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FOR  
EUROPEAN COMMISSION  
REGARDING

*Advice concerning the strengths and weaknesses of the Investigation report on the accident at Santiago de Compostela on 23 July 2013*

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The present document is a non-legally binding advice of the European Railway Agency. It does not represent the view of other EU institutions and bodies, and is without prejudice to the decision-making processes foreseen by the applicable EU legislation. Furthermore, a binding interpretation of EU law is the sole competence of the Court of Justice of the European Union.



## 1. Executive summary

In its letter referenced as Ares(2015)4585609 dated 26 October 2015 and addressed on the same date to the European Railway Agency (ERA), the European Commission requested ERA to provide advice concerning the independence of the investigating body in Spain.

In addition to the request for technical advice concerning the independence of the investigating body in Spain, dated 26 October 2015 (Ref. Ares(2015)4585609), the Commission, on 30<sup>th</sup> November 2015, requested the Agency to highlight the weaknesses, if any, of the final investigation report of the Santiago de Compostela accident and advice and to what extent this illustrates the lack of independence of the investigating body in Spain.

### **Review of the Investigation report into the derailment of high-speed train close to Santiago de Compostela Station (A Coruña)**

On 24 July 2013 at 20.41 hours, a derailment of high-speed passenger train running at 179 km/h on the Angrois curve (where the speed limit is 80 km/h), occurred. After the derailment, most of the coaches hit the concrete wall along the curve and the rear generator car caught fire. The result was 80 fatalities and 152 injured (almost all the passengers).

The aim of an independent in-depth investigation carried out by a National Investigation Body is to establish exactly what, how and why the accident happened and based on that to learn lessons for the possible improvement of railway safety and the prevention of similar accidents<sup>1</sup> and or to limit the consequences.

Based on its analysis of the CIAF investigation report, the Agency considers that the following points are weaknesses in the investigation:

- › The composition of the investigation team that included Traffic Safety Directors from the involved organisations (Adif, Renfe) and Ineco staff. The requirement that the CIAF shall be independent from any infrastructure manager, railway undertaking “and from any party whose interests could conflict with the tasks entrusted to the investigation body” was not ensured. Therefore the investigation did not comply with requirements in articles 21.1 and 21.2 of the Railway Safety Directive.
- › In the case of Ineco, this company also fulfilled the role of independent assessment body for one of the involved organisations, specifically in relation to the decision to export risks to the driver. This further weakens the independence of the investigation.
- › The emphasis of the CIAF report is put on the direct cause (one human error) and on the driver’s (non-) compliance with rules, rather than on the underlying and root causes. Those causes are not reported as part of the conclusions of the report and typically are the most likely to include the organisational actions of Adif and Renfe.
- › The report focuses mainly on the derailment itself; the subsequent collision and fire and their impact are not sufficiently described, critically analysed and no conclusions are arrived at in the report. The report also fails to identify the wheelset/vehicle that derails first, which can also provide a better understanding of the accident and its causes.
- › The report does not sufficiently analyse and conclude on the decisions around the design of the line, including those made by DGF, and how any risks were assessed.

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<sup>1</sup> Article 19.1 RSD



- › The report does not sufficiently analyse and conclude on the design of the rolling stock involved in the accident, the authorisation by DGF and how any risks were assessed.
- › Some key elements of which would be expected in an independent accident investigation regarding the involved organisations are not critically analysed and concluded, e.g. human factors, SMS of involved organisations, the risks assessments and their impacts, responsibilities and decision making processes, the role of the infrastructure and vehicle design in the consequences of accidents.
- › The proposed safety recommendations seem to arise from the topics discussed and not from a well-understood and established causation chain leading to evidence based conclusions.
- › In this report, there is neither description, nor evidence on whether, when and how the victims and their relatives were informed during the investigation process and given the opportunity as far as possible to give comments (Railway Safety Directive, Article 22(3)) .

In conclusion, the Agency considers that:

- › The composition of the CIAF investigation team did not ensure the independence of the investigation.
- › The emphasis of the CIAF report is on the direct cause (one human error) and does not answer essential questions on the root causes.
- › The unanswered questions relate to bodies that were included in the investigation team (such as Renfe Operadora, Adif and Ineco) and the functioning of DGF.
- › The investigation body did not meet the requirements of independence set out in the Railway Safety Directive (Article 21) and therefore the obligation to investigate accidents (Article 19) has not been properly fulfilled.

In short, the Agency considers that the accident on 24 July 2013 involving the derailment of a high-speed train close to Santiago de Compostela Station (A Coruña), resulting in 80 fatalities and 152 injured, has not yet been independently investigated as required by the Railway Safety Directive.

Furthermore, taking into account the very serious nature of this accident, the Agency considers an investigation that meets the requirements of independence and addresses as a minimum the weaknesses identified referred to above and in the following report should be opened.

