



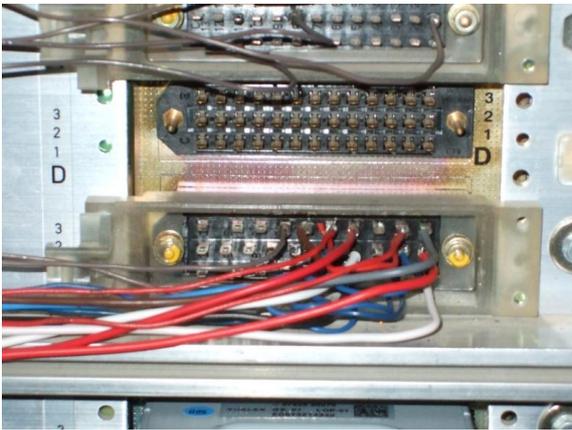
Romanian Railway Authority

- AFER -

Romanian Railway Investigating Body

- OIFR -

Annual report



Preface to the Report

This report presents the activity carried out by Romanian Railway Investigating Body during the year 2009.

Romanian Railway Investigating Body was set up and carry out its activities according to the Law no. 55/2006 concerning the railway safety (that transposed the Directive 2004/49/EC of European Parliament) and to the Government Decision no. 1561 from the 1st of November 2006 for the amendment of the Government Decision no. 626/1998 concerning the Romanian Railway Authority organizing and functioning, being a permanent and independent body in Romanian Railway Authority - AFER.

Romanian Railway Investigating Body was set up for the investigation of the serious railway accidents, aiming to improve the railway safety.

Romanian Railway Investigating Body has to investigate the serious railway accidents and can investigate, besides the serious accidents, those accidents and incidents that in conditions little different could lead to serious railway accidents, including the technical failures of the structural subsystems or of the interoperability constituents of European high-speed or conventional railway system, taking into account in its decision the next:

- the seriousness of the accident or incident;
- if it is part of a series of accidents or incidents relevant for the whole system;
- its impact on the community railway safety;
- applications of the infrastructure administrators, railway undertakings, Romanian Railway Safety Authority or of other EU member states.

Taking into account the need to regulate how the investigation of Romanian railway accidents and incidents is performed, respectively for the development and improvement of the railway safety and the regulation of the railway accidents investigation monitoring in accordance with the provisions of the Law 55/2006 concerning the railway safety, it was necessary to draw up a Regulations for the investigation of the railway accidents and incidents, for the development and improvement of Romanian railway safety.

The regulations for the investigation of the railway accidents and incidents, for the development and improvement of Romanian railway safety cover all the economic operators that carry out railway transports on Romanian network, respectively the public railway infrastructure administrator, non-interoperable railway infrastructure managers, licensed and private railway undertaking, economic operators that own industrial branches or railway vehicles, as well as economic operators that carry out activities connected and adjoining to the railway transport.

In this situation and in accordance with the provisions of the Law no. 55/2006 concerning the railway safety, on the 2nd of March 2010 was adopted the Government Decision no. 117 for the approval of the Regulations for the investigation of the railway accidents and incidents, the development and

improvement of Romanian railway safety and were cancelled the Minister of Transports Order no. 210 from the 14th of March 2000 concerning the approval of the Instructions for the prevention and investigation of the railway accidents and events – 003 and the Minister of Transports, Public Works and Housing no. 1852 from the 11th of January 2002 for the approval of the Instructions for the prevention and investigation of the subway railway events and accidents – 003 M.

CONTENTS

| | |
|------------------------------------------------------------------------------------------|-----------|
| Preface to the Report | 2 |
| 1. PRESENTATION OF ROMANIAN RAILWAY INVESTIGATING BODY | 4 |
| 1.1. National legislation and level of the Safety Directive implementation | 4 |
| 1.2. Role and purpose | 4 |
| 1.3. Organization | 5 |
| 1.4. Organizational flow | 6 |
| 2. INVESTIGATION PROCESS | 6 |
| 2.1. Investigation process | 7 |
| 2.2. Institution involved (currently or exceptionaly) | 7 |
| 2.3. Investigation process | 8 |
| 3. INVESTIGATION | 9 |
| 3.1. General overview on the ended investigations, identification of the main tendencies | 9 |
| 3.2. Investigation ended and started in 2009 | 9 |
| 3.3. Research studies (or safety studies) ordered and completed in 2009 | 11 |
| 3.4. Summary of investigation completed in 2009 | 11 |
| 3.5. Accidents and incidents that were investigated during the last 5 years | 17 |
| 4. RECOMMENDATION | 18 |
| 4.1. Short review of recommendations | 18 |

1. PRESENTATION OF ROMANIAN RAILWAY INVESTIGATING BODY

Romanian Railway Investigating Body was set up, organized and carries out its activities according to the provisions of the Law no. 55/16.03.2006 concerning the railway safety (that transposed the Directive 2004/49/EC of European Parliament and Council) and of the Government Decision no. 1561 from the 1st of November 2006 for the amendment of the Government Decision no. 626/1998 concerning Romanian Railway Authority organizing and functioning, being a permanent and independent body in Romanian Railway Authority - AFER.

Romanian Railway Investigating Body was set up for the investigation of the serious railway accidents, aiming to improve the railway safety and to prevent the accidents.

Romanian Railway Investigating Body has to investigate the serious railway accidents and can investigate, besides the serious accidents, those accidents and incidents that in conditions little different could lead to serious railway accidents, including the technical failures of the structural subsystems or of the interoperability constituents of European high-speed or conventional railway system.

1.1 National legislation and the level of the Safety Directive implementation

The Directive 2004/49/EC of European Parliament and Council was transposed in Romania by the Law 55/16.03.2006 concerning the railway safety that came into force on the 13th of April 2006.

Romanian Railway Investigating Body is independent in the organization, the legal structure and decisions making, from any infrastructure administrator, railway undertaking, tariff body, allocation body and notified body, as well as from any part whose interest can conflict with its tasks.

