



# Annual Report 2010

Ireland

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## Document History

Title	Annual Report 2010
Document type	Annual Report
Document number	2011-AR2010
Document issue date	28 <sup>th</sup> July 2011

Revision number	Revision date	Summary of changes

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## Foreword

The Railway Accident Investigation Unit's purpose 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.

Twenty five preliminary examinations were carried out in 2010, from which seven full investigations were commenced. Four of the full investigations involved level crossings, of which three involving manually operated level crossings being worked by members of the public and one involved a level crossing operated by railway staff that was struck by a train. The remaining three investigations involved two derailments and one instance equipment failure on a train.

Six investigations reports were published in 2010 relating to occurrences that took place in 2009. These related to: a collision between a locomotive and carriages; two derailments; the collapse of Malahide Viaduct; the irregular operation of a level crossing; and the derailment of a train that collided with a landslip. A total of 26 new recommendations were issued in 2010. The focus of the recommendations was: competency management for staff; the implementation of documentation on inspections and maintenance; the management of records; and the management of recommendations.

Sixty recommendations have been issued in total up to the end of 2010, 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. Of these, sixteen have been closed out as having been addressed, twenty three are complete and awaiting verification that they have been addressed, and a further twenty one are open.

David Murton  
Chief Investigator

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## List of abbreviations

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ERA	European Railway Agency
IE	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' (the Railway Safety Directive). This directive 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 no blame accident investigation body.

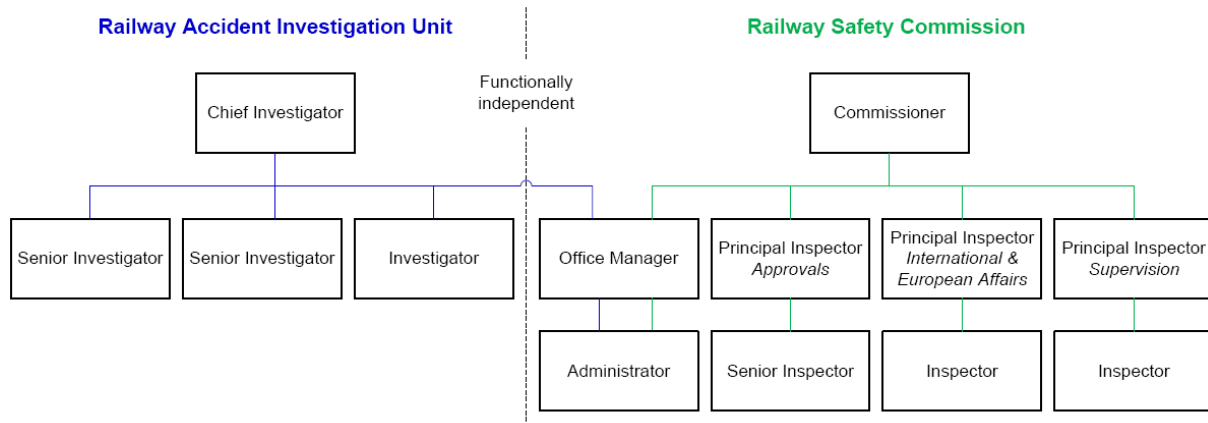
The Railway Safety Act 2005 was passed on the 23<sup>rd</sup> December 2005, transposing the Railway Safety Directive into national legislation and creating the framework for the establishment of the Railway Safety Commission (RSC). On the 1<sup>st</sup> January 2006 the RSC was established transferring the regulation of railway safety from the 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 6<sup>th</sup> 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 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, who was appointed in 2007, and a team of three investigators, which have been in place since 2009. 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**

It is planned that the RAIU, the Air Accident Investigation Unit and the Marine Casualty Investigation Board be merged into a multi-modal accident investigation body within the Department of Transport, 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.

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For each of these railway systems there are entities identified as Railway Undertaking and Infrastructure Managers in the Railway Safety Act 2005 as amended by SI no. 61 of 2008. 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 responsible for 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 boarder services are operated by IÉ in conjunction with Translink, the Railway Undertaking responsible for the management of commercial train operations, station operations and Centralised Traffic Control 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 based in Northern Ireland, the Railway Preservation Society of Ireland, also operate steam trains on the heavy rail system several times a year as a guest operator. 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 2010 include: Cavan and Leitrim Railway; Diffin 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.



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### 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 2010 NIB plenary meetings and provided input on the direction of NIB related work.

The RAIU has been participating 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. In 2010 an initial proposal for legislation was drafted and the RAIU provided input into the drafting of new legislation aimed at merging the three investigation bodies in the new independent no blame multi-modal investigation body. The RAIU is due to be co-located with the Air Accident Investigation Unit and the Marine Casualty Investigation Board in early 2011.

At the request of the Oireachtas Joint Committee on Transport, the RAIU attended two meetings of the committee in 2010 relating to the collapse of the Malahide Viaduct in August 2009.

The RAIU attended the International Railway Safety Conference, where it presented a paper on the investigation into the collapse of Malahide Viaduct in 2009. The RAIU also attended the bi-annual International Rail Accident Investigation Conference.

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 remain in place. The RAIU have engaged in work towards the possibility of further Memorandums of Understandings with 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 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 5 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 considered 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. 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 2010

There were twenty seven preliminary examinations carried out in 2010. These are broken down into serious accidents, accident and incidents by network in Table 1. From the preliminary examination reports produced, seven full investigations were commenced, these are detailed in section 4 below.

**Table 1 – Preliminary examination reports in 2010 by network**

<b>Railway Network</b>	<b>Serious Accidents</b>	<b>Accidents</b>	<b>Incidents</b>
IÉ	7	12	1
Luas	0	7	0
Heritage railways	0	0	0
Bord Na Móna	0	0	0
<b>Total</b>	<b>7</b>	<b>19</b>	<b>1</b>

### 3.4 Investigations within the past five years

The RAIU began its first investigation in 2007 following appointment of the Chief Investigator. Since then the number of full investigations launched each year has increased as the RAIU's staffing resources have grown and its processes have developed. Table 2 shows the areas that have been examined through the RAIU investigations by occurrence type.

