



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER



ROMANIAN RAILWAY INVESTIGATING BODY

INVESTIGATING REPORT

of the railway accident
occured on 19.04.2012 between the railway stations Augustin and Racoş in the Regional center for
railway operation, maintenance and repairs Braşov



*Final report
23rd of August 2012*

NOTICE

Concerning the railway accident happened on **19.04.2012**, at **08:25** hour, in the **Regional center for railway operation, maintenance and repairs Braşov**, running section Braşov - Sighişoara (electrified double line), **between the railway stations Augustin and Hm Racoş**, at km. 227+787, **by the derailment of the first bogie in the running direction of wagon no. 335353043011 (last but one) in the composition of the freight train no. 80360-1** belonging to the railway transport operator SC GFR SA Bucureşti, Romanian Railway Investigating Body performed an investigation, according to the provisions of the Government Decision no. 117/2010. Through the performed investigation, the information concerning the occurrence of this accident were gathered and analyzed, the conditions were established and the causes determined.

The investigation of Romanian Railway Investigating Body does not aim to establish the guilty or the responsibility in this case.

Bucharest, 23rd of August 2012

Approved by

Director,
Dragoş FLOROIU

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

I submit for approval

Chief investigator

Eugen ISPAS

This notice is part of the report for the investigation of the railway accident happened on the 19th of April 2012, at 08:25 hour, in the Regional center for railway operation, maintenance and repairs Braşov, on the running section Braşov – Sighişoara (electrified double line), between the railway stations Augustin and Racoş, at km 227+787, by derailment of the first bogie in the running direction of wagon no. 335353043011 (last but one) in the freight train composition no. 80360-1.

SUMMARY

I. Preamble

I.1. Introduction

I.2. Investigation process

A. Accident brief presentation

A.1 Brief presentation

A.2 Accident causes

A.2.1 Direct cause, contributing factors

A.2.2 Underlying causes

A.2.3 Root causes

A.3. Severity level

A.4. Safety recommendations

B. The investigation report

B.1 Accident presentation

B.2 Accident circumstances

B.2.1 Parties involved

B.2.2 Composition and the equipments of the train

B.2.3 Railway equipments

B.2.4 Communication facilities

B.2.5 Starting of the railway emergency plan

B.3 Accident consequences

B.3.1 Fatalities and injuries

B.3.2 Material damages

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

B.4 External circumstances

B.5 Investigation course

B.5.1 Summary of the involved staff testimonies

B.5.2 Safety management system

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

B.5.4 Operation of the technical equipments, infrastructure and rolling stock

B.5.4.1 Data found on lines

B.5.4.2 Data found on the operation of the rolling and of it's technical equipments

B.6 Analysis and conclusions

B.6.1 Conclusions on the wagons within the train composition

B.6.2 Conclusions on the track superstructure technical condition and of the accident occurrence

B.7 Accident causes

B.7.1 Direct cause, contributing factors

B.7.2 Underlying causes

B.7.3 Root causes

C. Safety Recommendations

I. PREAMBLE

I.1. Introduction

Concerning the railway accident happened on **19.04.2012**, at **08:25** hour, in the **Regional center for railway operation, maintenance and repairs Braşov**, running section Braşov - Sighişoara (electrified double line), between the railway stations **Augustin and Racoş**, at km. 227+787, **by the derailment of the first bogie in the running direction of the wagon no. 335353043011 in the freight train composition no. 80360-1** belonging to the railway transport operator SC GFR SA Bucureşti, Romanian Railway Investigating Body performed an investigation, according to the provisions of the Government Decision no. 117/2010, in order to prevent some accidents with similar causes, by establishing the conditions and determined the causes.

OIFR investigation did not aim to establish the guilty or the responsibility, it's objective being the improvement of the railway safety and the prevention of the railway accidents.

I.2 Investigation process

According to the provisions of art. 48, paragraph. 1 from the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by GD 117/2010, on 19.04.2012, OIFR decided to start an investigation on the accident happened in the **Regional center for railway operation, maintenance and repairs Braşov**, running section Braşov- Sighişoara (electrified double line), between the railway stations Augustin and Racoş, at km. 227+787, by the derailment of the first bogie in the running direction of the wagon no. 335353043011 (last but one) in the freight train composition no. 80360-1 belonging to the railway freight undertaking SC GFR SA Bucureşti.

