



MINISTRY OF TRANSPORTS AND INFRASTRUCTURE  
ROMANIAN RAILWAY AUTHORITY - AFER

ROMANIAN RAILWAY INVESTIGATING BODY



## INVESTIGATING REPORT

of the incident in which was involved the light engine DHC 235,  
belonging to SNTFC “CFR Calatori” SA, in the running of the train no. 17958,  
occurred on the running line II Ruginoasa – Targu Frumos,  
at the km 25+300, on the 6<sup>th</sup> of June 2010



Final edition  
The 16<sup>th</sup> of July 2010

## NOTICE

With reference to the railway accident occurred on the 6<sup>th</sup> June 2010, in the running of the train no. 17958, consisting in the light engine DHC 235, a fire in the locomotive cab, on the running line II Pascani-Iasi, between the railway stations Ruginoasa and Targu Frumos, at the km. 25+300, Romanian Railway Investigating Body carried out an investigation, according to the provisions of Government Decision 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, in this respect it included in the report a series of safety recommendations.

Bucharest, the 20<sup>th</sup> of July 2010

*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**  
Sorin CONSTANTINESCU

***This approval is part of the Report for the investigation of the accident occurred on the 6<sup>th</sup> of June 2010, in the Branch of the Railway County Iasi and of the Railway Passenger County Iasi, in the running of the train no. 17958, belonging to SNTFC “CFR Călători” SA, on the track section Pascani - Iasi, running line II (electrified double line), between the railway***

*stations Ruginoasa and Targu Frumos, at the km 25+300, consisting in a fire in the locomotive DHC 235.*

## **CONTENT**

<b>I. Preamble</b>	<b>5</b>
<b>I.1. Introduction</b>	<b>5</b>
<b>I.2. Investigation</b>	<b>5</b>
<b>A. <u>ACCIDENT RESUME</u></b>	<b>6</b>
<b>A.1. Brief presentation</b>	<b>6</b>
<b>A.2. Accident causes</b>	<b>6</b>
A.2.1. Direct cause	6
A.2.2. Underlying causes	6
A.2.3. Root causes	6
<b>A.3. Severity level</b>	<b>7</b>
<b>A.4. Safety recommendations</b>	<b>7</b>
<b>B. <u>Investigating report</u></b>	<b>8</b>
<b>B.1. Accident presentation</b>	<b>8</b>
<b>B.2. The accident circumstances</b>	<b>10</b>
B.2.1. Involved parties	10
B.2.2. Train composition and equipments	11
B.2.3. Railway equipments	11
B.2.4. Means of communications	11
<b>B.3. The consequences of the accident</b>	<b>11</b>
B.3.1. Losses and injured people	11
B.3.2. Material damages	12
B.3.3. The consequences of the incident in the railway traffic	12
<b>B.4. External circumstances</b>	<b>12</b>
<b>B.5. Investigation</b>	<b>12</b>
B.5.1. The summary of the of the involved railway staff testimonies	12
B.5.1.1 Summary of the testimonies of the staff of the railway undertaking and infrastructure manager	12
B.5.2. The safety management system	13

B.5.3. Norms and regulations. Sources and references for investigation	13
B.5.4. Operation of the rolling stock	14
B.5.4.1 Data on the locomotive DHC 235	14
B.5.4.1.1 Data resulted from the inspections performed on the 7 <sup>th</sup> of June 2010 by the investigation commission and the repair staff of the Depot Iasi and written in the minute (part of the investigation file) and photos (taken by the investigation commission)	14
B.5.4.1.2 Data resulted from the analysis of the documents asked from the railway infrastructure manager	18
<b>B.6. Analysis and conclusions</b>	<b>18</b>
B.6.1 Analysis of the incident occurrence	18
<b>B.7. The accident causes</b>	<b>18</b>
B.7.1. Direct cause	18
B.7.2. Underlying cause	19
B.7.3. Root causes	19
<b>C. <u>Safety recommendations</u></b>	<b>20</b>



## **I. PREAMBLE**

### **I.1. Introduction**

The fire appeared on the 6th of June 2010 in the running of the train no. 17958 in the light engine DHC 235 (structural subsystem-railway vehicle ), is an accident included in the art. 7, paragraph (1), letter e) from the ***Regulations for the investigation of the accidents and incidents, for the development and the improvement of the railway safety on the Romanian railway and subway network***, approved by Government Decision no. 117/2010, hereinafter referred to as „***Regulations***”.

