



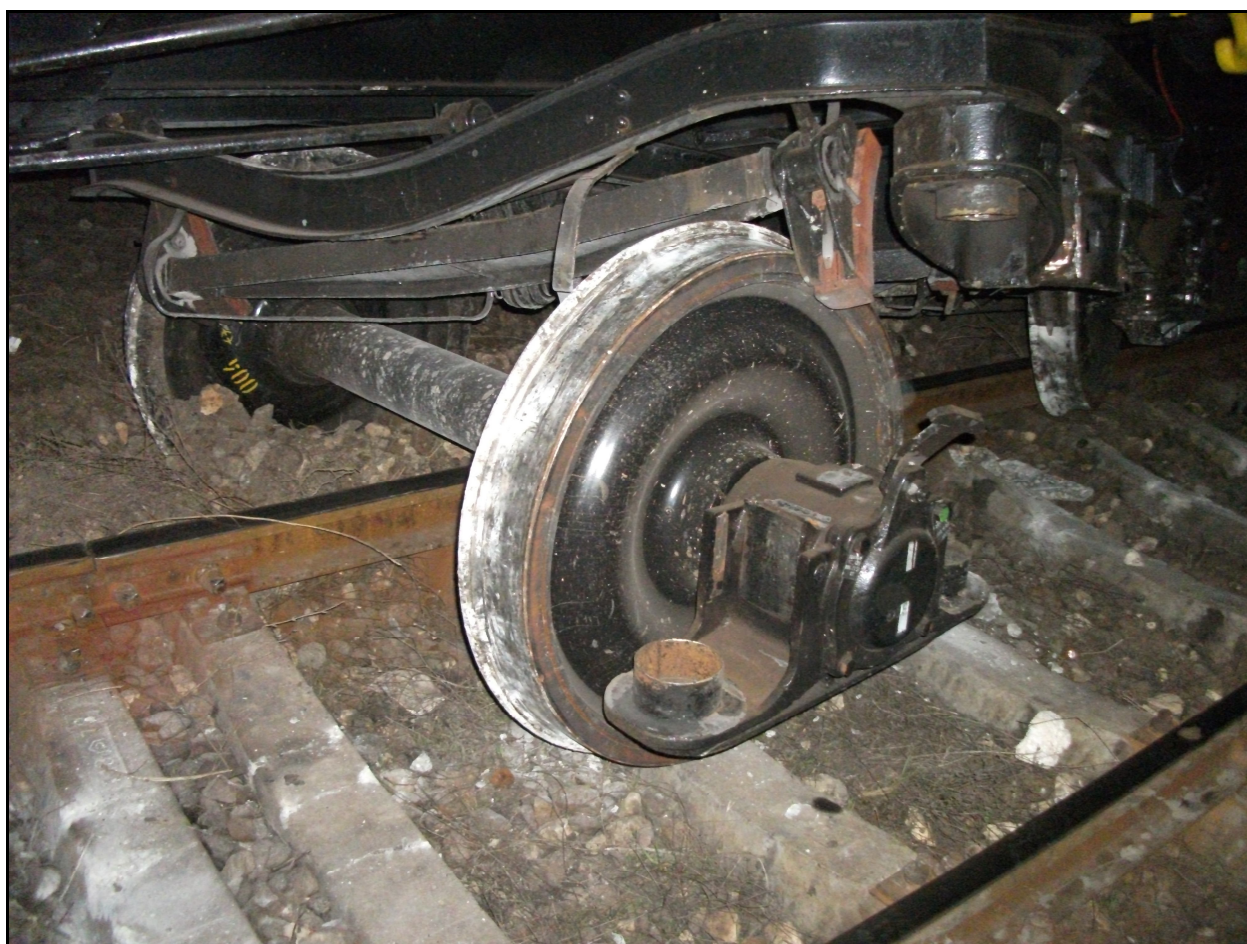
MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



INVESTIGATING REPORT

on the railway accident
occurred on the 8th of February 2011, in the railway station Capu Midia



FINAL EDITION
The 12th of September 2011

NOTICE

With reference to the railway accident occurred on the **8th of February 2011**, at **5:15 p.m.**, on the range of activity of **CF Constanta Regional Branch**, the non-interoperable running section P1 Capu Midia – Capu Midia, at the entry in the **railway station Capu Midia**, consisting of the **derailment of the wagons no. 33877919348-5, 37807923043-9 and 33807920395-0** (placed the 19th, the 20th and the 21st in the composition of the train) in the composition of the **freight train no. 82961** (belonging to the railway undertaking SNTFM “CFR Marfa” SA), Romanian Railway Investigating Body carried out an investigation, according to the provisions of the HG no. 117/2010. Through the investigation, the information on the respective accident was gathered and analyzed, the conditions were established and the causes determined.

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

Romanian Railway Investigating Body considers necessary to take corrective measures in order to improve the railway safety and to prevent the accidents, so it included in the report a series of safety recommendations.

Bucharest, *September 2011*

Approved by
Dragoş FLOROIU
Director

*I agree the compliance with the
legal provisions on the
investigation performance and
drawing up of this Investigation
Report, that **I submit for approval,***

Chief Investigator
Nicu PĂLĂNGEANU

This approval is part of the Report for the investigation of the accident occurred on the 8th of February 2011, at 5:15 p.m., on the range of activity of CF Constanta Regional Branch, in the railway station Capu Midia, consisting of the derailment of the wagons no. 33877919348-5, 37807923043-9 and 33807920395-0 in the composition of the freight train no. 82961.

