



## **INVESTIGATING REPORT**

on the derailment

of a wagon in the composition of the freight train no. 39462

belonging to SC SETRVTRANS INVEST SA, occurred on the line Voslabeni-Chileni

belonging to CF Brasov Regional Branch, on the 25<sup>th</sup> of November 2010



## NOTICE

With reference to the railway accident occurred on the 25<sup>th</sup> of November 2010 in the running of the freight train no. 39462, on the range of activity of CF Brasov Regional Branch, line Voslabeni - Chileni, consisting of the derailment of a wagon by an axle, Romanian Railway Investigating Body carried out an investigation, according to the provisions of Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety approved by the Government Decision no. 117/2010. 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.

Bucharest, the 14<sup>th</sup> of March 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 25<sup>th</sup> of November 2010 in the running of the freight train no. 39462 belonging to SC SERVTRANS INVEST SA, on the line Voslabeni - Chileni, on the range of activity of CF Brasov Regional Branch;***

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## **I. PREAMBLE**

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

With reference to the railway accident occurred on the 25<sup>th</sup> of November 2010 in the running of the freight train no. 39462, consisting in the derailment of a wagon by an axle, on the line Voslabeni - Chileni at km 0+300, on the range of activity of CF Brasov Regional Branch, Romanian Railway Investigating Body, permanent and independent body from the Romanian Railway Authority - AFER hereinafter referred as OIFR, started an investigation to prevent accidents with similar causes, by establishing the conditions, determining the causes and issuing safety recommendations.

Through the investigation, the information on the respective accident was gathered and analyzed, the conditions were established and the causes determined.

OIFR investigation did not aim to establish the guilty or the responsibility in this situation, its aim being to improve railway safety and to prevent railway accidents.

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

Immediately after the occurrence of the railway accident Romanian Railway Investigating Body was notified verbally and in written by the Romanian Railway Safety Authority, body operating in Romanian Railway Authority – AFER about the occurrence of the railway accident in which had been involved the freight train no. 39462. Also Romanian Railway Investigating Body took note on the following consequences:

- the freight train 39462 was stopped on the line Voslabeni-Chileni before the shunting signal M 6 and the switch 6-14 with access to lines 4-8 from the flag station (Hm) Voslabeni having the wagon no. 845359347521 the second by locomotive derailed by the first axle (axle no.3) of the second bogie, with both wheels fallen, the one on the right in the running direction, between the rail wires and the one on the left outside the rail to outside the curve at about 15 cm from the rails;
- the derailed axle ran about 90 m until the stop km 0+210;
- the locomotive was stopped in front of the access section to the switch no. 6 from Hm Voslabeni.

There were no deaths or injuries.

At the place of the accident were also present the representatives of Romanian Railway Safety Authority, of National Railway Company CFR<sup>SA</sup>, of SC SERVTRANS INVEST SA.

Through the Decision no. 39 of the 26<sup>th</sup> of November 2010, of OIFR Director, according to the provisions of the art. 19, paragraph (2) of the Law no. 55/2006 on railway safety, the investigation commission was appointed, consisting in:

- |   |                     |
|---|---------------------|
| • Sever PAUL – OIFR investigator                              | - main investigator |
| • Dumitru SFÂRLOS – OIFR investigator                         | - member            |
| • Ștefan BUCUR – regional inspector SCV-SRCF Brasov           | - member            |
| • Ioan VLAD – regional inspector SCL-SRCF Brasov              | - member            |
| • Gheorghe BARBU - driver instructor - SC SERVTRANS INVEST SA | - member            |
| • Mihai PRIMAC - instructor- SC SERVTRANS INVEST SA           | - member            |

During the investigation, CF Brasov Regional Branch, through the document no. 612/1/226/02.02.2011 requested the replacement of the two members of the commission its employees Bucur Ștefan and Vlad Ioan due to some personal problems of them. In their place were proposed Mr. Grigercsik Ștefan and Mr. Dinescu Florian.

Following this, the investigation was complete by the commission consisting of:

- Sever PAUL – OIFR investigator - main investigator
- Dumitru SFÂRLOS – OIFR investigator - member
- Ștefan GRIGERCSIK – Head of lines service - SRCF Brasov - member
- Florian DINESCU – regional instructor MR - SRCF Brasov - member
- Gheorghe BARBU- driver instructor- SC SERVTRANS INVEST SA - member
- Mihai PRIMAC – instructor V- SC SERVTRANS INVEST SA - member

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

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

On the 25<sup>th</sup> of November 2010 the freight train no. 39462, was running on the section Voslabeni - Chileni, where the running of the trains is made using the system “centralized management of train traffic”.

The freight train no. 39462 belonging to SC SERVTRANS INVEST SRL Bucharest had in composition 20 wagons series Eakkmos loaded with broken stone, 80 axles, 1443 tons, automatic braked tonnage after service book 722 t, in fact 1042 t, hand braked tonnage after service book 231 t, in fact 340 t, with a length of 305 meters, being towed with the locomotive EA 837 belonging to SNTFC “CFR – Calatori” SA, leased by SC SOFTRANS SA. The locomotive was driven and served by locomotive staff belonging to SC SOFTRANS SA, being also assisted by a locomotive driver belonging to SC SERVTRANS INVEST SRL Bucharest.

Around 1:54p.m., near the shunting signal M6 of Hm Voslabeni which had a permissive light indication, occurred the derailment by an axle (the third of the wagon and the first of the bogie in the running direction, corresponding to the wheels 3-4) of the wagon no. 845359347521, with the wheel no. 3 (on the right in the running direction) between the rail wires and with the wheel no. 4 (on the left in the running direction), outside the rail, to the outside of the curve at about 15 cm from the rails.

According to the Freeways register from Hm Chileni and to the minutes of checking and reading the speedometer band no. 453B/1967/2010 prepared by Brasov Depot, the train was sent from Hm Chileni to Hm Voslabeni at 1:40p.m., based on the written provision no. 6 of the traffic operator from the Tg. Mures Traffic Controller, the locomotive driver receiving the movement order no. 093201. In Hm Voslabeni the train was going to be shunt at line 4 deviated.

The railway accident occurred before the signal M6, of access in Hm Voslabeni from Hm Chileni. The gradient on the railway accident area is of 15.3‰ from the km 0+300 to km 0+400 and of 10‰ between km 0+200 and km 0+300.

