



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



INVESTIGATING REPORT

of the railway accident happened on 24.03.2012 in the Regional center for railway operation, maintenance and repairs Cluj, running section Sărățel – Deda, in the railway station Râpa de Jos, by the derailment of the first axle of the locomotive EA 40-0499-0 within the freight train composition no. 83599-2 belonging to SNTFM „CFR Marfă SA”



*Final edition
10th of May 2012*

NOTICE

Concerning the railway accident happened on 24th of March 2012 in the freight train running no. 83599-2, in the Regional center for railway operation, maintenance and repairs Cluj, running section Sărățel - Deda, in the railway station Râpa de Jos, by the derailment of the locomotive EA 40-0499-0 by the first axle in the running direction. 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, 09th of May 2012

Approved by

Director,
Dragoș 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

Nicu PALANGEANU

This notice is part of the report for the investigation of the railway accident happened on the 24th of March 2012 in the freight train running no. 83599-2 belonging to SNTFM „CFR Marfă SA”, on line no.4 in the railway station Râpa de Jos, in the Regional center for railway operation, maintenance and repairs Cluj.

SUMMARY

I. Preamble

I.1. Introduction

I.2. Investigation process

A. Accident brief presentation

A.1 Brief presentation

A.2 Direct cause, factors that contributed

A.2.1 Direct causes

A.2.2 Factors that contributed

A.2.3 Underlying causes

A.2.4 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 its technical equipments

B.5.4.2.1 On locomotive

B.6 Analysis and conclusions

B.6.1 Conclusions on the track superstructure technical condition

B.6.2 Conclusions on the locomotive technical condition

B.6.3 Conclusions

B.7 Accident causes

B.7.1 Direct cause

B.7.2 Factors that contributed

B.7.3 Underlying causes

B.7.4 Root causes

B.7.5 Additional Observations

C. Safety Recommendations

I. PREAMBLE

I.1 Introduction

Following the railway accident happened on 24th of March 2012 in the freight train running no. 83599-2 belonging to SNTM "CFR Marfă" SA, by the derailment of the locomotive EA 40-0499-0 of the first axle in the running direction, on line no.4 in the railway station Râpa de Jos, at km 39+905, in the Regional center for railway operation, maintenance and repairs Cluj, hereinafter CREÎR CF Cluj Branch, Romanian Railway Investigating Body, permanent and independent body, within the Romanian Railway Authority – AFER, hereinafter OIFR, performed an investigation in order to prevent some accidents with similar causes, by establishing the conditions and determined the causes and issuing safety recommendations.

By the investigation, informations related to the accident were collected and analyzed, conditions were established and causes were determined.

The OIFR's investigating action didn't have as purpose to establish the guilt or the responsibility, its objective being to improve the railway safety and to prevent railway accidents.

I.2. Investigation process

Soon after the occurrence of this accident, Romanian Railway Investigating Body was verbally notified and in writing by Romanian Railway Safety Authority, body within the Romanian Railway Authority - AFER about the railway accident in which was involved the freight train no. 83599-2. Also, Romanian Railway Investigating Body took notice about the followings:

- the freight train no. 83599-2 was stopped on line no.4, in the railway station Râpa de Jos, the hauling locomotive was on the common crossing of the switch no.3, with the first axle derailed in the running direction;

In this accident were no victims or injured persons.

Representatives of Romanian Railway Safety Authority, CNCF „CFR” SA and SNTFM „CFR Marfă SA” were present at the accident site.

By decision no. 76 of March 24, 2012, of OIFR's director, according to the art. 19, paragraph (2) from the Law no. 55/2006 on the traffic safety, in connection with the art. 48, paragraph (1) and art. 52, paragraph (1), and c), 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, the investigation commission was appointed, consisting in:

- Cristian GROZA – investigator OIFR - main investigator
- Niculaie COSTIN – state inspector – ISF Cluj - member
- Gabriel PASCU – head of traffic safety control – CREÎR CF Cluj Branch - member
- Alexandru COTUȚ – ganger – CREÎR CF Cluj Branch - member
- Mircea Florin BIBAN – head of traffic safety control – Transilvania Branch - member
- Mircea CHIFOR – ganger - Transilvania Branch - member

A. ACCIDENT BRIEF PRESENTATION

A.1. Brief presentation

On 24.03.2012 the freight train no. 83599-2 belonging to SNTFM „CFR Marfă” SA was running between Zalău Nord - Constanța Port composed of 34 freight wagons series Eacs loaded with scrap iron. The locomotive staff are employees of SNTFM „CFR Marfă” SA – Transilvania Branch.

