no. 318353000065-2.

**Contributing factors** to the occurrence of this accident were as follows:

- weakening of the wheel no. 6 bandage from the wagon no. 318353000065-2, resulting its rotation on the wheel rim and the grinding of the fixing ring (pinning), which was determined by:
  - weakening over time of the tightening forces exerted between the bandage and the wheel rim as a result of the thermal and mechanical stresses occurred in the operation of the axle (the mounted axle is 40 years old);
  - the bandage thickness in the rolling circle plane close to the limit admitted in operation.

### **A.2.2. Underlying causes**

**The underlying causes** of this accident were:

1. late notification of the technical inspector of wagons on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, by the operator on duty about the fact that he should be at the railway station CFR Ploiesti Triaj to carry out the technical inspection in transit of the freight train no. 60182/60182-1.
2. Failure of the technical inspector of wagons on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010 on carrying out the technical inspection in transit of the freight train no. 60182/60182-1, as envisaged in the notice of appointment in traffic of the train.

### **A.2.3. Root cause**

**The root cause** of this accident is the existence at SC Grup Transport Feroviar SA of a safety management system implemented and accepted by Romanian Railway Safety Authority, which was not updated to the new characteristics of the railway transport activity as stipulated in art. 9, paragraph (2) of the *Law no. 55/2006 on railway safety*.

Although starting with September 2010 the technical inspections of the trains operated by SC Grup Transport Feroviar SA have not been performed by the staff of the railway provider (SC Railway Transport Company SA), but by its own staff, the railway undertaking did not adapt the safety management system to the new characteristics of the railway transport activity.

## **A.3. Severity level**

According to the provisions of the art. 3, letter l of the Law no. 55/2006 on railway safety, corroborated with the provisions of the art. 7, paragraph (1), letter b of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010 the event is categorized as accident.

#### **A.4. Safety recommendations**

1. Romanian Railway Safety Authority will conduct an inspection at SC Grup Transport Feroviar SA, which will verify the implementation and enforcement of the safety management system by the railway undertaking.  
If after this inspection, it is found that the safety management system implemented by the railway undertaking is not adapted to the character, extension and other characteristics of the activity and if it does not provide the control of all risks associated with the activity of the railway undertaking the Romanian Railway Safety Authority will revoke the safety certificate part A held by the SC Grup Transport Feroviar SA.
2. Modification by Romanian Railway Safety Authority of the *Guidelines for the development of Safety Management System*, so that it provides to the railway undertakings and to the administrators/managers of non-interoperable railway infrastructure a tool to develop the procedures through which is detailed how staff and its representatives at all levels are involved in the safety management system.
3. Update of the MT Order no. 290/2000 for the purposes of its correlation with the other specific regulations on trains technical inspection work, so that the critical railway service "technical inspection of freight trains in the railway stations (at composition, in transit, on arrival)" to be certified in the subunits (working points) of the railway undertakings.

The addressees of the safety recommendations are: Romanian Railway Safety Authority, Romanian Railway Notified Body and the freight railway undertaking SC Grup Transport Feroviar SA.

## **B. INVESTIGATING REPORT**

### **B.1. Description of the accident**

On the 13<sup>th</sup> of November 2010, by the notice no. 7949 of the Central Office of Railway Traffic Coordination was appointed in traffic the freight train no. 60182/60182-1, belonging to the railway undertaking SC Grup Transport Feroviar SA, to run between Calarasi Nord to the railway station Calan Bai, where was going to be recomposed to be sent to the railway station CFR Zalau Nord. Also, by the same notice at this train was going to be performed the technical inspection in traffic between the railway stations CFR Ploiesti Triaj and Caracal.

On the 14<sup>th</sup> of November 2010, in the railway station CFR Calarasi was composed the freight train no. 60182, towed by the locomotive EA 40 0462-8 and the pushing locomotive EA 40 0444-6 and it had in composition 33 wagons (all loaded with billets by SC SILCOTUB SA – Calarasi working point).

On the same date, at 11:57a.m., after the technical inspection at composition and the complete test of the brakes, the freight train no. 60182 was sent from the railway station CFR Calarasi Nord to the railway station CFR Ploiesti Triaj.

On the 14<sup>th</sup> of November 2010, by the notice no. 7964 of the Central Office of Railway Traffic Coordination the freight train no. 60182/60182-1 composition was modified as in the railway station CFR Ploiesti Triaj an empty wagon had to be attached and the towing means to be changed.

The freight train no. 60182 ran without problems between Calarasi Nord – Ciulnita – Fetesti – Tandarei – Faurei – Buzau – Ploiesti Sud and arrived to the railway station CFR Ploiesti Triaj on the 14<sup>th</sup> of November 2010, at 11:55p.m.

After the train arrival in the railway station CFR Ploiesti Triaj was performed the exchange of towing means, respectively the pushing locomotive EA 40 0444-6 was detached, the towing locomotive EA 40 0462-8 was put as pushing locomotive and there was attached the locomotive EA 40 0509-6 as towing locomotive and the locomotive DA 60 1583-2 as second locomotive. Also, after the second locomotive was attached an empty wagon.

Although according to the notice of appointment in traffic the freight train no. 60182/60128-1 has the technical inspection in transit planned to be performed in the railway station CFR Ploiesti Triaj, the technical inspector of wagons belonging to the railway undertaking SC Grup Transport Feroviar SA did not perform this inspection, performing only the continuity test for the brakes, which he mentioned in the railway station movement logbook.

After these shunts and the brakes continuity test, on the 15<sup>th</sup> of November 2010, at 1:30a.m. the freight train no. 60182/60182-1 was sent from the line 1A of the railway station CFR Ploiesti Triaj to Chitila.

