MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY

INVESTIGATING REPORT

for the railway accident happened on the 27th of July 2011, consisting in the derailment of two wagons from the freight train no. 64702-1, belonging to SNTFM "CFR Marfa" SA, on the line 4 from the railway station Campia Turzii

Final edition
September 2011

NOTICE

Concerning the railway accident, happened on the 27th of July 2011, in the running of the freight train no. 64702-1, consisting in the derailment of one bogie at each of 2 wagons during the routing, on the line 4 in the railway station Campia Turzii, in the Regional center for railway operation, maintenance and repairs Cluj, 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, September 2011

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
Nicu PALANGEANU

This notice is part of the report for the investigation of the railway accident happened on the 27th of July 2011, in the running of the freight train no. 64702-1, consisting in the derailment of one bogie at each of 2 wagons during the routing, on the line 4 in the railway station Campia Turzii, in the Regional center for railway operation, maintenance and repairs Cluj

SUMMARY

1. PREAMBLE

I.1 Introduction

Concerning the railway accident happened on the 27th of July 2011, in the running of the freight train no. 64702-1, consisting in the derailment in routing of one bogie at each of two wagons, on the line 4 of the railway station Campia Turzii, in the Regional center for railway operation, maintenance and repairs Cluj, Romanian Railway Investigating Body, permanent and independent body of Romanian Railway Authority – AFER, hereinafter as OIFR, started an inspection in order to prevent some accidents with similar causes, to establish the conditions, to determine the causes and to issue some safety recommendations

Through the investigation one gathered and analyzed the information on the occurrence of the respective accident, established the conditions and determined the causes.

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

I.2 Investigation process

Soon after the occurrence of this accident, Romanian Railway Safety Authority notified Romanian Railway Investigating Body by word of mouth and in written about the occurrence of the railway accident in which the freight train no. 64702-1 was involved. Romanian Railway Investigating Body was informed as follows:

- the freight train no. 64702-1, belonging to SNTFM "CFR Marfa" SA, was stopped on the line 4 of the railway station Campia Turzii, having derailed the wagon no. 31535474833-9 (the second bogie) and the wagon no. 31535483955-9 (the first bogie in the running direction), respectively the wagons 20 and 21 in the train consist;
- the derailment traces indicate that after the derailment of those two wagons, the train run in these conditions on about 80 m, than stopped, passing the exit signal X_4 on stop position, with the locomotives and 5 wagons.

It is an accident without fatalities and injuries.

At the accident place were present also the representatives of Romanian Railway Safety Authority, CNCF"CFR" SA, SNTFM "CFR Marfa" SA.

Through the decision of OIFR director no. 64 from the 27th of July 2011, according to the art. 19, paragraph (2) from the Law 55/2006 on railway safety, one established the investigation commission consisting in:

● Groza Cristian – OIFR – chief investigator;
● Pascu Gabriel – head RRSC Cluj – investigator;
● Bucur Dumitru – head of Track Division – CREIR Cluj – investigator;
● Botezan Gelu – General Inspector Sector M – CREIR Cluj – investigator;
● Biban Mircea – Head of Department CPP SU –Transilvania Freight Branch – investigator;
● Gal Bandi Ştefan – General Inspector Traffic Safety V – Transilvania Freight Branch– investigator;
● Chifor Mircea – General Inspector Traffic Safety T – Transilvania Freight Branch – investigator;

A.ACCIDENT BRIEF PRESENTATION

A.1 Brief presentation

On the 27th of July 2011, the freight train no. 64702-1 run between Razboieni and Apahida, where the traffic is made using the system "interlocking system".
The freight train no. 64702-1, belonging SNTFM "CFR Marfa" SA consisted in 38 empty wagons, 152 axles, 790 tons, 590 m length, being hauled by the locomotive EA-740, and from the railway station Campia Turzii having in the composition the hauled locomotive EA-412, both of them belonging and being driven by staff of SNTFM – Dej depot.
At around 2,38 hour, after passing the exit signal X_4 with permissive position from the line 4 of the railway station Campia Turzii, with the locomotives and those 5 wagons, the train stoped because the derailment of the second bogie of the wagon no. 31535474833-9 and of the first bogie of the wagon no. 31535483955-9, in the running direction, the wagons 20 and 21 after the locomotives from the train composition.

During the investigation one established that the train run in these conditions around 80 m.

A.2. Direct cause, underlying causes and root causes

A.2.1. Direct cause

The derailment occured because of hit and climbing of the right wheel from the 3rd axle (in the running direction) of the wagon no. 31535474833-9 on a part fallen from the wagon on the track, followed by the overclimbing of the line and the outside fall of the wheel

Contributing factors
Breakage of the welding points of the loading and unloading clack and its fall on the track

A.2.2 Underlying causes

Assembly of an unloading clack of another type than that necessary for the wagon 31535474833-9 during the running repair in the Section IRV Sibiu, on the 28th of June 2011;

A.2.3 Root causes

None

A.3. Severity level

According to the provisions of article 3, item l of the Law no.55/2006 on the railway safety and to the definition stipulate in the chapter **II**, art. **7**,group **1,** point **b** of the **Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety**, the event, according to its consequences, is qualified as railway accident.