Romanian Railway Investigating Body is independent from functional point of view from Romanian Railway Safety Authority and from any railway regulation authority.

Romanian Railway Investigating Body can carry out also other tasks established by government decision on the investigation of other events than the railway accidents and incidents, if these investigations do not affect its independence.

Romanian Railway Investigating Body carry out its tasks independently of any infrastructure administrator, railway undertaking, tariff body, allocation body and notified body, and has the necessary resources for it, the investigators are complete independent in the carrying out of their tasks.

1.2. Role and purpose

Romanian Railway Investigating Body started its activity on the 1st of March 2007.

The purpose of Romanian Railway Investigating Body investigations of the railway accidents and incidents is to improve the railway safety and to prevent the occurrence of similar accidents or incidents.

Through the investigations, Romanian Railway Investigating Body establishes the causes and circumstances of the railway accidents and incidents.

According to the provisions of the Law no. 55/2007, a serious accident is any train collision or derailment, that leads to the death of one person at least, serious injuring of 5 or more persons, important damages of the rolling stock, infrastructure or environment and any other similar accident with a clear impact on the railway safety regulation or on the safety management.

Romanian Railway Investigating Body does not investigate those accidents that are not part of its purpose, respectively to improve the railway safety and to prevent some similar accidents. The Law no. 55/2006 stipulates that in the decision making concerning the investigation start, Romanian Railway Investigating Body has to take into account:

- seriousness of the accident or incident;
- if it is part of a series of accidents or incidents relevant for the whole system;
- its impact on the community railway safety;
- applications of the infrastructure administrators, railway undertakings,

Romanian Railway Safety Authority or of other EU member states.

Romanian Railway Investigating Body does not investigate:

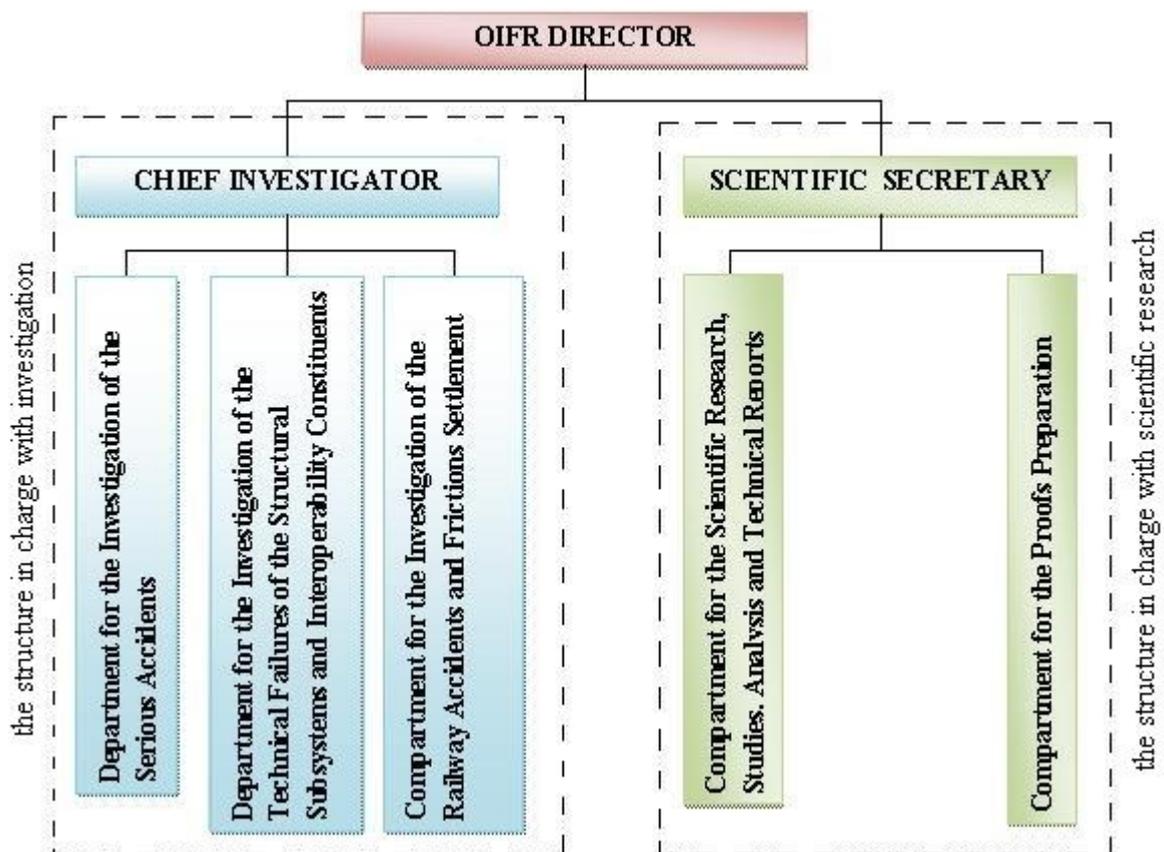
- railway accident/incident that are not relevant for the railway system;
- suicides.

1.3 Organization

In May 2009 the Directing Committee of Romanian Railway Investigating Body and AFER Board of Managers approved a new organizational chart of Romanian Railway Investigating Body, this being approved by Order of Minister of Transports and Infrastructure no. 562/27.04.2009.

In 2009 in the structure of Romanian Railway Investigating Body were 19 investigators and 2 psychologists.