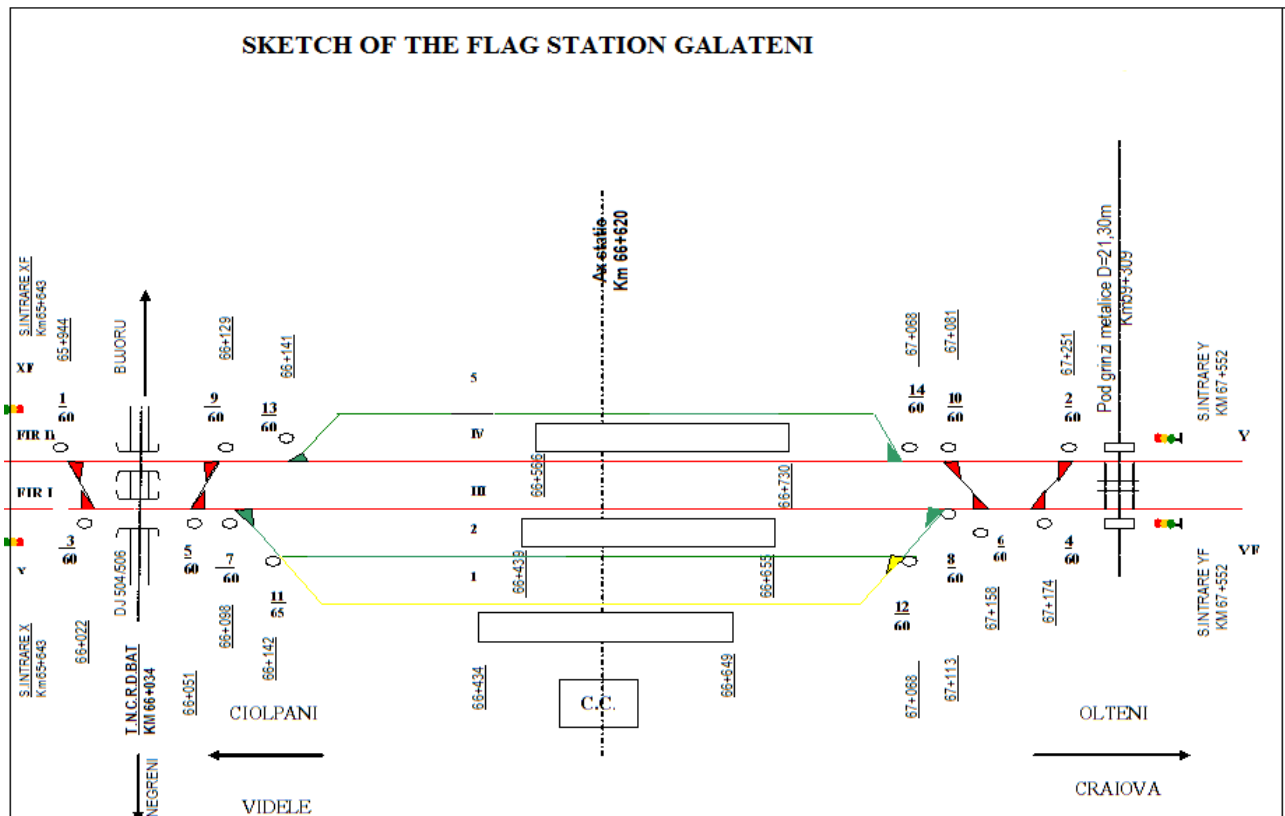
Then the train ran without stop between Ploiesti Triaj – Chitila – Chiajna – Videle, until the entry to the flag station Galateni, where crossing over the switch no. 7 occurred the derailment by the second bogie in the running direction of the wagon no. 31835300065-2 (the third in the composition of the train).

The first sign of abnormal running was found on the cross heart area (monoblock) of the switch no. 7, this sign being seen on the outside of the rail head on the right. At about 9 m from the top of the cross heart the wheel on the right in the running direction from the first axle of the derailed bogie



(the axle corresponding to wheels 5-6) derailed from the right rail in the running direction at the same time with the fall of the wheel on the left of the same axle inside the rails of the direct line III.

The wagon ran in derailed condition about 200 m, stopping at km 66+320, due to the emergency braking occurred as a result of the braking of the traction bar from this wagon and then of the general air pipeline from the wagon no. 35835320206-4 (first wagon by the derailed one – the fourth by locomotive).



At the place of the accident were found the following:

- the wagon no. 31835300065-2, the third by fuse – was derailed by the second bogie in the running direction (the bogie corresponding to axles 3-4);
- at the wheel no. 6 (from the first axle in the running direction of the derailed bogie) was found that the bandage was axially displaced on the wheel rim and between the bandage and the rim were signs of strong friction (metallic luster);



- there were not found missing brake shoes at the derailed wagon;

- all the brake shoes of the involved wagon had dimensions within the limits provided in the specific regulations;
- the shoes and the bandage of the wheel no. 6 did not have signs of overheating as a result of braked running;
- the rod of the traction hook in the end from the train signal had a 100% new break;
- the general air pipeline was broken next to the supporting clamp in the end of the wagon no. 4 in the composition, to the derailed wagon (section 100% specific of the new break).



## **B.2. The accident circumstances**

### **B.2.1. Involved parties**

The running section where the railway accident occurred is managed by CNCF “CFR” SA and maintained by its employees.

The railway infrastructure and superstructure are managed by CNCF “CFR” S.A. and maintained by the employees of Section L 2 Rosiori, District no. 1 Olteni, CF Craiova Regional Branch.

Installations signaling, centralization and blocking (SCB) from the flag station Galateni are managed by CNCF “CFR” SA and maintained by employees of Section CT 3 Rosiori District SCB 2 Rosiori, CF Craiova Regional Branch.

The installation of railway communications on the locomotive belongs to the railway undertaking SC Grup Transport Feroviar SA and is maintained by its employees.

All the locomotives in the composition of the freight train no. 60182-1 (towing locomotive EA 40 0509-6, second locomotive DA 60 1583-2 and towing locomotive EA 40 0462-8) belong to the railway undertaking SC Grup Transport Feroviar SA.

The investigation commission questioned the employees involved in the technical inspection of the trains in which composition ran the wagon involved in the accident, the locomotive drivers and also the movement inspectors from the railway station CFR Ploiesti Triaj, where the train no. 60182-1 had provided the technical inspection in transit.

### **B.2.2. Forming and equipments of the train**

The freight train no. 60182-1 was composed of 34 wagons, 136 axles, 2569 gt, length 549 m, braked automatically under the service book 1285 tons, real 1585 tons, (plus 300 tons compared to the service book) hand braked under the service book 257 tons, real 549 tons (plus 292 tons).

The train was towed with the locomotive EA 40 0509-6 and with the pushing locomotive EA 40 0462-8 and also had in composition the locomotive DA 60 1583-2 as second locomotive – belonging to the railway undertaking SC Grup Transport Feroviar SA.

