



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE  
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



## INVESTIGATING REPORT

of the railway accident  
happened on 31.01.2012 between the railway stations Bălănoaia and Stănești



Final Edition  
4th of May 2012

# NOTICE

Concerning the railway accident, happened on the 31<sup>st</sup> of January 2012, at 15:35 o'clock, in the Regional center for railway operation, maintenance and repairs București, on the running section Giurgiu Nord – Videle (non-electrified single line), between the railway stations Bălănoaia – Stănești, in the level crossing area at km11+015, by derailment of one bogie from the locomotive DA 1279, hauling the freight train no. 92212 (belonging to SNTFM “CFR Marfă” SA București), 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, 4<sup>th</sup> of May 2012

**Approved by**

**Director,**  
Dragoș FLOROIU

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

**I submit for approval**  
**Chief investigator**  
Nicu PALANGEANU

*This notice is part of the report for the investigation of the railway accident happened on the 31st of January 2012, at 15:35, in the Regional center for railway operation, maintenance and repairs București, on the running section Giurgiu Nord – Videle (non-electrified single line), between the railway stations Bălănoaia – Stănești, in the level crossing area at km11+015, by derailment of one bogie from the locomotive DA 1279, hauling the freight train no. 92212 (belonging to SNTFM “CFR Marfă” SA București)*

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## **I. PREAMBLE**

### **I.1 Introduction**

Concerning the railway accident happened on 31.01.2012, at 15:35, in the Regional center for railway operation, maintenance and repairs București, on the running section Giurgiu Nord – Videle (non-electrified single line), between the railway stations Bălănoaia – Stănești, in the level crossing area at km11+015, by derailment of one bogie from the locomotive DA 1279, hauling the freight train no. 92212 (belonging to SNTFM “CFR Marfă” SA București), Romanian Railway Investigating Body performed an investigation, according to the provisions of the Government Decision no. 117/2010, in order to prevent some accidents with similar causes, by establishing the conditions and determined the causes.

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

### **I.2 Investigation process**

Soon after the occurrence of this accident, Romanian Railway Investigating Body notified the Railway Safety Inspectorate within the Regional center for railway operation, maintenance and repairs București about the occurrence of the railway accident happened on the running section Giurgiu Nord – Videle, between the railway stations Bălănoaia – Stănești, in the level crossing area at km11+015, by derailment of one bogie from the locomotive DA 1279.

Taking into account that the happened deeds are defined as railway accident, according to the provisions of art. 3, point 1 of the Law no. 55/2006 on railway safety and that this accident is relevant for the railway system, according to the art. 19, paragraph (2) from the Law no. 55/2006 on the traffic safety, in connection with the art. 48, paragraph (1) from the Regulation for the investigation of the accidents and incidents, for the development and improvement of Romanian railway and subway safety, approved by GD 117/2010, OIFR decided to start an investigation. Through the OIFR director Decision no. 80, from the 2nd of February 2012, the investigation commission was appointed, consisting in:

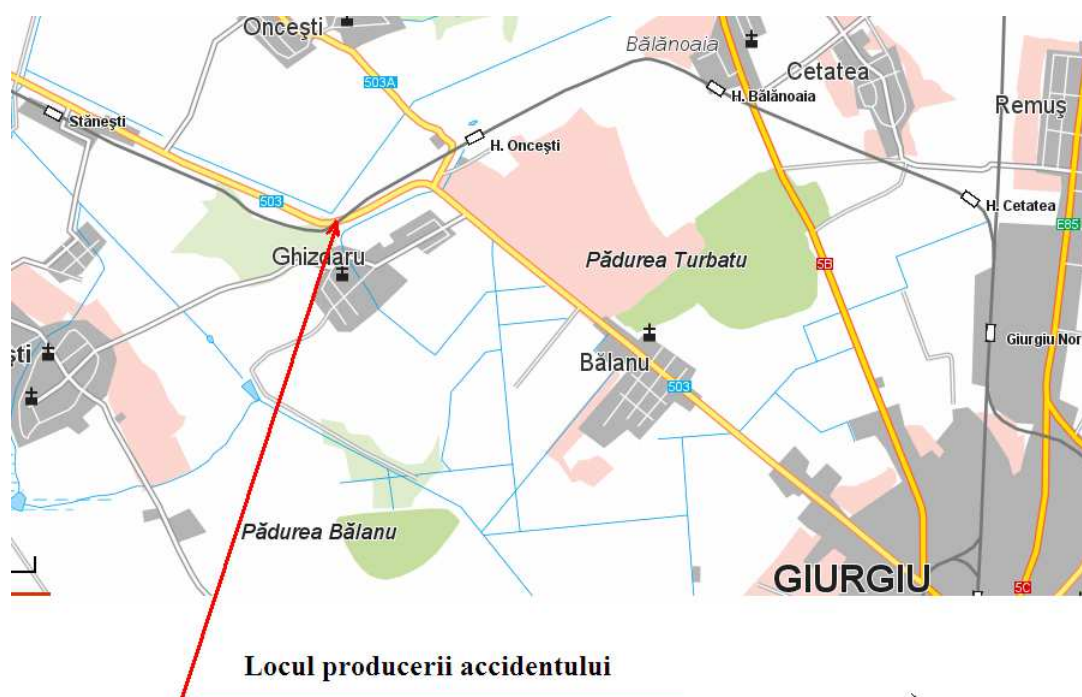
- |   |                   |
|---|-------------------|
| ▪ ZAMFIRACHE Marian – investigator - OIFR   | main investigator |
| ▪ NICOLESCU Mircea – investigator - OIFR  | member            |
| ▪ DRAGNE Georgel - Regional Traffic Safety Inspector<br>Bucharest Freight Regional Center | member            |
| ▪ ALEXANDRU Victor - Lines central inspector CNCF “CFR” SA                                | member            |

## **A. ACCIDENT BRIEF PRESENTATION**

### **A.1. Brief presentation**

On 31.01.2012, at 15:35, in the Regional center for railway operation, maintenance and repairs București, running section Giurgiu Nord – Videle (simple line, non-electrified), between the railway stations Bălănoaia and Stănești, at the level crossing at km 11+015 with road automatic signalling equipment without half-barrier SAT, one occurred the derailment of locomotive DA 1279 by one bogie in the running direction.

The railway accident site was on the Regional center for railway operation, maintenance and repairs București, om the running section Giurgiu - Videle (single line non-electrified), at km 11+015.



The freight train no. 92212 (belonging to SNTFM “CFR Marfă” SA) was composed of 18 wagons, 86 axles, 1185 brute tons, length 337 m, necessary brake tonnage 593/119 t, real brake tonnage 619/318 t and was hauled by the locomotive DA 1279 and banking locomotive DHC 392 (both belonging to SNTFM “CFR Marfă” SA - București Triaj engine shed).

The train was dispatched from the railway station Giurgiu Nord at 14:48 towards the railway station București.

There were no damages at the track nor at the railway equipment.

Following this accident there were no fatalities or injuries

## **A.2. Accident causes, contributing factors and root causes**

### **A.2.1. Direct causes**

**The direct cause** of this accident was hitting by the left wheel (in the running direction) of axle no. 2 from the locomotive DA 1279 of long shackle from the traction engine no.1, which led to the derailment of this axle and then the derailment of axles no. 3 and 1. The hit part was fallen and blocked in the trough on the left of the level crossing at km 11+105.

Tearing out the long shackle of the traction engine no. 1 was produced by breaking a piece of the first axle crown gear followed by the brake and detachment of some traction gear elements, due to the occurrence of an overload of the trailer locomotive DA 1279, that after failure of the banking locomotive, it had to ensure the hauling of the train no. 92212 (on a grade with slope of 15 ‰).

### **A.2.2 Underlying causes**

None.

### **A.2.3. Root causes**

None.