The train no. 83599-2 was parked at 12⁴⁷, on line no. 4 in the railway station Râpa de Jos in order to uncoupling the banking locomotive EA-792 and meeting with the train no.4143.

The railway station Râpa de Jos is on the running section Sărățel - Deda, belonging to CNCF „CFR” SA -”CREÎR CF” Cluj Branch.

After the separation of the banking locomotive and running of the train no.4143, one dispatch the train no.83599-2 from line no.4 with exit signal Y₄ on free position and route locked in the automatic block line, to the railway station Deda at 13⁰⁰. After 65 meters occurred the derailment of the right wheel from the first axle of the locomotive.

At the accident site, the line is in curve, right deviation, gradient 8 ‰ with down-grade to the railway station Deda.

A.2. Accident causes, contributing factors

A.2.1. Direct causes

The direct cause of the accident consists of the inappropriate condition of the sleepers, that under the action of the locomotive transversal dynamic forces, allowed the track over-widening at values above maximum tolerances permissible in operating and fall between the rails of the right wheel of the locomotive first axle.

A.2.2. Contributing factors

Using an improvised mounting system by which 4 normal sleepers were replaced with spliced sleepers, each sleeper was made up of two pieces.

A.2.3. Underlying causes

None.

A.2.4. Root causes

None.

A.3. Severity level

According to the provisions of article 3, item 1 of the Law no.55/2006 on railway safety and of 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.

B. INVESTIGATING REPORT

B.1. Description of the accident

On 24.03.2012 the freight train no. 83599-2 belonging to SNTFM „CFR Marfă” SA was running between Zalău Nord - Constanța Port and was composed of 34 freight wagons series Eacs loaded with scrap iron, 136 axles, 2119 tons, automatic brake tonnage according to the timetable 1060 t, real 1610 t, hand brake tonnage according to the timetable 340 t, real 512 t, with a length of 512 metri, hauled by the locomotive EA 40-0499-0 belonging to SNTFM „CFR Marfă” SA. The locomotive staff are employees of SNTFM „CFR Marfă” SA – Transilvania Branch

On the section Sărățel - Deda the train movement is done according to the system „automatic block line” (BLA).

The train no. 83599-2 was parked at 12⁴⁷, on line no. 4 in the railway station Râpa de Jos in order to uncoupling the banking locomotive EA-792 and meeting with the train no.4143. After the separation of the banking locomotive and running of the train no.4143, one dispatch the train no.83599-2 from line no.4 with exit signal Y₄ on free position and route locked in the automatic block line, to the railway station Deda.

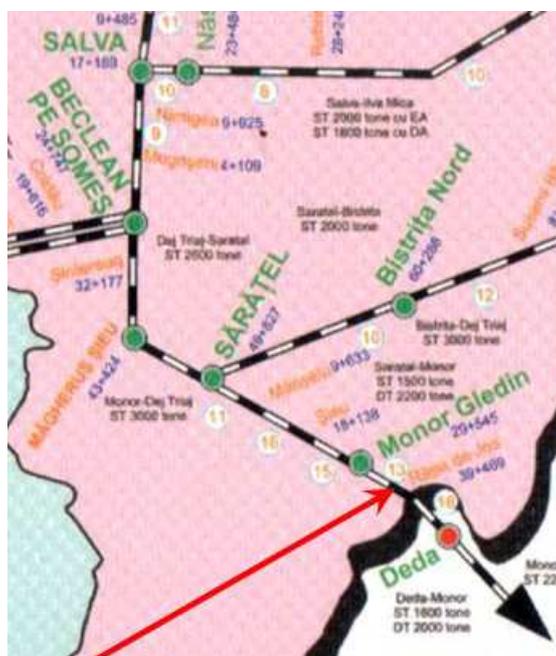


Photo 1 : The railway station Râpa de Jos position

According to the Unified Registry of movement and command free pass system from the railway station Râpa de Jos and of the official report for checking and reading the speed recording tape no. 709/26.03.2012 draw up by Dej Triaj Depot, the train was dispatched from the railway station Râpa de Jos to Deda at 13⁰⁰, and after 65 meters, at km. 39+905 (determined as the derailment place– where the wheel fell – point „0”) the contact was lost between the right wheel and the interior rail of the curve, due to failure and breakage of the wooden sleeper in the area where the sleeper was joined.