Taking into account that the happened deeds are defined as railway accident, according to the provisions of art. 3, point 1 of the Law no. 55/2006 on railway safety and that this accident is relevant for the railway system, according to the art. 19, paragraph (2) from the Law no. 55/2006 on the traffic safety, in connection with the art. 49, paragraph (2) from the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by GD 117/2010, OIFR decided to start an investigation. Through the OIFR director Decision no. 87, from the 20th of March 2012, the investigation commission was appointed, consisting in:

- | | | |
|-------------------|---|---------------------|
| • PAUL Sever | - Investigator – OIFR | - main investigator |
| • MARCU Ioan | - Head of RRSC - „CREÎR CF”
Braşov Branch | - member |
| • BOACĂ Gheorghe | - Head of Line Division – „CREÎR CF”
Braşov Branch | - member |
| • DINESCU Florian | - Regional Instructor–„CREÎR CF”
Braşov Branch | - member |
| • BĂRBUCEANU Vlad | - Regional ganger– „CREÎR CF”
Braşov Branch | - member |
| • CRĂCIUN Stelian | - Head of Traffic Safety Department – SC GFR SA | - member |
| • GULEAMĂ Claudiu | - Head of Lines Department - SC GFR SA | - member |
| • MIHALCEA Paula | - Head of Braşov Working Point– SC GFR SA | - member |
| • BUZAC Dan | - Instructor T - SC GFR SA | - member |

A. ACCIDENT BRIEF PRESENTATION

A.1. Brief presentation

On **19.04.2012**, at **08:25 hour**, in the **Regional center for railway operation, maintenance and repairs Braşov**, running section Braşov - Sighişoara (electrified double line), between the railway stations **Augustin and Racoş**, at km. 227+787, **one occurred the derailment of the first bogie in the running direction of the wagon no. 335353043011 (last but one) in the freight train composition no. 80360-1** belonging to the railway freight undertaking SC GFR SA Bucureşti.

The freight train no. 80360-1 belonging to the railway freight undertaking SC GFR SA Bucureşti was running from Constanţa Port to Dej Călători and had in its composition the hauling locomotive EA 582, hauling a number of 29 wagons series E loaded with wires (the first 27), with caolin (the last two) and banking locomotive DA 1548.

Both locomotives were operated by the railway freight undertaking SC GFR SA Bucureşti staff.

Following this accident there were no fatalities or injuries

A.2. Accident causes

A.2.1. Direct causes, contributing factors

Direct cause

The railway accident happened as a result of the lateral oscillations of the metal plates on the timber sleepers, under the action of the horizontal forces on the rolling stock wheels while running, which led to the fall of the right wheel of the first axle from the last but one wagon between the rails, it runned in this state on a distance of 16,5 m, after which the right wheel from the same axle climbed the exterior rail of the curve and fall outside the rails.

Contributing factors

- the unsuitable timber sleepers no longer allowed the coach screws tightening for fixing the metal plates on the sleepers;
- existence of a cant of the track excess according to the running speed limited at 30 km/h that led to the increase of horizontal force value acting on the route inside the curve (right in the running direction).

A.2.2 Underlying causes

None.

A.2.3. Root causes

None.

A.3. Severity level

According to the provisions of art. 3, letter 1 from Law 55/2006 on railway safety, the event is defined as railway accident.

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

A.4. Safety recommendations

None

This investigation report will be sent to Romanian Railway Safety Authority, public railway infrastructure manager CNCF „CFR” SA and railway freight undertaking SC GFR SA București.

B. INVESTIGATING REPORT

B.1. Accident presentation

On 18.04.2012 the freight train no. 80360-1 belonging to the railway freight undertaking SC GFR SA București was dispatched from the railway station Constanța Port at 02:35 hour, to the railway station Dej Călători and it arrived in the railway station Brașov on 19.04.2012 at 02:30 hour.

In the railway station Brașov at the train 80360-1, two wagon loaded with caolin were coupled at the train end and the train was dispatched from the railway station on 19.04.2012 at 05:45 hour under the conditions of the freight train no. 70300-1 working timetable, according to the running order series A No. 0108401, having in its composition, the hauling locomotive EA 582 then 29 loaded wagons and the banking locomotive DA 1548.

The two wagons loaded with caolin coupled to the train, of which one involved in the derailment, arrived in the railway station Brașov on 17.04.2012 at 20:23 hour and they layover until their coupling to the freight train no. 80360-1.

The train belongs to the railway freight undertaking SC GFR SA București, was operated by the SC GFR SA București staff.



The train movement from the railway station Brașov until the derailment occurrence was performed without technical or railway safety issues.