## 2. General Context

1. In its letter referenced as Ares(2015)4585609 dated 26 October 2015, further clarified on 30<sup>th</sup> November 2015, and addressed on the same date to the European Railway Agency (ERA), the European Commission requested ERA to prepare a technical advice concerning the independence of the investigating body in Spain and the strengths and weaknesses of the investigation report for the Santiago de Compostela.
2. In its subsequent letter referenced as Ares(2015)5449187 dated 30 November 2015 and addressed on the same date to the European Railway Agency (ERA), the European Commission clarified its request to ERA : to highlight the weaknesses, if any, of the final investigation report of the Santiago de Compostela accident and provide an advice as to what extent this illustrates the lack of independence of the investigating body in Spain. Such additional request will be dealt with in the second part of this advice.



### 3. Legal Background

Article 21(1) of the Railway Safety Directive<sup>2</sup> (RSD) provides that *“Each Member State shall ensure that investigations of accidents and incidents referred to in Article 19 are conducted by a permanent body, which shall comprise at least one investigator able to perform the function of investigator-in-charge in the event of an accident or incident. This body shall be independent in its organisation, legal structure and decision-making from any infrastructure manager, railway undertaking, charging body, allocation body and notified body, and from any party whose interests could conflict with the tasks entrusted to the investigating body. It shall furthermore be functionally independent from the safety authority and from any regulator of railways”*.

1. Article 21(2) of the Railway Safety Directive provides that *“The investigating body shall perform its tasks independently of the organisations referred to in paragraph 1 and shall be able to obtain sufficient resources to do so. Its investigators shall be afforded status giving them the necessary guarantees of independence”*.
2. Other provisions of the RSD deal in particular with the obligation to investigate certain railway accidents (Article 19), the status of the investigation (article 20), the investigation procedure (article 22) and Annex V relating to the content of the accident investigation report.
3. The Railway Accident Investigation Commission (*“Comisión de investigación de accidentes ferroviarios”* or *“CIAF”*) has been established and organised by the Law 1/2014 and the Royal Decree 623/2014.

### 4. Analysis related to the Investigation report into the derailment of high-speed train close to Santiago de Compostela Station (A Coruña)

#### 4.1 Introduction

There is a formal judicial investigation ongoing regarding the high-speed train derailment near Santiago de Compostela station (A Coruña) on 24 July 2013. It is ending its first phase of collecting information about the whole case. The investigation is complex given the high number of fatalities (80) and injured people (152).

The independent accident investigation by the Investigation Commission of Railway Accidents (CIAF) into the causes, has already been finalised with the investigation report made public on 4 June 2014.

This advice is based solely on the currently available CIAF investigation report<sup>3</sup>. The CIAF investigation file concerning this accident is not (publicly) available, this includes the CIAF investigation process, which has been specifically applied and led to the outcome: the CIAF investigation report.

This report review consists of:

- Introduction
- Noticeable factual circumstances of the accident to facilitate the understanding of the note below
- Analysis of the CIAF investigation report
- Analysis of the composition of the CIAF investigation team
- Advice

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<sup>2</sup> Directive 2004/49/EC of European Parliament and of the Council of 29 April 2004 on safety on the Community's railways (OJ L 164, 30.04.2004, p. 1).

<sup>3</sup> Final report on serious railway accident no 0054/2013 of 24/07/2013 near Santiago de Compostela station (A Coruña), Ministry of Development, CIAF. The English version of the core report (without the Annexes) as provided by the translation centre of the EU was used for this review. (Hereafter CIAF report (Eng.)). The annexes of the Santiago report were not translated and are not in the scope of this review. There were no contacts between ERA and CIAF.



## 4.2 Noticeable factual circumstances of the accident

Below is a short description of the derailment of the high-speed train and of some of the accident circumstances based on the information available in the CIAF investigation report.

On 24 July 2013 at 20.41 hours, a **derailment**<sup>4</sup> of high-speed passenger train 150/151 running at 179 km/h on the Angrois curve (where the speed limit is 80 km/h), occurred. After the derailment, most of the coaches **hit** the concrete wall along the curve and the rear generator car caught **fire**. Consequences: 80 fatalities and 152 injured (almost all the passengers).

Some of the main circumstances of the accident of Santiago de Compostela (A Coruña) regarding the rolling stock (1-3), the infrastructure (4-9) and the operational work of the train driver in the high-speed train cabin (10-14) are the following:

1. Alvia Class 730 passenger high-speed train 150/151. Class 730 is a conversion of Class 130; two end passenger coaches modified to accommodate one generator car (including diesel tank) each.
2. Train 150/151 consists of 13 vehicles: two power cars at either end, followed by two generator cars at either end, eight passenger coaches and a restaurant car. The train is 382 tons.
3. The high-speed train was equipped with ASFA Digital and ERTMS/ETCS, due to problems of reliability and availability with the ERTMS configuration of this Class 730 on this line, the Renfe Operadora applied to operate under a trackside signal block (BSL) with the protection of ASFA Digital.
4. The line 082 Coto da Torre branch-A Grandeira branch (km point 85.0) is equipped with BSL, ERTMS/ETCS level 1, except at its beginning and end, and back-up ASFA Digital.
5. The low speed curve (maximum 80 km/h) itself has a design radius of 402 m and is located in the end section of the line solely equipped with ASFA Digital.
6. Along part of the curve, there is a massive, concrete wall. Maximum permitted speed is 80 km/h according to the Maximum Speed Table (from Adif).
7. The signals and path for the Alvia Class 730 passenger train 150/151 was set: the relevant signals indicated "track clear".
8. Speed change indication marker/board (without warning) before the curve at kilometre point (PK) 84+273.
9. In the drivers' cabin of the train there are several communications systems (e.g. the radiotelephony (track-train); the mobile telephony (GSM-R)) for corporate communication within the train and outside the train.
10. The timetable book for the drivers shows the change in speed: limit the speed to 80 km/h at PK 84+230 (the Angrois curve).
11. Before entering the curve the driver must have made the required adjustments of the speed (200 km/h to 80 km/h) himself and decide to use the brakes (without any technical controls) on time.
12. Train was running late with a delay of between 2 and 3 minutes.
13. The train driver was answering a service call from the train manager in the train on the corporate mobile telephone, 6000 meter before the start of the curve. The corporate mobile phone call lasted 100 seconds.
14. The brakes of the train 150/151 were not activated enough to achieve the required speed reduction.

The general characteristic of the accident above is that the layout of the infrastructure line 082 includes the Angrois curve, for which a speed reduction from up to 200 to 80 km/h is set out in the maximum speed table and in the timetable. Over this stretch of the track, leading up to the Angrois curve, there is no technical intervention from an automatic train protection system if the driver does not reduce speed. This means that the driver needs to be aware at all times that it is up to him to make the necessary speed adjustments (from

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<sup>4</sup> Point of kilometre (PK) 84+413 on line 82 from Coto da Torre branch (Ourense) to A Grandeira branch (A Coruña), near Santiago de Compostela station (A Coruña).





200 to 80km/h) and decide on the use of the brakes (without any technical controls) on time before entering the Angrois curve.

### 4.3 Analysis of the CIAF investigation report

There are several limitations of the report. Some of them are described in the following four sections. The first focuses on the human factors, the second on the technical issues, the third on communication during the investigation and the fourth on the safety management systems and recommendations.

#### 4.3.1 Human factors

##### *The investigation report focuses on direct cause and the late intervention of the train driver*

In the CIAF investigation report, there is only one conclusion, which is focusing on the direct cause:

*“the cause of the accident was excessive speed of the train (going at 179 km/h) on the curve entering the A Grandeira branch (Angrois bend, limited to 80 km/h). The driver was in breach of the requirement of the timetable book for train 150/151 and the maximum speed table for line 082”<sup>5</sup>.*

Consequently, this identified cause focuses on putting the responsibilities on the driver without having identified the underlying and root causes within the involved organisations: ADIF (the Spanish Infrastructure Manager), Renfe Operadora (the Spanish Railway Undertaking) and the DGF (Dirección General de Ferrocarriles)<sup>6</sup>. Other causes (underlying and root) are not reported as part of the conclusions of the report although this is required under Annex V of the RSD<sup>7</sup>. Considering the limited extent of the analysis of causes and its focus on the driver’s compliance with rules, the report may give the impression that it apportions blame and liability. This would be in direct contradiction with Article 19.4 of the RSD<sup>8</sup>.

##### *Limited investigation into the role of the human factors in train driving*

The CIAF investigation report contains information and findings in general and is detailed on the factual findings<sup>9</sup> related to the train driver shortly before the derailment. It gives a description based on parameters of *what* has happened and *how* the derailment happened. However, there is no assessment of the driver’s task and the working conditions. In particular, the investigation should have examined the risk assigned to the driver. This operational task assigned to the driver - braking the train – makes him the final barrier to protect the train from travelling too fast into the curve, with possible catastrophic consequences.

The investigation gives a record of the actions/non-actions of the driver in the period leading up to the accident. A chronological description of these activities and events on a timeline would have been a useful to support an analysis of the workload of the driver. In particular the parallel tasks – multi-tasking - of

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<sup>5</sup> See pg. 104 number 4.3 of the CIAF report (Eng.).

<sup>6</sup> Since end of 2014, DGF (Dirección General de Ferrocarriles) is not the ES NSA anymore, which is Agencia Estatal de Seguridad Ferroviaria ([http://www.seguridadferroviaria.es/AESF/lang\\_castellano/](http://www.seguridadferroviaria.es/AESF/lang_castellano/)).

<sup>7</sup> « Conclusions:

- direct and immediate causes of the occurrence including contributory factors relating to actions taken by persons involved or the condition of rolling stock or technical installations,
- underlying causes relating to skills, procedures and maintenance,
- root causes relating to the regulatory framework conditions and application of the safety management system » (annex V RSD, section 4.3) ».

<sup>8</sup> «The investigation shall in no case be concerned with apportioning blame or liability ».

