RAIB

Rail Accident Investigation Branch

Annual Report 2013 Section 1

This page is intentionally left blank

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.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Fax: 01332 253301
Website: www.raib.gov.uk

This report is published by the Rail Accident Investigation Branch, Department for Transport.

This page is intentionally left blank

Preface

This is the Rail Accident Investigation Branch's (RAIB) Annual Report for the calendar year 2013. 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 RAIB's website at www.raib.gov.uk.

This page is intentionally left blank

RAIB Annual Report 2013

Contents

Chief Inspector's Foreword

This Annual Report sets out our activities during 2013 and shares our views of the risks we see through our investigation work and the work the industry has undertaken in dealing with those risks.

Our investigations inform others of safety measures that need to be taken in at least four ways:

a) recommendations that are specific to the incident and the parties involved;

b) recommendations that are likely to apply to other organisations with similar operations or equipment;

c) recommendations to the regulators, or government organisations regarding the standards, guidance, supervision and legislation; and

d) the picture that emerges from the total number of investigations we have completed to date.

Referring to d) above, section 5 of part 1 of this report gives an overview of the areas of risk that feature repeatedly in our investigations. We have outlined what the industry is doing in each of these areas and much good work is being done. However, as some of these areas of risk continue to be the subject of investigation in 2014, this indicates there is yet still work to do.

Concerning a), b) and c) above, part 2 of this report outlines the reports we have received during 2013 from:

i. the Office of Rail Regulation (ORR) concerning their own and the rail industry's response to our recommendations; and

ii. other public bodies when they have been subject of our recommendations[1].

The level of uptake and implementation of our recommendations remains high at around 97%. In almost all cases industry parties implement our recommendations by choice; in rare cases the safety regulator may require the industry to implement our recommendations provided they are deemed as reasonably practicable under Health & Safety legislation[2]. Nevertheless there are a relatively small number of recommendations where we have particular concerns over the adequacy of the actions taken by the industry, and consequently the risks we noted during our investigations may still not be adequately addressed. These are highlighted in part 2 of this report. At 31 December 2013, 28 recommendations made to industry and 11 recommendations made to public bodies were reported to the RAIB as accepted but still not implemented after two years; these figures include 14 recommendations to industry and 11 recommendations to public bodies which were still awaiting implementation after three years[3]. This is an overall improvement on last year but the RAIB remains concerned that these recommendations are seemingly still open after this length of time. The ORR is particularly focussing its efforts on improving the situation and the RAIB is following up the recommendations with the relevant public bodies and seeking to understand whether there is more the RAIB can do to support these organisations (but we have no jurisdiction over them).

---

[1] The European Safety Directive requires the safety regulator or public bodies to ensure our recommendations are duly considered and acted upon appropriately.

[2] 'Reasonably practicable' is a narrower term than 'physically possible'. A computation must be made in which the risk is compared with the cost of the measures necessary for averting the risk, and if it is shown that there is a gross disproportion between them – the risk being insignificant in relation to the cost then the measures should not be implemented.

[3] More currently, at the end of September 2014, 32 of the recommendations made to industry were not implemented after two years (16 of which were more than three years old); and five of the recommendations made to public bodies were not implemented after two years (three of which were more than three years old).

Chief Inspector's Foreword

Following the conclusion of three investigations in 2013 into accidents at Arley (RAIB report 12/2013), Beech Hill (RAIB report 17/2013) and Bulwell (RAIB report 20/2013), the RAIB is concerned that these accidents occurred despite recommendations made in earlier RAIB investigations, which were intended to address similar causal factors. In each case the recommendations had been accepted and reported as implemented, indicating the lessons from the earlier investigations had not been fully learned.

During the past year, some industry organisations have expressed concern that the selection of (and recommendations from) our investigations have not always aligned with what the industry, in general, views as areas of highest risk. We select our investigations based on our judgement of how much safety learning and improvement might be achieved through an independent professional investigation. Our investigations inform the industry risk modelling. As a result, our investigations may bring new focus on other risks. An example of this is the development of a strategy for the management of risk at the platform-train interface, including the process of train dispatch, following our investigations into the accidents at James Street, RAIB report 22/2012 and Charing Cross, RAIB report 10/2013.

In our last Annual Report, I expressed a hope that there could be more transparency between the industry, ORR and ourselves regarding our respective goals and priorities concerning common areas of industry risk. We believe this will better inform our investigation activities, their selection, their scope and the related recommendations. Together with the ORR and Network Rail we have made progress during 2013 and we are continuing this work this year.

The 12 month period ending December 2013 has been another busy year for the RAIB. Despite operating with less than our full complement of investigators for part of the year, we have published 22 full investigation reports; five bulletins; issued four Urgent Safety Advice notices and started a further 26 investigations. Other activities during the year have included:

- launching a significant internal reorganisation to strengthen investigation support services at both our Derby and Farnborough offices;
- playing a major role in the International Rail Accident Investigation Conference in October 2013 in London;
- as Chief Inspector, giving written and oral evidence to the Transport Select Committee on safety at Level Crossings in November 2013;
- further training of our own and overseas investigators, including staff from the Government of Dubai owned Roads and Transport Authority (with whom we have an established Memorandum of Understanding); and
- continuing to engage with, and actively support, the European Rail Agency and the European Network of National Investigation Bodies.

My team has worked hard and we remain totally committed to supporting the UK's railways in the prevention of accidents.

Carolyn Griffiths

Chief Inspector of Rail Accidents

1 The role of the Rail Accident Investigation Branch

1. 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 organisation for investigating accidents and incidents occurring on the UK's railways. The roles and duties of the RAIB are set out in the Railways and Transport Safety Act 2003 (the Act) and its associated implementing regulations, the Railways (Accident Investigation and Reporting) Regulations 2005 (the Regulations). Together, the Act and the Regulations also implement the requirements of the European Railway Directive (2004/49/EC) (the Directive), which came into force in 2004. The Directive creates a common regulatory framework for safety across Europe and requires each member state to establish national safety authorities (eg ORR), and an independent body to investigate all rail accidents (RAIB).

2. Aims of the Branch

The RAIB's aims are to improve the safety of the railways by carrying out timely investigations into railway accidents and incidents to determine the causes and circumstances, and to make safety recommendations to reduce the likelihood of accidents in the future.

3. Objectives of the Branch

To respond promptly and effectively to notifications of railway accidents and incidents.

To conduct thorough investigations in a way that is proportionate to the seriousness of the event and the lessons to be learned from it.

To use the resources of the RAIB appropriately to achieve the maximum effect in the improvement of safety on railways and tramways.

4. Scope of accidents and incidents investigated

The scope of the RAIB's investigation work is set out in the Regulations and the Act and covers the mainline railways, metros, light rail and heritage railways of Great Britain and Northern Ireland, the Channel Tunnel and tramways in England and Wales. Under the Act, the RAIB is mandated to investigate any serious railway accident, as defined in the Regulations, and also has the freedom to investigate other types of accident or incident where it believes that an investigation could significantly improve railway safety.

5. 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.

6. 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 to respond to incidents.

7. 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.

8. Investigation

The RAIB's investigations are conducted completely independently of all other organisations and investigations by other parties. However, it can share factual evidence with industry stakeholders and will share such evidence with other statutory investigatory bodies. It will not share the identities of witnesses or their statements, nor medical records relating to persons involved in the accident or incident, or other information given in confidence. The RAIB will keep involved parties informed of emerging findings throughout the investigation and may 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 may be learned then it might publish a bulletin, which consists of a summary of the findings and identification of safety lessons.

9. 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.

10. The recommendation process

Where appropriate, the RAIB's investigation reports will include recommendations to improve safety and to prevent the reoccurrence of similar accidents.

11. Organisation and Funding

The RAIB consists of full time investigators and support staff. They are based in two operational centres, at Derby and Farnborough.

The RAIB's budget for 2013 was £ 5.1 m.

12. Board of Transport Accident Investigators

The Board of Transport Accident Investigators was established in 2003 by the Secretary of State, consisting of the three Chief Inspectors of accident investigation (Rail, Marine and Air), and is currently chaired by the RAIB's Chief Inspector. Its purpose is, where appropriate, to ensure consistency of approach and identify and develop any common strategic aims and objectives and best practices. These include the development of a new and common electronic evidence management system, upkeep of the Branches' web sites, and dealing with common risks in a collaborative manner. The Board normally meets quarterly.

2 Operational Activity 2013

2. Operational Activity 2013

During the period from 1 January to 31 December 2013, the RAIB received 360 notifications of railway accidents and incidents from the industry. These resulted in 41 deployments of RAIB inspectors to the accident or incident site to carry out a preliminary examination. There were ten additional preliminary examinations which did not require deployment to site.

As a result of the analysis of the information gathered, the RAIB started 26 full investigations, and issued five Bulletin reports and four Urgent Safety Advice. (See page 15 for more information on Bulletins and Urgent Safety Advice.)

Investigation reports published in 2013

The RAIB completed and published 22 full investigation reports in 2013. While the RAIB's aim is to publish reports and bulletins within 12 months, the length of individual investigations can sometimes extend beyond this because of the complexity and scale of the investigation, late reporting or the need to address complex issues raised during formal consultation. In 2013 the average time from the date of the incident to publication for full investigations was 11.9 months (11.8 months in 2012), with the longest being 23 months[4] and the shortest six months. In addition to these, there were five bulletins published in 2013. The average time from the incident to publication of the bulletin was just over five months (3.3 months in 2012[5]). Overall the average time for full investigation and bulletin reports to be published was 11 months.

Table 1 provides a summary of the outputs achieved by the RAIB in 2013. Details on the status of recommendations issued in reports published in 2013 and recommendations subject to a report by the safety authority can be found in part 2 of the Annual Report.

Table 1 – RAIB outputs in 2013

Preliminary examinations completed	51
Full investigation reports published	22
Bulletins published	5
Urgent Safety Advice issued	4
Investigations commenced	26

Table 2 provides details of the investigations completed in 2013 and the legal basis for the investigation. The references 19(1), 19(2) and 21(6) refer to the relevant articles in the Directive (see Table 2 for more detail).

Table 3 provides details of full investigations commenced in 2013 and the basis for the investigation.

Table 4 provides details of an investigation opened in 2012 but not completed by 31 December 2013.

[4] Partial failure of a structure inside Balcombe Tunnnel, West Sussex, that occurred on 23/09/2011. This investigation took a long time due to the difficulty of accessing the tunnel without disrupting planned train services. Access was required to provide the detailed information needed for the final report but disrupting regular services was not considered to be justified by the level of risk which remains after implementation of the measures described in this report.

[5] Average time for bulletins has increased due to the complexity of the RAIB Bulletin 5/2013 Track worker struck and seriously injured at West Drayton, which took 8 months from incident date to publication.

