



Rail Accident Investigation Branch



# Annual Report 2010 - Section 1



Department for  
**Transport**

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This report is published in accordance with:

- the Railway Safety Directive (2004/49/EC);
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.

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### Preface

This is the Rail Accident Investigation Branch's (RAIB) Annual Report for the calendar year 2010. It is produced in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005 (SI1992) and also meets the requirement of the European Railway Safety Directive (2004/49/EC).

This legislation can be referred to on the website at [www.raib.gov.uk](http://www.raib.gov.uk).

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# RAIB Annual Report 2010

## RAIB Annual Report 2010

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## Chief Inspector's foreword

### Chief Inspector's foreword

Last year, 2010 was our fifth full year of operations: our investigations ranging across mainline railways, metro, tramway and heritage systems. During the year 2010 we started 29 investigations and completed 31; publishing 20 full reports and 11 bulletins. We hope that each of our investigations gives confidence to both the public and members of the industry that these accidents and incidents have been subject to independent professional investigation and that appropriate recommendations have been made to prevent further similar incidents.

This report covers not only the activities of the Rail Accident Investigation Branch (RAIB) during 2010, but also the activities of the industry and the Office of Rail Regulation (ORR, the rail regulator) in implementing our recommendations. [Part 2 of our report](#) details all the industry responses to recommendations received during 2010. There has been substantial progress in the implementation of recommendations since the end of 2010; this will be reported in the next RAIB Annual Report covering this current calendar year.

#### Industry's management of safety

The ORR reported in its Health and Safety Report 2010<sup>1</sup> that we continue to have one of the safest railways in Europe. This reflects the efforts of the many organisations that comprise the industry and its staff. Nevertheless, four<sup>2</sup> of our investigations undertaken during 2010 involved fatalities. Seventeen of the published reports, and seventeen investigations we started during the year concerned serious accidents<sup>3</sup> or events which under slightly different conditions might have led to a serious accident.

The RAIB generally makes recommendations to improve safety as a result of our investigations. We cannot mandate implementation. However, the recipients of our recommendations have an obligation to consider our recommendations and to assess their potential for reducing risk whilst also taking into account other factors such as industry good practice and the cost of implementation. When recommendations are made to the rail industry, the safety authority will decide whether the industry's consideration and response is sufficient<sup>4</sup>.

In general, the industry continues to be very receptive to the recommendations arising from our work. This is in no small part due to the way in which the industry engages with and supports our investigations. Of the recommendations where the industry and ORR have completed their considerations around 96% are reported by ORR as either in progress or already implemented. The ORR has also worked hard during 2010 to improve the speed of delivery and transparency of their reports to us concerning the industry's response to our recommendations. These now include the identification of target timeframes for the industry to complete implementation. Each recommendation accepted has been assessed as beneficial by the end implementer and/or ORR; each recommendation that is implemented represents a change to railway equipment or the way on which the railway is operated, and an improvement in safety.

<sup>1</sup> [www.rail-reg.gov.uk](http://www.rail-reg.gov.uk).

<sup>2</sup> The four investigations involving fatalities occurred on the national networks.

<sup>3</sup> 'serious accident' means 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; 'extensive damage' means damage that can immediately be assessed by the investigating body to cost at least EUR 2 million in total.

<sup>4</sup> See part 1 paragraph 8 for link to an explanation on the recommendation process.



### Issues warranting further industry attention

Our Annual Report again identifies some important safety issues, including factors which have recurred in our investigations, indicating that risks previously identified have remained at large. These are detailed in Section 5 of this report and include:

- risk assessment and management of level crossings;
- managing the susceptibility of safety critical staff to making errors through fatigue;
- low wheel/rail adhesion during braking in the autumn season; and
- the design, condition and operation of freight vehicles.

In particular, recommendations relating to the first two issues have remained open and continue to be open after many months; in the meantime the risks we have identified have still to be fully addressed, although we are aware of the action Network Rail and others are taking to address these issues. This is also true for some of the recommendations which were made by the RAIB in January 2007 concerning some of the complex aspects of both the understanding and tackling of wheel/rail adhesion issues. We urge the industry to complete their activities to implement these recommendations.

[Part 2 of this report](#) details those recommendations for which ORR has reported a change in status during 2010. In specific cases, the RAIB has elected to comment on the response of industry and the ORR; either because we have particular concerns, taking into account the risks and likely costs, that no action has been taken or because we are concerned that the action taken may not address the risk we have identified. There were nine such recommendation responses during 2010.

### Grayrigg recommendations

In our last Annual Report, I highlighted the industry's progress on implementing the recommendations arising from our investigation into the accident at Grayrigg, which occurred in February 2007. This investigation is the largest we have carried out to date. The inquest into the death of Mrs Masson who lost her life in this accident had just been completed at the time of the publication of this report.

In October 2008 the RAIB published its investigation report and made 29 recommendations. The recommendations are not fully detailed in Part 2 of this report since it contains updates only on those recommendations formally reported by ORR as having a changed status during the year. Nevertheless, work has been ongoing in the industry during 2010. The ORR has recently reported to the RAIB that they have assessed 22 recommendations as having been implemented. Overall, the ORR has reported substantial progress. A further three recommendations have been reported by the rescue services as implemented.

However, there are four recommendations, made to Network Rail, concerning the fundamental design, management and maintenance of its switch and crossing assemblies that are still outstanding, recommendations 1, 2, 3 and 10.

## Chief Inspector's foreword

It has been agreed between ORR and Network Rail that full implementation of recommendation 1 will take place by July 2012. Recommendation 1 requires Network Rail to carry out a detailed review of its switches & crossing (S&C) non-adjustable stretcher bar assembly design so as to understand the relationships between the design, loading, usage and the inspection and maintenance regimes, and implement appropriate modifications to the design or the inspection or maintenance regimes. In the case of recommendations 2 and 3<sup>5</sup> Network Rail has stated to ORR that it considers implementation to be complete; in both the ORR is still seeking further information to verify whether this is the case. ORR has still to conclude that the actions taken in response to parts of recommendation 10<sup>6</sup> are sufficient.

A further recommendation, which was made to Network Rail, and which was intended to improve the controls of working hours of safety critical staff is, in the RAIB's opinion, also outstanding and contributes to my concern regarding the management of worker fatigue expressed above. Whilst the ORR has reported to the RAIB that alternative measures have been taken by Network Rail to implement this particular recommendation, the ORR are now revisiting whether those measures are effective.

A number of passengers may have received head injuries due to the failure in retention of the reading light panels. Recommendation 24 asked for a review of the mounting of the reading light panels on Class 390 Pendolinos and to take steps to minimise occupant injury. Whilst actions have been reported that should result in improved new locks, retrofitting the fleet with improved locks or other means of panel retention was not considered necessary by the ORR, on the basis they deemed that the locks' retention failed when the design load had been exceeded and the risk associated with the current locks is therefore acceptable.

Recommendation 25 intended that the industry should capture learning relating to vehicle crashworthiness arising from Grayrigg, and where appropriate, make changes to standards. ORR has reported that the Rail Safety and Standards Board (RSSB) has considered and assessed the reasonable practicability of the recommendation and concluded that no changes to current standards are justified. ORR consider the recommendation to be closed. However, based on the feedback it has received, the RAIB is unclear of the basis for these decisions and is therefore concerned that potential lessons regarding vehicle roll over strength, and vehicle penetration resistance may not have been captured. We are following this up in discussions with the ORR.

### Resources

In common with all other government organisations, the RAIB has been required to find significant savings. My organisation has been required to relinquish 19% of its budget and to move our southern office (currently in Woking) to the same site as the AAIB in Farnborough. In order to realise these savings I have had to reduce my team headcount from 52 to 44 and I have committed to a saving of 16% during the current (2011-12) fiscal year. The office move, planned for mid 2012 has presented and will continue to present additional demands and operational challenges to the now smaller RAIB team. Everyone who works in the RAIB team however continues to be absolutely committed to maintaining the quality of our operations and investigations.

<sup>5</sup> Recommendations 2 and 3 are concerned with the monitoring the performance of S&C, implementation of a revised design and the development of risk based standards.

<sup>6</sup> Recommendation 10 is concerned with the management of basic visual inspections.

### Your feedback

We have changed the format of this year's report; for matters that do not change from year to year, such as our legal framework, we have provided links to the details on our website. We have tried to make this report as relevant as possible to the many different groups who may read it but we are very open to new ideas. As in previous years I would very much appreciate your feedback on the content - its interest and use to you. The feedback form is at page 40.

Finally, I want to record my personal appreciation for the continuing positive co-operation we receive from parties involved in the events we investigate and the continuing hard work and enthusiasm of the RAIB team; all essential to our ongoing quest to prevent accidents in the future.

A handwritten signature in black ink, appearing to read 'Carolyn Griffiths', followed by a stylized, scribbled mark.

Carolyn Griffiths  
Chief Inspector of Rail Accidents  
9 November 2011

# 1 The role of the Rail Accident Investigation Branch

## The role of the Rail Accident Investigation Branch

Further information about the role of the RAIB can be found on our website by clicking on the following links:

### [1. Background to the Branch](#)

The RAIB became operational in October 2005 as the UK's independent body for investigating accidents and incidents occurring on the railways of Great Britain and Northern Ireland and tramways in England and Wales.

### [2. Scope of accidents and incidents investigated](#)

The scope of the RAIB's work is set out in the Railways and Transport Safety Act 2003 (the Act) and it is mandated to investigate any serious railway accident, as defined in the Railways (Accident Investigation and Reporting) Regulations 2005 (the Regulations).

### [3. Accident and incident notification](#)

The Regulations place a duty on railway industry bodies, whose staff or property is involved in an accident or incident to notify the RAIB.

### [4. The RAIB's response to notifications](#)

The RAIB will decide on the basis of the initial notification whether it should immediately mobilise personnel to the accident site. Usually this is to conduct a Preliminary Examination. The RAIB's Chief Inspector or her Deputy, a Duty Co-ordinator and a team of inspectors are on call 24 hours a day, 365 days per year.

### [5. Preliminary Examination](#)

The purpose of the Preliminary Examination is to gather sufficient details and evidence to enable the RAIB to make an informed decision whether or not to conduct a full investigation.