The automatic brake of the train was active, the safety and vigilance devices (DSV), the equipment for the point control of the speed and hitchhiking (INDUSI) on the locomotives that insured the traction were active and instructionally working, being sealed.

### **B.2.3. Railway equipments**

#### ***Description of the rail path***

The switches in the X end of the flag station Galateni are located in embankment transverse profile, in line and gradient (slope) of 4 ‰.

The derailment occurred on the switch no. 7, that has the following features: rail type 60, radius R=300 m, tangent tg 1:9, right deviation, wooden sleepers, indirect fastening type SKL 12, equipped with peak binding with auxiliary device with spring and welded joints.

The running speed in deviation over the switching area is of 30 km/h and in straight line the established speed of the line.

The prism of broken stone was complete, the fixing system of the metal parts of sleepers being complete and active.

To receive the train 60182-1 at the line no. III, the switch no. 7 was operated into the “in straight line” position, being attacked from the top.

#### ***Description of safety installations to control the railway traffic***

The flag station Galateni is provided with installation signaling, centralization and blocking type CED CR2 with DOMINO console equipped with light signals and automatic line block trivialized.

### **B.2.4. Means of communications**

The communication between the driver and the movement inspectors was insured through radio-telephone equipments.

### **B.2.5. Triggering the railway emergency plan**

Immediately after the occurrence of the railway accident, triggering intervention plan to remove damages and restore train traffic was performed in accordance with the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010, from which there came representatives of the public railway infrastructure manager (CNCF "CFR" SA - CF Craiova Regional Branch), of the railway undertaking SC Grup Transport Feroviar SA Bucharest and of the Romanian Railway Authority - AFER.

To restore on the rails the derailed wagon, was requested and directed the intervention train specialized with hydraulic winches SC Interventii Feroviare SA – Craiova District.

### **B.3. The consequences of the accident**

#### **B.3.1. Deaths and injuries**

None.

#### **B.3.2. Material damages**

The amount of material damages in accordance with the estimates prepared by the owner of the rolling stock, of the means of intervention and the public railway infrastructure manager, is as follows:

▪ at the wagons	3 958.72 lei
according to the estimate no. 237/23.07.2010 of SC CTF SA - Umerva working point	
▪ at the line	230 203.11 lei
according to the estimate no. 218/127/2010 of Section L2 Rosiori	
▪ at the installations of the contact line	
according to the estimate no. 782/2010 of Electrification Center Rosiori	18 731.14 lei
▪ cost of the means of intervention	
according to the estimate no. 2.1/203/2010 of Section L6 Craiova	39 695.27 lei
▪ cost of train delays	
according to the estimate no. 112/6/205/2010 of Traffic Division Craiova	52.34 lei
<b>Total amount of the damages</b>	<b>292 640.58 lei</b>

#### **B.3.3. Consequences of the accident in the railway traffic**

As a consequence of this railway accident 2 passenger trains were delayed with a total 17 minutes.

### **B.4. External circumstances**

On the 15<sup>th</sup> of November 2010, at the time of the accident, the visibility was good, clear sky, the air temperature was about 12<sup>0</sup> C.

The visibility of the signals specific for the nighttime traffic was in accordance with the specific regulations in force.

### **B.5. Investigation course**

#### **B.5.1. The summary of the of the involved staff statements**

From the statements of the **technical inspector of wagons** who made the technical inspection at composition of the train no. 60182 on the 14<sup>th</sup> of November 2010, in the railway station CFR Calarasi Nord, it is worth noting the following:

- he made also the technical inspection at arrival of the train no. 60157 from the 7<sup>th</sup> of November 2010 in the railway station CFR Calarasi Nord, train in which composition came in the railway station CFR Calarasi Nord the wagon involved in the accident;
- at this technical inspection he revised also the wagon no. 31835300065-2 and he did not find anything special to it;
- he does not remember if this wagon came in the composition of the train no. 60157 with the installation of automatic brake in action or isolated;
- when checking the bandages from the wheels of this wagon he found no evidence to lead to the conclusion that one of these was weak or rotated;

- he found no sign of braked running at the wagon no. 31835300065-2;
- on the 14<sup>th</sup> of November 2010, the same railway station CFR Calarasi Nord, he made the technical inspection at composition and the complete test of the brakes at the freight train no. 60182 train in which composition entered also the wagon no. 31835300065-2;
- at this technical inspection he found no damage to the wagon no. 31835300065-2;
- when checking the wagon no. 31835300065-2 he found no evidence to lead to the conclusion that the wheels bandages this wagon were weak or rotated;
- at the complete test of the brakes he did not find anything abnormal in the operation of the brake installations of the wagons in the composition of the train no. 60182 (by default at the installation of the wagon no. 31835300065-2);
- he does not remember if the automatic brake installation of the wagon no. 31835300065-2 was in action or isolated at the moment of the technical inspection, but at the technical inspection at composition of the train no. 60182 he put into operation the automatic brake installations of all the wagons in the composition of this train and at the complete test of the brakes, the brake installation of this wagon corresponded.

From the statements of the **technical inspectors of wagons** who made the continuity test of the brakes at the train no. 60182 on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, in the railway station CFR Ploiesti Triaj and then assisted the train until the place of the accident, it is worth noting the following:

