Railway Accident Investigation Unit of Ireland

Annual Report

Annual Report 2012

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Foreword

The purpose of the Railway Accident Investigation Unit's is to independently investigate occurrences on Irish railways with a view to establishing their cause and make recommendations to prevent their recurrence or otherwise improve railway safety.

Thirty five preliminary examinations were carried out in 2012, from which three full investigations were commenced. The first investigation was a trend investigation into the management of possession work; this investigation was triggered by four possession incidents occurring between the 18th and 23rd February. The second investigation involved a collision between a tractor and a train at a user worked level crossing. The third related to an unplanned initiation of fog signals which led to a train driver sustaining minor injuries.

The Railway Accident Investigation Unit published three investigations reports in 2012 relating to occurrences that took place in 2011. These related to: one level crossing accident, one locomotive runaway and one equipment failure on a train. A total of thirteen new safety recommendations were issued in 2012. The focus of the safety recommendations were: the effective implementation of safety controls; improvements to competency management systems; implementing effective technical procedures; and the management of risk at user worked level crossings.

Ninety safety recommendations have been issued in total up to the end of 2012, including fourteen issued by the Railway Safety Commission in advance of the appointment of a Chief Investigator for the Railway Accident Investigation Unit in 2007. The Railway Safety Commission monitors the implementation of safety recommendations and has advised that of the ninety safety recommendations issued to date, thirty two have been closed out as having been addressed, twenty nine are complete and awaiting verification that they have been addressed, and a further twenty nine are open.

David Murton
Chief Investigator

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List of abbreviations

ERA	European Railway Agency
HABD	Hot Axlebox Detector
IÉ	Iarnród Éireann
NIB	National Investigation Body
No.	Number
NSA	National Safety Authority
RAIU	Railway Accident Investigation Unit
RSC	Railway Safety Commission
SI	Statutory Instrument

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1. Background

In April 2004, the European Parliament passed 'Directive 2004/49/EC of the European Parliament and of the Council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification'. This directive is referred to as the Railway Safety Directive and set out the requirement for each European Union member state to establish a National Safety Authority (NSA) to oversee the regulation of railway safety and a National Investigation Body (NIB) to act as an independent accident investigation body.

The Railway Safety Act 2005 was passed on the 23rd December 2005, transposing the Railway Safety Directive into national legislation and creating the framework for the establishment of the Railway Safety Commission (RSC). On the 1st January 2006 the RSC was established transferring the regulation of railway safety from the then Department of Transport. The Railway Safety Act 2005 established the RSC to act as the NSA and perform the duties outlined in the Railway Safety Directive associated with the licensing of railways. The Railway Accident Investigation Unit (RAIU) was established as a functionally independent unit within the RSC to act as the NIB, independently investigating railway occurrences. The roles of the RSC and the RAIU were subsequently elaborated upon under the European Communities (Railway Safety) Regulations 2008, Statutory Instrument number 61 of 2008 (SI no. 61 of 2008) dated the 6th March 2008.

The purpose of an investigation by the RAIU is to improve railway safety by establishing, in so far as possible, the cause or causes of an accident or incident with a view to making safety recommendations for the avoidance of accidents in the future, or otherwise for the improvement of railway safety. It is not the purpose of an investigation to attribute blame or liability. The RAIU's investigations are carried out in accordance with the Railway Safety Act 2005 as amended by SI no. 61 of 2008 and the European Railway Safety Directive.

2. RAIU

2.1 The organisation

The RAIU comprises a Chief Investigator and a team of three investigators, each able to perform the role of Investigator In Charge as necessary. One of the Senior Investigator posts became vacant in October 2012. The RAIU shares administrative support with the RSC, all other functions are carried out independently of the RSC. The organisation chart for the RSC, including the RAIU, is shown in Figure 1.

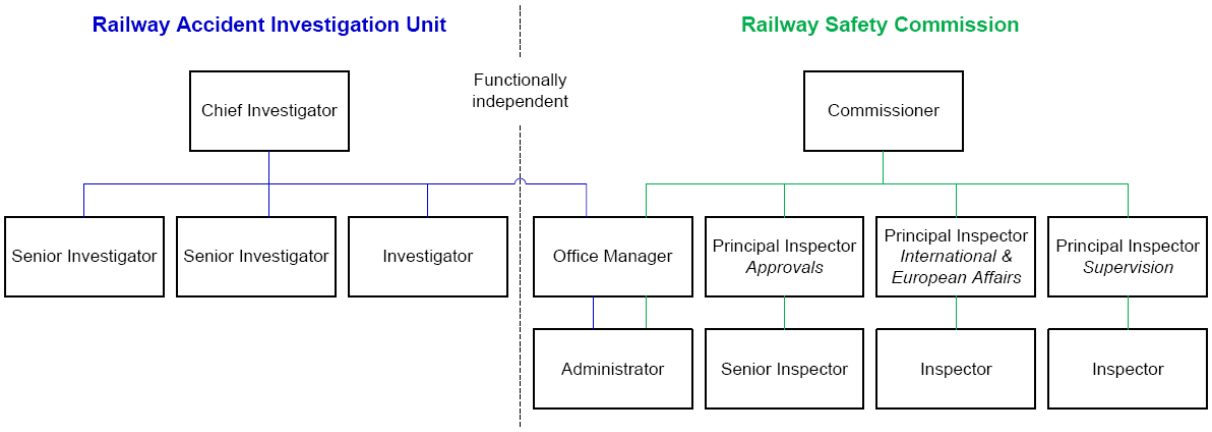

Figure 1 – Organisation chart

Plans remain in place to merge the RAIU, the Air Accident Investigation Unit and the Marine Casualty Investigation Board into a multi-modal accident investigation body within the Department of Transport, Tourism and Sport, giving them total independence from their respective regulatory bodies.

2.2 Railway networks within the RAIU's remit

There are ten railway systems within the RAIU's remit. These are:

- The Iarnród Éireann (IÉ) national heavy rail network;
- The Luas light rail system in Dublin;
- The Bord Na Móna industrial railway;
- Seven heritage railway systems.

For each of these railway systems there are entities identified as Railway Undertaking and Infrastructure Managers. Railway Undertakings are defined as organisations that provide the transport of goods and/or passengers by rail on the basis that the undertaking must ensure traction, including undertakings that provide traction only; which operate under a safety management system approved by the RSC through the issue of a safety certificate. Infrastructure Managers are defined as organisations that establish and maintain railway infrastructure, including the management of infrastructure control and safety systems; which operate under a safety management system approved by the RSC through the issue of a safety authorisation. There are ten organisations that act as Railway Undertaking and Infrastructure Manager for a railway network and two organisations that act solely as Railway Undertakings; there are currently no organisations that act solely as an Infrastructure Manager.