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I. PREAMBLE

I.1. Introduction

In the case of the railway accident occurred on the 8th of February 2011, at 5:15 p.m. on the range of activity of CF Constanta Regional Branch, on the non-interoperable running section P1 Capu Midia - Capu Midia rented from CNCF “CFR” SA by the manager of the non-interoperable railway infrastructure SC ROMPETROL LOGISTICS SRL Ploiesti (non-electrified line), in the running of the freight train no. 82961 belonging to the railway undertaking SNTFM “CFR Marfa” SA, at the entry in the railway station Capu Midia, at the km 32+337, consisting of the derailment of three wagons (the 19th, the 20th and the 21st by the locomotive) in the composition of the train, Romanian Railway Investigating Body carried out an investigation according to the provisions of the Government Decision no. 117/2010, to prevent accidents with similar causes by establishing the conditions and determining the causes.

Romanian Railway Investigating Body investigation did not aim to establish the guilty or the responsibility in this situation, its objective being to improve railway safety and to prevent railway incidents or accidents.

I.2. Investigation process

On the 8th of February 2011 the General Inspectorate for Traffic Safety in CNCF “CFR” SA announced Romanian Railway Investigating Body about the accident occurred on the 8th of February 2011 at 5:15 p.m., on the range of activity of CF Constanta Regional Branch, on the non-interoperable running section P1 Capu Midia - Capu Midia rented from CNCF “CFR” SA by the manager of the non-interoperable railway infrastructure SC ROMPETROL LOGISTICS SRL Ploiesti, at the km 32+340, in the running of the freight train no. 82961 (belonging to the railway undertaking SNTFM “CFR Marfa” SA) consisting of the derailment of three wagons in the composition of the train.

Taking into consideration that, the occurrence is defined as accident according to the provisions of the art. 3, point 1 of the Law 55/2006 on railway safety and of the art. 7, paragraph 1, point b) of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010 and that this accident is relevant for the railway system, under the article 19 paragraph (2) of the Law no. 55/2006, corroborated with the art. 48, paragraph 1 of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, Romanian Railway Investigating Body decided to start an investigation. So, through the decision no. 50 from the 9th of February 2011, of the OIFR director, the investigation commission was appointed, consisting of:

- Zamfirache Marian - main investigator
- Țena Lucian - investigator
- Dobre Florin - investigator
- Odae Viorel - state inspector in ISF Constanta-ASFR
- Bătrânoiu Ștefan - head of Control Service Protection, Prevention and Emergency Situations, Muntenia- Dobrogea Freight Branch, Constanta
- Toma Tamara - responsible SC at SC ROMPETROL LOGISTICS SRL Ploiesti.

A. BRIEF PRESENTATION OF THE INCIDENT

A.1. Brief presentation

On the 8th of February 2011, at 1:58 p.m., the freight train no. 82961, belonging to the freight railway undertaking SNTFM “CFR Marfa” SA, was sent from the railway station CFR Palas towards the railway station Capu Midia belonging to the manager of the non-interoperable railway infrastructure SC ROMPETROL LOGISTICS SRL Ploiesti.

Around 5:15 p.m., at the entry in the railway station Capu Midia, at the km 32+337, there occurred the derailment of three wagons in the composition of the train, as follows:

- wagon no. 33877919348-5, the 19th by the train locomotive, derailed by a bogie;
- wagon no. 37807923043-9, the 20th by the train locomotive, derailed by both bogies and inclined;
- wagon no. 33807920395-0, the 21st by the train locomotive, derailed by both bogies.



Place of the accident

The freight train no. 82961 was composed of 22 tank wagons (all empty), 88 axles, 685 gross tons, length 379 m and was towed with the locomotive DA 855 (belonging to the railway undertaking SNTFM “CFR Marfa” SA).

The train was received in the railway station with normal command in the line block installation, going to be shunted in the deviated line 4 of the railway station Capu Midia.

There was no damage at the towing locomotive of the train or at the railway installations.

There were no deaths or injuries.

A.2. Causes of the accident

A.2.1. Direct cause

The direct cause of the occurrence of this accident is the exceeding of the guiding capacity of the driving axle from the first bogie of the wagon no. 37807923043-9 (placed the 20th in the composition of the train) by the guiding force with which this axle attacked the rail corresponding to the outer wire of the curve (the left side in the running direction of the train), followed by the climbing of the wheel rim on the rail and then by its fall outside the path.

Increasing of the guiding force of the driving axle occurred under the conditions:

- growth of the dynamic shocks transmitted by the path to the wagon wheels, under the circumstances in which the values of the curve arrows measured in the area of the derailment were exceeding the admitted tolerances set in the Instruction of standards and tolerances for the construction and maintenance of the rail no. 314/1989;
- non-equalization of the binding device between the wagons no. 37807923043-9 and no. 33807920395-0.

A.2.2. Underlying causes

None.

A.2.3. Root causes

None.

A.3. Severity level

According to the provisions of the art. 3, letter 1 of the Law no. 55/2006 on railway safety, corroborated with the provisions of the art. 7, paragraph (1), letter b of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010, the event is categorized as railway accident.

A.4. Safety recommendations

None.

B. INVESTIGATING REPORT

B.1. Description of the accident

On the 8th of February 2011, at 1:58 p.m. the freight train no. 82961 belonging to the freight railway undertaking SNTFM “CFR Marfa” SA was sent from the railway station CFR Palas towards the railway station Capu Midia belonging to the manager of the non-interoperable railway infrastructure SC ROMPETROL LOGISTIC SRL Ploiesti.

On the distance run from the railway station CFR Palas to the place of the derailment the train ran with speeds within 30 km/h and 49 km/h.