### [6. Investigation](#)

The RAIB's investigations are conducted completely independently of all other organisations and investigations by other parties. However, it can share with industry stakeholders and will share with other statutory investigatory bodies factual evidence. It will not share witness statements or identification, nor medical records relating to persons involved in the accident or incident. The RAIB aims to keep involved parties informed of emerging findings throughout the investigation and may elect to inform the broader industry of progress and findings during the investigation by way of an interim report.

If the RAIB decides that a full investigation is disproportionate to the potential safety lessons that might be learned then it might publish a bulletin, which consists of a summary of the findings and identification of safety lessons.

### [7. The investigation report](#)

On completion, the Chief Inspector sends the report to the Secretary of State for Transport and publishes it on the RAIB's website.

### [8. The recommendation process](#)

Where appropriate, the RAIB's investigation reports will include recommendations to improve safety.

### [9. Organisation](#)

The RAIB consists of full time investigators and support staff. They are based in one of two operational centres: Derby and Woking.

### [10. Board of Transport Accident Investigators](#)

The Board of Transport Accident Investigators was established in 2003, consisting of the three Chief Inspectors of accident investigation (Rail, Marine and Air), and currently chaired by the RAIB's Chief Inspector. Its purpose is to, where appropriate, ensure consistency of approach and to identify and develop any common strategic aims and objectives and best practices. The Board normally meets quarterly; joint work initiated by the Board is ongoing.

## 2 Operational activity 2010

### Operational activity 2010

During the period from 1 January to 31 December 2010, the RAIB received 428 notifications of railway accidents and incidents from the industry as required by law, in accordance with the Railways (Accident Reporting and Investigation) Regulations 2005, Schedules<sup>7</sup> one to five. In addition, there were 12 events which should have been notified to RAIB, but were identified by the RAIB by scrutiny of the operational control logs. These resulted in 42 deployments of RAIB inspectors to the accident or incident site to carry out a preliminary examination. There were two additional preliminary examinations which did not require deployment to site. As a result of the analysis of the information gathered, the RAIB started 18 full investigations, issued 11 Bulletins and two Urgent Safety Advices.

### Investigation reports published in 2010

The RAIB completed and published 20 full investigation reports in 2010.

It also published one Special Investigation report. This covered a potentially dangerous malfunction of newly installed signalling equipment due to incomplete testing of application data during the design of interlocking. The incident had been investigated, and reported upon in December 2008, by the railway companies involved, in accordance with the railway industry standards and procedures. In June 2009, the RAIB was asked (by one of the railway companies) to investigate. The RAIB undertook a special investigation to examine areas that were not already covered by the industry investigation, and further activities that were required by the industry, to prevent further similar incidents.

In addition, the RAIB assisted its French counterpart, the Bureau d'Enquêtes sur les Accidents de Transport Terrestre (BEA-TT), who had the lead role in the investigation of an accident in the Channel Tunnel that occurred on 11 September 2008. The report was published on 22 November 2010.

Table 1 – RAIB outputs in 2010

Preliminary examinations completed	44
Full investigation reports published	20
Joint report with BE-ATT	1
Special investigations published	1
Bulletins published	11
Urgent Safety Advice issued	2
Investigations commenced	18

A summary of the details of each full investigation where a report has been published and the associated recommendations can be found in [Part 2 of the Annual Report](#).

Tables 2 to 4 provide details of the investigations started or completed during 2010, along with identification of the relevant Article of the European Railway Safety Directive that identifies the basis for the investigation. These are:

- Article 19(1) - a serious accident where the investigation is mandatory.

<sup>7</sup> Full details on the Schedules can be found by clicking [here](#).



- Article 19(2) - an accident or incident, which under slightly different conditions might have led to a serious accident, ie a near miss of a serious accident (see key below - a, b, c or d):
  - a. the seriousness of the accident or incident;
  - b. it forms part of a series of accidents or incidents relevant to the system as a whole;
  - c. its impact on railway safety on a community level;
  - d. requests from infrastructure managers, the safety authority or the Member State.
- Article 21(6) - a non-serious accident or incident where there is significant potential for learning safety lessons.

The Directive defines 'serious accident' to mean 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; 'extensive damage' means damage that can immediately be assessed by the investigating body to cost at least €2 million in total.

Table 2 – Investigations completed in 2010

Report Number	Event date	Publication date	Title of investigation (location)	Occurrence type	Basis for investigation		
					19(1)	19(2)	21(6)
01/2010	12/06/08	14/01/10	Derailment of a freight train at Marks Tey, Essex	Freight train derailment		a	
02/2010	27/01/09	03/02/10	Derailment of a freight train near Stewarton, Ayrshire	Freight train derailment	x		
03/2010	10/03/09	04/03/10	Derailment of a Docklands Light Railway train, near West India Quay station, London	Passenger train derailment			x
04/2010	22/03/09	18/03/10	Incident at Greenhill Upper Junction, near Falkirk	Failure of signalling system		a	
05/2010	27/03/09	22/03/10	Near-miss at Hanger Lane junction	Signal passed at danger (near miss)		a	
06/2010	01/06/09	25/03/10	Derailment of a passenger train near Cummersdale, Cumbria	Passenger train derailment		a	
07/2010	28/09/09	08/04/10	Derailment at Hampton Loade, Severn Valley Railway	Passenger train derailment			x
08/2010	06/05/09	12/05/10	Fatal accident at Fairfield level crossing, Bedwyn	Level crossing fatality	x		
09/2010	05/08/09	03/06/10	Fatal accident at Norbreck, Blackpool <sup>8</sup>	Level crossing accident		a	
10/2010	04/01/10	21/06/10	Collision at Exeter St Davids station	Collision with other train		a	
11/2010	11/10/09	05/08/10	Derailment at Windsor & Eton Riverside station	Passenger train derailment			x
12/2010	23/09/09	05/08/10	Overhead line failure, St Pancras International	Electric Shock (near miss)		a	
13/2010	15/09/09	16/08/10	Collision on the Great Orme Tramway	Collision with other train		a	
14/2010	25/08/09	18/08/10	Derailment at Wigan North Western station	Freight train derailment		a	
15/2010	02/12/09	02/09/10	Fatal accident at Whitehall West junction, Leeds	Staff hit by train (Fatality)	x		
16/2010	29/09/09	23/09/10	Fatal accident at Halkirk level crossing, Caithness	Level crossing fatalities	x		
17/2010	14/11/09	23/09/10	Failure of Bridge RDG1 48 (River Crane) between Whitton & Feltham	Infrastructure failure		a	
18/2010	19/12/09	07/10/10	Near-miss on Victory level crossing, near Taunton, Somerset	Level crossing near miss		a	
19/2010	28/11/09	28/10/10	Derailment near Gillingham tunnel, Dorset	Collision with an obstacle		a	
20/2010	04/02/10	09/12/10	Incident at Romford Station	Train movement accident involving passengers (train doors)		a	

<sup>8</sup> The pedestrian was seriously injured as a result of the accident and died five weeks later.

## 2 Operational activity 2010

Table 3 – Joint report with BE-ATT

Report Number	Event date	Publication date	Title of investigation (location)	Occurrence type	Basis for investigation		
					19(1)	19(2)	21(6)
ET/2010	11/09/08	22/11/10	Technical Investigation Report concerning the Fire on Eurotunnel Freight Shuttle 7412	Fire on rolling stock	x		

Note: As this joint investigation was led by BEA-TT, it does not feature in the RAIB's statistics

Table 4 – Full investigations commenced in 2010

Event date	Title of the investigation (location)	Occurrence type	Basis for investigation		
			19(1)	19(2)	21(6)
04/01/10	Investigation into an accident involving a freight train at Carrbridge, Inverness-shire	Freight train derailment		a	
04/01/10	Collision at Exeter St David's station	Collision with other train		a	
16/01/10	Investigation into a fatal accident on a level crossing at Moreton-on-Lugg, Herefordshire	Level crossing fatality	x		
04/02/10	Investigation into an incident involving a freight train partly loaded with ballast stone, at Romford station	Train movement accident involving passengers		a	
20/02/10	Investigation into the derailment of a passenger train at East Langton, near Market Harborough, Leicestershire	Passenger train derailment		a	
06/03/10	Investigation into a train struck by a length of rail at Washwood Heath, Birmingham	Collision with an obstacle		a	
30/03/10	Investigation into a track worker struck by a train at Cheshunt Junction, Hertfordshire	Staff hit by train (Injury)		a	
04/05/10	Investigation into runaway wagons at Ashburys, Manchester	Runaway incident			x
12/05/10	Investigation into the derailment of an engineer's train near Gloucester Road, London Underground	Freight train derailment		a	
06/06/10	Investigation into derailment near Falls of Cruachan, Argyll	Collision with an obstacle		a	
10/07/10	Investigation into the collision of a passenger train with a fallen tree at Lavington, Wiltshire	Collision with an obstacle		a	
20/07/10	Investigation into runaway and collision near Raigmore, Inverness	Collision with other train		a	
13/08/10	Investigation into the runaway of an engineering train from Highgate to Warren Street	Runaway incident		a	
17/08/10	Investigation into a collision between a passenger train and a lorry on a level crossing near Sudbury, Suffolk	Level crossing Injury		a	
17/08/10	Investigation into an incident involving a freight train near Shap, Cumbria.	Runaway incident		a	
05/11/10	Investigation into an accident involving a heavy goods vehicle and a train near Oxshott, Surrey	Collision with an obstacle		a	
08/11/10	Investigation into an incident involving a passenger train near Stonegate, East Sussex	Runaway Incident		a	
28/12/10	Investigation into the derailment of a passenger train in Summit Tunnel, Calderdale	Collision with an obstacle		b	

Table 5 – List of investigations opened in 2009 but not completed by 31 December 2010

Event date	Title of the investigation (location)	Occurrence type	Basis for investigation		
			19(1)	19(2)	21(6)
22/12/09	Investigation into a near-miss involving a freight train and two passenger trains at Carstairs, South Lanarkshire <sup>9</sup>	Freight train runaway		a	
	Class Investigation - AOCLs <sup>10</sup>				

<sup>9</sup> Published on 31 January 2011.

<sup>10</sup> Published on 28 July 2011.

Summary details of current investigations can be found at [www.raib.gov.uk](http://www.raib.gov.uk) in the section called [current investigations register](#) under the 'publications' area.

### Bulletins published in 2010

During 2010, the RAIB published 11 Bulletins on its website, and can be found at [www.raib.gov.uk](http://www.raib.gov.uk).