At the site and in the area where the accident happened the track is in right curve, radius $R=220$ m, cant of the track $h=15$ mm, over-widening $s=15$ mm, track deflection $f = 228$ mm , gradient 8 ‰ with down-grade to the railway station Deda.

According to the traffic instruction no. 28 at 11⁰⁰ of the traffic controller from Dej District, the train no.83599-2 runned according to the timetable for the train no.83282.

The area where the railway accident happened is on the running section Sărățel - Deda, belonging to CNCF „CFR” SA - ”CREÎR CF” Cluj Branch.



Photo 2 : *Locomotive EA 40-0499-0 - derailed*

As a result of this accident there were no destroyed sleepers on the derailed area, no injured and no damages to the line or equipments.

B.2. Accident circumstances

B.2.1. Involved parties

2.1.1. The involved staff are employees of CNCF “CFR” SA – CREÎR CF Cluj Branch, Line Division and SNTFM „CFR Marfă SA” – Transilvania Branch.

2.1.2. The locomotive and the 34 wagons from the composition of the train involved in the railway accident belongs to SC SNTFM „CFR Marfă SA” – Transilvania Branch, the repairs and their maintenance is provided by its own employees.

2.1.3. The involved railway infrastructure, line 4 in the railway station Râpa de Jos, is under CN CF „CFR” SA administration – „CREÎR CF” Cluj Branch and is maintained by the Șieu District personnel - Section L8 Bistrița.

2.1.4. The signalling equipment on the running section Sărățel - Deda are in the administration of CNCF „CFR” SA and maintained by „CREÎR CF” Cluj Branch employees.

2.1.5. The railway communication equipments on the running section Sărățel - Deda is under CNCF „CFR” S.A. administration and maintained by SC TELECOMUNICAȚII CFR S.A employees.

2.1.6. The railway communication equipments onboard the involved locomotive belongs to SC SNTFM „CFR Marfă SA” - Transilvania Branch and is maintained by its employees.

The investigation commission questioned the involved staff in the maintenance and operation of the infrastructure and involved staff in driving the locomotive.

B.2.2 Composition and the equipments of the train

The freight train no. 83599-2 belonging to SNTFM „CFR Marfă” SA was composed of 34 freight wagons series Eacs loaded with scrap iron, 136 axles, 2119 tons, automatic brake tonnage according to the timetable 1060 t, real 1610 t, hand brake tonnage according to the timetable 340 t, real 512 t, with a length of 512 metri, hauled by the locomotive EA 40-0499-0 belonging to SNTFM „CFR Marfă” SA.

The locomotive' staff belongs to SNTFM „CFR Marfă” SA. – Branch Transilvania.

The safety and vigilance devices (DSV), the punctual control installation of the speed and autostop (INDUSI) of the hauling locomotive were active and functioning instructional and active automatic brake.

B.2.3 Railway equipments

Description of the railroad track

The railway infrastructure is under the management of National Railway Company „CFR” SA CREÎR Cluj Branch and under the maintenance of Line District Șieu – Section L8 Bistrița.

The track suprastructure related to line no.4 from movement halt Râpa de Jos consists of rail type 49, on wooden sleepers, indirect fastenig type K, in active and complete state, in curve with $R=220$ m, , over-widening $S=15$ mm, cant of the track $h=15$ mm, track deflection $f = 228$ mm , gradient 8 ‰ (a slope in the running of the train), track joints. Broken stone prism was complete, but it was clogged in proportion of 20%.

The maximum running speed on deflecting section no.4 is 30km/ h.

The accident occurred in the right curve with $R=220$ m, , over-widening $S=15$ mm, cant of the track $h=15$ mm, track deflection $f = 228$ mm (measured from 5m to 5 m with span of 20 m), in slope (in the running of the train). In the line profile, the site of the accident is on an area with a gradient of 8‰ (a slope in the running of the train).

B.2.4. Communication facilities

The connection between the driver and movement inspectors was ensured by radiotelephone installation.