The train ran without problems on the section Palas – Constanta Marfuri – Lumina – P1 Capu Midia, to the entry in the railway station Capu Midia, where at the running on an area of curve with radius of 260 m occurred the derailment of the wagon no. 33877919348-5 (the 19th in the composition of the train) by a bogie, of the wagon no. 37807923043-9 (the 20th in the composition of the train) by both bogies and of the wagon no. 33807920395-0 (the 21st in the composition of the train) by both bogies.

The first sign of climbing of the left wheel rim of the first axle of the first bogie of the 20th wagon on the rolling surface of the rail head associated to the outer wire of the curve was found at the km 32+337 (point located on the area of the circular curve with the radius $R = 260$ m). This sign continues with the mark of the bandage rim on the rolling surface of the rail on a length of 6310 mm, followed by the sign of falling of the wheel on the left of the rail head from the outer wire of the path (outside the path).

The point in which derailed the first axle of the first bogie of the 20th wagon, coincides with the X end of the level passage (tiled) whose axis is located at the km 32+349.

After the derailment of the 20th wagon, in the derailment were involved also the wagons no. 19 and no. 21 in the composition of the train.

From the place of the escalation occurrence (km 32+337) and to the stop, the train ran a distance of about 232 m.

Moving to the place of the accident the members of the investigation commission found the following:

➤ at the wagons:

- wagon no. 33877919348-5 (the 19th in the composition of the train):
 - the pad pan in the end towards the wagon no. 37807923043-9 right side in the running direction dismantled from the pad rod and fallen;
- wagon no. 37807923043-9 (the 20th in the composition of the train):
 - triangular axis outer to the axle corresponding to the wheels 3-4 deformed;
 - impact signs on the pad body placed in the end with the brake spindle right side running direction of the train came from the impact with the pad pan corresponding from the wagon placed in its front in the composition of the train (wagon no. 33877919348-5);
- wagon no. 33807920395-0 (the 21st in the composition of the train):
 - the traction hook towards the wagon in its front (wagon no. 37807923043-9) deformed;

- snare of the linking device in the same end broken.
- at the line:
 - at the km 32+337, on the area in curve, was found an escalation sign of the rail corresponding to the outer wire of the curve, which continues with a sign left on the wheel bandage rim on the left and then falling sign of the wheel on the left of the rail head (outside the path);
 - on the rail head, this sign is on a length of 6310 mm (near the first end tile of the level passage located at the km 32+349);
 - starting from the falling sing of the wheel on the left, was found the impact of the fixing elements of the metallic plates on the sleepers outside the path and of these between the rail wires;
 - after this level passage were found signs of rolling of the wheels bandages rims on the ends on the left (in the running direction of the train) of the sleepers, and also between the rail wires (in the middle of the sleepers).

B.2. Circumstances of the accident

B.2.1. Involved parties

The non-interoperable running section where the railway accident took place is managed by SC ROMPETROL LOGISTICS SRL Ploiesti and maintained by SC EURO CONSTRUCT SA Constanta.

The railway infrastructure and superstructure is in the responsibility of SC ROMPETROL LOGISTICS SRL Ploiesti and is maintained by SC EURO CONSTRUCT SA Constanta.

The installations signaling, centralization and blocking (SCB) from the railway station Capu Midia are managed by SC ROMPETROL LOGISTICS SRL Ploiesti and maintained by the employees of SC ISAFIT LITORAL SRL Constanta.

The installation of railway communications from the railway station Capu Midia is managed by SC ROMPETROL LOGISTICS SRL Ploiesti and is maintained by the employees of SC ISAFIT LITORAL SRL Constanta.

The installation of railway communications from the locomotive is the property of the railway undertaking SNTFM “CFR Marfa” SA and is maintained by its employees.

B.2.2. Forming and equipment of the train

The freight train no. 82961, was composed of 22 wagons, 88 axles, 685 tons, length 379 m, automatically braked according to the service book 343 tons, real 641 tons, (plus 298 tons to the service book) hand braked according to the service book 69 tons, real 433 tons (plus 364 tons).

The train was towed with the locomotive DA 855 – belonging to the railway undertaking SNTFM “CFR Marfa” SA, locomotive that was served by staff belonging to SNTFM “CFR Marfa”- Palas Depot.

The automatic brake of the train was active, the safety and vigilance equipments (DSV), the equipment for the point control of the speed and hitchhiking (INDUSI) in the equipment of the locomotive that provided the traction were active and instructionally working, being sealed.

The automatic brakes of the wagons in the train were active excepting the wagons no. 33807919867-1, 33807918232-9 and 33807918363-2, placed on the positions 6, 8 and respectively 13 in the composition of the train.

B.2.3. Railway equipments

Description of the rail path

From the sending station to the place of the derailment occurrence the train ran a distance of about 33 km, the rail path in plane being composed of a succession of curves and alignments, radia having values within 250 and 800 m.

The profile along of the rail path is composed of a succession of slopes (ramps in the running direction of the train) and levels, the slopes values being within 7 – 10.46 ‰.

Description of the rail superstructure

In the area of the derailment occurrence the railway superstructure is built of rail type 49, concrete sleepers T29 and indirect clamping type K.

Description of the safety installations to guide the railway traffic

The railway station Capu Midia is provided with installations signaling, centralization and blocking type CR3 with automatic line block.

B.2.4. Means of communication

The communication between the locomotive driver and the movement inspectors and between the locomotive driver and the train party was insured through radio-telephone devices.

B.2.5. Triggering the railway emergency plan

Immediately after the occurrence of the railway accident, triggering the intervention plan to remove damages and restore trains traffic was performed according to the provisions of the Regulations for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by Government Decision no. 117/2010, after which were presents representatives of the manager of the non-interoperable railway infrastructure (SC ROMPETROL LOGISTICS SRL Ploiesti), of the railway undertaking (SNTFM “CFR Marfa” SA – Muntenia - Dobrogea Branch and of the Romanian Railway Authority - AFER.