The Bulletins covered:

- one derailment;
- six collisions;
- one runaway incident;
- one accident to staff;
- one fatal accident at User Worked Crossing; and
- one train door incident.

### Urgent Safety Advice

The RAIB can issue advice at any stage during an investigation when it believes that there is a need to provide immediate information to the relevant industry bodies about the wider safety issues that have been identified. This includes, where appropriate, notification to the European Railway Agency for further dissemination in Europe. It does this by issuing Urgent Safety Advice.

During 2010 the RAIB issued Urgent Safety Advice on two occasions, as follows:

Table 6 – Urgent Safety Advice by the RAIB in 2010

Incident date	Incident	Date of USA issue	Urgent Safety Advice
03/03/10	Runaway and collision on Welshpool and Llanfair Light Railway.	16/03/10	Advice to all operators of heritage and other minor railways should satisfy themselves that they fully understand the design of the braking systems and associated controls on their vehicles and on-track plant. In particular this should include: <ul style="list-style-type: none"> <li>• the identification of potential hazards (including the ways in which the actions of an operator can override safety interlock systems); and</li> <li>• the implementation of suitable control measures for the hazards identified.</li> </ul>
20/02/10	Axle failure causing a passenger train to derail at East Langton	01/07/10	Advice to raise awareness that the installation of bearings on critical items such as railway axles affects both bearing performance and safety. In particular, the correct interference fit of bearing inner rings on the axle needs to be maintained throughout the life of the wheel set to prevent the inner rings initially creeping and then rotating around the axle in service. If such rotation occurs, it could lead to the bearing locking up or seizing, the inner ring spinning on the axle and a thermal runaway situation developing which could result in fracture of the axle and derailment.

## 3 Operational experience

### Operational experience

#### Summary of accidents and incidents investigated by the RAIB (2006-2010)

##### Classification of accidents and incidents that have to be notified to the ERA

The RAIB has a duty to report to the European Rail Agency (ERA) on accidents and incidents occurring on the railways in the United Kingdom. The Agency has identified that member states have adopted different criteria for notifying accident and incidents to the Agency.

In addition, in December 2009, the Directive was amended to include heritage railways within its scope.

During 2010, the Agency and the task force of national investigating bodies (in which the RAIB actively participated) worked together to produce new guidance on the criteria for investigating accidents and incidents and to promote consistent categorisation and reporting to ERA.

To provide a consistent base for the future, and to take account of the change regarding heritage railways, the RAIB has used the new guidance to review the categorisation of all the accidents and incidents that it has previously notified to the ERA.

The basis for the investigation of a number of accidents and incidents have been re-categorised according to the new criteria for Articles 19(1), 19(2), and 21(6), (see Section 2 for an explanation).

The following table shows the breakdown of accidents and incidents, that the RAIB has investigated between 2006-2010. The figures have been collated according to the date of occurrence and not publication of the report.

Table 7 – Investigations by category sorted by Article 19(1), 19(2), and 21(6)<sup>11</sup>

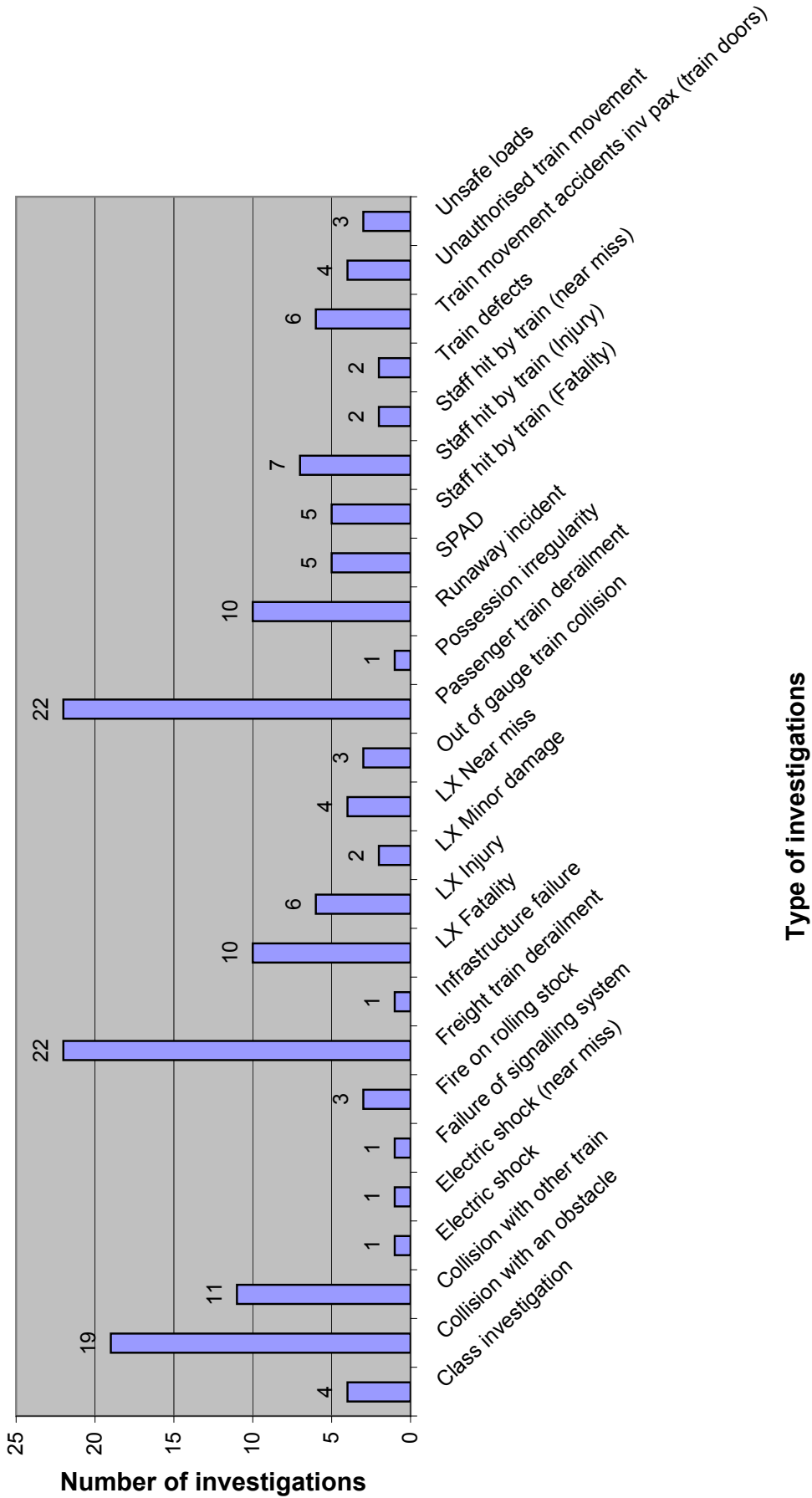
Basis for Investigations by ERA category	2006	2007	2008	2009	2010	TOTAL
Article 19(1)	4	4	6	4	1	19
Article 19(2)	30	27	21	13	16	107
Article 21(6)	12	6	2	3	1	24
<b>Total</b>	<b>46</b>	<b>37</b>	<b>29</b>	<b>20</b>	<b>18</b>	<b>150</b>

Bar charts 1 to 5 (on the following pages) show the total number of investigations carried out by the RAIB broken down by the type of accident and railway for the 5 year period 2006 to 2010<sup>12</sup>.

<sup>11</sup> Figures do not include 4 class investigations (which address more general safety issues) or the discontinued report.

<sup>12</sup> Figures include 4 class investigations and 1 discontinued report.