<sup>9</sup> E.g. see pg. 87 – 91 of the CIAF report (Eng.): Safety recorder data, Audio recording in cab, Conversations; pg. 95- 99: Sequence of events. pg. 103: Discussion on the driver’s conversations with CRC Atocha (Madrid).



responding to the telephone, observing and responding to the trackside information boards (for change of speed reduction) and the control of train speed (the train was running late) in the time leading up to the accident. Task complexity along this route is increased by the combination of different operational automatic train control (ATC) modes, each with different operation rules for the driver. The driver must always be aware of the level of technical supervision and this may influence how he carries out his tasks, for example, when to pick up a phone call. The investigation should also examine how workload and task design are managed in the SMS.

#### **4.3.2 Technical Issues**

##### ***Technical investigation focused on derailment (not on the collision of the coaches with the wall and the fire in the rear generator car after the derailment)***

The CIAF investigation report contains extensive information and findings in general and on the factual part of the derailment. It gives a description of *what* has happened and *how* the derailment happened. The technical investigation (including the sequence of events before the derailment) is described<sup>10</sup>. However, the derailment was only one event in the chain of events observed in the accident. The collision of the coaches with the concrete wall and the fire in the rear generator car after the derailment were likely relevant to the accident outcomes. The factual findings regarding which bogie or wheelset of the train derailed first, the collision (including its impact) of the different coaches with the wall around the curve and the fire (including its impact) after the derailment are not sufficiently described, critically analysed and concluded in the report. Such investigation is probably not possible without running various simulation exercises. The report does not provide information on whether such simulations were carried out in practice.

##### ***Absence of findings about the type of injuries and causes of death in relation to the design of the infrastructure and of the rolling stock***

The factual description, the analysis on the causes of death and injuries are not included in the investigation report. The location and time of death (at the accident site or in the hospital) and the type of injuries including the information about the location (seat and number of coach) of the train passengers are not included. The report states, “No official list of victims is available”<sup>11</sup>. Part of the investigation should give an answer on the question, how it is possible that the consequences of a derailment (followed by collision and fire) are so serious and that almost all of the train passengers were affected (80 fatalities and 152 injured). The SMS (Renfe Operadora and Adif) should have considered the possible contribution of the design of the infrastructure and the high-speed train to the mitigation of the consequences in the case of a derailment. In this case, the design of the infrastructure (the curve and the wall around the curve which *most of the coaches hit*), the composition of the train (there was a fire in the rear generator unit after the derailment) and the design of the interior of the coaches might have played an important role in the consequences of this accident. The design issues are not included in the analysis and the conclusions of the CIAF investigation report.

##### ***No investigation of the performance of the rescue services***

With such a disaster and so many casualties, it is required that the performances of rescue and emergency services are part of the CIAF investigation<sup>12</sup> or investigated separately by the CIAF. In the report there is some information regarding the activation of the railway contingency plan and the emergency plan by the public

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<sup>10</sup> E.g. pg. 10-24, pg. 60-64 and pg. 95-99 of the CIAF report (Eng.).

<sup>11</sup> Pg. 27 point 2.3.1 of the CIAF report (Eng.).

<sup>12</sup> RSD, Annex V



services<sup>13</sup>. Nevertheless, the report does not answer some key questions, such as: “How many persons received medical care in the first critical hour at the accident site or later in the hospital?”, “How effective were the rescue services?”. The performance of the rescue services is not included in the analysis and the conclusions of the CIAF investigation report.

#### **4.3.3 Communication during the investigation with the bereaved of the victims**

In this report, there is neither description, nor evidence on whether, when and how the victims and their relatives (80 deaths and 152 injured) were informed *during* the investigation process and given the opportunity as far as possible to give comments. This contradicts article 22.3 of the RSD:

*“the investigation shall be carried out with as much openness as possible, so that all parties can be heard and can share the results”*. All interested parties including *“the victims and their relatives”* shall be regularly informed of the investigation and its progress and, as far as practicable, shall be given the opportunity to submit their opinions and views to the investigation and be allowed to comment on the information of the draft report.” This provision may help the victims and their families to come to terms with what has happened and with their suffering.

#### **4.3.4 Safety management system and recommendations**

##### ***Investigation of the practical implementation of the SMS is limited***

Annex V (section 3) of the RSD provides that the investigation into the SMS should be part of the investigation report (notably: *“the framework organisation and how orders are given and carried out”, “requirements on staff and how they are enforced”, “routines for internal checks and audits and their results”, “interface between different actors involved with the infrastructure”*). Information and parts of the SMS of Renfe Operadora and Adif are described in the investigation report. However, the investigation into the functioning of the SMS of Renfe Operadora and Adif and the functioning of the DGF in practice are not sufficiently critically analysed and considered. Below are some important topics, which should be part of the analysis and conclusions of this report and which have not been fully identified in the investigation report<sup>14</sup>:

##### ***Management of responsibilities within Renfe Operadora and risk assessment of train driving***

In relation to the specific circumstances of the accident (see section 6.2) the following topics are not sufficiently critically analysed and no conclusions are arrived at in the report<sup>1516</sup>:

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<sup>13</sup> Pg. 25 and 26 of the CIAF report (Eng.).

