



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



INVESTIGATING REPORT

On the railway accident on the 2nd of November 2009 between the railway stations Dealu Ștefăniței – Fiad, km. 28+715



**Final edition
1 February 2010**

NOTICE

Concerning the railway accident, happened on the 2nd of November 2009, between the railway stations Dealu Ștefăniței – Fiad, km. 28+715, in which was involved the passenger train no. 17444 (light locomotive), Romanian Railway Investigating Body performed an investigation, according to the provisions of the Law 55/2006 on railway safety.

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.

Romanian Railway Investigating Body considers as necessary to take some corrective measures, in order to improve the railway safety and to prevent the accidents, and accordingly it made some recommendations this report.

Bucharest, the 1st of February 2010

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

I consider positive

Director,
Dragoș FLOROIU

This notice is part of the report for the investigation of the railway accident happened on the 2nd of November 2009, between the railway stations Dealu Ștefăniței – Fiad, km. 28+715, in which was involved the passenger train no. 17444 (light locomotive).

	Page
I. Preamble	5
I.1. Introduction	5
I.2. Investigation process	5
—	
A. Accident brief presentation	6
A.1 Brief presentation	6
A.2 Direct cause, underlying causes and root causes	7
A.2.1 Direct causes	7
A.2.2 Underlying causes and root causes	7
A.3. Severity level	7
A.4. Safety recommendations	7
B. The investigation report	9
B.1 Accident presentation	9
B.2 The background of the occurrence	10

B.2.1 Parties involved	10
B.2.2 Composition and the equipments of the train	11
B.2.3 Railway equipments	11
B.2.4 Communication facilities	11
B.2.5 Starting of the railway emergency plan	12
B.3 Accident consequences	12
B.3.1 Fatalities and injuries	12
B.3.2 Material damages	12
B.3.3 Consequences of the railway accident on the railway traffic	13
B.4 External circumstances	13
B.5 Investigation course	13
B.5.1 Brief presentation of the involved staff testimonies	13
B.5.2 Safety management system	15
B.5.3 Norms and regulations. Sources and references for investigation	15

B.5.4 Operation of the technical equipments, infrastructure and rolling stock	16
B.5.4.1 Data on equipments	16
B.5.4.2 Data on lines	16
B.5.4.3 Data found out at the functioning of the rolling stock and its technical installations	17
B.6 Analysis and conclusions	17
B.6.1 Braking of the light locomotive when approaching the locomotive of the stopped train	17
B.6.2 Cause that led to the collision of the train stopped on the running line	17
B.6.3 Findings on the employees training	18
B.7 Accident causes	18
B.7.1 Direct cause	18
B.7.2 Underlying causes and root causes	19
C. Safety Recommendations	19

1. PREAMBLE

1.1 Introduction

Concerning the railway accident happened on the 2nd of November 2009, between the railway stations Dealu Ștefăniței – Fiad, km. 28+715, in which was involved the passenger train no. 17444 (light locomotive), Romanian Railway Investigating Body, permanent and independent body of Romanian Railway Authority, hereinafter referred as OIFR, started an investigation in order to prevent some accidents with similar causes, establishing the conditions and the causes and making safety recommendations.

OIFR investigation was carry out in accordance with the Law 55/2006 concerning the railway safety and did not aim to establish the guilty or the responsibility, its objective being the improvement of the railway safety and the prevention of the railway accidents.

1.2 Investigation process

On the 2nd of November 2009, OIFR was notified by Romanian Railway Safety Authority about the railway accident occurrence and went to the accident place and found out:

- collision between a passenger train and a light locomotive;
- slight injury of 3 passengers;
- derailment of 2 axles and the damage of the light locomotive;
- damage of the locomotive and of one coach from the he train no. 1923.

At the accident place were present also the representatives of:

- The prosecution Office of Bistrita Court of Appeal;
- Operational Department of the Railway Transports Police;
- Mobile Service of Emergency, Reanimation and Extraction – SMURD;
- National Railways Company ”CFR” – SA;

- National Railway Passenger Company “CFR Calatori” – SA;
- Romanian Railway Safety Authority.