Table 2 – Investigations completed in 2013

Report Number	Event date	Publication date	Title of investigation (location)	Occurrence type	Basis for investigation		
					19(1)	19(2)	21(6)
01/2013	02/05/2012	14/01/2013	Fatal accident at Kings Mill No.1 level crossing, Mansfield	Level crossing fatality to member of public		a	
02/2013	28/01/2012	28/01/2013	Freight train derailment at Reading West Junction	Freight train derailment		a	
03/2013	16/05/2012	14/02/2013	Pedestrian struck by a tram at Sandilands tram stop, Croydon	Level crossing injury to member of public[6]		a	
04/2013	17/02/2012	28/03/2013	Derailment of a tram at East Croydon	Passenger train derailment		a	
05/2013	28/10/2012	25/04/2013	Dangerous occurrence involving engineering possession, near Dunblane, Scotland	Possession irregularity		a	
06/2013	05/01/2012	20/05/2013	Accident involving a pantograph and the overhead line near Littleport, Cambridgeshire	Infrastructure failure		a	
07/2013	16/07/2012	27/06/2013	Dangerous occurrence involving track workers, near Roydon station, Essex	Staff hit by train (near miss)		a	
08/2013	07/07/2012	22/07/2013	Derailment of a freight train at Shrewsbury station	Freight train derailment		a	
09/2013	25/03/2012	24/07/2013	Collision of a road-rail vehicle with a buffer stop at Bradford Interchange station	Runaway incident		a	
10/2013	24/11/2012	25/07/2013	Accident at Charing Cross station	Train movement accidents involving a passenger		a	
11/2013	22/03/2012	29/07/2013	Dangerous occurrence at Lindridge Farm user worked crossing, near Bagworth, Leicstershire	Level crossing near miss		b	
12/2013	10/08/2012	08/08/2013	Collision between a stoneblower and ballast regulator near Arley, Warwickshire	Collision with other train		a	
13/2013	23/09/2011	15/08/2013	Partial failure of a structure inside Balcombe Tunnel, West Sussex	Infrastructure failure		a	
14/2013	28/06/2012	02/09/2013	Train ran onto a washed-out embankment near Knockmore, Northern Ireland	Infrastructure failure		a	
15/2013	19/03/2012	12/09/2013	Dangerous occurrence involving an engineering train at Blatchbridge Junction, near Frome	Train defect		a	
16/2013	26/04/2012	16/09/2013	Signal passed at danger at Stafford	SPAD		a	
17/2013	04/12/2012	24/09/2013	Collision between a train and a car at Beech Hill level crossing, near Finningley	Level crossing fatality to a member of public	✓		
18/2013	08/01/2013	25/09/2013	Train fire at South Gosforth	Fire on rolling stock		a	
19/2013	28/11/2012	26/09/2013	Fatal accident at Bayles and Wylies footpath crossing, Bestwood, Nottingham	Level crossing fatality to member of public	✓		
20/2013	06/08/2012	03/10/2013	Track worker struck by a train at Bulwell, Nottingham	Staff hit by train (injury)		a	
21/2013	04/12/2012	29/10/2013	Fatal accident involving a track worker at Saxilby	Staff hit by train (fatality)	✓		
22/2013	27/12/2012	11/12/2013	Derailment of a freight train at Barrow upon Soar, Leicestershire	Freight train derailment		b	

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

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.

[6] This investigation has been re-categorised since the publication of the Annual Report 2012.

2 Operational Activity 2013

Table 3 – Full investigations commenced in 2013

Event date	Title of investigation (location)	Occurrence type	Basis for investigation		
			19(1)	19(2)	21(6)
08/01/2013	Electrical fault and fire on a metro train near South Gosforth, Newcastle upon Tyne	Fire on rolling stock		a	
21/01/2013	Derailment of a freight train at Castle Donington, Leicestershire	Freight train derailment		a	
23/01/2013	Derailment at Liverpool Street station, in London	Passenger train derailment		a	
23/01/2013	Derailment at Ordsall Lane Junction, Salford	Passenger train derailment		a	
24/01/2013	Fatal accident at Mott's Lane level crossing, Witham, Essex	Level crossing fatality to member of public	✓		
08/03/2013	Dangerous occurrence in a tunnel near Old Street station, in London	Infrastructure failure		a	
21/03/2013	Fatal accident at Athelney automatic half barrier level crossing, near Taunton, Somerset	Level crossing fatality to member of public	✓		
13/04/2013	Incident involving a tram operating with doors open in Croydon	Train movement accidents involving passengers		a	
21/04/2013	Road Rail Vehicle runaway and collision at Glasgow Queen Street Tunnel	Runaway incident		a	
31/05/2013	Accident at Balnamore level crossing, County Antrim, Northern Ireland	Level crossing near miss		a	
05/06/2013	Passenger trapped in train doors and dragged a short distance at Newcastle Central station	Train movement accidents involving a passenger		a	
06/06/2013	Near-miss at Llandovery level crossing, Carmarthenshire	Level crossing near miss		a	
25/06/2013	Incident at Butterswood level crossing, near Goxhill, Lincolnshire	Level crossing near miss		b	
14/07/2013	Accident at Jetty Avenue no.18 user worked level crossing near Woodbridge	Level crossing minor damage		b	
16/07/2013	Collision at Buttington Hall user-worked crossing, Welshpool	Level crossing injury		a	
21/07/2013	Collision between a passenger train and a stationary train at Norwich station	Collision with other train	✓		
01/08/2013	Dangerous occurrence at Denmark Hill Station, London	Infrastructure failure		b	
25/08/2013	Uncontrolled evacuation of a train at Holland Park station	Train defect		a	
27/08/2013	Derailment of freight train at Stoke Lane level crossing, near Nottingham	Freight train derailment		a	
28/08/2013	Incidents involving a wheelchair rolling off Southend station platform on 28 August 2013 and a pushchair rolling off Whyteleafe station platform on 17 September 2013	Near miss (non level crossing)		a	
15/10/2013	Derailment of a freight train at Gloucester	Freight train derailment		a	
15/10/2013	Derailment of a freight train at Camden Road, North London	Freight train derailment	✓		
26/10/2013	Road vehicle incursion onto the railway at Aspatria, Cumbria	Near miss (non level crossing)		b	
26/10/2013	Pedestrian fatality at Barratts Lane footpath Crossing	Level crossing fatality to member of public	✓		
20/11/2013	Passenger train collision with buffer stops at Chester station	Collision with an obstacle		a	
23/11/2013	Connecting rod detached from locomotive at Winchfield	Train defect		a	

Table 4 – List of investigations opened in 2012 but not completed by 31 December 2013

Event date	Title of investigation (location)	Occurrence type	Basis for investigation		
			19(1)	19(2)	21(6)
	Class investigation - Accidents due to landslips at Loch Treig (near Tulloch), Falls of Cruachan, Rosyth, St Bees, Bargoed and Hatfield Colliery during 2012/2013[7]				
	Class investigation - Broken rail incidents on the East Coast Main Line[8]				

Summary details of open investigations can be can be found at www.raib.gov.uk in the section called current investigations register under the publications area.

Bulletins

Normally, when the RAIB deploys inspectors to the site of an accident or incident, it is to conduct a preliminary examination of the circumstances and key evidence. In some instances, on the basis of a review of this information, the RAIB concludes that further investigation by the RAIB would be unlikely to result in the formal recommendations for the improvement of safety. However, sometimes, more general safety lessons are identified where the RAIB believes that it would be beneficial to make these widely known across the industry, and Bulletins are used for this.

During 2013, the RAIB published five Bulletins on its website.

The Bulletins covered:

- one level crossing incident - a train narrowly avoided a collision with a car on a level crossing due to an error from the crossing keeper (RAIB bulletin 01/2013);
- one near miss - two trains were travelling towards each other on the same line and stopped 160 meters apart (RAIB bulletin 02/2013);
- one Signal Passed at Danger (SPAD) - a train passed a signal at danger and crossed a level crossing that was still open to road traffic (RAIB bulletin 03/2013); and
- two accidents where staff were injured - a track worker was struck by a passing train when walking along the side of the track (suffering minor injuries) (RAIB bulletin 04/2013) and a member of staff was acting as a lookout and had his back to the train when he was struck and seriously injured (RAIB bulletin 05/2013).

[7] This Class investigation initially started as an investigation of a landslip resulting in a collision and derailment at Loch Treig. Subsequently, due to some similarity the investigations into five other landslips, Falls of Cruachan, Rosyth, St Bees, Bargoed and Hatfield Colliery were incorporated into the same report. (This report was published on 02/04/14 RAIB Report 8/2014 and was entered on ERAIL as the Loch Treig report.)

[8] Class investigation triggered by rail break at Corby Glenn. Details of this and rail breaks at Copmanthorpe and Hambleton are included in this report.

2 Operational Activity 2013

Urgent safety advice (USA)

In addition, the RAIB can issue urgent safety 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. If the issue affects other European member states the safety advice is reported to the European Rail Agency (ERA) via their safety information system (SIS); this action alerts all member states of the advice. During 2013 the RAIB issued urgent safety advice on four occasions, as follows:

Table 5 – Urgent safety advice issued by the RAIB in 2013

Incident date	Incident	Urgent Safety Advice	Date of USA	Date sent to ERA SIS
04/12/2012	Collision between train and car at Beech Hill AHB crossing	USA issued to make infrastructure managers aware of the risk of road vehicle drivers not seeing illuminated wig wag road traffic lights that are fitted with 36W lamps on the type of lens used in some wig wag traffic lights.	16/04/2013	UK specific - not sent to ERA
30/04/2013	Vehicle runaway	USA issued as Strathclyde Partnership for Transport Subway needs to urgently review the inspection maintenance and inadequacy of the brakes on its works train fleet and the adequacy of the related operating procedures.	20/05/2013	UK specific - not sent to ERA
05/06/2013	Passenger trapped in train doors and dragged at Newcastle Central station	USA issued to make Manufacturers, Railway Undertakings and Entities in Charge of Maintenance of passenger vehicles with electronic sensitive door edges aware of the possibility of overcoming the protection provided by a sensitive edge system by means of an angular deflection of a nosing rubber. Consideration should be given to any measures, whether technological and/or procedural, necessary to manage the associated risk to a tolerable level.	23/10/2013	24/10/2013
15/10/2013	Flange climb derailment leading to a container falling from a train at Primrose Hill/ Camden Road	USA issued as FEA wagons were running over infrastructure with loads distributed in a way that makes them susceptible to derailment on permitted levels of track twists.	06/11/2013	Not sent to ERA. NIBs consulted during investigation

3. Operational experience - Summary of incidents and accidents investigated by the RAIB (2009 – 2013)

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

The RAIB has a duty to investigate and to report to the ERA all serious railway accidents, as defined by the Directive, and where necessary, any other similar accident with an obvious impact on railway safety regulation or the management of safety occurring on the railways in the United Kingdom.

The ERA has published guidance to promote consistent categorisation of investigations in accordance with the Directive. The RAIB uses this to classify its investigations according to Articles 19(1), 19(2) and 21(6) (see Table 2 for more detail).

The following table (Table 6) shows the breakdown of accidents and incidents that the RAIB has investigated between 2009 and 2013. The figures have been collated according to the date of occurrence and not publication of the report.

Table 6 – Investigations by category sorted by Article 19(1), 19(2), and 21(6)[9]

Basis for Investigations by the European Railway Safety Directive category	2009	2010	2011	2012	2013	TOTAL
Art 19(1)	4	1	4	3	5	17
Art 19(2)	13	16	23	21	21	94
Art 21(6)	3	1	0[10]	0	0	4
Total	**20**	**18**	**27**	**24**	**26**	**115**

The bar charts 1 to 5 show the total number of investigations carried out by the RAIB; the total broken down by the type of accident and railway for the 5 year period 2009 to 2013[11].