A.4. Safety recommendations

None

B. THE INVESTIGATING REPORT

B.1. Accident presentation

According to the data concerning the condition of the railway infrastructure and track materials, measurements at the tracks, wagons and to the reading and analysis of speed recorder records, involved staff testimonies, recording documents, one restored the accident occurrence.

On the 26th of july 2011, in the Railway Branch Timisoara – railway station Coslariu, the train 64702-1 was formed for the railway station Dej, consisting in 38 empty wagons Eacs, 152 hollow shafts, 790 tons, 590 m, being hauled by the locomotive EA 740 belonging to Dej Depot.

The technical inspection during the forming was made in the railway station Coslariu by the staff of the Wagons and Coaches Inspection Brasov Triaj – Coslariu Wagons and Coaches Point

The train 64702-1 left the railway station Coslariu on the 27th of July 2011, at 0,45 hour and arrived in the railway station Campia Turzii at 1,56. After coupling of the second locomotive (hauled locomotive EA no. 412) , the staff of the wagon repair and maintenance depot Dej Triaj – Wagons Inspection Campia Turzii performed the brake continuity test. During the departure of the train, it was visually inspected by the train preparer on duty.

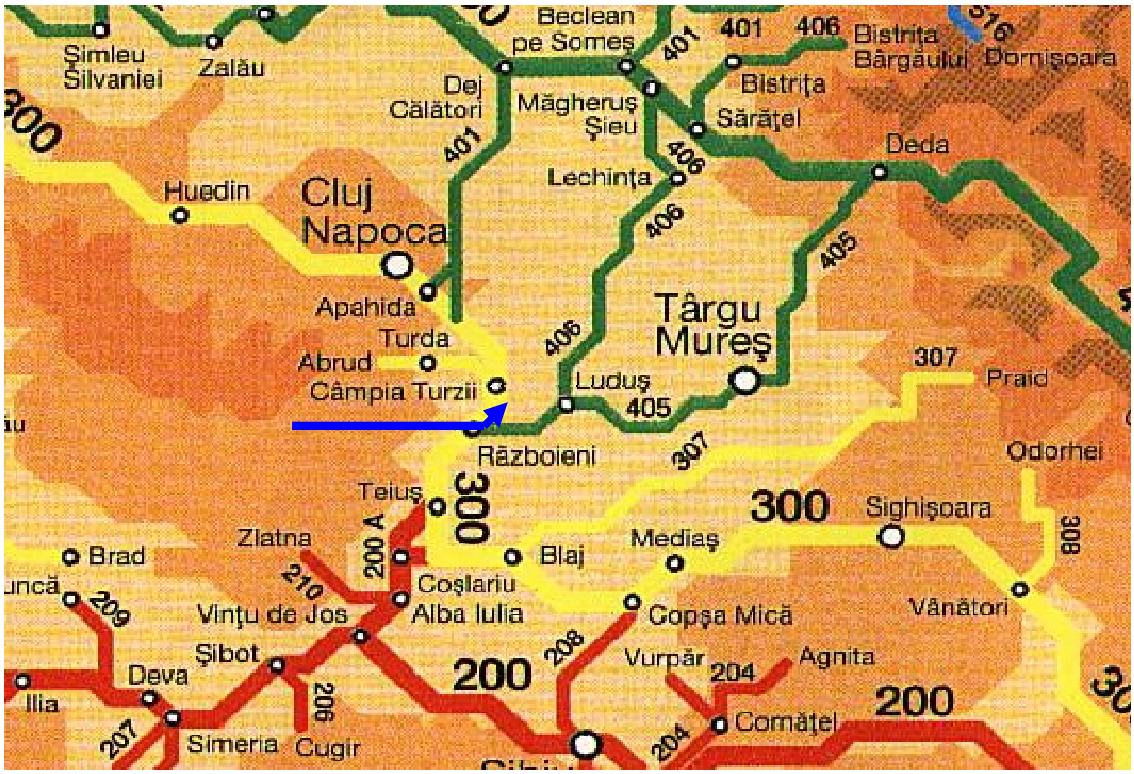
The train 64702-1 run from the railway station Coslariu to the railway station Campia Turzii without problems.

At around 2,36, on the 27th of July 2011, the freight train no. 64702-1, belonging to SNTFM "CFR Marfa" SA, consisting in the hauled locomotive EA 412, 38 empty wagons, 152 axles, 790 tons, 590 m length, hauled by the the locomotive EA 740, is dispatched from the deflecting line 4 of the railway station Campia Turzii to the railway station Apahida.

The train passed the exit signal X_4 on permissive position, with the locomotives and 5 wagons, then the train preparer on duty informed by the radio equipment the driver to stop the train because he heard a curious noise at one of the train wagons. After the train stop, one found out that the first bogie of the wagon no. 31535474833-9 (the 20th in the train consist) derailed in the running direction.

At about 37 m from the first derailed wagon to the rear of the train, between the lines 3 and 4, one found an unloading clack with hit traces, fallen from the wagon 31535474833-9.