### **A.3. Severity level**

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

### **A.4. Safety recommendations**

None

\*  
\*       \*

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

## **B. INVESTIGATING REPORT**

### **B.1. Accident presentation**

On 31.01.2012, at 14:48, the freight train no. 92212 (belonging to railway freight undertaking SNTFM „CFR Marfă” SA) was dispatched from the railway station Giurgiu Nord towards București Triaj.

The train was composed of 18 wagons, 86 axles, 1185 brute tons, length 337 m, necessary brake tonnage 593/119 t, real brake tonnage 619/318 t and was hauled by the locomotive DA 1279 and banking locomotive DHC 392 (both belonging to SNTFM “CFR Marfă” SA - București Triaj engine shed).

Both locomotives were operated by driver and driver assistant belonging to railway freight undertaking SNTFM „CFR Marfă” SA.

The train runned from the railway station Bălănoaia towards the railway station Stănești with the hauling locomotive DA 1279 and banking locomotive DHC 392, in that area the line was with a gradient of 15‰.

After the locomotive DA 1279 and the first part of the train pass over the level crossing at km 11+015, the banking locomotive driver (DHC 392) notified, by radiotelephone equipment, about the heating of the diesel engine and the overheating operation system came into operation.

Following this and while the hauling locomotive DA 1279 started to slip, at 15:11, the locomotive driver stopped the train right to mile post 12+000 and requested the movement inspector from the railway station Bălănoaia the withdrawal of the freight train in this railway station.

After the București traffic controller approval, the movement inspector from the railway station Bălănoaia ordered the withdrawal of the train in the railway station.

The train reverse the direction (with hauling locomotive DHC 392 and banking locomotive DA 1279) at 15:25 and when the locomotive DA 1279 pass over the level crossing at km 11+015 one occured the derailment of the first bogie in the running direction.

Right after the derailment of the locomotive DA 1279 one occured the breaking of coupling between the locomotive and the first wagon within the train composition, which led to the uncoupling of air half-coupling from the automatic brake equipment and to it's emergency braking.

### **B.2. Accident circumstances**

#### **B.2.1. Involved parties**

The track section where the railway accident happened is administrated by CNCF „CFR”, in the Regional center for railway operation, maintenance and repairs București.

The infrastructure and superstructure are administrated by CNCF „CFR” SA and maintained by the employees of the Permanent Way District no. 5 Giurgiu Nord from the Track Section L1 București.

The interlocking system (SCB) from the railway station Bălănoaia and Stănești are administrated by CNCF „CFR” SA and maintained by the employees of the Regional center for railway operation, maintenance and repairs București - Section CT 2 București – SCB Giugiu Nord District.

The locomotive communication equipment belongs to the railway transport operator SNTFM „CFR Marfă” SA and it is maintained by it’s employees.

The railway communication equipments from the railway stations Bălănoaia and Stănești are unde CNCF „CFR” SA administration and maintained by SC Telecomunicații CFR SA employees.

The locomotives DA 1279 and DHC 392, hauling the freight train no. 92212 belongs to the railway transport operator SNTFM „CFR Marfă” SA and maintained and inspected on route by it’s employees, the repairs are performed by economic agents authorised as railway suppliers.

The inquiry commission questioned the involved employees in the train running, locomotive operation and railway traffic management.

### **B.2.2. Train composition and the equipments**

The freight train no. 92212 (belonging to the railway transport operator SNTFM „CFR Marfă” SA) was composed of 18 wagons of different types transmitted to the border by the railway infrastructure administrator of the Bulgarian railway network BDZ, 86 axles (8 hollow shafts and 78 loaded axles), tara 494 tones, net tonnage 691 t, gross tonnage 1185 t, necessary tonnage for automatic braking 593 t and for hand braking 119 t, automatic braking real tonnage 619 t and hand brake real tonnage 318 t, train lenght 337 m and it was hauled with the hauling locomotive DA 1279 and with banking locomotive DHC 392.

The freight train no. 92212 had in it’s composition 6 wagons with insulated automatic brake: 31525400063-3, 31523938503-4, 31525400979-0, 31525400308-2, 31525400201-3-9 and 31525400196-1, this being the 5th, 8th, 13rd, 14th, 16th and 17th from the hauling locomotive.