Chart 1 - Types of incidents/accidents investigated 2006 - 2010



# 3

## Operational experience

**Chart 2 - Types of incidents/accidents investigated on National Networks 2006 - 2010**

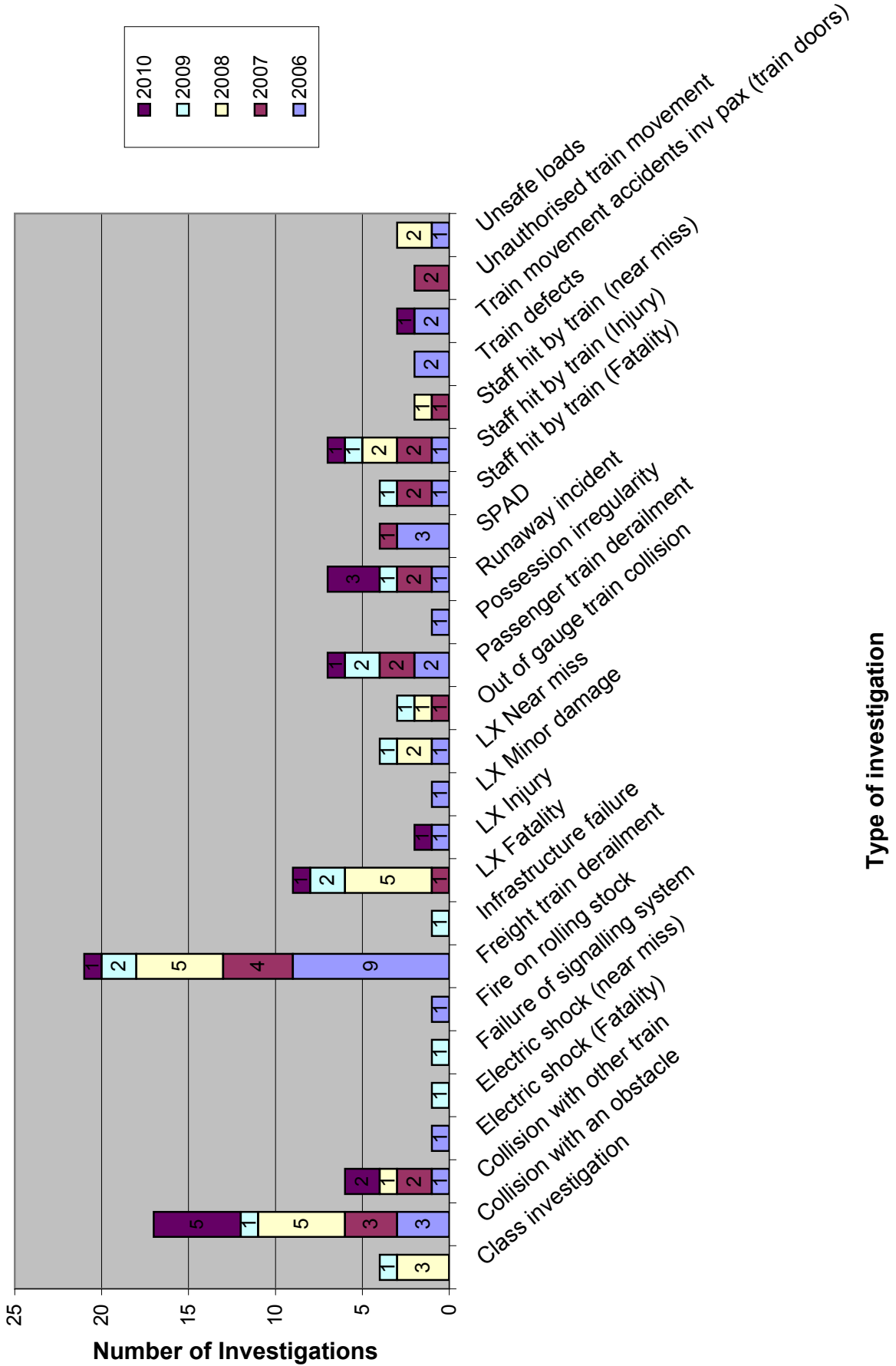




Chart 3 - Types of incidents/accidents investigated on Light Rail 2006 - 2010

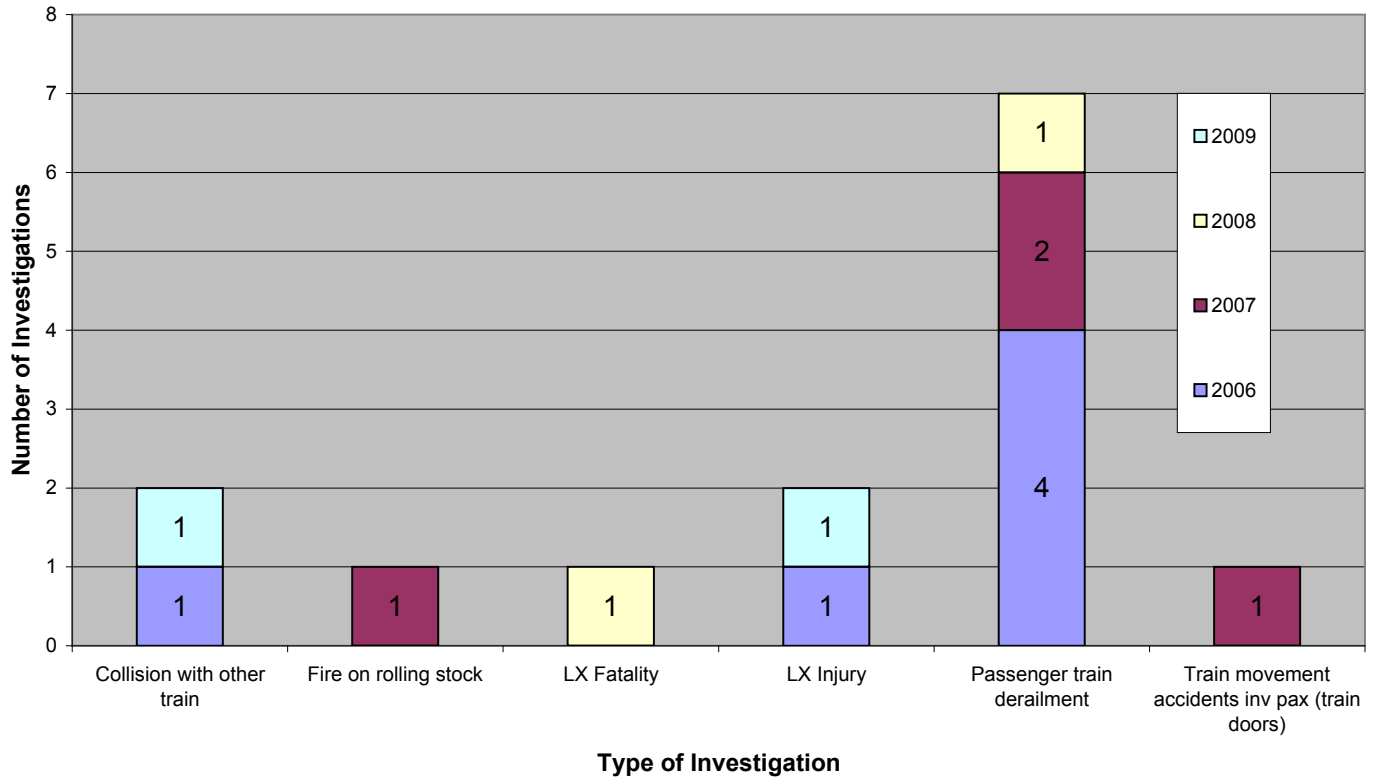
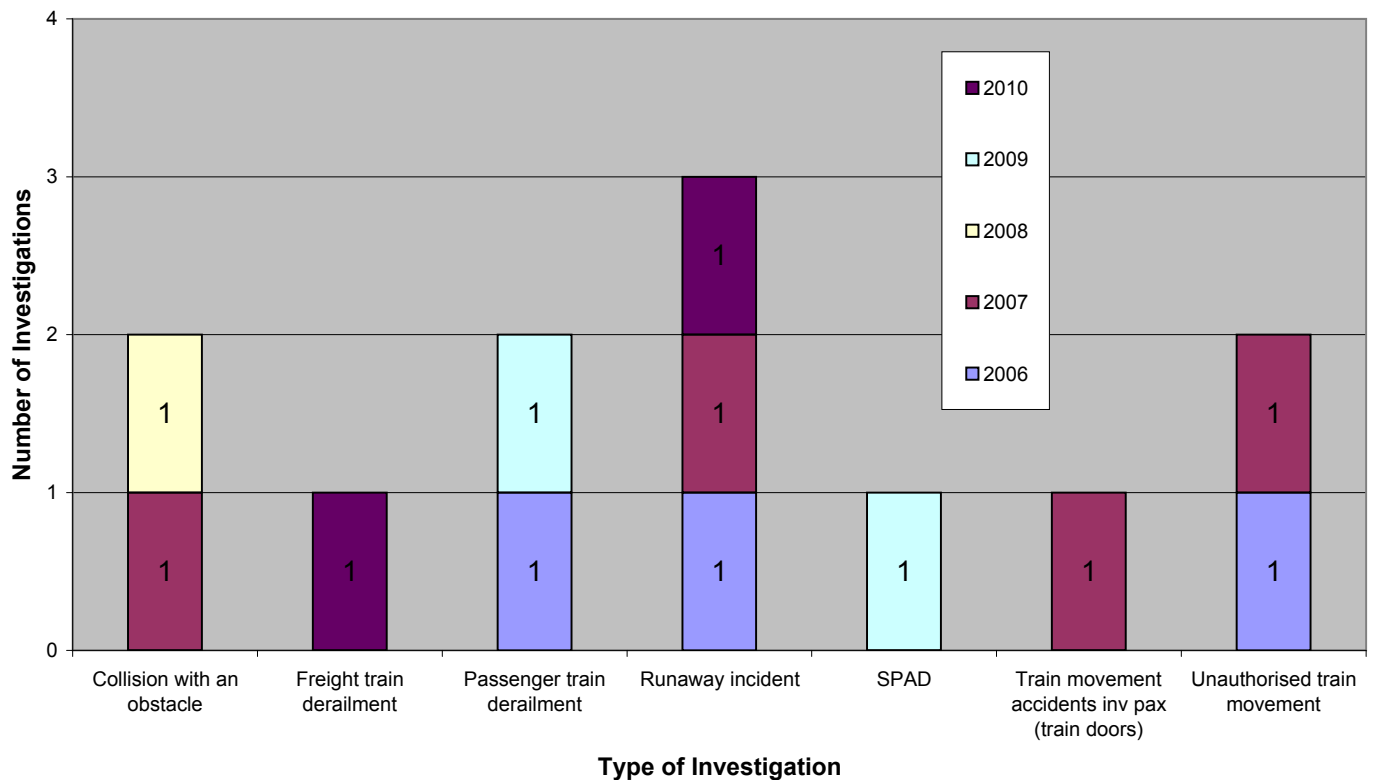


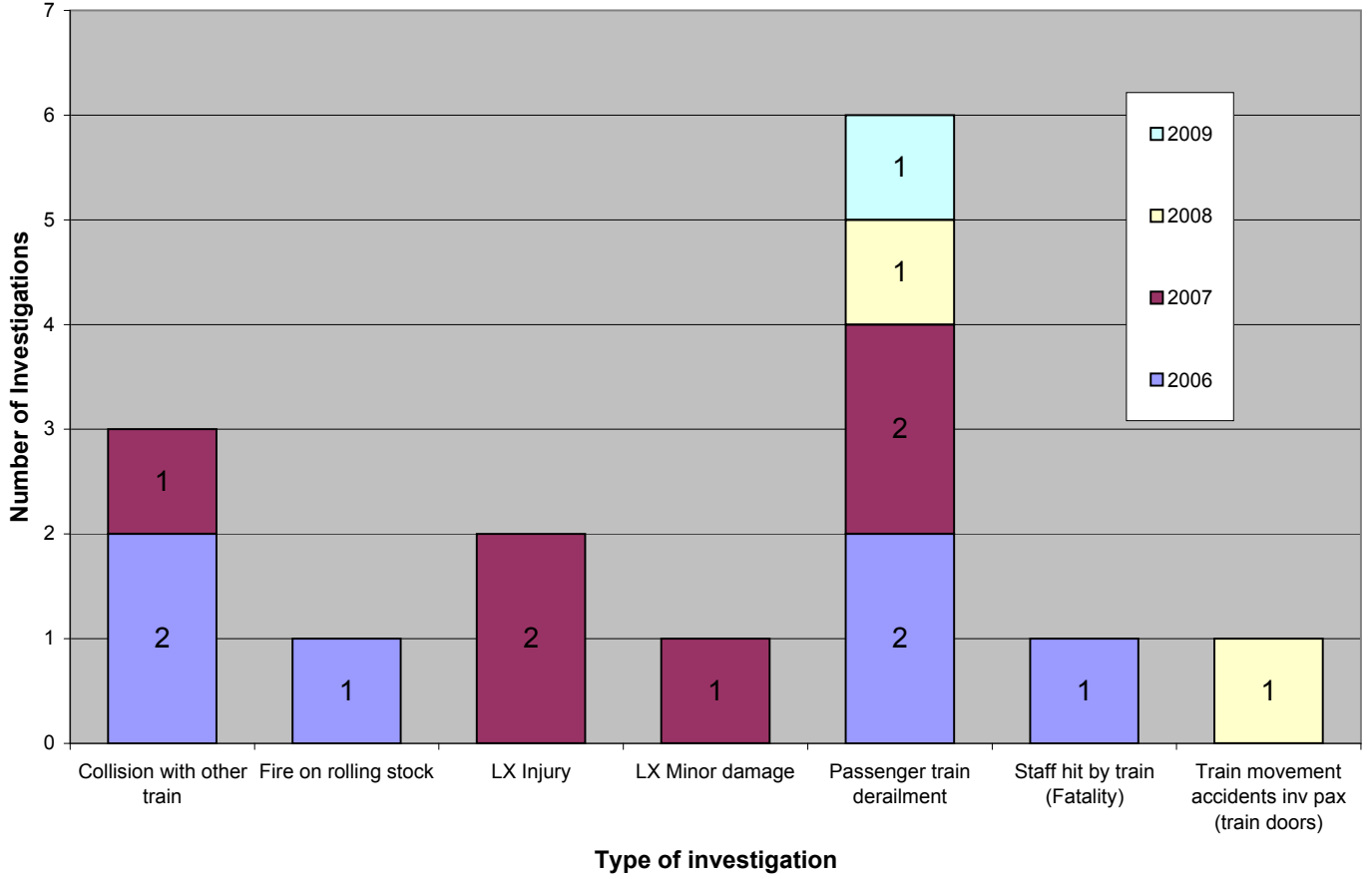
Chart 4 - Types of incidents/accidents investigated on Metro 2006 - 2010