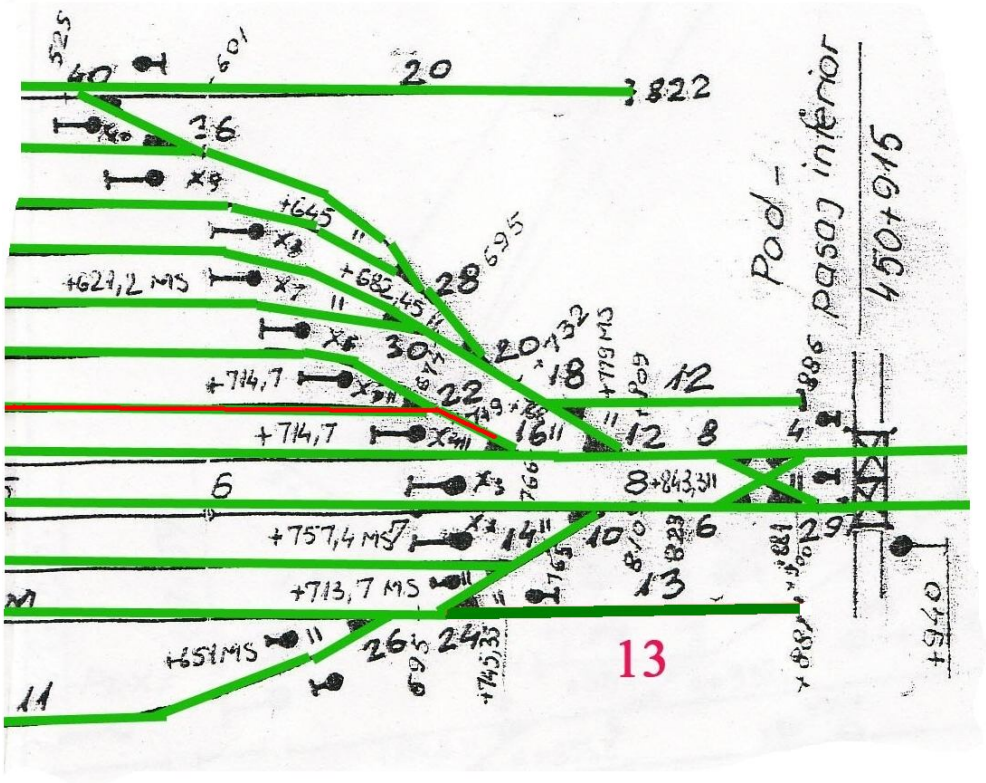
The railway station Campia Turzii belongs to the Regional center for railway operation, maintenance and repairs Cluj, at 52 km south-east from the railway station Cluj Napoca.



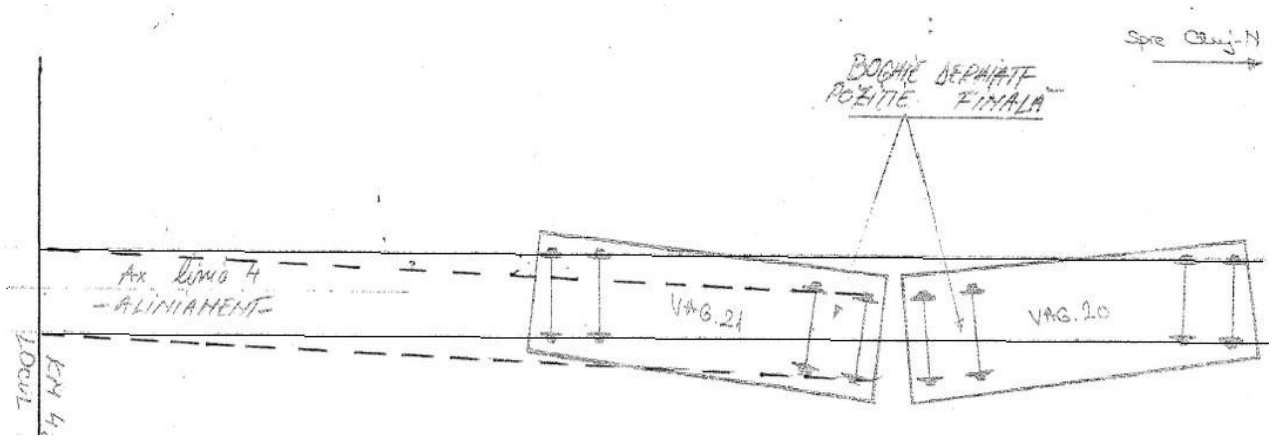
Picture 1: Geographical position of the accident

Picture 1 : Position of the railway station Câmpia Turzii

Place of the railway accident is in the Regional center for railway operation, maintenance and repairs Cluj, in the railway station, on the line 4.