The train automatic braking was in service. Safety and vigilance equipments (DSV), equipment for the punctual control of the speed and self-stop (INDUSI) of the hauling locomotive were in service and sealed.

### **B.2.3. Railway equipments**

#### ***Route presentation***

In the area where the accident occured, the line was in straight line and gradient (slope) 15‰.

#### ***Superstructure presentation***

In the area where the derailment occured, the line consists in superstructure type 49, welded track, reinforced concrete sleepers T 13 and indirect fastening system type K.

The fastening was complete and active, and the concrete slabs within the level crossing were in good condition.

The level crossing located at km 11+005 is built with reinforced concrete slabs, provided with corner cramps at ends.

#### ***Presentation of the safety equipments for the traffic control***



The railway station Bălănoia is provided with interlocking system type CR 2 and BLSR.

The railway accident happened in an area with maximum running speed limited at 50 km/h.

#### **B.2.4. Communication means**

The communication between the driver and the movements inspectors was ensured through radio-telephone equipments.

#### **B.2.5. Start of the railway emergency plan**

Soon after the railway accident, the intervention plan for the removal of the damages and for the re-stauration of the traffic was made in accordance with the information flow stipulated in the Regulation for the investigation of the accidents and incidents, for the development of Romanian railway and subway safety, approved by the Government Decision no. 117/2010, according which, at the accident place came the representatives of Romanian Railway Authority – AFER, of the railway public infrastructure administrator CNCF „CFR” SA - Regional center for railway operation, maintenance and repairs București and of the railway undertaking SNTFM „CFR Marfă” SA.

The re-railing of the derailed wagon was made with local means

### **B.3. Accident consequences**

#### **B.3.1. Fatalities and injuries**

None

#### **B.3.2. Material damages**

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

- at the locomotive – according to document no. B.T./428/2012 of 3.642,47 lei  
„CFR IRLU” SA - București Triaj IRLU Section
- at the lines - none;
- at the equipments - none;

**Total values of the damages – 3.642,47 lei**

#### **B.3.3. Consequences of the accident in the traffic**

The locomotive DA 1279 was re-railed around 19:30 hour, after its withdrawal in the railway station Stănești with the banking locomotive DA 971, and the traffic between the railway stations Bălănoia and Stănești was restored at 21:57 hour.

The railway traffic was completely closed between the railway stations Bălănoia and Stănești on 31.01.2011, between the hours 15:35 - 21:57.

Consequences for the traffic:

- cancelled trains - passenger trains no. 9345 and 9346.
- delayed trains - 3 passenger trains with a total of 542 minutes.

### **B.4. External circumstances**

On 31.01.2011, when the railway accident occurred, the visibility was good, clear sky, temperature -20<sup>0</sup> C.

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

## **B.5 Investigation course**

### **B.5.1 Summary of the involved staff testimonies**

To establish the circumstances of the railway accident occurrence, the inquiry commission questioned the driver and the driver's assistant of the hauling locomotive DA 1272, the driver of the banking locomotive DHC 392 and the foreman shunter who was in the locomotive as assistant together with the movement inspector on duty in the railway station Bălănoaia.

From the statements of the driver of the locomotive DA 1279, hauling of the freight train no. 92212 from 31. 01. 2012 one can retain:

- on 31.01.2012, was on duty on the locomotive DA 1279, hauling the train 92212, dispatching from the railway station Giurgiu Nord at 14:48;
- the train ran with the banking locomotive DHC 392;
- being on current line between the railway stations Bălănoaia and Stănești at km 12+000 was notified through radio-telephone equipments by the banking locomotive driver that it couldn't bank the train because the locomotive DHC 392 had issues;
- due to the slope it couldn't continue to the railway station Stănești, so he ensured the train against movement and contacted the movement inspector from the railway station Bălănoaia to withdraw the train in this railway station;
- after receiving the approval from the railway station Bălănoaia movement inspector, the train ran reverse, the locomotive DHC 392 becoming hauling locomotive, and the locomotive DA 1279 as banking locomotive;
- when passing over the passage of section 12 that it exceeded by about 100-150m, one heard a blow under the locomotive, after which the train broke off coupling from the locomotive DA 1279 that was after the train;
- after stopping he alighted from the locomotive and noticed the derailment of the locomotive by 3 axles from the train side;
- the locomotive DA 1279 ran in good conditions until the derailment from the passage of section 12;
- the locomotive DA 1279 had no problems from the time when he took it to the derailment;
- after the derailment, the driver's assistant went on the field and checked the locomotive, then he returned and notified that the locomotive is derailed;
- he notified the line managers and then he went on the field to check the locomotive;
- he observed on the left side in the running direction the gear box fallen near the locomotive and the broken coupling fallen at one meter in front of the locomotive between the rails;

From the statements of the driver's assistant of the locomotive DA 1279, hauling of the freight train no. 92212 from 31. 01. 2012 one can retain:

- he was on duty on the hauling locomotive DA 1279 hauling the train 92212, dispatch at 14:48 hour from the railway station Giurgiu Nord, the train had the banking locomotive DHC 392;
- in current line between the railway stations Bălănoaia and Stănești, at km 12+000, the banking locomotive driver notified by radio-telephone equipments that it couldn't bank the train because the locomotive DHC 392 had issues;
- because it couldn't continue the running to the railway station Stănești, due to the line gradient one ensured the train against movement and the locomotive driver contacted the movement inspector from the railway station Bălănoaia to withdraw the train back to the railway station;

- after receiving the approval to withdraw the train in the railway station Bălănoaia, the train runned with the locomotive DHC 392 in the front of the train and locomotive DA 1279 at the train end;
- when passing over the passage of section 12 that it exceeded by about 100-150m, one heard a blow under the locomotive, after which the train broke of coupling from the locomotive DA 1279 that was after the train;
- after stopping he alight from the locomotive and notice the derailment of the locomotive by 3 axles (bogie no.1);
- before the derailment the locomotive runned in good conditions;
- when the derailment occured he was in the driver's cab no.1 (train side);
- after the derailment he activated the handbrake, he alight from the locomotive and notice the derailment of the first bogie;
- at the inspection after the derailment he observed the gear box fallen and the broken coupling fallen between the rails;

From the statements of the driver of the locomotive DHC 392, that runned as banking locomotive for the freight train no. 92212 from 31. 01. 2012 one can be retain:

- he drove the banking locomotive DHC 392 in one-man system and he was accompanied by the foreman shunter;
- from the dispatch of the train from the railway station Giurgiu Nord until km 12, the train runned in good conditions;
- at km 12 the engine temperature cut-out system activated and the engine shut down;
- he notified the banking locomotive DA 1279 driver and the movement inspector from the railway station Bălănoaia about this;
- after he was verbally notified by the movement inspector from the railway station Bălănoaia to run reverse, he started to run the train with the approval of the locomotive DA 1279 driver ;
- after running about 150-200 meters, he observed the pressure decrease of the main air pipe, being notified by the locomotive DA 1279 driver that it derailed;
- he send the foreman shunter, situated in the driver's cab, to the end of the train and then he notified the movement inspector from the railway station Bălănoaia about the derailment of the locomotive DA 1279;
- then one asked again for the movement inspector from the railway station Bălănoaia approval so that the train could run reverse (without the locomotive DA 1279) with the locomotive DHC 392 as hauling locomotive;
- after complete brake test, the train was withdrawal in the railway station Giurgiu Nord;

From the statements of the foreman shunter onboard the locomotive DHC 392, that runned as banking locomotive for the freight train no. 92212 from 31. 01. 2012 one can be retain:

- on 31.01.2012 was on duty as foreman shunter in the railway station Giurgiu Nord and he attend the locomotive DHC 392 as banking locomotive for the freight train no. 92212;
- in the railway station Oncești he observed that the locomotive engine had overheated causing the release of liquid from the cooling system and the temperature cut-out system activated;
- following this, the locomotive driver notified the locomotive driver in front of the train and they stopped the train;
- after receiving the movement inspector from the railway station Bălănoaia approval to withdrawal the train, one introduce the train and after about 150-200 m the train stopped suddenly;
- he was send at the train end by the locomotive driver to found out what happened;
- then he found out that the locomotive DA 1279 was derailed by one bogie and the coupling was broken;
- after this he performed complete brake test and the train was withdrawal in the railway station Giurgiu Nord.

