MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY

INVESTIGATING REPORT

of the railway accident occurred on 30.08.2012 on the Regional centre for railway operation, maintenance and repairs Bucureşti,
in the railway station Bucureşti Triaj, Switch cabin 17

Final Edition
19.11.2012

NOTICE

According to the provisions of 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*, Romanian Railway Investigating Body performed an investigation regarding the railway accident occurred on 30.08.2012, at 22:30, in the Branch of the Regional centre for railway operation, maintenance and repairs Bucureşti, in the freight train traffic no.84796-1 (belonging to the railway undertaking SNTFM „CFR Marfă" - SA), in the railway station Bucureşti Triaj, Switch cabin 17, by the derailment of the second bogie in the running direction of the wagon no.81536653788-5, the 9th from the locomotive.

Through the performed investigation, the information concerning the occurrence of this accident were gathered and analysed, the conditions were established and the causes determined.

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

Bucharest, 19.11.2012

Approved by
Director,
Nicolae Sandu

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 30th of August 2012, at 22,30 hour, in the Branch of the Regional center for railway operation, maintenance and repairs Bucureşti, in the freight train traffic no.84796-1* (belonging to the railway undertaking SNTFM „CFR Marfă" - SA), in the railway station Bucureşti Triaj, Switch cabin 17, by the derailment of the second bogie in the running direction of the wagon no.81536653788-5, the 9th from the locomotive.**

SUMMARY

A. PREAMBLE

A.1. Introduction

Romanian Railway Investigating Body, hereinafter OIFR, performs investigations according to the provisions of Law *no.55/2006* on railway safety, hereinafter Law on railway safety, as well as Regulation for the investigation of the railway accidents and incidents, development and improvement of Romanian railway and subway safety approved by GD 117/2010, hereinafter Regulation for investigation.

The investigation of Romanian Railway Investigating Body aims to improve the railway safety and prevent railway accidents and incidents.

The investigating actions carried out by Romanian Railway Investigating Body are performed independently of any judicial inquiry, their aim is not to establish guilty or responsibility.

A.2. Investigation process

According to art.19 paragraph.2 of *Law on railway safety*, and art. 48, paragraph. 1 from the Regulation for the investigation, OIFR, in case of certain railway accidents or incidents, has the obligation, to start investigations and form investigation commissions to gather and analyse technical informations, establishing the occurrence conditions, including determining the cause and, when appropriate, issuing some safety recommendations in order to prevent some similar accidents and to improve the railway safety.

Taking into account that informative paper of the General Inspectorate for the Traffic Safety and Control from CNCF « CFR » SA from the 31th of August 2012 and the approval paper of the Regional Inspectorate for the Traffic Safety within the Branch of the Regional centre for railway operation, maintenance and repairs Bucureşti, hereinafter CREÎR Bucureşti, regarding the railway accident on 30.08.2012, at 22:30, on the activity area of CREÎR Bucureşti, in the freight train traffic no.84796-1 (belonging to the freight railway undertaking SNTFM ,,CFR Marfă" SA), in the railway station Bucureşti Triaj, Switch cabin 17, by the derailment of the second bogie, in the running direction, from the wagon no.81536653788-5, the 9th in the train from the locomotive, and taking into account that the railway event is defined as accident, according to the provisions of the art. 7(1), point b) *from the Regulation for the investigation,* OIFR director decided to start an investigation and appoint the investigation commission.

Through the Decision no. 93, from the 4th of September 2012 of OIFR director, the investigation commission was appointed, consisting in staff from OIFR, CREIT Bucureşti and Zonal Freight Center Bucuresti hereinafter CZM Bucuresti, as follows:

Eduard STOIAN	OIFR department head	- main investigator
Nicolae FRÂNCULESCU	Regional inspector SC MR CREIR Bucureşti	- member
Daniel VISALON	Regional inspector SC L CREIR Bucureşti	- member
Florin DUMITRACHE	Regional inspector SC MC CREIR Bucureşti	- member
Gheorghe SILIŞTEANU	Regional inspector SC CZM Bucureşti	- member

Through the Decision no.93-1 from 27.09.2012 this commission was modified as follows:

Lucian ŢENA	OIFR department head	- main investigator
Nicolae FRÂNCULESCU	Regional inspector SC MR, CREIR Bucureşti	- member
Daniel VISALON	Regional inspector SC L, CREIR Bucureşti	- member
Florin DUMITRACHE	Regional inspector SC MC, CREIR Bucureşti	- member
Gheorghe SILIŞTEANU	Regional inspector SC CZM Bucureşti	- member

B. ACCIDENT BRIEF PRESENTATION

On 30.08.2012, at 22:30, on the activity area of CREIR Bucureşti, in the freight train traffic no.84796-1 (belonging to the freight railway undertaking SNTFM ,,CFR Marfă" SA), in the railway station Bucureşti Triaj, Switch cabin 17, when passing over the switch no.23 one occur a railway accident consisting in the derailment of the second bogie, in the running direction, on the wagon no.81536653788-5, the 9th in the train from the locomotive.