Picture 2: Outline of the railway station Câmpia Turzii



Picture 3: Derailment outline

B.2 Incident circumstances

B.2.1 Parties involved

2.1.1 The railway station Campia Turzii is administrated by CNCF "CFR" SA, Regional center for railway operation, maintenance and repairs Cluj, the lines of trhis railway station (including the line 4) are maintained by the staff of the Permanent Way District L Campia Turzii-Track Section L3 Cluj.
2.1.2 The locomotives and wagons of the freight train involved in the railway accident are owned by SNTFM „CFR Marfa" SA and are maintained and inspected by its staff, the repairs are performed by the economic agents authorized as railway suppliers.
2.1.3 The interlocking system from the railway station Campia Turzii ais administrate by CNCF „CFR" SA and are maintained by the staff of the Regional center for railway operation, maintenance and repairs Cluj-Section CT1 Cluj
2.1.4 The railway communication equipment from the railway station Campia Turzii is administrated by CNCF"CFR" SA and maintained by the employees of SC „TELECOMUNICATII" SA
2.1.5 The equipment of force and electric traction from the railway station Campia Turzii is administrated by CNCF"CFR"SA and maintained by the employees of SC „ELECTRIFICARE" SA
2.1.6 The railway communication equipment from the involved locomotives is owned by SNTFM „CFR Marfa" SA and maintained by its employees.

The investigating commission questioned the employees involved in the railway accident, that is the drivers, shunting gang and the movements inspector from the railway station Campia Turzii , examiners and the coordinator head of the Section IRV Sibiu

B.2.2 Consist and the equipments of the train

The freight train no.64702-1 consisted in 38 empty wagons, 152 axles, 790 tons, 590 m length, hauled by the locomotive EA-740 from the railway station Campia Turzii and with hauled locomotive (EA-412), both of them being driven by the staff of SNTFM – Dej Depot. According to the "braking sheet" drawn up by the train preparer during the performance of the braking test in the railway station Coslariu, there were found 11 wagons with the automatic brake out of order and 9 with the hand brake out of order.

The speed recorder (IVMS), safety and vigilance equipments (DSV) and the equipment for the punctual control equipment for the speed INDUSI from the locomotives worked according to the instruction and the automatic brake was active.

B.2.3. Railway equipments

The involved railway infrastructure, that is the place where the railway accident happened, line 4 from the railway station Campia Turzii, is administrated by CNCF "CFR" SA - , Regional center for railway operation, maintenance and repairs Cluj , being maintained by the employees of the Permanent Way District L Campia Turzii - Track Section L3 Cluj.

The superstructure of the track 4 from the railway station Campia Turzii consists in rail type 49, concrete sleepers $T_{13,}$ indirect fastening system type K active and complete, in a straight line and on the flat, welded track,complete broken stone bed, running speed 30 km/h.

Running, main line and the lines from the railway station Campia Turzii are electrified.

B.2.4. Communication facilities

Communication between the locomotive drivers and the movements inspectors was ensured by the radio equipment

B.2.5. Starting of the railway emergency plan

Immediately after the railway accident occurrence, the start of the intervention plan for the removal of damages and restoring the trains circulation was made by 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 Government Decision 117/2010***, after which the representatives of the railway public infrastructure administrator CNCF "CFR" SA- Regional center for railway operation, maintenance and repairs Cluj, of the undertaking SNTFM „CFR Marfa" SA and of Romanian Railway Authority came.

B.3. Accident consequences

B.3.1 Fatalities and injuries

None

B.3.2. Material damages

- at the rolling stock 1315,89 lei;

- according to the estimation no. 1075/2011 from Dej wagon repair and maintenance depot: 504,79 lei;
- according to the estimation no. 12.2/1217/08.08.2011 from SC IRV S.A-SIRV Oradea: 811,10 lei;

- at the line - none;

- at the installation- none;
- at the environment – none;
- cost of the intervention equipments – none.

Total - 1315,89 lei.

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

Closed lines - the traffic on the main line 300 was not affected;
- the line 3 from the railway station Campia Turzii was closed between 2,38 hour and 8,05 hour;
- the line 4 of the railway station Campia Turzii was closed between 2,38 hour and 13,00 hour;

Delayed trains - none

B.4. External circumstances

On the 27th of July 2011, at 2,38 hour, when the railway accident happened, the visibility specific to night conditions, cloudless sky, without wind and the air temperature was about $+15^0$ 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

Brief presentation of the testimonies of the staff belonging to the undertaking and to the railway public infrastructure manager.

From the statements of the train preparer (employee of SNTFM "CFR Marfa" SA – Transilvania Branch, Wagon Inspection Dej Triaj – Wagon Inspection Point), that visually inspected the train 64702-1 on the 27th of July 2011 in the railway station Campia Turzii can be retained:

- he was on duty on the 26th/27th of July 2011 in the Point for the Wagon Inspection Campia Turzii;
- he performed the continuity test, after introducing the locomotive EA 412, after the hauling locomotive EA 740, without carrying out the technical inspection;
- during the visually inspection of the train 64702-1, he heard a very strong noise and took measures for train stop by the radio equipment;
- the driver stopped the train and one found out that 2 wagons from the train composition had each of them one bogie derailed.