From the statements of the movement inspector on duty in the railway station Bălănoaia on 31.01.2012 one can retain:

- at 14:51 he was noticed about the dispatch of the freight train no. 92212 from the railway station Giurgiu Nord with banking locomotive coupled to the train and to the train brake system until the railway station Stănești;
- after he had the approval from the railway station Stănești movement inspector, he performed passing order of the train no. 92212 on line II;
- he guided this train that passed without any irregularities through the railway station at 15:00 hour;
- around 15:18 he was notified through radio-telephone equipment by the locomotive DHC 392 driver for the return of the train no. 92212 in the railway station Bălănoaia;
- after the request and receive of the instruction from the traffic controller, he notified the train no. 92212 driver that he can return from current line to the railway station
- after a few minutes he found that the train start moving occupying, on the push-button interlocking frame, the insulated section 2 AD, ;
- the locomotive DHC 392 driver notified him through radio-telephone equipment, that the train will return to the railway station Bălănoaia without the locomotive DA 1279 due to its derailment over the level crossing at km 11+015;
- at 16:35 hour the train pass through the railway station Bălănoaia, withdrawal to the railway station Giurgiu Nord.

### **B.5.2. Safety management system**

At the moment of the accident, CNCF “CFR” SA, as manager of the railway infrastructure, had implemented its own railway safety management, according to the provisions of the Directive 2004/49/CE on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 101/2008 on the granting of the safety authorization to Romanian railway infrastructure administrator/manager, 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 11006 – 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.

SNTFM “CFR Marfa” SA, as railway undertaking had implemented its own railway safety management, according to the provisions of the Directive 2004/49/EC on the community railways safety, of the Law no. 55/2006 on the railway safety and of the Minister of Transports Order no. 535/2007 on the granting of the safety certificate in order to perform railway transport on Romanian railways.

When the railway accident happened, the railway undertaking got the next documents concerning its own railway safety management system:

- Safety Certificate – Part A, identification number CSA 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 CSB 0187 – 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 Directive 2004/49/EC and with the applicable national legislation.

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

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

#### *norms and regulations:*

- Regulation for the investigation of the accidents and incidents, for the development of Romanian railway and subway safety, approved by the Government Decision no. 117/17.02.2010;
- Instructions for the locomotive staff activity in the railway transport No. 201, approved by Minister of Transports, Constructions and Tourism Order no. 2229/23.11.2006;
- Instruction for setting the terms and order of the track inspection no. 305, approved by Minister of Transports Order no. 71/17.02.1997;
- Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989;

#### *sources and references:*

- copies of the documents requested by the inquiry commission, enclosed to the investigation file;
- photos taken soon after the railway accident by the members of the investigation commission;
- photos took from the locomotive DA 1279 at PAE Giurgiu headquarters;
- documents concerning repairs performed at the locomotive DA 1279;
- documents concerning maintenance of the tracks provided by their maintenance staff;
- results of the measurements performed soon after the railway accident at the track superstructure;
- questioning of the employees involved in the railway accident.

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

#### **B.5.4.1 Data found out on the lines**

##### **Technical condition of the line before the railway accident**

The last maintenance work performed in the crossing area at km 11+015 was for lining of the track by manual packing of sleepers on 2nd of November 2011.

The measured values at that time did not exceed the tolerances allowed in the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

### **Findings and measures at the line, after the derailment and locomotive jack up**

The reinforced concrete slabs were in good condition, the troughs were clean, ensuring the flow at the passage ends.