B.2.5. Start of railway emergency plan

Right after the railway accident, the triggering intervention plan for removing damages and and restore running trains was achieved through the information flow specified in Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway network approved by HG 117/2010, following which were present the public railway infrastructure representatives (CNCF “CFR” SA - CREÎR CF Cluj Branch), of the railway operator SNTFM „ CFR Marfă SA” – Transilvania Branch.

B.3 Accident consequences

B.3.1 Fatalities and injuries - none

B.3.2. Material damages

- rolling stock – 198,69 lei

according to the estimation no.B2/541/2002 of section IRLU Dej;

- lines – 0 lei

according to the estimation no. 814/31/2012 – no material damages at line and at points and crossing

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

Closed lines :line no.4 from movement halt Râpa de Jos was closed from 24.03.2012 , hour 13:00 and it wasn't reopened until the investigation is final.

Delayed trains: none

B.4. External circumstances

On 24.03.2012, at the hour of the occurrence ,the visibility was 1500m, clear sky, without wind and the temperature was of approximately + 10 °C.

The visibility of the colour-light signals was according to the provisions of the regulations in force.

B.5. Investigation course

B.5.1. Brief presentation of the involved staff testimonies

The testimonies of the staff belonging to the railway operator and of the manager of the public railway infrastructure

The engine driver who drove the freight train no.83599-2, stated the following:

- Was running in normal conditions to movement halt Râpa de Jos where he stopped on line 4 for uncoupling the banking locomotive;
- After the brake test and after putting the exit signal in open position started the train of the movement halt, raising the speed to 7-10km/h.
- After passing with the locomotive of the exist signal, he heard a loud noise and he felt vibrations at the locomotive;
- He took measures of rapid break of the train;
- After stopping the train he noticed that the axle no.1 (first in running direction) was derailed of the left wheel, and the right wheel climbed the built-up common crossing;

The drivers' assistant from the locomotive of the freight train no.83599-2, stated the following:

- Was running in normal conditions to movement halt Râpa de Jos where he stopped on line 4 for uncoupling the banking locomotive;
- After the departure of the train from the movement halt and after passing the exit signal he felt strong vibrations and a loud noise at the locomotive;
- After the driver stopped the train by a rapid break, at driver' order, he descended from the driving position to notice the cause of the irregularity notified;
- When checking the locomotive he noticed that the axle no.1 (first in running direction) was derailed of the left wheel, and the right wheel climbed the built-up common crossing;

Workers' Head of the District L Şieu, stated the following:

Starting with February 2012, on the range of the team no.10 Monor, the daily track inspection is performed by the Workers' Head or the District Head, because the only authorized ganger was declared medically inable.

- Half month inspections are performed in incomplete formation caused by the absence of the authorized ganger, performed the last half month inspection together with the Head District on 14.02.2012, because after that date he was in rest leave, sick leave or days off and the inspection was performed only with the District Head.
- The last maintenance works, before the occurrence of the railway accident, were performed on 9.03.2012, when were performed works of fastening the vertical bolts

manually and assembly of the inside locking to points and crossing no.3 from movement halt Râpa de Jos.

- Joined sleepers were manufactured by the workers' head and placed in track in 1999. He chose this solution in following the order received from the District Head at that time and due to lack of wooden sleepers.
- In the spring of 2011 he performed other works in the area and he noticed in leveling of the track by packing of sleepers to the joints of the points and crossings no.3, due to fastening and sleepers with no clues which imposed the performing of works in area.

District Head of the District L Șieu stated the following:

- The daily inspection of line no.4 from movement halt Râpa de Jos, is based on the inspection schedule, by the Head of the District or by a worker who is in charge with the lines maintenance, because the only authorized ganger was declared medically unable in february 2012.
- In 2004 when he took the lead over the district were 6 gangers authorized to carry out the activity on 3 inspections distances, but following the staff dismissals from this period and disease, at this moment in the district is not any suitable ganger to perform this function, the situation is known by the head of the section and the solution is expected.
- The last quarterly inspection was performed on 14.03.2012 in incomplete formation caused by the absence of the authorized ganger and team leader who at that date he was in sick leave. At the time of performing the quarterly inspection the lines were covered with snow and ice, could not visually determine the condition of the sleepers and the fastening material, but measurements of the line did not indicate problems or level gauge in the area.
- He is aware of joined sleepers from line no.4 of the movement halt Râpa de Jos since he took over the District, these were kept under observation being reviewed in the autumn of 2011 in the second category and they had to be replaced in 2012. Due to the current line there are reviewed sleepers of first category and the volume of work required to be performed exceeds the number of staff existing in the district, the focus is on replacing the sleepers in current line.
- He could not explain the factors that contributed to scraping of the track into the curve and he believes that those factors determined the sudden fracture of the sleeper in the joining area; rotting it from inside as a result of the action of environmental factors (deterioration through moisture and frost and non frost repeated action), sleepers in line 4 from the movement halt Râpa de Jos (joined or not) at the outside had proper aspect.
- He is aware of situation with the lack of the District staff and especially to the ganger, was brought to the attention to the Line Section and until finding a solution the revision of the track is performed by the Team Head or the Head of the District. Due to the large volume of work in the current line and of the reduced number of staff, these are working merged and a Team Head can be used in the revision of the track.
- In the third trimester of 2011 all the measurements performed in curves from the section area were performed under the supervision of the Section Head Assistant, on which occasion the graphic evidence was drawn and the works were established where it was necessary.
- Regarding the curves from line 4 from the movement halt Râpa de Jos, these don't have special problems that require programming or execution of works.

B.5.2 Safety management system

In its tasks and responsibilities, the public railway infrastructure manager - National Railways Company "CFR" – SA and the railway transport operator SNTFM "CFR Marfa SA" had implemented their own safety management system.

In this context, CNCF "CFR" SA and SNTFM "CFR Marfa SA" ensures the control of the risks associated with the manager activity, respectively railway operator activity.

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

At the railway accident investigation the followings were taken into account:

norms and regulations

- Instruction regarding the deadlines and the order in which the track revisions should be made no.305 approved by OMT no. 71/17.02.1997;
- Instruction for the Section chief for maintenance of the track no.325/1957 – reprinted in 1997;
- Instruction for the district permanent way inspector head of of track maintenance no. 323/1965;
- Instruction for the activity of maintenance of track of the Team Head no.322/1972;
- Instruction for norms and tolerances for constructions and maintenance of track – line with normal gauge no.314/1989;
- Instruction for using the wagons and wagons for measurement the track no. 329/1972;

sources and references

- photos taken soon after the railway accident by the members of the investigation commission;
- documents concerning the maintenance of the tracks, put at the disposal by the responsables with their maintenance;
- results of the measurements made after the accident at the superstructure and derailed wagon;
- inspection and interpretation of the technical condition of the elements involved in the accident: infrastructure, railway equipments and train;
- interviewing involved staff in the occurrence of the railway accident;
- minutes and measurements performed after the occurrence of the railway accidents by the members of the inquiry and investigation commission;
- documents concerning the maintenance of the tracks, put at the disposal by the responsables with their maintenance;
- inspection and interpretation of the technical condition of the elements involved in the accident (rail track and locomotive);
- questionnaires of the maintenance staff and of the rolling stock and of the involved tracks;
- minutes of reading the speed recorder – BDV.

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

B.5.4.1 Data found on lines

Technical condition of the track before the railway accident

The derailment occurred on line no.4 of movement halt Râpa de Jos, at km. 39+905. At the data of the railway accident the track superstructure consists of rail type 49, on wooden sleepers, joint track, indirect fastening type K, in active and complete state. In the area where the wheel fell, the position of the sleepers is tight, due to the introduction on the track of five pieces of joined wooden sleepers. Broken stone prism was complete, but it was clogged in proportion of 20%. The maximum running speed of the line being 30 km/h.

Observations and measurements made at the line after the derailment and lifting wagon