Following this railway accident, the train traffic between the railway stations Bucureştii Noi –Bucureşti Băneasa was closed from the moment of the accident until 05:20 on 31.08.2012.

8 trains were delayed with a total of 2097 minutes.

There were no fatalities or injured.

The direct cause of this accident consists of the malfunction of the centre casting which led to the reduction of the bogie mobility affecting the entry into curve.

There were no ***underlying causes***.

There were no ***primary causes***.

No ***safety recommendations*** were issued.

C. INVESTIGATING REPORT

C.1. Accident presentation

On 29.08.2012, in the railway station Mintia, the train no.84796-1, composed of 38 wagons series Fals, empty, 152 axles, was made available for inspection at forming of train and full brake test performed by examiners employees of Simeria Triaj wagons inspection.

The inspection at forming of train and full brake test were ready at 22:35, and the train dispatch from the railway station Mintia at 22:47 and arrive in the railway station Roşiori de Vede on 30.08.2012 at 11:40 when it is made available for tranzit inspection.

The transit inspection was complete at 12:10 and the continuity test at 13:20, the train departure at 13:25 and arrive in the railway station Bucureşti Triaj, Switch cabin 17, at 22.30,

when, passing over the switch 23, the second bogie in the running direction derailed, from the 9th wagon in the train, from the locomotive.

The accident site – photo 1.

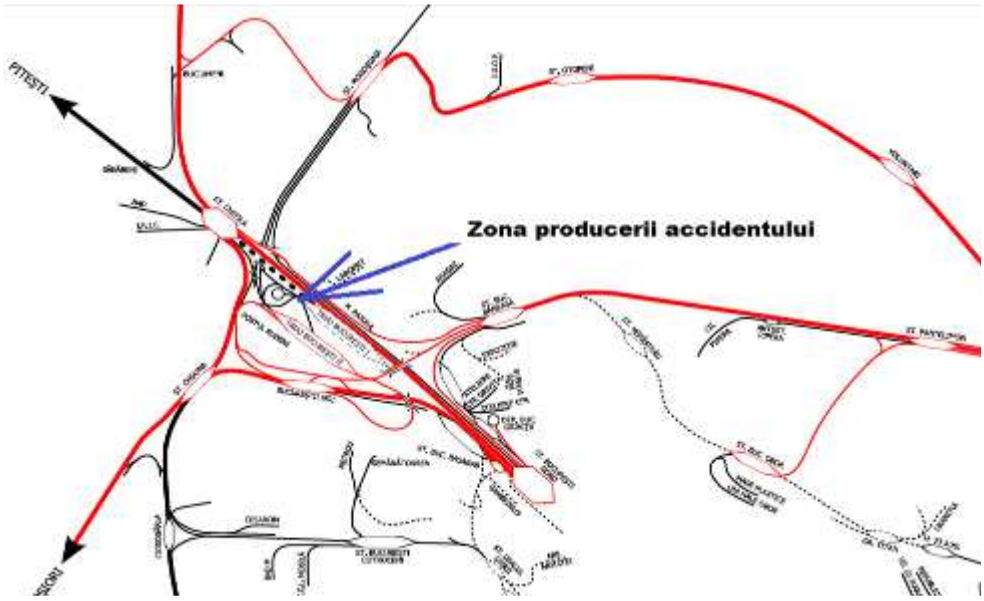

Photo no.1

Following this accident, the railway traffic between the railway stations Bucureştii Noi – Bucureşti Băneasa was closed from the hour of the accident until 05:20 on 31.08.2012.

Following this accident, 8 freight trains were delayed with a total of 2097 minutes.

There were no victims or injured.

The derailed wagon was lifted at 03:33 on 31.08.2012 and the train traffic between the railway stations Bucureştii Noi –Bucureşti Băneasa was resumed at 05:20 in the same day.

