Health and safety report for 2014-15

July 2015

Contents

Foreword

It is in everyone's interest for Britain's railways to be the safest they can be. Thanks to the women and men who work in the industry, our railways continue to have a good safety record and remain one of the safest in Europe.

Railway health and safety is of course central to the Office of Rail and Road's role. Our 2014-15 report sets out the current state of health and safety on our railways, trams, heritage and metro systems. It outlines our assessment of the year with a useful reference of comparisons and historical perspective – to see how far the industry has come, and what further work it needs to do.

As the regulator, we have a unique view of the whole sector. We must not only regulate in the here and now, but also cast our gaze forward for future generations of passengers and workers. We take a proactive approach to ensuring safety risks are effectively managed and encourage the industry to use growth and renewal opportunities to enhance safety by design where possible.

Our message is very much about predicting and preventing health and safety issues before they happen. This is focused on factors such as safety in the design of trains, stations and infrastructure, management systems with an emphasis on continuous improvement, and sharing best practice.

In the words of William Blake: 'Hindsight is a wonderful thing but foresight is better, especially when it comes to saving life, or some pain.'

Despite the good record, there is still much to do. We have seen little change in 2014-15 as improvements plateau. We are working with the industry to address some significant challenges in managing sustainable growth safely and improving worker health right now and into the future. We expect the information and insights in this report will provide direction and focus to help move the industry forward to excellence.

Good data is vital to our work. Our report would not be possible without cooperation from a range of bodies, groups and companies. It is important the sector also collects and uses its own health and safety data to keep its priorities visible and firmly on track. One of these priorities, which the data highlights, must be future resilience planning for the current highly skilled workforce.

You may have noticed we are reporting under our new name, the Office of Rail and Road. In April 2015 we took on the monitoring of Highways England, who manage Britain's main road network. We look forward to using our expertise in rail to build on our work in roads.

We have a rich and proud history on our railways. However we are not, and will never be, complacent about health and safety. Health and safety is everyone's job.

Richard Price
Chief Executive, ORR

Ian Prosser
Director of Railway Safety, ORR

Section 1 - Director of Railway Safety's overview

Looking back over the last decade, safety on Britain's mainline railways, metro systems and London Underground improved steadily as passenger numbers have grown considerably. Over that same period, Network Rail increased its efficiency by more than 30%. Key investment in regulated safety enhancements, such the requirement for train protection, helped drive the industry towards continuous improvement in risk management. It's why our mainline network is now regarded as the safest railway in Europe, but we cannot be complacent.

In 2014-15, there were some positive improvements to health and safety, particularly the small reduction in overall harm to passengers at the platform-train interface and low levels of harm from train accidents, areas we and the industry have focused on.

There are also historic achievements worth noting, it's the eighth consecutive year without any train accident-related passenger fatalities. There were no passenger train derailments for the second year - a significant achievement. Harm to passengers has reduced by a third over the last decade when normalised by the growth in passenger numbers.

In general though, improvements have plateaued. In 2014-15, we saw:

- actual harm to passengers increased 2%, but when normalised by the 4% increase in passenger journeys, decreased 2%;
- actual harm to workers reduced 3%, but stayed the same when normalised by the 3% fewer workforce hours worked; and
- actual harm to the public, excluding suicides, increased 10%. This was driven by two additional level crossings fatalities.

The industry's level of management maturity showed only gradual improvements. It's still some way from the excellence in health and safety and asset management culture that is central to high reliability organisations. However, we found that some passenger and freight operators and London Underground are beginning to edge towards excellence in some aspects of their risk management maturity such as employees actively involved in developing processes and management understanding the competencies needed for safe working.

Almost all the safety performance metrics we monitor look backwards. It's important that we also look forward proactively. Otherwise, there is a danger of over-relying on risk models and their perceived stability to inform our judgements and losing sight of the fact that each incident had the potential to cause significant harm. Also, major train incidents are now rare on Britain's railways, so we require a more sophisticated reading of underlying trends. With that in mind, the three key strategic safety points I want to focus on within the current risk landscape are:

- **the ongoing challenges of managing growth and change:** growth continued with 1.66 billion mainline passenger journeys (up 4%) and 1.3 billion passenger journeys on London Underground (up 3%). Considerable transformational projects put pressure on the industry, which is also managing resource constraints. Station management is proving more challenging with passenger growth alongside modifications and upgrades. These pressures will continue to grow and we are focused on improving industry safety by design and change management processes. Use of our railway management maturity model (RM3)

assessment helps us all target the right areas.

- **maintaining and renewing a safe, sustainable mainline infrastructure**: while a lot of good work is being done in different areas, Network Rail has not delivered all its renewals plans and CP4 maintenance backlogs are now putting added pressure on maintenance teams, with the potential to increase risk. We are pressing Network Rail to assess this and will monitor and take enforcement as necessary.

- **some meaningful improvements in occupational health and safety management:** our latest report on industry occupational health performance[1] identified some examples of excellence, but overall the sector still has a way to go. A robust health management culture will aid industry management maturity to face the growth and efficiency challenges. Similarly, there's scope to significantly improve workforce safety, especially around infrastructure and construction activities.

Particular risk areas we are scrutinising across the sector include:

- **drainage on the mainline railway:** poor drainage management can cause embankment instability and track quality weaknesses. We had to take enforcement action on Network Rail this year.

- **station safety:** overall harm to passengers and others at mainline stations increased 2%, but reduced 2% when normalised by the 4% increase in passenger journeys (the best estimate for the growth in station use). The harm to passengers from the platform-train interface (PTI) decreased 21%, but by 24% when normalised. The PTI forms the single largest source of harm to individual passengers at stations, most involving slips, trips and falls. Mainline duty holders must implement the new PTI strategy[2] as passenger numbers and infrastructure investment pressures grow. Using a safety by design approach will be important.

- **signals passed at danger:** there were 299 mainline signals passed at danger (SPAD) - numbers increased 4%, but overall SPAD risk declined 7%. The industry is producing a strategy to reduce SPAD risks as the mainline moves towards automatic train control, through the implementation of the European Train Control System (ETCS). We will monitor SPAD trends closely, particularly those that are high risk.

- **infrastructure risk:** there were overall reductions in the risk from earthwork, cutting and embankment failures - but it's unclear if these resulted from benign weather. Following our enforcement in 2013-14, we saw track geometry improvements. However, we saw significant variations between Network Rail's routes on how it was managed and their performance levels. Freight train derailments increased to 14, up six. We took steps to accelerate industry discussions about the system solutions needed to reduce derailment risks.

- **mainline workforce safety:** minor workforce injuries declined 2%. Of the 175 major injuries, 63% involved infrastructure workers. Our sector lags behind some comparable industries, levels of harm to railway infrastructure workers are worse than in other engineering professions. Important workforce safety initiatives are being rolled out by

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[1] http://orr.gov.uk/what-and-how-we-regulate/health-and-safety/occupational-health
[2] http://www.rssb.co.uk/Library/improving-industry-performance/2015-pti-strategy-mind-the-gap-overview-document.pdf

Network Rail, but they require long-term commitment. We took significant levels of enforcement on construction activities.

- **level crossings**: overall harm at level crossings increased 22%, primarily due to 10 fatalities, two more than 2013-14, but none involved any breaches of health and safety law. Of the 10, eight were pedestrians. Incidents involving road vehicles continue to decline. Network Rail closed 118 crossings, improved its crossing risk assessments and is implementing new technology. We expect the Law Commission's 2013 report recommendations[3] to be implemented by the Department for Transport (DfT). It will help drive future risk reductions.

- **electrical safety**: Britain's railways are still some way off achieving compliance with the Electricity at Work Regulations 1989. Applying a safety by design approach is key. We issued a third rail electrification systems policy statement[4] to help clarify our position.

I report with great sadness that four industry workers lost their lives at work. Two were electrocuted and two were killed in occupational road accidents. The electrocution fatalities were tragic, but avoidable events and are still subject to our investigation. We challenge the sector to better manage electrical safety and occupational road safety.

Network Rail continues to show strong leadership in suicide prevention, collaborating closely with partners including the Samaritans. However, I note sadly there was a 5% increase in suicides and suspected suicides - the highest level ever recorded. This compares to a consistently lower level of suicides on London Underground.