The national heavy rail system is owned by IÉ. IÉ are the Infrastructure Manager and are also the primary Railway Undertaking with responsibility for the management of commercial train operations, station operations and Centralised Traffic Control. The heavy rail system is interoperable with the heavy rail system in Northern Ireland and cross border services are operated by IÉ in conjunction with Translink, the Railway Undertaking in Northern Ireland. These operations are carried out under IÉ's Safety Case and Translink is classified as a guest operator. A heritage Railway Undertaking, the Railway Preservation Society of Ireland, also operates steam trains on the heavy rail system several times a year. The performance of the national heavy rail system is reported to the European Railway Agency (ERA) in accordance with European reporting requirements.

The Luas light rail system is owned by the Railway Procurement Agency. Veolia Transport is the Railway Undertaking that operates passenger services, the passenger stops and the Central Control Room. Veolia is also the Infrastructure Manager responsible for the maintenance of the infrastructure.

The Bord Na Móna industrial railway is owned and operated by Bord Na Móna, acting as the Railway Undertaking and Infrastructure Manager for the transport of peat on its network. As this is an industrial railway and does not carry passengers it only falls within the RAIU's remit where the railway interfaces with the public, at level crossings and bridges, and other railways, at bridges.

The operational heritage railway systems in 2012 include: Cavan and Leitrim Railway; Difflin Railway; Fintown Railway; Irish Steam Preservation Society; Lartigue Monorailway; Waterford and Suir Valley Railway; and West Clare Railway. Each of these acts as the Railway Undertaking and Infrastructure Manager for their system.

2.3 Non-investigative activities

As part of its role as an NIB, the RAIU actively participates in the development of accident investigation processes and procedures through the work of ERA. To this end, the RAIU participated in the 2012 NIB plenary meetings and provided input on the direction of NIB related work. RAIU was also a member of the ERA taskforce set up to develop a system of cross auditing for the NIBs.

The RAIU continued to participate in a joint working group with the Air Accident Investigation Unit and the Marine Casualty Investigation Board on the formation of a multimodal investigation body within the Department of Transport, Tourism and Sport.

The RAIU attended the International Railway Safety Conference, as part of this event, continued to engage with NIBs from other countries by chairing the NIB Stakeholders meetings.

The Memorandums of Understanding entered into with the Transportation Safety Board of Canada and the Rail Accident Investigation Board of the United Kingdom of Great Britain and Northern Ireland remains in place. The RAIU continued to work towards the possibility of further Memorandums of Understandings with Health and Safety Authority, An Garda Síochána and the Coroner's Society of Ireland.

3. Occurrences

3.1 Classification of occurrences

Occurrences fall into one of three types as defined in Statutory Instrument (SI) no. 61 of 2008:

- Accident – An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences including collisions, derailments, level crossing accidents, accidents to persons caused by rolling stock in motion, fires and others;
- Serious accident – Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety, where extensive damage means damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total;
- Incident – Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation.

For clarity the meaning of the following terms should be noted:

- Harmful consequences – Injury to persons and/or damage to equipment;
- Serious injury – Any injury requiring hospitalisation for over 24 hours.

3.2 Investigation of occurrences

The RAIU have investigators on call, 24 hours a day, 7 days a week, who are notified of reportable occurrences by the Railway Undertakings in accordance with the Railway Safety Act 2005. Based on the nature of the occurrence and the legal requirements, a decision is made on whether or not an investigation is required. In accordance with the Railway Safety Directive, the RAIU must investigate serious accidents; accidents and incidents are investigated depending on the potential for safety lessons to be learnt.

Where notified occurrences warrant further investigation to determine whether or not an investigation is warranted a preliminary examination is carried out and one of the following four determinations is made:

- No further investigation – no safety improvements are likely to be identified that could have prevented the occurrence or otherwise improve railway safety;
- Monitor railway investigation – the investigation of the railway organisation with responsibility for the party investigation is monitored for adequacy and to ensure any further information that comes to light is taken into account by the RAIU;

- Trend investigation – where the occurrence is part of a group of related occurrences that may or may not have warranted an investigation as individual occurrences, but the apparent trend warrants investigation;
- Full investigation – there is clear evidence that the occurrence could have been prevented or the severity of the outcome could have been mitigated through the actions of those parties involved either directly or indirectly in the installation, operation and maintenance of the railway.

Investigations are classified as one of three types under the Railway Safety Directive:

- Article 19(1) – Investigations into serious accidents on the IÉ network, the objective of which is possible improvement of railway safety and the prevention of accidents;
- Article 19(2) – Investigation into accidents and incidents, which under slightly different conditions might have led to serious accidents on the IÉ network;
- Article 21(6) – Investigations into railway accidents and incidents under national legislation, this includes all investigations relating to the Luas light rail system, the Bord Na Móna industrial railway and the heritage railways.

For each investigation, the level of damage to rolling stock, track, other installations or environment is identified and classified based on the European common safety indicators as follows:

- None;
- Less than €150,000 (<€150,000);
- Equal to or greater than €150,000 (≥€150,000);
- Equal to or greater than €2,000,000 (≥€2,000,000).

Within seven days of a decision to carry out a full investigation, the RAIU advise the relevant railway undertaking of the decision. In accordance with SI no. 61 of 2008, the RAIU also notify the ERA within seven days of a decision to carry out a full investigation into an occurrence on the IÉ network.

The RSC, An Garda Síochána, the Health and Safety Authority and other organisations may carry out investigations in parallel with an RAIU investigation. The RAIU will share its own technical information with these Investigation Bodies, however, the investigations are carried out independently. Based on its investigation, the RAIU produce a report that is provided to all relevant parties, including the Railway Undertaking, the RSC and the Department of Transport, Tourism and Sport. Reports relating to the IÉ network are also provided to ERA. All investigation reports are made available in the public domain once they have been published.

In accordance with the Railway Safety Act 2005, for all occurrences notified to the RAIU the relevant railway must carry out an investigation and produce a report within six months.

3.3 Summary of occurrences in 2012

There were thirty five preliminary examinations carried out in 2012. These are broken down into serious accidents, accident and incidents, by network, in Table 1. From the preliminary examination reports produced, three full investigations were commenced; these are detailed in section 4.

Table 1 – Preliminary examination reports in 2012 by network

Railway Network	Serious Accidents	Accidents	Incidents
IÉ	6	17	7
Luas	1	3	0
Heritage railways	0	1	0
Bord Na Móna	0	0	0
Total	7	21	7

3.4 Investigations within the past five years

Table 2 shows the areas that have been examined through the RAIU investigations by occurrence type over the past five years. The occurrences are presented for all railways and for the IÉ network only. It should be noted that five of these occurrences that were investigated in 2012 were part of a trend investigation and therefore addressed in a single report. Table 2 shows the RAIU's investigations by type for 2012 and for the past five years. Occurrences at level crossings and derailments remain the main focus of RAIU's investigations over the last five years. However, the trend investigation into possession management has contributed to an increase in the sub-set designated 'other incidents' in the 2012.