The area of the railway accident is located on the running section Voslabeni - Chileni, belonging to CNCF “CFR” SA - CF Brasov Regional Branch.

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

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

**The direct cause** of the accident was an accumulation of circumstances that led to the fall of the wheel on the right of the first axle of the second bogie, in the running direction, between the rail wires, which after running 4.68 m with the bandage rim on the vertical screws of fixing the rail on the right of the path (inner wire of the curve) resulted in the escalation of the rail on the left of the path (outer wire of the curve) by the wheel on the left of the first axle of the second bogie in the running direction and its fall outside the path.

#### **A.2.2. Contributing factors**

- Increase of the vertical force on the running surface inside the curve (right in the running direction) favored by the existence of an excessive over-elevation corresponding to the running speed limited to 30 km/h, which resulted of the wooden sleepers wear under the metallic clamping plates (plates immersion in the sleepers – photo 1).



**Photo1:** *Metallic plate immersed in the sleepers on the inner wire of the curve*

- Increase of the horizontal force value that operates in the running plane of the rail inside the curve (right in the running direction) favored by the existence of an excessive over-elevation corresponding to the running speed limited to 30 km/h, which resulted of the accelerated wear of the system of clamping the metallic plates under the rail on the wooden sleepers. (photo1)
- Existence of a defective sleeper whose capacity to provide rail clamping on the sleeper was diminished and which under the effect of additional stress due to excess of over-elevation produced increasing of the path width (gauge) under load.
- Existence of some deviations from the gauge that do not spread evenly with a maximum variation of 2mm/m.
- Stroke at the friction stones amounted, improper to the bogie with the axles 5-6 and 7-8 (not derailed) of 3 mm to the minimum of 6 mm provided in the Instructions on technical inspection and maintenance of wagons in operation no. 250 table 6 no. 20, led to the hardening of the whole chassis - bogie that influenced how the wagon entered the curve.





**Photo 2:** *Bandage of the axle no. 3 in the running direction*

- Values of the bandage rates  $q_r$  of the axle no. 3 in the running direction (the derailed axle), at the minimum limit of 6.5 mm at the wheel no. 4 and of 6.6 mm at the wheel no. 3, which favored the escalation of the rail on the outer wire of the curve and influenced the entry of the bogie into curve (photo 2).
- Values of the bandage rates  $q_r$  of the axle no. 1 in the running direction, at the minimum limit of 6.5 mm at wheel no. 8 and of 6.6 mm at wheel no. 7, which influenced the entry on the wagon into curve.
- An additional load of the wheel no. 3, on the right in the running direction (that fell between the rail wires), to the wheel no. 4, on the left in the running direction, with a report of the axles loads of about 1.13 to 1 (calculated as the average of the three checks of the axle loads performed on the rate line "0", on the electronic device of SC "CFR SIRV" SA Brasov – device specialized to check the axle loads at the passenger coaches – a check, respectively on the electronic device of SC "CFR SCRL" SA Brasov – device specialized to check the axle loads of the locomotives – two checks), without displacing the center of gravity of the load.
- Value of the distances between the inner sides of the derailed axle measured in two points, of 1357 mm, at the instructional minimum limit, and in a point, of 1356.5 mm under the instructional minimum limit, values obtained after the measurements performed in 3 points located at 120° from each other, closer to the rail head, measurements performed after the derailment.
- Value of the distance between the outer sides of the derailed axle of 1410.5 mm, close to the instructional minimum limit, wheels diameters being of 890 mm.

The derailment of the axle occurred by the accumulation of all the factors above, none of them could cause by itself the derailment of the wagon axle.

### **A.2.3. Underlying causes**

None.

### **A.2.4. Root causes**

2.4.1. Exceeding the instructional term on the periodicity of execution of regular repair works at lines.

2.4.2. Operational use of the rolling stock with bandages values at the minimum instructionally admitted limit and with defects at the wagon chassis (inappropriate stroke at the friction stones).



### A.3. Severity level

According to the provisions of the art. 3, letter l of the Law no. 55/2006 on railway safety and 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 railway event is categorized as railway accident.

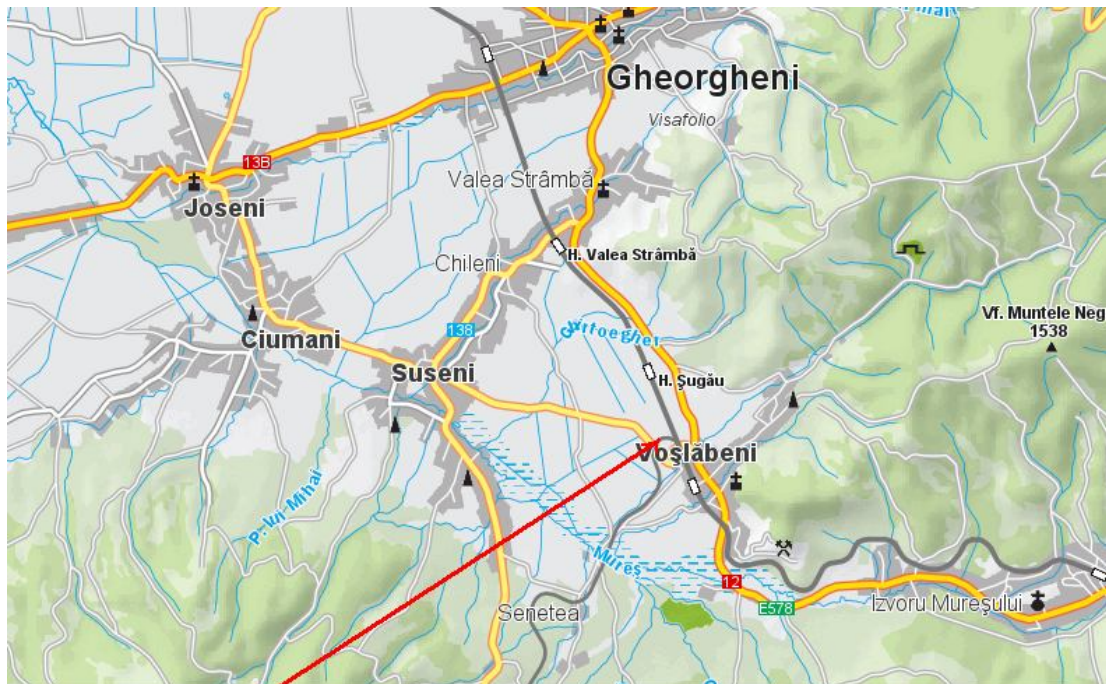
### A.4 Safety recommendations

None.