Following the notification of this railway accident, performed according to the specific regulations, the representatives of Romanian Railway Investigating Body, Romanian Railway Safety Authority, railway infrastructure manager - CNCF „CFR" SA Bucharest and railway undertaking SNTFM “CFR Marfă” SA went to the accident site.

According to the accidents classification stipulated in art.7 paragraph.(1) letter.b) of the *Investigation Regulation*, the derailment of the wagon no.81536653788-5 in the train no.84796-1 on 30.08.2012 in classified as **railway accident** according to **art.7 point.1 letter.b**.

C.2.Accident circumstances

C.2.1. Involved parties

The railway infrastructure and superstructure were the railway accident occurred is under the administration of the railway infrastructure manager - CNCF „CFR" SA.. The railway

superstructure maintenance is performed by specialised staff from the District no. 4 within Section 2 – CREIR Bucuresti.

The interlocking system from the railway station Bucureşti Triaj is maintained by the Section CT1 staff, District SCB-AT Bucureşti Triaj - CREIR Bucureşti.

The hauling locomotive EA 847 and the wagons of the train no.84796-1 belongs to freight railway undertaking SNTFM'' CFR Marfa''SA.

The communication equipment onboard the hauling locomotive is owned by the railway undertaking SNTFM „CFR Marfă" SA and maintained by its employees.

C.2.2. The train composition and equipments

The freight train no.84796-1, composed from 39 wagons (empty), 156 axles, 950 gross t, length 595 m, was hauled by the locomotive EA 847 belonging to the freight railway undertaking SNTFM''CFR Marfă''SA.

C.2.3. Description of the involved railway equipment at the accident site

C.2.3.1. Lines

The path description

From the departure station until the derailment site, the train ran about 460 km, the track alignment consisting of sequences of alignments and curves, the smallest curve radius (R= 250 m) at km 0+056 - 0+248.

In the long profile, the track alignment consists of sequences of slopes, the maximum slope of 11,0‰ at km 11+070-11+200 (down-grade in the running direction).

Description of the track superstructure

The derailment occurred on the cross-over 23-17 of the scissors crossing 21/25-23-17-19.

The distance between the center of the scissors is 5250 mm, and the two switches within this cross-over have the following characteristics:

- rail type 49 ;
- tangent tg.=1/9;
- flexible point switch Af
- radius R=190 m;
- left deviation.

The cross-over 23-17 is within the scissors crossing 21/25-23-17-19, scissors crossing type 49 with the distance between the centres of the track D=5250 mm composed of :

- switch 17: type 49 , tg.1:9, Af R=190 m, left deviation;
- switch 19: type 49, tg.1:9, Aa R=190 m, left deviation;
- switch 23: type 49 , tg.1:9, Af R=190 m, left deviation;
- TJD 21/25 type 49, tg.1:9, Aa R=190 m,

C.2.3.2. Traffic system

The traffic from the railway station Bucureştii Noi-Group C-Post 17-Railway station Pajura is based on free path and running order handed by the movement inspector from the railway station Bucureştii Noi to the locomotive driver, due to busy sections.

C.2.3.3.Wagons

The technical characteristics of the wagon no.81536653788-5

- wagon series	Fals;
- automatic brake type	KE-GP;
- bogie type	Y25Cs ;
- beam adjuster type	DRV 2AT-600;
- distance between the bogie pins	9,00 m;
- length between the buffers	14,54 m;
- tare of wagon	25 t;
- bugging gears	circle buffers;
-draft gear	discontinuous;
- hand brake	manoeuvrable from the platform;
- load capacity	55 t;
- date of the last planned repair performed	RP 20.02.2009 CTFB
- other repairs at the wagon	RR, RIF 02.02.2012 LSI
- maximum repair period	6 years

C.2.4. Communication means

The communication between the engine driver and the movement inspectors was ensured through the radio equipment.

C.2.5. Starting the railway emergency plan

Immediately after the railway accident, the starting of the emergency plan for damages removal and the train running restoration one achieved according to the Regulation for accident and incident investigation, approved through the Government Decision no. 117/2010, at the railway accident site come the representatives of the public railway infrastructure manager CNCF „CFR" SA, freight railway undertaking SNTFM "CFR Marfă" SA, Romanian Railway Authority – AFER and of the Operative Department of the Railway Police.

C.3. Accident consequences

C.3.1. Fatalities and injures

None.