To restore on the rails the derailed rolling stock, were used local means.

B.3. Consequences of the accident

B.3.1. Deaths and injuries

None.

B.3.2. Material damages

The amount of the material damages according to the estimates prepared by the owner of the rolling stock, of the intervention means and by the manager of the non-interoperable railway infrastructure, is the following:

▪ at the locomotive - none;	
▪ at the environment - none;	
▪ intervention means – none;	
▪ other damages – train delays – none;	
▪ at the wagons:	
- estimates no. 435, 436 and 437 from the 23.02.2011 of SC CFR IRV SA Constanta – Section PALAS;	4 189.83 lei
- order VTG no. 2022532/23.04.2011	5 171.75 €
- invoice VTG no. 50016959/12.05.2011	5 579.16 €
▪ at the line	4 725.88 lei
according to the estimate no. 399 from the 03.03.2011 of SC EURO CONSTRUCT SA Constanta	
▪ at the installations	4 927.54 lei
according to the estimate no. 58 from the 14.02.2011 of SC ISAFT Litoral SRL Constanta	
Total amount of the damages	13 843.25 lei and 10 750.91 €

B.3.3. Consequences of the accident in railway traffic

There was no train delay.

B.4. External circumstances

On the 8th of February 2011, during the interval 4:00 p.m. - 6:00 p.m. the visibility was good and the air temperature was of about +5⁰ C.

The visibility of the light signals was in accordance with the specific regulations in force.

B.5. Investigation course

B.5.1. Summary of the involved staff statements

From the statements of the **technical inspector of wagons 1** who performed the technical inspection at composition at the train no. 82961 on the 8th of February 2011, in the railway station CFR Palas, one can retain the following:

- at the technical inspection at composition he checked also the wagon no. 37807923043-9 and he found no defect;
- at this train he made also the complete test of the brakes from the wagons in the first part of the train;
- at the complete test he found the inappropriate operation of the brakes from a number of three wagons and in consequence he isolated the braking installation from these wagons;
- at the technical inspection at composition he checked also the wagons linking and he did not find problems at the wagons linking devices;
- at the technical inspection at composition he checked also the impact devices of the wagons and he found no defect.

From the statements of the **technical inspector of wagons 2** who performed the technical inspection at composition at the train no. 82961 on the 8th of February 2011, in the railway station CFR Palas, one can retain the following:

- at the technical inspection at composition he checked also the wagon no. 37807923043-9 and he found no defect;
- at this train he made also the complete test of the brakes from the wagons in the second part of the train;
- at the complete test at the wagons in the second part of the train he did not find problems at the braking installations of these wagons;
- at the technical inspection at composition he checked also the wagons linking and he did not find problems at the wagons linking devices;
- at the technical inspection at composition he checked also the impact devices of the wagons and he found no defect.

From the statements of the **train guard** who accompanied the train no. 82961 on the 8th of February 2011, one can retain the following:

- he left with the train no. 82691 from the railway station CFR Palas on the 8th of February 2011 at 1:30 p.m.;
- he stationed in the driving station II of the towing locomotive;
- the train stationed in the railway station CFR Constanta Marfuri until 4:09 p.m., when it was sent towards the railway station Capu Midia;
- after the input signal of the railway station Capu Midia he noticed the sudden stop of the train, he went down from the driving station and he went along the train occasion on which he found that the 2nd, the 3rd and the 4th wagon in the end of the train were derailed and the 3rd was also inclined to the left in the running direction;
- also he found that the train was broken between the wagons 2 and 3 from the end of the train;
- these findings were performed together with the driver assistant and the shunter.

From the statements of the **shunter** who accompanied the train no. 82961 on the 8th of February 2011, one can retain the following:

- he left with the train no. 82691 from the railway station CFR Palas on the 8th of February 2011 at 1:30 p.m.;
- he stationed in the driving station II of the towing locomotive;
- the train stationed in the railway station CFR Constanta Marfuri until 4:09 p.m., when it was sent towards the railway station Capu Midia;
- after the input signal of the railway station Capu Midia he noticed the sudden stop of the train, he went down from the driving station and he went along the train occasion on which he found that the 2nd, the 3rd and the 4th wagon in the end of the train were derailed and the 3rd was also inclined to the left in the running direction;
- also he found that the train was broken between the wagons 2 and 3 from the end of the train;
- these findings were performed together with the driver assistant and the guard.

From the statements of the **locomotive driver** who drove the train no. 82961 on the 8th of February 2011, one can retain the following:

- he drove the train no. 82961 on the 8th of February 2011 on the distance Palas – Capu Midia;
- he entered the railway station Capu Midia following the permissive indication of the input signal (two yellow lights);
- when he entered the railway station he noticed kickbacks in the train body and he saw dust at its end;
- in consequence he took actions of emergency braking of the train;
- after he stopped the train and insured the locomotive not to move he sent the driver assistant to check the vehicles in the train;

- after the driver assistant came back from the train end he announced him that in the train were 3 derailed wagons;
- then he left the driver assistant and he moved to the end of the train where he found that the 2nd, the 3rd and the 4th wagon in the end of the train were derailed;
- he came back to the locomotive, then he announced the movement inspector on duty in the railway station Capu Midia about what had happened.

From the statements of the **driver assistant** who served the towing locomotive of the train no. 82961 on the 8th of February 2011, one can retain the following:

- he served the towing locomotive of the train no. 82961 on the 8th of February 2011 on the distance Palas – Capu Midia;
- after the input signal of the railway station Capu Midia, while the train was shunted he noticed kickbacks in the train body and, looking through the window, he saw dust at the train end;
- he announced the locomotive driver about what he had seen and this one took actions of emergency braking of the train;
- after the train stopped and the locomotive was insured against movement he left towards the end of the train to check the vehicles in the train;
- after getting to the end of the train he found that the 2nd, the 3rd and the 4th wagon in the end of the train were derailed;
- he came back to the locomotive then he announced the locomotive driver about what he had found then he insured the train with the hand brakes necessary to maintain it in place.