On the first interior slab of the passage from the railway station Videle one found a nicked, and the next slabs, towards the railway station Giurgiu Nord were scratched.

One performed the technical inspection of the track with the measuring gauge from 2,5 m to 2,5 m on the derailment area between km 11+005 – km 11+020.



The measured values did not exceed the tolerances allowed in the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

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

#### **Inspections and repairs performed at the locomotive DA 1279**

- the locomotive was build in 1979 and operated from 06.04.1979;
- major overhaul type RG in september 2010 performed at SC CFR IRLU SA – Section IRLU București Triaj;
- inspection type RT on 15.12.2011 performed at SC CFR IRLU SA – Section IRLU București Triaj;
- the locomotive performed supply and equipment technological process type PTAE on 31.01.2012 at București Triaj Depot – Giurgiu working point.

#### **Data on axle no. 1**

- registration no. in CFR stock: 43011;
- stock no.: 77892;
- manufacture year: 1980;
- manufacturer: ICMC Caransebeș (actual name SC CAROMET SA Caransebeș);
- registration no. of crown gear: 2601-99282;
- axle mounting date at the locomotive DA 1279: 17.09.2001 (due to the repair by lifting type RR) when it was mounted as axle no. 3;
- in the period between the repair by lifting type RR and the one of major overhaul type RG, one didn't performed any action on the axle;
- in september 2010 this axle was moved from axle no. 3 to axle no. 1;
- the last ultrasonic non-destructive checking was performed on: 31.03.2011.

#### **Preliminary findings performed at the locomotive DA 1279 at the accident site**

- in the level crossing trough corresponding to the left line in the running direction one found a piece of an electric engine shackle;





- also, in the derailment area were found the following subassemblies coming from the derailed locomotive: another piece of the above mentioned shackle, an inferior half-casing from a deformed gear box, as well as a metal half-bearing from an electric engine.



#### **Findings on the locomotive DA 1279 after derailment, at Giurgiu working point**

- the snow-plough blade from the driver's cab no. 1 deformed and with friction traces on the inner side;
- the driver's cab plough deformed at the inner side on the left side (in the running direction), with hitting traces from the traction engine no. 1 direction (opposite to the locomotive direction);
- the support pipe for broken brake rigging safety;
- the reversing rods of brake slack adjuster from axle no. 1 broken on both sides;
- friction traces on brake cross lever from axle no.1;
- top and bottom surfaces of gear box from electric engine no.1 deformed and braked;
- long shackle from the electric engine no. 1 braked and separated – engine side;
- the separated part was found at the accident side:
  - the bearing axle-box clamp was found in the level crossing trough at km 11+015, with traces of wheel tracks on its surface;
  - another piece of the shackle was found in the same passage where the derailment occurred, having also on its surface, traces of wheel tracks;
- the half-bearings and bearing axle-box – involved part, failed (the bearing axle-box was in driver's cab no. 1 was found after lifting the locomotive - at the accident site);
- the half-bearings from the uninvolved part of the electric engine no. 1 was fallen (found at the accident site after lifting the locomotive);



- the axle no.1 cog wheel was broken, missing from it a piece of 20 cm in length (7 cogs from the crown cogging);
- 2 fastening screws of the cog wheel were cut off and another 2 screws had traces of impact;
- the electric engine no. 1 engine pinion had the cogging deformed on the entire circumference;



- the electric engine no. 1 frame presented hit traces on the bottom side towards the uninvolved part;
- brake cross lever at axle no. 2 was hit and braked;
- bearing axle-box and lower involved box of axle no. 3 presented hit traces;
- brake cross lever of axle no. 3 was hit and deformed on the uninvolved side.
- the journal of axle no. 1 was scratched support bearing on the involved part.

## **B.6 Analysis and conclusions**

### **B.6.1 Conclusions on the technical condition of the track superstructure**

Following the checking of the gauge (E), cross level (N), one found out that the line meets with the tolerances stipulated in the Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989.

The elements of the level crossing at km 11+015 (reinforced concrete slabs, troughs) were in good technical condition, in accordance with Instruction for norms and tolerances for track construction and maintenance – lines with standard gauge no. 314/1989 on level crossings.