Starting from the derailment point checks of the gauge and of the transversal level of the track in static state were carried out, with the gange measure, in points having the equidistant of 2,5 m. In the checked points the gauge values comply with the provisions of article 1, point 13 of the instruction 314/1889, **except for two consecutive points** (instead of wheel fell and its previous point), **where these values exceed the maximum gauge (1470 mm)**, and the values of the transversal level comply also with the provisions of article 2, point 2 of the the same instruction. In accordance with article 1, item 14, paragraph 1, lit. "C" of the Instruction for norms and tolerances for constructions and maintenance of track – line with normal gauge no.314/1989 gauge tolerances than 1435+S (S= over widening) are set to -3 mm and + 10 mm, which corresponds, to the curve geometric elements of a gauge between 1447-1460 mm. In the measurement points situated before point „0” where the wheel fell at the distances of 2,5 m, 5 m and 10 m, the measured gauge values are 1470mm, 1469 mm and respectively 1467 mm. Regarding the analysis of measured data on the wear track was found that vertical wear “Uv” and lateral wear "UL" of the rail comply in the allowed limits by the Instruction 314/1989, in Table 24 and Table 25 and the provisions of " technical prescriptions concerning the measurement of vertical and lateral wear on railways " approved by Order no. 30/1298/1987 of DLI Bucharest. From the derailment place (point”0”) located at km 39+905 and until the point when the wheel was climbing on the track, located at 4.8 m after this place, on the right side of the head of the rail there were pronounced signs of friction at about 1-2 cm below its running surface and boring dust fell on base of the rail, due to the contact between outside tyre with the outer surface of the head rail, while the left wheel was running normaly. Also, in the area of the derailment could not see traces of striking vertical bolts between the tracks, which ensures the fastening of left track, due to the wheel climbing the track.



Photo 3: the place where the right wheel fell



Photo 4: the place of escalating the wheel



Photo 5: line in the derailment area and joining the sleepers

On a portion of the line located 2.5 m either side of the place where the wheel fell, the position of the sleepers is tight, on track 5 joined sleepers being placed, of which 4 pieces in a row.



Photo 6: breaking of the joined sleeper “0”

Between the place located at 10 m before the wheel fell and the stopping of the train, as a result of its dynamic action on the line, this was scraped of the locomotive with measured values between 40 mm and 60 mm towards the right line, in the running direction, so the values of the track deflection were affected and their interpretation has no relevance.



Photo 6: • Scraping of the track

Data resulting from the analysis of the documents required by the rail infrastructure manager

At the last census conducted in autumn of 2011 by the district lines Șieu on line no. 4 of movement halt Râpa de Jos were reviewed 80 pieces of inadequate sleepers of a total number of 1215 pieces of wooden sleepers being on the line, corresponding to a rate of 6.58% which does not exceed the number allowed under the article 25 from the instruction, section 4 of the instruction no. 314/1989.

The annual measurement of the curve, whereby the derailment occurred, was performed under the direct supervision of the deputy department head on 27.09.2011, the measure track deflections (except that the track deflection was measured in 5 m 5 m to 20 m rope) over widening ,increased bank and vertical and horizontal wears not exceeding the instructional limits for the amount of curve radius and speed of running of 30 km / h.

The checking of the track with the wagon for measuring the track was carried out according to the schedule on 21.03.2012, on this occasion there were no reported deficiencies that endanger railway safety or requiring scheduling urgent works.

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

B.5.4.2.1. At locomotive EA 40-0499-0:

As a result of the checkings performed on the site the following were found:

- The automatic brake was active.
- The safety and vigilance devices (DSV), the punctual control installation of the speed and autostop (INDUSI) of the hauling locomotive were functioning and sealed.
- Time to enter the direct braking action corresponds
- The air installation was tight and in function.
- Driver's automatic brake valve KD2 functioning normal.
- The brake rigging in good condition.
- The outside of the right wheel tyre of the axle no 1 presents friction traces
- Wheels tyre in proper condition.

Following the interpretation of the records system IVMS on the locomotive EA 40-0499-0, revealed that between railway stations Sărățel și Râpa de Jos the freight train no.83599-2 was running in normal condition with speeds between 58 km / h and 39 km / h, and until the derailment which occurred at 7 km/ h.

Findings performed at EA 40-0499-0 on checkings carried out at Shed Dej :

After the railway accident, at the involved locomotive dimensional checks were carried out on both bogie wheel profile, the transversal coupling was checked and measured , the locomotive was weighed and clearances between the locomotive frame and bogies were measured.

The tyre values as a result of the checkings, comply with the provisions of Instructions no.201/2007 – Annex 6, according to the Measurement Sheet drawn up by the IRLU Dej Section.

The length of the transversal coupling is in the normal range of the locomotive technical book.

At the axles 1, 3 and 4 the value of axle load does not comply with the provisions of the Order no. 310/4/a/2800/col.1993 of D.G.T. București.