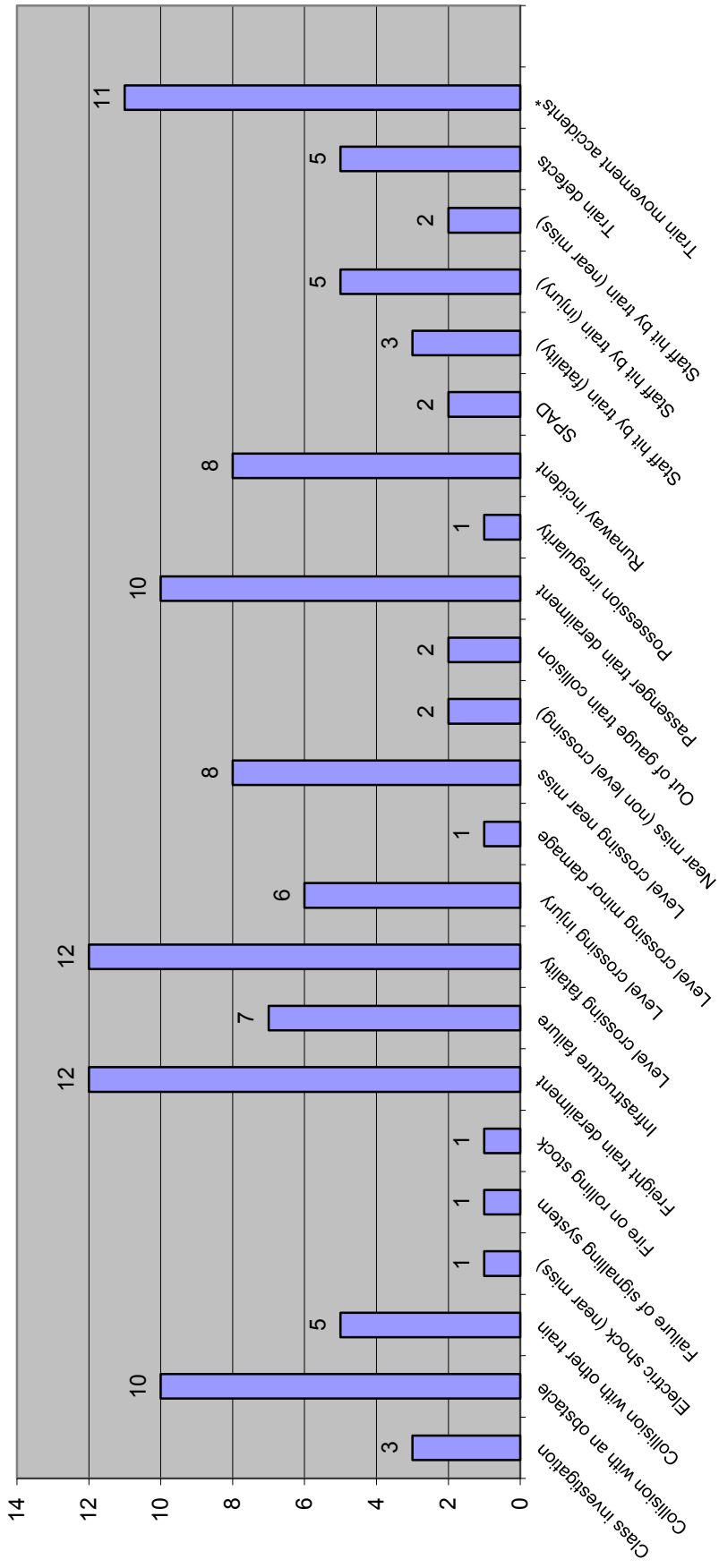
[9] Figures do not include 3 class investigations (which addressed more general safety issues).

[10] In 2008 the ERA widened the scope of the Directive to include tramways and heritage. Since then, the RAIB has categorised all accidents and incidents according to Article 19(1) or 19(2).

[11] Figures include 3 class investigations; two involving infrastructure failures and one involving safety at AOCLs.

3 Operational experience

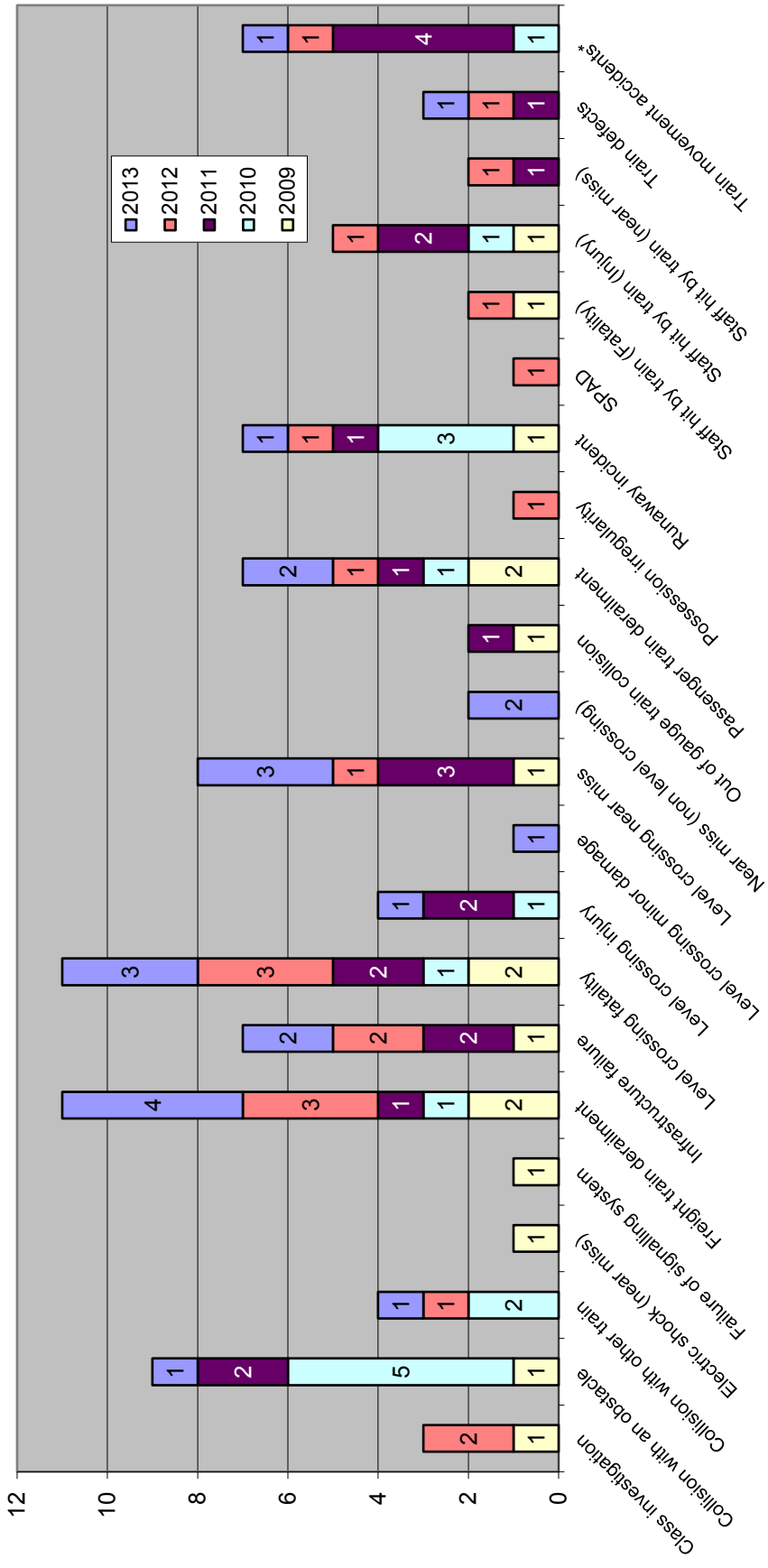
Chart 1 - Types of incidents/accidents investigated 2009 - 2013



Type of investigation

*Note: 'Train movement accidents' involve passengers and members of public (not staff).

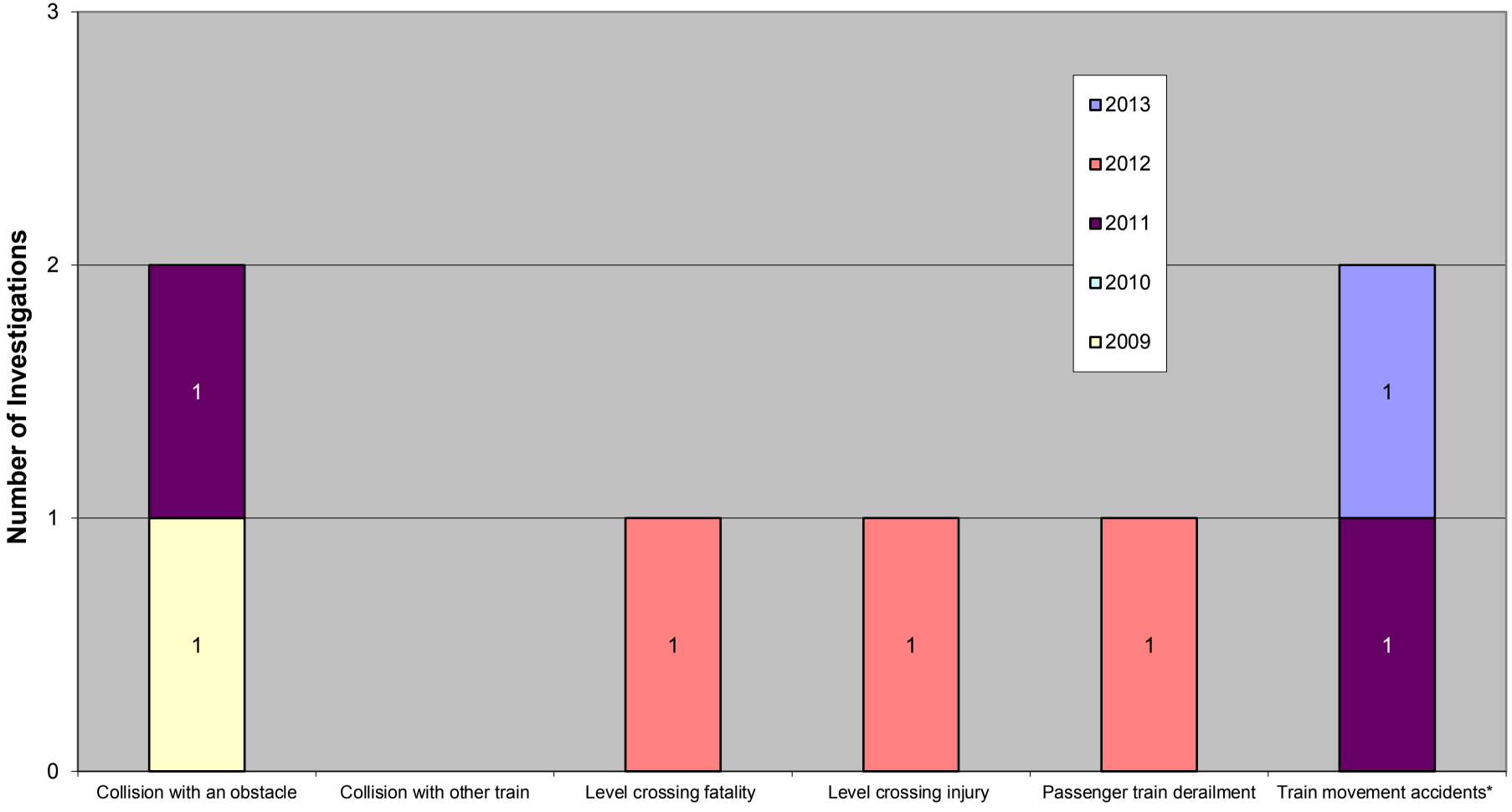
Chart 2 - Types of incidents/accidents investigated on National Networks 2009 - 2013



Type of Investigation

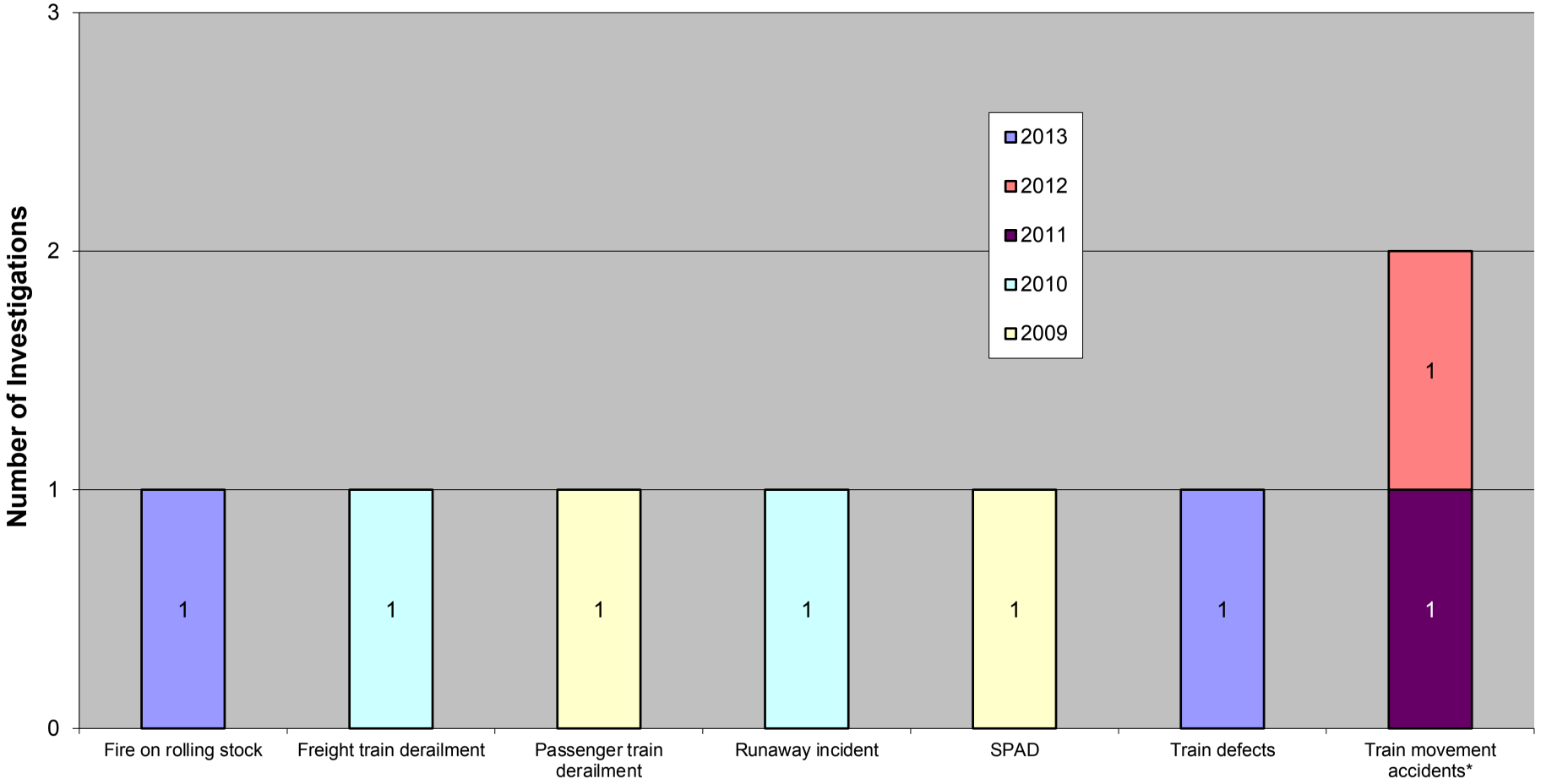
*Note: 'Train movement accidents' involve passengers and members of public (not staff).