According to the provisions of the art.3, letter 1 of the Law 55/2006 concerning the railway safety, the occurred facts were ranked as railway accident, therefore OIFR director decided to perform an investigation.

So, one established an investigation commission, through the decision of OIFR director no. 14 from the 5th of November 2009, consisting in:

- Sorin CONSTANTINESCU –investigator in charge;
- Mihai OLARU – investigator;
- Vladimir MACICĂȘAN – investigator;
- Cristian GROZA – investigator.

It needs to underline that the activity for the removal of the railway serious accident effects was coordinated by the members of the inquiry commission, in accordance with the provisions of the Instructions for the prevention and the inquiry of the railway events no. 003/2000.

A. ACCIDENT BRIEF PRESENTATION

A.1 Brief presentation

On the 2nd of November 2009, at 10.35 hour, on the running track section Salva – Sighetu Marmatiei happened the collision between the passenger train no. 1923, stopped on the running line, between the railway stations Dealul Stefanitei – Fiad, because of some technical failures at the hauling locomotive and the diesel – electric locomotive LDE 60-0720-7, routed as emergency locomotive, running as light locomotive as train no. 17444.

The collision place is in the Railway County Cluj, between the railway stations Dealu Stefanitei – Fiad, km 28+715. The line is sloping (19.2‰) in the running direction of the light locomotive (Dealu Stefanitei – Fiad), straight line on about 250m and in mixed cross section.



The passenger train no. 1923, consisting in 4 coaches, hauled by the diesel – electric locomotive LDE 60-1165-4, belonging to the railway county Cluj of National Railway Passenger Company “CFR Calatori” – SA , that run between Timisoara Nord – Fiad, for Sighetu Marmatiei, stopped at km 28+715 between Fiad – Dealu Stefanitei with the hauled locomotive out of order.

The locomotive LDE 60-0720-7 belonging to RTFC Cluj was running isolated as train no.17444 on the distance Viseu de Jos- Dealu Stefanitei – km 28+715 being directed as assistance locomotive for the train 1923.

The railway accident occurred as result of the collision between the locomotive of the passengers train no.1923, that was stabling and the isolated locomotive LDE 60-0720-7.

The consequences of the collision were:

- easy injury of three passengers;
- derailment of two axles of the isolated locomotive;
- damages to the two locomotives;

- damage to a passenger coach.

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

A.2.1. The direct cause of the accident - the collision happened because the assistance locomotive LDE 60-0720-7 wasn't stop at the regular distance, running isolated as train no. 17444, fact that lead to violent end-on collision of the passenger train no.1923 hauling locomotive situated in stop position. The locomotive wasn't stop at a regular distance due to a human error, because:

- the assistance locomotive had to be stopped at km 28+800 as it was stipulated at point 1 of the running order no. 2303140 issued by the movement inspector from Dealu Ștefăniței railway station;
- according to the provisions of article 115, paragraph (3), chapter II of Instructions for the locomotive staff in railway transport No. 201/2007, the locomotive must have been stopped at least 2 meters before the first railway vehicle hauling from the train composition, after that the coupling should be made.

A.2.2. There weren't identified underlying or root causes of this railway accident.

A.3. Severity level

According to the provisions of article 3, item 1 of the Law no.55/2006 on the railway safety, the event is qualified as railway accident.

A.4. Safety recommendations

The recommendations are given in order to solve the following aspects:

1. Organizing a training action with the occasion of the training sessions through the school of the personnel of the engine drivers and of the movements inspector from the regulations concerning the circulation of the assistance locomotives, of the intervention means and of Utility Motor Driven on closed current line.
2. To agree on the provisions concerning the running of the assistance locomotives, of the intervention means and of Utility Motor Driven on closed current line of the Regulation for the circulation of trains and shunting the railway vehicles no. 005/2005, Instructions for the driving staff activity in the railway transport no. 201/2007 and the Regulation for hauling and braking no.006/2005.