Organizational chart of Romanian Railway Investigating Body in 2009 was:



The tasks of those two departments subordinated to the chief investigator result from the provisions of the art. 19(1) and art. 19(2) of the Law 55/2006 concerning the railway safety, respectively the

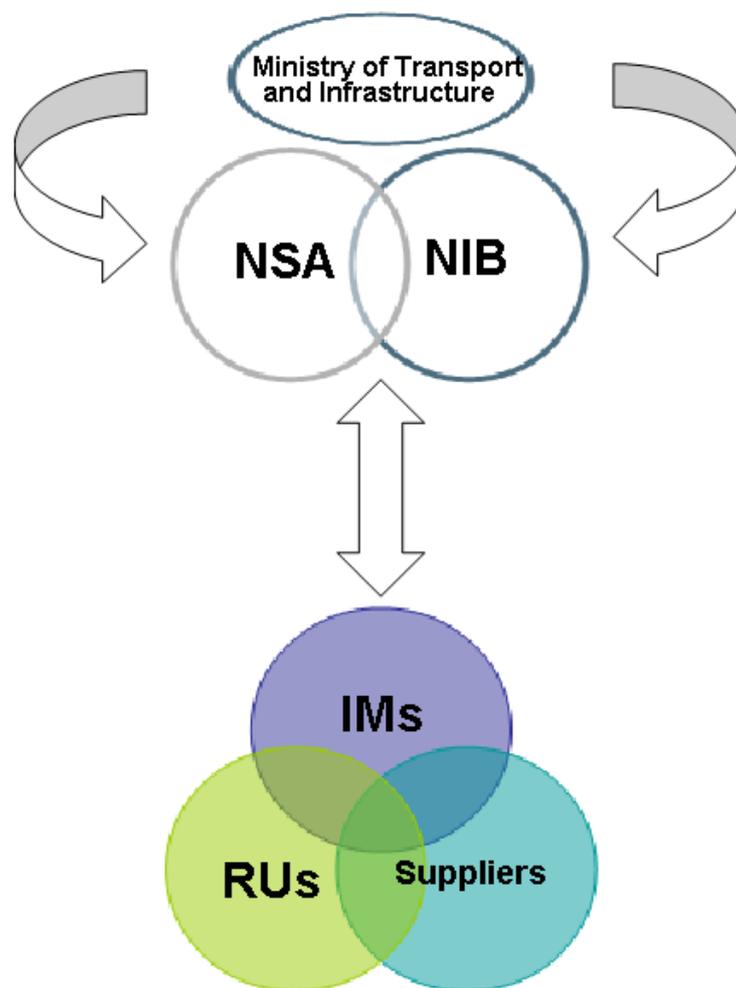
investigation of the railway serious accidents and the investigation of those accidents and incidents that in conditions little different could lead to serious railway accidents, including the technical failures of the structural subsystems or of the interoperability constituents of European high-speed or conventional railway system.

In the investigations it's possible the appearance of situations that need a quick presence of the investigators in distant places, in order to supply the first information as soon as possible and to take the necessary measures for the identification, keeping and taking of the proofs.

So, in order to achieve the above mentioned tasks, besides the central structure Romanian Railway Investigating Body set up a compartment, subordinated to the chief investigator, with 6 investigators in charge with the territorial structure.

Taking into account that for the investigation of the railway accidents and incidents there are necessary studies, researches, analysis and technical reports, one set up a compartment, like an interface with other technical bodies, that can ensure technical support concerning the scientific research, performance of studies, analysis or reports necessary to find the causes that generated the railway accidents or incidents.

1.4 Organisational flow



2. INVESTIGATION PROCESS

The investigation aims to prevent the accidents and incidents and includes gathering and analyzing of the information, establishment of the conditions, including the definition of the causes and, if case, the issuing of some safety recommendations.

The investigation is from the legal point of view an administrative action, allowing the main investigators to meet with their tasks as efficiently as possible and as soon as possible. The

investigation is independent of any legal investigation. The investigation does not aim to establish the guilty or the responsibility.

The result of an accident or incident investigation is part of the investigation report drawn up in accordance with the seriousness of the accident or incident.

The report presents the investigations objectives and includes, if case, safety recommendations.

Before to draw up the investigation report (final investigation report), onw draws up a report draft, that according to the provisions of the art 22(3) of the Law 55/2006 is submitted to the infrastructure administrator, involved railway undertaking, Romanian Railway Safety Authority, victims and their relatives, owners of the damaged goods, manufacturers, involved emergency services and the representatives of the staff and the users in to order to inform them about the investigation and its course and to give them the possibility to present their opinions on the investigation and to make comments on the information of the report draft.

If Romanian Railway Investigating Body considers that the opinions and comments are relevant for the investigation, the investigation report is change accordingly.

After its ending, the investigation report is submitted to Romanian Railway Investigating Body for the approval and publishing on OIFR site.

2.1 Investigated cases

In 2009 there were 571 railway accidents/incidents, as follows:

| | |
|------------------------------------------------------------------------|------------------------|
| - accidente | 431 from which: |
| • collisions | 2 |
| • derailments | 12 |
| • level crossing hits | 145 |
| • hits of persons by the running rolling stock | 235 |
| • Rolling stock fires | 28 |
| • Others (persons that come in the influence area of the contact wire) | 9 |
| - incidents | 140 |

In 2009 there were:

- 81 hits of the rolling stock with obstacles inside the structure clearance: trees, rocks, stones fallen from the slopes, hits of cars, others than the hits at the level crossing and hits of un-surveilled animals;
- 25 suicides.

These are not in the total number of 431 accidents.

Taking into account the seriousness of the railway accidents/incidents and their impact on the railway safety, according to the provisions of the art. 19(2) of the Law no. 55/2006 concerning the railway safety, in 2009 Romanian Railway Investigating Body considered necessary to start 6 accidents/incidents investigations, as follows:

| | |
|---------------------|----------------------|
| - railway accidents | 4 from which: |
| • collisions | 2 |
| • derailments | 2 |
| - railway incidents | 2 |

In 2009 Romanian Railway Investigating Body ended 5 railway accidents/incidents investigations, as follows:

| | |
|----------------------------|----------------------|
| - railway accidents | 3 from which: |
| • accidents | 2 |
| • serious accidents | 1 |
| - serious accidents | 2 |

From those 5 investigations ended in 2009, 4 are investigations started in previous year.