Transport for London has maintained a high level of safety for its passengers and workforce as passenger numbers and services grow. We took more enforcement than expected on London Underground's construction activities. Its management response was mature, but it highlighted the challenge of operating a safe and busy railway during a very significant long-term investment programme.

We continued to discuss health and safety matters with the trade unions. Their frontline insight and perspective informed our overall evidence picture and priorities, for example, alerting us to substandard occupational health management.

We set up specialist teams to look at Network Rail's work on level crossings, track, civil structures and electrical and workforce safety. These have proved very effective and will ensure the challenges of Control Period 5 (CP5) 2014-19 are met without compromising safety. Our train and freight operator, metro, heritage and Transport for London teams are focused on their specific risk areas, such as station safety, driver management and workforce safety.

We have developed a programme to manage our approach to safety by design. It includes an experienced senior inspector to lead our monitoring of High Speed 2's (HS2) design. We revised our memorandum of understanding with the Health and Safety Executive (HSE)[5] to clarify our role in enforcing road vehicle incursions on the tracks and are developing a new agreement to take enforcement on design aspects of new-build projects.

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[3] http://lawcommission.justice.gov.uk/docs/lc339_level_crossings.pdf
[4] http://orr.gov.uk/__data/assets/pdf_file/0017/17621/dc-electrification-policy-statement.pdf
[5] http://orr.gov.uk/__data/assets/pdf_file/0006/1698/mou-between-orr-and-hse-300415.pdf

We continue to monitor the changing risk profile and landscape and will consider any necessary changes to our regulatory approach and business plans to meet our 'drive for a safer railway' strategic objective[6]. As part of this, we reviewed and revised our health and safety regulatory strategy[7] and implemented an integrated business management system to improve how we regulate. The equivalent of 115 full time workers were devoted to our health and safety work in 2014-15, which was close to half our resources[8].

We enjoy a very strong reputation as a respected railway health and safety regulator among stakeholders in Britain and overseas. Over the last year we provided expert advice and assistance to regulators in Canada, USA, Singapore, Hong Kong, Greece, South Korea and Dubai.

2015 represents a huge milestone for the inspectors of Her Majesty's Railway inspectorate, now part of ORR's Railway Safety Directorate, we celebrate our 175th year. On 10 August 1840, the first Chief Inspecting Officer, Sir Frederick Smith, was appointed. I am the 25th Chief Inspector and it has been a great privilege to lead the inspectorate over the last seven years, and into the future, with my very dedicated team.

The importance of why we were created still remains central to our current role - to ensure Britain's railways protect the health and safety of its passengers, workforce and the public.

Ian Prosser
Director of Railway Safety, ORR
HM Chief Inspector of Railways

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[6] http://orr.gov.uk/careers/about-us/strategic-objectives

[7] http://orr.gov.uk/publications/corporate-publications/health-and-safety-strategy
[8] http://orr.gov.uk/__data/assets/pdf_file/0013/11731/business-plan-2014-15.pdf

Section 2 - Health and safety across the railway sector: regulator's view

Introduction

In this section we provide an overview of our key findings across key risk areas and set out the evidence leading to our conclusions about each duty holders' risk management effectiveness, including the results of our RM3 assessments.

RM3 is one of our key assessment tools. It measures an organisation's risk management maturity and ability to achieve excellence in risk control. It looks at the areas of policy, monitoring, audit and review, planning and implementing, securing cooperation and confidence and organising for control and communication. It uses a five point scale to assess performance and identify areas for improvement:

- level 1 'ad hoc';

- level 2 'managed';

- level 3 'standardised';

- level 4 'predictable'; and

- level 5 'excellence'.

We cover Britain's:

- mainline railway: Network Rail – *see pages 10-15,* train – *see pages 16-19* and freight operating companies – *see pages 19-20*;
- metros – *see pages 20-21*;
- heritage railways – *see page 21*;
- tramways – *see pages 21-22*; and
- Transport for London's operations, including London Underground – *see pages 22-23.*

Overall mainline health and safety risk management maturity:

Overview: overall, our assessment of duty holders' safety management maturity, based on our enforcement and the other indicators we monitor showed that the industry's health and safety performance was fairly consistent, but static and broadly similar to 2013-14. Train accident risk, as modelled by the mainline precursor indicator model (PIM), showed a reduction in risk and consistent health and safety risk management. Importantly there is still scope for improvement.

We found a few examples of excellence and best practice such as freight operators edging towards level 5 'excellence' on one or two discrete RM3 areas, as well as substandard risk management exceptions. There is a cross-industry weakness in managing growth and change, particularly around station safety. Overall levels of harm to passengers and the public at stations increased 2%, but reduced by 2% when normalised by the 4% increase in mainline passenger journeys. Duty holders must use opportunities to secure safety by design enhancements when renewing or building new infrastructure, stations, rolling stock and equipment.

Evidence: our inspections and interventions, our assessment of duty holders' health and safety risk management maturity using RM3[9] found limited improvements in duty holders' overall scores compared to 2013-14, but there was progress in specific areas. Our RM3 assessments produced a range of scores, around level 2 'managed' and level 3 'standardised', but with a few consistently showing at level 4 'predictable'.

We found improvements to level crossings risk management, despite an increase in actual harm to crossing users and improvements to the asset stewardship of earthwork, bridges, tunnels and viaducts. There was an overall 2% reduction in harm to the public from trespass and a 21% reduction in platform-train interface (PTI) harm to passengers, or a 24% risk decline when normalised by the increase in passenger journeys.

However, we found insufficiently effective arrangements to manage basic worker construction health and safety risks, such as working with electricity and at height as well as delays to planned safety enhancements. The mainline SPAD risk trend remained stable but SPAD numbers increased. There is plenty of scope to further improve earthworks, bridges, tunnels and viaducts; and to improve the management of passengers at stations, service growth and change management.

More broadly, the industry's pace of change is not fast enough. We welcome Network Rail's recognition of the potential risk from 'change initiative overload'. It is important that change is targeted, managed, supported, realistic and resourced to avoid unintended consequences.

Our specific targets for 2015-16 and beyond: track geometry; managing growth and change safely, including station safety, driver management and the high SPAD numbers; workforce safety; and occupational health.

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[9] http://orr.gov.uk/__data/assets/pdf_file/0013/2623/management-maturity-model.pdf

Mainline: Network Rail

Overview: we scrutinised Network Rail's health and safety management systems (SMS) closely, as it moves from 'ad hoc' and 'standard' to a more 'predictable' level of management maturity. Overall its management maturity improved marginally over 2014-15.

We found significant variations in RM3 elements across routes, which indicates that Network Rail had not yet implemented its SMS consistently or shared good practice effectively.

Successes this year included the continued low level of Potentially High Risk Train Accidents (PHRTAs), which are a credit to Network Rail's maturing leadership and collaboration with train operators and its safety 'deep dive' reviews and audit. There were no fatal or major injuries and 23 minor injuries from the 41 mostly minor train accidents in 2014-15 – the lowest levels of harm for a decade. However, there was an ongoing rise in freight train derailments, which in part, were caused by substandard track geometry and its dynamic interface with freight wagon suspension and uneven wagon loads.

As our enforcement action shows, we found too many significant examples of failures to identify or control risks to the workforce effectively by Network Rail and its contractors, particularly around construction activities. Network Rail's recent in-depth reviews have helped to improve understanding of specific risk areas, their causes and how effectively they are being managed. These lessons must now be learnt and used.

Evidence: Network Rail must now look at the evidence from our RM3 assessment where it received only a level 1 'ad hoc' or level 2 'managed' and target improvements.

Level crossings

Overview: the harm posed by level crossings continued to remain low, as it has since 2010-11, but overall harm to crossing users increased 22%, primarily because of the two additional fatalities compared to 2013-14.

However, the high level of pedestrian incidents over recent years highlights the need for the industry's focus on enhancing crossing users' intentional or unintentional misunderstanding or misjudgement of crossing risks[10]. There was not enough progress in reducing overall harm, but there was a decline, down three to seven, in vehicle collisions with trains at level crossings.