The present Investigating Report will be transmitted to the manager of the public railway infrastructure, all licensed railway undertakings and to the Romanian Railway Safety Authority.

According to the provisions of the Law no.55/2006 on the railway safety, the Romanian Railway Safety Authority will survey the way of implementation of these recommendations.

B. THE INVESTIGATING REPORT

B.1. Accident presentation

On November 2, 2009, at 8:44 o'clock, the train no.1923 that was running on Timisoara Nord – Sighetu Marmatiei was dispatched from Fiad railway station to CFR Dealu Stefanitei railway station according to the free pass system with line clear exit signal without other comments.

The train was composed of 4 wagons, 16 axles, 125 metres, 191 tons having the automatic braked mass of 230 tons (according to the timetable) but in reality of 262 tons, manual braked mass according to the timetable of 33 tons but in reality of 88 tons, being hauled with the locomotive LDE 60-1165-4 belonging to the engine shed of Cluj Napoca, driven by a single engine driver that belonged to the engine shed of Cluj Napoca - the working point of Sighetu Marmatiei.

Due to the release of smoke to the traction electric engine (MET) no.5 of the locomotive LDE 60-1165-4, the train was stopped at the km 28+715 outdoor at 9:00 o'clock. The engine driver together with the train crew are interfering with the fire extinguishers from the locomotive's endowment and of the train set in order to remove the smoke. After the intervention on MET no.5 and removing the smoke, the engine driver isolates the group MET 2-5 and repeatedly tries to start up the train in order to continue the route., but without success due to the wheels sliding on the rails and to the low adhesion. On these conditions, the engine driver tried to communicate by radio station with the close railway stations and not succeeding, he phoned using the mobile phone to Traffic Controller Dej within RTFC Cluj Napoca at 9:10 o'clock, requesting an assistance locomotive.

Following this request, the traffic controller of the Traffic Controller Dej ordered the granting of the assistance locomotive LDE 60-0720-7 from the passenger train no. 4650 that was in Viseu de Jos railway station, driven by an engine driver and a driver's assistant, the two belonging to the engine shed Cluj Napoca – working point Sighetu Marmatiei. The driver's assistant was performing traineeships in order to obtain an authorization for driving the locomotive according to specific regulations in force and he could drive the locomotive under supervision of the main engine driver.

The isolated locomotive LDE 60-0720-7 was directed as train no.17444 at 9:45 o'clock from Viseu de Jos railway station , arriving to Dealu Stefanitei railway station at 10:15 o'clock according to the report of reading the speed recording tape no.3361/03.11.2009 of the Engine Shed Cluj Napoca and leaves at 10:17 o'clock on closed running line on the basis of the running order no. 2303140 issued by CFR Dealu Stefanitei railway station in which the following running conditions were established:

- “Circulate under the conditions of train no.1924 on closed running line between Dealu Stefanitei railway station – Fiad railway station till the km 28+800 from which you must haul the train 1923 and circulate under the conditions of train no.1923 then enter in the railway station when the semaphore signal shows free position”.
- “Exit from the station when the semaphore signal shows closed position, circulate with maximum speed of 20 km/h”.

The isolated locomotive LDE 60-0720-7 circulated between CFR Dealu Stefanitei railway station and the km 28+715 with speeds between 13 km/h and 42 km/h and at 10:33 o'clock has ran into the locomotive 60-1165-4 that was stabling in front of the passenger train no.1923. The impact occurred with a speed of 26 km/h.

Following the collision, occurred the easy injury of three passengers, the damaging of the two locomotives involved and of the wagon no.50532055061-7, the first from the locomotive.

As follows, to the locomotive LDE 60-0720-7 occurred the derailment of axles 5 and 6 (the first in the running way) and the damaging of the coupling and buffing gears, of the plough and of the locomotive's body in the area of driver's cab, deformation of the frontal sleeper and of the sole bar for the driver's cab II.