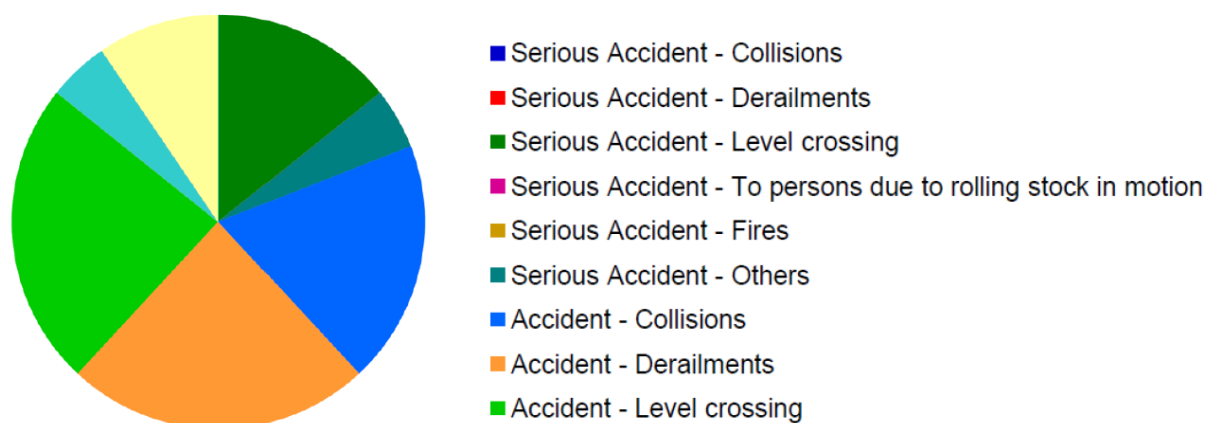
As part of its work under the Railway Safety Act 2005 as amended by SI no. 61 of 2008, the RAIU monitor occurrences in order to identify possible trends. Figure 2 shows the RAIU's investigation trend both for 2010 and for the past five years. Occurrences at level crossings continue to represent the greatest portion of our investigations and derailments remain the focus of a quarter of our investigations.

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

Occurrence		Year					5 year average	
Type	Subset	2006	2007	2008	2009	2010	Total	Percentage
Serious accident	Collisions	N/A	-	-	-	-	-	-
	Derailments	N/A	-	-	-	-	-	-
	Level crossing	N/A	-	1 (1)	-	2 (2)	3 (3)	14.29 (16.67)
	To persons due to rolling stock in motion	N/A	-	-	-	-	-	-
	Fires	N/A	-	-	-	-	-	-
	Others	N/A	-	-	1 (1)	-	1 (1)	4.76 (5.56)
Accident	Collisions	N/A	-	- (1)	3 (2)	-	4 (3)	19.05 (16.67)
	Derailments	N/A	-	1 (1)	2 (1)	2 (1)	5 (3)	25 (23.81)
	Level crossing	N/A	1(1)	2 (2)	-	2 (2)	5 (5)	25 (27.78)
	To persons due to rolling stock in motion	N/A	-	-	-	-	-	-
	Fires	N/A	-	-	-	-	-	-
	Others	N/A	-	-	-	1(1)	1(1)	4.76 (5.56)
Incident	Infrastructure	N/A	-	-	-	-	-	-
	Energy	N/A	-	-	-	-	-	-
	Control-command & signalling	N/A	-	-	-	-	-	-
	Rolling stock	N/A	-	-	-	-	-	-
	Traffic operation & management	N/A	-	1 (1)	1 (1)	-	2 (2)	9.52 (11.11)
	Others	N/A	-	-	-	-	-	-
<b>Annual Total</b>		N/A	1 (1)	6 (6)	6 (5)	7(6)	21 (18)	<b>100 (100)</b>

Note: The statistics for the IÉ network only are in brackets.

## Investigation within the past 5 years



## Investigations in 2010

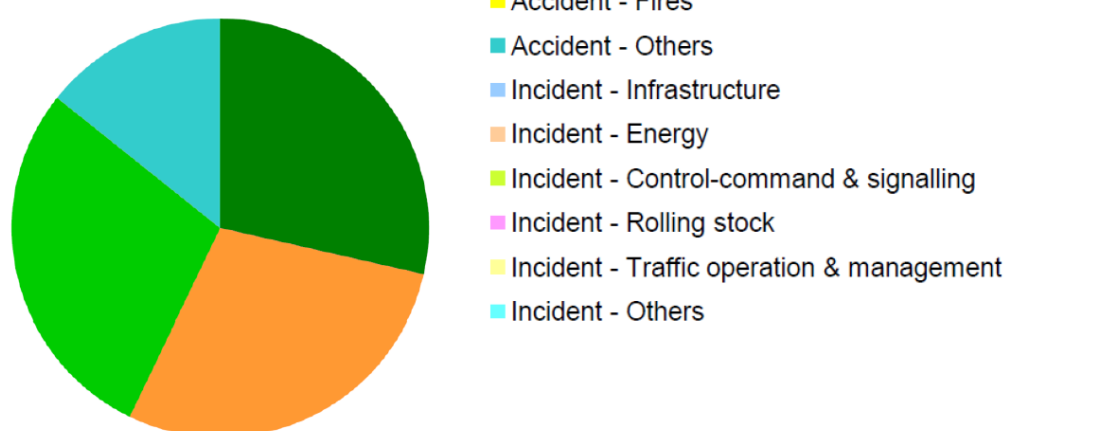


Figure 2 – Investigation trend

## 4. Investigations commenced in 2010

### 4.1 Train derailment at Laois Traincare Depot

At approximately 15:25 on the 20<sup>th</sup> January 2010, a Class 22000 six carriage train began to depart Laois Traincare Depot with assistance of a shunter positioned on the ground. A set of points were moved as the train passed over them, leading to the third and fourth carriages taking diverging routes and derailling.



Figure 3 – Derailed train

**Occurrence classification:**

Accident.

**Subset:**

Deraiment.

**Investigation classification:**

Article 19(2).

**Fatalities and injuries:**

None.

**Damage:**

≥€150,000.