From the written statements of the movements inspector on duty in the railway station Campia Turzii on the 26th/27th of July 2011, one can be retained:

- the train 64702-1 stopped in the railway station Campia Turzii on the line 4 according to the disposal of the traffic controller 61, at 23,50 hour, in order to haul the locomotive EA 412, without transit technical inspection;
- the train hauled the locomotive EA 412 and the train preparer performed the brake continuity test, then the disposing station movements inspector clears the exit signal;
- being at the visually inspection, after the passing of two-three wagons in his front he heard to the area II strong noises at the train, went in the movements office and asked the disposing station movements inspector to stop the train;
- after the train stop, he went on spot and found out 2 derailed wagons, then he notified the traffic controller and the railway station master.

From the written statements of the disposing station movements inspector on duty in the railway station Campia Turzii on the 26th/27th of July 2011, one can be retained:

- around 2,39 hour after the running start of the train 64702-1 and its passing of the exit signal X_4 on stop position, the examiner on duty informed the driver to stop the train because in the train consist there is a derailed wagon. At the same time, his fellow worker, the movements inspector that performed the train visually inspection, came in the movements office and told him that the train had a curious noise in front of the building for the wagon inspection and it had to be stopped;
- he took the measures for the urgent train stop, also he asking the driver to stop, this confirming that he understood.

From the statement of the driver (employee of SNTFM "CFR Marfa" SA – Dej Depot) on duty on the locomotive EA 740, on the 27th of July 2011, one can be retained:

- on the 26th/27th of July 2011 he driven the locomotive EA 740 in complete crew for the hauling of the train 64702-1, and after the end of the brake test and the confirmation of the train preparer on the completeness of the test, he received the conditions for the train dispatching from the railway station Campia Turzii. After running about 100 m, he was asked by the train preparer, through the radio equipment, to stop the train;
- he stop the train by an emergency brake.

From the statement of the driver's assistant (employee of SNTFM "CFR Marfa" SA – Dej Depot) on duty on the locomotive EA 740, on the 27th of July 2011, one can be retained:

- on the 26th/27th of July 2011 he was in the driving crew of the locomotive EA 740 as driver's assistant for the hauling of the train 64702-1. After ending of the test and receiving the confirmation of the examiner on the completeness of the test, and the meeting with the conditions for the train dispatching from the railway station Campia Turzii, he started to run. After running about 100 m, he was asked by the examiner, through the radio equipment, to stop the train;
- he took the measures to stop the train by an emergency brake.

From the statement of the driver (employee of SNTFM "CFR Marfa" SA – Dej Depot) on duty on the locomotive EA 412, on the 27th of July 2011, one can be retained:

- on the 27th of July 2011 he drove the locomotive EA 412. After leaving the railway station Campia Turzii around 2,39 hour, he heard through the radio equipment that the examiner on duty asked the emergency train stop;
- the train was stop after the passing of the exit signal X_4 on stop position.

From the statement of the driver's assistant (employee of SNTFM "CFR Marfa" SA – Dej Depot) on duty on the locomotive EA 412, on the 27th of July 2011, one can be retained

- on the 27th of July 2011 he was in the driving crew of the locomotive EA 412. After the train run starting in the railway station Campia Turzii around 2,39 hour, he heard through the radio equipment that the examiner on duty asked the emergency train stop;
- the train was stop after the passing of the exit signal X_4 on stop position.

From the statement of the train preparer (employee of SNTFM "CFR Marfa" SA – Freight County Centre Brasov, Wagon Inspection Brasov Triaj – Wagon Inspection Point Coslariu) that performed the inspection during the forming of the train 64702-1, on the opposite side of the railway station Coslariu, on duty on the 26th/27th of July 2011, one can be retained:

- on the 26th of July 2012, at 21,30 hour, he received the order no. 1 from the programmer movements inspector to perform the inspection during the forming of the train 64702-1 and its complete brake test in the railway station Coslariu;

- during the inspection of the train 64072-1, he did not found out problems at the train wagons that can threaten the traffic safety. The braking test was ready at 23,55 hour, then up to 00,10 hour he checked the hand brakes together with the driver's assistant;

- the train 64702-1 left the railway station Coslariu at 00,45 hour being visually inspected on both sides by him and his fellow worker (train preparer), seeing no problem at the wagons.

From the statement of the train preparer (employee of SNTFM "CFR Marfa" SA – Freight County Centre Brasov, Wagon Inspection Brasov Triaj – Wagon Inspection Point Coslariu) that performed the inspection during the forming of the train 64702-1, on the side of the railway station Coslariu, on duty on the 26th/27th of July 2011, one can be retained:

- on the 26th of July 2012, at 21,30 hour, he received the order no. 1 from the programmer movements inspector to perform the inspection during the forming of the train 64702-1 and its complete brake test in the railway station Coslariu;

- during the inspection of the train 64072-1, he did not found out problems at the train wagons that can threaten the traffic safety. The braking test was ready at 23,55 hour, then up to 00,10 hour, his fellow worker from the rear of the train checked the hand brakes together with the driver's assistant. After finishing the checking of the hand brakes, he remove the disc from the train front, signed the route sheet, the train being ready for departure ;

- the train 64702-1 left the railway station Coslariu at 00,45 hour being visually inspected on both sides by him and his fellow worker (train preparer), seeing no problem at the wagons.