Of the 5,974 crossings on the mainline network in June 2015, 72% are 'passive', where the user makes the decision about whether to cross, 14% are manual crossings, where there is some form of control and 14% have some form of automatic user warning controls. Footpath crossings form the biggest level crossing fatality risk to pedestrians.

It is important that risk reduction momentum is maintained, including the focus on crossing closures, down-gradings and improving users' understanding of the risks. Further strategic improvement will be driven by DfT's implementation of the Law Commission's level crossing safety report recommendations originally made in 2013[11].

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[10] The House of Commons Transport Committee's level crossing safety report issued in May 2014 recommended use of 'deliberate misuse' rather than 'misuse' to differentiate between wilful negligence and impaired human decision-making.
[11] http://lawcommission.justice.gov.uk/docs/lc339_level_crossings.pdf

Evidence: we focus on level crossing safety because of the high levels of potential harm they present, especially to crossing users. Level crossings account for 8% of overall modelled mainline train accident risk.

There were 10 level crossing fatalities, eight involved pedestrians, one was a car occupant and one a motor cyclist. There were five other non-fatal collisions between trains and road vehicles at level crossings, down three, and reductions in the levels of recorded 'near miss' events. This continues the lower level of incidents involving road vehicles since 2010-11.

The trend in level crossing pedestrian fatalities has remained high over the last few years, as those involving road vehicle occupants has declined. Modelled risk shows that of the harm at crossings, 57% involved pedestrians and 30% involved road vehicles being struck by trains. Reported incidents of near misses between trains and cyclists or pedestrians at level crossings have reduced slightly.

Over Control Period 5 (2014-19), our inspection will focus on passive crossings, as these pose the biggest risk to pedestrians. Central to future risk reduction will be the roll out of more cost effective active warning technologies to passive crossings, such as footpath, bridleway and user-worked crossings. There was a slight rise in pedestrian fatalities at passive crossings over the last two years and active technologies should help reduce this risk. We challenged Network Rail's failure to follow its change management process when altering the specification of new obstacle detector crossings. This resulted in the retention of low-level obstacle detection at crossings.

Other effective initiatives included the introduction of an improved individual crossing risk assessment process and the implementation of new technology. As well as the use of 15 British Transport Police (BTP) operated mobile safety vehicles, the development of red light safety cameras at 10 crossings to deter deliberate crossing misuse, and the installation of audible warnings for pedestrians at more than 100 crossings.

Network Rail is developing a strategy to improve risk management at level crossings. It includes consideration to make all passive crossings effectively active by enhancing them with active risk control. We required Network Rail to improve its process to focus on qualitative risk assessment by its crossing managers. This is improving the industry's understanding of crossing use and effectiveness of customised mitigation measures.

Crossing closures and downgrading form an important part of this ongoing risk reduction strategy: 383 are due for renewal and 345 crossings with wig-wag lights will be upgraded to LED lights. In 2014-15, Network Rail closed a total of 118 crossings, of which 25 were closed using the £74m of the ring-fenced CP5 funding. This will achieve 21% of the planned 25% risk reduction. Network Rail plans to close around 250 crossings over CP5 using ring-fenced funding. The remaining funds will be used to commission new technologies at user-worked and footpath crossings.

We continue to work closely with RSSB by contributing to their research to reduce risks to pedestrians at crossings and to enhance signage and warning systems at private and public crossings.

We processed 114 level crossing Orders from Network Rail, as crossings were renewed or upgraded during new signalling schemes – this is a high number. These should deliver sustained long term benefits. We are in the process of assessing a further 150 crossing Orders.

Infrastructure risks

Overview: some progress was made in improving drainage asset knowledge and in the stewardship of bridge, tunnel and viaduct civil assets, but Network Rail needs to do more to manage track geometry and to ensure the long-term safety and sustainability of all its assets.

Drainage: our inspections found improving mainline drainage asset knowledge, but it has been too slow. We found variations in the approach, quality and completeness of different routes' drainage management plans, which are needed to address the drainage asset under-investment legacy. Network Rail must do the necessary work to inspect and maintain its drainage assets.

Track: Network Rail's current approach is largely based on track renewal and refurbishment work to deliver long-term improvement and reactive routine maintenance work to correct track geometry faults. It needs to be better and more sustainably managed. Nationally, we remain unconvinced that Network Rail has done sufficient analysis of the accuracy of its work banks to enable us to check it has sufficient resource (labour, access, material, equipment) to maintain its asset.

However, at this stage we are satisfied that immediate safety risks arising from poor track geometry is being controlled, but in an inefficient and largely reactive way that sometimes does not address the underlying causes of faults and misses opportunities to address identified weaknesses. This increased the reliance on routine inspection and reactive maintenance activities to manage risk – *see pages 31-32.*

Switches and crossings: our November 2014 enforcement on Network Rail demonstrated that while good central review and development of technical solutions supported by clear process is important, equally important is their implementation in the field, supported by suitable mentoring and monitoring activity. Our future inspections will focus on the potentially increased pressures on maintenance delivery units as a result of the under delivery of planned renewals and refurbishment, and shortfalls in mechanised maintenance, such as tamping and stone blowing.

Earthworks: Network Rail has refined its contingency arrangements in the event of severe weather, but this is not a sustainable long-term response. There must be an overall improvement in earthwork asset condition. The first step has to be better knowledge of its asset condition.

Structures: there was a growing backlog in structures examinations. Network Rail must halt this trend and ensure it is adequately resourced to inspect the condition of its civils portfolio - the physical features, such as bridges, tunnels and earthworks, on which railways are built.

Off-track and vegetation management: our inspections found that vegetation conditions and its management varied across routes. Following our interventions over 2011-13, we found that the impact of the leaf fall season in 2014 was now mostly managed consistently, but was off the pace in discrete areas.

Evidence

Drainage: following on from our work in 2013-14, we served a national improvement notice on Network Rail in February 2015 to drive improvements in drainage capacity and degraded performance, because they increase potential landslip, and therefore train derailment risk.

Track: crucially, further reductions in repeat track twist events are largely dependent on renewal and refurbishment volumes being maintained and supported by more effective maintenance interventions. Keeping the right balance between maintenance and renewal activity will be essential. If renewals are not delivered to plan, it puts increasing pressures on maintenance delivery units to identify and manage defects. Repeated monitoring and repair activity is inherently less reliable than permanent repair.

Switches and crossings: we are monitoring the roll out of Network Rail's new design of tubular stretcher bar, developed as a result of the Grayrigg derailment in 2007, through field inspections of employee competence.

Earthworks: we routinely monitor the development of Network Rail's five year activity plan aimed at improving asset management by focusing on risk assessment and reviewing changes to the earthworks management standards.

Structures: we recently looked closely at the management of advertising hoardings attached to structures, the inspection and assessment of operational property, the safety of metallic structures with concrete encased beams and the maintenance of signal posts. In November 2014, a signal fell across the track on the Western route and was struck by a high-speed train but caused no injuries. Another collapsed after corrosion, on the Anglia route in April 2015. We are also focused on ensuring appropriate risk control measures are put in place to manage known weaknesses in station footbridges.

Off-track and vegetation management: Network Rail has surveyed vegetation management on all its routes and we are awaiting its results. In the interim, we have continued to press Network Rail to develop deliverable plans and will monitor its revised business plan for any indications of reversing planned volumes. Our assessment of the sector's low-adhesion prevention and rail-head enhancement work over autumn 2014 found that vegetation management had improved on previous seasons. It remained an issue in some areas, such as long stretches in Anglia, which led to a heightened potential safety risk and knock-on effects on service performance.

Safety by design

Overview: our work is focused on duty holders' failures to take opportunities to eliminate or reduce risks at the design stage, especially during new-build and refurbishment projects. We found evidence in large infrastructure projects of a failure to consider optimal risk reduction, and preferably its elimination, at the design stage. Our enforcement over 2014-15 showed the industry remains some way off the pace in applying the safety by design principles.

Evidence: Network Rail's major infrastructure projects present significant opportunities to design out or reduce risks. Some safety enhancements may only be realistic if implemented at the starting point of an infrastructure's life-cycle.

We took enforcement on Network Rail in April 2014 because of its failure to have suitable and sufficient assessments of the risks to passengers, public and staff at two Western upgrade sub-projects. And again in January 2015, due to the failure of its North West Electrification phase 1 project to comply with electrical safety standards, to which it had committed.