According to the above mentioned stipulations and to the art. 19, paragraph (2) of the Law no. 55/2006 on the railway safety, corroborated with the art. 48, paragraph (1) of the ***Regulations***, Romanian Railway Investigating Body appointed an investigation commission.

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.

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

Soon after this accident, Romanian Railway Investigating Body was notified, orally and in writing, by CNCF „CFR” SA about it. After going to the accident place, it acknowledged about:

- the light engine DHC 235, running as train no. 17958 from Pascani to Iasi, was stopped on the running line (km 25+300) between the railway stations Ruginoasa and Targu Frumos;
- the interior of the locomotive cab was affected by the fire;
- the electric equipment of the locomotive cab damaged by the fire;
- the line and the equipments in the accident area were in good condition.

This accident did not generate loss or injured people.

At the accident place were present the representatives of:

- Inspectorate for Emergency Situations „Mihail Grigore Sturdza” from Iasi district, Fire point Targu Frumos;
- Operative Department of Railways Police;
- Romanian Railway Safety Authority;
- CNCF „CFR” SA;
- SNTFC „CFR Calatori” SA.

Through the Decision no. 24 from the 7<sup>th</sup> of June 2010 of OIFR director, in accordance with the provisions of art. 19, paragraph (2) of the *Law no. 55/2006 on railway safety*, corroborated with the art. 48(1) of the ***Regulations*** one appointed the investigation commission, consisting in :

- Marian DRAGHICI – investigator in charge
- Dumitru SFARLOS – member
- Eugen ILIE – chief of Traffic Safety Department of Passenger Railway County Iasi - member
- Mihai GHENGHEA – Traffic Safety Regional Inspector - member

## **A. ACCIDENT RESUME**

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

On the 6<sup>th</sup> June 2010, the train no. 17958, running between Pascani – Iasi, consisting in the light engine DHC 235, after passing through the railway station Ruginoasa, running on the line II to the railway station Targu Frumos, at the km. 25+300, appeared a fire under the floor of the driving cab, on the left side in the running direction, that extended to the driving cab.

Being incapable to bring under control and to blow out the fire, the driver call the number 112, asking for the intervention of the Inspectorate for Emergency Situations, the fire being blown out by the Fire Brigade belonging to the Fire Point Targu Frumos, at 20:30 hour. The Firemen intervention implicated the closing of the running lines I and II and cut off of the contact line.

The light engine DHC 235, running as train 17958, belongs to SNTFC “CFR Calatori” SA and was driven by the driver/driver’s assistant.

The accident place is situated at the km 25+300 on the running line Ruginoasa-Targu Frumos, with mixed cross profile, curve line with R=625, left deviation and gradient of 21‰ in the running direction.

The accident place is situated on the track section Iasi-Pascani, belonging to CNCF “CFR” SA – Branch of the Railway County Iasi.

### **A.2. Accident causes.**

#### **A.2.1. Direct cause**

Appearance of a fire inside the niche of the left batteries (boxes 5-8) generated by a short-circuit between the connection between the niches and a series equipment of the elements from the battery box no. 6, that led to the fire of the cables insulation and the covers of the elements of the batteries no. 5-8, followed by the fire of the cables insulation and the fuel deposits appeared in time from the locomotive operation, upper to the niche of the batteries no. 5-8.

#### **Contributory factors**

Non-performance on due time of the works specific to the repair type to which the locomotive was falling due (falling due at the repair type RG from the February 2009), it leading to an unsuitable thermo-technical situation, to the lost of the petroleum products through the constructive tightness points of the diesel engine and their deposit in very hard to reach places.

#### **A.2.2. Underlying cause**

Non-performance of some maintenance works of the locomotive, with the limit for the introduction into repair exceeded, for the additional checking of the insulation capacity of the cables and protection of the cables afferent to the batteries set, as well as for the cleaning of the petroleum product deposits from the constructive areas of the locomotives, where they can accumulate.

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

None.

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

According to the provisions of the **Regulations**, the event was defined as accident, according to the provisions of art 7, paragraph (1), letter e.