<sup>14</sup> See Guidance on Good reporting practices (ERA/GUI/05/2010-EN, 15/10/2010), pages 18 and following.

<sup>15</sup> See pg. 104 number 4.3 of the CIAF report (Eng.).

<sup>16</sup> RSD, Annex V, point 4.3

« Conclusions:

- *direct and immediate causes of the occurrence including contributory factors relating to actions taken by persons involved or the condition of rolling stock or technical installations,*
- *underlying causes relating to skills, procedures and maintenance,*
- *root causes relating to the regulatory framework conditions and application of the safety management system » (annex V RSD, section 4.3) ».*





- › The arguments and the criteria used by the top management team<sup>17</sup> to justify their decision to accept operating the high-speed passenger service, when there was a clear identified risk<sup>18</sup> as a result of human error (when the driver has not reduced the train speed) with all its possible consequences and why no mitigating measures had been put in place.
- › The legal and corporate (safety) roles and responsibilities regarding the top management team, the head of the safety department, the designer of the tasks of train drivers<sup>19</sup> and the designer and manufacturer of the rolling stock, the independent assessment body and other involved staff and their allocation in relation to:
  1. the authorisation of the rolling stock Alvia Class 730 and its modifications;
  2. the safety certificate of Renfe Operadora and its modifications;
  3. the risk-assessment (objectives, methods, technical information system, hazard identification program, risk assessment, safety reviews, evaluation of mitigating measures, resources, budget etc.) done by Renfe to operate a safe high speed train service;
  4. the documented risk assessment of the tasks of train drivers (including braking the train, monitoring the trackside boards, and communication by phone).
- › The policy and arrangements for ensuring the control of risks, the effectiveness of the safety management system (SMS) and how the safety policy, the risk-based approach and the Plan-Do-Check-Act cycle worked in practice. Regarding the tasks of the train drivers (including communication by phone); here specifically in regards to the assurance of the compliance with speed limitations in relation to curves (without an automatic protection system) in the infrastructure in Spain.
- › Safety culture of the organisation.
- › The main safety requirements of the safety certification of Renfe Operadora regarding the tasks of train drivers (including when there are operational changes such as the introduction of ERTMS), which were not met including the reasoning.
- › The main safety requirements of the authorisation of Alvia Class 730 high-speed passenger train 150/151 (including any modifications), which were not met including the reasoning.
- › The risk assessments done for:
  - The design of tasks of train drivers<sup>20,21</sup> (including communication by phone) and the design of the rolling stock (Alvia Class 730) with any modifications before the line was put in service and subsequently up to the time of the accident. The identified hazards, assessed risks, the information on how the results were communicated towards the management and the measures taken.
  - The design of the operational procedure to be applied in delivering the high-speed service on the infrastructure line 082. The identified hazards, assessed risks, the information on how the results were communicated towards the management and the measures taken.
  - Management of the changes implemented as consequences of the decision to deliver high-speed passenger service on the infrastructure line 082.

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<sup>17</sup> Person or group of people who directs and controls an organisation at the highest level.

<sup>18</sup> See pg. 19.

<sup>19</sup> Including: the task description, the risk analysis of the tasks, the workload and competence management.

<sup>20</sup> Including: the task description, the risk analysis of the tasks, the workload and competence management.

<sup>21</sup> Some information about staff requirements is available in the CIAF report pg. 48 Staff requirements and pg. 100 Discussion on personnel requirements-driver.



- › The timeline of top management team decisions taken regarding the risk assessment of the tasks of the train drivers and the rolling stock (Alvia Class 730), the authorisation of the rolling stock (including its modifications) before the line 082 was put in service and afterwards.
- › The explanation of why the consequences of a derailment could be so serious that almost all of the train passengers were affected (80 fatalities and 152 injured). The possible influence of topics such as;
  1. the speed of the high-speed train;
  2. the design and composition of the high-speed train (including the modifications with the generator car);
  3. the design of the interior of the carriages and
  4. the design of the infrastructure of line 082 and in particular the curve and the concrete wall along the curve.

### ***Management of responsibilities within Adif - risk assessment infrastructure line 082***

In relation to the specific circumstances of the accident (see section 6.2) the following topics are not sufficiently critically analysed and no conclusions are arrived at in the report<sup>22</sup>:

- › The arguments and the criteria used by the top management team to justify their decision of operating the line 082, when there was a risk of derailment<sup>23</sup> by human error with all its possible consequences and why no mitigating measures had been put in place.
- › The legal and corporate (safety) responsibilities of the top management team of Adif, the head of the safety department, the designers of line 082<sup>24</sup>, the independent assessment body and other involved staff and their allocation in relation to:
  1. the authorisation of the infrastructure line 082 (including modifications);
  2. the risk-assessment (objectives, methods, technical information system, hazard identification program, risk assessment, safety reviews, evaluation of mitigating measures, resources, budget etc.) done by Adif to ensure the line 082 was safe;
  3. the documented risk assessment (safety dossier) of the infrastructure line 082.
- › The policy on how to ensure the control of risks, the effectiveness of the SMS and how the safety policy, the risk-based approach and the Plan-Do-Check-Act cycle worked in practice. Regarding the assurance of the safe design and operation of the infrastructure, here specifically in relation to train speed. This extends to the consideration of the critical (derailment) speed of trains in relation to different types of curves and radius in the infrastructure, the rolling stock and the tasks of the train drivers in Spain.