## B. INVESTIGATING REPORT

### B.1. Description of the accident

On the 25<sup>th</sup> of November 2010 the freight train no. 39462, running between Chileni – Voslabeni left from Hm Chileni at 1:40p.m. to Hm Voslabeni where was going to be shunt at line no. 4.



place of the accident

**Photo 3:** Geographical location of the accident

Around 1:54p.m. at km 0+300, on the curve of entry in Hm Voslabeni, occurred the derailment of the wagon no. 845359347521, the second by locomotive, by the first axle (axle no.3) of the second bogie.

The derailment started at km 0+300 on the inner wire of the circular curve, with  $R=200$  m, by the fall of the wheel on the right of the first axle, of the bogie 2, in the running direction of the wagon no. 845359347521 the second by locomotive, inside the rail. (photo.4)



**Photo 4:** *Place of the beginning of fall of the right wheel between the rail wires*

After a distance of 4.68 m with the right axle on the ends of the vertical screws of clamping the rail on the metallic plates, the left wheel escalated the rail on the outer wire of the curve, on the left in the running direction, and then fell outside the rail. (photo.5)



**Photo 5:** *Mark the left wheel at fall outside the rail*

Both axle wheels ran on the vertical metallic clampings and sleepers about 90 m until the stop of the locomotive in front of the switch 6 of access at lines 4-8 from Hm Voslabeni.

As a consequence was the degradation of the vertical metallic clampings on the wire on the right inside the rail and on the wire on the left outside the rail.

The freight train no. 39462, had in composition the locomotive EA 837 belonging to SNTFC “CFR-Calatori” SA leased by SC SOFTRANS SA and 20 wagons belonging to SC SERVTRANS INVEST SA, wagons loaded with broken stone by SC LAFARGE AGREGATE BETOANE SA Bucharest – Suseni Quarry (photo 6).



**Photo 6:** wagon no. 845359347521 derailed

The line Chileni-Voslabeni is simple, electrified, with centralized control.

No injuries.

No damages at the lines or at the installations.

At the wagon, the derailed axle had to be turned to remove the defects due to the derailment.

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

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

2.1.1. The involved staff belongs to C.N. CF “CFR” SA – C.F. Brasov regional Branch, Lines Division Brasov, SC SOFTRANS SA and SC SERVTRANS INVEST SA.

2.1.2. The wagons in the composition of the train involved in the accident belong to SC SERVTRANS INVEST SA and are maintained by its employees and the repairs are performed by undertakings, railway authorized providers.

2.1.3. The involved railway infrastructure, respectively the line Chileni-Voslabeni, is managed by CN CF “CFR” SA – CF Brasov Regional Branch and is maintained by the staff of District 8 Izvorul Muresului - Section L6 Gheorghieni.

2.1.4. Installations signaling, centralization and blocking (SCB) between Hm Chileni and Hm Voslabeni are managed by CNCF “CFR” SA and maintained by the employees of CF Brasov Regional Branch.

2.1.5. The installation of railway communications from Hm Voslabeni is managed by CNCF “CFR” S.A. and maintained by the employees of SC TELECOMUNICATII CFR S.A.

2.1.6. The installation of power and electric traction (IFTE) is managed by CNCF “CFR” SA and maintained by the employees of SC ELECTRIFICARE CFR SA.

2.1.7 The installation of railway communications on the involved locomotive is the property of SNTFC “CFR-Calatori” SA and is maintained by its employees.



The investigation commission questioned the employees involved in the infrastructure maintenance and operation and the employees involved in driving the locomotive and serving the involved train.

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

The train was composed of 20 wagons, 80 axles, 1443 tons, length of 305m, automatically braked 1042 t, by hand 340 t, hauled by the locomotive EA 837 belonging to SNTFC “CFR-Calatori” SA, driven and served by the driver and the driver assistant belonging to the railway undertaking SC SOFTRANS SA and assisted by a locomotive driver belonging to the railway undertaking SC SERVTRANS INVEST SA.

The 20 wagons belong to the railway undertaking SC SERVTRANS INVEST SA.

The safety and vigilance equipment (DSV), the equipment for the point control of the speed and hitchhiking (INDUSI) of the locomotive equipment were active and instructionally working and with the automatic brake active.

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

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

The involved railway infrastructure, respectively the railway line, is managed by the National Railway Company “CFR” SA – CF Brasov Regional Branch, being maintained by the Lines District no. 8 Izvorul Muresului - Section L6 Gheorghieni.

The rail superstructure of the line between the flag station Chileni and the flag station Voslabeni is by rail type 49, wooden sleepers, indirect clamping type K, built in 1984 with semi-good material (SB), the running speed of the line being of 40 km/h.

In the area of the kilometer 0+300, the line is in embankment of 1-2 m, in circular curve with R=200m, over-enlarging of 20 mm, over-elevation of 65 mm, rail type 49, on wooden sleepers, with indirect clamping type K. The gradient between the km 0+200 and km 0+300 is of 10‰ and from the km 0+300 to km 0+400 is of 15.3‰. The running speed is limited to 30 km/h from the km 0+000 to 7+021(whole distance) due because of the non-execution of some RPMG works in 2001.

The current line Chileni-Voslabeni is electrified.

### **B.2.4. Means of communication**

The connection between the locomotive driver and the movement inspectors was provided through radio-telephone equipment.

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

Immediately after the railway accident, the intervention plan to eliminate the damages and to restore the trains traffic was carried out by the information circuit mentioned in 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, after which there came representatives of the public railway infrastructure manager (CNCF "CFR" SA – CF Brasov Regional Branch), of the railway undertaking SC SERVTRANS INVEST SA and of the Romanian Railway Authority – AFER.

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

### B.3.1. Deaths and injuries

None.

### B.3.2. Material damages

- at the rolling stock - 1327.34 lei;  
- according to the estimate no. 08/27.01.2011 of Section IRV Sibiu- Wagons Repairs Line Brasov Triaj;
- at lines - none;
- at the installations - none;
- at the environment - none;
- cost of means of intervention - none;
- **Total - 1327.34 lei;**

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

**Closed lines:** the traffic was not affected on the highway 400 or in Hm Voslabeni. The line Chileni-Voslabeni was closed from 2:00p.m. on the 25<sup>th</sup> of November 2010 to 1:31p.m. on the 26<sup>th</sup> of November 2010.