Between the railway stations Augustin and Racoş, on a curve area with right deviation, in the area of km 227+787 occurred the fall of the right wheel from the first axle in the running direction between the rails, its movement with the tyre active surface on the vertical screws inside the line and between the tyre lateral side and the rail active lateral surface was a friction over a distance of 16,15 m - *photo no.1.*



photo no. 1 – fallen wheel traces on the right side between the rails

Reaching the joint at km 227+803,5 the right wheel from the wagon first axle hit the upper fishplate shoulder from inside the line, runned with the flange of wheel on the fishplate shoulder and fell between the rails after it has passed.



photo no. 2 – hitting the fishplate and the tyre running on it

During this time, the left wheel from the first axle in the running direction runned in normal conditions until the right wheel hit the upper fishplate shoulder. At that time, on a distance of 0,95 m from the joint, the left wheel climbed the rail to the exterior of the line, runned on the head of rail on a distance of 0,42 m (*photo no. 3*), after which it fall on the exterior vertical screws (*photo no.4*).



photo no. 3 – climbing and the fall of the left wheel

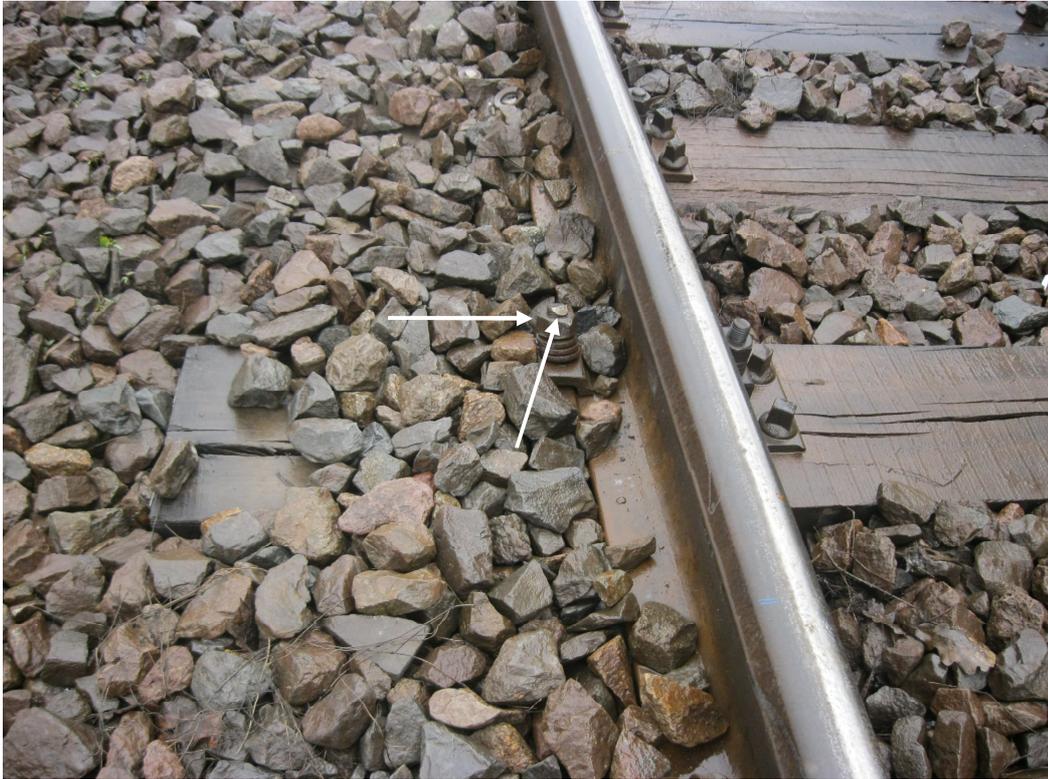


photo no. 4 – the first bolts from the exterior of the line hit by the left wheel

From this point, the wagon runned derailed on a distance of 600 m, after which the train stopped as a result of the measured taken by the driver.

B.2. Accident circumstances

B.2.1. Involved parties

The running section where the railway accident occurred is under CNCF „CFR” SA administration and it is maintained by its employees.

The infrastructure and superstructure are administrated by CNCF „CFR” SA and maintained by the employees of the Permanent Way District no. 1 Racoş from the Track Section L2 Sighişoara, Regional center for railway operation, maintenance and repairs Braşov.

The interlocking system (SCB) between the railway stations Augustin and Racoş are administrated by CNCF „CFR” SA and maintained by the employees of the Section CT1 Braşov, Regional center for railway operation, maintenance and repairs Braşov.