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<sup>22</sup> See pg. 104 number 4.3 of the CIAF report (Eng.).

<sup>23</sup> Pg. 74 of the CIAF report: "In the system safety case for the Ourense-Santiago section, in the part headed 'Conclusions. Exported Risks,' the following are highlighted as related to the present accident:

- The Maximum Speed Table for the line must respect the restrictions set for the infrastructure. Risk exported to Adif.
- Trains running under cover of trackside signalling or ASFA must comply with the Maximum Speed Table issued for the line by Adif. Risk exported to the driver.
- The driving assistance system ASFA does not provide supervision on board. Therefore the driver has to obey the indications displayed by the trackside signalling. Risk exported to the driver.

Ineco, as the independent assessment body recognised by the Directorate-General of Railways, drew up the Independent Assessment Report for this section. It also lists the first two risks listed above in its 'Exported Risks' section, without saying where they are exported."

<sup>24</sup> Including the layout of line 082 and the various subsystems such as: Infrastructure (subdivided into Track Bed and Track Assembly), Power (subdivided into Overhead Contact Line, Substations and Remote Control), Civil Defence (referring to the tunnel safety installations) and the Control, Command and Signaling subsystem.



- › Safety culture in the organisation.
- › The main safety requirements for the authorisation of line 082, which were not met including the reasoning.
- › The risk assessment of the design of the infrastructure (line 082) with its modifications, before the line was put in service and afterwards. The identified hazards, assessed risks and information on how the results were communicated towards the management and which possible measures were taken and which were not taken.
- › The timeline of the top management team decisions taken regarding the authorisation of the infrastructure line 082 (including the connection of the high speed line to the low speed curve with no automatic protection system) and the risk assessment of the line 082 (including its modifications), before the line was in service and afterwards.
- › The explanation of why the consequences of a derailment could be so serious that almost all of the train passengers were affected (80 fatalities and 152 injured). The possible influence of topic such as;
  1. the design of the infrastructure of line 082 and in particular the curve and the concrete wall along the curve.
  2. the speed of the high-speed train
  3. the design and composition of the high-speed train (including the modifications with the generator car);
  4. the design of the interior of the carriages.

#### ***Management responsibilities within DGF – authorisation and safety certification***

In relation to the specific circumstances of the accident (see section 6.2) the following topics are not sufficiently critically analysed and no conclusions are arrived at in the report<sup>25</sup>:

- › The arguments and criteria used by the top management team of DGF to justify their decision to authorise Adif to place into service the railway line 082 and to issue the safety certificate and the authorisation for placing into service the rolling stock (Alvia train) to Renfe Operadora. When there was a risk of derailment by human error with all its possible consequences and no mitigation was put in place to address this.
- › The application of the regulatory framework and the assurance of the DGF main tasks.
- › The legal and corporate (safety) roles and responsibilities of the top management of DGF, the head of the safety department (safety certification, authorisations, supervision), the independent assessment body and other involved staff regarding:
  1. the generic process for issuing safety certificates/authorisation and authorisation for placing into service of technical sub-systems such as railway lines and rolling stock, including a risk assessment process, if any;
  2. the generic supervision process, including the presence of a supervision strategy and plan, and its implementation;
  3. the specific authorisation of the railway line 082 managed by Adif and possible re-authorisation due to changes or modifications;
  4. the specific authorisation of the Renfe Operadora rolling stock Alvia Class 730 and its modifications;
  5. the specific safety certification activity of Renfe Operadora (including the process of train driving);

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<sup>25</sup> See pg. 104 number 4.3 of the CIAF report (Eng.).



6. the supervision plan prepared as consequence of the changes made by Renfe and Adif.
- › The dossier produced as results of the assessment made by DGF of
    - the application for the authorisation of the infrastructure (082) made by Adif;
    - the application for the safety certificate made by Renfe Operadora;
    - the application for authorisation of the rolling stock (Alvia Class 730) made by Renfe Operadora.
  - › The DGF has authorised Adif to place into service the railway line 082 with or without restrictions.
  - › The DGF has issued the safety certificate and the authorisation for placing into service the rolling stock (Alvia train) to Renfe Operadora with or without restrictions.
  - › The timeline of the top management team decisions DGF took regarding the authorisation of the infrastructure (line 082), the authorisation of the rolling stock Alvia Class 730 and the safety certification of Renfe Operadora, before the line 082 and the rolling stock was in service and afterwards.
  - › The supervision arrangements DGF put in place to check whether the results outlined in the application for a safety certificate and the authorisations were achieved during the operation starting from December 2011.