**Train delays:** none

## B.4. External circumstances

On the 25<sup>th</sup> of November 2010, at the time of the railway accident, the visibility was good, covered sky, coverage of 10/10, no wind and air temperature was about +3<sup>0</sup> C.

The visibility of the light signals 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

***The summary of the railway undertaking and public railway infrastructure manager staff statements***

**The locomotive driver** who drove the freight train no. 39462, stated as follows:

- normal driving conditions after leaving from Hm Chileni;
- before the signal M6 that had a permissive light, he noticed through the rearview mirror that the second wagon did not ran normally, so he stopped the train by a rapid braking;
- after stopping the train was found that the second wagon in the composition of the train was derailed by an axle.

**The driver assistant** who served the freight train no. 39462, stated as follows:

- near the M6 signal that had a permissive light, while he was watching the signal and over, he noticed that the locomotive driver stopped the train by a rapid braking;
- the driver told him that he had noticed deficiencies in the running of the train;
- checking on the ground he found that at the second wagon in the composition of the train the axle no.1 of the bogie no. 2 in the running direction was derailed.

**The technical inspector of wagons** who served the freight train no. 39462, stated as follows:

- he scrolled the train at removal from the loading and its shunting at line 3 in Hm Chileni;
- he covered the train with red disks at both ends and performed the technical inspection at composition and the complete test with the train locomotive;
- he did not find irregularities at the wagons in the composition of the train;
- after finishing the works he handed the brake note to the guard, raised the red disks and signed the roadmap of the driver;
- he performed in Hm Voslabeni, the inspection at arrival of the train set which had formed the train 39462, respectively the train 39389 on the 25<sup>th</sup> of November 2010 at 8:40a.m. and so he found out 9 shoes with wear under the limit, which he was going to replace at train's return from Hm Chileni;
- at the wagon no. 845359347521 (the derailed wagon) he found the bandage rim at wheel no. 8 from the first axle in the running direction of the wagon at the time of derailment, suspicious, but checked with the Qr pattern, it corresponded.

**IDM** on duty in Hm Chileni stated as follows:

- after the inspection and the complete test, the V body made the registrations regarding the train that the brake test is fine and the train could be sent in full traffic safety conditions;
- after reviewing the form of train description, the train being fine from the point of view of the running, he sent it to Hm Voslabeni (the traffic being made by the centralized control of trains) at 1:40p.m.;
- around 2:10p.m. was announced by the operator of Tg. Mures Traffic Controller that from the train 39462, in current line, near the entry signal of Hm Voslabeni a wagon was derailed.

**IDM** on duty in Hm Voslabeni stated as follows:

- having in running on the running section Voslabeni – Chileni with centralized control, the train no. 39462, around 1:58p.m. the train driver announces by the radio-telephone device that he could not enter the station;
- then, the technical inspector of wagons told him by phone that the second wagon in the composition of the train was derailed by the axle no. 3;
- he announced the operator from Tg. Mures Traffic Controller, the Head of Gheorghieni railway station and the Head of L District.

**The guard** who served the train no. 39462 on the 25<sup>th</sup> of November 2010, stated as follows:

- on the 25<sup>th</sup> of November 2010 he was on duty for the train 39462;
- in Hm Chileni he performed the train presentation, RTV he performed the complete test and after receiving the brake note he went to the IDM from Hm Chileni;
- after the IDM prepared the sending forms he assisted the train 39462 to Hm Voslabeni;
- he did his job in the regulations of the instructions in force;
- during the loading he was near the wagons and he did not find irregularities when leaving from Hm Chileni;
- RTV did not announce any irregularity regarding the train;
- he has no obligation regarding the weighing of the wagons;
- if he finds that a wagon was improperly loaded he announces verbally the quarry worker who takes remediation actions;

**The railway inspector** from District 8 Izvorul Muresului stated as follows:

- the last inspection of the line Voslabeni-Chileni was performed on the 25<sup>th</sup> of November 2010, according to the maintenance schedule approved by the management of section L 6 Gheorghieni;
- in the area of km. 0+300 at the last inspection he did not find defects at the line or defect materials that could have endanger the traffic safety;

- it was not necessary to announce in written the management of the team and of the district on the existence on the rail of the vertical clamping incomplete and degraded (coach screws missing of broken, metallic plates immersed in the sleeper, etc.), because the rail condition was corresponding to the traffic safety for the running speed;

**Head of district** from the District 8 Izvorul Muresului stated as follows:

- the non-interoperable line Voslabeni-Chileni was taken over from SC SERVTRANS INVEST SA on the 15<sup>th</sup> of July 2009;
- when taking over the line, was prepared a minutes of handover in terms of financial-accounting (fixed assets management), not from technical point of view;
- the evidences of the line were not given over by SC SERVTRANS INVEST SA, only were established the works to be performed during the next period, there was not carried out the census of the materials, of the artworks and rail geometry;
- at the census of the sleepers, of the material, of the works in 2010 were reviewed in the area of km. 0+200-0+300, a number of 18 pieces of inappropriate sleepers, of which 5 pieces I emergency; these sleepers were not replaced because they have not been supplied, but were required normal wooden sleepers for the district through reports of necessary and monthly traffic safety analysis;
- the last work on the line Voslabeni-Chileni in the area of km. 0+300 was performed on the 12<sup>th</sup> of October 2010, drawing the line to pattern (gauge rectification) in quantity of 27 sleeper heads, using 30 pieces rubber pads K 49 (completion after handling of metallic plates);
- in 2010, the District 8 Izvorul Muresului was not supplied with normal wooden sleepers;
- in 2010 on the range of the district were reviewed the inappropriate sleepers in the rail, as follows:
  - the non-interoperable line Voslabeni-Chileni, total reviewed 158 pieces, of which 64 pieces I emergency;
  - stations lines (Izvorul Muresului, Voslabeni), were reviewed a number of 1773 pieces inappropriate wooden sleepers, of which 1205 pieces I emergency;
  - in current non-interoperable line were reviewed a number of 44 pieces inappropriate wooden sleepers, of which 16 pieces I emergency;