# 3

## Operational experience

**Chart 5 - Types of incidents/accidents investigated on Heritage Railways 2006 - 2010**



## Recommendations

Recommendations are the prime output of the RAIB's investigations in improving safety as required by the Directive and the Regulations<sup>13</sup>. The recommendations are addressed to the appropriate safety authority<sup>14</sup>, and other public bodies where they are the end implementer.

The purpose of addressing the recommendation in this way is so these organisations can ensure the recommendations are duly taken into consideration and where appropriate are acted upon. The Regulations give the safety authority the power to require end implementers to provide full details of the measures they intend to take, or have taken, to implement the recommendation. The safety authority is also required to inform the RAIB of the measures taken, or the reasons why no implementation measures are being taken.

The RAIB has no role or statutory powers to follow up on the implementation of recommendations, other than if it becomes relevant as part of a subsequent investigation.

This section provides an overview of the status of recommendations made by the RAIB. It is compiled from information provided to the RAIB by the ORR, other safety authorities, or other public bodies, and the categories used are based on the following ORR descriptors:

- **Awaiting response** – awaiting initial response.
- **In-Progress** – meaning a timeframe for delivering the recommendation has been agreed with the ORR and work is in progress.
- **Implemented** – meaning that all associated actions to deliver the recommendation have been completed.
- **Non-implementation** – meaning that no measures will be taken to implement the recommendation.

Between 1 January 2006 and 31 December 2010, the RAIB made a total of 900 recommendations. The following table provides a summary of the status.

Table 8 – Recommendation implementation status

Recommendations issued		Awaiting response		In-Progress		Implemented		Non-implementation	
Year	No.	No.	%	No.	%	No.	%	No.	%
2006	133	0	0%	4	3%	122	92%	7	5%
2007	292	1	1%	33	11%	246	84%	12	4%
2008	181	0	0%	77	42%	99	55%	5	3%
2009	196	1	1%	71	36%	116	59%	8	4%
2010	98	73	75%	15	15%	10	10%	0	0%
<b>TOTAL</b>	<b>900</b>	<b>75</b>	<b>8%</b>	<b>200</b>	<b>22%</b>	<b>593</b>	<b>66%</b>	<b>32</b>	<b>4%</b>

The 98 recommendations made by the RAIB during 2010 is an average of five per report, which is one less than the average during 2009.

Further details of the recommendations that were still in-progress at the beginning of 2010 are detailed in [Part 2 of the Annual Report](#).

<sup>13</sup> The European Railway Safety Directive (2004/49/EC) and Railways (Accident Investigation and Reporting) Regulations 2005.

<sup>14</sup> The safety authority is the safety regulator; for the mainland UK this is primarily the Office of Railway Regulation (ORR) although there are some recommendations made by the RAIB where the Health & Safety Executive has been the safety authority (for accidents occurring that were not attributed to the railway and are investigated under the Health and Safety at Work etc Act 1974); for the Channel Tunnel it is the Inter Governmental Commission and for Northern Ireland it is the Department for Regional Affairs.

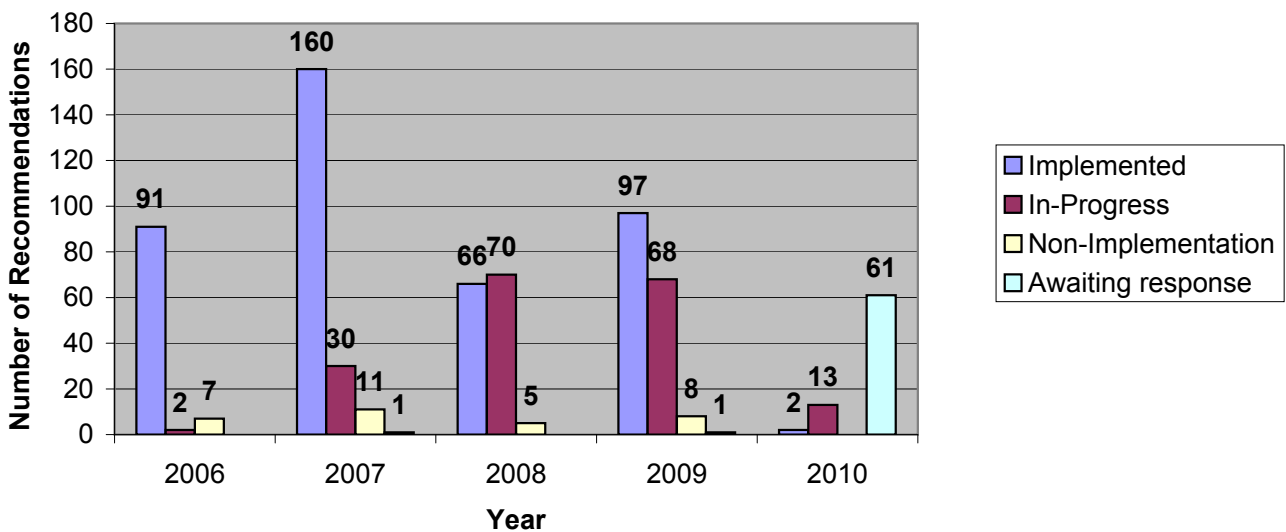
## 4 Recommendations

Of the recommendations made in 2010, the majority were targeted at the following organisations:

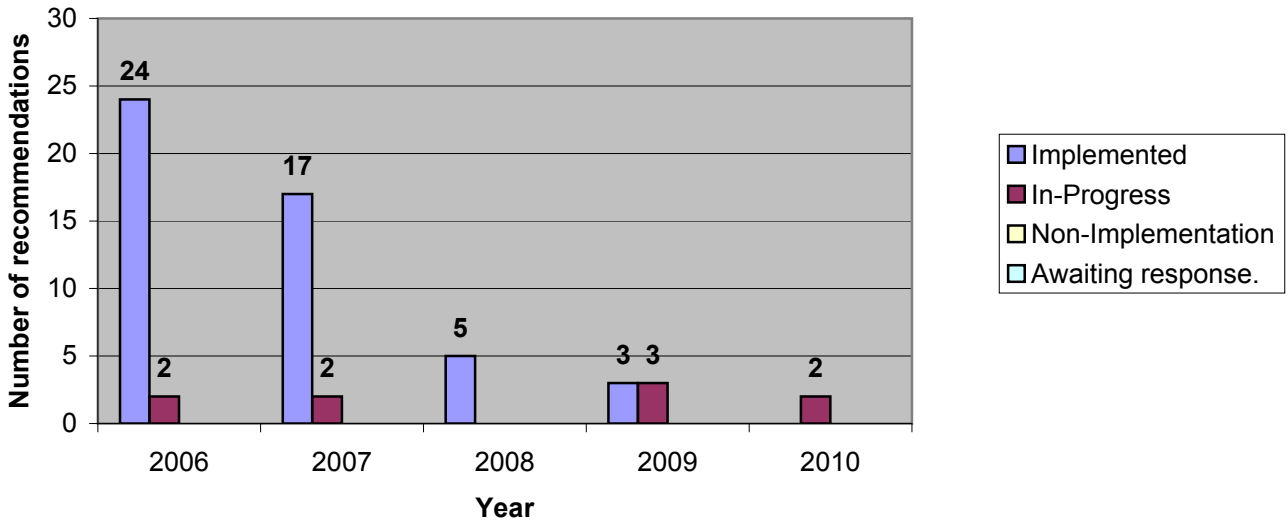
- Network Rail (56).
- Mainline passenger and freight train operators (10).
- London Underground Ltd (6).
- Mainline Infrastructure owners (6).
- Other Public Bodies (6).
- Heritage railways (5).

The number of accidents investigated and the number of recommendations made should not be taken as an indicator for assessing the safety of the UK railways. There is no way to assess how many incidents/accidents did not occur as a result of the actions taken. The statistical data on UK's railway safety is published by the ORR, the current report is the National Rail Trends 2009-2010 Yearbook and can be found at [www.rail-reg.gov.uk](http://www.rail-reg.gov.uk).