Chart 3 - Types of incidents/accidents investigated on Light Rail Systems 2009 - 2013



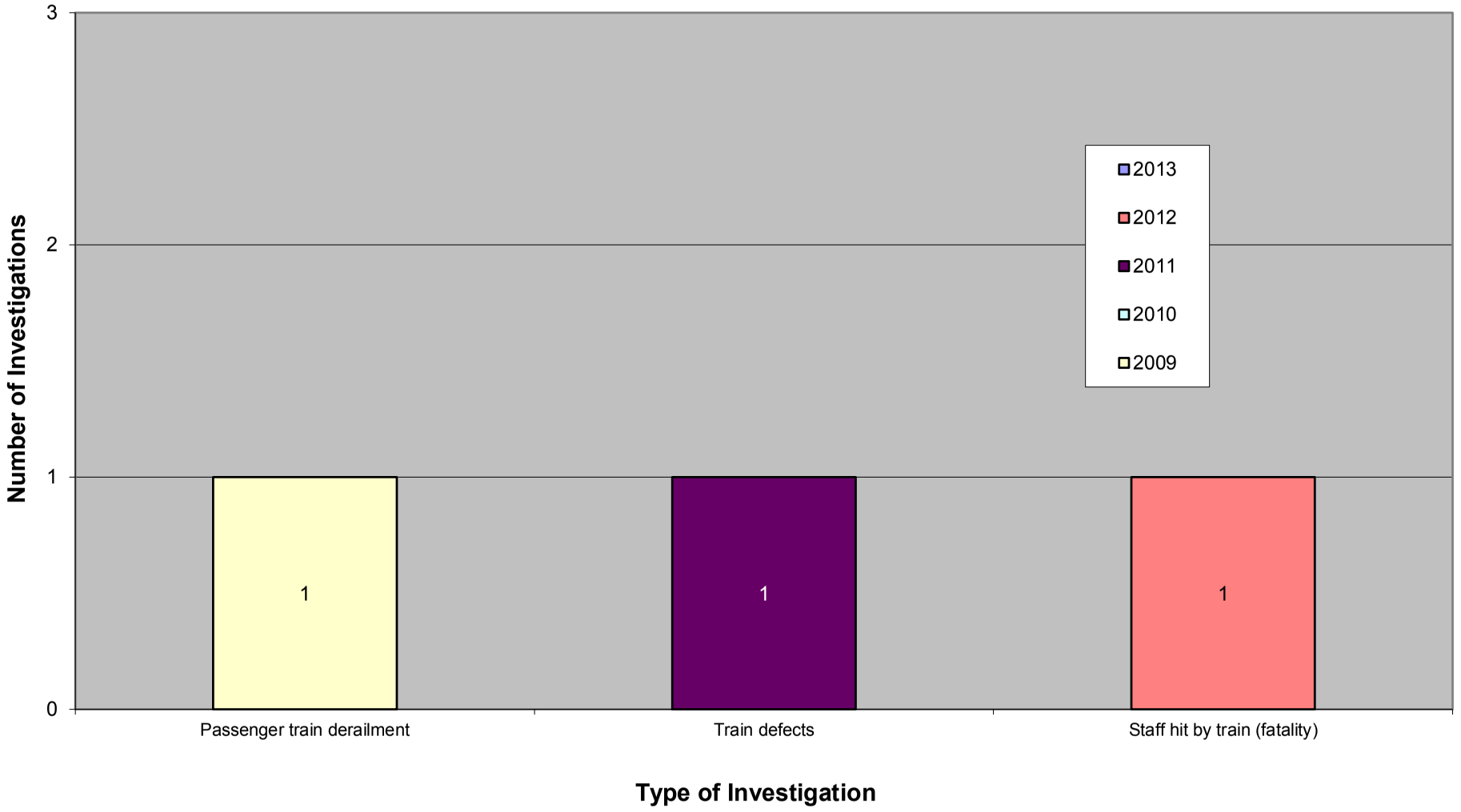
*Note: 'Train movement accidents' involve passengers and members of public (not staff).

Chart 4 - Types of incidents/accidents investigated on Metros 2009 - 2013



*Note: 'Train movement accidents' involve passengers and members of public (not staff).

Chart 5 - Types of incidents/accidents on Heritage Railways 2009 - 2013



4. Recommendations

Recommendations are one of the prime outputs of the RAIB's investigations in improving safety. The recommendations are addressed to the appropriate safety authority[12], and to other public bodies where they are the end implementer.

The purpose of addressing the recommendation in this way is so that the safety authority can ensure that the organisations to which the recommendations are made properly consider the recommendations, and where appropriate act on them; as the Directive and Regulations require. 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, within a period not exceeding 12 months[13], 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, unless it is necessary to do so as part of a subsequent investigation. However, in part 2 of the Annual Report the RAIB indicates where it has material concerns regarding the response to the recommendations.

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:

- Implemented - meaning that all associated actions to deliver the recommendation have been completed.
- Implemented by alternative means – meaning that the intent of the recommendation has been satisfied in a way that was not identified by the RAIB during the investigation.
- Implementation ongoing – meaning that work to deliver the intent of the recommendation has been agreed and is in the process of being delivered.
- In-Progress - meaning that ORR has yet to be satisfied that an appropriate plan, with timescales, is in place to implement the recommendation; and work is in progress to provide this.
- Non-implementation - meaning that no measures will be taken to implement the recommendation.
- Awaiting Response – meaning awaiting initial response from ORR (or other safety authority or public body) on the status of the recommendation.

The following table provides the status of recommendations made between 1 January 2009 and 31 December 2013.

[12] The safety authority is the safety regulator; for Great Britain this is primarily the Office of Rail Regulation (ORR) although there are some recommendations made by the RAIB where the Health and Safety Executive (HSE) 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.

[13] In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005.

4 Recommendations

Table 7 – Recommendation implementation status per year (includes recommendations made not only to safety authorities but also public bodies)

Recommendations issued		Table 7: Recommendation implementation status											
		Awaiting Response		In-Progress		Implementation ongoing		Implemented by alternative means		Implemented		Non-implementation	
Year	Nos	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%
2009	196	1	1%	9	5%	2	1%	1	1%	175	89%	8	4%
2010	98	0	0%	4	4%	1	1%	3	3%	89	91%	1	1%
2011	93	3	3%	10	11%	10	11%	1	1%	68	73%	1	1%
2012	110	4	4%	32	29%	27	25%	6	5%	40	36%	1	1%
2013	84	78	93%	6	7%	0	0%	0	0%	0	0%	0	0%
TOTAL	**581**	**86**	**15%**	**61**	**10%**	**40**	**7%**	**11**	**2%**	**372**	**64%**	**11**	**2%**

Further details of the recommendations where a change of status has been reported to the RAIB during 2013 are detailed in part 2 of this report.

In the 22 reports published in 2013, the RAIB made a total of 84 recommendations; the average number of recommendations per report is approximately four. The majority of the recommendations made in 2013 were targeted at the following organisations (in some cases they were made to more than one implementer):

- Network Rail (48).
- Main line freight train operators (5).
- Light Rail Tram (LRT) Operating Company and Infrastructure (13).
- Railway Contractors (6).
- Northern Ireland Railways (5).
- Other Public Bodies (3).
- Rail Safety and Standards Board (2).
- ORR (4).

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 have been avoided as a result of the actions taken. The statistical data on UK's railway safety is published by the ORR on its website. These statistics can be found at: www.dataportal.orr.gov.uk.

Note: Charts 6 to 9 show the status of recommendations (for each sector and by year) made in RAIB reports to the main rail sectors as at 31 December 2013.