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

The recommendations aim to settle the next issues:

1. Identification and implementation of some solutions for the protection of the connections of the batteries, including between those two niches;
2. Supplement of the actions for the periodical technical inspection of the insulation capacity of the connection cables of the batteries, after the performance of the operations stipulated in the technological processes for the maintenance and operation of the batteries, up to the achievement of the protection solution stipulated previously;
3. Periodical removal of the fuel deposits from the places susceptible to the accidental fires of the locomotive, operations to be included in the technological processes of the periodical inspections.

The addressee of the safety recommendations is SNTFC „CFR Calatori” SA Bucuresti.

This report will be sent to Romanian Railway Safety Authority, to SNTFC „CFR Calatori” SA and to CNCF „CFR” SA.

## **B. INVESTIGATING REPORT**

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

On the 6th of June 2010, the train no. 17958, running between Pascani-Iasi, consisting in the light engine DHC 235, had passing order on the line 4 from the railway station Ruginoasa, at 18:09 hour to Targu Frumos railway station, where it was to be dispatched on the line 4.

At 18:20 hour, after the train passing through the railway station Pietrisu, the driver's assistant observed the appearance of a fire outside the driving cab, between those two bogies to the end of the gas tank, on the left side, in the running direction. Removing a panel from the driving cab floor, those two drivers observed a fire that increased quickly inside the cab.

The thermic influence of the fire from the bateries niche, left side of the locomotive.



The fire effects on the equipment for the control, indication and protection of the driving cab.







The driver took measures to stop the locomotive at the km 23+500 and tried to bring under control the fire.

Because of the impossibility to bring under control and to extinguish the fire, at 18:29 hour, the driver call 112, the Inspectorate for Emergency Situations, and at 18:35 hour he notified the Railway Energy Controller Point Iași in order to cut the energy supply in the contact wire.

At 18:54 hour one cut the energy supply in the contact wires afferent to both running lines, between Targu Frumos – Ruginoasa – Pascani and stopped the running on the lines I and II Ruginoasa – Targu Frumos in order to allow the firemen intervention.

At 19:05 the tower wagon, belonging to SC ELECTRIFICARE CFR SA, left Targu Frumos, on the line II Targu Frumos – Ruginoasa.

Starting with 19:30 hour, the military firemen, belonging to Fire Point Targu Frumos started to extinguish the fire up to 20:10 hour.

The locomotive condition at the accident place, after the fire extinction.



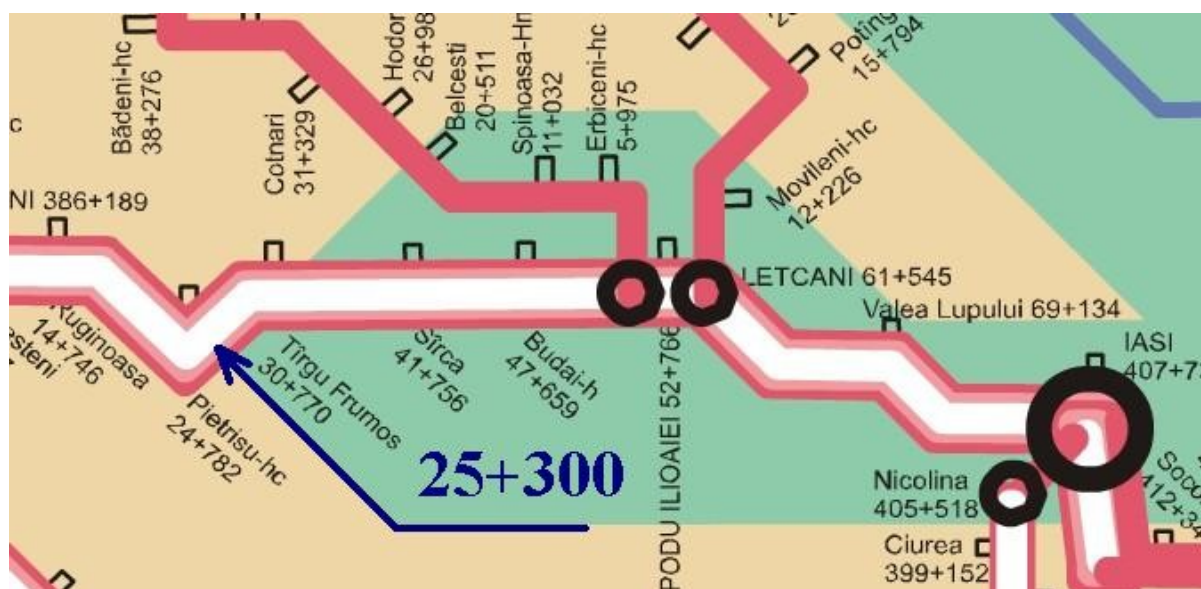
At 20:11 hour one started the energy supply for the lines I and II Targu Frumos – Ruginoasa – Pascani and the running line I Targu Frumos- Ruginoasa was open.