**The Deputy Head of section L6 Gheorghieni** stated as follows:

- at the inappropriate sleepers census in Autumn of 2010 for 2011 were reviewed a number of 4701 inappropriate wooden sleepers;
- since the 17<sup>th</sup> of November 2010 was supplied a number of 1022 pieces normal wooden sleepers for all the L sections on the range of CF Brasov Regional Branch, but due to adverse weather conditions specific to the area, on the range of the L section Gheorghieni no sleeper was replaced;
- the speed limit of 30 km/h on the line Voslabeni-Chileni was introduced in 2001 to perform the works of RPMG+CI;
- he inspected together with the Head of district the curve on which occurred the derailment on the 10<sup>th</sup> of November 2010;
- given the provisions of the Instruction 314, art. 1, paragraph 2, on the distance Voslabeni-Chileni were not performed works of restoration or changes in the geometry of curves;

**The Head of section L6 Gheorghieni** stated as follows:

- the non-interoperable line Voslabeni-Chileni was taken over from SC SERVTRANS INVEST SA on the 15<sup>th</sup> of July 2009;
- when taking over the line by the section, was prepared a minutes of inspection to establish the maintenance works to be performed in the near future, not a census of materials;
- the speed limit of 30 km/h on the line Voslabeni-Chileni was introduced in 2001 to perform the works of RPMG+CI;
- at the date when the speed was limited, by lack of fuel, were performed work only up to km. 1+800, the work beginning from km. 7+021 to the railway station Voslabeni; the area km. 0+000-1+800 remained without works, which maintained the speed limitation;



- during the period when it had the line leased, SC SERVTRANS INVEST SA did not perform any work with heavy rail machines;
- at the rail materials census carried out in 2003 for 2004, on the area of km. 0+200-0+300 were reviewed a number of 26 inappropriate sleepers, of which 13 of I emergency, sleepers that should have been replaced during the period 01.11.2003-31.10.2004;
- in September 2004, the line Voslabeni-Chileni was given over to SC SERVTRANS INVEST SA;
- during the period September 2004-July 2009, the maintenance and repairs works were performed by SC SERVTRANS INVEST SA;
- at the census of the inappropriate sleepers in autumn of 2010 for 2011, on the area km. 0+200-0+300 were reviewed a number of 18 inappropriate sleepers, of which 5 pieces I emergency, sleepers that were going to be replaced during the period 01.11.2010-31.10.2011; on this area were not performed works of sleepers replacement, but only of gauge rectification and of worn rail small material replacement;
- on the range of the section, at the census performed in the autumn of 2010, for the year of schedule 01.11.2010-31.10.2011 were reviewed a number of 4701 inappropriate sleepers;
- in 2010 were supplied beginning with the 17<sup>th</sup> of November 2010 a number of 1022 pieces of normal wooden sleepers, of which, due to adverse weather conditions, no piece was replaced; the supplied sleepers are for all the L sections on the range of CF Brasov Regional Branch;
- the curve where occurred the derailment was thoroughly controlled by the Head of district together with the Deputy Head of section at that time on the 30<sup>th</sup> of April 2010;
- during the period 13<sup>th</sup> – 16<sup>th</sup> of September 2010, the curve was controlled by the Head of section during the detailed inspection;
- given the provision of the art. 1, paragraph 2 of the Instruction no. 314/1989, on the distance Voslabeni-Chileni were not performed restoration works to modify the geometry of the curves.

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

In carrying out its responsibilities and duties, the public railway infrastructure manager – the National Railway Company “CFR” SA and the railway undertaking SC SERVTRANS INVEST SA had implemented their own safety management system.

In this context, CN CF “CFR” SA and SC SERVTRANS INVEST SA provide the control of risks associated with the activity of manager, respectively transport operator.

### **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 for setting terms and order for the rail inspections no. 305 approved by OMT no. 71 on the 17<sup>th</sup> of February 1997;
- Instruction of standards and tolerances at lines, switches, bridges and tunnels - standard gauge lines no. 314/1964;
- Instruction for the lineman head of district for the rail maintenance no. 323/1965;
- Instruction for the activity of the foreman for the maintenance of the line no.322/1972;
- Instruction for the flagmen and rail or dangerous points inspectors no. 321/1972;

- Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989;

#### *sources and references*

- photos taken immediately after the accidents by the members of the investigation commission;
- documents on the lines maintenance provided by the responsible with their maintenance;
- results of the measurements performed immediately after the railway accident at the rail superstructure and at the derailed wagon;
- inspection and interpretation of the technical condition of the elements involved in the accident: infrastructure, railway installations and train;
- questioning of the staff involved in the railway accident;
- minutes and measurements performed immediately after the railway accidents by the members of the research commission and those of the investigation commission;
- documents on the lines maintenance, provided by the responsible with their maintenance;
- inspection and interpretation of the technical condition of the elements involved in the accident (rail and wagon);
- questioning of the staff in charge with the maintenance and the operation of the involved rolling stock and lines;

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

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

##### ***Technical condition of the line before the railway accident***

In the area of the derailment the line is in curve, with  $R=200$  m, with the over-enlargement of 20 mm, over-elevation on the circular curve of 65 mm, in embankment, in slope (in the mileage direction) of 10‰ from km 0+200 to km 0+300 and of 15,3‰ from km 0+300 to km 0+400.

The line Volslabeni-Chileni was put in service in 1985 with the running speed of 40 km/h.

The only one RPMG+Ci work was performed in 2001 from the km 1+800 to km 7+021.

On the entire distance, from km 0+000 to km 7+021 in 2001 was introduced the speed restriction of 30 km/h because there were not performed all the technological stuffing and were not started the RPMG works on the distance km 0+000 to km 1+800.

In the area of the derailment the prism of broken stone was clogged in a percent of 70-80.

The instructional term on the frequency of execution of regular repairs works at the lines was overdue.

During the period 2004-2009 the line was leased by SC SERVTRANS INVEST SA that did not perform works with heavy rail machines.

##### ***Findings and measurements made at the line, after the occurrence of the derailment and the removal of the wagons.***

After the derailed wagon was restored on the line on the 25<sup>th</sup> of November 2010 were performed checks with the rail measurement pattern of the gauge and of the cross level, starting from the derailment point in the opposite of the running direction of the train.