Table 2 – Full investigations within the past five years by type

Occurrence		Year					5 year total	
Type	**Subset**	2008	2009	2010	2011	2012	**Total**	**%**
Serious accident	Serious Accident - Collisions	0	0	0	0	0	0	0.00
	Serious Accident - Derailments	0	0	0	0	0	0	0.00
	Serious Accident - Level crossing	1	0	2	0	0	3	10.34
	Serious Accident - To persons due to rolling stock in motion	0	0	0	0	0	0	0.00
	Serious Accident - Fires	0	0	0	0	0	0	0.00
	Serious Accident - Others	0	1	0	0	0	1	3.45
Accident	Accident - Collisions	0	3	0	1	0	4	13.79
	Accident - Derailments	1	2	2	0	1	6	20.69
	Accident - Level crossing	2	0	2	1	1	6	20.69
	Accident - To persons due to rolling stock in motion	0	0	0	0	0	0	0.00
	Accident - Fires	0	0	0	0	0	0	0.00
	Accident - Others	0	0	1	1	1	3	10.34
Incident	Incident - Infrastructure	0	0	0	0	0	0	0.00
	Incident - Energy	0	0	0	0	0	0	0.00
	Incident - Control-command & signalling	0	0	0	0	0	0	0.00
	Incident - Rolling stock	0	0	0	0	0	0	0.00
	Incident - Traffic operation & management	1	1	0	0	0	2	6.90
	Incident - Others	0	0	0	0	4	4	13.79
Annual Total		5	7	7	3	7	29	**100**

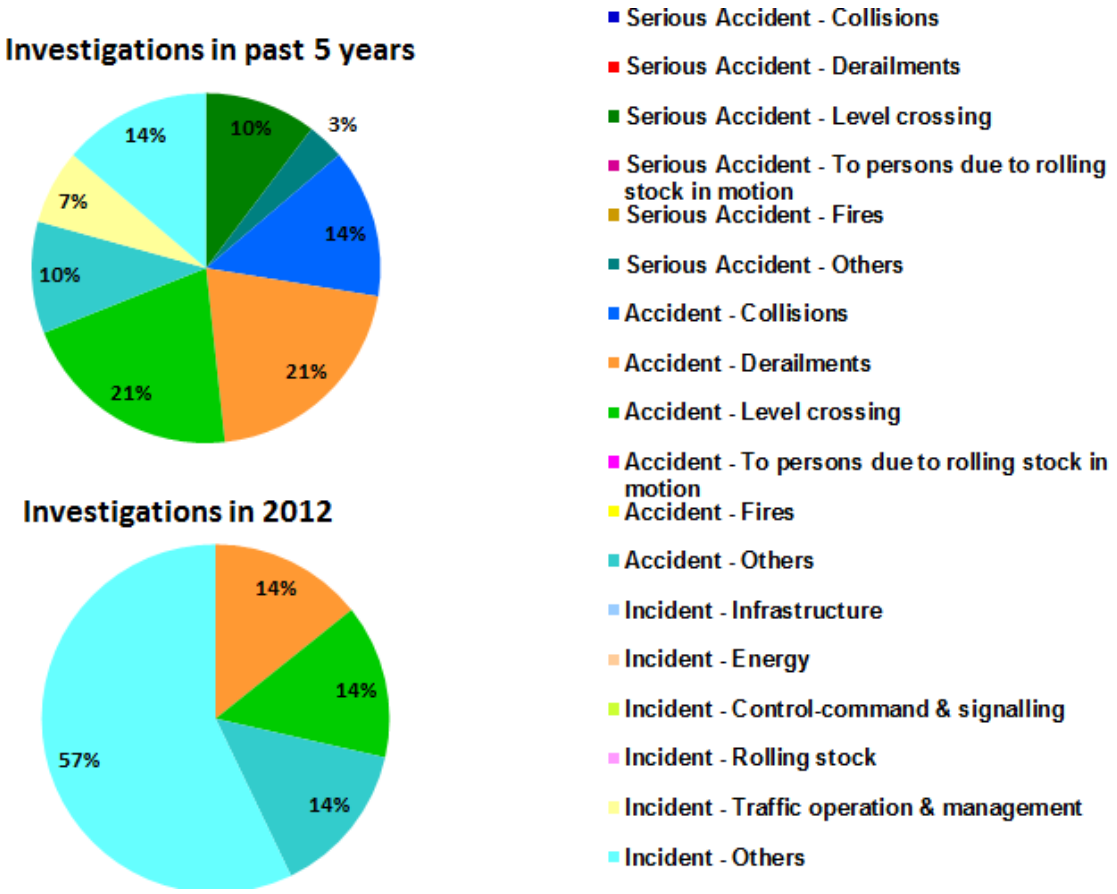

Figure 2 – Investigation trend 2008-2012

4. Investigations commenced in 2012

4.1 Possession incidents occurring on IÉ network

In 2012 Iarnród Éireann (IÉ) had four possession related incidents within the space of one week. These incidents lead to the RAIU to initiate a trend investigation on the 27/02/2012. The scope of the trend investigation included the four aforementioned incidents and nineteen other relevant reported possession incidents that occurred between January 2009 to January 2013.

4.2 Road vehicle struck at level crossing XE020

On the 20th June 2012 at 14:50 hours the 14:15 hours passenger train travelling from Limerick to Galway was involved in a collision with a tractor at level crossing number XE020 which is located close to Cratloe, County Clare on the R462. The driver of the train was initially unaware of the collision and continued to Sixmilebridge Station. The tractor driver although shocked was uninjured and the tractor sustained frontal damage.

Occurrence classification:
Accident
Subset:
Level crossing
Investigation classification:
Article 19(2)
Fatalities and injuries:
Minor injuries
Damage:
<€150,000

Figure 3 – Tractor Collision at XE020

4.3 Explosion on Dart at Bray Station

On the 6th of March 2012 the 08.00 DART service from Greystones to Malahide was stationary at platform 2, in Bray Railway Station awaiting a driver change over. The relief driver entered the cab at 08.10hrs, intending to drive the DART all stops to Malahide

As the driver placed his leather drivers' bag on the floor of the DART cab, eleven of the twelve Railway Fog signals that he was carrying in the bag exploded. The driver sustained injuries to his hand and suffered some temporary loss of hearing. The interior of the cab was superficially damaged.