Chart 6 - National Networks recommendation implementation status

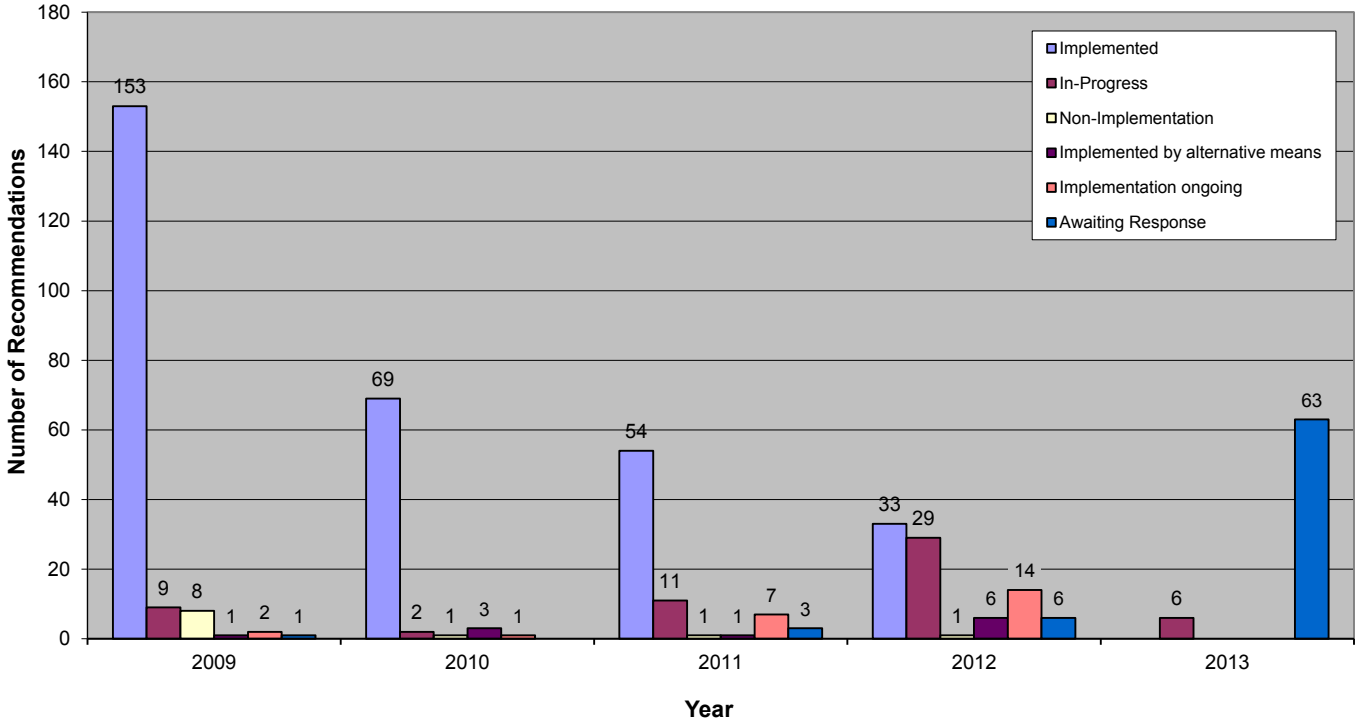
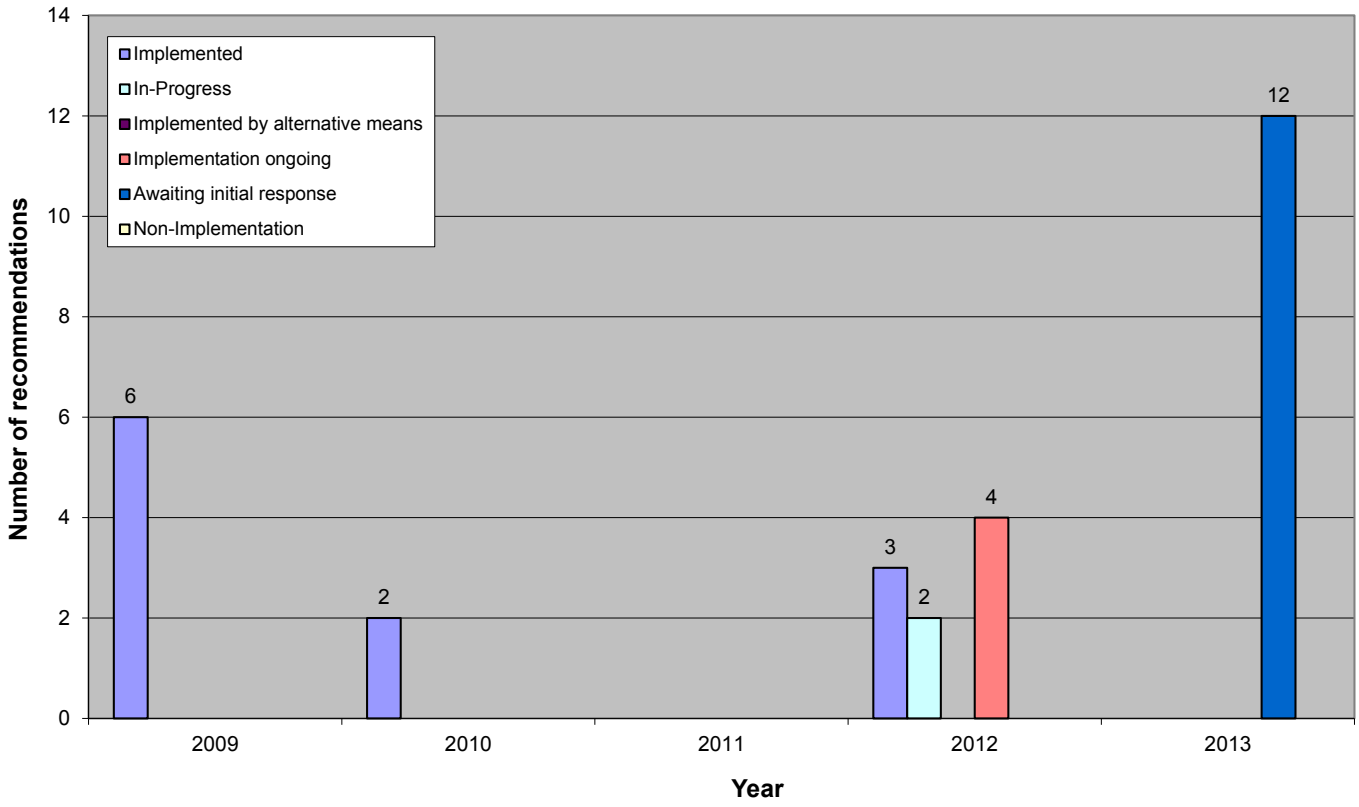


Chart 7 - Light Rail recommendation implementation status



4 Recommendations

Chart 8 - Heritage recommendation implementation status

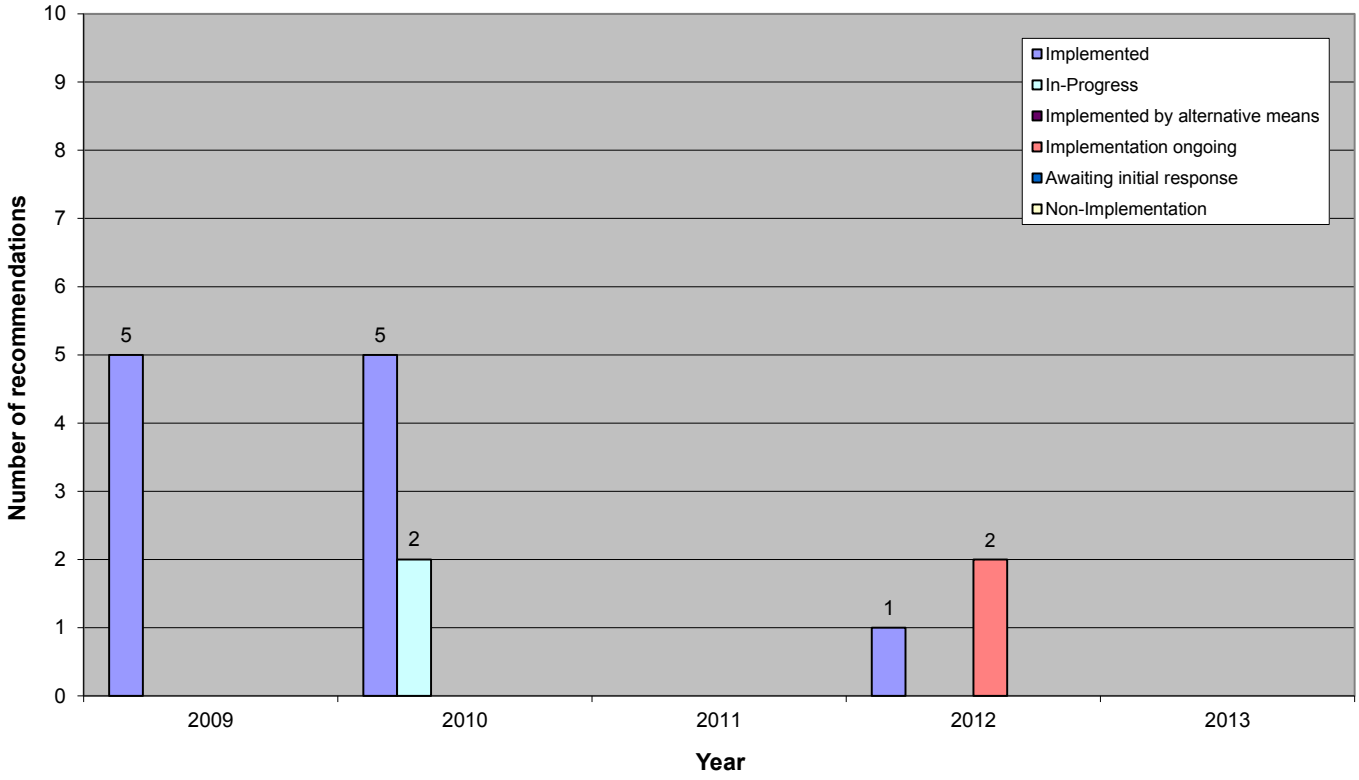


Chart 9 - Metro recommendation implementation status

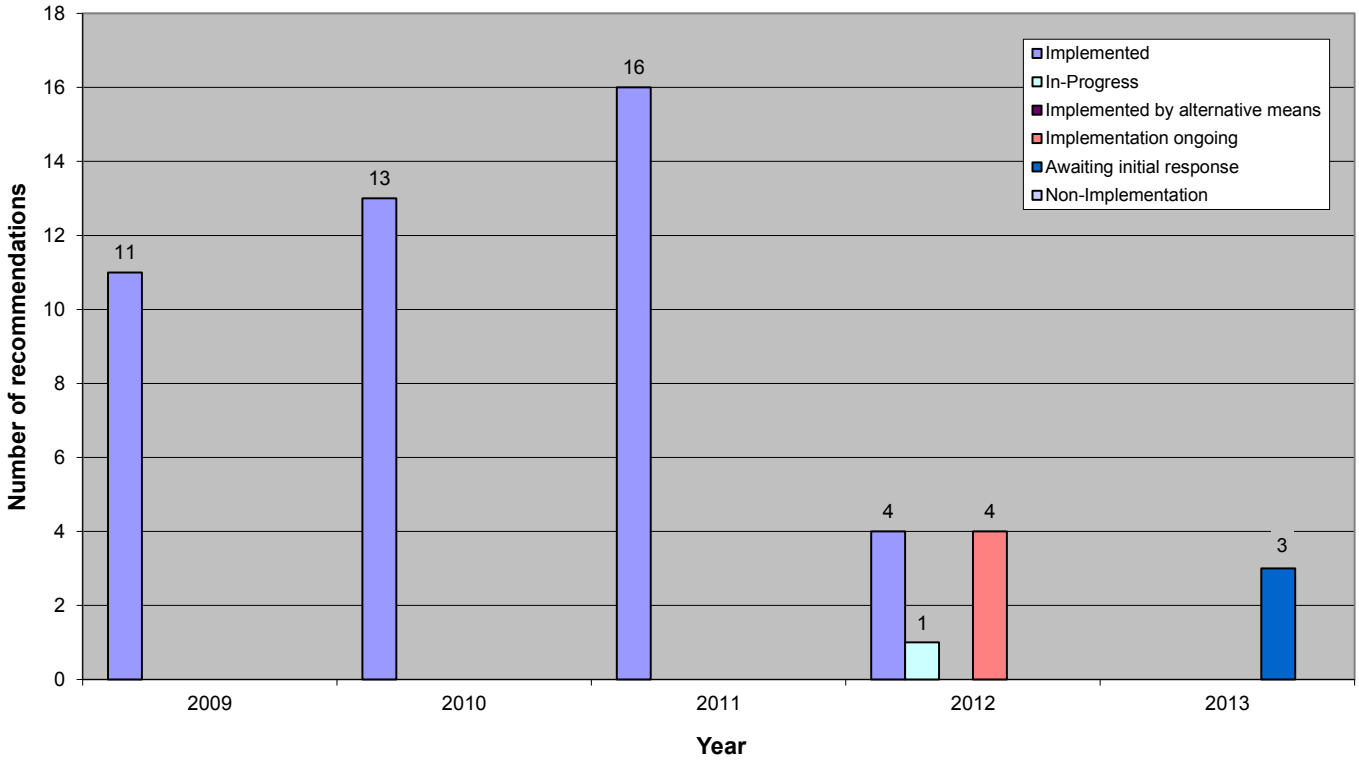
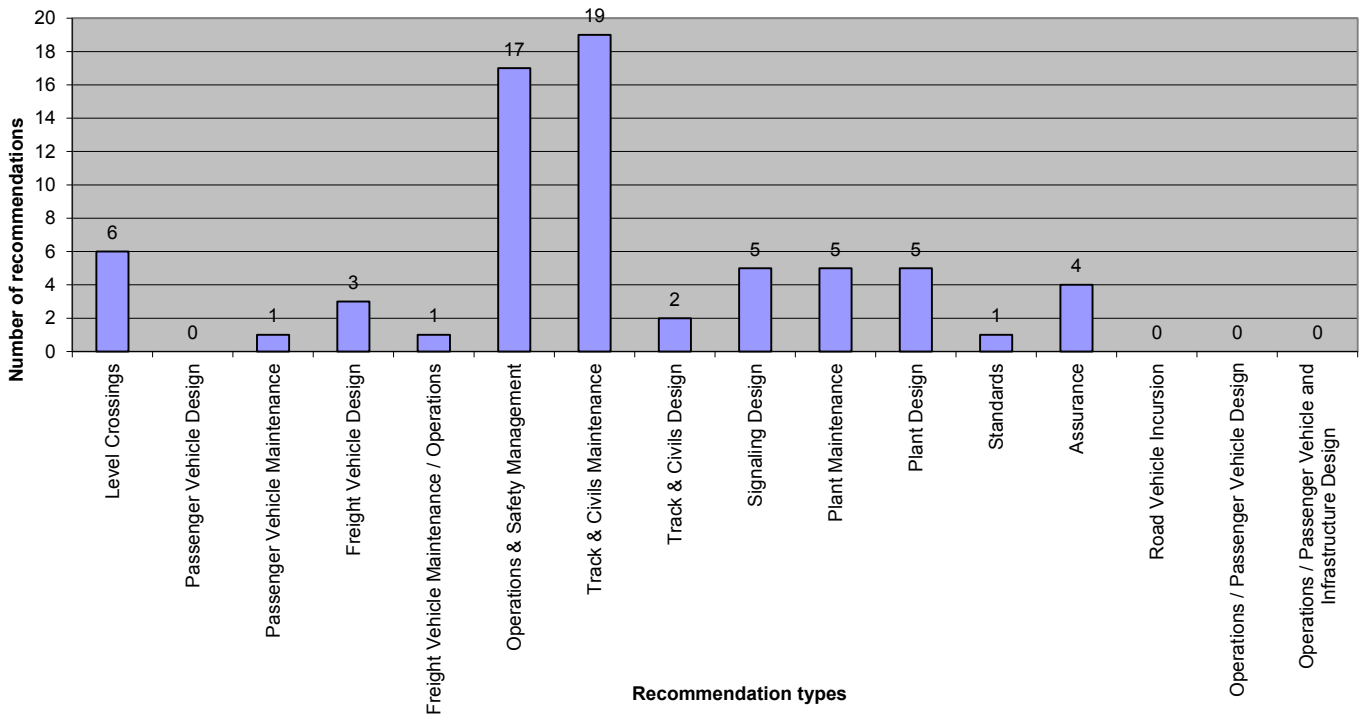