The railway communication equipments between the railway stations Augustin and Racoş are under CNCF „CFR” S.A. administration and maintained by SC TELECOMUNICAŢII CFR SA employees.

The involved wagon belongs to ROLINGSTOC RSCO.

B.2.2. Train composition and the equipments

The freight train no. 80360-1 belonging to the railway freight undertaking SC GFR SA Bucureşti was composed of 29 loaded wagons, 116 axles, 2200 gross tones, of which automatic braking

according to the working timetable 1100 tones, automatic braking real tonnage 1249 tones, necessary tonnage for hand braking 374 tones, and real for hand braking 519 tones and a length of 461 m. The train automatic brake was active.

B.2.3. Railway equipments

Route presentation

The line design speed is 65 km/h.

The running speed is limited at 30 km/h from km 224+300 to 229+ 900 due to the inadequate wooden sleepers in the track.

The route between the railway stations Augustin and Racoş consists in a sequence of alignments and curves. The derailment occurred in a curve area with radius $R=280$ m and cant of the track $h=110$ mm.

The route on the track long profile, in the accident area, is on gradient 1,5 ‰ (down-grade in the running direction).

Superstructure presentation

In the area where the derailment occurred, the line consists in superstructure type 65 from CCCP, put into service in 1990, normal timber sleepers, indirect fastening system type K and type SKL12, joint track, complete broken track bed.

B.2.4. Communication means

The communication between the hauling locomotive driver and the movements inspectors, as well as between the locomotive driver and train crew was ensured through radio-telephone equipments.

B.2.5. Start of the railway emergency plan

Soon after the railway accident occurred, the intervention plan for the removal of the damages and for the re-stauration of the traffic was made in accordance with the information flow stipulated in the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by the Government Decision no. 117/2010, according which, at the accident place came the representatives of Romanian Railway Investigating Body – OIFR, of the railway public infrastructure administrator (CNCF „CFR” SA - Regional center for railway operation, maintenance and repairs Braşov), of the freight transport operator SC GFR SA Bucureşti, Romanian Railway Safety Authority - ASFR and Railway Transport Police.

B.3. Accident consequences

B.3.1. Fatalities and injuries

None

B.3.2. Material damages

The value of the material damages, according to the estimations drawn up by the owner of the rolling stock and the railway public infrastructure administrator, is:

- **at wagon no. 335353043011**
according to the estimate no. 191/2012 drawn up by
SC SIRV SRL

482,12 lei

<ul style="list-style-type: none"> • at the lines according to the estimate no 250/291/2012 drawn up by Lines Division – Technical-Economic Department 	5 503 lei
<ul style="list-style-type: none"> • at the equipments 	none
Total value of the damages	5 985,12 lei

B.3.3. Consequences of the accident in the traffic

The railway accident didn't caused major disruptions in the rail traffic, because after its occurrence, the traffic was carried on the running line II, the running line I remained closed to rail traffic. Following this accident occur the following disturbances:

- train no. 80360-1 delayed by 527 minutes;
- train no. 374-1 delayed by 23 minutes;
- train no. 3500 delays by 27 minutes;

B.4. External circumstances

On 19.04.2012, between 07:00 - 09:00 the visibility was good, temperature of 20° C, overcast with precipitation as rain.

Between 17.04-19.04.2012 in Braşov and in the accident area were significant precipitations.

B.5 Investigation course

B.5.1 Summary of the involved staff testimonies

Summary of the railway transport operator staff testimonies.

From the statements of the **driver** of the locomotive EA 582, hauling of the freight train no. 80360-1 can be retain:

- he was on duty (e foarte faina expresia) on 19.04.2012 hauling the freight train no. 80360-1 in one man driving;
- after the train departure from the railway station Braşov until the moment of the accident, had run in normal conditions;
- when the locomotive reached km 228+300 between the railway stations Augustin and Racoş, at a speed of 26-27 km/h, the driver of the cold locomotive after the train, that the second wagon from the end of the train derailed by one axle from the first bogie;
- he took all the necessary measures to stop the train and send the conductor in order to evaluate the situation;
- he keep the train in place with the automatic brake, direct brake and hand brake.