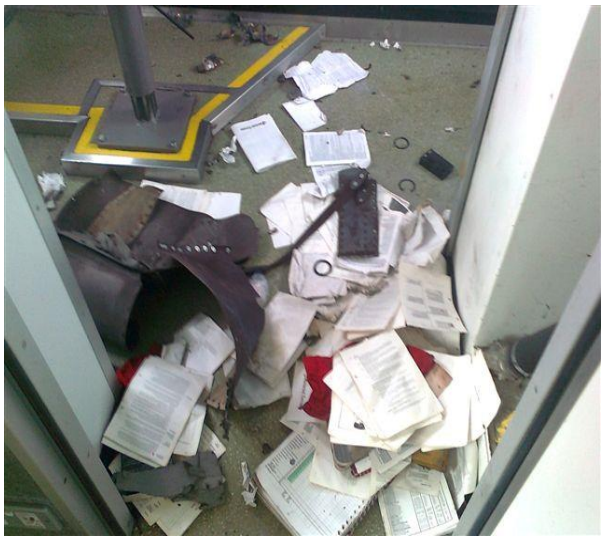

Figure 4 – Damage to drivers' bag and cab

Occurrence classification:

Accident.

Subset:

Others

Investigation classification:

Article 19(2)

Fatalities and injuries:

Minor injuries

Damage:

<€150,000

5. Investigation reports published in 2012

5.1 Overview of investigation reports for 2012

The RAIU published three investigation reports in 2012. These related to: one level crossing accident, one locomotive runaway and one equipment failure on a train. A total of thirteen new safety recommendations were made.

5.2 Road vehicle struck at level crossing XG 173

Figure 5 – Car strike at XG173

At approximately 12:00 hours on Monday 14th February a waste collection vehicle crew, who regularly used the Morrough level crossing (XG173) to collect waste from the private residence, Murrough House, opened the gates of the level crossing and passed over the level crossing. The crew left the level crossing gates open while they collected waste, a task that usually took only a few minutes. At approximately 12:13 hours a car approached the level crossing with the gates still open. The car slowly drove onto the level crossing. At approximately the same time, the 09:30 hours passenger service from Heuston to Galway approached the level crossing. On seeing the car, the train driver sounded the horn twice and applied the emergency brake. The train struck the car as the car's driver was attempting to reverse off the level crossing. Both occupants of the car were treated for their injuries at the local hospital and released later the same day.

- The immediate cause of the accident was that:

The car stopped at the level crossing in a position that encroached into the path of the approaching train, and was then struck by the train while attempting to reverse off the level crossing.

The contributory factors were:

- The level crossing gates, which provide a barrier to the railway, were open when the car arrived at the level crossing;
- The signage present at the Level Crossing was not successful in communicating to the car driver that he was approaching a Level Crossing or in conveying any of the dangers associated with level crossings;
- There were no warning signs on the approach to the level crossing to alert the car driver that he was approaching a level crossing.

The underlying factors were:

- IÉ did not comply with their own internal standard for the certification of changes to infrastructure on the network;
- IÉ independently developed the new style signage, without proper consultation with the Railway Safety Commission or other parties;
- The Railway Safety Commission adopted an informal approach to the oversight of IÉ's signage design.

Four safety recommendations were made:

- IÉ should review the suitability of the signage at user worked crossings on public and private roads, ensuring that human factors issues are identified and addressed;
- IÉ should liaise with local authorities where private road level crossings can be accessed from a public road to ensure there is advance warning to road users;
- IÉ should ensure that they adopt their own standards in relation to design changes to any plant, equipment, infrastructure or operations that have the potential to affect safety;
- The Railway Safety Commission should ensure that they adopt a formal approach to submissions made by IÉ in relation to design changes to any plant, equipment, infrastructure or operations that has the potential to affect safety.

5.3 Runaway locomotive at Portlaoise Loop

Figure 6 – Runaway locomotive

On the morning of the 29th September 2011 a Train Driver was rostered to drive a locomotive around Portlaoise Rail Depot to carry out preparatory works for a planned possession. He collected a locomotive from Limerick Junction and travelled to Portlaoise without incident. As part of his manoeuvre into Portlaoise Rail Depot he was required to change driving cab, disembark the locomotive and set the route, at a set of points, into Portlaoise Rail Depot. While setting the route the Train Driver saw the locomotive rolling away from him, down the gradient, towards Portlaoise Station.

The locomotive travelled approximately 306 metres from its stationary position, passing a signal at danger, running over a set of points and striking the buffer stop in the former Bay Platform road at Portlaoise Station, before continuing to travel another 9 m approximately until finally coming to a stop.

There were no passengers or other crew members on the locomotive and nobody was injured as a result of the occurrence. There was no damage to the to the locomotive or buffer stop as a result of the accident.

The immediate cause of the locomotive running away, whilst left unattended on a gradient, was the gradual release of the brakes. This was as a result of the following causal factors, which were necessary for the accident to occur:

- An air leak in part of the braking system;
- The train driver did not fully comply with the instructions for vacating and occupying locomotive cabs, set out in Iarnród Éireann's Drivers' Manual.

The contributory factors were

- The overhaul in the braking system did not occur within the allocated time and therefore the locomotive was only subject to examination which did not include the brake leakage test which may have detected any faults in the braking system;
- The leak in the braking system was not detected during any pre-service checks carried out by the train drivers.

The underlying factors were:

- There was no quality control system in place for the updating of testing procedures which resulted in the omission of the brake leakage test from the newer procedures;
- IÉ's Drivers' Manual for 071 class locomotives had not been formally briefed to train drivers on its introduction in 2005, resulting in the train driver not fully appreciating the necessity of the brake leakage test included in the pre-service checks, or the necessity to carry out the braking instructions, in full, in relation to vacating and occupying locomotive cabs;
- There was no system in place to ensure that train drivers are routinely assessed in relation to changing cab ends on locomotives.

Four new safety recommendations were made

- IÉ should review their Vehicle Maintenance Instructions for locomotives to ensure that there are adequate braking tests at appropriate intervals;
- IÉ should adopt a quality control system, for the introduction of new maintenance procedures for locomotives;
- IÉ should review their system for introducing new train drivers' manuals, to ensure that train drivers are fully trained and assessed in all aspects of these manuals;
- IÉ should review their competency management system for train drivers to ensure that all driving tasks are routinely assessed.

Figure 7 – Failed bearing on locomotive 233

Bearing failure on a train a Connolly Station

At 17:45 hours on the 18th October 2011, the 16:10 hours service from Belfast to Dublin passed a Hot Axlebox Detector (HABD) near Drogheda triggering an alarm on the Sligo and Northern Signalman's panel in Centralised Traffic Control. The Sligo and Northern Signalman advised the Suburban Signalman of the alarm, who then contacted the Train Driver to request that the train be stopped and inspected. The Train Driver inspected all of the axleboxes on the train and found no issues.

The train was then allowed to continue its journey to Connolly Station. When the train arrived at Connolly Station it was inspected by a member of maintenance staff, one of the axleboxes on the locomotive was found to be red hot and smoking. An axle journal bearing on the locomotive, which was positioned at the rear of the train, had failed.