We propose to formalise our enforcement role to enable us to deal more effectively with safety by design issues at an earlier stage in major new-build infrastructure projects. With that in mind, we have increased our engagement on the safety aspects of HS2.

Infrastructure worker safety risk

Overview: overall workforce harm declined 3%, but when normalised by the 3% decline in workforce hours worked, showed no significant change. Undoubtedly, the big challenge for the industry is culture and behavioural change for infrastructure workers to help implement planned safety improvement initiatives.

Evidence: There were four workforce fatalities, one of which was on metro infrastructure. This compared to three mainline fatalities in 2013-14. Of those four, two were electrocuted - one fell on to the third rail at a train depot and one contacted the overhead line (non-mainline) – we are currently investigating both. Two were killed in occupational road incidents. There were some minor reductions in non-fatal injuries. Of the 175 workers who suffered major injuries, 100 involved infrastructure workers. Of the overall harm to the workforce, 40% involves infrastructure workers who work on or near the running line - a disproportionately high level of harm given the relatively low number of infrastructure workers.

The ongoing national roll out of the safe work (the new control of work permit procedure and safe work leader) initiatives undoubtedly sets the right ambitions to improve infrastructure worker safety. We recognise that this is the solution Network Rail has identified to secure long-term cultural change. Therefore, we have focused our efforts on their development and implementation.

Occupational road safety

Overview: Network Rail's recent focus on reducing risks from the operation of its road fleet appears to show some benefits, with reductions in incidents without injuries and those with injuries or where the emergency services were called.

Evidence: two infrastructure workers were killed and four received major injuries in occupational road accidents while working. There were 104 minor injuries, of which 24 resulted in staff taking three or more days off from their usual duties. Overall harm reduced 7%. Most occupational road incidents involved Network Rail's infrastructure workers and contractors.

There have been five occupational road fatalities in the last three years. It is estimated to represent about 4% of the overall harm to the workforce. There were several off-duty fatal road accidents involving railway employees driving home after long shifts, such as two recent multi-fatality traffic accidents in Scotland and Western involving off-duty railway contractor staff.

The inquest into the deaths of two rail welders in a road traffic collision at Newark in 2013 highlighted the problems of fatigue and driving risk. RSSB and wider industry partners have been active in promoting good practice[12]. Their work and the Health and Safety Executive's Driving at Work[13] guidance provide useful risk management resources.

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[12] http://www.rssb.co.uk/Library/improving-industry-performance/2013-good-practice-guide-t997-managing-occupational-road-risk.pdf
[13] http://www.hse.gov.uk/pubns/indg382.pdf

Occupational health performance

Overview: available evidence shows meaningful progress towards worker health being treated on an equal basis with worker safety, but we are not there yet. Pockets of innovation and good practice exist, but we served a further two notices in 2014-15 on the basics of assessment and control of health risks. These included substandard arrangements for manual handling and the control of substances hazardous to health.

Evidence: available data suggests the level of occupational ill health in railways is similar to construction – another high risk sector. The sickness absence rate in railways is 4%, compared with 2% in the private sector. Respiratory disease rates in railway workers are relatively high. Musculoskeletal disorders, stress, and hand arm vibration syndrome[14] (HAVS) are also key health issues in the industry. New cases of work-related ill health cost railway employers £2.5-5 million a year, not including the longer term economic effects from occupational cancers, and our surveys suggest health claims cost around £3 million per year. We recently issued our 'better health is happening: ORR assessment of progress on occupational health up to 2014 and priorities to 2019' report[15].

In the short term, we are targeting our inspection to achieve basic legal compliance with occupational health law. We will continue to focus on industry's asbestos management, exposure to silica dust in ballast and management and prevention of HAVs. We continue to proactively monitor the network-wide implementation of Network Rail's 'Transforming Health and Wellbeing strategy'[16], including the appointment of route occupational health managers and the implementation of their route action plans.

All cases reported to ORR under RIDDOR* from across Britain's railways: 2010-11 to 2014-15 (most were related to the mainline railway):

Disease type	2010-11	2011-12	2012-13	2013-14	2014-2015
Carpal tunnel syndrome[17]	4	0	2	2	4
Cramp in the hand or forearm due to repetitive movements	0	0	2	1	0
Hand arm vibration syndrome (HAVS)	34	95	97	74	80
Infectious disease due to biological agents	0	1	3	0	0
Occupational asthma	0	0	0	2	1
Occupational cancers	0	0	0	0	0
Occupational dermatitis	1	0	0	0	1
Tendonitis or tenosynovitis in hand or forearm[18]	1	1	0	0	1
Total	**40**	**97**	**104**	**78**	**87**

Source: RSSB and ORR.
*Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013[19]

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[14] http://www.hse.gov.uk/pubns/indg175.pdf
[15] http://orr.gov.uk/news-and-media/press-releases/2015/better-health-is-happening-in-rail
[16] http://www.networkrail.co.uk/browse%20documents/strategicbusinessplan/cp5/supporting%20documents/transforming%20network%20rail/transforming%20safety%20and%20wellbeing.pdf
[17] Carpal tunnel syndrome is a nerve disorder which may involve pain, tingling, numbness and weakness in parts of the hand and can be caused by, among other things, exposure to vibration.
[18] Often associated with work that is physically demanding and involves frequent, repetitive movements.
[19] http://www.hse.gov.uk/riddor/

Mainline: train operating companies

Management maturity

Overview: our RM3 assessments found varied performance (between RM3 level 2 and level 4) in employee engagement and consultation, internal communication arrangements, safety culture, change management and proactive indicators.

There were two empty passenger train derailments, seven train collisions with vehicles at level crossings (resulting in two fatalities), and two low-speed collisions between passenger trains and empty passenger trains at Glasgow station.

We continue to encourage more progress on the use of activity-based safety performance indicators and outcomes because evidence shows that these can change behaviours and reduce unsafe acts.

Evidence: our RM3 approach is now embedded in most operators' safety management systems and is being used as part of their own auditing arrangements. Train operator staff continued to attend our training course on using RM3 in a manner consistent with our approach.

Working with the Association of Train Operating Companies (ATOC), we produced a suite of high-level RM3 evidence matrices on key risk topics such as train crew management. We intend to extend this to include passenger safety (but not at the platform-train interface), station infrastructure management and workforce safety.

We also updated our RM3 assessment audit protocols for our inspectors and mainline train operators on evaluating the key risk topics during inspection and audit, to aid consistency of assessment criteria.

In December 2014, we held our annual RM3 review meeting with 75 industry invitees. It was run jointly with ATOC, hosted by RSSB and with guests from Network Rail and the freight industry. This successful event reviewed TOC performance and looked at integrating and developing their use of RM3. We highlighted improvements made by the train operating community over the last four years. Some are making progress towards level 4 'predictable' risk management in several areas, but improvements to the implementation, culture and monitoring and review lag behind the leadership, policy and planning criteria.

Train protection and warning system

Overview: We continue to push operators to enhance their Train Protection and Warning Systems (TPWS) where reasonably practicable, so that it has in-service monitoring functionality. In 2014-15 SPADs highlighted some shortcomings with Mark 1 equipment. Progress has been improving. Chiltern Railways now have a progressive TPWS upgrade plan and c2c plans to upgrade its entire fleet to at least mark 3 TPWS as standard. We anticipate further train operator upgrade commitments in 2015.

We continue to monitor industry plans to roll out the European Train Control System, which includes the European Rail Traffic Management System (ERTMS). However, until ERTMS is fitted network-wide, which is a long way off, the residual risk of and from SPADs remain the highest potential catastrophic hazard facing train operators.

Evidence: there were 299 mainline SPADs, a 4% increase, but overall SPAD risk declined 7% as measured against the September 2006 baseline. SPADs now represent more than

15% of the overall Precursor Indicator Model (PIM) risk, 10% of all train accident risk and 0.6% of total accident system risk. The numbers of multi-SPAD signals, where trains have passed them twice or more in the last five years, increased gradually over recent years. This trend is likely to be associated with a more congested mainline network and drivers facing more red signals.