The publishing deadline of the investigations did not exceed 12 months, stipulated in the Law no. 55/2006.

2.2 Institutions involved in the investigation (currently or exceptionally)

In the investigations Romanian Railway Investigating Body cooperated with the authorities in charge with the legal investigation, as well as with other authorities responsible with the interventions at the accident/incident place.

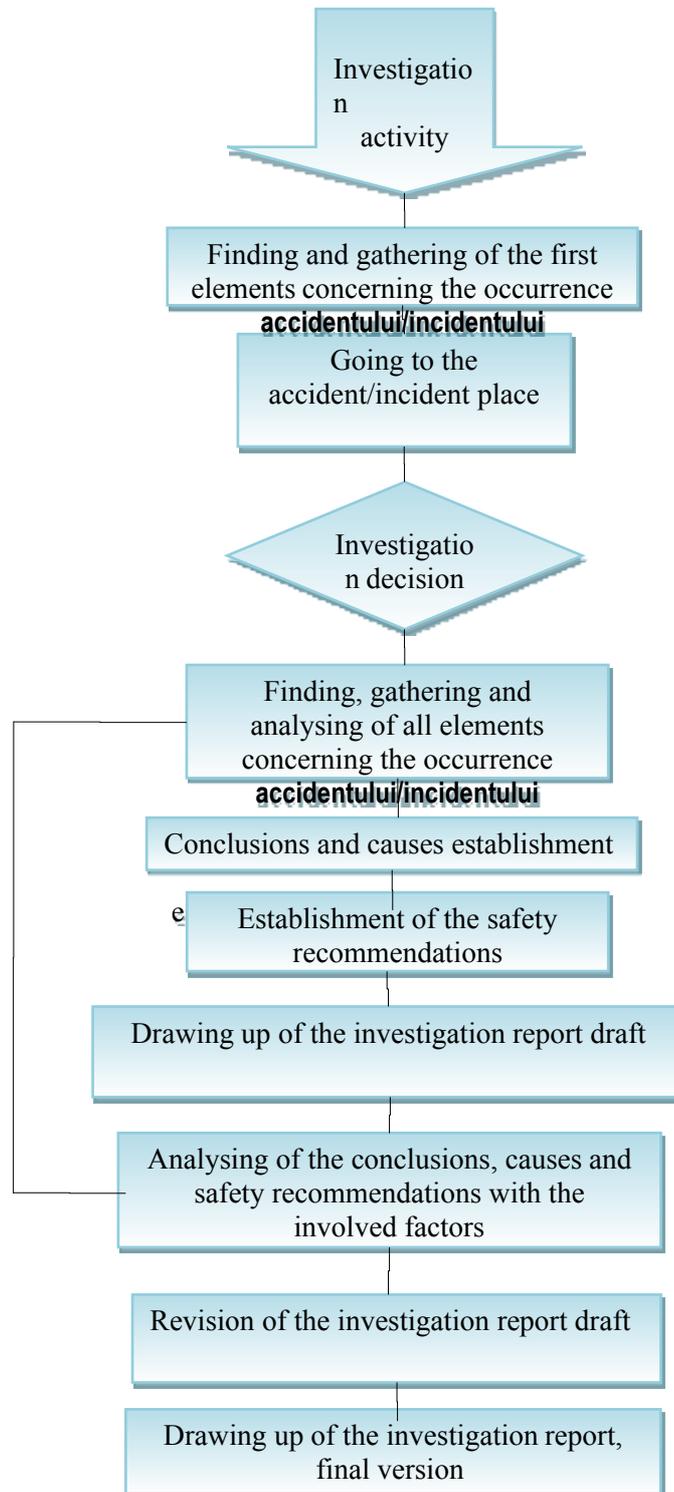
According to the provisions of the art. 20 , paragraph 4 of the Law no. 55/2006 concerning the railway safety, in the investigations, Romanian Railway Investigating Body can use, if necessary, specialist from connected fields.

In 2009, the provisions of this article were applied to an investigation started following the breakage of axle journal from a wagon of a freight train. In this situation there was necessary to make an metallographic expertise in order to establish the causes that led to this brakage.

Romanian Railway Investigating Body asked Laboratories Department from Romanian Railway Notified Body to perform metallographic analysis, but after their interpration resulted a series of parameters and conclusions that did not permit to identify the causes of the axle journal breakage.

In conditions, according to the provisions of the art. 20, paragraph 4 of the Law 55/2006 concerning the railway safety, Romanian Railway Investigating Body asked the extension of the expertises, asking for suport the University „Politechnics” Bucuresti – The center for the Researches and Expertises ECO Methallurgy Ecomet. The conclusions from the Technical Report, drawn up following the metallographic expertise by this institution are basis for the issuing of the safety recommendations.

2.3 Investigation process



3 INVESTIGATIONS

3.1 General overview of the ended investigations, identification of the main tendencies.

In 2009 Romanian Railway Investigating Body ended and published 5 investigation reports and started 6 investigation, from which one is in those 5 ended investigations.

In the bellow tabel are presented the investigations and the legal basis for their carrying out, these taking into account the requirements of European Directive concerning the railway safety and the national legislation.