Chart 10 - Types of recommendations made to National Networks in 2013 (Network Rail, Northern Ireland and Channel Tunnel)



5 Identification of important recurrent issues

5. Identification of important recurrent issues

Statistics in this section relate to investigations started and reports published between 17 October 2005 (the date that the RAIB became operational) and 31 December 2013. The areas of recommendations highlighted in this section are those which have featured in the RAIB investigation reports that were published during 2013.

Details of the actions taken by the railway industry are primarily based on reports provided by the ORR during 2013.

Throughout this section the RAIB reports are referred to as follows:

two digit report number/year of publication; location of event

A full listing of RAIB reports, giving dates of occurrence and the full title is to be found at: www.raib.gov.uk.

Recurrent themes

Table 8 shows some of the most important recurrent issues identified in the RAIB investigation reports to date, and details where there have been recurrences during 2013. The table shows for each theme:

- the number of investigations published before 2013;
- the number of investigations published during 2013 and their titles; and
- the number of investigations ongoing at 31 December 2013 and their titles.

All named investigations have taken place on Great Britain's national network unless indicated thus:

- (U) London Underground.
- (L) Light rail/tramway.
- (H) Heritage sector (and other minor railways).
- (NI) Northern Ireland.
- (M) Metro.

Themes that are highlighted in yellow in table 8 are of particular interest to the RAIB and are discussed in more detail in the text that follows. These themes have been selected for one or more of the following reasons:

- there are major risk implications [eg level crossings, track worker safety, platform train interface];
- there have been a number of potentially dangerous events [eg failures of structures and road vehicle incursions];
- factors that have been identified previously have recurred and are still of concern to the RAIB [eg level crossings, track worker safety, freight trains, track];
- it is judged to be an emerging theme [eg the risk to passengers at the platform/train interface].

Table 8 – Summary of some recurrent safety themes in RAIB investigations between October 2005 and the end of 2013

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Level crossings	Level Crossing N = 27 (+ 2 class investigations + 2 bulletins) L = 4 H = 3 (+ 1 bulletin) NI = 1 **Total = 40**	5 (+1 bulletin)	Fatal accident at Kings Mill No.1 level crossing, Mansfield, RAIB report 01/2013. Pedestrian struck by a tram at Sandilands tram stop, Croydon, RAIB report 03/2013 (L). Dangerous occurrence at Lindridge Farm user worked crossing, near Bagworth, Leicestershire, RAIB report 11/2013. Collision between a train and a car at Beech Hill level crossing near Finningley, RAIB report 17/2013. Fatal accident at Bayles and Wylies footpath crossing, Bestwood, Nottingham RAIB report 19/2013 (L). *Near-miss at Four Lane Ends level crossing, near Burscough Bridge, Lancashire, RAIB bulletin B01/2013.*	8	Fatal accident at Motts Lane level crossing, Witham, Essex (since published, RAIB report 01/2014). Fatal accident at Athelney level crossing, near Taunton, Somerset (since published, RAIB report 04/2014). Accident at Balnamore level crossing, County Antrim (since published, RAIB report 10/2014) (NI). Near miss at Landovery level crossing, Carmarthenshire (since published, RAIB report 11/2014). Incident at Butterswood level crossing, near Goxhill, Lincolnshire (since published, RAIB report 12/2014). Accident at Jetty Avenue no.18 user-worked level crossing near Woodbridge on 14/07/2013. Collision at Buttington Hall user-worked crossing, Welshpool (since published, RAIB report 06/2014). Fatal accident at Barratt's Lane No.2 footpath crossing, Attenborough, Nottinghamshire (since published, RAIB report 18/2014).

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Risk management and inspection at level crossings	N = 18 (+ 1 class investigation + 1 bulletin) H = (1 bulletin) **Total = 21**	4	Fatal accident at Kings Mill No.1 level crossing, Mansfield, RAIB report 01/2013. Pedestrian struck by a tram at Sandilands tram stop, Croydon, RAIB report 03/2013 (L). Collision between a train and a car at Beech Hill level crossing near Finningley, RAIB report 17/2013. Fatal accident at Bayles and Wylies footpath crossing, Bestwood, Nottingham, RAIB report 19/2013 (L).	4	Fatal accident at Motts Lane level crossing, Witham, Essex (since published, RAIB report 01/2014). Near miss at Landovery level crossing, Carmarthenshire (since published, RAIB report 11/2014). Accident at Jetty Avenue No.18 user-worked level crossing near Woodbridge on 14/07/2013. Fatal accident at Barratt's Lane No.2 footpath crossing, Attenborough, Nottinghamshire (since published, RAIB report 18/2014).
Error by signaller or crossing keeper at level crossings	N = 7 (+ 1 bulletin) H = 1 **Total = 9**	(+1 bulletin)	*Near-miss at Four Lane Ends level crossing, near Burscough Bridge Lancashire, RAIB bulletin B01/2013.*	3	Accident at Balnamore level crossing, County Antrim (since published, RAIB report 10/2014) (NI). Near miss at Landovery level crossing, Carmarthenshire (since published, RAIB report 11/2014). Incident at Butterswood level crossing, near Goxhill, Lincolnshire (since published, RAIB report 12/2014).

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Error by level crossing users	N = 15 (+ 1 class investigation) L = 2 NI = 1 **Total = 19**	4	Fatal accident at Kings Mill No.1 level crossing, Mansfield, RAIB report 01/2013. Collision between a train and a car at Beech Hill level crossing near Finningley, RAIB report 17/2013. Fatal accident at Bayles and Wylies footpath crossing, Bestwood, Nottingham, RAIB report 19/2013 (L). Pedestrian struck by a tram at Sandilands tram stop, Croydon, RAIB report 03/2013 (L).	5	Fatal accident at Motts Lane level crossing, Witham, Essex (since published, RAIB report 01/2014). Fatal accident at Athelney level crossing, near Taunton, Somerset (since published, RAIB report 04/2014). Accident at Jetty Avenue No.18 user-worked level crossing near Woodbridge on 14/07/2013. Collision at Buttington Hall user-worked crossing, Welshpool (since published, RAIB report 06/2014). Fatal accident at Barratt's Lane No.2 footpath crossing, Attenborough, Nottinghamshire (since published, RAIB report 18/2014).

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Level crossing design Issues	N = 25 (+ 2 bulletins) H = 3 (+ 1 bulletin) NI = 1 **Total = 32**	4 (+ 1 bulletin)	Fatal accident at Kings Mill No.1 level crossing, Mansfield, RAIB report 01/2013. Pedestrian struck by a tram at Sandilands tram stop, Croydon, RAIB report 03/2013 (L). Collision between a train and a car at Beech Hill level crossing near Finningley, RAIB report 17/2013. Fatal accident at Bayles and Wylies footpath crossing, Bestwood, Nottingham, RAIB report 19/2013 (L). *Near-miss at Four Lane Ends level crossing, near Burscough Bridge Lancashire, RAIB bulletin B01/2013.*	6	Fatal accident at Motts Lane level crossing, Witham, Essex (since published, RAIB report 01/2014). Fatal accident at Athelney level crossing, near Taunton, Somerset (since published, RAIB report 04/2014). Near miss at Landovery level crossing, Carmarthenshire (since published, RAIB report 11/2014). Incident at Butterswood level crossing, near Goxhill, Lincolnshire, (since published, RAIB report 12/2014). Accident at Jetty Avenue No. 18 user-worked level crossing near Woodbridge on 14/07/2013. Fatal accident at Barratt's Lane No. 2 footpath crossing, Attenborough, Nottinghamshire (since published, RAIB report 18/2014).
Road vehicle incursions	N = 5 (+ 1 bulletin) **Total = 6**	0		1	Road vehicle incursion onto the railway at Aspatria, Cumbria (since published, RAIB report 14/2014).

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Staff working on lines that are still open to traffic (Red Zone working)	N = 9 (+ 1 bulletin) L = 1 **Total = 11**	2 (+ 2 bulletins)	Dangerous occurrence involving track workers, near Roydon station, Essex, RAIB report 07/2013. Track worker struck by a train at Bulwell, Nottingham, RAIB report 20/2013. *Member of staff struck by a train near Poole, Dorset, RAIB bulletin B04/2013.* *Track worker struck and seriously injured at West Drayton, RAIB bulletin B05/2013.*	0	
Work activities in and around an engineering possession (including train movements)	N = 9 (+ 1 bulletin) **Total = 10**	3	Dangerous occurrence involving engineering possession, near Dunblane, RAIB report 05/2013. Fatal accident involving a track worker at Saxilby, RAIB report 21/2013. Collision between a stoneblower and ballast regulator near Arley, Warwickshire, RAIB report 12/2013.	0	
Safety of track workers, safety leadership and the supervision of track workers	N = 17 (+ 2 bulletins) L = 1 **Total = 20**	5	Dangerous occurrence involving engineering possession, near Dunblane, RAIB report 05/2013. Dangerous occurrence involving track workers, near Roydon station, Essex, RAIB report 07/2013. Collision between a stoneblower and ballast regulator near Arley, Warwickshire, RAIB report 12/2013. Track worker struck by a train at Bulwell, Nottingham, RAIB report 20/2013. Fatal accident involving a track worker at Saxilby, RAIB report 21/2013.	0	

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Track quality, maintenance & inspection	N = 14 L = 4 H = 3 U = 1 NI = 1 **Total 23**	2	Freight train derailment at Reading West Junction, RAIB report 02/2013. Derailment of a freight train at Barrow upon Soar, Leicestershire, RAIB report 22/2013.	5	Class investigation into broken rail incidents on the East Coast Main Line (refers to various incidents between September 2012 and February 2013). Derailment of a freight train at Castle Donington, Leicestershire (since published, RAIB report 02/2014). Derailment at Ordsall Lane Junction, Salford (since published, RAIB report 07/2014). Derailment at Liverpool Street station, London on 23/01/2013. Derailment of a freight train at Gloucester on 15/10/2013.
Switches and crossings (S&C)	N = 5 (+ 2 bulletins) L = 4 H = 2 U = 1 **Total = 14**	1	Derailment of a freight train at Shrewsbury station, RAIB report 08/2013.	0	
Road rail vehicles	N = 3 NI = 1 **Total = 4**	1	Collision of a road-rail vehicle with a buffer stop at Bradford Interchange station, RAIB report 09/2013.	1	Accident involving a runaway road-rail vehicle at Glasgow Queen Street High Level station (since published, RAIB report 15/2014).