The values of the clearances between lubricating boxes of the axles 4 and 5 and the bogie frame does not comply with the provisions of the Order no. 310/4/a/2800/col.1993 of D.G.T. București and horizontal clearances between the locomotive box and the bogie frame are exceeded, the locomotive box being displaced towards right.

Not complying the axle load with the provisions of the Order no.310/4/a/2800/col.1993 of D.G.T. București and of the measured allowances can be a consequence of the derailment. At the locomotive the repair type RR was performed on 24.09.2009 in Reloc Craiova . the last repair was type R2 and was performed on 25.01.2012 in IRLU Dej Section;

The deadlines regarding the periodical repairs were not exceeded.

Following the railway accident no wagons were involved belonging to SNTFM CFR Marfă SA.

B.6. Analysis and conclusions

B.6.1. Conclusions on the technical condition of the rail suprastructure before derailment

1. In all measurement values obtained from the gauge comply with the provisions article 1, point 13 of Instruction no. 314/1989 with the exception of the place where the wheel fell and its previous point where these values exceed the limit of 1470 mm.
2. In all measured points the obtained values on the level are complying with the provisions of article 2, point 2 of Instruction 314/1989 respectively the cant of the track is not less than 15 mm and does not exceed 150 mm.
3. Regarding the analysis of measured data on the wear track was found that vertical wear "Uv" and lateral wear "UL" of the rail comply in the allowed limits by the Instruction 314/1989, in Table 24 and Table 25 and the provisions of " technical prescriptions concerning the measurement of vertical and lateral wear on railways " approved by Order no. 30/1298/1987 of DLI Bucharest
4. On a portion of the line located 2.5 m on both sides of the wheel fell, the position of the sleepers is tight, on track being introduced five sleepers of which 4 sleepers in a row.

B.6.2. Analyse concerning the technical condition of the locomotive EA 40-0499-0

- The axle tyres are in proper values ;
- The length of the transversal coupling corresponds ;
- The displaced locomotive box towards right as a result of the shock and the forces following the derailment ;
- Vertical clearance between lubricating boxes of the axles 4 and 5 and the bogie frame does not comply with tolerances ;
- the air installation corresponds ;
- INDUSI, DSV, IVMS are sealed and in function ;
- the measurements were performed after the derailment. The irregularities found at the locomotive can be a result of derailment.

B.6.3. Conclusions

Following the dynamic action performed by the train locomotive 83599-2 on line, the increase of gauge occurred over operational limits due to failure and breakage of spliced wooden sleepers (sleeper marked "0"). This caused the fell and the rolling wheel to the right of the first axle of the locomotive with the outside surface of the tyre in contact with the inner side of the head rail.

The wheel was running in these conditions a distance of 4,8 m, place in which the track gauge returned in instructional limits, the left wheel escalated the head rail while the right wheel was back on track, running about 1,4 m, after which the left wheel fell outside the track running about 13 m until the stopping of the train.

After the derailment of the locomotive, the train was running in these conditions the distance of 25 m after he stopped at the built-up common crossing of the points and crossing no.3 of movement halt Râpa de Jos.

B.7. Accident causes

B.7.1. Direct cause:

The direct cause of the accident consists of the inappropriate condition of the sleepers, that under the action of the locomotive transversal dynamic forces, allowed the track over-widening at values above maximum tolerances permissible in operating and fall between the rails of the right wheel of the locomotive first axle.

B.7.2. Factors that contributed

Using an improvised mounting system by which 4 normal sleepers were replaced with joined sleepers, each sleeper was made up of two pieces.

B.7.3. Underlying causes - none

B.7.4. Root causes- none

C. Safety recommendations - none

The present Investigating Report will be transmitted to the Romanian Railway Safety Authority, National Railway Company „CFR” SA and SNTFM „CFR Marf SA”.

In accordance with the provisions of Law no. 55/2006 regarding railway safety and of the *Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway network* approved by HG no. 117/2010 Romanian Railway Safety Authority will pursue the implementation of these recommendations.

Members of the investigating commission:

- Cristian GROZA - main investigator
- Niculaie COSTIN -member
- Gabriel PASCU - member
- Alexandru COTUȚ - member
- Mircea Florin BIBAN - member
- Mircea CHIFOR -member