From the statements of the **driver** of the locomotive DA 1548, running as banking locomotive of the freight train no. 80360-1 can be retain:

- he was onboard the cold locomotive from the railway station Braşov until the moment of the accident;
- from the moment of dispatching from the railway station Braşov until the moment of the accident, the train run in traffic safety conditions, train irregularities weren't observed in the areas where the train could be followed;

- between the railway stations Augustin and Racoş, the shunter from the opposite driver's cab notified him that smoke is coming from the front of the locomotive;
- at the checks carried out in the engine room there were no findings, and when the shunter open the window from the opposite driver's cab, he saw that the second wagon from the rear of the train was running derailed and notified by radiotelephone equipment the hauling locomotive driver which took braking measures;
- after the train stopped, one went to the wagon for findings;

From the statements of the **conductor** on duty on 19.04.2012 on the train no. 80360-1 can be retain:

- he was on duty on 19.04.2012 hauling the freight train no. 80360-1 in one man driving;
- after the train departure from the railway station Braşov until the accident, the trainrunned in traffic safety and normal conditions;
- in the area of km 228+300 between the railway stations Augustin and Racoş, at a speed of 26-27 km/h, the shunter onboard the locomotive from the rear of the train, that the second wagon from the rear of the train derailed by one axle from the first bogie;
- the driver took all the necessary measures to stop the train and he went to the rear of the train in order to evaluate the situation;
- when he reached the rear of the train he found out that the second wagon from the rear of the train was derailed by the first bogie in the running direction, at 40-50 cm from the rail;
- he went backwards to the running direction, toward the railway station Augustin to see where the wagon derailed and he found out that the wagon runned derailed about 400-500m in successive left-right curves, neither he nor the driver could see the wagon from the locomotive;

From the statements of the shunter on duty on 19.04.2012 on the train no. 80360-1 can be retain:

- he was on duty on 19.04.2012 following to be onboard the train on the distance Braşov - Sighişoara;
- between the railway stations Augustin and Racoş, he was on the opposite driver's cab of the locomotive DA 1548 running in the rear of the train, he obserbe smoke from the rear of the train;
- he believed that the smoke came from the locomotive and he notified its driver;
- he opened the driver's cab window and he observed that the second wagon from the rear of the train runned derailed and he notified by radiotelephone equipment the hauling locomotive driver to stop the train;

Summary of the infrastructure manager staff testimonies

From questioning the **ganger** from the section L2 Sighişoara – District 1 Racoş can be retain:

- at the last semi-monthly inspection in March, he found inappropriate sleepers, used rail, but which does not require to reduce the speed limit of 30km/h on line I Augustin – Racoş;
- scheduled works and performed in April were: sleepers replacement, remedied defects after VMC, hidden parts checks, reset the line to optimal running parameters, replacement of used curved lines;
- considers that following the inspection the modification of the existing speed restrictions was not necessary;
- considers that the track status identified during the inspections and dynamic measures with the testing and recording car allowed the trains to run with a speed of 30km/h;
- the cause of the accident consists of the degradation over time of the sleepers, their doaking with water, fastening failure when passing the rolling stock;
- the track path in the area is in curve in shaded area and wooded permanently wet;

From questioning the **district inspector** from the section L2 Sighișoara – District 1 Racoș one can be retain:

- the semi-monthly inspection of line I 300 between the railway stations Racoș – Augustin was performed on 13rd of April 2012;
- at the inspection were checked on the field the defects recorded at the track measuring with the testing and recording car from 02.04.2013 including the grade III defect – widening from km 227+740;
- the works performed in April until the accident, was of replacing the used curve rails on the distance Augustin – Racoș;
- considers that further measures should not be established for running safety on the area with speed limit of 30km/h from current line I Augustin– Racoș. The last intervention was to remedy the grade IV defect – widening at km 224+560 on 18.04.2012;
- considers that the track technical status was covered by the speed limit of 30km/h on the current line I Augustin-Racoș ;
- considers that the accident happened due to the degradation over time of the sleepers affected by humidity in the forest area, weather conditions in winter 2011-2012, freeze-thaw and of winding route curve against curve;
- last periodic repairs with heavy track machined with complete clearance were performed on 1998;
- considers that in the accident area were necessary cleaning of the broken stone at the sleepers end to ensure water flows from the broken stones in the ditch in the right side;

From questioning the **lines instructor** from the section L2 Sighișoara one can be retain:

- on the area Augustin-Racoș line 300 I following the inspection, there was no need to take additional measures for the area with speed limits of 30 km/h;
- the track parameters in the area with speed limit of 30km/h line 300 I Augustin-Racoș analyzed, corresponded to train movement with speed limit of 30km/h;
- he verified in practical training sessions how staff exercises its inspection and maintenance works and found that the track maintenance and inspection personnel know and apply technological processes, observing this with the occasion of the inspection;
- referring to the findings of the inspection performed on April 2012, the material stocks were analyzed, rails, wooden sleepers SB and metallic fastening, as priority these were for maintaining the condition of the track on the distance Racoș-Rupea and for the distance Augustin – Racoș with speed limit of 30km/h.