- on the 13<sup>th</sup> of November 2010 he was informed by the operator SC Grup Transport Feroviar SA that he has to be at the railway station CFR Ploiesti Triaj on the 14<sup>th</sup> of November 2010;
- on this occasion he was informed that he was going to make the continuity test at the train no. 60182 in the railway station CFR Ploiesti Triaj and the technical inspection in transit at the same train in the railway station CFR Caracal and that he was going to assist this train to the destination;
- he was not informed that in the railway station CFR Ploiesti Triaj he has to make the technical inspection in transit at the train no. 60182 from the 14<sup>th</sup> of November 2010;
- on the same occasion the operator SC Grup Transport Feroviar SA informed him that the train no. 60182 was formed in the railway station CFR Calarasi Nord and had as destination the railway station CFR Zalau Nord;
- he did not realize that the distance that was going to be run by this train between the forming station (Calarasi Nord) and that one where he knew that he had to do the technical inspection in transit (Caracal) was of over 460 km, distance bigger than the one admitted between two consecutive technical inspections for the freight trains in operation according to the Instruction no. 250/2005 (350 km) and so it was mandatory to do the technical inspection in transit in one of the railway stations between Calarasi Nord – Caracal;
- in the situations previous to the date of 14<sup>th</sup> of November 2010, when he assisted the trains of SC Grup Transport Feroviar SA in the railway station CFR Ploiesti Triaj he was not informed to make the technical inspection in transit because it was carried out by the technical inspector of wagons from the working point of SC Grup Transport Feroviar SA in Ploiesti;
- going to the movement inspector of the railway station CFR Ploiesti Triaj he told him only that at the train no. 60182 is carried out the exchange of towing means;
- he made the continuity test of the brakes at the train no. 60182 from the date of 14<sup>th</sup> of November 2010 and he recorded this in the movement register of the railway station CFR Ploiesti Triaj;
- when he registered in the movement register of the railway station CFR Ploiesti Triaj that he had made the continuity test, he did not notice that in the register there was no other previous registration to confirm the technical inspection in transit of this train;
- on the occasion of continuity test he checked also the brake installation of the wagon no. 31835300065-2 even if this wagon was not within the last 3 wagons in the composition of the train and, according to the provisions of the Instruction no. 250/2005, this was not necessary;
- he met the technical inspector of wagons from the working point of SC Grup Transport Feroviar SA in Ploiesti at the end of the train while he was performing the continuity test of the brakes and he told him that he was performing the continuity test;

- when he went to the working point of SC Grup Transport Feroviar SA in Ploiesti he was asked to perform more quickly the continuity test of the brakes;
- he considers that, if at this train had been performed the technical inspection in transit in the railway station CFR Ploiesti Triaj it would have been possible to be noticed one of the evidences that lead to the conclusion that the bandage of the wheel no. 6 of the wagon no. 31835300065-2 was weak or rotated.

From the statements of the **technical inspector of wagons** on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, at the working point of SC Grup Transport Feroviar SA in Ploiesti it is worth noting the following:

- on the 14<sup>th</sup> of November 2010, around 7:00p.m., he was informed by the operator of SC Grup Transport Feroviar SA that he would have to perform the technical inspection in transit of the train no. 60182 that was running from Calarasi Nord to Zalau, and for this he was going to be informed by phone when the train was getting near the railway station CFR Ploiesti Triaj in order to have the necessary time to go from the working point to the railway station;
- the operator of SC Grup Transport Feroviar SA informed him by phone only at 0:30a.m., when the train have been parked in the railway station CFR Ploiesti Triaj already for 35 minutes and asked him to help the technical inspector of wagons, who had come to assist the train to the destination, to perform the technical inspection in transit of the train no. 60182 because the train was already delayed;
- at the arrival in the railway station CFR Ploiesti Triaj he contacted the technical inspector of wagons who had come to assist the train to the destination and this one informed him that he had made all the necessary works at this train and he had registered all the necessary in the movement register of the railway station;
- after this conversation he went to the movement office of the railway station and asked the movement inspector what had registered the technical inspector of wagons who had come to assist the train to the destination and this one told him that his colleague had registered the continuity test of the brakes;
- then he went to the train to supervise its scrolling but he supervised only about half of the vehicles in the composition of the train because at his arrival the train was already moving;
- he did not notice that at the train no. 60182 had not been performed the technical inspection in transit because he was confused by the technical inspector who had come to assist the train to the destination and who had told him that he had performed all the necessary works at this train, having the impression that this one had performed the technical inspection in transit but had wrongly registered the performed works in the movement register;
- even if he considered that it was only a wrong registration in the movement register of the railway station, he did not inform verbally about the supposed mistake his colleague, or his managers. Also, he did not prepare the event report through which to inform in written his managers about the supposed wrong registration in the movement register, as provided in HG no. 117/2010.

From the statements of the **driver of the second locomotive, who acted also as guard** (on the locomotive DA 60 1583-2), on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, at the train no. 60182, it is worth noting the following:

- he is authorized for 4 positions: locomotive driver, driver assistant, guard and chief shunting;
- on the 13<sup>th</sup> of November 2010, he was announced by the operator of SC Grup Transport Feroviar SA that at the train no. 60182 would act as driver assistant;
- on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, he was announced by the operator of SC Grup Transport Feroviar SA that at the train no. 60182 he would act as guard;
- in fact he acted as guard in the railway station CFR Ploiesti Triaj and as driver assistant between Ploiesti Triaj – Galateni;
- he took over the documents of the train from the guard who assisted the train no. 60182 on the distance Calarasi – Ploiesti Triaj;



- in the railway station CFR Ploiesti at the train no. 60182 was attached a wagon first by locomotive and was performed the continuity test of the brakes;
- he knew that at the train no. 60182 the technical inspection in transit had to be performed in the railway station CFR Ploiesti Triaj;
- in the railway station CFR Ploiesti Triaj he did not pursue if at the train no. 60182 had been performed the technical inspection in transit because in the meantime he dealt with the modification of the form "Train composition" and then he went to the locomotive where acted as driver assistant;

From the statements of the **operator** on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, at the working point of SC Grup Transport Feroviar SA in Ploiesti, it is worth noting the following:

- at the entry in service on the 14<sup>th</sup> of November 2010, at 7:00a.m., his colleague told him that the technical inspector of wagons who was going to assist the train no. 60182 from the railway station CFR Ploiesti Triaj would perform also the technical inspection in transit of the train in the railway station CFR Caracal;
- as scheduled by the CNCF "CFR" SA train no. 60182 had the technical inspection in transit scheduled in the railway station CFR Ploiesti Triaj;
- he established the technical inspection in transit to be performed by the technical inspector of wagons who was on duty at the working point of SC Grup Transport Feroviar SA in Ploiesti;
- on the 14<sup>th</sup> of November 2010, around 7:00p.m., he verbally informed the technical inspector of wagons who was on duty at the working point of SC Grup Transport Feroviar SA in Ploiesti that he would have to perform the technical inspection in transit at the train no. 60182;
- as the train no. 60182 stationed about an hour in the flag station Valea Calugareasca, and in Cronos computer system the train departure was updated with delay, the operator heard about the arrival of the train in the railway station CFR Ploiesti Triaj only from the movement inspector when he called to announce him that at this train was attached a wagon, around 0:00a.m.;
- after learning that the train no. 60182 had arrived in the railway station CFR Ploiesti Triaj he announced in written the technical inspector of wagons who was on duty at the working point of SC Grup Transport Feroviar SA in Ploiesti to come to the station to perform the technical inspection in transit.