To the locomotive LDE 60-1165-4 (locomotive of train no.1923) occurred the damaging of the coupling and buffing gears, of the plough and of the locomotive's body in the area of driver's cab, deformation of the frontal sleeper and of the sole bar for the driver's cab II.

To the passenger wagon occurred the horizontal deformation of the frontal sleeper in the area of the buffing gear, of the lateral sole bar, of the central sole bar, of the sleeper of the superior centre casting and of the metallic floor of the platform, from the end with manual brake.

B.2. The background of the occurrence

B.2.1. Parties involved

The running section where the railway accident took place is under the management of CNCF "CFR" S.A and is maintained by its employees.

The railway infrastructure and superstructure are under the management of CNCF "CFR" SA and are maintained by the employees of Lines District no.5 Telciu within the section L9 Sighetu Marmatiei, Railway County of Cluj Napoca.

The installations of railway communications from Fiad railway station are under the management of CNCF "CFR" SA and are maintained by the employees of SC TELECOMUNICATII CFR SA.

The installations of railway communications from the locomotives are the property of SNTFC "CFR CALATORI" SA and are maintained by its employees.

The locomotives and the wagons from the passenger train composition are the property of SNTFC "CFR CALATORI" SA being maintained and inspected during the route by its employees and the repairs are performed by economic agents authorized as railway suppliers.

The investigating commission questioned the employees involved in the railway traffic management, the driving staff and the operating staff.

B.2.2 Composition and the equipments of the train

The passenger train no.1923 was composed of 4 wagons, 191 tons, 16 axles, automatic braked - 230 tons, actually braked 262 tons plus 32 tons in comparison with the timetable, manual braked 33 tons, actually braked 85 tons, plus 52 tons, length of 125 metres and was hauled by the locomotive LDE 60-1165-4 belonging to the Engine Shed CFR Cluj Napoca, subunit of SNTFC "CFR" Calatori S.A.

The isolated locomotive LDE 60-0720-7 belongs to the Engine Shed CFR Cluj Napoca, subunit of SNTFC "CFR" Calatori S.A.

The safety and vigilance devices, the punctual control installation of the speed (INDUSI) from the endowment of the traction means were active and were functioning according to the instructions and the automatic brake of these was active.

B.2.3. Railway equipments

The current line at the km 28+715 and in the area of the railway event is presenting a gradient ratio of 19.2‰ from Fiad railway station to CFR Dealu Stefanitei and alignment of 250 meters between km 28+715 and the km 28+965. The superstructure is of type 49 with concrete sleepers T18 with indirect fastening type SKL 12, track without joints, non-electrified single track.

The weather was ensuring a good visibility of 2500 meters, the sky was clear, the temperature of the rail of +1° C and the air temperature was of +1° C.

The railway accident occurred on an area where the maximum running speed of trains foreseen in the timetable was of 60 km/hour.

The railway stations are endowed with locking installations with keys and block and the railway circulation is done according to the free pass system.

On November 2009, 2 near the place where the accident took place it weren't performed works to the railway installations or tracks.

B.2.4. Communication facilities

Communication between the engine driver and the movements inspectors and also between the engine driver and the train crew couldn't be ensured through the radiophone installation, the cause being the lack of signal due to the field configuration, respectively due to the fact that the batteries from the mobile stations RER of the personnel were discharged.

B.2.5. Starting of the railway emergency plan

Immediately after the railway accident occurrence, the start of the intervention plan for granting the first aid to victims, removal of damages and restoring the trains circulation had two components:

- Notifying the single national system for emergency calls 112 referring to fires, accidents, medical emergencies, disasters and other events that involves fast intervention of the specialized services by the passengers of train no.1923

involved in the railway accident, following which to the place of the railway accident occurrence were present the representatives of Mobile Service of Emergency for Reanimation and Extraction – SMURD, of the Railway Transport Police, of the Prosecutor’s office of the Legal Court of Bistrita;

- Notifying on the railway accident through the circuit of the information mentioned to annex 2 of the Instructions for preventing and investigating the railway accidents and events- no.003 following which were present the representatives of CNCF “CFR” SA – the public railway infrastructure manager, of SNTFC “CFR CALATORI” SA – the railway undertaking and of the Romanian Railway Authority.