From questioning the **deputy section chief** from the section L2 Sighișoara one can be retain:

- the last inspection at Lines District 1 Racoș was performed on January 2012, according to the Instruction no. 305 and ended with findings report;
- due to the inspection the situation of of the speed limit of 30 km/h on the current line I Augustin-Racoș, works for track consolidation were proposed and shortening existing speed limit, its improvement;
- to maintain the running conditions of the trains on line I 300 Augustin-Racoș, in the last six months one performed current maintenance works, replacement of lateral used rails on the area 227+400-228+000, were replaced normal wooden sleepers on the areas where the gauge has exceeded the +35mm values completed the coach screws on the areas where they were missing, with inclined coach screws;
- on line I 300 Augustin-Racoș didn't performed works that led to the modification of geometrical elements of the track, overhaul repairs or periodical repairs with heavy track machines.

From questioning the **section chief** from the section L2 Sighișoara can be retain:

- the last inspection on the area of District 1 Racoş was performed on October 2011, according to art. 2, sheet 12 from the Instruction 305/1997;
- checked the line I 300 Augustin-Racoş with speed limit of 30 km/h through measurements and analyzed the area and track condition so that it corresponds to the running speed of 30 km/h;
- on the date of the inspection, the track was in the instructional tolerances for the running speed at 30 km/h;
- he didn't prioritize the works on the mentioned area against other areas within the district maintenance areas;
- the speed limit where the accident occurred was introduced in 2009 due to the increase of the inappropriate sleepers, increase of the used rails, of some supply problems and lack of staff to remedy these defects;
- the last works in the area were performed in the first half of April, rectification of defects detected at the line measuring with testing and recording car on 02.04.2012, specially for the defects type L (widening);

B.5.2. Safety management system

At the moment of the accident, CNCF "CFR" SA, as manager of the railway infrastructure, had implemented its own railway safety management, according to the provisions of the Directive 2004/49/CE on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 101/2008 on the granting of the safety authorization to Romanian railway infrastructure administrator/manager.

At the moment of the accident, SC GFR SA Bucureşti, as freight railway undertaking had implemented its own railway safety management, according to the provisions of the Directive 2004/49/EC on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 535/2007 on the granting of the safety certificate in order to perform railway transport on Romanian railways.

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

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

norms and regulations:

- Regulation for railway technical operation no.002, approved by Public Works, Transport and Housing Minister's Order no. 1186 from 29.08.2001;
- Instruction for setting the terms and order of the track inspection no. 305, approved by Minister of Transports Order no. 71/17.02.1997;
- Instruction of the permanent-way man district inspector on track maintenance no. 323/1965;
- Instruction for the foreman ganger no.322/1972;
- Instruction for lengthman and ganger or dangerous points no. 321/1972;
- Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989;
- Instruction for using the testing and recording car no. 329/1972.

sources and references:

- copies of the documents requested by the inquiry commission, enclosed to the investigation file;
- photos taken soon after the railway accident by the members of the investigation commission;
- photos of the involved wagon, at the accident site, and at SC CFR IRV SA Constanţa - IRV Sibiu Section – Braşov wagon repair line;

- documents on lines repair provided by those responsible for their maintenance;
- results of measurements performed immediately after the railway accident at track superstructure;
- examination and interpretation of the elements technical state involved in the accident: infrastructure, railway equipments and train;
- The questionnaires of involved employees;

B.5.4 Operation of the technical equipments, infrastructure and rolling stock

B.5.4.1 Data found out on the lines

Technical condition of the line

Checks were carried out in static state with the measuring gauge and of the transversal level from 2,5m to 2,5m, starting from the point of the first fall (of the right wheel), in opposite running direction.