At 20:30 hour the tower wagon was dispatched on the line 5 of the railway station Targu Frumos.

At 20:35 hour the locomotive EA 546, that left Iasi at 19:33 hour, as assisting one, train 17959 was routed on the closed line Ruginoasa – Targu Frumos, were hauled the locomotive DHC 235 and dispatched then in the railway station Targu Frumos, on the line 5, at 21:31 hour, and at 21:35 hour one open the railway traffic also the running line Ruginoasa – Targu Frumos.

The accident place is situated at the km 25+300, on the line II Ruginoasa – Targu Frumos, in mixed cross section, curved line with the radius  $R = 625$  m, left deviation and gradient 21‰, in the running direction.

The running line II Targu Frumos – Ruginoasa is electrified, and the trains running is managed by the automatic line block.



Geographical position of the accident

No injured persons.

## B.2 Accident circumstances

### B.2.1. Involved parties

2.1.1. The involved staff belongs to SNTFC „CFR Calatori” SA, Railway Passenger County Iasi, Engine Shed Iasi.

2.1.2. The locomotive DHC 235 belongs to SNTFC „CFR Calatori” SA and is maintained by the staff of the Section for Locomotives Repair Iasi, belonging to SC „CFR – SCRL Brasov” SA.

2.1.3. The railway infrastructure where happened the accident belongs to CNCF „CFR” SA and is maintained by the staff of the Track Section L3 Roman.

2.1.4. The interlocking system between the railway stations Ruginoasa and Targu Frumos are administrated by CNCF „CFR” SA – Branch of the Railway County Iasi and is maintained by the staff from the Section CT 1 Iași.

2.1.5. The railway communications equipment from the railway stations Ruginoasa and Targu Frumos is administrated by CNCF „CFR” SA and maintained by the staff from SC TELECOMUNICATII CFR SA.

2.1.6. The force and traction equipment (IFTE) is administrated by CNCF „CFR” SA and maintained by the staff of SC ELECTRIFICARE CFR SA.

2.1.7. The railway communications equipment from the involved locomotive belongs to SNTFC „CFR Calatori” SA and maintained by the staff from the Section for Locomotive Repair Iasi, belonging to SC „CFR – SCRL Brasov” SA.

The investigation commission questioned the employees in charge with the driving of the involved and took statements from the movements inspector on duty in the railway stations Ruginoasa and Targu Frumos.

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

The train no. 17958, consisted only in the locomotive DHC 235, the driving being ensured by a complete crew, driver and driver’s assistant.

The locomotive belongs to railway undertaking SNTFC „CFR Calatori” SA.

The safety and vigilance equipment (DSV), the equipment for the punctual control installation of the speed (INDUSI) from the locomotive endowment were affected by the fire.

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

The involved railway infrastructure, that is the lines I and II between the railway stations Ruginoasa and Targu Frumos, is administrated by CNCF „CFR” SA – Branch of the Railway County Iasi and it is maintained by the staff of the Track Section L3 Roman.

The line II is curved, consisting in rail type 65, reinforced concrete sleepers T17.

The running lines I-II are electrified.

### **B.2.4. Communication equipments**

The communication between the driver and movements inspectors was ensured by radio.

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

### **B.3.1. Losses and casualties**

None.