From the statements of the **movement inspector** who was on duty on the 8th of February 2011, in the railway station CFR Palas, one can retain the following:

- on the 8th of February 2011, at 5:07 p.m., the railway station Navodari sent him the leaving approval for the train no. 82961;
- then he performed the entry command for this train and he waited for the train shunting;
- while the train was shunting at the line 4 from the railway station he noticed that the switch no. 15/21 lost its control and the locomotive driver announced him that the train was braked;
- after about 1 minute the control slot on the control panel corresponding to the signal M7 started to pulse;
- as consequence he asked to the shunting party to check the wagons in the composition of the train and he recorded in the Register of Lines Inspection and Traffic Safety Installations the damage occurred;
- after about 15 minutes the shunting party announced him that the train was derailed;
- he went to the derailment place where he found that the 2nd, the 3rd and the 4th wagon in the end of the train were derailed, the switch 15/21 was half-opened and with the counter-needle broken and the signal M7 was damaged;
- then he announced about what had happened the Head of the railway station, the operator of the Traffic Controller and the Head of district CT;
- when he came back to the movement office he recorded in the Register of Lines Inspection and Traffic Safety Installations those found on the spot.

B.5.2. Safety management system

At the moment of the railway accident occurrence, SC ROMPETROL LOGISTICS SA as manager of non-interoperable railway infrastructure, had implemented its own railway safety management, according to the provision of the Directive 2004/49/CE on community railway safety, of the Law no. 55/2006 on railway safety and of the Order of the Transport Minister no.101/2008 on granting the security authorization to the administrator / management of railway infrastructure in Romania, being in possession of:

- Safety Authorization - Part A with the identification no. ASA 08002 delivered on the 8th of October 2008 – through which the Romanian Railway Safety Authority from AFER confirms the acceptance of the safety management system of railway infrastructure manager;
- Safety Authorization - Part B with the identification no. ASB 10004 delivered on the 4th of March 2010 – through which the Romanian Railway Safety Authority from AFER confirms the acceptance of the provisions adopted by the railway infrastructure manager to meet specific requirements necessary to ensure safety of rail infrastructure, in the design, maintenance and operation, including where appropriate, maintenance and operation of traffic control and signaling system.

At the moment of the railway accident occurrence, SNTFM “CFR Marfa”- SA as railway undertaking had implemented its own safety management system, according to the provisions of the Directive 2004/49/CE on community railway safety, of the Law no. 55/2006 on railway safety and of the Order of the Transport Minister no. 535/2007 on granting the safety certificate to perform railway transport services on Romanian railways, being in possession of the following documents regarding the own safety management system:

- Safety certificate - Part A with the identification no. CSA 0021 delivered on the 9th of November 2009 – through which the Romanian Railway Safety Authority from AFER confirms the acceptance of the safety management system of the railway undertaking;
- Safety certificate - Part B with the identification no. CSB 0017 delivered on the 28th of January 2011 – through which the Romanian Railway Safety Authority from AFER confirmed the acceptance of the provisions adopted by the railway undertaking to accomplish the necessary specific requirements for safe operation on the relevant network in accordance with the Directive 2004/49/CE and with the national applicable legislation.

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

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

norms and regulations:

- Instructions on technical inspection and maintenance for wagons in operation no. 250 approved by the Order of the Minister of Transports, Constructions and Tourism no. 1817 of the 26th of October 2005;
- Uniform Contract of Use of the wagons – CUU;
- Railway Technical Norm “Railway vehicles. Technical prescriptions to repair the frames of the bogies in the equipment of the wagons and coaches” - NTF no. 81-005:2006;
- Instruction for setting terms and order for the rail inspections no. 305 approved by OMT no. 71 on the 17th of February 1997;
- Instruction for the lineman head of district for the rail maintenance no. 323/1965;
- Instruction for the activity of the foreman for the maintenance of the line no. 322/1972;
- Instruction for the flagmen and rail or dangerous points inspectors no. 321/1972;
- Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989;

sources and references:

- copies of the documents submitted as annexes to the investigation file;
- photos taken soon after the railway accident by the members of the investigation commission;
- photos taken at the wagons involved in the railway accident at SC “CFR – IRV” Constanta SA – Section IRV Palas;
- documents on the lines maintenance provided by the responsible with their maintenance;
- results of the measurements performed immediately after the occurrence of the railway accident at the railway superstructure and at the derailed wagons;
- inspection and interpretation of the technical condition of the elements involved in the accident: infrastructure, railway installations and railway vehicles;

- questioning of the staff involved in the occurrence of the railway accident.

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

B.5.4.1. Data found on the line

Technical condition of the line before the occurrence of the railway accident

The lines and the rail devices in the area of the railway accident occurrence are built of rail type 49, concrete sleepers T29, indirect clamping type K, path without joints, cross profile embankment, the prism of broken stone complete.

The fixing elements of the rails and of the metallic parts on the sleepers were active, providing their appropriate fixing.

Findings and measurements performed at the line, after the occurrence of the derailment and wagons restoration

At the kilometric position km 32+337, on area in curve, was found a sign of escalation of the rail, corresponding to the outer wire of the curve, which continues with a sign left by the wheel on the left bandage rim and then with a falling sign of the wheel on the left of the rail head (outside the path).

On the rail head, this sign is on a length of 6310mm (to near the first end tile from the level passage located at the km 32+349).