The measured value of the gauge in the *point of the first fall* was of **1480 mm**, value that is not within the tolerances allowed in the provisions of the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

In the soecond point of measuring, the gauge value was of 1471 mm, value that is not within the tolerances allowed in the provisions of the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

The others gauge values measured before the derailment site were within the tolerances allowed in the provisions of the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

When checking the sleepers technical state and how the metallic plate were fixed on the sleepers in the area in which track measurements and track cross level were performed, from the second measuring point to the first (first fall trace) in the train running direction, one can be retain:

- the sleepers, on the ends, had cracks in the coach screws area;
- the upper surface of the sleepers presented mechanical wears on the area under the metal plates, which led to their penetration in the body of the sleepers;
- fixing the metal plates on the sleepers wasn't ensured according to the instruction with 4 coach screw so:
 - the first sleeper– the metal plate from the end of the sleeper corresponding to the inner stretch of rails of the curve had only 2 coach screws;
 - the second sleeper,– the metal plate from the end of the sleeper corresponding to the inner stretch of rails of the curve had only 2 coach screws;
 - the third sleeper - the metal plate from the end of the sleeper corresponding to the inner stretch of rails of the curve had only 2 coach screws, and on this end one observed a trace corresponding to a lateral displacement of the metal plate, the metal plate displacement measured at this sleeper end was of 18 mm – *photo no. 5*;
 - the fourth sleeper - the metal plate from the end of the sleeper corresponding to the inner stretch of rails of the curve had only one coach screw, and the trace of the metal plate displacement on the upper surface of this sleepers end was of 15 mm – *photo no. 6*;
 - the fifth sleeper (the place where the wheel fall between the rails) - the metal plate from the end of the sleeper corresponding to the inner stretch of rails of the curve had only 2 coach screws, but neither one fixed the metal plate on the sleeper– *photo no. 6*.



photo no. 5 – fastenings in the area before the accident



photo no. 6 – fastenings and sleepers in the accident area (sleeper no.5)

B.5.4.2. Data found at the functioning of the rolling stock and its technical installations:

Preliminary findings performed at the derailment site of the train and wagon no. 33535304301-1 involved in the derailment

The 29 wagons series E from the freight train no. 80360-1 composition were connected properly (instructional), the automatic brakes were active, except six wagons that had the automatic brake “off” and corresponded with the defect ones in the form "list of wagons", change brake lever "empty-loaded" and "G-P" in the position corresponding to the loading state of the wagons.

The wagon no. **33535304301-1** (the second from the rear of the train) is type Eaos, on four axles, with bogie Y 25 Cs, brake type KE GP - DRV 2AT-600 and cast wheels with diameter of 920 mm, tara 21 100 kg., useful floor area 12,80 m, wagon length over buffers 14,54 m, distance between pivots 9 m. The wagon has high capacity buffers with friction rings and rectangular plate, the handbrake is activated from the front platform and operational.

The wagon had its last periodical repair type RP on 28.11.2008 available for 6 years, operation inspection for wheelsets and brake systems performed on 01.2012.

At the derailment site at the involved wagon, the followings were also found:

- the wagon was derailed by the first bogie in the running direction, (the bogie with the wheels 1-2, 3-4), the wheels 1-3 on the right side and the wheels 2-4 on the left side in the running direction;
- the brake hanger pin from the inferior brakeblock holder from wheel no.4 left in the running direction from the interior missing, with recent use traces – *photo nr. 7*;



photo. no. 7 – inferior brakeblock holderwheel no.4

- the upper bolt from the crowbar that support the missing vertical crowbars, with recent use traces and from which one found in the derailment area the washer and forelock pin broken;
- the block from axle journal no.1 right in the running direction, front axle fell and found on the right side in the running direction together with the shim at about 80 m from the derailment site ;
- upper support of the side bearers right side in the running direction new deformed;
- one checked the distance between the axle inside surfaces, at the axle with the wheels 1-2 were obtained values between 1361,50 – 1361,55, and at the axle with the wheels 3-4 values between 1359,55- 1360,60, values within the instructional limits;
- also, one checked the flange of wheel height, Qr rate, the flange of wheel thickness at the derailed bogie wheels, the obtained measures are within the instructional limits;

Findings at the wagon no. 33535304301-1 involved in the derailment at the SC CFR IRV SA Constanța headquarters - IRV Sibiu Section– Brașov Wagon Repair Line, după ridicarea vagonului de pe boghiuri:

- the friction blocks clearance are within the limits of the instructions;
- at the derailed bogie, the corresponding plate, whole and non-cracked, one found two broken safety stirrup-piece (new breaks) at the axle journal 2 (front) and 4 (back) against the direction of traffic;
- wheel no. 1, first in the running direction on the right side, had a trace on the cast wheel edge, trace resulted from the impact of this wheel with the interior fish plate that had hit traces in the wheel no.2 climbing area – *photo no.8;*



photo no. 8 – trace on the wheel no.1 edge

- at wheel no.1 one also found here and there, traces on the wheel of lateral friction;
- triangular axis of the axle journals 2-4, where it was found a missing brake hanger pin, it doesn't present hit traces with the bogie frame or wheel and neither deformations although the wagon automatic brake was active;
- at the bogie no.2 (non-derailed) was found no conformities against the operation instructions;

Wagon no. 33535304301-1 involved in the accident was weighed on 19.04.2012 at around 23:30 in the railway station Braşov Triaj, yielding a net value of 59650 kg.