From the statements of the train preparer (employee of SNTFM "CFR Marfa" SA – Transilvania Branch, Wagon Inspection Brasov Triaj – Wagon Inspection Point Sibiu Triaj), that took over the wagon 315354748339 on the 28th of June 2011 at SIRV Sibiu can be retained:

- the repairs at the wagon started on the 27th of June 2011, with notification-advice no.01156 with the next failures: friction block clearance ended, 2 door rods broken, one side door distorted, from those 6 broken clack and needed to be replaced, 5 pillars broken, up frame distorted, central solebar cracked, wagon over-operated, being included in 2 running repair;
- the failures found out were removed properly;
- during the visually checking of the welding works, one did not found visible problems or inappropriate;
- the wagon was approved to be loaded with long materials;

From the statements of the Coordinator head of the section SIRV Sibiu (employee of SC CFR IRV Constanta – Section IRV Sibiu) can be retained:

- the repairs at the wagon started on the 27th of June 2011, with notification-advice no.01156 with the next failures: friction block clearance ended, 2 door rods missing, 2 door cams missing, 6 pillars broken, up frame distorted, central solebar cracked and one couple missing, wagon over-operated, being included in 2 running repair;
- **a clack was replaced with one from the unit deposit, this being improperly**;
- the respective clack was fitted up over the cover, ensuring by welding with material addition, between those two intermediary, central solebar and the lateral frame of the wagon, ensuring the improperly seal of the clack, without its operation.

B.5.2 Safety management system

In order to achieve its tasks and responsibilities, the railway public infrastructure administrator CNCF "CFR" SA - Regional center for railway operation, maintenance and repairs Cluj, undertaking SNTFM „CFR Marfa"SA had implemented their own safety management system.

In this context, CNCF "CFR" SA and SNTFM "CFR Marfa" SA ensure the control of the risks associated with the activity of the administrator and undertaking.

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

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

<u>*Norms and regulations*</u>:

- instructions for the inspection and maintenance of the operated wagons no. 250 approved by Order of the Minister of Transports, Constructions and Tourism no. 1817 from the 26th of October 2005;
- instruction of norms and tolerances for lines, switches, bridges and tunnels – lines with standard gauge no. 314/1989;
- regulation no. 005/2005 for the train running and shunting of the railway vehicle;
- regulation no. 006/2005 for hauling and braking;

- technical specification RC/DA no. 3.3. e/1103/2000.

Sources and references:

- photos taken by the investigation commission members immediately after the accident;
- documents on the maintaince of lines, supplied by the responsibles with their maintainance;
- the results of the measures made immediately after the railway accident at the track superstructure and derailed wagons;
- checking and analysis of the technical condition of the elements involved in the accident: infrastructure, technical equipments and train;
- questioning of the employees involved in the railway accident occurrence;
- the minutes for the reading the locomotive speed recorder tapes, of the technical conditions of the wagons involved in the accident and of the line technical condition;
- the documents concerning the on board sheets of locomotives, provided by those responsible for their maintenance;
- the results of the measures made immediately after the railway accident at the locomotive and the wagons involved in the accident;
- checking and analysis of the technical condition of the locomotive and wagons involved in accident;
- the minute for treating in guarantee period of time of the wagon no. 315354748339; drawn up in the railway station Campia Turzii on the 28th of July 2011.

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

B.5.4.1 Data on equipments

The technical condition of the line involved in the railway accident

The line where happened the accident (picture 1) consists in rail type 49, concrete sleepers T_{13} , indirect fastening system type K, active and complete, in a straight line and on the flat, welded track, complete broken stone bed, running speed 30km/h, electrified line.

Picture 1. Line where happened the accident

Findings and measurements made at the line after the wagon derailment and re-railing

After re-railing of the wagons on the 27th of July 2011, one performed measurements at the line with the measure gauge type "Lugoj" from 2,5 m to 2,5 m, concerning the gauge (E) and the track level (N) and resulted as follows:

Table no: 1

Point:	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5	6
E(mm)	-2	-2	-2	-2	-2	-2	**-1**	0	0	1	0	-1	-2
N(mm)	0	0	0	0	0	0	**0**	0	1	0	0	0	0

The running direction of the train was from the point "-6" to the point "6" and the point "0" is the derailment place

Change of the gauge deviations is within 2 mm stipulated in the instruction 314/1989, at art. 1, point 14, letter c, paragraph 2.

The tolerances at the plan track cross level is according to the value stipulated in the instruction no. 314/1989, at art. 7, letter A, paragraph 1.

In the points where the gauge and the level were measured one established the vertical wear "U_v" and the lateral wear "U_L" of the rail.

These measurements were made with the calipers for the measurement of the rail wear resulting the next levels red on the device scales.

Table no: 2

Point:	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5	6
C_V	148	148	148	148	148	148	148	148	148	148	148	148	148
C_O	28	28	28	28	28	28	28	28	28	28	28	28	28

With these scales from the table IV from "Technical prescriptions concerning the measurement of the vertical and lateral wears of the rails", drawn up in 1987 by ICPTT Bucuresti, one established for the wears the next values:

Table no: 3

Point:	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5	6
U_V (mm)	1	1	1	1	1	1	1	1	1	1	1	1	1
U_L (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0

In all points where the rail wear was measured, it was between the limits stipulated in the instruction no. 314/1989, at the table 24, respectively 25.