The immediate cause of the bearing failure could not be determined due to the extensive damage to the bearing, which can occur following substantial overheating and deformation of the material as in this case.

The contributory factors identified were:

- The Train Driver could not identify the presence of the fault with the bearing when inspecting the axlebox;
- The information provided by the Signalman to the Train Driver did not include the type of hot axlebox detector alarm and which axlebox on the train triggered the alarm, rendering the task of identifying the overheating the axlebox unnecessarily more difficult;
- The lack of technical support provided by Fleet Technical Services following the hot axlebox detector alarm allowed the bearing to remain in service with no further monitoring until the train reached its destination.

The underlying factors identified were:

- There were no controls in place to address the subjective observation of overheating bearings by train drivers;
- The competency management system for signalmen in Centralised Traffic Control did not address the competency assessment of signalmen in relation to hot axlebox detector alarms;
- There were no procedures in place governing Fleet Technical Services support following hot axlebox detector alarms.

Three safety recommendations were made:

- IÉ should put in place provisions to assist train drivers with the task of identifying if there is a fault present with an axlebox;
- IÉ should ensure the competency management system for signalmen includes the assessment of HABD related functions they perform;
- IÉ should put in place formal procedures governing the role of Fleet Technical Services staff in relation to hot axlebox detectors.

Two further safety recommendations, relating to additional observations were also made.

- IÉ should ensure that a robust system is put in place for the competency assessment of safety critical rolling stock maintenance staff;
- IÉ should update its competency management system for train drivers to include assessment of their competency in relation to their tasks following a HABD alarm.

6. Safety recommendations

6.1 Monitoring of RAIU safety recommendations

Under the Railway Safety Act 2005, the RSC is responsible for monitoring the implementation of RAIU recommendations. All safety recommendations issued by RAIU are addressed to the RSC unless otherwise stated and the implementers are identified in the recommendation. The recommendations issued by the RAIU are reviewed by RSC for acceptability and where RSC accept the recommendations it monitors their implementation. Table 3 identifies the three status codes assigned to recommendations by RSC and the definition of each.

Table 3 – Recommendation status descriptions

Status	Description
Open	Feedback from implementer is awaited or actions have not yet been completed.
Complete	Implementer has taken measures to effect the recommendation and the RSC is considering whether to close the recommendation.
Closed	Implementer has taken measures to effect the recommendation and the RSC has considered these and has closed the recommendation.

Open recommendations are those for which RSC has received some or no update from the organisation or organisations responsible for implementing the recommendation and for which further action is deemed to be required by RSC. This status is assigned by RSC.

Complete recommendations are those where the organisation responsible for implementing the recommendation is satisfied that it has carried out the necessary actions to address the recommendation and for which RSC has received evidence of implementation that it will review to determine whether or not the recommendation is closed. This status is advised to RSC by the organisation or organisations responsible for implementing the recommendation.

Closed recommendations are those for which RSC is satisfied that the organisation responsible for implementing the recommendation has taken suitable action to address the recommendation. This status is assigned by RSC.

6.2 Progress in 2012

The progress with the implementation of recommendations in 2012 is shown in Table 4. The status of forty four recommendations did not change in 2012, of which nine were issued in 2012. The status of fourteen recommendations was upgraded from open to complete, of which four were issued in 2012. The status of two recommendations was upgraded from complete to closed. The status of one recommendation was upgraded from open to closed.

Table 4 – Progress with recommendations in 2012

Status	End 2011	New in 2012	End 2012
Open	31	9	29
Complete	17	4	29
Closed	29	0	32
Total	77	13	90

The RSC as the NSA for Ireland holds meetings with the relevant stakeholders to monitor the progress of recommendations. An update is included in the Appendix on the status of individual recommendations that were not closed prior to 2012 and the recommendations are listed in chronological order by investigation report. For clarity and completeness a comment has been included on the status of individual recommendations.

6.3 Summary of status of recommendations

As of the 31st December 2012 the RAIU have made 90 recommendations, in addition to these the RAIU have included the 14 recommendations made by RSC in its investigation report published in 2006 on the collapse of the Cahir viaduct in 2003. All recommendations were accepted by their Addressee and the Implementer. The status of the recommendations as of the end of 2012 is included in Table 5.

Table 5 – Status of recommendations by year

Year	Recommendations	Accepted by implementer	Open		Complete		Closed	
			No.	%	No.	%	No.	%
2006	14*	14	1	7.14	3	21.43	10	71.43
2007	-	-	-	-	-	-	-	-
2008	7	7	1	14.29	2	28.57	4	57.14
2009	13	13	1	7.69	3	23.08	9	69.23
2010	26	26	8	30.77	9	34.62	9	34.62
2011	17	17	9	52.94	8	47.06	0	-
2012	13	13	9	69.23	4	30.77	0	-
Total	**90**	**90**	**29**		**29**		**32**	

*Recommendations issued by the RSC

The overall progress with the closure of recommendations is shown in Figure 9. Over a third of all recommendations have been closed and over thirty percent of recommendations are at a stage where the organisation responsible for implementing them believes they have been fully addressed.