### 4.2 Secondary suspension failure on a train at Connolly Station

At approximately 22:50 on the 7<sup>th</sup> May 2010, shortly after a Class 29000 Diesel Multiple Unit had returned from passenger service, a member of the train cleaning staff working at Connolly Station observed that carriage 29310 was raised relative to the adjacent carriage, 29410, and reported this to IÉ staff. The secondary suspension was found to have over-inflated and the bogie centre pivot retaining plate bolts had failed with the bogie centre pivot lifted out of the bogie centre.



Figure 4 – Carriage underframe equipment

**Occurrence classification:**

Accident.

**Subset:**

Others.

**Investigation classification:**

Article 19(2).

**Fatalities and injuries:**

None.

**Damage:**

<€150,000.

#### 4.3 Tram derailment at The Point Stop on the Red line

At approximately 22:10 on the 13<sup>th</sup> May 2010, a tram arriving into The Point Stop on the Luas Red Line entered the Event Platform, which was already occupied by another tram, whilst intending to travel to the Inbound Platform. The tram driver stopped the tram and contacted the Central Control Room to advise the controller of the situation. The tram driver was advised to move to the other driving cab in order to return to the outbound track and allow movement towards an unoccupied platform. As the tram began to move away from the Event Platform it derailed on a set of points.



Figure 5 – Derailed tram at Point stop

**Occurrence classification:**

Accident.

**Subset:**

Derailement.

**Investigation classification:**

Article 21(6).

**Fatalities and injuries:**

None.

**Damage:**

None.

#### 4.4 Pedestrian strike and fatality at level crossing XE039, County Clare

At approximately 22:10 on the 27<sup>th</sup> June 2010, the 21:45 passenger service from Ennis to Limerick struck and fatally injured a farmer at level crossing XE039, outside the town of Sixmilebridge, County Clare. The farmer was travelling on foot and had been attempting to move a cow across the railway at the time of the accident. XE039 is a manually operated level crossing.



Figure 6 – Level crossing XE039

**Occurrence classification:**

Serious accident.

**Subset:**

Level crossing.

**Investigation classification:**

Article 19(1).

**Fatalities and injuries:**

The level crossing user was fatally injured.

**Damage:**

None.



#### 4.5 Gate strike by an On Track Machine at level crossing XC219, County Cork

At approximately 10:23 on the 2<sup>nd</sup> July 2010, the 08:00 passenger service from Dublin to Cork passed over level crossing XC219 to the west of Buttevant, County Cork, with the gates closed across the road. Seconds later, a Track Recording Vehicle approached the level crossing from the Cork side as the Level Crossing Keeper was in the process of closing the gates across the railway. The Track Recording Vehicle struck one of the gates destroying it. The level crossing is a type CX crossing, which are normally kept closed across the railway.



**Occurrence classification:**

Accident.

**Subset:**

Level crossing.

**Investigation classification:**

Article 19(2).

**Fatalities and injuries:**

None.

**Damage:**

<€150,000.

Figure 7 – Level crossing XC219

#### 4.6 Tractor strike and fatality at level crossing XM096, County Roscommon

At approximately 11:13 on the 2<sup>nd</sup> September 2010, as the 09:30 freight service from Ballina to Dublin approached manually operated level crossing XM096 in the townland of Ballymacfrane, County Roscommon, the train driver observed a tractor stopped on the railway line at the level crossing. The train struck the tractor, destroying the tractor and fatally injuring the tractor driver.



**Occurrence classification:**

Serious accident

**Subset:**

Level crossing.

**Investigation classification:**

Article 19(1).

**Fatalities and injuries:**

The level crossing user was fatally injured.

**Damage:**

<€150,000.

Figure 8 – Train at level crossing XM096

#### 4.7 Car strike at level crossing XM250, County Mayo

At approximately 11:50, on the 24<sup>th</sup> October 2010, the 10:15 passenger service from Athlone to Westport approached level crossing XM250 in the townland of Knockaphunta outside Castlebar, County Mayo. The train driver observed a car approaching the level crossing on the road and applied the emergency brake. The train struck the car, resulting in significant damage to the car.



Figure 9 – Level crossing XM250

**Occurrence classification:**

Accident.

**Subset:**

Level crossing.

**Investigation classification:**

Article 19 (2).

**Fatalities and injuries:**

None.

**Damage:**

<€150,000.

## 5. Investigation reports published in 2010

### 5.1 Overview of investigation reports for 2010

The RAIU published five investigation reports in 2010. These related to one serious accident, four accidents and one incident. A total of twenty six new recommendations were made.

### 5.2 Collision of a Locomotive with Passenger Carriages at Plunkett Station in Waterford



**Figure 10 – Plunkett station**

On the 29<sup>th</sup> March 2009 at 20:12, the 17:35 service from Dublin to Waterford arrived on the Platform Line at Plunkett Station in Waterford. The carriages were uncoupled from the locomotive in order to move the locomotive from one end of the carriages to the other. The locomotive was moved over a set of points onto the Up Main Line. The train driver then tried to change cab to travel in the opposite direction by deselecting the cab he was in but could not as the MU-2-B1 valve that allows this was defective and therefore drove from the rear cab

of the locomotive without a shunter controlling the movement from the leading cab. The locomotive was incorrectly routed back onto the Platform Line towards the carriages by the signalman. When the train driver became aware that the locomotive was mis-routed the train driver applied the brakes, however the locomotive collided with the carriages. The coupling systems on all the carriages were damaged and the four wheels on one bogie of the first carriage struck derailed. A shunter, who was at the rear of the carriages at the time, was struck by the moving carriages. There were no fatalities. The shunter was hospitalised and released the same day. Two other members of staff, who were in the carriages at the time of the collision, suffered minor injuries. There were no passengers on the carriages at the time of the accident.

The immediate cause was:

- The route was not set correctly for the locomotive movement causing the locomotive to collide with the carriages.

The causal factor was:

- The locomotive movement was not controlled in accordance with the IÉ Rule Book.

The contributory factors were:

- The lack of formal requirements for refresher training and assessment of signalmen in cabins where they work as a relief signalman;
- The locomotive was in service with a defective MU-2-B1 valve;
- The lack of train driver instruction in the correct operation of the MU-2-B1 valve.