**Table 1**

point	0	1	2	3	4	5	6	7
E (mm)	+40	+35	+19	+13	+21	+12	+18	+36

N (mm)	63	73	74	69	64	59	57	59
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note: „o” – derailment place at km 0+300 where the measurement is influenced by the derailment;  
 -distance between the measurement points 2.5 m;  
 -measurement direction is in the mileage direction (in the opposite of the running direction of the train)

Before the “o” point where the derailment occurred were found the following:

- the instructional limit values of the rail twisting are not exceeded.
- are exceeded the tolerances in operation of the gauge values in point 1, but the maximum admitted limit of 1470mm is not exceeded.
- is exceeded the operating deviation of the gauge variation of 2 mm/m between the points 1-2, 3-4, 4-5, 6-7.
- the effective over-elevation exceeds the value of the over-elevation designed for the speed of 40km/h in points 1, 2, 3 without exceeding the tolerated deviations for operation.
- for the speed of 30 km/h, at the date of the derailment, the normal designed over-elevation is exceeded by the effective over-elevation of the line resulting of the acceleration of the vertical wear of the rail on the inner wire and increase of the stress on the vertical clamping and sleepers on the inner wire.

Also, at the same occasion were measured the gauge and the cross level in the point where the wheel on the outer wire of the curve escalated the rail head, at a distance of 4.68 m after “o” point in the running direction E(mm) +19 and N(mm) 57.

Checking the sleepers condition on the measured length, preceding the derailment point, was found that at “o” point was an inappropriate sleeper with the coach screws inactive on the inner wire of the curve (photo 3), between the points 5-6 was an inappropriate sleeper and a missing coach screw and between the points 6-7 was an inappropriate sleeper and 2 missing coach screws.

***Data resulted from the checks carried out on spot by the investigation commission on the 29<sup>th</sup> of November 2010***

- in the area affected by the derailment were replaced 18 wooden sleepers and was corrected the gauge on a length of 20 m.
- the first joint after “o” point on the inner point of the curve to km 0+000 has the sleepers mechanically worn under the metallic plate that led to the plate immersion into the sleepers with 10-15 mm (photo.1).
- on the circular curve, in the area of the derailment the joints are not at plotter, the instructional plotter difference of 50 mm being exceeded.
- Were also measured the arrows of the circular curve in 6 points before and after the “o” point **from the km 0+285 to km 0+310**. The measurements were made from 5 to 5 meters, with a string of 10 m, the first measuring point being at km 1+310 (point 1). The measured valued do not exceed the instructional limit values corresponding to the speed of 30 km/h

**Table 2**

Point no.	1	2	3(“o”)	4	5	6
Y measured (mm)	69	60	74	64	59	57
Y designed (mm)	62.5	62.5	62.5	62.5	62.5	62.5

- In the area of the derailment the rails wears have the following values:
  - the rail on the inner wire of the curve (right in the running direction) has the vertical wear of 4 mm;
  - the rail on the outer wire of the curve (left in the running direction) has the vertical wear of 2 mm and the side wear of 8 mm.

The measured values do not exceed the instructional limits.

### ***Data resulted from the analysis of the documents asked to the railway infrastructure manager***

The last maintenance work on the area of the derailment was performed on the 12<sup>th</sup> of October 2010 and consisted of the correction of the gauge from km 0+200 to km 0+300.

The last measurement with the rail measuring cart was performed on the 12<sup>th</sup> of October 2010 when was found a 2 grade defect at km 0+291(V2). In the derailment area were not found defects at the rail width during this measurement.

At the last census performed in the autumn of 2010 by the lines district no.8 Izvorul Muresului on the area km 0+200 to km 0+300 were reviewed 18 inappropriate wooden sleepers of which 5 of I emergency corresponding to a percent of over 10 that exceeds the instructional admitted number.

The annual measurement of the curve, in which occurred the derailment, was made on the 30<sup>th</sup> of April 2010, on the distance km 0+245 to km 0+340 the measured values of the arrows, over-enlargement, over-elevation and vertical and horizontal wears without exceeding the instructional limits for the value of the curve radius and of the running speed of 40 km/h. Was not modified the over-elevation of the curve, this being calculated for the speed of 40Km/h and not for the existing of 30 km/h introduced since 2001. For the speed of 30 km/h the measured values exceed the values of normal over-elevations and even of those increased with 25% prided in the regulations in force at the release in operation of the line. Are exceeded the operation values provided in the current regulations. The consequence is the overloading and the acceleration of the vertical wear of the inner wire, without direct consequences on the safety at derailment. The maximum admitted value of the over-elevation is not exceeded.

### **B.5.4.2. Data found on the work of the rolling stock and of its technical installations**

#### **B.5.4.2.1. At locomotive**

The automatic brake of the train was active, the safety and vigilance equipment (DSV), the equipment for the point control of the speed and hitchhiking (INDUSI) of the locomotive equipment were active and instructionally working.

After the interpretation of the Hassler installation records on the locomotive EA 837, that hauled the freight train no.39462 resulted that after leaving from Hm Chileni, the train ran normally until the moment of the derailment, with speeds between 18 km/h and 28 km/h, the speed when the rapid braking to stop the train was performed being of 20 km/h. At the moment of the derailment the train was running inertial, the speed decreasing in that period from the value of 28 km/h to the value of 20 km/h.

#### **B.5.4.2.2. At the involved wagon**

##### **B.5.4.2.2.1. Technical features of the wagon no. 845359347521**

- |                                     |   |
|-------------------------------------|---|
| • wagon series                      | - Eakkmos;  |
| • year of construction              | - could not be indentified;                       |
| • tare of the wagon                 | - 31.600 kg;                                      |
| • length of the wagon               | - 13.800 m;                                       |
| • distance between the bogie pivots | - 8.20 m;   |
| • collision devices                 | - pads with rectangular plates;                   |
| • traction device                   | - discontinuous;                                  |
| • bogies                            | - YCS 25;   |
| • bogie wheelbase                   | - 1.80 m;   |
| • mounted axles                     | - 3 axles with applied bandage, 1 monoblock axle; |
| • automatic brake                   | - KE-GP;  |
| • regulator                         | - SAB type DRV-2 at- 600;                         |

#### B.5.4.2.2.2. Inspections and repairs at the involved wagon

Wagon no. 845359347521

- periodic repair type RP on the 12<sup>th</sup> of October 2007 at REC;
- inspection RR+RIF on the 10<sup>th</sup> of October 2010 at STM – Tg. Mures;

#### B.5.4.2.2.3. Findings at the involved wagon during the checks made after the accident

After the railway accident, at the involved wagon were performed dimensional checks of the profile of the wheels from the derailed bogies and was measured the height of the pad centers to the upper level of the rails.