The putting back the derailed rolling stock on the rails was performed by own means.

B.3. Accident consequences

B.3.1 Fatalities and injuries

Following the railway accident were registered three people easily injured.

B.3.2. Material damages

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

- **To the line** - there weren't;
- **To the installation**- there weren't;
- **To the locomotives**
 - to the locomotive LDE 60-0720-7, according to the estimate no.3379/2009 of the Engine Shed Cluj Napoca the damage was of **9606,80 lei**;
 - to the locomotive LDE 60-1165-4, according to the estimate no.3380/2009 of the Engine Shed Cluj Napoca, the damage was of **14039,82 lei**.
- **To the wagons** – to the wagon no.50532055061-7, according to the estimate no.2/760/2009 of the Wagons Inspection Cluj, the damage was of **12892,77 lei**;
- **To the environment** – there weren't;
- **Other damages (delays of trains)** – estimate of minutes of delay of the passenger train no.43/b/211/2009 of the Traffic Division of Cluj within SNTFC “CFR CALATORI” SA in total of **2362,29 lei**.

Total value of material damages -38901,60 lei.

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

The running track between Fiad railway station and CFR Dealu Stefanitei railway station was closed for the railway traffic on November 2, 2009 from 9:32 to 19:47.

Due to the railway accident occurrence 10 passenger trains had a total delay of 731 minutes.

B.4. External circumstances

On November 2, 2009 between 10:00 - 12:00 o'clock the visibility was very good of approximately 2500 meters, the temperature was of approximately +1°C, clear sky and without wind.

In the area where the railway accident took place the line is straight on a part of 250 meters and down- grade in the running way of the isolated locomotive.

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

B.5. Investigation course

B.5.1. Brief presentation of the involved staff testimonies

The movement inspector on duty to Fiad railway station stated the following:

- he directed the train no.1923 to Dealu Stefanitei railway station at 8:44;
- at 9:30 o'clock the traffic controller ordered the closing of the current line between Fiad railway station and Dealu Stefanitei railway station due to the damaging of the locomotive from the train no.1923;
- the radio connection with the train no.1923 couldn't be done because of the field configuration;
- found out about the railway accident from the TF Police.

The movement inspector on duty in Dealu Ștefăniței railway station stated the following:

- it was informed about the locomotive failure of the train no. 1923 by the traffic controller from RCM Dej;
- handed the running order to the engine driver;
- in the moment of guidance to current line of the train no. 17444, at the locomotive LDE 60-0720-7 driver's desk was the driver's assistant.

The conductor on duty at the train no. 1923 stated the following:

- was waiting for the assistance locomotive, standing next to locomotive LDE 60-1165-4 and he observed that the assistance locomotive LDE 60-0720-7 speed was higher than normal;
- observed that the assistance locomotive was driven by the engine driver;
- doesn't heard any conversation through its portable radio station, because it had the battery discharged.

The train inspector on duty at train no. 1923 stated the following:

- was waiting for the assistance locomotive, standing next to locomotive LDE 60-1165-4 and he seen that the engine driver from the assistance locomotive LDE 60-0720-7 ask them to stay away;
- observed that the locomotive was traveling with braked wheels;
- observed that the assistance locomotive was driven by the engine driver.