We are monitoring the development of the RSSB-led Strategy Project Group's 10 year SPAD mitigation strategy. Work to examine whether the higher risk SPAD categorisation process - in which we were involved - has amplified the actual risks posed by SPADs continues. There is some anecdotal evidence that SPAD causation categorisation has in the past been too risk averse given the actual circumstances.

We prosecuted a now former First Capital Connect train driver who failed to set up his cab secure radio, passed a signal at danger, reset the train control system and then drove off without alerting the signaller at Hitchin in October 2013 – a so called 'reset and continue' SPAD. We take SPAD and 'reset and continue' SPAD events very seriously because they undermine basic system protection control arrangements.

Mainline charter train SPAD

Our investigation into the potentially very serious SPAD at Wootton Basset Junction on the mainline network in March 2015 involving West Coast Railway (WCR) continues. Our work highlighted significant weaknesses in WCR's board governance arrangements and led to our enforcement action in May 2015. We continue to monitor the implementation of WCR's post-incident improvement plan, which included significant organisational change.

Driver management

Overview: our short-term focus remains on improving driver management and maintaining pressure on operators for train protection enhancements. Specific issues include drivers losing concentration and becoming fatigued or distracted. We encourage the use of Network Rail's 'VariSPAD' workshops to rectify the causes and impact of high risk SPADs and of on-train data recorder downloads to provide more reliable driver performance assessment data.

Evidence: we continue to see examples of interruptions in driver's concentration and/or distractions causing, or at least exacerbating, potential safety incidents. We look to the whole industry to identify common patterns, learn lessons and implement appropriate remedies, which may include infrastructure enhancements.

Low-adhesion

Overview: our assessment of the sector's low-adhesion prevention and rail-head enhancement work on the mainline network, found that vegetation management remained substandard in some areas, but overall had improved on previous seasons.

Evidence: leaf fall contributes to rail-head low adhesion by creating a slippery leaf mulch on the rail-head which can lead to trains sliding past signals for a considerable distance even after brakes are applied, or of trains becoming 'invisible' to the signalling system as wheel-to-rail contact is lost.

We saw significant evidence from our inspections of systematic vegetation clearance and good evidence that rail-head treatment work has improved. However, it was inconsistent on some routes, such as long stretches in Anglia, which led to a heightened potential safety risk and knock-on effects on service performance.

Station management, train dispatch and the platform-train interface

Overview: overall harm to passengers and the public at stations increased 2% compared to 2013-14 but reduced 2% when normalised by the 4% increase in passenger journeys (the best available approximation of increases in station usage by passengers and public). Our pressure and the industry's own concern means that most operators now have good platform-train interface (PTI) risk management arrangements in place. Our inspections generally found strong and consistent PTI management processes. Overall mainline PTI harm reduced by 21%, but when normalised by increases in passenger journeys it decreased 24%.

We found evidence of good performance in safety leadership, risk assessment, worker engagement and safety culture around the management of the PTI. Generally, standards of train dispatch are at satisfactory to good levels, but some station risk assessment issues remain, such as curved platforms, or where platform furniture obscures views during platform-train dispatch.

Evidence: managing crowd congestion or taking appropriate proactive steps to avoid it continues to be a big challenge right across the network. These pressures are due to increases in passenger numbers, service frequency and disruption, including the impact of one-off and everyday rush-hour events, and from station infrastructure enhancement works. We saw examples of poor management of station crowding at Birmingham New Street, Finsbury Park (following the engineering overruns at Euston station), London Bridge and Paddington stations in 2014-15.

Procedures for proactively identifying and dealing with station crowding include having a dedicated control room, automated congestion monitoring with critical levels triggering a proactive response, use of CCTV to better understand passenger behaviour and staff resourcing levels, and the effective control of passenger flows during train dispatch. The industry's people on trains and station risk working groups are seeking to improve crowd management.

A cross-sector PTI risk management strategy was launched in January 2015 – in which we were involved and endorsed – and provides an analytical tool for enhancing PTI controls, including influencing passengers' behaviour. It shows a good example of effective partnership working.

We continue to inspect station passenger management plans to monitor their PTI risk management processes because of the high level of fatality and major injury risk posed. This includes periodic visual inspections to ensure proactive management is effective and dynamic. The future passenger crowding challenge means we must keep pushing operators' day-to-day responsiveness to crowding.

As mentioned previously, we are also focused on the use of engineering solutions to design out risk for new or enhanced infrastructure, stations and rolling stock. This approach will help deliver our longer term asset management work plan, which includes the alignment of relayed track and platforms to reduce PTI gaps. Looking ahead, residual PTI risk will remain a perennial challenge until engineering solutions, such as PTI gap fillers, or platform-edge doors, (which can prove prohibitively expensive when retrofitted), are installed.

Rolling stock risks

Overview: we found rolling stock maintenance was generally of a high standard, but very little evidence that fleet departments are using the data they collected about rolling stock management to enhance a balanced suite of performance and safety indicators. Although they expressed a willingness to do this with their contractors. We continue to monitor trends in vehicles returning to service with failures after overhaul or external maintenance, but saw some improvements after the worsening trend in 2013-14.

Evidence: PIM-measured risk from train and rolling stock increased 4%. We found evidence of train operators failing to fully recognise the full consequences of introducing new rolling stock. For example, the emergency evacuation plan arrangements for disabled passenger assistance and stepping distances for Thameslink's new 700 class fleet arrangements were not considered at the design stage by the train operator.

However, more broadly, our relationships with train operators and train service providers are open and honest and provide us with a strong forum to challenge them when necessary.

Mainline: Freight operating companies

Overview: we are generally satisfied that freight operators' safety management systems perform at consistently acceptable levels. There are some areas requiring improvement, particularly the rise in rolling stock axles and bearing failures.

There were 14 freight train derailments, part of a growing trend. SPAD numbers involving freight operators have continued to increase since 2010-11. There were 72 freight operator SPADs in 2014-15, a 13% increase, of which 14 were potentially significant. The trend in SPADs per freight kilometre travelled has increased gradually since 2011. There was a 40% increase in harm to freight workers, with 11 major and 194 minor injuries.

Evidence: our work was focused on analysing the ability of freight operators to deliver excellence in driver management, but more specifically, in key areas of their management maturity in support of driver management techniques. We used RM3 to promote operators' systematic analysis of their management systems to help us identify areas of improvement as well as good practice. We also looked at governance, policy, leadership, securing co-operation, competence and the development of employees at all levels and the planning and implementing of risk controls through co-ordinated management arrangements.

We found that most freight operators consistently achieved level 3 'standardised' to level 4 'predictable' score when assessed with RM3. Some operators are now beginning to push towards level 5 'excellence' assessments for a few parts of the RM3 assessment criteria. Our RM3 assessment found that freight operators were generally complying with the Railway and Other Guided Transport System (ROGS) Regulations[20].

A series of freight container wagon derailments over the last few years were caused by interconnected common factors. Track condition (in particular track twist), a wagon's wheel/suspension-sensitivity to sub-optimal track geometry and the uneven loading of goods

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[20] http://orr.gov.uk/__data/assets/pdf_file/0020/2567/rogs-guidance.pdf

in freight containers causes 'wheel unloading'. This can cause wheel(s) to lose contact with the rail and lead to derailment. None of the incidents in 2014-15 caused catastrophic consequences but all had the potential. They caused damage to the infrastructure and vehicles, but no fatalities or injuries. Other notable incidents in 2014-15 included freight containers being blown off a wagon in high wind - an issue we are monitoring.

To accelerate industry dialogue to identify a system level solution, we held a seminar on 6 March 2015. It identified the fundamental collective leadership and thinking needed, including a rolling stock and track standards review. We continue to monitor progress closely. We continue to liaise with the industry at its national meetings, including the National Freight Safety Group and Rail Freight Operators Group.

Occupational health: train and freight operators

Overview: we are seeing some evidence of the benefits of robust and proactively applied occupational health strategies. These include better staff attendance, improved health and reduced employee absence costs, but train and freight operators have more to do. There are some slight variations between comparable operators' staff sickness absence and overall wellbeing levels.

The specific issues we will be looking at are asbestos management, noise at work, managing stress and the control of substances hazardous to worker health.