***No explanation how identified hazard by the Renfe leader driver in December 2011 was dealt with by the top management team***

The considerable and sudden speed decrease from 200 to 80 km/h, which the driver has to operate before the Angois curve, was identified and reported by the leader driver of Renfe Operadora<sup>26</sup> on December 2011 as a significant issue. There is no description of how the reported hazard has been taken into account by those who had the responsibility to manage and ensure safety at all levels of the organisation, including the top management team. Notably, it is not known from the report who, of the managerial functions, should have been informed to process the information identified by the leader driver, to take the decision and measures. These issues are not sufficiently analysed and are not part of the conclusions in the report.

***Limited analysis of previous derailments with excessive speed***

Derailments with excessive speed occurred in Spain in the period from 2008-2013 twenty times (14 incidents and 6 accidents). All six accidents that have occurred in 2008 (1), 2009 (1), 2010 (2), 2012(1) and 2013(1) were investigated by CIAF. The recommendations issued by CIAF sought to reinforce action to avoid risky behaviour by driving staff.<sup>27</sup> In the CIAF report, it is stated that those accidents did not have the same characteristics as the derailment near Santiago de Compostela. Nevertheless, there were similarities such as excess of speed, presence of a curve and absence of ASFA balises on the lines, all mentioned explicitly in the CIAF report<sup>28</sup>.

There is not a detailed description and analysis (the direct cause and root causes) of these accidents in the investigation report based on the former Renfe Operadora and or Adif investigation reports and on the former CIAF reports. Nor is there any information available on the involvement of different managerial levels of Renfe Operadora, Adif and DGF and on which kind of mitigation measures those companies had taken. In the analysis and the conclusion of the report, these issues are partly covered, but not sufficiently.

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<sup>26</sup> Pg. 54,55 and 56 of the CIAF report (Eng.).

<sup>27</sup> Pg. 94, point 3.7of the CIAF report (Eng.).

<sup>28</sup> Pg. 94, point 3.7of the CIAF report (Eng.).



## Recommendations

A positive aspect of the CIAF report is that it shows that measures seem to have been taken early during the investigation process (30 July 2013 by CIAF)<sup>29</sup> and that safety recommendations were issued when deemed relevant. Two examples:

- › The recommendation number 54/13-2 which is addressed to Adif: “For these situations (significant speed reductions), arrange progressive set-up of balises which may help to control the speed of trains, so that they brake in case the speed limit for entry into the next section is lowered. Therefore, implement the necessary ASFA Digital (Automatic Braking and Announcement of Signals) systems”.
- › The recommendation number 54/13-5, which is addressed to Directorate-General of Railways (DGF): “The process of commissioning new railway lines and alternative stretches should include a specific risk assessment. This should include identification and management of possible hazards driving from the interaction between subsystems, in normal and degraded operating conditions, and their links with the driving and traffic staff involved when a train is travelling from beginning to end of the line or alternative stretch, and its connection to the existing network. Also, analyse the viability of the layout at the various construction stages. In justified cases, promote the application of such assessments to lines which are in service”.

Nevertheless, the links between the analysis, the conclusions and these safety recommendations do not appear neither explicitly<sup>30</sup>, nor in the logic of the text of the report. The levels of causation (underlying and root causes) are not described in the conclusion of the investigation report although this is required under the RSD<sup>31</sup>. The focus of this investigation report seems to be on determining the direct cause, and on the compliance with a rule. The proposed safety recommendations seem to arise from the topics discussed and not from the well-understood and established causation.

### 4.4 Composition of the CIAF investigation team of the Santiago de Compostela accident

Article 21.1 of the Railway Safety Directive requires that the National Investigation Bodies shall be independent in its organization, legal structure and decision making, especially from any infrastructure manager and railway undertaking<sup>32</sup>. Article 21.2 RSD furthermore requires that the investigating body shall perform its tasks independently of those organisations and that its investigators shall be afforded status giving them the necessary guarantees of independence<sup>33</sup>. These provisions are meant to ensure that the

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<sup>29</sup> Pg. 104 – 108 of the CIAF report (Eng.).

<sup>30</sup> See *guidance on Good reporting practices*, page 27.

<sup>31</sup> « Conclusions:

— direct and immediate causes of the occurrence including contributory factors relating to actions taken by persons involved or the condition of rolling stock or technical installations,

— underlying causes relating to skills, procedures and maintenance,

— root causes relating to the regulatory framework conditions and application of the safety management system » (annex V RSD, section 4.3) ».

<sup>32</sup> Article 21.1, RSD: “Each Member State shall ensure that investigations of accidents and incidents referred to in Article 19 are conducted by a permanent body, which shall comprise at least one investigator able to perform the function of investigator-in-charge in the event of an accident or incident. This body shall be independent in its organisation, legal structure and decision-making from any infrastructure manager, railway undertaking, charging body, allocation body and notified body, and from any party whose interests could conflict with the tasks entrusted to the investigating body. It shall furthermore be functionally independent from the safety authority and from any regulator of railways.”

<sup>33</sup> Article 21.2 RSD: “The investigating body shall perform its tasks independently of the organisations referred to in paragraph 1 and shall be able to obtain sufficient resources to do so. Its investigators shall be afforded status giving them the necessary guarantees of independence”.





investigation unveils the real causes of the accident and thus enable learning from it without the pressure of conflict of interest.