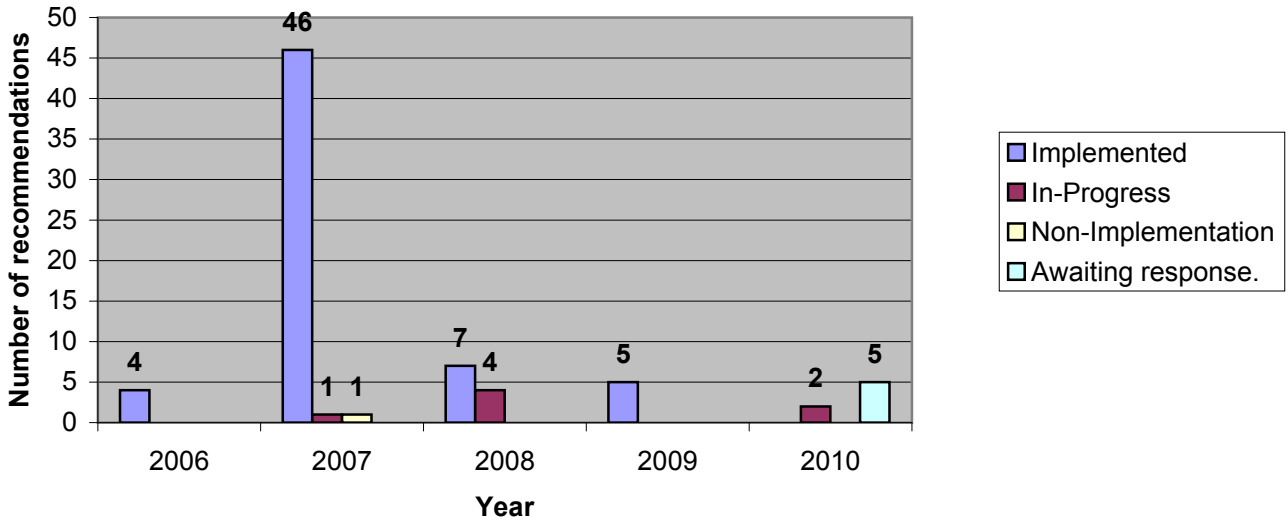
**Chart 6 - National Network recommendation implementation status**



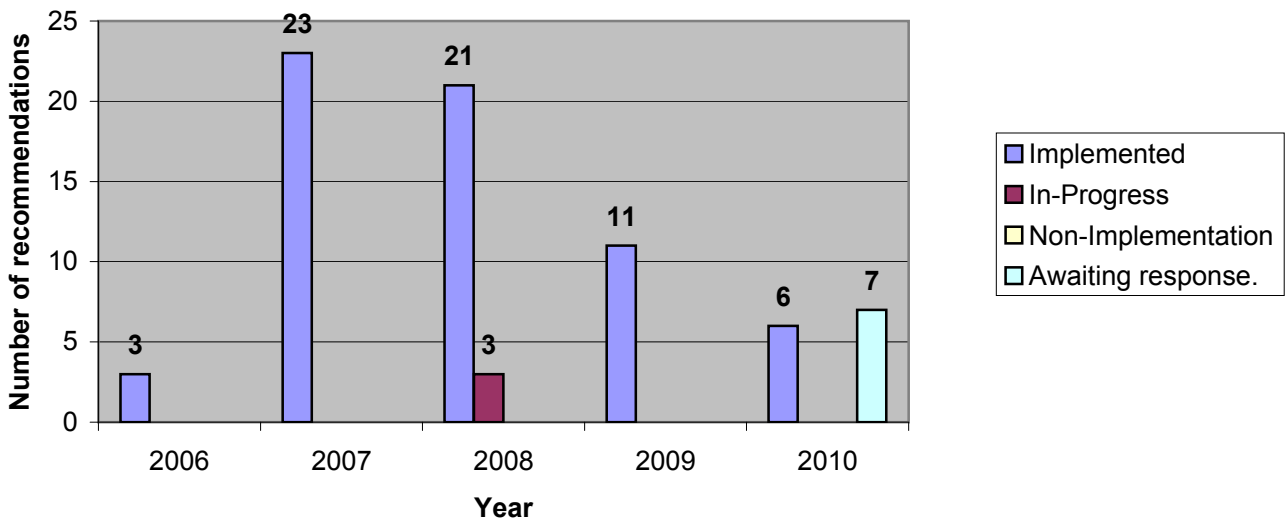
**Chart 7 - Light Rail recommendation implementation status**



**Chart 8 - Heritage recommendation implementation status**



**Chart 9 - Metro recommendation implementation status**



## 5 Identification of important recurrent issues

### Identification of important recurrent issues

Statistics in this section relate to investigations started and reports published between 17 October 2005 and 31 December 2010.

Shown in the table below are the recurrent issues identified in the RAIB investigations to date and details of recurrences during 2010. The table shows for each theme:

- the number of investigations published before 2010;
- the number of investigations published during 2010 and their titles;
- the number of investigations still ongoing on 31 December 2010 and their titles.

All named investigations have taken place on the national network unless indicated thus:

- (U) London Underground.
- (L) Light rail/tramway.
- (H) Heritage sector (and other minor railways).

Table 9 – Status of recurrent issues (to 31 December 2010)

Recurrent themes	No. of reports published before 2010	No. of reports published during 2010	Report reference (bulletins shown in italics)	No. of investigations still ongoing at 31/12/10	Report, reference (and date of publication)
Level crossings	21	4 (+2 bulletins)	Fairfield, 08/2010 Norbreck, 09/2010 (L) Halkirk, 16/2010 Victory, 18/2010 ( <i>Penrhyndeudraeth, B07/2010</i> ) ( <i>Stow Park, B10/2010</i> )	2	
- Risk management and inspection	11	3 (+1 bulletin)	Fairfield, 08/2010 Halkirk, 16/2010 Victory, 18/2010 ( <i>Penrhyndeudraeth, B07/2010</i> )	2	Moreton-on-Lugg, 04/2011 (28/02/11) Sewage Works Lane, 14/2011 (11/08/11)
- Human error (public)	5	4	Fairfield, 08/2010 Norbreck, 09/2010 (L) Halkirk, 16/2010 Victory, 18/2010	0	
- Violation	0	1 bulletin	( <i>Penrhyndeudraeth, B07/2010</i> )	1	Sewage Works Lane, 14/2011 (11/08/11)
Staff working on lines that are open to traffic (Red Zone working)	8	1	Whitehall West Jn, 15/2010	1	Cheshunt, 06/2011 (23/03/11)
Work activities inside an engineering possession	9	1 bulletin	( <i>Kentish Town, B02/2010</i> )	1	Washwood Heath, 01/2011 (24/01/11)
Safety leadership and supervision for track workers	15	0	-	2	Washwood Heath, 01/2011 (24/01/11) Cheshunt, 06/2011 (23/03/11)
Track quality, maintenance and inspection	16	5	Marks Tey, 01/2010 Cummingsdale, 06/2010 Hampton Loade, 07/2010 (H) Windsor and Eton, 11/2010 Wigan North Western, 14/2010	1	Earls Court, 05/2011 (U) (21/03/11)
Defective points	11	1 (+1 bulletin)	Great Orme, 13/2010 (H) ( <i>Dingwall, B11/2010</i> )	0	



Earthworks	6	1	Gillingham, 19/2010	1	Falls of Cruachan, 11/2011 (14/07/11)
Failures of structures	2	2	Stewarton, 02/2010 Feltham, 17/2010	0	
Road rail vehicles (RRVs) and trolleys	3 RRVs 3 trolleys	1 bulletin	( <i>Welshpool, B06/2010 (H)</i> )	1	Raigmore, 10/2011 (11/07/11)
Defective freight wagons / preparation	14	2 (+2 bulletins)	Romford, 20/2010 Wigan North Western, 14/2010 ( <i>Carlisle, B04/2010</i> ) ( <i>Kilsby Tunnel, B09/2010</i> )	3	Carstairs, 02/2011 (31/01/11) Carrbridge, 03/2011 (24/02/11) Ashburys, 07/2011 (24/03/11) Highgate, 09/2011 (U) (15/06/11)
Fatigue	6	0	-	1	Shap, 15/2011 (15/08/11)
Low adhesion	4	1 (+1 bulletin)	Exeter St Davids, 10/2010 ( <i>Darlington, B01/2010</i> )	1	Stonegate, 18/2011

Areas of particular concern to the RAIB during 2010 are described below.

### Level crossings

The RAIB notes that the UK's mainline railway has a good overall level crossing safety record relative to the other European Union Member States. However, by 31 December 2010 the RAIB had cause to investigate 27 level crossing accidents or incidents, and had published 25 related reports. Those accidents investigated by the RAIB resulted in 15 fatalities on the national network, one fatality on Northern Ireland Railways and one fatality on a tramway (light railway).

Relevant investigations published by the RAIB in 2010 were:

08/2010	Fairfield	(May 2009) <sup>15</sup>	Pedestrian struck by train at footpath crossing (one fatality)
09/2010	Norbreck	(Aug 2009)	Pedestrian struck by Blackpool tram on vehicular crossing (suffered serious injury and subsequently died five weeks later)
16/2010	Halkirk	(Sept 2009)	Car struck by train on Automatic Open Crossing (three fatalities)
18/2010	Victory LC	(Dec 2009)	Near-miss between train and wheelchair user

#### Bulletins:

<i>B07/2010</i>	<i>Penrhyndeudraeth</i>	<i>(Sept 2009)</i>	<i>Car struck by train at User Worked Crossing (one fatality)</i>
<i>B10/2010</i>	<i>Stow Park</i>	<i>(Feb 2010)</i>	<i>Train collision with gate of level crossing</i>

### Investigations still ongoing at 31 December 2010 relating to level crossings

**Moreton-on-Lugg:** on 16 January 2010 two cars were struck by a train on the crossing. A passenger in one of the cars received fatal injuries; the car driver was seriously injured. The RAIB investigation report 04/2011 was published in February 2011.

**Sewage Works Lane:** on 17 August 2010 a passenger train struck the trailer of a loaded articulated tanker lorry on a User Worked Crossing at Sewage Works Lane, near Sudbury. All persons on the train were reported injured; one passenger critically injured. The RAIB investigation report 14/2011 was published in August 2011.

<sup>15</sup> Date in brackets indicates when accident/incident happened.

## 5 Identification of important recurrent issues

### Recurrent factors relating to level crossings

The RAIB has concerns about the following recurrent factors:

#### User behaviour at level crossings

The railway industry attempts to influence user behaviour at level crossings by various means including active measures such as warning lights and passive measures such as signage. Other factors influencing human behaviour (eg distraction) can result in these measures becoming ineffective. Such 'human factors' were found to be relevant to all but one of the investigations of Footpath and User Worked Crossings. The RAIB has considered the ways in which the safety measures might better influence the behaviour of crossing users and made recommendations accordingly.

Eight RAIB investigations have found the actions of pedestrians to have been a factor and in another eight the actions of a road vehicle driver were found to be a factor.