The values resulted from these checks are the following:

Measured elements	Wheel no. 1	Wheel no. 2	Wheel no. 3	Wheel no. 4	Wheel no. 5	Wheel no. 6	Wheel no. 7	Wheel no. 8
Rim width (mm)	27	26	27	26.5	27.5	27.5	27	27
Rim height (mm)	26.5	32	28	28	28	28.5	28	27
Rate $q_r$ (mm)	6.6	6.6	6.6	6.5	6.8	8.5	6.6	6.5
Distance between the inner faces measured in three points placed at 120° (mm)	1358.5 1359.5 1358		1357 1357 1356.5		1360 1360.5 1360.5		1360 1360 1359.5	
Wheels diameters in the rolling circle plan (mm)	900	900	890	890	890	880	890	890
Height of the pad centers to the upper level of the rails (mm)	996		998		1004		1006	

After checking the stroke at the friction stones, were found the following:

- at the front bogie in the running direction, the amounted stroke is of **3 mm**, 0 on the left and 3 mm on the right in the running direction;
- at the back bogie in the running direction (the one with the derailed axle), the amounted stroke is of **13 mm**, 0 on the left and 13 mm on the right in the running direction;

At the derailed wagon were performed also five checks of the loads on the axles (in the running position in the moment of derailment and after return), three of them on the device belonging to SC “CFR SIRV” SA Brasov – specialized device to check the stresses on the axle at the coaches and two checks on the electronic device of SC “CFR SCRL” SA Brasov – specialized device to check the stresses of the axle of the locomotives.

Of the five performed checks, three were made with the entire wagon on the line of rate “zero” of the device, two checks on the device belonging to SC “CFR SIRV” SA Brasov.

After all the checks was found an additional load of the wheel no. 3 (the one that fell between the rail wires) to the wheel no. 4 (the one that escalated the outer wire).

Analyzing the results of the three checks performed with the entire wagon on the rate line “zero” resulted that the wheel no. 3 was more loaded than the wheel no. 4 with an average quantity of 1189 kg and an average ratio between the wheels of 1.13.

The results of the two checks on the same device, without the wagon placed on the rate line “zero”, one with the wagon in the running position of the derailment moment and the second with the wagon turned, were totally different, the only one conclusion being that the wheel no. 3 was more loaded than the wheel no. 4.

The wagon was loaded by SC LAFARGE AGREGATE BETOANE SA Bucharest – Suseni quarry and weighed on CF scales belonging to it, dynamically. During checks was found that at the wagon involved in the derailment had not been exceeded the maximum admitted load, but at the date of the weighing, its metrological checking was outdated, the last Bulletin of metrological checking no. 0060870 being on the 2<sup>nd</sup> of April 2009.

For the check of an eventual difference at loading between the axles, in front of each wheel was put a piece of aluminum wire, of about 110 mm length, then the wagon was passed over them. Measuring the width of remained pieces of wire were found the following values:

R 1 - 2.2 mm	R 2 - 1.9 mm
<b>R 3 - 1.7 mm</b>	<b>R 4 - 2.1 mm</b>
R 5 - 2 mm	R 6 - 2.1 mm
R 7 - 1.9 mm	R 8 - 1.9 mm

From the analysis of data obtained resulted that the biggest difference between the widths of wire pieces remained after passing the wagon was recorded to the derailed axle, of 0.4 mm, concluding that the wheel no. 3 was more loaded than the wheel no. 4.

Also, the wagons was lifted in winches and after removing the bogie with the axle no. 3 – derailed, there were found the following:

- the polyamide plate was broken in three big pieces, but they were in the lower pallet;
- the polyamide plate had abnormal operation wears (reduced thickness) and was smeared with grease;
- the pallet pivot had mobility in the upper pallet;
- the friction stones had signs of dry friction with metallic luster;

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

### **B.6.1. Conclusions on the technical condition of the rail superstructure before the derailment**

1. The measurement performed after the derailment (on the 25<sup>th</sup> of November 2010 by the investigation commission) according to the table no. 1 shows:

- an exceeding of the operation deviation of the gauge variation of 2 mm/m between the points 1-2, 3-4, 4-5, 6-7;
- the tolerances in operation of the gauge values in point 1 are exceeded, but the maximum admitted limit of 1470mm is not exceeded;

There were not complied the provisions of the art. 1 point 14.1 of the Instruction no. 314/1989 of standards and tolerances for the construction and maintenance of the rail - standard gauge lines.

2. The measurement performed after the derailment (on the 25<sup>th</sup> of November 2010 by the investigation commission) according to the table no. 1 and those performed on the 30<sup>th</sup> of April 2010 at cross level show:

- for the speed of 30 km/h the measured valued exceed the values of normal over-elevations and even those increased with 25%.

There were not complied the provisions of Table 3 and 6 of the Instruction no. 314/1964 of standards and tolerances at lines, switches, bridges and tunnels - standard gauge lines applicable to the segment of the line where were not performed regular repair works. These values do not exceed the value of the maximum admitted over-elevation from the TABLE 3 of the Instruction no. 314/1989 of standards and tolerances for the construction and maintenance of the rail - standard gauge lines.

3. The sleepers from the joint located at a meter after the point (“o”) in the running direction were not damaged in the area of clamping the bridge metallic plate and were not replaced after the derailment. There were not complied the provisions of the art. 25, point 4 of the Instruction no. 314/1989 of standards and tolerances for the construction and maintenance of the rail - standard gauge lines, that require that «at joints are not admitted inappropriate sleepers»;

4. All the measurements were performed after the derailment. The irregularities found after the measurement point (“o”) could be a consequence of the derailment;

#### **B.6.2. Conclusions on the technical condition of the wagons in the composition of the train**

##### ***Findings at the wagons in the composition of the train:***

-the regime exchangers “Freight – Passenger” and “Empty – Loaded” were in proper positions corresponding to the load condition of the wagons, respectively “Freight” and “Loaded”.

- the linking of the wagons between them was done properly;

- the operating hook of the traction device properly tighten for freight trains;

- no parts were found uninsured to endanger the traffic safety.