The engine driver that was serving the locomotive LDE 60-1165-4 located in the hauling of the passenger train no. 1923 stated the following:

- the passenger train no. 1923 was stopped on current line due to a failure at MET 5. After the engine driver's intervention to remedy the technical failure, he could not continue to run due to locomotive sliding;
- in the accident area, the line was covered with white frost and dry leaves and the visibility was good;
- could not establish the contact through the locomotive radio station with the nearby railway stations and he used the mobile phone to contact the passenger traffic controller Dej to request the assistance locomotive;
- observed the assistance locomotive LDE 60-0720-7 from a distance of approximately 250 m, place from where the locomotive LDE 60-0720-7 gave a whistle signal as a sign of eye contact confirmation;
- at a distance of approximately 30 m from the train no. 1923, he has seen that the engine driver of locomotive LDE 60-0720-7 was making signs suggesting them to stay away;
- warned the conductor and the train inspector to stay away from the locomotive and he displaced to the engine room until the moment of the impact.

The driver's assistant, situated in time of probation as engine driver on the locomotive LDE 60-0720-7, stated the following:

- the movement inspector from the Vișeu de Jos railway station demanded them to run with the locomotive LDE 60-0720-7 towards Dealu Ștefăniței CFR railway station as a assistance locomotive for the train no.1923;
- in Dealu Ștefăniței CFR railway station they received from the movement inspector a running order in which the running conditions were established in current line as service train no.17444, as light running;
- after leaving from the Dealu Ștefăniței railway station, followed and communicated the indications on the mile posts to the engine driver;
- had stopped the locomotive in the former Romuli railway station to convinced about the indications of the mile post;
- at a distance of 200 – 300 m from the train no.1923, after passing a curve, visual contact with the train no.1923 was established;
- at a distance of approximately 20 – 30 m from the train no. 1923, the engine driver told him that he can not stop the locomotive;
- partial operated the locomotive handbrake and then the impact took place;
- between Dealu Ștefăniței railway station and the collision spot, the locomotive LDE 60-0720-7 was operated by the engine driver;
- the conditions established through the running order handed by the movement inspector from CDR Dealu Ștefăniței railway station were read aloud;
- didn't saw the speed of the locomotive LDE 60-0720-7.

The engine driver that was operating the locomotive LDE 60-0720-7 stated the following:

- the movement inspector from the Vișeu de Jos railway station demanded them to run with the locomotive LDE 60-0720-7 towards Dealu Ștefăniței CFR railway station as a assistance locomotive for the train no.1923;
- in Dealu Ștefăniței CFR railway station he received from the movement inspector a running order in which the running conditions were established in current line as service train no.17444, as light running;
- the conditions established through the running order handed by the movement inspector from CDR Dealu Ștefăniței railway station were read together with the driver's assistant;
- after leaving the Dealu Ștefăniței railway station, he increased the speed up to 40 km/h;
- at a distance of 200 – 250 m from the train no.1923 he established visual contact with the train no.1923 and he took measures to reduce speed;
- the locomotive LDE 60-0720-7 speed was not reduced to 0 (zero) because on the line were leaves and white frost;
- at a distance of 30 m from the train no.1923 he warn the engine driver and the crew members from the train no.1923 to stay away because he can not stop the locomotive LDE 60-0720-7;
- between Dealu Ștefăniței railway station and the collision spot he operated the locomotive LDE 60-0720-7.

B.5.2 Safety management system

In its tasks and responsibilities, the SNTFC CFR Călători SA railway operator drawn up and implement his own safety management system.

In this context, SNTFC CFR Călători SA ensures the control of the risks associated with the railway operator activity.

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

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

- the railway accident research file no. 2104/3968/2009 drawn up by the inquiry commission named through the Chief Inspector Order no. 2000/2430/01.11.2009 within the Romanian Railway Safety Authority – AFER;
- photos taken by the investigation commission members and by inquiry commission members immediately after the accident;
- the minutes reading the locomotives speed recorders involved in the accident;
- the documents concerning the on board sheets of locomotives, provided by those responsible for their maintenance;
- the documents concerning the adjustment and management process of train movement;
- the results of the measures performed immediately after the railway accident at the diesel-electric locomotive that hauled the train wagons involved in the accident;
- the technical conditions examination and interpretation of the locomotives and train involved in the accident;
- interviewing staff on training, professional knowledge and their interpretation
- Technical regulation of railway operation no. 002 approved by Public Works, Transport and Housing Minister's Order no. 1186/29.08.2001;