Evidence: we found areas of improvement such as safety leadership, the trialling of new technologies and work methods, the provision of safety information to staff, staff engagement and good use of safety targets. However, operators must ensure their line managers and supervisors have health management competencies and monitor the compliance with their own company health plans. We will continue to use our RM3 assessments of operators' safety management systems to identify weaknesses and target improvement.

We found examples of substandard risk assessment, poor provision of personal protective equipment and checks on its use by staff and competence management systems that are not yet good enough. We also saw insufficient efforts to ensure corrective risk management actions are implemented and a lack of consideration of occupational health issues at the design stage.

Metro railways

Overview: we are investigating train fire and electrical incidents and have engaged an electrical specialist from the Health and Safety Executive (HSE) to establish specific causes. We have asked Nexus to review their current arrangements for handling overhead line equipment 'electrical trips' to ensure workers, passengers and others are kept safe. We continue to monitor incidents involving passengers being trapped by closing doors during platform-train dispatch procedures.

Evidence: we investigated an incident of a small train fire that led to a live overhead line cable 'snaking' around a passenger train while it was at a station - no injuries were caused. This is one of a series of serious train fires involving life-expired trains, poor electrical control standards and insufficient levels of infrastructure and rolling stock investment. Passenger numbers increased 7% on the Tyne and Wear Metro network in 2014-15.

Heritage railways

Overview: we have continued to encourage the Heritage Railway Association (HRA) to take a greater leadership role over its sector, particularly on the maintenance and compliance with HRA's core guidance[21] and standards for the industry. This was an important step and significant progress has been made, but board governance and staff competency are still not where we want them to be. We continue to maintain our support to the industry by hosting workshops to communicate new initiatives.

Evidence: we focused on getting heritage operators to maintain, develop and comply with their own customised safety management system (SMS), following our targeted enforcement in 2010-12. More remains to be done to bring operators' SMSs up to an appropriate standard. Crucially, our focus in 2014-15 and into the future is on getting operators to develop and maintain strong board governance and staff competency arrangements for themselves. Our level of enforcement remained low key compared to 2010-12.

Tramways

Overview: safety performance on tramways remains consistent and fairly strong. However, changes to Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013[22] (RIDDOR) incident reporting legislation and enhanced industry procedures led to a notable increase in the reporting of tram collisions with road vehicles.

Overall tram passenger numbers continued to grow, up 2%[23]. There were 94.4 million passenger journeys on the seven English tramways in 2014-15. This figure does not yet include the new Edinburgh Tram.

Evidence: UKTram, Britain's light rail and tramway industry trade body (sponsored by DfT), was reconstituted at an annual general meeting on 23 December 2014. This was an important step into a more proactive group with an explicit commitment, among others, to prepare and publish guidance, including safety guidance. As part of this process, we signed an agreement for UKTram to own the high-level guidance document (Railway Safety Principles 2 and Guidance on Tramways), which was previously managed by us.

We have worked with the sector to improve industry incident recording centrally by, for example, producing clearer guidance in response to changes to the RIDDOR regulations and refinements to data capturing systems. This process highlighted that some minor tram-road vehicle collisions should have been reported to us. This, along with the recent opening

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[21] http://www.hra.uk.com/mem_docsdb.php
[22] http://www.hse.gov.uk/riddor/
[23] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/433286/light-rail-and-tram-statistics-2014-15.pdf

of new extensions to Manchester Metrolink's network, which operates more intensively along the road, led to a notable rise in reports of tram collisions with road vehicles – *see page 37*.

We do not believe that there was an actual rise in tram collisions with road vehicles, because we have not seen a parallel rise in secondary reports of injuries. Instead we believe those incidents are now being recorded more accurately. We encourage this as it helps identify areas and patterns where additional safety controls may be required.

We support UKTram's ongoing work to develop a more consistent system of incident and accident recording across the tramways. We encourage their exploration of appropriate benchmarking to assess safety performance across the sector.

Manchester's Metrolink network continued to grow with a new line to its airport and the new Edinburgh Tram opened on 31 May 2014. Our inspectors have been focused on monitoring the safety aspects of how these lines come into operation. We kept oversight of Edinburgh tram coming into operation under the Railways and Other Guided Transport (Safety) System[24] safety verification process. Tram passenger journeys increased 4% on Croydon Tramlink, 8% on Nottingham Express Transit, 7% on Manchester Metrolink, but declined on Blackpool Tramway, Midland Metro and Sheffield Supertram.

Transport for London's operations, including London Underground Limited

Overview: safety performance on Transport for London's (TfL) managed infrastructure, including London Underground (LU), was consistent but not faultless in 2014-15. There were no railway operations fatalities; a high level of safety for its passengers and workforce was maintained, as passenger numbers and services frequency grew; and its large infrastructure modernisation investment programme continued.

However, we served a total of five enforcement notices in 2014, focused on below standard construction activities on LU's infrastructure. This highlighted the dual challenges of running a very busy infrastructure alongside a very significant modernisation programme. We received no worker-related ill health notices from TfL.

Station crowd congestion remains a challenge for LU. There were 1.3 billion passenger journeys on LU, up 3%. While they are distinctly different mass transport systems, there are lessons the mainline sectors can learn from LU's well practiced, robust, proactive and effective approach to station safety.

Evidence: our broader interventions confirmed that LU has the necessary health and safety procedures to manage its operational risks well. However, there were serious safety events which included workers falling from height; and substandard scaffold set-ups, lifting operations and arrangements for working with electricity in a switch gear room. We also found substandard monitoring of employees' competency, control of work, incidents of electric shock to staff and the poor separation of equipment and workers during an engineering blockade. Our investigations into these serious incidents continue. Following these incidents and our five enforcement notices, we held a series of senior meetings with TfL to make sure they re-affirmed their safety commitment.

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[24] http://orr.gov.uk/__data/assets/pdf_file/0020/2567/rogs-guidance.pdf

In terms of actual harm trend on LU, major and minor injuries to the workforce were at historic lows, but this reflects LU's current use of nightly overnight 'engineering hours', when passenger services are suspended. Looking ahead, we have monitored LU's plans to operate 24 hour Night Tube passenger services on some of its lines on Friday and Saturday nights, planned to start on 14 September 2015.

Our inspections in 2014-15 were focused on the effectiveness of LU's audit process, improving the management of escalator risks, worker manual handling (it is still the primary way to move materials to platforms) and the introduction of new S-stock on to the District line's operational infrastructure.

A comparison between harm profiles on the mainline railway and LU is provided on page 30.

Our non-safety accessibility work

In addition to our routine health and safety work, we monitor operators' compliance with the 'Rail Vehicle Accessibility (Non-Interoperable Rail System) Regulations' 2010 (RVAR) and the Technical Specification for Interoperability (TSIs). These relate to accessibility of the European Union's (EU) railway system for 'persons with disabilities and persons with reduced mobility' (PRM TSI).

The PRM TSI is now a well-established standard for new mainline railway vehicles and is checked as part of the authorisation process when introducing vehicles into service. We have been working with Network Rail to clarify the application of the PRM TSI when stations are redesigned as it provides the opportunity to achieve TSI compliance when major work takes place at stations.

We have liaised with DLR and LU about their applications to DfT for exemptions from elements of RVAR in order to ensure that their proposals do not affect accessibility or safety. Currently, these have not yet been granted.

Most accessibility matters we have dealt with were raised by members of the public and required a cross-office approach to fully consider the application of the Disabled Persons Protection Policy and our duties under the Equality Act 2010 to promote equal treatment. Cases have included the individual failings of 'Passenger Assist' bookings, operators' rules on the carriage of mobility scooters on trains, and improving railway staff understanding that passengers' disabilities may not always be immediately apparent.

Section 3 – Overview of health and safety performance on Britain's railways in 2014-15

Introduction

We use a range of data from various sources together with our inspectors' assessments, observations and findings to develop a full picture of the state of health and safety. This section sets out some of this data in the context of historical trends.