The final investigation report of the Santiago de Compostela accident indicates the composition of the investigation team (p.12):

*“Under Article 23.1 of that Regulation, and in view of the exceptional features of this accident, the CIAF Chairman passed a resolution on 26 July 2013 appointing the CIAF Secretary as Chief Investigator. The Secretary, who has signed this report, then worked with the two investigators belonging to this Commission.*

*The members of the investigating team were the Secretariat technician referred to, plus:*

- › *the Traffic Safety Director of Adif, who delivered his personal report on 6 November 2013, signed with due authority, by the Sub-Director of Rolling Stock and Traffic Safety Management and the head of accident investigation; and*
- › *the Traffic Safety Director of Renfe Operadora, who delivered his personal report on 5 November 2013, signed jointly with the head of the accident technical investigation area.*

*Ineco, S.A., a publicly owned company, acting within the framework of an agreement for the provision of support in investigating railway accidents signed with the Sub-Secretariat of the Ministry of Development, has carried out work in support of the accident investigation on behalf of the chief investigator”.*

In the investigation report, it is indicated that Adif and Renfe Operadora are part of the investigation team. More specifically, the involved staff were two Traffic Safety Directors of Adif and Renfe Operadora. This leads to a conflict of interest, because the investigation team has to investigate the particular role of each involved organisation (Adif, Renfe Operadora, DGF, etc.). In addition, Ineco<sup>34</sup> also supports the CIAF chief investigator. It should be noted in addition that Renfe Operadora and Adif are shareholders of Ineco. It emerges that the CIAF investigation was performed with a team that included staff from organizations that were directly involved in the accident. Thus the requirement that the CIAF shall be independent from any infrastructure manager, railway undertaking *“and from any party whose interests could conflict with the tasks entrusted to the investigation body”* is not ensured. This means that this investigation does not comply with the article 21.1 and 21.2 of the RSD.

#### **4.5 Advice related to the Investigation report into the derailment of high-speed train close to Santiago de Compostela Station(A Coruña)**

The composition of the investigation team that included Traffic Safety Directors from the involved organisations and Ineco staff, even if compliant to the Spanish legislation at the time, raises questions about its independence. The requirement that the CIAF shall be independent from any infrastructure manager, railway undertaking *“and from any party whose interests could conflict with the tasks entrusted to the investigation body”* is not ensured. This means that this investigation does not comply with the article 21.1 and 21.2 of the RSD.

It emerges that the emphasis of the CIAF report is on the direct cause (one human error) and on the driver's compliance with rules. Other causes (underlying and root) are not reported as part of the conclusions of the report. The report does not provide the logical links between the analysis, the conclusions and the nine recommendations as established in the investigation report.

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<sup>34</sup> Pg. 74 point C of the CIAF report: *“Ineco, as the independent assessment body recognised by the Directorate-General of Railways, drew up the Independent Assessment Report for this section.”*





The report contains extensive information and technical findings on the derailment. Nevertheless, the factual findings regarding the specific features of the derailment, the subsequent collision of the coaches with the concrete wall and the fire that occurred after the derailment and their impact are not sufficiently described, critically analysed and no conclusions are arrived at in the report.

As showed in the review, some of the key elements of the independent accident investigation regarding the involved organisation are not critically analysed and no conclusions are arrived at in the CIAF report. Examples of such topics are: the role of human factors, the functioning of the regulatory framework, the functioning of DGF, the functioning of the SMS in practice at Renfe Operadora and Adif, the risk assessments and their impacts, the responsibilities and the decision making process, the design of the infrastructure and the train versus the consequences of accidents and the learning from accidents with similarities.

The failure to critically analyse and conclude on key elements leaves many essential questions unanswered.

In this report, there is neither description, nor evidence on whether, when and how the victims and their relatives were informed during the investigation process and given the opportunity as far as possible to give comments.

In conclusion, the Agency considers that:

- › The composition of the CIAF investigation team did not ensure the independence of the investigation.
- › The emphasis of the CIAF report is on the direct cause (one human error) and does not answer essential questions on the root causes.
- › The unanswered questions relate to bodies that were included in the investigation team (such as Renfe Operadora, Adif and Ineco) and the functioning of DGF.
- › The investigation body did not meet the requirements of independence set out in the Railway Safety Directive (Article 21) and therefore the obligation to investigate accidents (Article 19) has not been properly fulfilled.

In short, the Agency considers that the accident on 24 July 2013 involving the derailment of a high-speed train close to Santiago de Compostela Station (A Coruña), resulting in 80 fatalities and 152 injured, has not yet been independently investigated as required by the Railway Safety Directive.

Furthermore, taking into account the very serious nature of this accident, the Agency considers an investigation that meets the requirements of independence and addresses as a minimum the weaknesses identified referred to above and in the following report should be opened.

Valenciennes, 26<sup>th</sup> January 2016

Christopher CARR  
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