Two recommendations were made:

- IÉ should review their systems for training and competency management of signalmen ensuring working as a relief signalman is taken into account;
- IÉ should ensure procedures are put in place for the operation and maintenance of the MU-2-B1 valves.

### 5.3 Derailment of an on track machine at Limerick Junction Station



**Figure 11 – Derailed on track machine**

At approximately 04:50 on the 3<sup>rd</sup> July 2009, a train consisting of two coupled On Track Machines, ballast regulator 703 and tamping machine 743, was travelling from a work site on the Dublin side of Limerick Junction Station to the Limerick Junction Sidings. For the final part of the movement unit 703 was leading. The leading left wheel of unit 703 did not follow the route the no. 27A points were set for, it travelled over the top of the left switch rail of the points and along the stock rail before derailing.

The immediate cause was:

- The derailment of the wheels as a result of the wheels taking diverging routes on the track due to the poor interface created by degraded condition of the switch rail and the wheel profile.

The causal factors were:

- The poor condition of the no. 27A points;
- The flange sharpness of the wheels on the leading wheelset of the On Track Machine.

The underlying factors were:

- The lack of measurement of the wheel profiles as part of the maintenance of the On Track Machine;
- The lack of measurement of the wheel profiles following previous derailments of the On Track Machine.

Two recommendations were made:

- 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;
- IÉ should ensure On Track Machine maintenance personnel are trained and competent to examine the wheelsets.

#### 5.4 Derailment of a tram at Connolly Station



**Figure 12 – Derailed tram at Connolly stop**

On the 16<sup>th</sup> July 2009 at approximately 17:10, the driver of LUAS red line Tram 3006 changed cabs at Connolly Station and proceeded to drive on the normal outbound route towards Tallaght with passengers on board. The tram travelled past the Points Position Indicator for the facing points adjacent to the tram stop and was travelling over the points when the driver heard a loud bang and stopped the tram. This loud bang was as a result of the second wheelset of the first bogie derailing and rerailing. Two off-duty Veolia staff checked the tram and did not notice

any sign of derailment, however, they did notice an item of clothing under the tram. The driver then continued a short distance before stopping again as the driving cab was swerving towards the adjacent wall, which was due to the second wheelset travelling in the diverging direction. The investigation found that the Points Position Indicator for the points was displaying a single dot aspect prior to the driver departing the stop, meaning the facing points were not properly set for the normal outbound route. The points not being set for the route was a result of an item of clothing being stuck in the points. The driver did not check the PPI due to human error omission.



The immediate cause was:

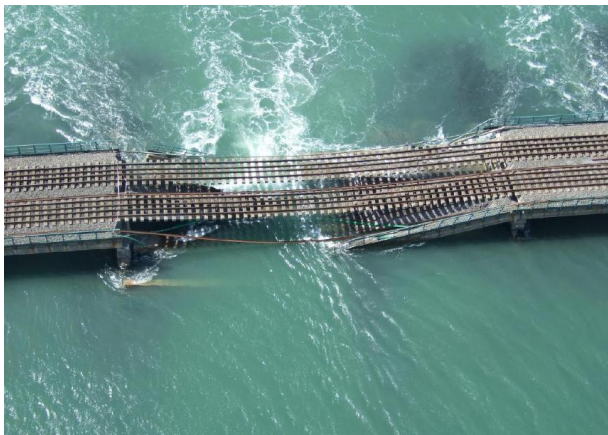
- The tram driver did not react to the 'position of the points not detected' indication on the PPI sited on the approach to points SO-9D at Connolly Station, and proceeded over the points causing the tram to derail.

The contributory factor was:

- The points did not return to normal after the passage of the tram into the outbound platform as there was an item of clothing stuck in facing points SO-9D.

The findings of this investigation, combined with the actions already taken by Veolia, result in this investigation not sustaining any recommendations.

## 5.5 Malahide Viaduct Collapse on the Dublin to Belfast line



**Figure 13 – Collapse of Malahide Viaduct**

On the 21<sup>st</sup> August 2009, as an IÉ passenger service, travelling from Balbriggan to Pearse, passed over the Malahide Viaduct the driver witnessed a section of the viaduct beginning to collapse into Broadmeadow Estuary. The driver reported this to the controlling signalman who immediately set all relevant signals to danger ensuring no trains travelled over the viaduct. Within minutes of the report of the accident Pier 4 of the Malahide Viaduct had collapsed into the Broadmeadow Estuary. All post accident

emergency procedures were properly employed by the operating staff resulting in no fatalities or injuries to any members of the public or staff. At the time of the accident, the Malahide Viaduct piers were formed on a grouted rock armour weir.

The immediate cause was:

- The collapse of Pier 4 as a result of the undermining of the weir that surrounds and supports Pier 4 through the action of scouring.

The causal factors were:

- An inspection carried out on the Malahide Viaduct three days before the accident did not identify the scouring defects visible at the time;

- A scour inspection undertaken in 2006 did not identify the Malahide Viaduct as a high-risk structure to the effects of scouring;
- IÉ's likely failure to take any action after an independent inspection carried out on the Malahide Viaduct in 1997 identified that scouring had started at the base of Pier 4 and that the rock armour weir was "too light for the job";
- The historic maintenance regime for the discharge of stones along the Malahide Viaduct appears to have ceased in 1996, resulting in the deterioration of the weir which was protecting the structure against scouring.

The contributory factors were:

- IÉ had not developed a flood/scour management plan at the time of the accident, despite the International Risk Management Services Implementation Review (2001) and the AD Little Review (2006) recommending that this plan be developed. Contributory to IÉ not developing this flood/scour management plan was the fact that the RSC closed this recommendation in 2008;
- Engineers were not appropriately trained for inspection duties, in that the inspections training course they completed was an abridged version of the intended format, and there no formal mentoring programme, for Engineers on completion of this course;
- There was a shortfall in IÉ's suite of structural inspection standards in that a standard which provided guidance for inspectors in carrying out inspections was not formalised;
- There existed an unrealistic requirement for patrol gangers to carry out annual checks for scour, as they do not have access under the structure and in addition, they did not have the required specialist training/ skills to identify defects caused by scouring;
- A formal programme for Special Inspections for structures vulnerable to scour was not adopted, as per IÉ's Structural Inspections Standard, I-STR-6510, at the time of the accident.