From the place of the first escalation sign of the rail head on the left in the opposite of the running direction of the train, were performed checks of the gauge (E) and of the cross level of the rail (N) with the rail measuring pattern, in points having the equidistance of 2.5 m, their values being within the tolerances admitted by the Instruction of standards and tolerances for the construction and maintenance of the rail - standard gauge lines no. 314/1989.

The curve on which occurred the rail escalation was picketed every 10 m, to the top joint of the switch no. 15. After this picketing the escalation point of the rail on the left was within the measurement points no. 23 and no. 24, at a distance of 3.210 m before the point no. 24 and the point where the wheel on the left felt outside the rail (near the X end of the level passage located at the km 32+349) is placed between the measurement points no. 24 and no. 25.

After this picketing of the curve in the resulted points were performed checks of the gauge, of the cross level, of the side wear of the rail on the outer wire of the curve and also of the arrows measured in the middle of the rope of 20 m, being found the following:

- the tolerances between the neighbor arrows measured near the pickets no. 19 - 23 were exceeding the values provided in the table from the art. 7, letter B, point 1, of the Instruction of standards and tolerances for the construction and maintenance of the rail no. 314/1989;
- the tolerances between the maximum and minimum arrows, respectively between the arrows measured near the pickets no. 21 and no. 23 were exceeding the values provided in the table from the art. 7, letter B, point 1, of the Instruction of standards and tolerances for the construction and maintenance of the rail no. 314/1989.

On the line section on which the railway accident occurred, the railway superstructure is made of:

- rail type 49, concrete sleepers T29 – the area of the curve;
- rail type 49, wooden special and normal sleepers with indirect clamping type K – on the area of the switch no. 15 and of the line 4.

The fixing elements of the metallic plates on the sleepers and of the rails on the metallic plates were complete and active.

The prism of broken stone in the area of the train derailment had some area with clogged broken stone.

B.5.4.2. Data found on the condition of the installations

At the check performed immediately after the occurrence of the railway accident were found the following:

- the key and the door of the relays room sealed;
- the buttons on the control desk sealed,
- the handles sealed on the panel,
- all the switches with control, excepting the switch no. 15/21 affected by the accident;
- the slot corresponding to the signal M7 on the control desk had flashing lights;
- the command performed in block for the train no. 82961 at the line 4 free with locked path;
- the isolated sections 15, 047, 35-37, 39, 45-61 and 51-59 occupied on the control desk and on spot with the train no. 82961;
- there were not found irregularities in the operation of the installations SCB.

B.5.4.3. Data found on the work of the rolling stock and of its technical installations

Findings performed at the wagons in the composition of the train

The regime exchangers “Freight – Passengers” and “Empty – Loaded” were in positions corresponding to the condition of the wagons, respectively “Freight” and “Loaded”.

The train had in composition 3 wagons with the automatic brake isolated namely the wagons no. 33807919867-1, 33807918232-9 and 33807918363-2 these being in the positions 6, 8 and 13 in the composition of the train.

There were not found uninsured parts to endanger traffic safety.

At the check of the linking of the wagons involved in the derailment, were found the following:

- between the 8th and the 9th wagon in the running direction, the couple was not equalized, the pads on the left with the pans in contact, these on the right distanced with about 15 cm, according to the photo (photo 1);

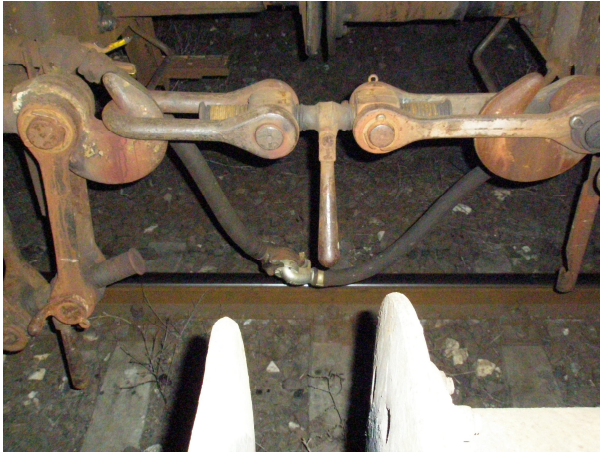


photo 1



photo 2

- between the 19th and the 20th wagon, the active couple of the 20th wagon tighten almost to maximum position (photo 2);
- between the 20th and the 21st wagon the snare of the active couple (from the 21st wagon) was broken, the snare nut being at about 14 turns from the thread from the end of the couple screw, characteristic to a non-equalized couple (photo 3);



photo 3



photo 4

- Between the 21st and the 22nd wagon, the active couple (from the 21st wagon) was not equalized and the couple screw was rusty (photo 4).

Findings performed at the derailed wagons in the railway station Capu Midia

At the check of the 3 derailed wagons were found the following damages:

- at the wagon no. 37807923043-9 (the 20th in the composition of the train):
 - triangular axis outer to the axle corresponding to the wheels 3-4 deformed;
 - impact signs on the pad body placed in the end with the brake spindle right side running direction of the train came from the impact with the pad pan corresponding from the wagon placed in its front in the composition of the train (wagon no. 33877919348-5);
- at the wagon no. 33807920395-0 (the 21st in the composition of the train):
 - the traction hook towards the wagon in its front (wagon no. 37807923043-9) deformed;
 - snare of the linking device in the same end broken;
- at the wagon no. 33877919348-5 (the 19th in the composition of the train):
 - the pad pan in the end towards the wagon no. 37807923043-9 right side in the running direction dismantled from the pad rod and fallen.