From the statements of the **external movement inspector** on duty on the 14<sup>th</sup> of November 2010, at the railway station CFR Ploiesti Triaj – Gara Veche Post, it is worth noting the following:

- he entered in the register of RC provisions the provision on the running of the trains for the date of 14<sup>th</sup> of November 2010 between 6:00p.m. – 12:00p.m.;
- in this provision was also transmitted the data on the running of the train no. 60182;
- at the registration of this provision, at the data on the running of this train he omitted to mention the technical inspection in transit to be done in the railway station CFR Ploiesti Triaj.

From the statements of the **external movement inspector** on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, at the railway station CFR Ploiesti Triaj – Gara Veche Post and who prepared and handed the order of movement at the train no. 60182, it is worth noting the following:

- he performed the verification with the vial alcooltest of the technical inspector of wagons who performed the continuity test of the brakes and who assisted the train no. 60182 from the station CFR Ploiesti Triaj;
- for the train no. 60182 he entered the necessary in the register of movement, he prepared and handed the order of movement and he supervised by scrolling the train at its sending from the railway station;
- in the book of RC provisions of the post for the train no. 60182 he had only the attachment of a freight wagon first by locomotive, the exchange of towing means and the running under the provisions of the service record of the freight trains 2009 – 2010 edition for the train no. 32502;
- in the book of RC provisions of the post for the train no. 60182 he had no registration about the technical inspection in transit in the railway station CFR Ploiesti Triaj.

From the statements of the **movement inspector** on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, in the flag station Galateni, it is worth noting the following:

- the train no. 60182-1 had crossing command on the direct line II from the flag station Galateni with entrance “in straight line” and exit “in deviation”;
- when the train attacked the section “3 rail” the section “2 rail” has been occupied, too and the locomotive driver informed him through the radio-telephone station that power was missing in the contact line and the air pressure in the general pipeline decreased suddenly;
- then the locomotive driver told him that the third wagon in the composition of the train was derailed by the second bogie in the running direction and that the same wagon had broken a pillar of the contact line;
- then he went to the place of the accident, he found that the facts communicated by the locomotive driver were confirmed, he went back to the movement office and the informed about the occurrence of the accident the operator from the traffic controller, the station manager and the lines divisions, SCB and IFTE.

From the statements of the **driver** of the towing locomotive of the train no. 60182-1 (EA 40 0509-6) it is worth noting the following:

- on the 14<sup>th</sup> of November 2010 he was informed by the operator of SC Grup Transport Feroviar SA to go to the working point Ploiesti to tow the train no. 60182;
- he went to the working point, he was assigned to the locomotive EA 40 0509-6 and after its inspection he was sent to the railway station CFR Ploiesti Triaj where he was verified with the vial alcooltest at the external movement inspector;
- then he coupled the locomotive to the train, he supplied the brake installation of the train and he performed together with the technical inspector of wagons the continuity test of the brakes;
- after the guard came with the train documents the train received the movement order from the external movement inspector and at 1:27a.m. he left to Chitila;
- he ran without problems until the entrance in the flag station Galateni, where the input signal had the permissive indication „ flashing yellow”;
- he took action to reduce the speed in order to perform the gear corresponding to signal indication and after about 200 meters he found the sudden decrease of the air pressure in the general pipeline and he stopped the train;
- after checking he found that the third wagon in the composition of the train had the second bogie in the running direction derailed;
- then he insured the train and he informed the moving inspector from the flag station Galateni about the incident.

From the statements of the **driver assistant** of the towing locomotive of the train no. 60182-1 (EA 40 0509-6) it is worth noting the following:

- at the entrance in the flag station Galateni, after the locomotive driver reduced the speed, he found the sudden decrease of the air pressure in the general pipeline of the train and the lack of power in the contact line;
- after the driver stopped the train he went besides the train and he found that the third wagon in the composition of the train had the second bogie in the running direction derailed and that the same wagon broke a pillar of the contact line.

### **B.5.2. Safety management system**

At the time of the accident CNCF "CFR" SA as manager of the public railway infrastructure, had implemented their own system of railway safety management, in accordance with the provisions of the Directive 2004/49/CE regarding the safety on the community railways, of the Law no. 55/2006 regarding the railway safety and of the Order of the Minister of Transport no.101/2008 on granting



the security authorization to the administrator / management of railway infrastructure in Romania, being in possession of:

- Safety Authorization – Part A with the identification no. ASA09002 – through which the Romanian Railway Safety Authority from AFER confirms the acceptance of the safety management system of railway infrastructure manager;
- Safety Authorization - with the identification no. ASB9007 – through which the Romanian Railway Safety Authority from AFER confirmed the acceptance of the provisions adopted by the railway infrastructure manager to meet specific requirements necessary to ensure safety of rail infrastructure, in the design, maintenance and operation, including where appropriate, maintenance and operation of traffic control and signaling system.

At the time of the accident, SC Grup Transport Feroviar SA as railway undertaking had implemented their own system of railway safety management, in accordance with the provisions of the Directive 2004/49/CE regarding the safety on the community railways, of the Law no. 55/2006 regarding the railway safety and of the Order of the Minister of Transport no.535/2007 on granting the security authorization in order to carry out railway transport services on the railways in Romania, being in the possession of the following documents regarding their own system of railway safety management:

- Safety Certificate – Part A with the identification no. CSA 0012 delivered on the 15<sup>th</sup> of September 2009 – through which the Romanian Railway Safety Authority from AFER confirms the acceptance of the safety management system of the railway undertaking;
- Safety Certificate – Part B with the identification no. CSB 0182 – through which the Romanian Railway Safety Authority from AFER confirmed the acceptance of the provisions adopted by the railway undertaking to meet specific requirements necessary the safe operation on the relevant network in accordance with the Directive 2004/49/CE and with the applicable national legislation.

When granting the safety certificate – part A the technical inspections of the trains operated by SC Grup Transport Feroviar SA were performed by the employees of a railway supplier (SC Compania Transport Feroviar SA) authorized and technically approved by the Romanian Railway Notified Body according to MT Order no. 290/2000.