In only one of the accidents investigated has it been proven that the accident was caused by deliberate violation of the rules associated with the use of the crossing. In three other investigations it was found that a deliberate violation could have played a part in the causation of the accident. However, it should be noted that the RAIB's policy is that it generally will not investigate accidents when an accident has been caused by reckless and deliberate violation.

Out of a total of 25 published RAIB investigations into accidents and incidents at level crossings, 12 have found the design of the crossing and/or the positioning of signage to be a factor (two of which were on a heritage line and two on light rail).

A safety issue identified by the RAIB in four crossing investigations is the positioning of signs relative to the location at which the user is required to make their final decision to cross the line. The position at which the user should have adequate sighting of approaching trains is not marked and in some cases may be counter intuitive. Therefore this is a particular issue at those locations where the best sighting of trains is not obtained from the existing gate and/or sign. The implications of this, and the potential solutions, were discussed in a class RAIB investigation (report 13/2009) examining the safety of User Worked Crossings that was published in 2009.

The RAIB investigations have identified a range of other local factors that might influence the actions of crossing users. These include:

- local obstructions to the sighting of trains;
- environmental conditions such as traffic noise and visibility at night;
- gates left open at User Worked Crossings;
- anxiety to cross the line to catch a train (station crossings); and
- visibility of road traffic signals (eg impact of sunlight).

Infrastructure managers need to take such factors into account in order to manage risk at level crossings. The RAIB welcomes the continued development of the railway industry's tool that is designed to help risk assessors identify factors of this type and evaluate potential mitigating measures (the Level Crossing Risk Management Toolkit<sup>16</sup>).

<sup>16</sup> This document is developed and maintained by RSSB and can be found at [www.lxrmk.com](http://www.lxrmk.com)

Inspection and risk assessment at level crossings

The term ‘inspection’ describes the process of checking that the crossing is in good condition and compliant with relevant railway standards and legal requirements. The term ‘assessment’ is a parallel process that the industry has implemented to assess risk at crossings in the UK and to identify any reasonably practicable measures for improvement.

In 14 of the 25 RAIB level crossing investigations, it was found that the application of the inspection and/or risk assessment process had been deficient and/or the findings of the inspection/assessment had not been fully implemented. The RAIB findings include:

- errors made during data collection and risk assessments (eg incorrect collection of data);
- inadequate consideration of local factors at individual crossings;
- competence of risk assessors and crossing inspectors;
- actions not being taken in response to inspection and risk assessments at level crossings; and
- insensitivity of the All Level Crossing Risk Model to certain inputs (eg sighting times).

Types of level crossings that feature in RAIB investigations

The number of investigations completed by the type of crossing involved is shown below:

Table 10 – Type of Level Crossing

Type of Level Crossing	Number of investigations
Automatic half barrier	2
<i>Automatic open</i> (locally monitored)	2
<i>Automatic barrier</i> (locally monitored)	1
Manually controlled barrier	0
Manually opened gates	3
Tramway road crossing protected by road traffic lights	1
Footpath (including tramways)	7 (2 of which were on a tramway)
User worked crossing	5
Open crossing protected only by signs	2 (both heritage)
Crossings at/near stations	2
<b>Total</b>	<b>25</b>

Areas of RAIB recommendations and learning points

Areas covered by RAIB recommendations (and learning points disseminated by bulletin) published during 2010 have included:

- the sensitivity of the All Level Crossing Risk Model to the sighting of trains (report 08/2010);
- management of sub-standard sighting at footpath crossings (report 08/2010);
- the location of signage relative to the point that users decide to cross (report 08/2010);
- maintenance and inspection of road traffic light signals (report 16/2010);
- consideration of local factors, including the history of near-misses and accidents, when undertaking risk assessments (report 16/2010);

## 5 Identification of important recurrent issues

- checking that crossings are fit for use after renewals and maintenance activities (report 18/2010); and
- adequate analysis of outputs from the All Level Crossing Risk Model (bulletin B07/2010).

### The railway industry's response to level crossing issues

The actions reported by the ORR<sup>17</sup> as taken by Network Rail in response to the RAIB recommendations include:

- a review of guidance relating to the measurement of sighting times at level crossings;
- installation of power operated gate opening technology at some User Worked Crossings to allow the opening and closing of gates without the need to cross the line;
- a review of how the risk at level crossings is being managed, which includes:
  - data collection at level crossings;
  - risk analysis (including the consideration of local factors);
  - assessment of options for improvement; and
  - record keeping.
- projects established to review the mandated signage at public and private level crossings;
- enhanced training on data collection for level crossing risk assessment;
- the option of marking the point at which level crossing users should make the decision to cross has been included within the Level Crossing Management Toolkit and it has been proposed that this be examined further as part of RSSB research;
- steps have been taken to invite the users of all User Worked Crossings to participate in site specific risk assessments; and
- a cross functional audit of level crossings and risk assessment/inspection processes has been carried out.

In total there have been 104 recommendations made that relate to level crossing issues up to 31 December 2010, of these:

Table 11 – Recommendation implementation status

Level crossing recommendations issued		Awaiting response		In-Progress		Implemented		Non-implementation	
		No.	%	No.	%	No.	%	No.	%
TOTAL	104	10	10	26	25	62	59	6	6

There are a number of issues that remain of particular concern to the RAIB. These include:

- signage at station pedestrian crossings; and
- the overall effectiveness of level crossings risk management processes.

Although industry is addressing many of the issues identified, the RAIB has ongoing concerns regarding the length of time taken to implement some key recommendations. The average length of the time taken between publication of level crossing related reports and ORR's notification that the recommendations have been implemented was 19 months (based on level crossing accident reports published between October 2005 and December 2009).

<sup>17</sup> In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005.

## Freight and engineering trains

By 31 December 2010 the RAIB had published a total of 15 reports into accidents involving the design, maintenance, preparation or loading of freight trains (one of which involved an on-track machine in Northern Ireland). Although the number of vehicle miles run and types of equipment are not comparable, six RAIB investigations have identified the design or condition of passenger rolling stock to be a factor.

By the end of 2010 the RAIB had published 100 recommendations relating to freight vehicles and their operations; nine of which were published in 2010 (reports 14/2010 and 20/2010, see below).

Investigations published by the RAIB in 2010 were:

14/2010	Wigan <sup>18</sup>	(Aug 2009)	Derailment of freight train (due to defective track and wagon frame twist)
20/2010	Romford	(Feb 2010)	Stone discharged from open hopper doors on train passing through a station (due to poor train preparation)

*Bulletins:*

<i>B04/2010</i>	<i>Carluke</i>	<i>(Aug 2009)</i>	<i>Cladding came loose from tank container and struck another train</i>
<i>B09/2010</i>	<i>Kilsby Tunnel</i>	<i>(Mar 2010)</i>	<i>Open door on freight wagon struck signal</i>

### Investigations still ongoing at 31 December 2010 relating to freight and engineering trains

**Carstairs and Carrbridge:** on 22 December 2009 and 4 January 2010, two separate incidents resulted from seriously degraded braking due to ingress of snow and ice into the braking equipment. The RAIB investigation reports (02/2011 and 03/2011) were published in January and February 2011.

**Ashburys:** on 4 May 2010, five wagons loaded with aggregate ran away from a siding for 973 yards (890 metres) before two of them were derailed at trap points. The wagons had been left in the siding three days earlier. The runaway was caused by ineffective handbrakes on the wagons. The RAIB investigation report (07/2011) was published in March 2011.

**Highgate:** on 13 August 2010, a rail grinding machine ran away on the London Underground system for a distance of four miles (6.4 km) during passenger operating hours. The grinder was being towed and the emergency coupler broke. The RAIB investigation report (09/2011) was published in June 2011.

<sup>18</sup> Date in brackets indicates when accident/incident happened.

## 5 Identification of important recurrent issues

### Recurrent factors relating to freight and engineering trains

The table below indicates where the same factors have played a part in more than one incident or accident that the RAIB has investigated.

Table 12 – Freight train design, maintenance, preparation and loading factors

	No. of investigations in which the factors have been identified (some investigations feature more than one factor)	
	National Network	Northern Ireland Railway
Defective wagon	9	1
Poor train preparation before departure	8	-
Design deficiencies/approvals	3	1
Twisted frame	3	-
Uneven/insecure loading	3	-
Operation and management of freight yards	5	-

### Areas of RAIB recommendations in 2010

Areas covered by RAIB recommendations made during 2010 have included:

- the identification and rectification of excessively twisted wagon frames (report 14/2010);
- the design, maintenance and the correct operation of hopper doors on aggregate wagons (report 20/2010);
- train preparation (report 20/2010); and
- the supervision of freight shunting and train preparation staff (report 20/2010).

### The railway industry's response to issues associated with freight trains

The actions reported by the ORR<sup>19</sup> as taken by freight operators in response to RAIB recommendations include:

- additional checks by freight operators to identify two axle wagons with excessively twisted frames and their removal from service until rectified;
- assessment of the derailment risk associated with the PHA type wagon (including testing of its suspension);
- development of future proposals for using wheel impact measuring systems to identify unevenly loaded wheels;
- establishment of clear pass/fail criteria for the inspection of damaged wagon stanchions;
- a freight operator has reviewed its terminal operations, and associated computer system, with a view to minimise the chance of oversized containers being loaded on to a train;
- all freight operators have reviewed their procedures for conveying empty and lightweight containers in windy conditions;
- all freight operators have identified those container flat wagons that are fitted with non-compliant devices for securing containers (spigots) and, where necessary, have introduced risk mitigation measures (eg modification of the spigots and/or procedural controls);

<sup>19</sup> In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005.



- steps have been taken to remind private owners of wagons of the requirement to retain maintenance records relating to wagon twist;
- a project has been instigated to deliver updated maintenance plans for private owner wagons and to ensure that these comply with current Railway Group Standards;
- the use of weather forecasts data for wind speeds and the ways this is disseminated with railway undertakings has been reviewed; and
- identification of container flats with incorrectly designed spigots and the implementation of associated risk control measures.

In total there have been 100 recommendations made in relation to freight rolling stock and freight train preparation, of these:

Table 13 – Recommendation implementation status

Freight rolling stock and freight train preparation recommendations issued		Awaiting response		In-Progress		Implemented		Non-implementation	
		Nos	%	Nos	%	Nos	%	Nos	%
TOTAL	100	9	9	8	8	82	82	1	1

There are a number of issues that remain of concern to the RAIB. These include:

- the impact of off-set loads on derailment risk (RAIB report 16/2008, recommendations 1, 2, 3, 5 and 6; and report 10/2009, recommendation 9).
- the approval and certification of freight wagons (RAIB report 12/2009, recommendation 7).