There were performed measurements of the geometric elements from the derailed axles, occasion on which was found that all the measured elements were within the limits admitted by the specific regulations in force (Uniform Contract of Use of the wagons – CUU and Instructions for technical inspection and maintenance of wagons in operation no. 250/2005).

Findings performed at the derailed wagons at SC CFR IRV SA Constanta – Section Palas

At the check of the wagon no. 37807923043-9 involved in the railway accident from the railway station Capu Midia, were found the following:

- the wagon no. 37807923043-9 is type Zagkks, is the property of the company VTG AG Hamburg and had marked at the last periodic repair type RP: 4 REV Sml 21.10.10;
- at the same wagon were found the following damages:
 - triangular axis corresponding to the outside of the wheels 5-6 was crooked,
 - the air pipeline head at the bogie corresponding to the wheels 5-6 7-8 was cracked and strangled,
 - fresh kicks in the windows of the bogie frame corresponding to the axles 5-6, 7-8 (no. 53264),
 - fresh kicks on the rolling profile of all the wheels,
 - crooked and detached screws in the pan of the collision devices on both ends of the wagon,
 - at the traction hook towards the end of the train were found new signs of impact on the left in the running direction.

The mounted axles of the same wagon were dismantled from the wagon and were checked their geometrical elements. After these checks was found that all the measured elements were within the limits admitted by the specific regulations in force (Uniform Contract of Use of the wagons – CUU and Instructions for technical inspection and maintenance of wagons in operation no. 250/2005).

At the check of the derailed bogies frames from the same wagon was found that all the measured elements were within the limits admitted by Railway Technical Norm “Railway vehicles. Technical prescriptions to repair the frames of the bogies in the equipment of the wagons and coaches” - NTF no. 81-005:2006 excepting the rate b (corresponding to the windows associated to the axle boxes of the wheels 5–6) from the bogie no. 53264 (the first in the running direction of the train) rate whose measured value was higher than the admitted value. This is an effect of the accident, as during the derailment the axle corresponding to the wheels 5-6 forced in these windows, deformed them and came out from under the bogie frame (cover photo).

There were also checked the pallets of both bogies: one of these (that corresponding to the bogie no. 53263 – wheels 1-2, 3-4) was intact and the other (corresponding to the bogie no. 53264 – wheels 5-6, 7-8) had the polyamide gasket cracked as consequence of the derailment.

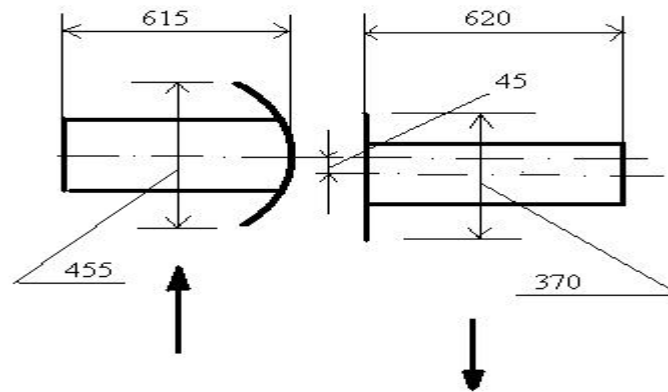
There were checked also the other subassemblies of the wagon and there were not found wears or defects over the admitted limits.

Also were checked the impact devices belonging to the wagon no. 37807923043-9 and wagon no. 33807919348-5 and were found the following sizes:

Sizes	wagon no. 37807923043-9 the end from Constanta	wagon no. 33807919348-5 the end from Valu lui Traian
Pads type	Pads with round pan, diameter of 455mm	Pads with rectangular pan surface 450 x 340 mm
Height of the pads center measured on vertical from the upper level of the rails	1045 mm	1000 mm

Distance between the pads center	1750 mm	1750 mm
Length of the impact devices	Impact device 1: 615 mm Impact device 2: 616 mm	Impact device 1: 620 mm Impact device 2: 620 mm

From the presented table results that between the pads centers in contact of the two wagons there is a vertical misalignment of 45 mm which, even if respects the values provided in the Instructions for technical inspection and maintenance of wagons in operation no. 250/2005, favors the overlapping tendency of the pads (see drawing 1).



drawing 1

B.6. Analysis and conclusions

B.6.1. Conclusions on the technical condition of the railway superstructure

The technical condition of railway superstructure by the exceedance of tolerances between the neighbor arrows, and also of the tolerances between the maximum and minimum arrow favored the escalation of the rail on the left (corresponding to the outer wire of the curve).

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

At the mounted axles of the derailed wagons bogies were not found defects which could have existed before the sending of the train from the railway station Palas and which could have necessitated the removal from the train of the wagons.

The link between the 20th wagon and the neighbor wagons (the 19th and the 21st) at the maximum limit admitted by the Instructions for technical inspection and maintenance of wagons in operation no. 250/2005, the non-equalization of the linking device between the wagons placed the 20th and the 21st in the composition of the train, corroborated with the big wheelbase of these wagons favored the compression of the impact devices placed to inside the curve, near the maximum limit of the active stroke.

Determination of the first axle which derailed

Taking into consideration that, at the moment of the train stop, the wagon no. 33807919348-5 (the 19th in the composition of the train), was derailed by the second bogie in the running direction and the wagon no. 33807920395-0 (the 21st in the composition of the train), was with the first bogie and the first axle of the second bogie in the running direction derailed and the wagon no. 37807923043-9 (the 20th in the composition of the train), had both bogies derailed one could conclude that the

bogies of this wagon rolled mostly in derailed condition and that the neighbor wagons (the 19th and the 21st) were involved in the derailment after the derailment of the wagon no. 37807923043-9.