We underline that the measurements between the points ”0 and 6” were made on the area run by the derailed wagons.

B.5.4.2 Data on the operation of the rolling stock and its technical equipments

B.5.4.2.1 At the hauling locomotive
- the automatic brake and the straight air brake are in operation;
- the cock KD2 driving cab I on fast braking position;
- DSV equipment sealed and in operation;
- the locomotive endowed with IVMS, sealed and in operation;
- the locomotive was in good operation condition;
- following the reading IVMS from the locomotive EA 740, that hauled the freight train no. 64702-1, resulted that the train left the railway station Campia Turzii at 2,37 hour, run normally up to the derailment, reaching the speed of 16 km/h, and after running 128 m, the speed decreased suddenly at 0 km, the train stopping after 192 m, at 2,38 hour.

B.5.4.2.2 At the involved wagons
B.5.4.2.2.1 Technical characteristics o the wagon no. 315354748339
-wagon series – Eacs;
- periodical repair the 20th of September 2005 TMS;
- wagon tare weight – 20100 kg;
- wagon length – 14,04 m;
- distance between the bogie pins- 9 m;
- buffing gears – high capacity cylinder buffers;
- draft gear – discontinous ;
- bogies – Y_{cs} 25;
- bogie pitch – 1,80 m;
- wheelsets – cast wheels;
- automatic brake – KE-GP;
- hand brake.

B.5.4.2.2.2 Technical characteristics o the wagon no. 3153547483959
- wagon series – Eacs;
- periodical repair the 29th of August 2007 TMS;
- wagon tare weight – 22200 kg;
- wagon length – 14,54 m;
- distance between the bogie pins- 9 m;
- buffing gears – high capacity cylinder buffers;
- draft gear – discontinous ;
- bogies – Y_{cs} 25;
- bogie pitch – 1,80 m;
- wheelsets – cast wheels;
- automatic brake – KE-GP;
- hand brake.

B.5.4.2.2.2 Inspections and repairs made at the first derailed wagon
Wagon **no. 315354748339**

- periodical repair type RP on the 20th of September 2005 TMS-at 6 years;
- inspection RR+RIF in September 2008 at the Repair Line Brasov Triaj;
- **running repair RC on the 28th of June 2011 at SIRV Sibiu, the wagon being in the guarantee period**.

B.5.4.2.2.3 Findings at the involved wagon during the checkings performed after the accident
After the accident, at the involved wagons were made dimensional checkings at the wheel geometries from the derailed bogies.
The resulted values are:

- **wagon no. 315354748339:**
  distance between the inner faces measured in 3 points placed at 120 degrees
  axle 1-2, 1360.35 mm; 1360 mm, 1360.15mm
  axle 3-4, 1360.20 mm; 1360,00 mm; 1360.10 mm

Tyre dimensions	**R1**	**R2**	**R3**	**R4**
Height of the flange of wheel	29,00	31,00	29,50	31,00
Thickness of the flang of wheel	30,00	29,00	30,00	28,00
Quote qR	9,00	10,50	9,50	10,50

- wagon failures: one unloading clack missing;

- **wagon no. 3153547483959**
  distance between the inner faces measured in 3 points placed at 120 degrees
- axle 5-6, 1359.30 mm; 1359,20 mm, 1359.30 mm
- axle 7-8, 1360.45 mm; 1360,40 mm; 1360.30 mm

Tyre dimensions	**R5**	**R6**	**R7**	**R8**
Height of the flange of wheel	28,80	29,00	28,00	30,00
Thickness of the flang of wheel	30,00	30,00	29,00	29,00
Quote qR	8,80	9,00	9,50	10,50

B.6 Analysis and conclusions

B.6.1 Analysis of the technical condition of the track superstructure before the derailment

1. The measurement made at the line with the measure gauge type "Lugoj" from 2,5 m to 2,5 m, concerning the gauge (E) and the track level (N), after the derailment (on the 27th of July 2011) by the investigation commission according the table no. 1 indicates that:

- the variation of the gauge deviations is within 2 mm/m, stipulated in the instruction 314/1989, at art. 1, point 14, letter c, paragraph 2.

- the tolerances at the plan track cross level is according to the value stipulated in the instruction no. 314/1989, at art. 7, letter A, paragraph 1.

2. One made measurements with the calipers for the measurement of the rail wear in the points where the gauge (E) and the track level (N) were measured, after the derailment (on the 27th of July 2011) by the investigation commission according to the tables no. 2 and 3 indicates that:

   In all points where the rail wear was measured, it is between the limits accepted by the instruction no. 314/1989, at the table 24, respectively the table 25.

3. on all measured distance the tolerances at the track torsion, stipulated at the art 7 from the Instruction of norms and tolerances for the track construction and maintenance – lines with standard gauge no. 314/1989, are not exceeded.