3.2. Investigations ended and started in 2009

Investigations ended in 2009

| Date of occurrence | No. of the investigation decision | Ending date | Presentation | Definition | Art. Of the Law no. 55/2006 |
|---------------------------------------|-----------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------|
| The 13 th of March 2008 | 6 | The 18 th of May 2009 | In the railway station Zavideni, in the Branch of the Railway County Craiova an axle journal of a wagon of the freight train no. 41651 broke | incident | 19(2) |
| The 10 th of May 2008 | 7 | The 8 th of May 2009 | In the railway station Valea Calugareasca, in the Branch of the Railway County Bucuresti, the locomotive and the first coaches of the passenger train no. 1661 derailed, it leading to the death of a passenger and light injuring of other 3 passengers and of the train conductor | Serious accident | 19(1) |
| The 26 th of May 2008 | 8 | The 12 th of January 2009 | In the railway station Mogoseni, in the Branch of the Railway County Cluj, the locomotive EA 826, hauling the passenger train no. 4483 | accident | 19(2) |
| The 16 th of December 2008 | 9 | The 15 th of Decem ber 2009 | In the railway station Basarabi, in the Branch of the Railway County Constanta, the equipment ordered a wrong route for the passenger train no. 8205, following the wrong answer of the interlocking system type CR2, equipment adapted for the switch motors type L 700H | incident | 19(2) |
| The 14 th of March 2009 | 10 | The 22 nd of October 2009 | In the railway statyon Comarnic, in the Branch of the Railway County Bucuresti, the first axle of the locomotive EA 906, that hauled the passenger train no. 3028, in the running direction, derailed | accident | 19(2) |

Investigations started in 2009 and ended in 2010

| Date of occurrence | No. of the investigation decision | Ending date | Presentation | Definition | Art. Of the Law no. 55/2006 |
|----------------------------------------|-----------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------------|
| The 8 th of September 2009 | 11 | The 25 th of May 2010 | In the railway station Ilva Mica, in the Branch of the Railway County Cluj, the axle no. 4 of the electric locomotive EA 040-139-2, hauling the passenger train no. 18703. | incident | 19(2) |
| The 21 st of September 2009 | 12 | The 24 th of February 2010 | On the running line between the railway stations Maracine and Malu Mare, in the Branch of the Railway County Craiova, the locomotive and the first seven coaches of the passenger train no. 169261 derailed | accident | 19(2) |
| The 17 th of October 2009 | 13 | The 3 rd of February 2010 | In the Branch of the Railway County Constanta, the running line II between the railway stations Lehliu and Sarulesti, at the km 66+100, there was caught up and hit the freight train no. 93402 by the freight train 93400 | accident | 19(2) |
| The 2 nd of November 2009 | 14 | The 1 st of February 2010 | In the Branch of the Railway County Cluj, between the railway stations Dealu Ștefăniței – Fiad, at km 28+715, occurred the collision between the light locomotive LDE 60-0720-7 running as passenger train no. 17444 and the passenger train no. 1923 locomotive that was stopped | accident | 19(2) |
| The 5 th of December 2009 | 15 | 15.03.2010 | In the Branch of the Railway County CF București, in the railway station CFR Pantelimon, for the passenger train no.8013 wrong route was performed at line 4, line occupied by the passenger train no.18207 | Incident | 19(2) |

3.3. Research studies (or safety studies) ordered and completed in 2009

Studies ordered in 2009

| Commission | Study name | Basis for | Additional data |
|------------|------------|-----------|-----------------|
|------------|------------|-----------|-----------------|

| date | (type, location) | legislation | |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| The 14 th of April 2009 | Investigations on the running surface and on the breakage surface area of the broken axle from wheel no.5 of wagon no. 315354943062, situated in the freight train composition no.41651, owned by the railway transport operator SNTFM "CFR Marfă" SA. The study was requested to the research center and eco-metallurgical expertise – ECOMET within Politehnica University of Bucharest. | Law no.55/2006, article 20(4) | The study was requested within the railway incident investigation occurred on 13.03.2008 in the railway station Zăvideni |

3.4 Summary of investigation completed in 2009

During 2009 there were completed a number of 4 investigations opened in 2008 and one investigation opened in 2009.

Below is a syntetical situation of the five investigation reports completed during 2009.

E.1.1. *The rarailway incident occurred on 13.03.2008, on the Branch of the Railway County CF Craiova, in the railway station Zăvideni by breaking the axle neck of wheel no.5 from the wagon no. 31535494306-2 (the 6th from the locomotive) situated in the freight train composition no. 41651 owned by SNTFM "CFR Marfă" SA. The investigation report was completed on 12.05.2009.*

Cauzele accidentului feroviar au fost stabilite după cum urmează

Direct cause

- The direct cause of the railway event occurrence is the breaking of the wheel set no. 3836632 from the wagon no. 31535494306-2 in the area of the stress relief clearing between the axle journal and shutter as result of the decrease of the material fatigue strength against the development of micro cracks in the areas with high density of the networks with manganese sulphide.

Underlying causes

- Exceeding the allowed limit for the sulphur concentration (determined values of 0,05 – 0,06% in comparison of the maximum allowed limit 0,04%) which determined the appearance of a discontinuous networks of manganese sulphide inclusions with negative influence on the breaking properties to fatigue of the material.
- Exceeding the allowed limit for the sulphur concentration (determined values of 0,05 – 0,06% in comparison of the maximum allowed limit 0,04%) which determined the appearance of a discontinuous networks of manganese sulphide inclusions with negative influence on the breaking properties to fatigue of the material.

Root causes

The non-compliance with the minimum imposed conditions on the chemical characteristics of the axles axis established in the reference documents in force at the date of manufacturing (STAS 1947/1990 - Wagons with standard gauge. Axles. General technical conditions of quality and the UIC leaflet 811-1/1987 – Chemical composition, mechanical tests, Axles axis).

Safety recommendations were:

- Withdrawal from circulation of all axles from the charge no.311561 produced by SC SMR SA Bals, from which the axle no.3836632 was a part, for the non-compliance of the conditions established by the UIC leaflet 811-1/87 -

Chemical composition, mechanical tests, Axles axis and the rejection of the respective charge. SNTFM „CFR Marfa” SA, other railway undertakings and also owners of wagons equipped with axles from the charge no.311561 will perform investigating actions and will comply with the present recommendation.