The underlying factors were:

- There was a loss of corporate memory when former IÉ staff left the Division, which resulted in valuable information in the relation to the historic scouring and maintenance not being available to the staff in place at the time of the accident;
- There was a dearth of information in relation to the Malahide Viaduct due to IÉ's failure to properly introduce their information asset management system;
- IÉ's inadequate resourcing of Engineers for structural inspections to be carried out at the Malahide Viaduct;

- IÉ's failure to meet all the requirements of their Structural Inspections Standard, I-STR-6510, in that:
  - Visual inspections were not carried out for all visible elements of structures;
  - Bridge Inspection Cards, for recording findings of inspections, were not completed to standard or approved by the relevant personnel;
  - A formal programme for systematic visual inspections of all elements of a structure, including hidden or submerged elements, despite an independent review recommending that IÉ implement this programme in 2006.

The RAIU made fifteen recommendations:

- IÉ should put appropriate interface processes in place to ensure that when designated track patrolling staff (who report to two or more divisional areas) are absent from their patrolling duties, that appropriate relief track patrolling staff are assigned to perform these patrolling duties;
- IÉ should amend the Track Patrolling Standard, I-PWY-1307, to remove the requirement for track patrollers to carry out annual checks for scour;
- IÉ should formalise their 'Civil Engineering and Earthworks Structures: Guidance Notes on Inspections Standard', I-STR-6515, which should include guidance for inspectors on conducting inspections and identifying structural defects. On formalising this document IÉ should re-issue, in the appropriate format, to all relevant personnel;
- IÉ should introduce a verification process to ensure that all requirements of their Structural Inspections Standard, I-STR-6510, are carried out in full;
- 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;
- IÉ should ensure that a programme of structural inspections is started immediately in accordance with their Standard for Structural Inspection, I-STR-6510, and ensure that adequate resources are available to undertake these inspections;
- 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;
- 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.



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- 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;
  - 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;
  - 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;
  - IÉ should incorporate into their existing standards the requirement for the input of asset information into the technical database system upon completion of structural inspections;
  - 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;
  - 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;
  - 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, 2001). This action plan should include defined timescales for the implementation and closure of all these recommendations.

## 5.6 Irregular operation of Automatic Half Barriers at level crossing XG019, Fern's Lock



**Figure 14 – Level crossing XG019**

On the 2<sup>nd</sup> September 2009, upgrading work was being undertaken at Automatic Half Barrier level crossing XG019, Fern's Lock, when an IÉ power cable was inadvertently severed. This disabled the external power supply to the level crossing, causing the crossing to fail and the barriers to automatically lower to the failsafe position. An Emergency Operator from Maynooth took control of the crossing while repairs were being undertaken to the cables to ensure that a train can only use the level crossing when the barriers are down, preventing

road traffic from accessing the rail line. This is done in conjunction with the controlling signalman and train driver. However, the signalman signalled the train through the level crossing without advising the Emergency Operator of its approach, which resulted in the passenger service travelling through XG019 while the barriers were in the raised position and the crossing was open to road traffic. The controlling signalman at the time of the incident normally operates the Suburban Network, which has no Automatic Half Barrier type level crossings, and only occasionally performs relief duties on the Sligo & Northern Line. The signalman was not familiar with the requirements in relation to the emergency operation of Automatic Half Barriers and therefore did not react to the indications displaying on the console which showed a fault at XG019 and the fact that an Emergency Operator had put the Automatic Half Barrier into local operation and raised the barriers for road traffic.

Immediate cause was:

- The controlling signalman did not follow the requirements for the 'General Instructions to Signalmen' during degraded operations at an Automatic Half Barrier.

The contributory factors were:

- The controlling signalman was unfamiliar with the 'General Instruction to Signalmen' when an Emergency Operator is on duty at an Automatic Half Barrier as he had never experienced an AHB in a degraded mode either in training, operationally or through the current competency management system.

The underlying cause was:

- The competency management system did not ensure that relief signalmen were adequately trained to deal with degraded operations at an Automatic Half Barrier crossing.

The RAIU made one recommendation:

- 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.

## 5.7 Derailment of empty train due to collision with landslip debris outside Wicklow Station



At approximately 06:20 on the 16<sup>th</sup> November 2009, an empty train travelling from Connolly to Arklow collided with soil obstructing the railway line as a result of a landslip and derailed south of Wicklow Station.

**Figure 15 – Derailed train on landslip**

The immediate cause was:

- The landslip was the result of soil deposition by a landowner at the crest of the cutting.

The causal factors were:

- The blocking of the drainage ditch for the field which was adjacent to the field;
- The presence of sand lenses in the cutting which facilitated the flow of water through the cutting;
- The heavy rainfall for the month of November which resulted in the saturation of the field adjacent to the cutting.

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The contributory factors were:

- The patrol ganger was unable to identify defects associated with the early signs of the landslip as the cutting was covered in dense vegetation, resulting in an unrealistic expectation that the patrol ganger could carry out these inspections effectively;
- The patrol ganger was unable to identify the water pouring down the pedestrian overbridge as an early defects associated with the failure of the cutting due to poor drainage as this was not identified as a condition to be looked for in the Track Patrolling Standard, I-PWY-1307, and not included in track patrolling training, again resulting in an unrealistic expectation that the patrol ganger could identify all signs of defects associated with cuttings;
- The only formal monitoring of cuttings during periods of heavy rainfall is through inspections carried out by the patrol ganger, through the Standard for Track Patrolling, I-PWY-1307. Given the fact that the track patroller has not received the appropriate training to identify all defects associated with the early signs of earthworks failure, there is some doubt that only carrying out these inspections is sufficient;
- The patrol ganger was not aware of the spreading of soil in the field adjacent to the cutting, which would be considered an “unusual events” being undertaken inside and outside the railway boundaries, as per the track patrolling standard, I-PWY-1307, as track patrols are carried out from track level, and therefore there was no way for the patrol ganger to be aware of the works being carried out in the adjacent field, which is approximately three metres above track level;
- A programme of Structural Inspections for the cutting was not adopted as required by Structural Inspections Standard, I-STR-6510, as the cutting was not identified as a structure under the Assistant Divisional Engineer’s structures list, which resulted in no structural inspection being carried out on the cutting;
- The landowner did not believe that the works he was carrying out on the adjacent field would affect IÉ’s cutting;
- The landowner was also unaware of the requirement to contact IÉ to inform them of any work, undertaken by him, which may affect the railway, as he had not been issued, nor was he aware of IÉ’s Guidance on Third Party Works, I-DEP-0120. He was also unaware of the RSC’s guidance document, RSC-G-011-A, Third Party Guidance on Railway Risk Volume 2 Neighbours, which again would have required him to contact the Division Engineer.