### **B.6.2 Conclusions on the technical condition of the locomotive DA 1279**

Analyzing the findings at the locomotive DA 1279, combined with the findings at the line and level crossing parts at km 11+015 one can conclude that breaking the cog wheel from axle no.1 led to the hit, deformation and braking the electric engine no.1 parts – axle no.1 (gear box, bearing axle-box, electric engine long shackle, engine frame), followed by their fall in the structure clearance and finally, to the derailment of bogie no.1 of this locomotive.

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

From the analysis of the findings from the accident site, of the technical condition of the locomotive, photos taken from the derailment site, tests and checkings performed, as well as of the testimonies of the involved employees, one can conclude that the dynamics of this derailment was:



- after the failure of the banking locomotive DHC 392, at the running in a ramp area with gradient of 15 ‰, the locomotive DA 1279 had to ensure, by itself, the hauling of the freight train no.92212, which had led to the increase of the dynamic demands of this locomotive traction gears;
- the increase of the dynamic demands of the traction gears led to the brake of the cog wheel from axle no.1 and the detachment of a piece that covered 7 cogs from this crown cogging;
- after braking, this piece of crown cogging hit, from inside, this gear box, which led to the detachment of the gear box lower part;
- under these conditions, at the train withdrawal back to the railway station Bălănoaia, when the locomotive DA 1279 reached the level crossing at km 11+015, the piece detached from the crown cogging with the gearing box lower side hit the first interior concrete slab (in the running direction) within the passage and then they forced in the crown cogging part left on the axle, which led to the force of electric engine no.1 pinion and its support point on the involved side of the axle;
- then, this led to pull-out from double-ended bolts and falling in the gauge of the axle-bearing from the support bearing of the electric engine no.1;
- whereas, the electric engine long shackle has an upper end mounted on the bogie frame and the lower end is fixed on the axle-bearing of the support bearing of the involved engine part, the axle-bearing pull-out caused, further, the breaking of this shackle lower end, followed by its enter and block in the trough from the left side of the level crossing passage at km 11+015;
- after entering of the long shackle lower end into the passage trough, while running over this area, the left wheel of axle no. 2 (in the running direction) hit the shackle end, which resulted in climbing the right line by the right wheel of this axle and by its fall outside the wheel, together with the fall of the left wheel from the left line and its running on the passage interior concrete slabs;
- after the detachment and falling in the gauge of the axle-bearing of the support bearing from the involved part of the electric engine no.1 one hit and brake the triangular brake beam from axle no.1 of the locomotive, hitting the interior parts of the electric engines no. 1 and 2 and then, deforming the triangular brake beam from axle no.2;
- after the derailment of axle no. 2, when passing over the same shackle end blocked in the passage trough one occurred the derailment of axle no. 3, which led to the derailment of axle no. 1 (first in the running direction);
- after the derailment of bogie no. 1 from the locomotive, one brake the coupling between the locomotive and the first wagon from the train composition, which led to the uncoupling of the air half-coupling of the train automatic brake system and then to the, to the emergency brake of it.

## **B.7. Accident causes**

### **B.7.1. Direct cause**

**The direct cause** of this accident was hitting by the left wheel (in the running direction) of axle no. 2 from the locomotive DA 1279 of long shackle from the traction engine no.1, which led to the derailment of this axle and then the derailment of axles no. 3 and 1. The hit part was fallen and blocked in the trough on the left of the level crossing at km 11+105.

Tearing out the long shackle of the electric engine no. 1 was produced by breaking a piece of the first axle crown gear followed by the brake and detachment of some traction gear elements, due to the occurrence of an overload of the trailer locomotive DA 1279, that after failure of the banking locomotive, it had to ensure the hauling of the train no. 92212 (on a grade with slope of 15 ‰).

### **B.7.2 Underlying causes**

None.

### **A.7.3. Root causes**

None.

### **C. Safety recommendations**

None

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

Members of the investigation commission:

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