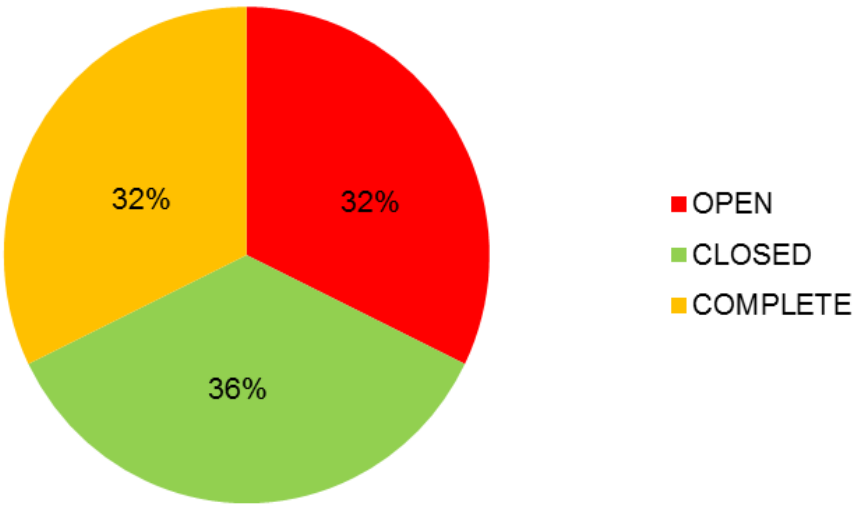

Figure 8 – Status of recommendations

Appendix – Status of individual recommendations by report

Investigation report no. None	**Issued** July 2006	
Inquiry into the Derailment of a Freight Train at Cahir Viaduct on 7th October 2003		
Recommendations		Total no. 14
2006-001	IÉ should conduct a review of its safety management system to identify all areas where design, inspection and maintenance procedures are not fully developed and documented, and should establish a programme to develop and implement the necessary specifications and standards prioritised on the basis of safety risk. The content and structure of each specification or standard should reflect the safety criticality of the various elements of the associated procedure or physical asset.	
	Comment: No change of status in 2012.	Status: Complete
2006-003	IÉ should review the derailment containment arrangements on its various structures and make whatever modifications might be required to ensure that they are fit for purpose and capable of preventing disproportionate failure.	
	Comment: No change of status in 2012.	Status: Open
2006-009	IÉ should ensure that, pending full implementation and validation of new data management systems including those currently in course of development, comprehensive and up to date records of infrastructure asset inspection and maintenance are maintained and that relevant data is effectively promulgated to inspectors, maintainers and managers.	
	Comment: Status upgraded from open to complete in 2012	Status: Complete
2006-015	IÉ should review its existing communications systems and take whatever action is necessary to ensure that on all parts of system train drivers are provided with an effective means of communication with the controlling signalman.	
	Comment: No change of status in 2012.	Status: Complete

Note: Recommendation 2006-014 does not exist.

Investigation report no. 07062801	**Issued** 18th June 2008	
Report into the Collision at Level Crossing XN 104 between Ballybrophy and Killonan on the 28th of June, 2007		
Recommendations		Total no. 7
2008-001	IÉ to review the various sources of information relevant to level crossings and develop a standard, or suite of standards, consolidating information on: civil engineering specifications; signage specifications; visibility of approaching trains; and inspection and maintenance. Ensuring effective implementation and compliance	
	Comment: Status upgraded from open to complete in 2012.	Status: Complete
2008-002	IÉ to develop a robust system that identifies current landowners who have crossings on their property and records the delivery of information to them. This should include the distribution of information to known contractors and should consider timely reminders coming up to the silage season.	
	Comment: Status upgraded from complete to closed in 2012.	Status: Closed
2008-003	IÉ to develop and implement a vegetation management programme that addresses vegetation management on a risk basis, prioritising high risk areas.	
	Comment: Status upgraded from open to complete in 2012.	Status: Complete
2008-004	IÉ to ensure that a system is put in place for effective implementation of existing standards and to manage the timely introduction of new and revised standards, this should include departmental instructions.	
	Comment: No change of status in 2012.	Status: Open

Investigation report no.	08022801	Issued	2nd March 2009	
Report into the Fatality at Level Crossing XX 032 between Ballina and Manulla Junction on the 28th of February 2008				
Recommendations				Total no. 4
2009-001	The RSC should carry out a review of the suitability of this type of level crossing on public roads. This review should include, but not be limited to, factors such as continual misuse, signage, user mobility, environmental and human factors.			
	Comment	Status upgraded from open to closed in 2012.		Status: Closed
2009-002	IÉ should, taking into account the close proximity of the three level crossings, close or upgrade some or all of these crossings.			
	Comment	A decision on a planning application for the upgrade of an existing underbridge in order to close the three level crossings was refused in 2012, for the second time. Status remains as open.		Status: Open
2009-003	IÉ must identify crossings that are regularly misused and take proactive action to manage the increased risk created by this misuse.			
	Comment	No change of status in 2012.		Status: Complete

Investigation report no.	08073101	Issued	29th July 2009	
Collision between a train and a road vehicle at level crossing XN125, Cappadine, on the Ballybrophy to Killonan line 31st of July 2008				
Recommendations				Total no. 2
2009-009	IÉ should assess the risks relating to road users' behaviour in identifying a safe stopping position at User Worked Level Crossings and based on the outcome of this risk assessment, IÉ should introduce measures to allow safe use of this type of level crossing. This recommendation was reiterated by RAIU in 2011 as part of investigation report 2011-007.			
	Comment	Status upgraded from open to complete in 2012.		Status: Complete
2009-010	IÉ should carry out risk assessments on level crossings that fail to meet the viewing distances specified in the RSC guidance and implement appropriate measures in order to meet this guidance as a minimum.			
	Comment	No change of status in 2012.		Status: Complete

Investigation report no.	R2010-003	Issued	10th June 2010
Derailment of an on track machine at Limerick Junction Station on the Dublin to Cork Line, 3rd of July 2009			
Time & Date	04:50, 3rd July 2009	Location	Limerick Junction Station
Railway	IÉ	Line	Dublin to Cork line
Recommendations			Total no. 2
2010-003	IÉ should put in place a formalised process to ensure that life expired points are removed from service, where this is not possible a risk assessment should be carried out and appropriate controls should be implemented to manage the risks identified.		
	Comment	No change of status in 2012	Status: Complete

Investigation report no.	2010-R004	Issued	16th August 2010
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009			
Time & Date	18:20, 21st August 2009	Location	Malahide viaduct
Railway	IÉ	Line	Dublin to Belfast line
Recommendations			Total no. 15
2010-008	IÉ should introduce a verification process to ensure that all requirements of their Structural Inspections Standard, I-STR-6510, are carried out in full.		
	Comment	No change of status in 2012.	Status: Complete
2010-009	IÉ should ensure that a system is put in place for effective implementation of existing standards and to manage the timely introduction of new and revised standards.		
	Comment	No change of status in 2012.	Status: Open
2010-011	IÉ should carry out inspections for all bridges subject to the passage of water for their vulnerability to scour, and where possible identify the bridge foundations. A risk-based management system should then be adopted for the routine examination of these vulnerable structures.		
	Comment	No change of status in 2012. The project to implement this recommendation is in progress.	Status: Open
2010-012	IÉ should develop a documented risk-based approach for flood and scour risk to railway structures through: Monitoring of scour risk at sites through scour depth estimation, debris and hydraulic loading checks, and visual and underwater examination; Provision of physical scour / flood protection for structures at high risk; Imposing of line closures during periods of high water levels where effective physical protection is not in place.		
	Comment	Status upgraded from open to complete in 2012	Status: Complete

Investigation report no.	2010-R004	Issued	16th August 2010
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009			
Time & Date	18:20, 21st August 2009	Location	Malahide viaduct
Railway	IÉ	Line	Dublin to Belfast line
Recommendations			Total no. 15