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The underlying factors were:

- IÉ's Structural Inspection Standard, I-STR-6510, only requires for visual inspections to be carried out on cuttings greater than 3m, with no requirement for any geotechnical assessment to be carried out. As a result the sand lenses present in the cutting, which was identified as a contributory factor to the accident occurring, were not identified. Therefore, there is some doubt as to the efficacy of only having visual inspections, when a more intrusive inspection would identify the geotechnical properties of the cutting, allowing IÉ to identify structures that may be vulnerable to failure;
- There is some doubt that all private landowners, adjacent to the railway, are aware of the requirement to consult with IÉ in relation to any works that may affect IÉ assets as set out in IÉ's Guidance on Third Party Works, I-DEP-0120 and the RSC's guidance document, RSC-G-011-A, Third Party Guidance on Railway Risk Volume 2 Neighbours. Considering there has been no advertising to make third parties aware of this guidance document there is an unrealistic requirement on a landowner to be familiar with these documents.

The RAIU made six recommendations:

- 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;
- 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;
- 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;
- 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;
- 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;
- 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.

## 6. Recommendations

### 6.1 Monitoring of RAIU recommendations

Under the Railway Safety Act 2005, the RSC is responsible for monitoring the implementation of RAIU recommendations. 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.

In August 2010 RSC published guidance document RSC-G-023-A 'Guidance on the RSC's Supervision Activities'. This document includes details of how RSC monitor recommendations by meeting with those parties recommendations are addressed to three times a year to review the progress made by the organisation in order to address the recommendations. According to the RSC guidance on supervision activities, once the action taken to address a recommendation has advanced to the point where RSC believe a recommendation can be closed, an internal peer review is carried by RSC out to verify that the evidence presented is sufficiently robust to permit assigning a closed status to the recommendation. The peer review process is due to commence in 2011.

## 6.2 Progress in 2010

The progress with the implementation of recommendations in 2010 is shown in Table 4. The status of nineteen recommendations was upgraded from open to complete, of which thirteen were made in 2010. The status of one recommendation was downgraded from complete to closed. No new recommendations were closed in 2010.

**Table 4 – Progress with recommendations in 2010**

Status	End 2009	New in 2010	End 2010
Open	13	13	21
Complete	5	13	23
Closed	16	0	16
Total	34	26	60

In 2010, RSC held progress meetings with IÉ in April, July and November on recommendations. An update is included in the Appendix on the status of individual recommendations that were not closed prior to 2010 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

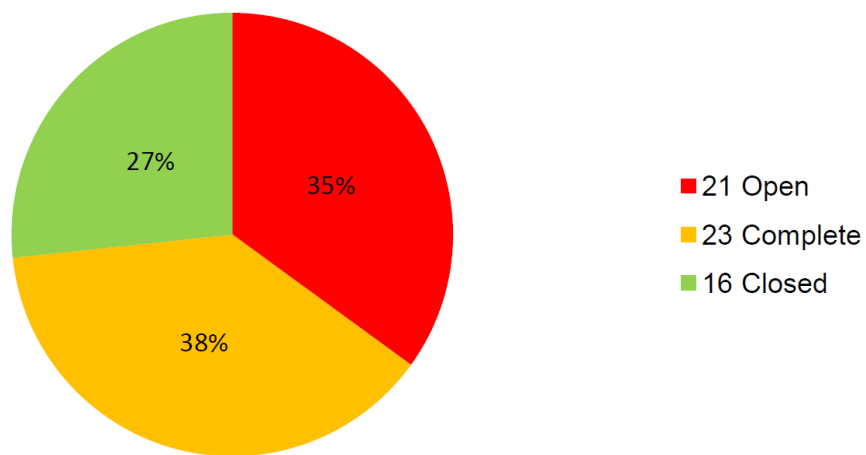
As of the 31<sup>st</sup> December 2010 the RAIU have made 46 recommendations, in addition to these the RAIU have included the 14 recommendations made by RSC in its investigation report published in 2006 on the collapse of the Cahir viaduct in 2003. All recommendations were accepted by the organisations they were made to. The status of the recommendations as of the end of 2010 is included in Table 5.

**Table 5 – Status of recommendations**

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	2	28.57	3	42.86	2	28.57
2009	13	13	5	38.46	4	30.77	4	30.77
2010	26	26	13	50	13	50	-	-
<b>Total</b>	<b>60</b>	<b>60</b>	<b>21</b>		<b>23</b>		<b>16</b>	

\*Recommendations issued by RSC

The overall progress with the closure of recommendations is shown in Figure 16. Over a quarter of all recommendations have been closed and over a third of recommendations are at a stage where the organisation responsible for implementing them believes they have been fully addressed.