Passenger safety – mainline railway versus cars, 1961-2013

Safety on Britain's mainline railways continues to improve. It remains a safer form of transport than road, although both are growing ever safer as risk is designed out, new technologies and processes are applied, and lessons are learnt from other industries. Road safety fatality rates reduced 49% between 2006 and 2013.
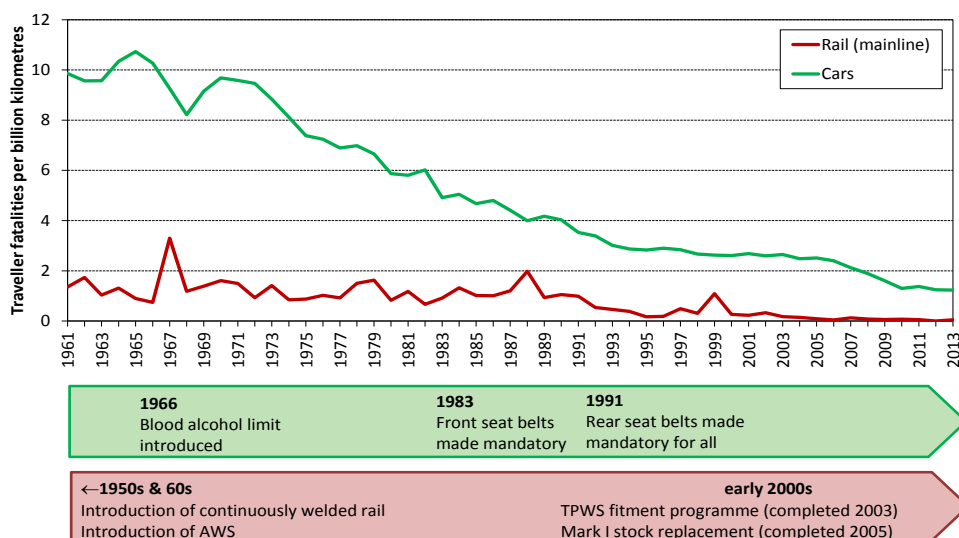
Source: RSSB analysis based on data from DfT, ORR and RSSB

The mainline passenger growth challenge

Mainline passenger and freight railway usage between 1966-67 and 2014-15

Passenger kilometres travelled (light blue line) and journeys made (dark blue line) have increased steeply since 1994-95. Freight tonnage and kilometres hauled (grey line) has increased more gradually over the last 20 years. Overall passenger and freight 'activity' (red line) has continued to grow gradually since the early 1980s.
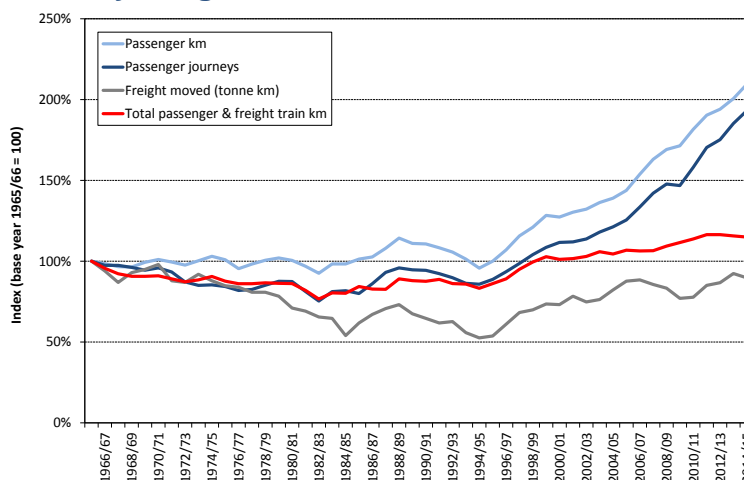
Source: RSSB, based on ORR's National Rail Trends[25] and DfT's Transport Statistics Great Britain[26]

Difference between modelled risk and actual harm

We use many different ways to assess the relative safety performance of Britain's railways. Two key measures often cited in this report do distinctly different things:

- *actual harm* caused to individuals, which is measured on the mainline using the fatalities and weighted injury index. For example, the actual fatality and injuries incidents to passengers, workers and the public caused by the operation of Britain's mainline railway; and

- *modelled risk*, which uses historic mainline data to periodically quantify the frequency and potential average consequence from a particular set of circumstances that could lead to a safety incident. The Safety Risk Model (SRM) periodically takes a snapshot of all significant risks on the mainline and the monthly Precursor Indicator Model (PIM) tracks trends in key catastrophic precursor train accident risk.

In 2014-15 modelled risk decreased, which shows that the mainline industry is reducing the potential for circumstances that lead to a catastrophic incident with multiple fatalities. However, some levels of actual harm to individuals increased. This highlights an important aspect of the potential randomness of events. For example, similar passenger train derailments may potentially cause a catastrophic incident with multi-fatalities in one set of circumstances, or cause minimal damage and no injuries or harm in another.

In 2014-15, the likelihood of harm from lower levels of risk was realised, but the higher levels of catastrophic harm was not. Ultimately, our interventions are aimed at ensuring duty holders prevent the potential risks from harm-causing incidents - particularly those that can cause catastrophic harm - by the provision of effective safety controls or risk elimination.

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[25] https://dataportal.orr.gov.uk/
[26] https://www.gov.uk/government/statistics/transport-statistics-great-britain-2014

Mainline passenger and public fatalities and weighted injuries

39 passengers, workers and members of the public were killed on the mainline railway and one on the non-mainline, in 2014-15, up 5% on 2013-14. These involved 22 trespassers, the same as 2013-14; 10 level crossing fatalities, down two; three passenger fatalities; four worker fatalities; and one public assault fatality at a station. The passenger fatalities involved falls at stations, one on to the third rail, one in front of a train and one down station stairs. None were industry-caused. The fourth station fatality was classified as a 'public assault' and involved the tragic death of a young boy in a suicide event involving his mother.

Passenger major injuries increased 7%.When normalised by increases in passenger journeys, passenger and public slips, trips and falls, which represent the largest harm to passengers at stations, increased 1%. This was due to an additional passenger trip fatality.

Of those incidents, 37% occurred on station stairs and 27% on platforms. Harm to passengers from boarding trains reduced 10% and from alighting trains reduced 32%, but harm to passengers on board trains increased 22% and those at stations increased 53%, mostly because of increases in major injuries.

Of those, 66% were caused by collisions with objects and people on railway property. Overall harm at the PTI reduced 21%, or 24% when normalised by increases in passenger journeys.

Trends in class 1 minor injury harm to passengers (when the person is taken to the hospital) reduced 10% and by 24% when normalised by the rise in passenger journeys. Major injuries caused by falls and 'contact with objects' accounted for 63% of the total harm recorded in 2014-15. Harm to passengers and the public at stations increased 53% due to increases in major injuries.

Overall harm to the public increased 10% because of the slight increase in level crossing fatalities. Assaults on the public and passengers increased 10%, but by 6% when normalised by the growth in passenger journeys. A total of 2,888 assaults were recorded by the BTP on trains and stations.
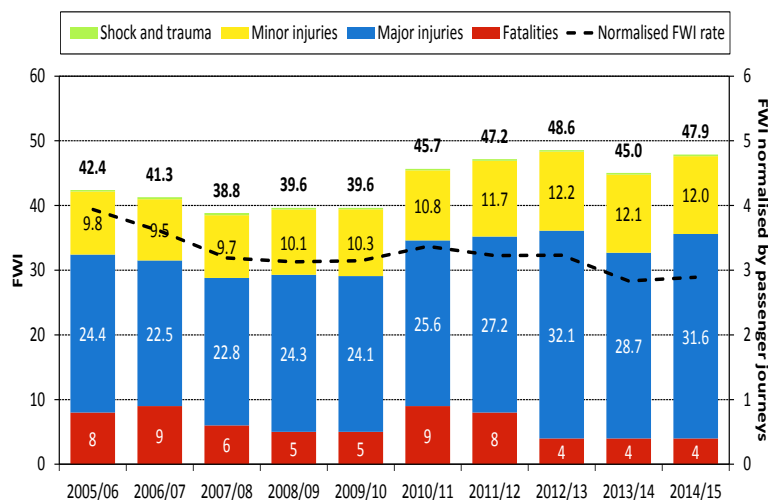
Mainline workforce fatalities and weighted injuries

Overall mainline industry workforce fatalities and injuries harm declined 3%, but when normalised by the 3% reduction in workers' hours worked (0.21 billion workforce hours worked), showed no significant change on 2013-14.