2010-013	IÉ should adopt a formal process for conducting structural inspections in the case of a report of a structural defect from a member of the public.		
	Comment	No change of status in 2012. Staff notices are posted on a regular basis.	Status: Complete
2010-014	IÉ should introduce a training, assessment and competency management system in relation to the training of structural inspectors, which includes a mentoring scheme for engineers to gain the appropriate training and experience required to carry out inspections.		
	Comment	No change in status in 2012. A competency management standard has been issued.	Status: Complete
2010-015	IÉ should review their network for historic maintenance regimes and record this information in their information asset management system. For any future maintenance regimes introduced on the network, IÉ should also record this information in their information asset management system.		
	Comment	No change of status in 2012. Project to implements this recommendation is in progress.	Status: Open
2010-017	IÉ should carry out an audit of their filed and archived documents, in relation to structural assets, and input this information into their information asset management system.		
	Comment	No change of status in 2012. Archiving of bridge data is taking place.	Status: Open
2010-018	The RSC should review their process for the closing of recommendations made to IÉ by independent bodies, ensuring that they have the required evidence to close these recommendations. Based on this process the RSC should also confirm that all previously closed recommendations satisfy this new process.		
	Comment	No change of status in 2012. RSC has reviewed and updated its procedures for the management of safety recommendations; these were published in the first quarter of 2012. A review of the safety recommendations issued by AD little and IRMS is taking place.	Status: Open

Investigation report no.	2010-R004	Issued	16th August 2010
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009			
Time & Date	18:20, 21st August 2009	Location	Malahide viaduct
Railway	IÉ	Line	Dublin to Belfast line
Recommendations			Total no. 15

2010-019	The RSC, in conjunction with IÉ, should develop an action plan in order to close all outstanding recommendations in the AD Little Review (2006) and the International Risk Management Services Reviews (1998, 2000, and 2001). This action plan should include defined timescales for the implementation and closure of all these recommendations.		
	Comment	No change of status in 2012. A review of the safety recommendations issued by AD little and IRMS is taking place.	Status: Open

Investigation report no.	2010-R005	**Issued**	24th August 2010
Irregular operation of Automatic Half Barriers at Fern's Lock, County Kildare, on the Dublin to Sligo Line, 2nd September 2009			
Occurrence date	2nd September 2009	**Location**	Level crossing XG019
Railway	IÉ	**Line**	Dublin to Sligo line
Recommendations			Total no. 1

2010-020	IÉ should review the competencies of all signalmen to ensure that when signalmen are assigned relief duties they have the required training and experience to perform these duties appropriately.		
	Comment	No change of status in 2012.	Status: Open

Investigation report no.	2010-R006	Issued	15th November 2010
Derailment of empty train due to collision with landslip debris outside Wicklow Station, 16th of November 2009			
Occurrence date	16th November 2009	Location	28 ½ milepost
Railway	IÉ	Line	Dublin to Rosslare Europort
Recommendations			Total no. 6

2010-021	IÉ should review their vegetation management processes to ensure that vegetation covering substantial earthworks structures is adequately maintained to facilitate the monitoring and inspection of earthwork structures by patrol gangers and other inspection staff.		
	Comment	Status upgraded from open to complete.	Status: Complete
2010-022	IÉ should review the effectiveness of their standards in relation to conducting earthworks inspections during periods of heavy rainfall, ensuring that earthworks vulnerable to failure are inspected during these periods by appropriately trained patrol gangers or inspectors.		
	Comment	No change of status in 2012.	Status: Complete
2010-023	IÉ should review their Standard for Track Patrolling, I-PWY-1307, for its effectiveness in identifying any third party activities that occur inside and outside the railway boundaries that could affect safety and where any deficiencies are found, IÉ should develop an alternative process for the identification of these third party activities.		
	Comment	Status upgraded from complete to closed in 2012.	Status: Closed

Investigation report no.	2010-R006	Issued	15th November 2010
Derailment of empty train due to collision with landslip debris outside Wicklow Station, 16th of November 2009			
Occurrence date	16th November 2009	Location	28 ½ milepost
Railway	IÉ	Line	Dublin to Rosslare Europort
Recommendations			Total no. 6

2010-024	IÉ should review their structures list and ensure that all earthworks are identified and included on this list. Upon updating this list, a programme for the inspection of earthworks is to be developed and adopted at the frequency requirements set out by the Structural Inspections Standard, I-STR-6510.		
	Comment	No change of status in 2012. The project to implement this recommendation is in progress.	Status: Open
2010-025	IÉ and the RSC should review their process for the issuing of guidance documents, to ensure that the third parties affected by these guidance documents are made aware of their existence.		
	Comment	No change of status in 2012.	Status: Complete
2010-026	IÉ should review the effectiveness of their Structural Inspections Standard, I-STR-6510, with consideration for the possibility of more thorough inspections being carried out on cuttings to establish the topography and geotechnical properties of cuttings; and from this information identify any cuttings that are vulnerable to failure.		
	Comment	No change of status in 2012.	Status: Complete

Investigation report no.	2011-R001	Issued	19th January 2011
Laois Traincare Depot Derailment, 20th January 2010			
Occurrence date	20th January 2010	Location	Laois Traincare Depot
Railway	IÉ	Line	Dublin to Cork line
Recommendations			Total no. 2

2011-001	IÉ should ensure that the risks relating to use of spring assisted manual points are identified and that appropriate control measures are implemented based on the risks identified.		
	Comment	No change of status in 2012.	Status: Open
2011-002	IÉ should ensure that the Signal Sighting Committee is informed when train drivers report difficulties viewing a signal and the Signal Sighting Committee should verify that the reported difficulties are addressed effectively.		
	Comment	No change of status in 2012.	Status: Complete

Investigation report no.	2011-R002	Issued	5th May 2011
Secondary suspension failure on a train at Connolly Station, 7th May 2010			
Occurrence date	7th May 2010	Location	Connolly Station
Railway	IÉ	Line	Dublin to Sligo line
Recommendations			Total no. 3

2011-003	IÉ should ensure all work in rolling stock maintenance depots is carried out in accordance with its control process.		
	Comment	No change of status in 2012.	Status: Complete
2011-004	IÉ should review its process of managing the hazard log in relation to the Class 29000s to ensure the adequacy of this process and verify that implementation of closure arguments in the hazard log is effective.		
	Comment	No change of status in 2012.	Status: Open
2011-005	IÉ should evaluate the risks relating to failure of the centre pivot pin to perform its function due to over-inflation of the secondary suspension and determine if any design modifications are required to avoid future failures.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete

Investigation report no.	2011-R003	**Issued**	11th May 2011
Tram derailment at The Point stop, Luas Red Line, 13th May 2010			
Occurrence date	11th May 2010	**Location**	The Point stop
Railway	IÉ	**Line**	Luas Red line
Recommendations			Total no. 1

2011-006	Veolia should introduce a communication protocol between normal and emergency for given situations where a clear understanding between a tram driver and Central Control Room are required.		
	Comment	No change of status in 2012.	Status: Complete

Investigation report no.	2011-R004	Issued	27th June 2011
Gate Strike at Buttevant Level Crossing (XC 219), County Cork, on the 2nd July 2010			
Occurrence date	2nd July 2010	Location	Level crossing XC219
Railway	IÉ	Line	Dublin to Cork line
Recommendations			Total no. 2