- Order of the Minister of Transports, Constructions and Tourism No.2229/23.11.2006 on the approval of the Instructions for the locomotive staff in railway transport No 201/2007.
- Regulation for train movement and railway shunting – no. 005/2005 approved by Order of the Minister of Transports, Constructions and Tourism No. 1816/26.10.2005;
- Order of the Minister of Transports, Constructions and Tourism No.1815/26.10.2005 on the approval the Regulations for hauling and breaking – No.006.

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

B.5.4.1 Data on equipments

The train movement between the railway stations Dealu Ștefăniței – Fiad is performed through the free path system.

The railway station Dealu Ștefăniței, from which the locomotive LDE 60-0720-7 was send, is equipped with lock control installation with keys and block type SBW.

Sending the locomotive LDE 60-0720-7 on running line closed was performed under the running order no. 2303140 issued by the CFR railway station Dealu Ștefăniței.

B.5.4.2 Data on lines

In the railway accident area, at km28+715 the track in single, without electricity, in a straight line and it is sloping 19.2‰ from the CFR railway station Dealu Ștefăniței to the railway station Fiad.

The rail is of type 49 British Steel 1999, with indirect fastening type SKL 12, on reinforced-concrete sleepers T18, track without joints. The trains running speed on that track section is 60 km/h.

At 10:00 the temperature in the track was +1°C.

The visibility distance for the locomotive LDE 60-0720-7, between the exit from the last curve and the train no.1923 was only 250 m, due to CF line in mixt profile.

B.5.4.3 Data found out at the functioning of the rolling stock and its technical installations

The locomotive LDE 60-0720-7 had the “INDUSI” equipment active and sealed, the safety and vigilance equipment was active and sealed, the speed recorder equipment was sealed, the

locomotive brake equipment was active and sealed, the cock handle FD1 of the direct brake was in brake position and the brake valve type KD2 was in filling position.

The measures performed at locomotive LDE 60-0720-7 tyres, performed on 04/11/2009 by SC CFR SCRL Braşov SA – Locomotive repair section Cluj Napoca, unit to which the locomotive was guided for examination, are registered in the measurement leaflet enclosed to the technical findings minute – part of the research file drawn up by the inquiry commission. From the analyses of the dimensions measured at the tyres of locomotive axles had resulted the fact that those are in the limits allowed by the Technical regulation of railway operation no. 002/2001.

The minute of reading the equipment IVMS records – part of research file drawn up by the inquiry commission – stipulates that the maximum locomotive speed was 42 km/h on Dealu Ştefăniţei area – km 28+715. The locomotive LDE 60-0720-7 impact speed with the stop train was 26 km/h.

B.6 Analysis and conclusions

B.6.1 Braking of the light locomotive when approaching the locomotive of the stopped train

According to the minute of reading the speed recording tape results that braking measures necessary to certainly stop before the stop train, were not taken from time.

B.6.2 Cause that led to the collision of the train stopped on the running line

The violent end-on collision of the stop train in current line, by the locomotive LDE 60-0720-7 that was running isolated as assistance locomotive, was due to a human error, provided that the line is sloping at 19.2‰, in a straight line of about 250m, good visibility. We state that the violent end-on collision is based on an error, because:

- in the running order no. 2303140 it was stipulated that the assistance locomotive LDE 60-0720-7 be stopped at km. 28+800 long before the stopping place in current line of train no. 1923;

- although the running order condition concerning the stop of train at km. 28+800 was not respected, the provision of art.115, paragraph (3), chapter II of Instructions for the locomotive staff in railway transport No. 201/2007, establishing that **in all cases** the locomotive to be linked to the train, must have been stopped at least 2 meters before the first railway vehicle hauling from the train composition, after that the coupling should be made.