On the 13<sup>th</sup> of September 2010 SC Grup Transport Feroviar SA obtained from the Romanian Railway Notified Body the technical approval to perform the critical railway service "technical inspection of freight trains in the railway stations (at composition, in transit, on arrival)". Based on this technical approval and on the authorization of railway supplier owned by SC Grup Transport Feroviar SA in accordance with the MT Order no. 290/2000, it started to perform the technical inspections of the freight trains with its own staff.

Although, after this change, the safety management system implemented at SC Grup Transport Feroviar SA and accepted by the Romanian Railway Safety Authority had to be adapted to the new features of the railway transport activity, this has not occurred. Thus, SC Grup Transport Feroviar SA did not introduce in the safety management system a procedure to achieve the prescriptive requirements set by the national safety standard (Instructions on technical inspection and maintenance for wagons in operation no. 250/2005) in the performance of the new activity (technical inspections to the freight trains).

However, at the railway accident investigation, it was found that at SC Grup Transport Feroviar SA to the Romanian Railway Notified Body to obtain the railway technical approval to perform the critical railway service “technical inspection of freight trains in the railway stations (at composition, in transit, on arrival)” was filed also the “List of documents of integrated management system quality, environment, occupational health and safety”, list where appears also the general procedure

no. 23 “Technical inspections performed to trains”, procedure by which were established the responsibilities of the own staff involved in the technical inspection of the trains.

Although this procedure insures the attainment of the conditions set by Instructions on technical inspection and maintenance for wagons in operation no. 250/2005, this was not introduced in the safety management system of the railway undertaking accepted by the Romanian Railway Safety Authority.

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

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

#### *norms and regulations*

- Instructions on technical inspection and maintenance for wagons in operation no. 250 approved by the Order of the Minister of Transports, Constructions and Tourism no. 1817 of the 26<sup>th</sup> of October 2005;
- Instruction on the mounted axles repair no. 931/1986;
- Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989;
- Order of the Minister of Transports no.535/2007 on approving the norms to grant the railway transport license and safety certificates in order to carry out railway transport services on the railways in Romania;
- Order of the Minister of Transports no. 290/2000 on the technical acceptance of products and/or services designed for use in activities of construction, modernization, maintenance and repair of the railway infrastructure and of the rolling stock, for the railway and subway transport.

#### *sources and references*

- copies of documents submitted as annexes to the investigation file;
- photos taken immediately after the railway accident by the members of the investigation commission;
- photos of the mounted axle that caused the derailment taken by the members of the investigation commission;
- results of measurements made immediately after the railway accident at the rail superstructure;
- inspection and interpretation of the technical condition of the elements involved in the accident: infrastructure, rail facilities and railway vehicles;
- questioning of the staff involved in the accident.

### **B.5.4. Work of the rolling stock and of the technical installations**

#### **B.5.4.1. Data found on the line**

##### ***The technical condition of the line before the occurrence of the railway accident***

In the flag station Galateni in the area of the X end on the direct line III corresponding to the running wire I the railway superstructure consists of rail type 60 welded, concrete sleepers T 26 flexible clamping SKL 12.

In the railway without joints is embedded also the switch no. 7 on which occurred the derailment.

The switch no. 7 has the following features: rail type 60, radius R=300 m, tangent 1:9, right deviation, wooden sleepers, clamping SKL 12.

The switch was introduced in the path on the 8<sup>th</sup> of November 2005 – the switch being new.

On the occasion of the last fortnightly inspection performed before the date of the accident, were not found weaknesses on this switch.

#### ***Findings and measurements on the line, after the derailment and lifting of the wagon.***

The switch no. 7 did not have wears of the metallic parts, the wooden sleepers were in proper condition, the clampings were complete and in active condition, the prism of broken stone was clean and complete.

As a result of the derailment a number of 280 concrete sleepers were damaged.

After checking the gauge and the cross level of the railway with the rail measuring pattern in the characteristic points of this switch and also at the basis of measurement of 2.5m starting from the first sign of derailment in the opposite of the running direction of the train it was found that the values of these measurements were within the tolerances admitted by the Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989, corresponding to the maximum speed admitted in the area of the accident.

#### **B.5.4.2. Data found on the condition of the installations**

At the checking performed immediately after the accident, were found the following:

- the isolated section 2 C occupied on the control device and available on site;
- the isolated sections III C, 3-7 and 033 occupied on the control device and on site by the train no. 60182-1;
- BAT installation closed with control;
- buttons BDA, 043 and 1-13 on the control device sealed with the seal of the railway station due to the failure of the train no. 70926 on the line 5 on the 14<sup>th</sup> of November 2010;
- buttons BDA, 4-8, 2-14 and 044 on the control device sealed with the seal of the railway station due to the untrammeling of the exit path of the train no. 60182-1;
- buttons BAV, BILC from the running wire I, Y end on the control device with the seals broken for the capital repair works performed to this running wire on the distance Galateni - Olteni;
- buttons BAV, BILC from the running wire I, X end on the control device with the seals broken due to the de-energizing of the contact line after the accident;
- seals from the relays room and its plumber key on the control device – intact;
- there were no irregularities in the operation of BCS installations.

As consequence of the accident a pillar supporting the contact line no. 3 and an insulator mounted on it were destroyed.

#### **B.5.4.3. Data found on the work of the rolling stock and of its technical installations**

##### ***Findings on the wagons in the flag station Galateni***

The regime exchangers “Freight – Passengers” and “Empty – Loaded” were in proper position for the respectively on the positions “Freight” and “Loaded”.

The train had in its composition 3 wagons with the automatic brake isolated namely the wagons no. 84535487795-1, 88535487850-0 and 31835300072-8 these being on the positions 22, 23 and 24 in the composition of the train.