**Figure 16 – 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 7 <sup>th</sup> October 2003				
Recommendations				Total no. 14
2006-001	IE 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	Due to be closed in March 2011.		Status
				Complete
2006-003	IE 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	None.		Status
				Open
2006-009	IE 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	Information is still being uploaded to the Infrastructure Asset Management System.		Status
				Complete
2006-015	IE 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	IE have upgraded all lines other than the Limerick Junction to Waterford line and the Ballybrophy to Limerick line to Mode A radio, which has full coverage. As the two remaining lines are lightly used IE have no plans to upgrade them and RSC are awaiting a response on how drivers are to make contact with the control centre in case of emergencies on these lines. Note: Recommendation 2006-014 does not exist.		Status
				Complete

Investigation report no. 07062801 Issued 18 <sup>th</sup> 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 IÉ are currently developing standards.	Status Open
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 None.	Status Complete
2008-003	IÉ to develop and implement a vegetation management programme that addresses vegetation management on a risk basis, prioritising high risk areas.	
	Comment A standard is being drafted.	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 None.	Status Complete
2008-005	IÉ to review the standards relating to on-board data recorders, ensuring that correct operation, accuracy and post incident downloads are effectively addressed.	
	Comment IÉ are building an event recorder website for staff, as of July 2010 this was 80 percent complete and was due to be finalised by the end of July 2010.	Status Open
2008-007	The RSC to review and issue 'Guidelines for the Design of Railway Infrastructure and Rolling Stock'.	
	Comment The Guidelines for the Design of Railway Infrastructure and Rolling Stock were issued in September 2008, a review of the guidelines was carried out in August 2010 with no changes.	Status Closed

Investigation report no. 08022801				Issued 2 <sup>nd</sup> 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	Implementation of this recommendation is ongoing, a survey of all occupation level crossings on public roads has been carried out. The status of this recommendation was downgraded from complete to open.			Status Open
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 is pending.			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	IÉ are writing to the users of level crossings that are known to be misused, this was already being carried out prior to the accident.			Status Complete
2009-004	IÉ are to put in place procedures that will capture and manage near miss reports.				
	Comment	Near misses are being assigned categories based on their severity and review of these near misses is carried out at the monthly operations safety review group meeting.			Status Complete

Investigation report no.		08011001	Issued	6 <sup>th</sup> April 2009
Report into the derailment of a Tara Mines freight train at Skerries on the 10 <sup>th</sup> of January 2008				
Recommendations				Total no.
2009-005	IÉ should put in place a risk based process to ensure ongoing review of the suitability of the temperature settings of the Hot Axle Box Detectors.			
	Comment	A program to reduce the differential and absolute temperature settings is being implemented.		Status Closed
2009-006	IÉ are to identify the necessary maintenance requirements for all Class D bearings, including producing detailed maintenance procedures taking into account their operational conditions and allowing for traceability of safety critical components, with assistance being sought from the Original Equipment Manufacturer where appropriate.			
	Comment	The manufacturer's instructions have been issued to maintenance personnel and component overhaul instructions have been issued. A book logging bearings fitted to axles in workshop is maintained in the workshop, the axles fitted to each bogie are now recorded as well as the bogie fitted to each vehicle.		Status Closed

Investigation report no.		08061401	Issued	11 <sup>th</sup> May 2009
Near miss at Ballymurray level crossing on the 14th of June 2008 between Athlone and Westport				
Recommendations				Total no.
2009-007	IÉ should ensure all safety critical staff have undertaken safety critical communications training and that their ongoing competency management systems specifically monitors the quality of safety critical communications.			
	Comment	Staff training is ongoing with the majority of staff having undergone training. The new safety critical communications review group meets quarterly to review 20 recordings of safety critical communications for acceptability.		Status Closed
2009-008	IÉ should put in place safe work methods for the maintenance of Automatic Half Barriers, these methods should include risk assessments for any hazards identified in the maintenance of Automatic Half Barriers.			
	Comment	A new standard has been issued as well as a checklist for maintenance personnel and a special instruction. All Automatic Half Barrier level crossings are due to be replaced.		Status Closed

<b>Investigation report no.</b>		08073101	<b>Issued</b>	29 <sup>th</sup> July 2009
<b>Collision between a train and a road vehicle at level crossing XN125, Cappadine, on the Ballybrophy to Killonan line 31st of July 2008</b>				
<b>Recommendations</b>				<b>Total no.</b> 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.			
	<b>Comment</b>	IÉ is developing a new asset strategy.		<b>Status</b> Open
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.			
	<b>Comment</b>	A new asset strategy is being developed.		<b>Status</b> Open

<b>Investigation report no.</b>		08120201	<b>Issued</b>	1 <sup>st</sup> December 2009
<b>Collision of a train with the gates of level crossing XH066, Bridgetown, on the Limerick Junction to Rosslare Strand line, 2<sup>nd</sup> of December 2008</b>				
<b>Recommendations</b>				<b>Total no.</b> 3
2009-011	IÉ should review the training and competency management of gatekeepers and signalling maintenance personnel.			
	<b>Comment</b>	A competency management system is being developed. A training facility is now active and two full time signalling assessors are in place.		<b>Status</b> Complete
2009-012	IÉ should review the design of signal indicators to ensure their design encourages correct interpretation.			
	<b>Comment</b>	All signal indicators have been illuminated and backlights have been fitted to signals.		<b>Status</b> Complete
2009-013	The RSC should audit IÉ's training and competency management system to verify its effectiveness.			
	<b>Comment</b>	RSC carried out an audit in April 2010 and published a report in May 2010, which included eight recommendations; three non-compliances were identified and are being tracked. A new standard has been approved internally by IÉ and is currently being briefed out to staff.		<b>Status</b> Open

<b>Investigation report no.</b>		2010-R001	<b>Issued</b>	4 <sup>th</sup> March 2010
<b>Collision of a Locomotive with Passenger Carriages at Plunkett Station in Waterford on the Limerick to Rosslare Line, 29th of March 2009</b>				
<b>Time &amp; Date</b>	20:12, 29 <sup>th</sup> March 2009		<b>Location</b>	Plunkett Station, Waterford city
<b>Railway</b>	IÉ		<b>Line</b>	Limerick to Rosslare line
<b>Recommendations</b>				Total no. 2
2010-001	IÉ should review their systems for training and competency management of signalmen ensuring working as a relief signalman is taken into account.			
	<b>Comment</b>	A new standard addressing this has undergone internal approval within IÉ and is in the process of being implemented.		<b>Status</b>
				Open
2010-002	IÉ should ensure procedures are put in place for the operation and maintenance of the MU-2-B1 valves.			
	<b>Comment</b>	Operation of the valves has been included in train driver training and maintenance requirements have been updated to include the valves.		<b>Status</b>
				Complete