The same wagon was weighed also on 24.04.2012 on the same weighting machine, yielding a net value of 59300 kg, with 350 kg less against the first weighing. The wagon load limit is 58900 kg.

The wagon was loaded on 10.04.2012 in Senovo – Bulgaria with a quantity of 58200 kg (with 700 kg less than the load limit), according to the weight docket no. 0000315962/10.04.2012 issued at forwarding and of carriage document drawn up by the forwarding station.

The wagon onvolved in the derailment arrived in the railway station Braşov on 17.04.2012 at 20:23 and it layover until marshalling the wagon to the train 80360-1 on 19.04.2012, throughout this period, in the area were recorded significant precipitations.

Findings to the motor rolling stock

At the hauling locomotive, safety and vigilance equipments (DSV), equipment for the punctual control of the speed and self-stop (INDUSI) were sealed, active and operating according to the instruction, the radiotelephone equipment good, board equipments in operation.

At the banking locomotive, safety and vigilance equipments (DSV) was sealed and active, equipment for the punctual control of the speed and self-stop (INDUSI) were sealed and insulated (according to the provisions of the instructions), the radiotelephone equipment good, board equipments in operation.

According to the report of reading and interpreting the speed record equipment type IVMS from the hauling locomotive – EA 582, after passing through the railway station Augustin at 08:00 and until the accident (on a distance of 7581m), the train speed remained constant between 22-30 km/h.

According to the reading report ICL of the locomotive DA 1548 (runned as banking according to the hauling locomotive journey report), from the memory readings :

- due to a technical interference at the rotary transducer, the ICL equipment indicate a idling speed of 400rotations/min and 452rotations/min;

- on 19.04.2012 between 04:50-09:00 the locomotive had a idling speed between 408 rot/min and 452 rot/min and a gas-oil consumption of 0,3 – 0,4 kg/min, consumption according to the idling speed;

- on 19.04.2012, when the accident occured, according to the ICL, the locomotive had a number of rotations of 418 rot/min and a gas-oil consumption 0,4 kg/min, consumption according to the idling speed.

From the above it appears that at the time of the accident, the banking locomotive was inactive.

B.6 Analysis and conclusions

B.6.1 Conclusions on the technical condition of the wagons within the train composition

The technical condition of the wagons within the freight train composition had not contributed to the accident.

B.6.2 Conclusions on the technical condition of the track superstructure and how the wagon derailed

From the analysis of the technical condition of the track superstructure constructive elements results that at the derailment contributed the normal wooden sleepers by their inappropriate condition and faulty implementation of fixing the metal plates to the rails.

The inappropriate technical condition of the wooden sleepers didn't allowed the coach screw tightening for fixing the metal plates on the sleepers, facilitating their lateral movement under the action of hotizontal guiding force from the wheels to the rolling stock.

B.7. Accident causes

B.7.1. Direct cause

Direct cause

The railway accident happened as a result of the lateral oscillations of the metal plates on the timber sleepers, under the action of the hotizontal forces on the rolling stock wheels while running, which led to the fall of the right wheel of the first axle from the last but one wagon between the rails, it

runned in this state on a distance of 16,5 m, after which the right wheel from the same axle climbed the exterior rail of the curve and fall outside the rails.

Contributing factors

- the unsuitable timber sleepers no longer allowed the coach screws tightening for fixing the metal plates on the sleepers;
- existence of a cant of the track excess according to the running speed limited at 30 km/h that led to the increase of horizontal force value acting on route inside the curve (right in the running direction).

B.7.2 Underlying causes

None.

B.7.3. Root causes

None.

C. Safety recommendations

None

This investigation report will be sent to Romanian Railway Safety Authority, public railway infrastructure manager CNCF „CFR” SA and railway freight undertaking SC GFR SA București.

Members of the investigation commission:

- | | | |
|-------------------|---------------------|-------|
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