C.3.2. Material damages

The value of the material damages according to the estimates made by the rolling stock owner, of intervention means and by the railway infrastructure manager, is the following:

Material damages	- ron -
at wagons - according to the estimate no.RVg/907/12.10.2012 from the Section IRV Ghighiu	522,24
at line – according to the estimate no.3293/03.09.2012 from Section Lines 2 Bucureşti	0,00

intervention train – according to the estimate no.L 4/320/2012 from Bucureşti Lines Division	3.767,42
TOTAL	4289,66

C.3.3. Accident consequences in the railway traffic

Following the railway accident a number of 8 trains have delayed with a total 2.097 minutes.

C.4. External circumstances

On 31.08.2012, between 19.00-24.00, the visibility was good, the temperature was about 28ºC.

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

C.5. The investigating

C.5.1. The brief of the involved staff testimonies

The examiner that performed the technical inspection in transit at the train no. 84796 in the railway station Roşiori Nord on the opposite side of the railway station stated the followings:

- he perform technical inspection in transit at the train no. 84796 in the railway station Roşiori Nord on the opposite side of the railway station;
- he finished the technical inspection at 12:10;
- during the technical inspection, he didn't find any irregularities;
- at 13:20 he performed continuity test;
- he visual inspected the dispatch of the train at 13:25.

The examiner that performed the technical inspection in transit at the train no. 84796 in the railway station Roşiori Nord on the side of the railway station stated the followings:

- he was notified by the movement inspector with no.30113 at 11:40 at the train no.84796 at line no.6, with technical inspection in transit;
- he supervised the parking of the train at line 6, after which he performed technical inspection in transit on the side with the railway station platform;
- he finished the technical inspection in transit at 12:10, and didn't find any irregularities at the wagons of the train;
- at 13:20 he performed continuity test;
- he visual inspected the dispatch of the train at 13:25.

C.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 system, according to the provisions of the Law on 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, getting**:**

- Safety Authorization – Part A, identification number ASA 09002 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the safety management of the railway infrastructure manager;
- Safety Authorization – Part B, identification number ASB 09007 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the dispositions taken by railway infrastructure manager in order to comply with the specific requirements necessary to assure the railway infrastructure safety, in the

designing, maintenance and operation, including if case, maintenance and operation of the system for the traffic control and signalling.

Also, SNTFM "CFR Marfă" SA, as railway undertaking had implemented its own railway safety management, according to the provisions of the Law on 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, getting:

- Safety Certificate – Part A, identification number 0024 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of safety management system of the railway undertaking;
- Safety Certificate – Part B, identification number 0060 – by which Romanian Railway Safety Authority, from Romanian Railway Authority – AFER agrees the acceptance of the dispositions taken by the railway company in order to comply with the specific requirements necessary for the safety operation on the relevant network, in accordance with the national legislation.

C.5.3. Norms and regulations. Sources and references for the investigation

At the railway accident investigation were taken into account the following norms and regulation:

- Regulations for train traffic and the shunting of railway vehicles no.005, approved by Minister of Transports, Constructions and Tourism Order no. 1816 from the 26th of October 2005;
- Instructions on the technical inspection and the maintenance of the wagons in operation no. 250, approved by Minister of Transports, Constructions and Tourism Order no. 1817 from the 26th of October 2005;
- Instructions for the locomotive staff of railway transport No 201. approved by Minister of Transports, Constructions and Tourism Order no. 2229 from the 23rd of November 2006;
- 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 of norms and tolerances for construction and maintenance of the standard gauge tracks no. 314/1989;
- Instruction for speed restrictions, track closure and cutting off the power supply - no. 317 approved by Minister of Transports Order no.317/08.03.2004.

At the railway accident investigation the followings sources and references were taken into account:

- copy of documents submitted as annexes to the investigation file;
- 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 responsible 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 equipment and train.
- Inquires of involved staff in the railway accident.

C.5.4. Functioning of technical equipment,, infrastructure and rolling stock

C.5.4.1. Data found on lines

<u>Findings and measurements of the track after the derailment</u>

1. at the time of the derailment the speed over the scissors crossing 21/25-23-17-19 from the cabin switch 17 Group A2 Bucureşti Triaj was of 5 km/h;

2. within the curve of the switch no.23, on the right rail, at a distance of 14700 mm against the stock rail joint, one found out the first trace of climbing of the lip of tyre on the head of rail;

3. starting from this point on the head of rail one observe, on a distance of 2710 mm, lip of tyre trace, followed by a mark on the exterior surface of the head of rail and then specific traces of the wheel falling and running on the fastening metallic parts of the rail on the metallic plates (rods of the vertical screws and rail clip type K), hit traces of the coach screws and running traces on the sleepers.