<b>Investigation report no.</b>		R2010-003	<b>Issued</b>	10 <sup>th</sup> June 2010
<b>Derailment of an on track machine at Limerick Junction Station on the Dublin to Cork Line, 3rd of July 2009</b>				
<b>Time &amp; Date</b>	04:50, 3 <sup>rd</sup> July 2009		<b>Location</b>	Limerick Junction Station
<b>Railway</b>	IÉ		<b>Line</b>	Dublin to Cork line
<b>Recommendations</b>				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.			
	<b>Comment</b>	None.		<b>Status</b>
				Open
2010-004	IÉ should ensure On Track Machine maintenance personnel are trained and competent to examine the wheelsets.			
	<b>Comment</b>	All On Track Machine maintenance personnel have undergone training and are now competent to examine wheelsets.		<b>Status</b>
				Complete

<b>Investigation report no.</b>		2010-R004	<b>Issued</b>	16 <sup>th</sup> August 2010
<b>Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009</b>				
<b>Time &amp; Date</b>	18:20, 21 <sup>st</sup> August 2009		<b>Location</b>	Malahide viaduct
<b>Railway</b>	IÉ		<b>Line</b>	Dublin to Belfast line
<b>Recommendations</b>				Total no. 15
2010-005	IÉ should put appropriate interface processes in place to ensure that when designated track patrolling staff (who report to two or more divisional areas) are absent from their patrolling duties, that appropriate relief track patrolling staff are assigned to perform these patrolling duties.			
	<b>Comment</b>	The patrol lengths have been rationalised and patrol gangers now only report to one permanent way inspector.		<b>Status</b> Complete
2010-006	IÉ should amend the Track Patrolling Standard, I-PWY-1307, to remove the requirement for track patrollers to carry out annual checks for scour.			
	<b>Comment</b>	The standard has been amended and re-issued.		<b>Status</b> Complete
2010-007	IÉ should formalise their 'Civil Engineering and Earthworks Structures: Guidance Notes on Inspections Standard', I-STR-6515, which should include guidance for inspectors on conducting inspections and identifying structural defects. On formalising this document IÉ should re-issue, in the appropriate format, to all relevant personnel.			
	<b>Comment</b>	The guidelines have been formalised and re-issued.		<b>Status</b> Complete
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.			
	<b>Comment</b>	A verification process has been put in place through the Infrastructure Asset Management System with work orders signed off as complete and closed in the system.		<b>Status</b> 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.			
	<b>Comment</b>	Systems have been put in place through the new company safety management system.		<b>Status</b> Complete
2010-010	IÉ should ensure that a programme of structural inspections is started immediately in accordance with their Standard for Structural Inspection, I-STR-6510, and ensure that adequate resources are available to undertake these inspections.			
	<b>Comment</b>	Structural inspections are now carried out in accordance with the standard.		<b>Status</b> Complete

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.	
	<b>Comment</b>	This recommendation is in progress, detailed inspections have been carried out on 105 bridges susceptible to scour. <b>Status</b> Open
2010-012	IÉ should develop a documented risk-based approach for flood and scour risk to railway structures through: <ul style="list-style-type: none"> <li>Monitoring of scour risk at sites through scour depth estimation, debris and hydraulic loading checks, and visual and underwater examination;</li> <li>Provision of physical scour / flood protection for structures at high risk;</li> <li>Imposing of line closures during periods of high water levels where effective physical protection is not in place.</li> </ul>	
	<b>Comment</b>	A management standard is being developed and is due to be completed in March 2011. <b>Status</b> Open
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.	
	<b>Comment</b>	None. <b>Status</b> 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.	
	<b>Comment</b>	A competency management system is being developed, a draft standard has been produced that includes mentoring. <b>Status</b> Open
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.	
	<b>Comment</b>	All historic information is currently being digitised and this is due to be completed in June 2011. <b>Status</b> Open
2010-016	IÉ should incorporate into their existing standards the requirement for the input of asset information into the technical database system upon completion of structural inspections.	
	<b>Comment</b>	This is being incorporated into the structural inspection process. <b>Status</b> Complete

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.
<b>Comment</b>	All historic information is currently being digitised and this is due to be completed in June 2011.
<b>Status</b>	Complete
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.
<b>Comment</b>	RSC guidance document was published in 2010 and a peer review process has been incorporated for monitoring of recommendations, which will commence in 2011.
<b>Status</b>	Open
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, 2001). This action plan should include defined timescales for the implementation and closure of all these recommendations.
<b>Comment</b>	This is in progress.
<b>Status</b>	Open

<b>Investigation report no.</b>		2010-R005	<b>Issued</b>	24 <sup>th</sup> August 2010	
<b>Irregular operation of Automatic Half Barriers at Fern's Lock, County Kildare, on the Dublin to Sligo Line, 2<sup>nd</sup> September 2009</b>					
<b>Time &amp; Date</b>	13:33, 2 <sup>nd</sup> September 2009		<b>Location</b>	Level crossing XG019	
<b>Railway</b>	IÉ		<b>Line</b>	Dublin to Sligo line	
<b>Recommendations</b>				<b>Total no.</b>	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.				
	<b>Comment</b>	A new standard has undergone internal approval and is due to be briefed out.			<b>Status</b> Open

<b>Investigation report no.</b>		2010-R006	<b>Issued</b>	15 <sup>th</sup> November 2010	
<b>Derailment of empty train due to collision with landslip debris outside Wicklow Station, 16<sup>th</sup> of November 2009</b>					
<b>Time &amp; Date</b>	06:20, 16 <sup>th</sup> November 2009		<b>Location</b>	28 ½ milepost	
<b>Railway</b>	IÉ		<b>Line</b>	Dublin to Rosslare Europort	
<b>Recommendations</b>				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.				
	<b>Comment</b>	The current standards are being reviewed and a new vegetation management standard is due to be developed in 2011.			<b>Status</b> Open
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.				
	<b>Comment</b>	A track and structures standard was due to be issued in November 2010.			<b>Status</b> Open
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.				
	<b>Comment</b>	The standard has been reviewed, updated and re-issued.			<b>Status</b> Complete
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.				
	<b>Comment</b>	The list is in the process of being reviewed and this is ninety percent complete.			<b>Status</b> 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.				
	<b>Comment</b>	None.			<b>Status</b> Open

2010-026	IE 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	The standard has been revised and cuttings are now being managed on a risk basis.		Status
			Complete



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