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Passenger train design and maintenance	N = 12 (+2 bulletins) L = 1 H = 2 (+1 bulletin) U = 2 M = 1 **Total = 21**	2	Accident involving a pantograph and the overhead line near Littleport, Cambridgeshire, RAIB report 06/2013. Train fire at South Gosforth, RAIB report 18/2013 (M).	4	Incident involving a tram operating with doors open in Croydon (Sandilands/ Lebanon Road) (since published, RAIB report 05/2014) (L). Passenger trapped in train doors and dragged a short distance at Newcastle Central Station on 05/06/2013 (since published, RAIB report 19/2014). Uncontrolled evacuation of a train at Holland Park station (since published, RAIB report 16/2014) (U). Locomotive failure near Winchfield, Hampshire (since published, RAIB report 13/2014) (H).
Defective freight rolling stock – including load and train preparation	N = 17 (+ 4 bulletins) **Total = 21**	3	Freight train derailment at Reading West Junction, RAIB report 02/2013. Dangerous occurrence involving an engineering train at Blatchbridge Junction, near Frome, RAIB report 15/2013. Signal passed at danger at Stafford, RAIB report 16/2013 (H).	1	Locomotive failure near Winchfield, Hampshire (since published, RAIB report 13/2014) (H).
Fatigue	N = 8 **Total = 8**	0		1	Collision between a passenger train and a stationary train at Norwich station (since published, RAIB report 09/2014).
Low adhesion	N = 3 (+ 1 bulletin) H = 1 **Total = 5**	0		1	Buffer stop collision at Chester station on 20/11/2013.

RECURRENT THEMES	No. of reports published before 2013 N = GB National Network L = Light Rail H = Heritage U = Underground NI = Northern Ireland M = Metro	No. of reports published during 2013	Report reference *(bulletins shown in italics)*	No. of investigations ongoing at 31 December 2013	Details of investigations ongoing at 31 December 2013 *(bulletins shown in italics)* Investigations & bulletins involve GB national network (N) unless otherwise indicated
Safety management, compliance with rules and asset management on heritage and other minor operators	H = 9 (+ 4 bulletins) **Total = 13**	1	Signal passed at danger at Stafford, RAIB report 16/2013 (H).	0	
Accidents involving passengers and moving trains at stations (Platform Train interface)	N = 4 (+ 1 bulletin) L = 1 U = 2 M= 1 **Total = 9**	2	Accident at Charing Cross station, RAIB Report 10/2013. Pedestrian struck by a tram at Sandilands tram stop, Croydon, RAIB report 03/2013 (L).	2	Passenger trapped in train doors and dragged a short distance at Newcastle Central Station on 05/06/2013 (since published, RAIB report 19/2014). Wheeled transport rolling off platforms at Southend and Whyteleafe stations (since published, RAIB report 17/2014).
Failures of structures or deficient inspection/ assessments	N = 7 **Total = 7**	1	Partial failure of a structure inside Balcombe Tunnel, West Sussex, RAIB report 13/2013.	1	Dangerous occurrence at Denmark Hill station, London on 01/08/2013.
Earthworks	N = 6 (+ 1 bulletin) **Total = 7**	2	Train ran over a washed-out embankment near Knockmore, RAIB report 14/2013 (NI). Derailment of a freight train at Barrow upon Soar, Leicestershire, RAIB report 22/2013.	1	Investigation into landslips on and adjacent to Network Rail infrastructure (refers to six incidents between June 2012 and February 2013) (since published, RAIB report 08/2014).

Topics of concern to the RAIB

Level crossings

The UK's mainline railway has one of the highest level crossing safety records relative to the other European Union Member States[14]. However, by 31 December 2013 the RAIB had cause to investigate 54 level crossing accidents or incidents, and had published 46 related reports (including four bulletins and two class investigations). These level crossing accidents resulted in a total of 29 fatalities. During 2013 the RAIB published five reports and one bulletin concerning accidents/incidents at level crossings. These accounted for three fatalities and one serious injury.

The year also saw the publication of an investigation into a fatal accident at Beech Hill automatic half barrier crossing (AHB), in Lincolnshire (report 17/2013). This investigation concluded that the accident had been caused by the inability of the road vehicle driver to see either the warning lights or the half barrier due to the effect of sunlight and glare. This led to important recommendations related to:

- improving the light output of road traffic signals ('wig-wags') at this crossing and numerous others of the same type; and
- the management of the risk at crossings of sunlight impeding visibility.

Recurrent issues related to level crossings

During 2013 the ORR provided additional information concerning the measures taken by the railway industry to implement RAIB recommendations. These are described in part 2 of this Annual Report.

The RAIB is concerned that the following recurrent factors have yet to be fully addressed by the railway industry:

User behaviour at level crossings

An important aspect of several of the RAIB's investigation is the role of crossing design in reducing the risk of human error and encouraging safe behaviour, such as the observance of warning lights. The RAIB does not condone the actions of those who choose to violate safety rules or disregard safety signals. However, it is important to recognise that the design of a crossing can strongly influence the way that users interact with the crossing. In some cases factors such as extended waiting times can increase the likelihood of non-compliant behaviour at level crossings.

[14] As indicated by the European Railway Agency: Railway Safety performance in the European Union 2014.

5 Identification of important recurrent issues

The RAIB investigations have identified a wide range of local factors that might lead the crossing user to make errors, or make it more difficult to use the crossing safely.

These include:

- local obstructions to the sighting of trains;
- environmental conditions such as traffic noise and visibility at night;
- anxiety to cross the line to catch a train (station crossings);
- visibility of road traffic signals due to factors such as sunlight; and
- the audibility of train horns.

Infrastructure managers need to take such factors into account in order to manage risk at level crossings. The RAIB welcomes the recruitment during 2013 of local managers dedicated to this task, each with an allocation of local crossings.

The investigations during 2013 indicate more needed to be done to guide and train level crossing managers in the identification and management of local risk factors (see below).

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 25 of the 46 RAIB level crossing investigations that were published before 31 December 2013 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).

The RAIB notes that Network Rail is seeking to address these concerns in several ways. In particular, it has reviewed and updated its procedures and guidance related to data collection, including the assessment of level crossing usage and measurement of the time that approaching trains are in view (sighting time). The RAIB is hoping that this initiative will lead to an improvement in the standard of level crossing risk management.

Design issues

Reports published during 2013 have identified a number of important design issues. These include:

- inconspicuity of level crossing road traffic signals in sunlight (report 17/2013, Beech Hill);
- inaudibility of horns and inadequate sighting of approaching trains (report 01/2013, Kings Mill);
- design of tramway crossings (report 03/2013, Sandilands; report 19/2013, Bayles & Wylies);
- absence of engineered safeguards to protect against the consequence of a single human error by a member of staff (bulletin B01/2013, Four Lane Ends); and
- excessive closure times (report 01/2014, Motts Lane).

A common theme linking all of these issues is the need for the adequacy of level crossing equipment to be kept under constant review and for the opportunities presented by new technology to be exploited. A good example of this was the continued use of 36 watt incandescent lamps (intended to meet a 1969 specification) at Beech Hill AHB level crossing despite a known problem with sunlight 'glare' and the availability of alternative equipment with a higher light output based on proven LED technology (report 17/2013).

With regard to some of the remaining manually operated crossings, the RAIB believes that it is not acceptable that a single human error can lead to a catastrophic outcome, such as the fatal accident at Moreton-on-Lugg in 2010; report 04/2011. A more recent example was the near-miss at Four Lane Ends level crossing; bulletin B01/2013. The RAIB continues to urge Network Rail to implement engineered safeguards, such as safety interlocks, to protect against such errors.

Time taken to address known risk factors at level crossings

In the last five years the RAIB has investigated at least six accidents that have occurred at level crossings where the need for improvements, or closure, had already been identified by Network Rail. In the light of the number of such instances, the RAIB is currently examining Network Rail's past and current processes for the planning and implementation of improvement works at those level crossings where the need for further risk mitigation has been identified. This examination has the objective of identifying:

- any factors which may extend the time taken to implement the measures for improvement that had been identified, or unreasonably impede the adoption of such measures; and
- why suitable interim risk mitigation measures were not implemented, at crossings where the need for major improvement works has been identified.

5 Identification of important recurrent issues

The RAIB will publish the outcome of this examination of the factors influencing the time taken to address known risk factors at level crossings during 2015.

Network Rail initiatives for the improvement of safety at level crossings

Network Rail has closed more than 10% of all its level crossings since 2009 and the ORR has confirmed that Network Rail has met its target of a 25% reduction in level crossing risk over Control Period 4 (CP4) 2009-14. The RAIB also notes Network Rail's Strategic Business Plan covering the period 2014-19 includes reference to a ring-fenced fund of £77 million for expenditure at crossings (this is in addition to the normal budget provision for the management and renewal of crossings) and a commitment to work towards the closure of at least 30 high risk crossings as part of an ongoing strategy to reduce risk by another 25%.

Network Rail initiatives for further safety improvement include:

- introduction of new technology to inform signallers of train location in long sections and/ or provide warnings to the users of user worked crossings when trains are approaching (including at high risk crossings currently reliant on users hearing the horn of approaching trains);
- modernised management processes with mobile IT systems;
- obstacle detection equipment; and
- installation of more red light enforcement equipment.

Road vehicle incursions

The incursion of road vehicles onto the railway line at locations other than level crossings is a significant risk to the railway. In most cases such accidents do not result in any serious damage to a train. However, the accident at Great Heck in 2001, which killed ten people, showed the potential for serious harm if the incursion of a road vehicle results in a train becoming derailed (the same is true of the accident that occurred at Ufton Nervet level crossing in 2004, killing seven). During 2010, a cement mixing lorry fell from a bridge at Oxshott, and onto a passing passenger train. The train derailed and a passenger suffered serious injuries (report 13/2011, Oxshott). During 2012 a car lost control on a road near Stowmarket, crashed through the railway boundary fence and came to a stand on the railway; where it was struck by a train travelling at 50 mph (80 km/h) (report 25/2012, Stowmarket Road).

Recurrent issues related to road vehicle incursion

During 2013 the ORR provided additional information concerning the measures taken by the railway industry to implement RAIB recommendations arising from the above RAIB investigations. These are described in part 2 of this Annual Report.

Actions reported by public bodies

Those recommendations directed to the local authority following the road vehicle incursion at Stowmarket Road (which covered the identification and assessment of road vehicle incursion locations in Suffolk) have now been reported as acted upon.

The Department for Transport (DfT) has recently notified the following to the RAIB in response to recommendations made to them:

- DfT is preparing guidance on -
  - highlighting the unprotected ends of railway bridge parapets to reduce the risk of them being struck by road vehicles; and
  - how to assess, identify and mitigate local safety hazards at bridges over railways.

  This guidance is planned for completion by February 2015.
- A regime has been established by the DfT (with Network Rail and ORR) for monitoring and following up on progress with the implementation of risk mitigation measures at road vehicle incursion sites.
- DfT has discussed with ORR the actions to be taken at high risk sites that have not yet been addressed and reports that the ORR has met with a number of local authority chief executives to urge completion of works at high risk sites.
- The lessons learnt in the Stowmarket Road investigation are now being disseminated by DfT at existing road industry forums, including the UK Roads Liaison Group.
- DfT has presented the findings of the investigation to workshops at a number of Local Resilience Forums and has provided a written summary to Local Resilience Forums of the key actions recommended following the Stowmarket Road investigation.

The safety of track workers

In 2013 five reports and two bulletins were published relating to the safety of track workers. One of these concerned the death of a track worker who was employed by a recruitment agency to work on Network Rail's infrastructure (report 21/2013, Saxilby). This has led to a number of important recommendations related to the management and monitoring of agency workers and the means by which the railway industry assures itself that existing staff continue to perform their job safely.

Sadly, another track worker was struck and killed by a train at Newark Northgate in January 2014. This is now the subject of a RAIB investigation.

Recurrent issues related to track worker safety

During 2013 the ORR provided additional information concerning the measures taken by the railway industry to implement RAIB recommendations. These are described in part 2 of this Annual Report.