- The performance of a control action by the railway undertakings that have technical departments of reception to the railway suppliers that are offering the working material in order to manufacture metallic elements used to parts and subassemblies from the mechanisms of the railway vehicles that are ensuring the railway safety (the running gear - wheels, axles, bearings and others, the draw and coupling gear - hooks, bars and others, respectively the buffing gear - buffers, springs) by which to identify the cases of non-observance of the own procedures of drawing the material. The conclusions of this control action and also the established measures will be included into a report that will be submitted to the Romanian Railway Authority – AFER the latest August, 2009.
- On the occasion of the state inspections scheduled by the Romanian Railway Safety Authority it will be supervised the method of implementation of the quality system assurance to the railway suppliers that are offering the working material in order to manufacture metallic elements used to parts and subassemblies from the mechanisms of the railway vehicles that are ensuring the railway safety (the running gear - wheels, axles, bearings and others, the draw and coupling gear - hooks, bars and others, respectively the buffing gear - buffers, springs).
- The Romanian Railway Notified Body will assess the technical conditions that stood at the basis of granting the technical homologation certificate for the wheel set type AI manufactured by SC SMR Bals SA.

E.1.2. *The serious railway accident occurred on 10.05.2009, on the Branch of the Railway County CF București, in the railway station Valea Călugărească, the locomotive and the first four wagons of the passenger train no. 1661 had derailed, owned by SNTFC “CFR Călători” SA, from the accident resulted the decease of a passenger and the slight injury of the train master and of other three passengers. The investigation report was completed on 18.05.2009.*

Causes were:

The direct cause of the railway event was the penetration of the wheel’s tyre lip from the right side of the first axle in the direction of the traffic of the locomotive (axle no.6), between the straight points and the curved stock rail of the switch no.9. This took place as result of allowing operating the route in the conditions of half opening the point switch.

Facts that contributed

The permit of performing the route took place as result of obtaining the control of the switch by a point motor, the control not being obtained properly in the conditions of the absence of the fastening elements of the locking box and of the produced half opening. This was due to the detector slides of the point motor that had the grooves of control widened in comparison with the projected.

The point switch half-opening was possible because of the locking box detaching from the fixing system in the conditions of the absence of the fastening elements (screws and nuts) that was fixing it by the curved stock rail of the switch no.9, having as consequence the loss of the function of the locking and guidance system of the straight points.

Primary causes were:

- the absence of the specific regulations (technical memorandum, working instructions, technological processes) on assembling, maintaining and repairing the point motors no.9 type EM5;

- the use of the fastening elements necessary to the locking box fastening of the curved stock rail are not corresponding to the technical documentation of the manufacturer;
- using for the point lock of the switch no.9 some constructive alternatives different from the technical documents of reference;
- non-assembling the crown nuts of the screws C2 and C4 of the point lock from the switch no. 9;
- keeping the screws DA M 22x65 with a fragment of used-up thread corroborated with the modification of the constructive solution designed by using the helical spring in place of the washers , fact that led to the situation that from the thread of the two screws only 4-5 and not all the designed surface;
- assembling in reverse position the arrester of the operating bar together with the screw C5 from the point lock of the switch no.9;
- non-replacing or non-reconditioning the used-up parts with the occasion of performing the examination tests of of the hidden parts of the switch, such as:
 - i. the cotters from the base of the points that is limiting the longitudinal displacement of the points,
 - ii. polishing the chipped corner of the right point of the switch no.9;
- widening the cuttings from the detectors slides of the point motor.

Safety recommendation were:

- Performing an examination on the entire railway network in order to identify all systems that have not been homologated, with improvisations or modifications in comparison with the technical documents of reference in force used at the subassemblies of the switch fasteners with pincers and to the *detectors* of the point motors of type EM 5. Following these actions, in case of identifying some major nonconformity a safety program for these safety installations shall be elaborated.
- Elaborating some specific proceedings, technical memorandum, working instructions, technological sheets by which shall be specified the way of assembling, maintaining, repairing 7 of the point motors of type EM5, including the method of mechanical control adjustment with the occasion of performing these type of works.
- Elaborating a normative document promoted through an order of the minister of transports and infrastructure by which shall be prohibited the performance of constructive changes without the approval of the central public authority from the railway transport field by the employees that are ensuring the maintenance of the components of the interlocking installation assemblies.
- Developing the level of the technical professional knowledge and improving the practical abilities of the personnel that are managing, maintaining and repairing the points and crossings and the point motors by internal courses or in specialized institutions followed by the professional examination of these.
- Accelerating the implementation of the safety management system at the level of the public railway infrastructure manager as foreseen in the Law no.55/2006 on the railway safety.
- Starting an examination action at the level of the public railway infrastructure manager of the personnel activity with responsibilities in traffic safety and of those with responsibilities in training and controlling for the nonconformities found with the occasion of this examination action referring to the elements of the switch no.9 of Valea Calugareasca. The conclusions of this action and also the possible disciplinary measures shall be contained in a Report that shall be submitted to the Romanian Railway Investigating Body.

E.1.3. *The railway accident occurred on 26.05.2008, on the Branch of the Railway County CFR Cluj, railway station Mogoşeni by derailment of locomotive EA 826, hauling the passenger train no. 4483, owned by SNTFC "CFR Călători" SA. The investigation report was completed on 12.01.2009.*

Direct cause of the railway accident was:

The presence in the switch no. 5, in the connection rails area, in the curve with the radius $R=190$ m, of **5 unsuitable sleepers**, in succession, that could not ensure the fastening of rail on the sleepers by coach screws, led to a gauge widening over the derailment safety limits and to the left wheel running inside the track.