2011-007	IÉ should identify similar manned level crossings where human error could result in the level crossing gates being opened to road traffic when a train is approaching; where such level crossings exist, Iarnród Éireann should implement engineered safeguards; where appropriate.		
	Comment	No change of status in 2012.	Status: Open
2011-008	IÉ should review its risk management process for manned level crossings to ensure that risks are appropriately identified, assessed and managed to ensure that existing level crossing equipment is compliant with criteria set out in Iarnród Éireann's signalling standards, where appropriate.		
	Comment	No change of status in 2012.	Status: Complete

Investigation report no.	2011-R005	Issued	18th July 2011
Person struck at level crossing XE039, County Clare, 27th June 2010			
Occurrence date	27th June 2010	Location	Level crossing XE039
Railway	IÉ	Line	Limerick to Claremorris line
Recommendations			Total no. 3

2011-009	IÉ should ensure that risk assessments are produced for all user worked level crossings to identify all hazards specific to particular level crossings.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
2011-010	IÉ should review their documentation on the measurement of viewing distances at existing user worked level crossings to ensure that the viewing distances provide sufficient views of approaching trains to allow level crossing users cross safely.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
2011-011	IÉ should review their procedures for the management of accidents to ensure that communication with the emergency services is clear and provides the necessary information to locate an accident site without undue delay and access it by the most appropriate point.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
Note	Recommendation 2008-003 from investigation report 07062801 was reiterated.		

Investigation report no.	2011-R006	Issued	4th October 2011
Road vehicle struck at level crossing XM096, County Roscommon, 2nd September 2010			
Occurrence date	2nd September 2010	Location	Level crossing XM096
Railway	IÉ	Line	Athlone to Westport line
Recommendations			Total no. 5

2011-012	IÉ should put in place a formal process for identifying and communicating with known users of user worked level crossings.		
	Comment	No change of status in 2012.	Status: Open
2011-013	IÉ should review the effectiveness of its signage at user worked level crossings, and amend it where appropriate, taking into account the information provided in the level crossing user booklet. The review should include the information on the use of railway signals, what to do in case of difficulty when crossing the railway and ensuring the signage is illustrated in a clear and concise manner, taking into account current best practice and statutory requirements.		
	Comment	No change of status in 2012.	Status: Open
2011-014	IÉ should update its risk management system to ensure that interim control measures are put in place where longer term controls to address risks require time to implement.		
	Comment	No change of status in 2012.	Status: Open
2011-015	IÉ should review how it determines the safe crossing time for user worked level crossings to ensure the safe crossing time allows adequate time for movements and includes a safety margin, over and above the crossing time.		
	Comment	No change of status in 2012.	Status: Open
2011-016	IÉ should review its use of disused rail as fencing at user worked level crossings to ensure it cannot potentially increase the severity of a collision and where this is the case, replace the disused rail with appropriate fencing.		
	Comment	No change of status in 2012.	Status: Open
Note	Recommendation 2008-003 from investigation report 07062801 was reiterated.		

Investigation report no.	2011-R007	Issued	19th October 2010
Car Strike at Knockaphunta Level Crossing (XM250), County Mayo, 24th October 2010			
Occurrence date	24th October 2010	Location	Level crossing XM250
Railway	IÉ	Line	Athlone to Westport line
Recommendations			Total no. 1
2011-017	IÉ should upgrade the Level Crossing to ensure that the operation of the Level Crossing is not reliant on any direct action by the level crossing user.		
	Comment	No change of status in 2012.	Status: Open
Note	Recommendation 2009-003 from investigation report 08022801 and recommendation 2009-009 from investigation report 08073101 were reiterated.		

Investigation report no.	2012-R001	Issued	08th February 2012
Car Strike at Murrough Level Crossing XG 173, 14th February 2011			
Occurrence date	14th February 2011	Location	Level Crossing XG 173 (Morrough)
Railway	IÉ	Line	Dublin to Galway
Recommendations			Total no. 4
2012-001	IÉ should review the suitability of the signage at user worked crossings on public and private roads, ensuring that human factors issues are identified and addressed.		
	Comment	No change of status in 2012.	Status: Open
2012-002	IÉ should liaise with local authorities where private road level crossings can be accessed from a public road to ensure there is advance warning to road users		
	Comment	No change of status in 2012.	Status: Open
2012-003	IÉ should ensure that they adopt their own standards in relation to design changes to any PEIO that has the potential to affect safety.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
2012-004	The RSC should ensure that they adopt a formal approach to submissions made by IÉ in relation to design changes to any PEIO that has the potential to affect safety.		
	Comment	No change of status in 2012.	Status: Open

Investigation report no.	2012-R002	Issued	19th September 2012
Runaway locomotive at Portlaoise Loop, 29th November 2012			
Occurrence date	29th November 2011	Location	Portlaoise Loop
Railway	IÉ	Line	Dublin to Cork
Recommendations			Total no. 4

2012-005	IÉ should review their VMIs for locomotives to ensure that there are adequate braking tests at appropriate intervals.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
2012-006	IÉ should adopt a quality control system, for the introduction of new maintenance procedures for locomotives.		
	Comment	Status upgraded from open to complete in 2012.	Status: Complete
2012-007	IÉ should review their system for introducing new train drivers' manuals, to ensure that train drivers are fully trained and assessed in all aspects of these manuals.		
	Comment	No change of status in 2012.	Status: Open
2012-008	IÉ should review their competency management system for train drivers to ensure that all driving tasks are routinely assessed.		
	Comment	No change of status in 2012.	Status: Open

Investigation report no.	2012-R003	Issued	26th September 2012
Bearing failure on a train at Connolly Station, 18th October 2012			
Occurrence date	18th October 2011	Location	Connolly Station
Railway	IÉ	Line	Dublin to Belfast
Recommendations			Total no. 5

2012-009	IÉ should put in place provisions to assist train drivers with the task of identifying if there is a fault present with an axlebox.		
	Comment	No change of status in 2012.	Status: Open
2012-010	IÉ should ensure the competency management system for signalmen includes the assessment of HABD related functions they perform.		
	Comment	No change of status in 2012.	Status: Open
2012-011	IÉ should put in place formal procedures governing the role of FTS staff in relation to HABDs.		
	Comment	No change of status in 2012.	Status: Open

Investigation report no.	2012-R003	Issued	26th September 2012	
Bearing failure on a train at Connolly Station, 18th October 2012				
Occurrence date	18th October 2011	Location	Connolly Station	
Railway	IÉ	Line	Dublin to Belfast	
Recommendations			Total no.	5
2012-012	IÉ should ensure that a robust system is put in place for the competency assessment of safety critical rolling stock maintenance staff.			
	Comment	Status upgraded from open to complete in 2012.	Status	Complete
2012-013	IÉ should update its competency management system for train drivers to include assessment of their competency in relation to their tasks following a HABD alarm.			
	Comment	No change of status in 2012.	Status	Open

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