4. the sleepers within the cross-over no.23-17 (cross-over on which the freight train no.84796-1 was running) allowed the coach screw fastening;

5. within the switch no.23 one found out that some sleepers at which fixing the rail on the base plate or fixing the base plates on the wooden sleepers was not made according to the instructions.
   Thus, starting from the first trace of climbing, on the right rail in the direction opposite to the running direction of the train, these were as follows**:**

   - in the climbing point one rail clip type K was missing, right side, inside the rails;

   - at the first and second sleeper after this point, the single plates from the right side were cut, the single plates were fixed with 3 coach screws;

   - at the fifth sleeper after the climbing point, one rail clip type K was missing on the right side, inside the rails;

   - at the seventh sleeper after the climbing point, the metal plate was missing;

   - at the 10th sleeper after the climbing point, the special metal plate was missing that should support the blades and the toe, the metal plate supporting existing track only ensure the blades;

6. the left and the right wheel fell in the same time, one found running traces of the left wheel on fastening metallic parts of rail on the metallic plates on the sleepers;

7. one found specific derailment traces on a distance of 15 meters;

8. over the scissor crossings one found out the wagon no.81536653788-5 derailed by the second bogie;

9. from climbing point in the opposite running direction of the train pegs were marked on the ground of 2.5 meters in 2.5 meters, in the resulted points measurements of the gauge and transversal level were made with the measurement gauge. The values of the measurement gauge were the following:

Peg	1	2	3	4	5
E/N (mm)	14/0	15/-10	10/-17	4/-4	12/2

10. There were no wear of metal parts of the switch, to determine derailment.

11. Following the checking through measurement of the gauge and transversal level in the characteristics points of the switch no.1 there were no values above the allowed

tolerances admitted in the Instruction for norms and tolerances for constructions and maintenance of track – line with normal gauge no.314/1989.

C.5.4.2. Data found at functioning of rolling stock and its technical equipment

Findings performed on the wagons of the train composition

- exchanger „Freight– Passengers" and „Empty – Loaded" were in proper positions to the status of the wagons, respectively positions „Freight" and „Loaded";
- the train had in its composition 12 wagons with isolated automatic brake,
- tying the wagons was proper;
- functioning coupler of the traction gear was proper tightened for freight trains;
- no uninsured parts were found which can jeopardize the safety running.

Defects found at the wagon no.81536653788-5 at the accident site:

- the second bogie, in the running direction, derailed by both bogies;
- Lenoir shock absorber ineffective at the axle journal no.7;
- the buffer from the end of the wagon without hand brake corresponding to the axle journal no.8 tear out from the screws after the derailment;
- loss of lubricant at the axle-box cover of the axle journal no.6.
- the two bogies wheels were positioned with the odd axle journal on the right side and with the even ones on the left side, in the train running direction (figure no.4)

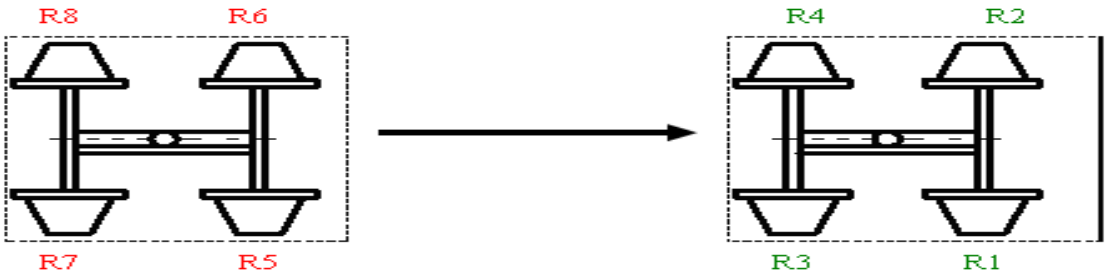

Figure no.4

- Findings at the wagon no.81536653788-5 performed at CIRV Section IRV Ghighiu:

wheel no. (axle)	running tread diameter	lip of tyre height Hb	lip of tyre thickness Sd	quota qR	DFI	total clearance at the friction stones	buffers height NSS
1	868	29	28	7,5	1360,2 1359,6 1359,3	14	1020
2	868	29	29	9			1020
3	871,5	28,5	25	7,5	1360,3 1361 1360,7		-
4	871,5	28,5	28,5	9			-
5	861,5	30	28	8,5	1360,1 1360 1360,1	31	-
6	861,5	30	29	9,5			-
7	862	29,5	27	8	1359,5 1359,4 1359,4		1020
8	863	30	28,5	8			1030