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

- at the locomotive, according to the costs estimate no. 14/2010 of SNTFC „CFR Calatori” SA, Railway Passengers County Iasi – 80915,20 lei;
- train delays, according to the costs estimate no. 623/1/261/2010 of SNTFC „CFR Calatori” SA, Railway Passengers County Iasi – 1326,42 lei;
- at the lines – none;
- at the equipments – none;
- at environment – none;
- the costs with the intervention means, according to the costs estimate no. 2/2/6/1.2/783/07.06.2010 of SC ELECTRIFICARE CFR SA, Electrification Center Iasi – 1964,34 lei;
- **TOTAL – 84205,90 lei.**

### **B.3.3. Consequences of the incident in the railway traffic**

The running line between Ruginoasa and Targu Frumos was closed on the line I between 18:54 and 20:11 for the intervention of the staff from the Inspectorate for Emergency Situations, and on the line II, between 18:54 and 21:35 (occupied by the locomotive DHC 235).

#### **Delayed trains**

Following the accident, there were 9 delayed trains with a total of 1063 minutes delay.

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

On the 6th of June 2010, at the moment of the accident occurrence, the running lines I and II, between the railway stations Ruginoasa and Targu Frumos were open.

On the 6th of June 2010, at the moment of the accident occurrence, the visibility was good, cloudless sky, without wind and air temperature was about 28<sup>0</sup>C.

The accident occurred at the km 25+300, in curve with R=625 m, line with rail type 65, sleepers BA type T17, non-welded track, with gradient 21‰, double electrified line.

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

### **B.5. Investigation**

#### **B.5.1 Brief presentation of the involved staff testimonies**

##### **B 5.1.1. Brief presentation of the testimonies of the railway undertaking and infrastructure manager staff**

**The driver** of the locomotive DHC 235, on the 6th of June 2010 stated as follows:

- normal running between Pascani and Ruginoasa;
- after passing through Pietrisu railway station, the driver's assistant observed outside a flame between the bogies from the end of the gas tank;
- he took soon measures to stop the locomotive;
- at the moment of the fire appearance observing, the locomotive speed was 40 km/h;
- he did not feel smoke before the driver's assistant see the flame;



- he used, together with the driver's assistant 6 extinguishers, trying to extinguish the fire;
- he could not extinguish the fire, at 18:29 hour he called 112 and asked for the intervention of the military firemen, mentioning the place and locomotive type;
- he informed, by phone, Iasi Controller Point about the situation and asked for the cutting of the power supply of the contact wire.

**The driver's assistant** of the train no. 17958, on the 6th of June 2010, stated as follows:

- he drove the locomotive between Pascani and Iasi in order to dispatched it in the home depot Iasi;
- during the inspection at the taking of the locomotive in the railway station Pascani, he did not find out failures;
- after passing through the railway station Pietrisu he observed outside, on the left side of the locomotive, a flame between the bogies from the end of the gas tank;
- he used the extinguishers in order to extinguish the fire;
- he did not find any smoke before to observe the flame outside the locomotive.

**The movements inspector** on duty in the railway station Ruginoasa, on the 6th of June 2010, stated as follows:

- the train 17958 had passing route through the railway station Ruginoasa, on the direct line 4;
- he left the office for the visual inspection of the train and did not observe anything special;
- he went to the movements office and informed the driver by radio equipment that the signalling is in accordance with the instruction and the running line II is open.

**The movements inspector** on duty in the railway station Targu Frumos, on the 6th of June 2010 stated as follows:

- he received the departure notice for the train 17958, at 18:09 hour;
- he tried to contact the driver by the radio equipment but without no answer;
- at 18:40 hour he was informed by traffic controller about a fire at the locomotive DHC 235.

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

In order to fulfill its tasks and responsibilities CNCF „CFR” SA and the railway undertaking SNTFC „CFR Calatori” SA established and implemented their own safety management system, ensuring the control of risks related to the carried out activity.

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

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

- the minutes concluded in the commission at the accident place on the situation of the rolling stock, lines and equipments;
- photos took soon after the accident by the members of the investigation commission;
- the statements of the driving crew and of the movements inspectors on duty in the railway stations Ruginoasa and Targu Frumos;
- the minutes concluded by the members of the investigation commission after the accident;
- the documents on the maintenance and repair of the locomotive, presented by the responsables with its maintenance;
- inspection and interpretation of the technical condition of the elements involved in the accident;
- questionnaires of the involved staff in charge with the rolling stock operation;
- documents on the putting into service of the train.