Underlying causes

- The missing from the team inspection notebook of the bimonthly measurements, according to the provisions of the sheet no. 3, art. 2 from the Instruction no. 305/1997 concerning the establishment of the terms and of the order for the track inspection.
- The non-performance of all switches inspections that the district head has to do, according to the provisions of the art. 26 from the Instruction no. 323/1965 of the district permanent way inspector, district head for the track maintenance.
- The presence of some wrong data concerning the geometrical characteristics of the switches in the inspections notebooks, that can lead to the use in operation of some unsuitable tolerance intervals that maintained in track can lead to the sleepers and fastenings wear.
- The absence of the switches measurements analysis.
- The non-performance of the complete technological processes during the inspections of the switches hidden parts.
- The non-removal of the gauge and level failures found out during the inspections of the switches hidden parts.
- One did not supply the materials stipulated to be replaced in the approved maintenance plan of the tracks and switches.
- One did not perform a realistic analysis at the end of the year 2007, concerning the replacement of the switches for 2007. One supplied smaller quantities against those needed, that are not in accordance with the size of the requested sleepers. So in 2007, from an approved necessary of 541 special sleepers, one supplied 308 pieces, from which 64 were supplied over the requested sizes. This led to a supply of 244 sleepers requested on sizes. The real percentage of the sleepers supplied on sizes is 45% not 57% as is written in the achievements global situation for 2007.
- The head team job from district 2 Beclean, Mogoseni team is vacant and the railway safety responsibilities/competences, according to the Instruction 305/1997 concerning the establishment of the deadlines and order for the track inspection, was not designed/re-assigned by the track section management.
- The exceeding of instruction deadline for the unsuitable special sleepers replacement of the switches.

Primary causes that led to the railway accident are connected to the framework for the regulation and implement of the railway safety management system concerning the maintenance and repair of the switches that have the next failures:

- The missing of a connection between the inventoried necessary and the supply with some pegs, whose unsuitable presence on the track is not accepted by the regulations (sleepers on switches, sleepers on bridges, and so on)
- The missing of a periodicity of some maintenance and repair works at the tracks and switches.
- The lost of the technical abilities of the staff involved in switches maintenance and repair, by supplying switches from time to time and the rehabilitation from the knowledge and practical abilities point of view.

Safety recommendations were:

- The re-viewing of the sleepers inventory in order to draw up a plan for the replacement of the unsuitable sleepers and the establishment of the necessary running conditions.
- The performance of an analysis concerning the progress of the sleepers wear on the switches within 5 years at least, in connection with the supply progress and track

sleepers replacement for switches of the running lines, main lines and arrival – departure lines.

- The performance of an analysis concerning the running speed slackening progress, on the switches, establishing the percentage of all causes.
- The performance of an analysis concerning the means for keeping and improving the technical and practical abilities of the staff involved in the management, maintenance and repair of the switches, by internal trainings like staff training or in special institutes.
- The analysis of the opportunity to perform a study on the Romanian railway network situation, concerning the track maintenance activity.

E.1.4. *The railway incident occurred on 16.12.2008, on the Branch of the Railway County CF Constanța, in the railway station CFR Basarabi, by stopping the passenger train no. 8205 over the switch no. 9 operated on deflecting section with access to line 1, occupied by the train no.8018.*

The investigation report was completed on 15.12.2009

Cauzele incidentului feroviar

Direct cause

- **The direct cause** of the railway incident is the wrong answer of the interlocking system type CR2, adjusted for the pint machines type L 700H, that consisted in getting the electric control and the signal on the track diagram of the coupled switch no. 9/15 on the position “direct” when the switch no. 9 was on wrong position with access on the deflecting section 1.

Underlying causes of the railway incident that led to the wrong answer of the interlocking system type CR2, adjusted for the point machine type L 700H was:

- Existence of a short circuit in the control scheme of the switch no. 9, situated between the control electromagnetic relays of the position of the switch no. 9 and the coupling B of the switch group, manufactured in Germany, following the wrong performance of the fitting works;
- Loss of the control of the switch 9/15 after passing the passenger train no.1821-2 on the direct line (before giving the entry order for the passenger train no. 8205);
- One pressing of the operation button of the coupled switch 9/15, without operating the lever that was on “plus” position.

Root causes of the railway incident were:

- lack of homologation/certification of the interlocking system type CR2, adjusted for the point machine type L 700H and its acceptance in operation by the representative of the railway infrastructure administrator, without the preliminary authorization for the putting into service;
- the designing and achievement of the control scheme of the coupled switch 9/15 from the interlocking system, that do not allow its wrong answer if some short-circuits appear in the inner cabling of the equipments, cumulated with the loss of the switch control and the operation of the button corresponding to the switch in the position in which it lost the control;
- lack of some principles for the design, clearly regulated, that ensure the unitary design/application of the electric scheme of railway safety, corresponding to the requirements of the railway infrastructure administrator and accepted by the respective authority;
- the inadequate monitoring of the infrastructure administrator, during a limited period of time.

Safety recommendations were

- Drawing by the railway infrastructure administrator of some technical norms on the principles and the design of the railway safety electric schemes from this type of interlocking systems, in order to meet with the railway safety.

- The public railway infrastructure administrator will take all the measures for the application of the respective legislation for the putting into service of the structural subsystems and of the interoperability constituents and the homologation/certification of the railway critical products.
- The administrator of the public railway infrastructure will found out all the cases of equipments used along the track for a limited period of time and that are not homologated/certified, respectively authorized for the putting into service and the meeting with the specific legislation.
- The administrator of the public railway infrastructure will present monthly to Romanian Railway Investigating Body a copy of each dossier on the failures of the interlocking subsystems with new technology, that generate traffic interruptions.

E.1.5. *The railway accident occurred on 14.03.2009, on the running section Ploiești Vest – Brașov, in the railway station CFR Comarnic by derailment of the first axle from the locomotive EA 906 in the traffic direction (owned by SNTFC “CFR Călători” SA), hauling the passenger train no.3028, on the curve after the switch no.10, which gives access to deflecting section 1.*

The report for this railway accident was completed on 22.10.2009

Cauzele accidentului feroviar au fost stabilite după cum urmează:

Direct cause

- **The direct cause** of the accident was the climbing on the outter rail (left – in the traffic direction) of the curve behind the heel of the switch no.10 by the left wheel of the axle no.6 (the first in the traffic direction) of the locomotive EA 906 followed by the falling of the wheel in the exterior of the track. The wheel’s derailment from the right part of the axle by wheel’s falling inside the track represents a consequence of the left wheel’s derailment.