## Fatigue

Fatigue has been identified as an issue in six investigations. These include three freight train derailments and two collisions between engineering trains operating within engineering possessions.

### Investigations still ongoing at 31 December 2010 relating to fatigue

**Shap:** on 17 August 2010 an incident occurred at Shap, Cumbria, when a freight train came to a stand and then rolled back for a distance of 2.1 miles (3.4 km). It is probable that this incident occurred due to the fatigue of the driver. The RAIB investigation report (15/2011) was published in August 2011.

### Areas of RAIB recommendations

During recent years recommendations have been made to both freight operators and Network Rail relating to the following issues:

- rostering patterns and the length of shifts;
- the impact of long hours on supervisory/management staff (and in particular recommendation 29 of the report into the derailment at Grayrigg; report 20/2008); and
- methods of managing the risk of fatigue.

## 5 Identification of important recurrent issues

### The railway industry's response to issues associated with fatigue

The ORR has reported that action has been taken in response to the seven recommendations made to freight operators, and they are generally content with this. However, the RAIB is concerned that Network Rail has still to fully implement the intent of fatigue related recommendations following the accidents at Grayrigg (report 20/2008) and East Somerset Junction (report 28/2009). Taken together, these reports covered the need to better understand the impact of long hours on the performance of staff carrying out safety critical duties to inform the development and implementation of appropriate thresholds and limits for safety critical work. The RAIB has shared its concerns with Network Rail and ORR.

### Low adhesion

#### Low adhesion events investigated by the RAIB, 2005-2010

During the autumn of 2005 a number of passenger trains ran past one or more signals at danger due to low rail head adhesion. The subsequent investigation was published in three volumes (report 25/2006).

Relevant investigations and bulletins published by the RAIB during 2010 were:

**Darlington station:** on 3 October 2009 a passenger train, comprising of a class 142 diesel multiple unit, collided with the rear of an express train at Darlington station. Factors causing the accident were the driving technique on the approach to the station, low rail head adhesion and the absence of a sanding system. The RAIB published a bulletin in January 2010 (B01/2010) to disseminate important learning points.

**Exeter St Davids station:** on 4 January 2010 a passenger train, comprising of a class 142 diesel multiple unit, collided with the rear of a stationary train at Exeter St Davids station. Again, the absence of a sanding system was a factor. The RAIB's investigation report (10/2010) was published in June 2010.

In September 2011 the RAIB was informed by ORR that Network Rail is now leading an initiative to fit sanders to those types of vehicles on which the fitment of such equipment had previously been precluded (eg Classes 14x and 153 diesel multiple units). A time bound plan has been agreed and progress is to be monitored by the ORR.

#### Investigations still ongoing at 31 December 2010 relating to low adhesion

**Stonegate:** on 8 November 2010 a train from London Charing Cross to Hastings was unable to stop at Stonegate, and came to a stand approximately 2.45 miles (4 km) beyond the station. The RAIB investigation includes examination of the arrangements for the servicing and maintenance of sanding equipment and the information provided to the driver concerning the availability of the sanding equipment.

#### Areas of RAIB recommendations

Areas covered by the RAIB's recommendations made during 2010 have included:

- identification of low adhesion hazards at level crossings and managing the associated risk (report 10/2010).



In previous years a range of recommendations have been made in relation to low adhesion. Substantive actions have now been taken in response to most of these recommendations.

There are a number of issues that remain a concern to the RAIB. However, in each of these areas the ORR has informed the RAIB of further work that has either commenced or is being planned. These issues include:

- The need to further understand the causes of low adhesion, in particular the phenomenon of ‘micro-contamination’. The ORR has informed the RAIB that the RSSB, in conjunction with the Adhesion Research Group, will be commencing further work in this area in November 2011.
- The potential use of existing technology on modern trains to detect and record instances of low adhesion when operating in normal service. The ORR has informed the RAIB that a trial is being conducted in autumn 2011 by a train operator using a modified rail vehicle fitted with an adhesion modifier delivery system and GPS real time recording of low adhesion areas.
- The potential use of existing technology on modern trains to detect and record instances of low adhesion when operating in normal service. The ORR has informed the RAIB that a trial is being conducted this autumn by a train operator using a modified rail vehicle fitted with an adhesion modifier delivery system and GPS real time recording of low adhesion areas. The RAIB is also aware of research that is now being undertaken at Loughborough University, as part of RSSB’s project T959, to investigate the feasibility of using data related to the dynamic behaviour of wheel sets and bogies during normal running to predict the levels of adhesion available for braking.
- Development of quantitative criteria for braking performance in low adhesion conditions. The ORR has informed the RAIB that the RSSB, in conjunction with the Adhesion Research Group, is commencing research on brake performance which will address this issue.

### Accidents that have occurred despite relevant RAIB recommendations

During 2009-10 the RAIB and ORR carried out a joint review to see if there were cases where accidents or incidents have occurred that might have been avoided had there been a fuller response to an earlier RAIB recommendation. This indicated that a number of accidents have occurred despite the identification of the risk in an earlier RAIB recommendation.

To further common understanding of the RAIB’s findings and recommendations, and in addition to the liaison it will have had during the investigation, the RAIB routinely now seeks to meet the decision making managers in the organisation which will implement the recommendations, and ORR, at the conclusion of ‘complex or contentious’ investigations.

Following the review ORR reports it now actively considers any repeat causality issues that may arise when the RAIB reports are published. This informs the way in which ORR addresses recommendations with other parties.

## 6 International Conference

### International Conference - London, 24 & 25 November 2010

This was the second International Conference in which RAIB took a leading role, both as chair of the organising committee and in providing speakers. While the format of the 2-day conference was similar to the previous successful event, the subject focus was very different; this time there was concentration upon topical issues being experienced by investigators, and the best practice that could be used.

The conference brought together 115 of the leading railway accident investigators and safety professionals. The speakers were drawn from investigation, safety and judicial organisations in France, Canada, Germany, Japan, Norway, Romania, Sweden, USA and UK. Delegates represented 24 nations from around the globe.

In addition to the main series of talks, delegates were able to attend a selection of intensive training workshops.

Immediately following the conference the RAIB held an open day for conference delegates at its Woking office.

## Budget

In common with all government departments it has been necessary for the RAIB to reduce its costs. The RAIB's budget for 2010-11 was £5.8 million, a reduction of 19% from the previous year. It has also been required to relocate its southern office to the site of the Air Accidents Investigation Branch on the outskirts of Farnborough during 2012. The move will present the RAIB with some additional operational challenges mainly due to the lack of rail and other public transport links to this site; but it will, in the medium term, achieve another 4% of savings (relative to the 2009-10 budget).

## Annexes

### Annex A – Glossary of abbreviations and acronyms

ALCRM	All Level Crossing Risk Model
ERA	European Railway Agency
ORR	Office of Rail Regulation
RRV	Road Rail Vehicle
RSSB	Rail Safety & Standards Board
SPAD	Signal Passed At Danger

## Annex B – Glossary of terms

All definitions marked with an asterisk, thus (\*), have been taken from Ellis' British Railway Engineering Encyclopaedia © Iain Ellis. [www.iainellis.com](http://www.iainellis.com)

Adhesion	Describing the friction produced between a rail and a rail wheel. Therefore, loss of adhesion is the absence of this friction and the inability to make any forward progress.*
All Level Crossing Risk Model (ALCRM)	A computer model on a central database used to compute the risk at level crossings, and to evaluate reasonably practicable improvements to reduce the risk.*
Automatic half barrier crossing	An automatic level crossing fitted with half barriers, traffic lights on the highway and a telephone to the relevant signal box.*
Automatic open crossing (locally monitored)	A level crossing without barriers, that is equipped with a flashing white light which is observed by the train driver to confirm that the road lights are functioning before the train proceeds over the crossing.*
Automatic barrier crossing (locally monitored)	An automatic level crossing fitted with automatic barriers and traffic lights on the highway, the correct operation of which is monitored by the train drivers.*
Earthworks	All natural earth slope and earth-related constructions such as cuttings and embankments.*
Infrastructure Manager	Any person who is responsible for establishing and maintaining infrastructure or a part thereof, which may also include the management of infrastructure control and safety systems, but does not include a maintainer.*
Manually Controlled Barriers	A manned level crossing with full barriers operated locally from a signal box or level crossing box.*
On Track Plant	Engineering plant with rail wheels, including On-Track Machines (OTM) and Road-Rail Vehicles (RRV).
Open crossing	A type of level crossing with no barriers, gates, warning system (apart from a whistle board) or monitoring.*
Points	An assembly of switches and crossings designed to divert trains from one line to another.*
Possession	A period of time during which one or more tracks are blocked to trains to permit work to be safely carried out on or near the line.*
Road-Rail Vehicle	Any vehicle adapted to operate equally well on road and rail.
Red Zone	An area that is on or near the line where trains are running normally.*

## Annexes

### Annex C – Annual Report feedback

Now you have had the chance to read the RAIB annual report, we would like to know your opinion of it. To help us improve the annual report we would welcome your feedback. The form is also available on our website [www.raib.gov.uk/publications](http://www.raib.gov.uk/publications)

<b>To what extent do you agree or disagree with the following statements?</b> (Please tick the appropriate box)	Strongly agree	Tend to agree	Neither agree or disagree	Tend to disagree	Strongly disagree
I found the information easy and interesting to read					
I found the information useful					
I found links to the RAIB website worked well					
I found the section on Operational Activity useful					
I found the section on Operational Experience useful					
I found the section on Recommendations useful					
I found the section on Identification of important recurrent issues useful					
I found this report useful in providing an overview of the RAIB's investigations					
Any other Comments:					

Please send your feedback form and any comments to the RAIB using any of the contact methods below:

Telephone: 01332 253300

Fax: 01332 253301

E-form on the website at the end of the annual report, or alternatively cut and paste this link:

[http://www.raib.gov.uk/publications/annual\\_report/annual\\_report\\_feedback\\_2011.cfm](http://www.raib.gov.uk/publications/annual_report/annual_report_feedback_2011.cfm)

E-mail: [Annualreportfeedback@dft.gsi.gov.uk](mailto:Annualreportfeedback@dft.gsi.gov.uk)

Or write to:

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