## **B.5.4. Operation of the rolling stock**

### **B.5.4.1. Data about the locomotive DHC 235**

**B.5.4.1.1. Data resulted from the inspections performed on the 7th of June 2010 by the investigation commission and the repairing staff from Iași Depot and written in a minute (piece of the investigation file) and photos (performed by the investigation commission)**

Following the inspections performed by the inquiry commission at the locomotive, there were found out the next:

Condition of the running gears and of the brake blocks:

There is no trace of thermic influence of the brake blocks and tyres that could lead to the fire.



Condition of the fuel tanks:

- the auxiliary tank as well as the afferent pipes were intact, without traces of recent intervention and thermic influence;
- the main tank was distorted by the over-pressure generated by the heating of the gas and the right compartment (driving cab A) has 2 holes below because of the metal breaking from the outside wall, in the area of the welding points of the counter-waves;



- above the same compartment from the main gas tank there are two fastening pins broken following the distortion of the upper part;
- the distortion of the main tank compartments did not affected the structure clearance.



#### Condition of the main parts:

- one disassembled and checked the compressor, dynastarter and the transfer pump and did not find any cause that could lead to the fire (photo);
- dynastarter has small traces of thermic affecting;
- in the area of the cooler of the right diesel engine, the paint is thermic affected because of the burning of the packings from the support frame.



#### Condition of the batteries

- the right batteries niche (boxes 1-4) afferent to the driving cab A were intact, not being affected by the fire;





- the left batteries niche (boxes 5-8) afferent to the driving cab B has visible traces of thermic affecting and the batteries boxes 5,6,7 and 8 are burn on the top having the lead connections type H between the elements melted, and the covers and the water proofing materials from the top are complete burn , as well as the insulation of the serial connections flexible between the boxes.



Condition of the batteries no. 5 after the fire



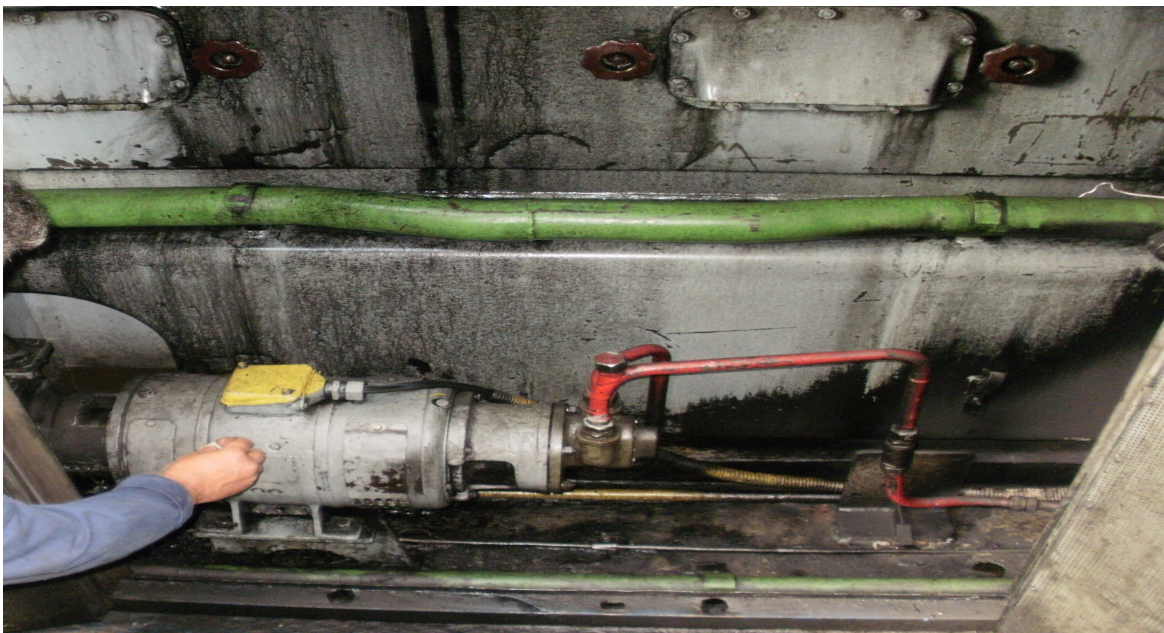


- the serial connection between AB boxes 4 and 5 that ensures the connection between the right and left niche, has the insulation burn on 40 mm length, that is from the entrance and inside the passing pipe under the cab floor;
- on the serial connection between the batteries no. 4 and 4 one find out trace of short-circuit at 750 mm from the connection lug with the battery terminal connection no. 5;



The condition of diesel engine, hydraulic transmission, reduction gear –reversing gear, axles passing, running gears, brake rigging, steam set type GAT 08S1, small cover and the other mechanical equipments:

- one did not found any degradation, distorsions or thermic affecting, generated by the fire, that influence their operation;
- traces of water and oil losses on the cover and crankcase.