B.6.3 Findings on the employees training

1. One does not comply with the provisions concerning the conditions compliance of the running order stipulated in the Instructions for the locomotive staff in railway transport No. 201/2007, chapter X, article 79(1): „The running order is a pre-printed form and with series, that bring in writing, notify the engine driver and where appropriate to the foreman shunter in connection with train traffic and / or shunting” have not been respected.
2. One does not comply the provisions concerning the stopping in order to attach the locomotive to the train stipulated in Instructions for the locomotive staff in railway transport No. 201/2007, chapter II, article 115(3):”In all cases, the engine driver will stop the locomotive at a distance of at least 2 m before the first railway vehicle hauled from the train composition, after which the coupling is made”, have not been respected.
3. One does not comply the provisions of the Regulation for hauling and breaking – No.006/2005, for the engine driver, chapter VII, section 2, article 72(2):”Any braking must be done in due time and with proper pressure for slaking the speed, stopping of the train to be done at the spot or before it” in order to prevent some situations in which the stopping of the train can not be assured, have not been respected.
4. One does not comply the provision of Instructions for the locomotive staff in railway transport No. 201/2007, chapter IV, article 129(4):” The train must be stopped before the obstacle, respectively before the stop signal, if the distance from where the observance of the signal was possible ensure the actual braking distance corresponding to the situation, have not been respected. If the actual braking distance correspondent to the situation is bigger than the distance between the observance spot and the obstacle, respectively signal, the speed must be reduce so as to satisfy all the measures to be taken.

5. One does not comply the provisions of Regulation for train movement and railway shunting – no. 005/2005, article 282(3):”On running sections not equipped with interlocking system, both day and night, in the running order is stipulated:” run with maximum speed of 40km/h respecting the speed restriction to ... km (distance of at least 1km from the stopped train) and with the maximum speed of 20 km/h from km to km” – the place where the first aid must be granted.

B.7. Accident causes

B.7.1 Accident direct cause – the collision happened because the assistance locomotive LDE 60-0720-7 wasn't stop at the regular distance, running isolated as train no. 17444, fact that lead to violent end-on collision of the passenger train no.1923 hauling locomotive situated in stop position. The locomotive wasn't stop at a regular distance due to a human error, because:

- the assistance locomotive had to be stopped at km 28+800 as it was stipulated at point 1 of the running order no. 2303140 issued by the movement inspector from Dealu Ștefăniței railway station.
- according to the provisions of article 115, paragraph (3), chapter II of Instructions for the locomotive staff in railway transport No. 201/2007, the locomotive must have been stopped at least 2 meters before the first railway vehicle hauling from the train composition, after that the coupling should be made.

B.7.2 **There weren't identified underlying or direct causes** of this railway accident

C. Safety recommendations

The recommendations are given in order to solve the following aspects:

1. Organizing a training action with the occasion of the training sessions through the school of the personnel of the engine drivers and of the movements inspector from the regulations concerning the circulation of the assistance locomotives, of the intervention means and of Utility Motor Driven on closed current line.
2. To agree on the provisions concerning the running of the assistance locomotives, of the intervention means and of Utility Motor Driven on closed current line of the Regulation for the circulation of trains and shunting the railway vehicles no. 005/2005, Instructions for the driving staff activity in the railway transport no. 201/2007 and the Regulation for hauling and braking no.006/2005.

The present Investigating Report will be transmitted to the manager of the public railway infrastructure, all licensed railway undertakings and to the Romanian Railway Safety Authority.

According to the provisions of Law no. 55/2006 concerning the railway safety, the Romanian Railway Safety Authority will follow the way of implementing these recommendations.

Investigation commission members:

- CONSTANTINESCU Sorin - investigator in charge _____
- OLARU Mihai - investigator _____
- MĂCICĂȘAN Vladimir - investigator _____
- GROZA Cristian - investigator _____