The RAIB is concerned that the following recurrent factors have yet to be fully addressed by the railway industry:

Underlying behaviours and attitudes

A recurrent theme has been the need to address underlying behaviours and attitudes that cause staff to violate rules, and implement (or fail to challenge) unsafe systems of work.

During track engineering activities it is vital that those with responsibility of the safety of the workers are well trained and have the qualities needed to exercise leadership. RAIB investigations have shown the following factors to be central:

- the ability of the leader to exercise authority and influence;
- the need for the leader to understand the task;

5 Identification of important recurrent issues

- the need for planning and effective communications between all parties;
- the need for the leader to possess the right personal qualities; and
- the need for clear instruction and procedures.

One or more of these factors have been identified in 25 investigations (24 on the national railway network and one on a light rail system).

The RAIB is aware that Network Rail is carrying out a range of initiatives designed to promote safe behaviours and attitudes amongst its staff and managers. In particular during 2013 and 2014, it is providing 'Managing Site Safety' training for thousands of team leaders, with the following aims:

- to raise awareness and understanding amongst team leaders about their roles as leaders of site safety;
- to develop new ways of thinking and behaving in the role; and
- to plan for, deliver and review safe and effective working environments and work practices by applying safety leadership behaviours and competencies.

The RAIB is supportive of such initiatives and will be seeking evidence in its future investigations of their effectiveness. A particular concern, is that such initiatives should also be extended to all staff who work on Network Rail's infrastructure, including those who are recruited to work via contractors and agencies.

Control of work activities

During 2013 Network Rail also started a major review of the way work activities on the track are controlled, known as the planning and delivering safe work programme. As a result of this programme a new role of Safe Work Leader is to be introduced in early 2015. This is intended to provide safety leadership on site and is being introduced in conjunction with a new process for the planning and implementation of work activities on track. This will include the use of an electronic work permit system, linked to electronic maps. If successfully implemented, this new role and process have the potential to address some of the recurrent issues relating to track worker safety identified by the RAIB.

Freight trains (including engineering trains and light locomotives)

Since 2005 the RAIB has investigated 66 accidents/incidents involving one or more freight trains. Figure 1 (below) gives a breakdown of the types of events covered by these investigations.

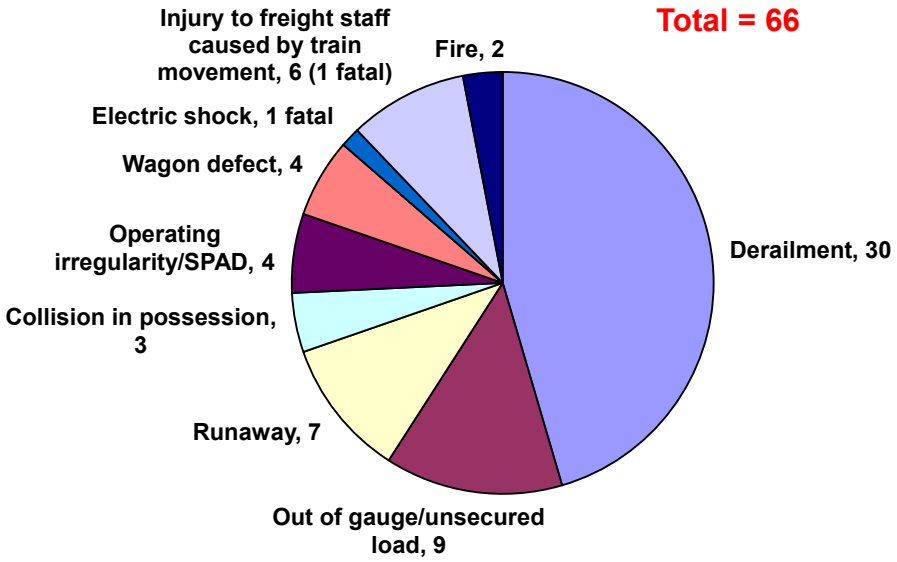


Figure 1: Types of events involving freight trains (RAIB investigations 2005-2013)

By 31 December 2013 the RAIB had published a total of 30 reports concerning the derailment of a freight train. Figure 2 (below) shows the primary causes of these derailments.

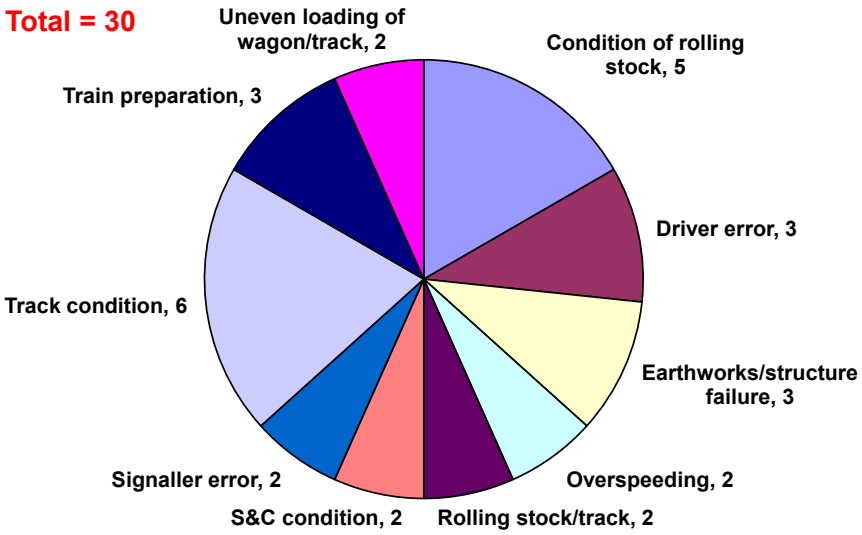


Figure 2: Primary causes of freight train derailments identified in RAIB investigations 2005-2013

5 Identification of important recurrent issues

During 2013 the RAIB commenced three new investigations involving the derailment of freight trains (at Castle Donington in January, and Camden Road and Gloucester in October). In all three cases it is apparent that poor track condition was a factor.

In the case of Camden Road, it was subsequently found that a combination of lateral and longitudinal asymmetrical loading was also a factor (this was a problem highlighted in RAIB's previous investigation into the derailment at Duddeston, report 16/2008). In the case of Gloucester it was found that the design of the wagon made it more prone to derailment when encountering a type of track defect known as cyclic top. In all cases the consequences could have been much worse had circumstances been slightly different. At Camden Road and Gloucester the derailed wagons were dragged for a considerable distance before the trains were brought to a stand.

Recurrent issues related to freight trains

During 2013, the ORR provided additional information concerning the measures taken by the railway industry to implement RAIB recommendations. These are described in part 2 of this Annual Report.

The RAIB is concerned that the following recurrent factors have yet to be fully addressed by the railway industry:

- the correct application of handbrakes, their efficacy and means of testing when stabling rolling stock - for the avoidance of runaway (report 07/2011, Ashburys; and also a RAIB preliminary examination into a runaway at Trafford Park in May 2007);
- controlling the risk associated with the uneven and/or insecure loading of freight wagons and containers; and the adequacy of current rules governing the distribution of weight on wagons when loading containers - to reduce the risk of wheel unloading leading to derailment (report 16/2008, Duddeston; report 02/2013, Reading West);
- the management of recurrent track faults, particularly in proximity to S&C and crossovers - for the avoidance of derailment (report 19/2012, Bordesley Junction; report 02/2013, Reading West); and
- the length of engineering work sites and systems to control the movement of freight trains - for the avoidance of collision (report 30/2007, Badminton; report 24/2009, Leigh-on-Sea; report 12/2013, Arley).

Failure of structures and earthworks

By 31 December 2013 the RAIB had cause to investigate eight incidents of earthwork failure and had published a class investigation into the management of earthworks (report 25/2008). During 2013 the RAIB published two reports into accidents associated with earthwork failure (one in Northern Ireland and the other on the GB national network).

Recurrent issues related to earthworks

The unusually wet conditions during the summer of 2012 and the winter of 2013/14 contributed to a large number of earthwork failures. Such failures can either block the line, or result in a loss of support for the track, increasing the risk of derailment. Consequently, the RAIB has recently published an investigation that identified a range of common factors in six different earthwork failures (report 8/2014, Landslips 2012-13).

The recommendations relate to the management of risk originating from earthwork and drainage issues on adjacent land and the railway's response to extreme weather (forecast and actual). The RAIB believes that recent developments in technology provide an opportunity to identify earthworks at particular risk of failure. This is vital to the future safety of the line given the apparent increase in the number of extreme weather events in recent years, and the winter of 2013/14 in particular.

Accidents to passengers at station platforms (platform train interface)

By 31 December 2013 the RAIB had published a total of ten reports and one bulletin into accidents to passengers associated with the movement of trains or trams at station platforms. Of these, six involved trains on the national network, two involved London Underground, two involved a tram and one a train on Newcastle's metro system. Of the total:

- three accidents involved people falling between the train and platform;
- four involved people who were trapped in train doors and dragged for a distance as the train departed;
- one involved a person who was trapped and dragged and then fell between the train and the platform;
- two involved mismanagement of train doors; and
- one involved a pedestrian who was struck by a tram at a tram stop.

The RAIB does not investigate all accidents at the platform train interface. However, it will sometimes choose do so if it judges that there is potential for new safety learning for the rail industry.Two new investigations involving the platform train interface were started during 2013.

5 Identification of important recurrent issues

One of these concerned a passenger who became trapped in train doors at Newcastle and the other is concerned with the risk of wheelchairs and children's push-chairs rolling off platforms and onto the track.

Recurrent factors related to the platform train interface

During 2013 the ORR provided additional information concerning the measures taken by the railway industry to implement RAIB recommendations. These are described in part 2 of this Annual Report.

The RAIB is pleased to note that the railway industry has established a group to develop an overall strategy with the aim of reducing safety risk at the platform train interface. The formal strategy is now in development and is planned for completion by January 2015. In support of this emerging strategy, RSSB is undertaking new research into operational and technical measures to reduce the risk to passengers at the interface between trains and platforms. It is hoped that this research will provide guidance to station operators, and future designers of stations and trains on measures to reduce the risk of people falling into the gap between the train and platform, so meeting the intent of a RAIB recommendation following the death of a young girl at James Street in 2011 (report 22/2012, James Street). It is important that additional work is done in this area given the increasing numbers of passengers, recognising that industry has not been able to reduce the risk by operational measures alone. One particular concern is that opportunities to reduce the size of the gap between train and platform, or to improve the surveillance of the interface, are not missed when new trains and stations are introduced or modified.

Annexes

Annex A - Glossary of abbreviations and acronyms

AHBC	Automatic Half Barrier Crossing
AOCL	Automatic open crossing, locally monitored
ERA	European Railway Agency
ERA SIS	European Railway Agency Safety Information System
LUL	London Underground Ltd
NIB	National Investigation Body
ORR	Office of Rail Regulation
RSSB	Rail Safety & Standards Board
S&C	Switches & Crossings
SPAD	Signal Passed At Danger
SPT	Strathclyde Partnership for Transport

Annexes

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.

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 level crossing	Any level Crossing where the warning to highway users is given automatically, triggered by the approach of a train.*
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.*
Ballast Regulator	An On Track Machine used for ballast regulation (the action of distributing ballast evenly along the track, and to the correct profile across it).*
Footpath crossing	A level crossing provided solely for use by pedestrians.*
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.*
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 a line where trains are running normally.*
Stoneblower	Colloquial (and descriptive) term for a Pneumatic Ballast Injection Machine; an On Track Machine that automatically lifts and aligns the track before carrying out the stoneblowing (pneumatic ballast injection) process.*
Switch	An assembly of movable rails (the switch rails) and fixed rails (the stock rails) and other components used to divert vehicles from one track to another.*

Switch Rail	The thinner movable machined Rail Section that registers with the stock rail and forms part of a switch assembly.*
Switches & Crossings	See definition of Points above.
User worked crossing	A level crossing where the barriers or gates are operated by the user. There is generally no indication of the approach of trains, but a telephone will be provided to contact the signaller.*

This page is intentionally left blank

This report is published by the Rail Accident Investigation Branch,
Department for Transport.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Telephone: 01332 253300
Fax: 01332 253301
Email: enquiries@raib.gov.uk
Website: www.raib.gov.uk