#### **B.5.4.1.2. Data resulted from the analysis of the documents requested from the railway undertaking**

- the last repair type total repair was performed on the 8<sup>th</sup> of February 2006 by SC Remarul 16 Februarie SA Cluj Napoca, according to the minute no. 112/313/2006;
- the locomotive DHC 235 is falling due for general repair from February 2009;
- the batteries set was manufactured by ROMBAT, having the no. 475 and fitted on the locomotive during the repair type general repair performed on the 8<sup>th</sup> of February 2006;
- the last inspection type “R2”+ CUS was performed on the 3/5 of May 2010 in the Section for Locomotive Repair Iasi, belonging SC CFR SCRL Brasov, according to the warranty certificate no. 5840;
- the last inspection type PTH3 was performed by SC CFR SCRL Brasov, on the 4<sup>th</sup> of June 2010, according to the warranty certificate no. 620;
- the locomotive DHC 235, on the 7<sup>th</sup> of June 2010 was falling due concerning the inspection type RT, it being the reason of its running to Iasi depot.

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

#### **B.6.1. Analysis of the accident occurrence**

The fire started on the left side of the driving cab, inside the niche of the batteries afferent to the boxes 5-8, appearing a short-circuit between the cable that is the connection between the right and left niches and a serial element of the elements of the battery no. 6.

Firstly, the fire was maintained by the streams of air appeared during the locomotive running, through the existing ventilation holes at the niche box.

The short-circuit generated the fire of the cable insulation, then of the covers and waterproofing material from the elements of the batteries 5,6,7 and 8.

Further increase of the fire was possible because of the successive fire of the cables under the cab floor, the fire being maintained by the ignition of the fuel deposits from upper of the left batteries niche.

The fire increase was generated mainly by the ignition of the fuel elements (cables insulation, floor, upholstery, etc.) from the driving cab inside and its outside at the driving point B.

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

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

Appearance of a fire inside the niche of the left batteries (boxes 5-8) generated by a short-circuit between the connection between the niches and a serial equipment from the battery box no. 6, that led to the fire of the cables insulation and the covers of the elements of the batteries no. 5-8, followed by the fire of the cables insulation and the fuel deposits appeared in time from the locomotive operation, above the niche of the batteries no. 5-8.

## **Contributing factors**

Non-performance on due time of the works specific to the repair type to which the locomotive was falling due (falling due at the repair type general repair from February 2009), it leading to an unsuitable thermo-technical situation, to the lost of the petroleum products through the constructive tightness points of the diesel engine and their deposit in very hard to reach places.

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

No-performance of some maintenace works of the locomotive, with the limit for the introduction into repair exceeded, for the additional checking of the insulation capacity of the cables and protection of the cables afferent to the bateries, as well as for the cleaning of the petroleum product deposits (fuels, lubricants) from the constructive areas of the locomotive where they can be accumulated.

### **B.7.3. Root causes**

None.

### C. Safety recommendations

The recommendations aim to settle the next issues:

1. Supplement of the insulation capacity of the connections of the batteries, including between those two niches.
2. Periodical technical inspection of the insulation capacity of the connection cables of the batteries, after the performance of the operations stipulated in the technological processes for the maintenance in operation of the batteries.
3. Periodical removal of the fuel deposits from the places susceptible to the accidental fires from the locomotive, operations to be included in the technological processes of the periodical inspections.

This report will be sent to Romanian Railway Safety Authority, to SNTFC „CFR Calatori” SA and to CNCF „CFR” SA.

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

Members of the investigation commission:

Marin DRAGHICI - investigator in charge

Dumitru SFARLOS – member

Eugen ILIE - member

Mihai GHENGHEA - member