4. The gauge values resulted following the checkings performed with the measure gauge, in the derailment area, indicate that the operation tolerances of the gauge values are not exceeded. The values are between the tolerances accepted according to the art. 1, points 13 and 14.1 from Instruction of norms and tolerances for the track construction and maintenance –lines with standard gauge no. 314/1989.

5. The analysis of the measurements corresponding to the vertical and lateral wears of the rail in accordance with the Technical Prescriptions for the measurement of the vertical and lateral wears of the rails – edition 1987 indicates vertical wears of 1 mm and lateral wears of 0 mm. The measured values are between the tolerances accepted by the provisions of the tables 24 and 25 from the Instruction of norms and tolerances for the track construction and maintenance –lines with standard gauge no. 314/1989

B.6.2 Analysis of the technical condition of the train wagons
***Findings at the train wagons*:**

- at the wagon no. **315354748339** missed **the unloading clack (Picture 2)** .

Picture 2 - unloading clack missing

- the clack was found fallen between the tracks 3 and 4 (Picture 3) at about 37 m from the first derailed wagon to the rear of the train. The welding traces from the found clack correspond to those from the wagon body, resulting that the fallen clack is from the derailed wagont no.315354748339. The fallen clack has traces and distortions left by the wagon wheels on it ;

Picture 3 - Place where the unloading clack kwas found

- the found clack is from another type of wagon than those to which it was fitted up, being improperly fixed on the floor by the joints and springs and stroke-arresting devices as the

constructive wagon was equiped. The fastening of the clack on the wagon floor was improvised with tapee pieces attached by welding ;

- at point “0” of the derailment one found metallic pieces detached from the derailed wagon and the fallen clack (picture 4) ;

Picture 4 - metallic pieces detached from the derailed wagon and the fallen clack

- the commission for the treating in the guarantee period of time found out that the unloading clack fallen from the wagon was improperly fitted up during the running repairs from the 28th of June 2011 at SIRV Sibiu;
- the exchanger system „Freight – Passenger” and „Empty – Loaded” werw on the corresponding loading positions for wagons, respectively on the positions “Freight” and “Empty”;
- lthe coupling of the wagons was made properly;
- the coupling in service of the draft gear was screwed up properly for freight trains;
- the values got by measurements at the derailed wagons are between the minimum and maximum limits stipulated in the Instructtions no.250/2005 ;
- one did not found out uninsured piece at the wagons ;

B.6.3 Conclusions

The technical condition of the involved railway infrastructure was right in the derailment area.

The technical condition of the locomotives and their driving way were right

The wagons of the train 64702-1 were right from technical point of view, excepting the wagon no. 315354748339.

At the wagon no. 315354748339, one of the unloading clack was of another type than that necessary and fitted up improperly during the running repair made at SIRV Sibiu on the 27th of June 2011.

B.6.3.1 Final presentation of the events series

On the 27th of July 2011, at 2,36 hour, the freight train no. 64702-1 was dispatched from the deflecting section 4 of the railway station Campia Turzii. Soon afterwards, the welded fastening of the unloading clack from the wagon no. 315354748339 broke because of the weight combined with the normal impact from the train running start.

Than the unloading clack detached from the wagon floor, fell on track and caught up by the first right wheel in the running direction of the bogie no. 2. The wheel overclimbed the

unloading clack, falls out the line and leads to the derailment of all wheels of the bogie no. 2 from the wagon 315354748339.
Afterwards, because of the horizontal forces made by the derailed wagon on the couples, also the bogie no. 1 derailed in the running direction of the wagon 315354748339.
The train run 192 m, being stopped by the examiner that inspected visually, that heard curious strong noises appeared in the running of the derailed wagons.

B.7 Accident causes

B.7.1. Direct cause

The derailment happened because of hit and climbing of the right wheel from the 3rd axle (in the running direction) of the wagon no. 31535474833-9 on a part fallen from the wagon on the track, followed by the overclimbing of the line and the outside fall of the wheel

Contributing factors

Breakage of the welding points of the loading and unloading clack and its fall on the track

B.7.2 Underlying causes

Assembly of an unloading clack of another type than that necessary for the wagon 31535474833-9 during the running repair in the Section IRV Sibiu, on the 28th of June 2011;

B.7.3 Root causes

None

C. Safety recommendations

None

The present Investigating Report will be transmitted to Romanian Railway Safety Authority, to CNCF "CFR" SA and to SNTFM "CFR Marfa" SA.

CLUJ NAPOCA September 2011

COMMISSION:

- Groza Cristian – OIFR – chief investigator;
- Pascu Gabriel – head RRSC Cluj – investigator;
- Bucur Dumitru – head of Track Division – CREIR Cluj – investigator;
- Botezan Gelu – General Inspector Sector M – CREIR Cluj – investigator;
- Biban Mircea – Head of Department CPP SU –Transilvania Freight Branch – investigator;
- Gal Bandi Ştefan – General Inspector Traffic Safety V – Transilvania Freight Branch– investigator;
- Chifor Mircea – General Inspector Traffic Safety T – Transilvania Freight Branch – investigator;