Factors which contributed

The climbing of the outter rail occurred as result of exceeding the safety limit on the conditions of increasing the guiding force (horizontal) on the conducting wheel on the curve of the heel of the switch no.10, fact connected with the lowering the contact point between the tyre’s lip and the active lateral surface of the rail and with the increase of the adhesion coefficient between the wheel and rail.

- The increase of the (horizontal) guiding force occurred because:
 - exceeding the maximum speed allowed on the curve located behind the heel of the switch no.10, following the keeping on the track of a curve located behind a switch, without a mandatory introduction of an intermediar alignment with a minimum length (corresponding to the maximum running speed) as is foreseen in the chart no.16, item 10-11 of the Instruction of norms and tolerances for constructions and track maintenance - lines with standard gauge no.314/1989;
 - exceeding the tolerances when operating for the values of the adjacent amounts of deflection on the curve.
- Lowering the contact point between the tyre’s lip and the active lateral surface of the rail is due to:
 - lateral wear of the rail in the climbed area with values of 9 mm;
 - the existence in the area where occurred the climbing (at approximately 1 metre) of a joint with unsuitable fish plates as it had cuttings in vertical section on the half of the fish plate and holes that were cutted with autogenous welding and presented bigger ovalizations than those allowed, fact that allowed the creation of a vertical shoulder and implicitly the increase of the deformation in vertical plan of the outter rail of the curve.
- The increase of the adhesion coefficient between the wheel and rail occurred due to:
 - the lack of the greasing oil between the wheel and rail as result of the non-functioning of the installation of greasing the tyres lip;

- the running surface of the first axle had a degree of roughness bigger than that from general operation because the locomotive EA 906 performed its first route after the turning of the wheel's tyres.

Root causes were:

- Non-introducing an alignment between the switch and the graduated transition curve with the line 1 when placing the switches, fact that modified the running conditions by decreasing the running speeds. The need of introducing this alignment is foreseen in chart 16, item 10-11 of the Instruction of norms and tolerances for constructions and track maintenance – lines with standard gauge no.314/1989.
- Using the fish plates with oblong holes on the breaking areas fact that influenced the appearance of bigger rail-joint gaps.
- Non-analising the amount deflection diagram from the heel of the switch no.10 and the wear of the rails running surfaces in order to find possible plane deformations of the curve according to the provisions of the sheet no.4, article 8 of the Instruction for fixing the terms and the order that must be performed the track's inspections no.305/1997.

Safety recommendations were:

- Performance by the public railway infrastructure manager and the noninteroperable railway infrastructure administrators of some inspections on the technical conditions of placing the curves after the switches and the running speeds allowed on these areas. For the situations that aren't foreseen in the instructional provisions, for each case it will be established the necessary measures to be taken, in order to observe the technical conditions foreseen in the Instruction of norms and tolerances for the track construction and maintenance – lines with standard gauge no.314/1989.
- Modification of the specific regulations in force on the periodical inspections of the locomotives in the sense of introducing the obligation of examining the functioning of the installation of greasing the tyre's lip with the occasion of performing these inspections or after performing the turning of the locomotives wheels tyres.
- Modification of the technical specification ST 21-008 in order to explicitly establish how to examine the degree of roughness of the running surfaces and also the necessary devices necessary for this examination.
- Obtaining by CNCF "CFR" SA the safety authorization according to the provisions of article 11 of the Law no.55/2006 on the railway safety.

3.5 Accidents and incidents that were investigated during the last 5 years.

Railway investigations in 2007-2009 (The Romanian Railway Investigating Body was established in March 2007)

| Accidents investigated ¹ | | 2007 | 2008 | 2009 | TOTAL |
|-------------------------------------|-------------------------------------------|------|------|------|-------|
| Serious accidents (Art 19, 1 + 2) | Train collision | - | - | - | - |
| | Train collision with an obstacle | - | - | - | - |
| | Train derailment | - | 5 | 3 | 8 |
| | Level-crossing accident | - | - | - | - |
| | Accident to person caused by RS in motion | - | - | - | - |
| | Fire in rolling stock | - | - | - | - |
| | Involving dangerous goods | - | - | - | - |
| | Train collision | - | - | - | - |

| | | | | | |
|----------------------------|-------------------------------------------|---|----------|----------|-----------|
| Other accidents (Art 21.6) | Train collision with an obstacle | - | - | - | - |
| | Train derailment | - | - | - | - |
| | Level-crossing accident | - | - | - | - |
| | Accident to person caused by RS in motion | - | - | - | - |
| | Fire in rolling stock | - | - | - | - |
| | Involving dangerous goods | - | - | - | - |
| Incidents | | - | - | 2 | 2 |
| TOTAL | | - | 5 | 5 | 10 |

¹ it was taken into account year complete investigation

4 Recommendations

4.1 Short review of recommendations

Implementation of the recommendations in the period 2008-2009

| Recommendations issued | | Recommendation implementation status | | | | | |
|------------------------|-----------|--------------------------------------|-------------|-------------|------------|-----------------------|-------------|
| | | Recommendation implementation status | | In progress | | Not to be implemented | |
| Year | [No.] | [No.] | [%] | [No.] | [%] | [No.] | [%] |
| 2008 | 24 | 5 | 20,8 | - | - | 19 | 79,2 |
| 2009 | 23 | 21 | 91,3 | 2 | 8,7 | - | - |
| TOTAL | 47 | 26 | 55,3 | 2 | 4,3 | 19 | 40,4 |

For a total number of 19 recommendations made in 2009 replies were not received from the system on the reasons of their non-fulfillment.

**DIRETOR
FLOROIU DRAGOȘ**