#### **B.6.3. Conclusions**

1. On the entire measured distance are not exceeded the tolerances at the rail twisting provided at the art. 7 of the Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989

2. The gauge values resulted from the checks performed with the rail measuring pattern, in the area of the accident, show that are exceeded the tolerances in operation of the gauge values in point 1, but the maximum admitted limit of 1470 mm is not exceeded. The values were within the admitted tolerances according to the art. 1 point 13 and 14.1 of the Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989

3. The interpretation of the measurements corresponding to the vertical and side wears of the rail on the outer wire of the curve according to the Technical prescriptions on the vertical and side wears of the rails - edition 1987 show vertical wears of 4 mm and side wears of less than 8 mm. The measured values were within the tolerances admitted by the provisions of the tables 24 and 25 of the Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989.

4. The increased over-elevation on the circular curve led by the overloading of the inner wire to the accelerated wear of the sleepers and of the rail clamping on the sleepers.

5. Non-compliance with the cyclical of the repairs at the lines led to the degradation of the rail condition that needed the limitation of the running speed and thus to the increase of the aggression of the railway vehicle on the rail due to the mismatch of the speed with the geometry of the curve.

6. The amounted stoke at the friction stones at the bogie with the wheels 5-6 and 7-8 is of **3 mm** under the instructional limit of **6 mm** according to the “Instructions for technical inspection and maintenance of wagons in operation no. 250” table 6 no. 20.

7. The wagon involved in the derailment had two wheels, no. 8 and no. 4 (derailed) with the value of the rate  $q_r$  of 6.5 mm, value at the minimum admitted limit according to the provisions of the Instructions for technical inspection and maintenance of wagons in operation no. 250 approved by



the Order of the Minister of Transport, Constructions and Tourism no. 1817 on the 26<sup>th</sup> of October 2005 Table 1.

8. The value of the distance between the inner sides of the derailed axle was of 1357 mm in two points, at the instructional minimum limit, and under the instructional minimum limit respectively 1356.5 mm, in one point, values obtained after measurements performed in 3 points placed at 120° one from each other, closer to the rail head, measurements performed after the derailment.

9. The derailed axle had after the derailment a higher load of the wheel no. 3 than the wheel no. 4, with a ratio of the loads on the axles of 1.13 to 1, value close o the admitted value of 1.25 to 1 provided in Annex II – RIV, without displacement of the center of gravity of the load.

## **B.7. The accident causes**

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

**The direct cause** of the accident was an accumulation of circumstances that led to the fall of the wheel on the right of the first axle of the second bogie, in the running direction, between the rail wires, which after running 4.68 m with the bandage rim on the vertical screws of fixing the rail on the right of the path (inner wire of the curve) resulted in the escalation of the rail on the left of the path (outer wire of the curve) by the wheel on the left of the first axle of the second bogie in the running direction and its fall outside the path.

### **B.7.2. Contributing factors**

- Increase of the vertical force on the running surface inside the curve (right in the running direction) favored by the existence of an excessive over-elevation corresponding to the running speed limited to 30 km/h, which resulted of the wooden sleepers wear under the metallic clamping plates (plates immersion in the sleepers – photo 1).
- Increase of the horizontal force value that operates in the running plane of the rail inside the curve (right in the running direction) favored by the existence of an excessive over-elevation corresponding to the running speed limited to 30 km/h, which resulted of the accelerated wear of the system of clamping the metallic plates under the rail on the wooden sleepers. (photo1)
- Existence of a defective sleeper whose capacity to provide rail clamping on the sleeper was diminished and which under the effect of additional stress due to excess of over-elevation produced increasing of the path width (gauge) under load.
- Existence of some deviations from the gauge that do not spread evenly with a maximum variation of 2mm/m.
- Stroke at the friction stones amounted, improper to the bogie with the axles 5-6 and 7-8 (not derailed) of 3 mm to the minimum of 6 mm provided in the Instructions on technical inspection and maintenance of wagons in operation no. 250 table 6 no. 20, led to the hardening of the whole chassis - bogie that influenced how the wagon entered the curve.
- Values of the bandage rates  $q_r$  of the axle no. 3 in the running direction (the derailed axle), at the minimum limit of 6.5 mm at the wheel no. 4 and of 6.6 mm at the wheel no. 3, which favored the escalation of the rail on the outer wire of the curve and influenced the entry of the bogie into curve (photo 2).
- Values of the bandage rates  $q_r$  of the axle no. 1 in the running direction, at the minimum limit of 6.5 mm at wheel no. 8 and of 6.6 mm at wheel no. 7, which influenced the entry on the wagon into curve.
- An additional load of the wheel no. 3, on the right in the running direction (that fell between the rail wires), to the wheel no. 4, on the left in the running direction, with a report of the axles loads of about 1.13 to 1 (calculated as the average of the three checks of the axle loads performed on the rate line "0", on the electronic device of SC "CFR SIRV" SA Brasov – device specialized to check the axle loads at the passenger coaches – a check, respectively on the electronic device of

SC “CFR SCRL” SA Brasov – device specialized to check the axle loads of the locomotives – two checks), without displacing the center of gravity of the load.

- Value of the distances between the inner sides of the derailed axle measured in two points, of 1357 mm, at the instructional minimum limit, and in a point, of 1356.5 mm under the instructional minimum limit, values obtained after the measurements performed in 3 points located at 120° from each other, closer to the rail head, measurements performed after the derailment.
- Value of the distance between the outer sides of the derailed axle of 1410.5 mm, close to the instructional minimum limit, wheels diameters being of 890 mm.

The derailment of the axle occurred by the accumulation of all the factors above, none of them could cause by itself the derailment of the wagon axle.

### **B.7.3. Underlying causes**

None.

### **B.7.4. Root causes**

7.4.1. Exceeding the instructional term on the periodicity of execution of regular repair works at lines.

7.4.2. Operational use of the rolling stock with bandages values at the minimum instructionally admitted limit and with defects at the wagon chassis (inappropriate stroke at the friction stones).

## **C. Safety recommendations**

None.

This investigation report will be sent to Romanian Railway Safety Authority, to National Railway Company “CFR” SA and to SC SERVTRANS INVEST SA Bucharest.

According to the provisions of the Law no. 55/2006 on the railway safety and 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 Safety Authority will monitor the implementation of these recommendations.

Members of the investigation commission:

- |                     |                     |       |
|---------------------|---------------------|-------|
| • Sever PAUL        | - main investigator | _____ |
| • Dumitru SFÂRLOS   | - member            | _____ |
| • Ștefan GRIGERCSIK | - member            | _____ |
| • Florian DINESCU   | - member            | _____ |
| • Gheorghe BARBU    | - member            | _____ |
| • Mihai PRIMAC      | - member            | _____ |