- the polyamide plate at the derailed bogie centre casting was completely destroyed, grounded (turn to dust), material that was thrown outside the contact area between the upper and lower centre casting according to figure no.2 ;
- pronounced friction traces on the upper centre casting with damage to the geometric shape and spherical cap of the upper centre casting according to figure no.3 ;
- the rubber protection joint had compactions and permanent deformations most pronounced in two opposite areas;
- buffers corresponding to the axle journals no.3 and no.7 blocked not allowing the rotation of the plate, as well as wear on the plate.

Figure no.2

Figure no.3

C.6. Analysis and conclusions

C.6.1. Conclusions on the technical condition of the rail superstructure

Given the characteristics of the line described in Chapter *C.2.3.1. Lines* presented in description of rail equipment involved in the accident as well as findings and measurements to the line, after the derailment, presented in chapter *C.5.4.1. - Data found on lines*, we can declare that the technical condition of the superstructure lines and points and crossing could not influence the derailment.

C.6.2. Conclusions on the technical condition of the wagons within the train

At the derailed wagon bogie running gears one didn't find any defects that existed prior to the dispatch of the train from the railway station Mintia.

At the wagon no. 81536653788-5 one found failures in operating the centre casting from bogie no.2 which had the effect of entering in direct contact of the upper centre casting with the lower centre casting with significant damage to the adhesion coefficient and the appearance of asymmetric wear at the upper centre casting, which directly influenced the derailment.

C.6.3. Analysis and conclusions on the train derailment occurrence

From the analysis of the findings of the accident site, the technical state of the involved wagon bogie, of the photos made on the site, as well as the testimonies of the involved staff, it can be concluded that the railway accident occurred in the following conditions:

- when passing over the switch 23, wheel no.5 of the first axle in the running direction of the second bogie frim the 9th wagon within the train, from the rear of

the train, at a distance of 14700 mm against the stock rail joint, climbed on the rail head on the right side, within the switch curve;

- starting from this point on the head of rail one observe, on a distance of 2710 mm, lip of tyre trace, followed by a mark on the exterior surface of the head of rail;
- after lip of tyre no.5 running on the head of rail on the right side on a distance of 2710 mm one occur the derailment of wheel no.5 outside this rail, together with the fall of wheel no.6 from the left rail between the rails and derailment of the axle with the axle journal no. 7-8 around 22 :30, specific traces of the wheel falling and running on the fastening metallic parts of the rail on the metallic plates (rods of the vertical screws and rail clip type K), hit traces of the coach screws and running traces on the sleepers;
- one found derailment traces on a distance of about 15 meters .

D. ACCIDENT CAUSES

D.1. Direct cause

The direct cause of this accident consists of the malfunction of the centre casting which led to the reduction of the bogie mobility affecting the entry into curve.

The malfunction of the centre casting was possible due to the total destruction of the weariness fitting, made of material type polyamide, by grinding and thrown outside the weariness fitting from the contact area upper centre casting – lower centre casting, which had the effect of entering into direct contact of the upper centre casting with the lower centre casting with significant damage to the adhesion coefficient and the appearance of asymmetric wear at the upper centre casting.
Under these circumstances the bogie mobility was affected which led to the reduction on the entry into curve and in final to the climbing with the lip of tyre no.5 on the head of rail and its derailment, followed by the derailment of the other axle (axle with the axle journals no.7-8) of bogie no.2 from the wagon no. 81536653788-5.

D.2. Underlying causes
None.

D.3 Root causes
None.

E. SAFETY RECOMMENDATIONS
None.

The present Investigating Report will be transmitted to the Romanian Railway Safety Authority, railway public infrastructure manager CNCF „CFR" SA, railway freight undertaking SNTFM „CFR Marfă" SA .

Bucharest

19 /11 / 2012

Members of the investigation commission:

Lucian ŢENA	head of service OIFR	- main investigator
Nicolae FRÂNCULESCU	regional inspector SC MR, CREIR Bucureşti	- member
Daniel VISALON	regional inspector SC L, CREIR Bucureşti	- member
Florin DUMITRACHE	regional inspector SC MC, CREIR Bucureşti	- member
Gheorghe SILIŞTEANU	regional inspector SC CZM Bucureşti	- member