This excludes the possibility that the derailment had been started by one of the axles of the second bogie of the wagon no. 33807919348-5 (the first derailed wagon as position in the train) and implicitly leads to the conclusion that this wagon was involved in the derailment by the next wagon (wagon no. 37807923043-9, the 20th in the composition of the train).

Analyzing the positions after the derailment, compared to the rail corresponding to the outer wire of the curve, respectively of:

- the second bogie in the running direction of the 19th wagon in the composition of the train,
- the first and the second bogie of the 20th wagon in the composition of the train,
- the first bogie of the first axle of the second bogie in the running direction of the 20th wagon in the composition of the train,

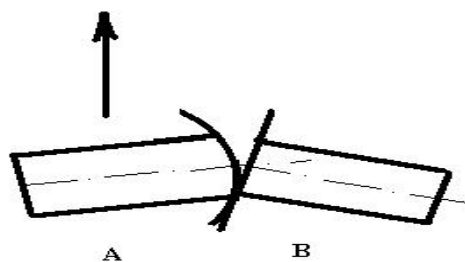
and noticing that all these 4 bogies were displaced to outside the curve one could conclude that, in the moment of the derailment, on the 3 wagons acted a system of horizontal forces quasi-radially oriented, from outside of the curve, sending to the end of the 20th wagon towards the 19th wagon a strong cross displacement move, which exceeded the guiding capacity of the driving axle of the first bogie of the 20th wagon and led to its derailment.

Corroborating this movement with the size of the deformations from the bogies frames of the 20th wagon there results that the derailment was initiated by the appeal wheel (left side in the running direction) of the driving axle from the first bogie of this wagon, in the running direction of the train.

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

From the analysis of the findings performed at the place of the railway accident occurrence, of the technical condition of the wagons in the composition of the train, of the photos taken at the place of the derailment and also of the statements of the involved employees one could conclude that the dynamic of the occurrence of this derailment was the following:

- after passing of the freight train no. 82961 by the input signal of the railway station Capu Midia, at a speed of about 26 km/h, entering on an area of curve with radius of 260 m, under the conditions in which the link between the 3 involved wagons was at the maximum limit admitted by the Instructions for technical inspection and maintenance of wagons in operation no. 250/2005 and the linking device between the wagon no. 37807923043-9 - the 20th in the composition of the train and the wagon no. 33807920395-0 – the 21st in the composition was non-equalized, the active strokes of the impact devices placed towards inside the curve consumed near the maximum limit of the active stroke;
- this situation favored the overlapping tendency of the pad A, belonging to the 20th wagon by the pad B belonging to the 19th wagon according to the drawing 2;



drawing 2

- in the same area, the measured arrows of the curve were exceeding the admitted limits between the neighbor arrows and between the maximum and minimum arrows, so that the dynamic shocks transmitted by the railway to the wheels of the wagons increased over the admitted limits;
- under these circumstances, shortly, the guiding force at the contact between the appeal wheel (wheel no. 8) from the wagon no. 37807923043-9 (the 20th in the composition of the train) increased too much and, at the kilometric position 32+337, this force exceeded the guiding capacity of the driving axle from this wagon, which led to the climbing of this wheel on the left rail in the running direction of the train (corresponding to the outer wire of the curve);
- then the wheel no. 8 rolled with the bandage rim on the rolling surface of the rail on a length of 6310 mm and then it fell to outside the path simultaneously with the fall of the wheel no. 7 between the two wires of the railway;
- the derailment of the driving axle (corresponding to the wheels 7-8) involved in the derailment also the second axle from this bogie (the first in the running direction of the wagon no. 37807923043-9) and then the two axles from the second bogie in the running direction of this wagon;
- after the derailment of all the axles from the wagon no. 37807923043-9 this involved in the derailment also the axles from the two neighbor wagons;
- the train ran in derailed condition about 232 m, stopping due to the emergency braking occurred as consequence of its breaking between the 20th and the 21st wagon, by breaking of snare of the linking device from the wagon no. 33807920395-0 (the 21st in the composition of the train) from the wagon no. 37807923043-9 (the 20th in the composition of the train), followed then by the decoupling of the two air half-couplings between these wagons.

B.7. Causes of the accident

B.7.1. Direct cause

The direct cause of the occurrence of this accident is the exceeding of the guiding capacity of the driving axle from the first bogie of the wagon no. 37807923043-9 (placed the 20th in the composition of the train) by the guiding force with which this axle attacked the rail corresponding to the outer wire of the curve (the left side in the running direction of the train), followed by the climbing of the appeal wheel rim on the rail and then by its fall outside the path.

Increasing of the guiding force of the driving axle occurred under the conditions:

- growth of the dynamic shocks transmitted by the path to the wagon wheels, under the circumstances in which the values of the curve arrows measured in the area of the derailment were exceeding the admitted tolerances set in the Instruction of standards and tolerances for the construction and maintenance of the rail no. 314/1989;
- non-equalization of the binding device between the wagons no. 37807923043-9 and no. 33807920395-0.

B.7.2. Underlying causes

None.

B.7.3. Root causes

None.

C. Safety recommendations

None.

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This report will be sent to Romanian Railway Safety Authority, to the manager of the non-interoperable railway infrastructure SC ROMPETROL LOGISTICS SRL Ploiesti and to the freight railway undertaking SNTFM “CFR Marfa” SA.

Members of the investigation commission:

- Zamfirache Marian - main investigator
- Țena Lucian - investigator
- Dobre Florin - investigator
- Odae Viorel - state inspector in ISF Constanta-ASFR

- Bătrânoiu Ștefan - head of Control Service Protection, Prevention and Emergency Situations, Muntenia- Dobrogea Freight Branch, Constanta
- Toma Tamara - responsible SC at SC ROMPETROL LOGISTICS SRL Ploiesti