***At the wagon no. 31835300065-2 (the derailed wagon):***

Features of the wagon:

- wagon type Eaos
- brake installation type Westinghouse unified type WU-GP;
- bogie type Y 25 Cs;

Findings on the wagon:

- the wagon was manufactured in 1972 at the trader OFFICINE FIORE RESINA Napoli;
- the last RP type inspection of the wagon was performed on the 14<sup>th</sup> of April 2005 the trader marked with the initials “TR”;
- the wagon is registered at the Italian Railways (FS) and was leased by SC Grup Transport Feroviar SA, on the 1<sup>st</sup> of September 2009, for 5 years from the trader ALF LOGISTIKS DOO Skopje;
- the automatic brake in action according to the document “Train Composition”;
- the regime exchanger “Empty – Loaded” was on the position “Loaded”;
- the regime exchanger “Freight – Passenger” was on the position “Freight”;
- no brake shoes missing at the derailed wagon;
- all the brake shoes of the involved wagon had the sizes within the limits provided by the specific regulations;
- the shoes and the bandage of the wheel no. 6 had no signs of overheating due to the braked running;
- the rod of the traction hook in the and towards the train signal had a break 100% new;
- the general air pipeline was broken next to the support clamp in the end of the wagon no. 4 in the composition, towards the derailed wagon (specific section for the brake 100% new);
- the bandage of the wheel no. 6 axially displaced on the wheel rim;
- the goods in the wagons (billets) were placed correctly with the compliance of the requirements set out in Annex II of the Uniform Contract of Use for Wagons.

***Findings on the axle mounted with the wheels 5-6 of the wagon no. 31835300065-2:***

- both covers of the axle boxes were sealed;
- marks found of the bandages:
  - wheel no. 5: 6097 I. LO 7 70 V 9 M 70;
  - wheel no. 6 (the one with the bandage axially displaced on the rim): 6097 I. LO 5 70 V 9 M 70 3 82;
  - wheel no. 7: 1598 I. LO 2 73 V 5 M 73;
  - wheel no. 8: 1370 I. LO 1 73 V 5 M 73;
- Obs.: On all the corresponding bandages and rims were found mechanical signs in shape of ↓ through was marked the mounting position of the bandage to the rim. At the wheels no. 5, 7 and 8 these marks were in proper position (without gaps from each other).
- given the marks found on the bandage of the wheel no. 6 it can be concluded that it belongs to charge no. 6097 and was manufactured in the 9<sup>th</sup> month of 1970 by the manufacturer with the initials I.LO (Italsider Lovere);
- marks found on the wheels rims:
  - wheel no. 5: 6399;
  - wheel no. 6: 6510;
  - wheel no. 7: 1579;
  - wheel no. 8: 1762-73;
- marks found on the end of the axis axle:
  - axle corresponding to the wheels 5-6: 2068914 US;
  - axle corresponding to the wheels 7-8: 4471189 US;

Obs.: The axle corresponding to the wheels 5-6 had marked on the metallic plate mounted at the end of the axle box the no. 4678645 different from the one punched on the end of the axis axle.

- in the axle boxes dismantled (wheels 5 and 7) was found grease in sufficient quantity and with unchanged color and smell;
- at the wheel no. 6 were found the following:
  - the circlip mounted between the bandage and the rim was polished to the upper side of the mounting channel from the bandage, due to the rotation of this bandage on the rim;
  - on the two tightening surfaces on the rim and on the bandage is a sign of strong friction with avulsion of material.



- there were measured the geometric elements of these axles, occasion on which were found the following values:

GEOMETRIC ELEMENTS	Axle with the wheels 5-6		Axle with the wheels 7-8	
	Wheel 5 (mm)	Wheel 6 (mm)	Wheel 7 (mm)	Wheel 8 (mm)
Bandage width	38	35	38,5	38,7
Nominal diameter	860	860	865	865
Rim width	26,5	25,5	26,8	24,5
Rim height	28,3	29,8	27	27,8
Rate $q_r$	6,8	8,7	7,5	7,8
Distance between the inner sides of the bandages	could not be measured		1359,5	

- all the measured values are within the limits provided by the Instructions on technical inspection and maintenance for wagons in operation no. 250/2005.

#### B.5.5. Previous events with similar nature

Until the date of this railway accident, in the activity performed by the railway undertaking SC Grup Transport Feroviar SA were registered another two previous events with similar nature, as follows:

- the railway accident occurred on the 18<sup>th</sup> of July 2010, at 5:15p.m., on the range of activity of CF Brasov Regional Branch, in the flag station Aiud, in the running of the freight train no. 60133-2, belonging to the railway undertaking SC Grup Transport Feroviar SA, at its entry on the direct line III, by the derailment of the wagon no. 84535451255-8, the 19<sup>th</sup> by locomotive, by the second bogie in the running direction on the area of the switch no. 6 from the Y end of the railway station, due to the displacement from the rim of the bandage of wheel no. 6;
- the railway accident occurred on the 22<sup>nd</sup> of February 2007, at 6:26p.m., on the range of activity of SRCF Galati, in the flag station Cricov, in the running of the freight train no. 60373 belonging to the railway undertaking SC Compania de Transport Feroviar SA, at its crossing on the direct line III, by the derailment of the last two wagons of the train, due to the axially displacement of

the bandage from the wheel no.5 from the second last wagon with no. 88536657717-3 of the axle no. 3 in the running direction.

## **B.6. Analysis and conclusions**

From the analysis of the findings at the place of the accident, of the technical condition of the involved wagon, of the photos taken on spot and also of the involved staff statements it can be concluded that the accident occurred in the following conditions:

- on the 14<sup>th</sup> of November 2010 the operator on duty from SC Grup Transport Feroviar SA did not follow attentively the running of the freight train no. 60182 and he learned about its arrival in the railway station CFR Ploiesti Triaj only when the train was parked in the station, around 0:00a.m., so that he announced with delay the technical inspector of wagons who was on duty at the working point of SC Grup Transport Feroviar SA in Ploiesti to go to the station to perform the technical inspection in transit of this train;
- as a result of this delayed notification, at the arrival in the railway station CFR Ploiesti Triaj of the train, the technical inspector of wagons who was on duty at the working point of SC Grup Transport Feroviar SA in Ploiesti could not perform its supervision by scrolling, according to the provision of the *Instructions on technical inspection and maintenance for wagons in operation no. 250/2005, art.10, paragraph (4) letter a)*;
- this technical inspector contacted the technical inspector of wagons who had arrived to assist the train to the destination railway station and this one told him that he had performed all the necessary works at this train and all the necessary registrations in the movement register of the railway station;
- after this conversation, this technical inspector went to the movement office of the railway station and asked the external movement inspector had registered the technical inspector who had arrived to assist the train to the destination railway station and this one told him that his colleague had registered the performance of the continuity test of the brakes;
- under these conditions, this technical inspector of wagons had the impression that his colleague had performed the technical inspection in transit, but had wrongly registered in the movement register the performed works;
- at the same time, due to a preparation error of the RC provisions, in the register of RC provisions from the external movement inspector of the railway station CFR Ploiesti Triaj data regarding the running of this train were incomplete, in that there was not mentioned that at this train the technical inspection in transit would be performed in this station;
- as a consequence of this error, the external movement inspector from the railway station CFR Ploiesti Triaj could not notice that the works registered by the technical inspector of wagons who had arrived to assist the train to the destination (the continuity test of the brakes) are not in accordance with the data regarding the scheduling in traffic of the train no. 60182 (technical inspection in transit);
- under these conditions the freight train no. 60182 was sent from the railway station CFR Ploiesti Triaj without being performed the technical inspection in transit, as it was provided in the conditions established at the scheduling in traffic of this train;
- as the technical inspection in transit was not performed, at the train no. 60182 was not checked the bandages tightening on the rim, visually and by hitting with the hammer, according to the art. 10, paragraph (4), letter e of the *Instructions on technical inspection and maintenance for wagons in operation no. 250/2005* and nor the supervision by scrolling of the train when leaving the railway station, according to the art. 10, paragraph (4), letter t of the same instructions;
- the bandage width in the rolling circle plan from the wheel no. 6 of the wagon no. 31835300065-2 being close to the minimum value admitted by the *Instructions on technical inspection and maintenance for wagons in operation no. 250/2005 (30 mm)*, corroborated with the operation time of the mounted axle (40 years), favored the dismantle of the bandage from the wheel rim;

- after the weakening and dismantle of the bandage of the wheel no. 6 this started to rotate on the rim and at the same time to grind of the fixing ring (pinning);
- after the grinding of the fixing ring until the level of the inner surface of the bandage, this started to move axially to the wheel rim, which led to the modification of the distance between the outer sides of the wheels of this axle (5 and 6) over the limits admitted by the *Instructions on technical inspection and maintenance for wagons in operation no. 250/2005*;
- under these conditions, at the entrance in the flag station Galateni when crossing over the cross heart area of the switch no. 7 wheel no. 6 started to roll with the rim on the rail head and then, at about 9 m from the top of the cross heart this derailed from the right rail in the running direction simultaneously with the fall of the left wheel of the same axle inside the rails of the direct line III;
- after the derailment of the axle corresponding to the wheels 5 – 6 (first axle from the second bogie in the running direction) this involved in the derailment also the second axle of this bogie (axle corresponding to wheels 7 – 8);
- the wagon ran in derailed condition about 200 m, stopping due to the emergency braking occurred as consequence of the braking of the rod of the traction hook from this wagon and then of the general air pipeline of the wagon placed after the derailed one (the 4<sup>th</sup> by locomotive).

## **B.7. Causes of the accident**

### **B.7.1. Direct cause**

**The direct cause** of the accident is the axial movement of the wheel no. 6 bandage on the wheel rim, which led to the derailment of the mounted axle corresponding to wheels no. 5-6 of the wagon no. 318353000065-2.

**Contributing factors** to the occurrence of this accident were as follows:

- weakening of the wheel no. 6 bandage from the wagon no. 318353000065-2, resulting its rotation on the wheel rim and the grinding of the fixing ring (pinning), which was determined by:
  - weakening over time of the tightening forces exerted between the bandage and the wheel rim as a result of the thermal and mechanical stresses occurred in the operation of the axle (the mounted axle is 40 years old);
  - the bandage thickness in the rolling circle plane close to the limit admitted in operation.

### **B.7.2. Underlying causes**

**The underlying causes** of this accident were:

1. late notification of the technical inspector of wagons on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010, by the operator on duty about the fact that he should be at the railway station CFR Ploiesti Triaj to carry out the technical inspection in transit of the freight train no. 60182/60182-1.
2. Failure of the technical inspector of wagons on duty on the 14<sup>th</sup>/15<sup>th</sup> of November 2010 on carrying out the technical inspection in transit of the freight train no. 60182/60182-1, as envisaged in the notice of appointment in traffic of the train.

### **B.7.3. Root cause**

**The root cause** of this accident is the existence at SC Grup Transport Feroviar SA of a safety management system implemented and accepted by Romanian Railway Safety Authority, which was not updated to the new characteristics of the railway transport activity as stipulated in art. 9, paragraph (2) of the *Law no. 55/2006 on railway safety*.

Although starting with September 2010 the technical inspections of the trains operated by SC Grup Transport Feroviar SA have not been performed by the staff of the railway provider (SC Railway Transport Company SA), but by its own staff, the railway undertaking did not adapt the safety management system to the new characteristics of the railway transport activity.

### **C. SAFETY RECOMMENDATIONS**

1. Romanian Railway Safety Authority will conduct an inspection at SC Grup Transport Feroviar SA, which will verify the implementation and enforcement of the safety management system by the railway undertaking.  
If after this inspection, it is found that the safety management system implemented by the railway undertaking is not adapted to the character, extension and other characteristics of the activity and if it does not provide the control of all risks associated with the activity of the railway undertaking the Romanian Railway Safety Authority will revoke the safety certificate part A held by the SC Grup Transport Feroviar SA.
2. Modification by Romanian Railway Safety Authority of the *Guidelines for the development of Safety Management System*, so that it provides to the railway undertakings and to the administrators/managers of non-interoperable railway infrastructure a tool to develop the procedures through which is detailed how staff and its representatives at all levels are involved in the safety management system.
3. Update of the MT Order no. 290/2000 for the purposes of its correlation with the other specific regulations on trains technical inspection work, so that the critical railway service "technical inspection of freight trains in the railway stations (at composition, in transit, on arrival)" to be certified in the subunits (working points) of the railway undertakings.

This investigation report will be sent to Romanian Railway Safety Authority, to Romanian Railway Notified Body, to the public railway infrastructure manager CNCF "CFR" SA and to the freight railway undertaking SC Grup Transport Feroviar SA.

Members of the investigation commission:

- Zamfirache Marian            - main investigator
- Stoian Eduard                - investigator
- Țena Lucian                  - investigator
- Popescu Nicolae             - investigator