There were 80 major injuries to workers, the same as in 2013-14, of which 45% involved slips, trips or falls and 32% involved contact with objects or persons.

There were minor reductions in overall non-fatal workforce injuries. Of those, 53% occurred at stations and 40% on board trains. On-train workforce harm increased slightly, but is the second lowest since 2005-06.
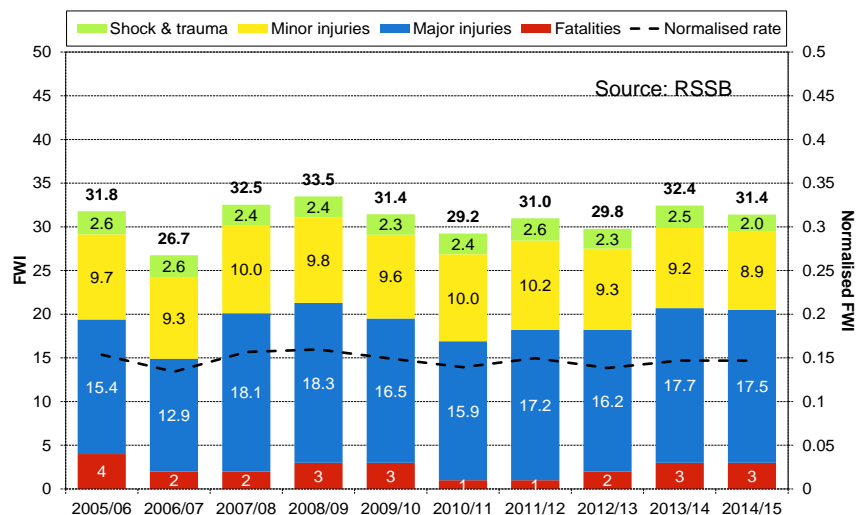
Source: RSSB

Harm to workers reduced 9% because of a 14% reduction in all workforce major injuries. Harm due to slips, trips and falls reduced 50%, but harm at the platform-train interface increased 53% (mostly drivers and train crew). There were 37 major injuries to the workforce, of which 76% occurred at stations. Slips, trips and falls account for 29% of major injury risk and 19% of the overall risk to the workforce.

The small improvements in workforce harm have only kept pace with the rises in workforce hours worked over the year. As the chart above shows, the trend in overall mainline workforce harm has remained broadly unchanged with only slight variations since 2005-06.
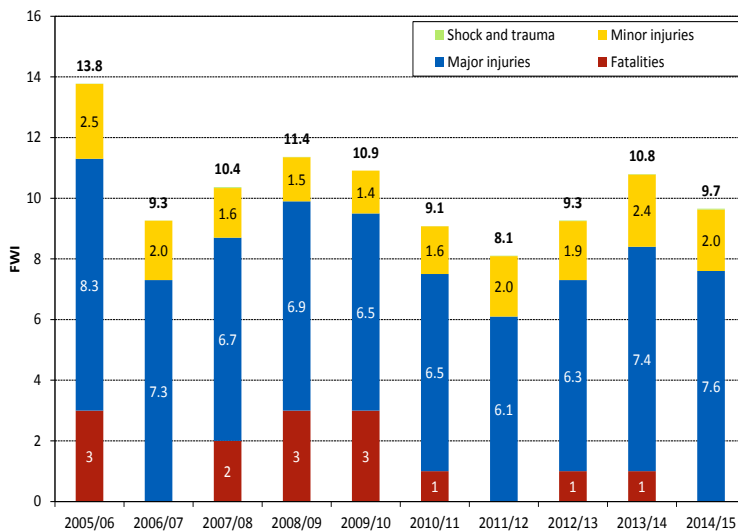
The key harm causing workforce injuries were slips, trips and falls, the PTI, contact with objects, on board injuries, struck and/or crushed by train and risks from electrical sources.

Mainline infrastructure worker fatalities and weighted injuries

There were two mainline infrastructure worker fatalities in occupational traffic accidents. One involved a construction worker on the new Borders Railway in Scotland and the other involved a Network Rail office worker in central London.

There were two other worker fatalities, one on the mainline caused by a cleaner coming into contact with the third rail at a depot and one caused by an infrastructure worker coming into contact with the overhead line on operational metro infrastructure. There were six electric shock major injuries and 21 minor injuries – a higher number than usual.

Mainline infrastructure worker fatalities and weighted injuries on the running line

Legend: Shock and trauma, Minor injuries, Major injuries, Fatalities

Year	Fatalities	Major injuries	Minor injuries	Total
2005/06	3	8.3	2.5	13.8
2006/07	—	7.3	2.0	9.3
2007/08	2	6.7	1.6	10.4
2008/09	3	6.9	1.5	11.4
2009/10	3	6.5	1.4	10.9
2010/11	1	6.5	1.6	9.1
2011/12	—	6.1	2.0	8.1
2012/13	1	6.3	1.9	9.3
2013/14	1	7.4	2.4	10.8
2014/15	—	7.6	2.0	9.7

Source: RSSB

Overall harm to mainline infrastructure workers on the running line declined 10%, because there were no worker fatalities on the running line. However, with the 3% reduction in mainline workforce hours (0.21 billion workforce hours worked), the infrastructure worker harm level was very similar to 2013-14.

Harm to infrastructure workers from major injuries increased slightly because of rises in electric shocks (six), and collisions with objects or people (22).

Harm to infrastructure workers from minor injuries that required hospitalisation reduced 23%, after the higher level of 2013-14.

The Safety Risk Model (SRM) v.8.1 suggests that slips, trips and falls harm represent 37% of the overall harm to infrastructure workers. Over the last decade, nine of the 14 infrastructure worker fatalities involved being struck by a train, which accounts for 10% of the overall harm to workers, but 64% of the fatality harm. Harm to infrastructure workers on the running line is around twice that of harm to the rest of the overall workforce.

Yards, depots and sidings

Harm to mostly workers in yards, depots and sidings increased 17% in 2014-15, with slips, trips and falls accounting for around half of this.

The fatality involved a train cleaner who was electrocuted on the third rail at a depot. It is not included in the dataset, but it is suspected that an off-duty worker committed suicide in 2014-15. There were five major and 1,354 minor injuries. The depot electrocution fatality and increase in major injury harm were the key drivers of the rise in harm.

Trends in harm to workers in yards, depots and sidings

Harm in yards, depots and sidings represents around 22% of harm to the whole workforce. Of that 43% is caused by slips, trips and falls and 32% is from 'contact with objects'.
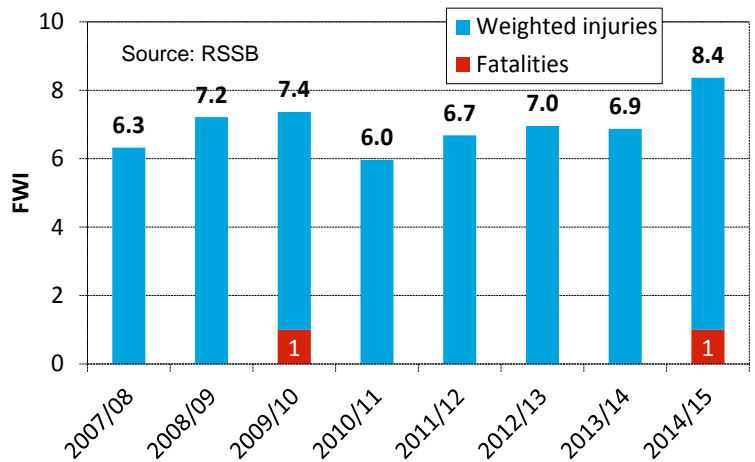
Trends in potentially high risk train accidents

Potentially High Risk Train Accidents (PHRTAs) represent 6% of incidents on the railway but 93% of the potential train accident risk, which is why we monitor it closely. PHRTA events include derailments, train collisions, buffer-stop collisions, train collisions with road vehicles and large objects blocking the running line.

The 25 PHRTAs, down seven (15%) on 2013-14, form part of a longer-term broadly reducing trend.

These 25 included 14 freight train derailments where track geometry was one of the contributory factors.

The other eleven PHRTAs included two empty passenger rolling stock derailments, one in a shunt movement-caused SPAD and one due to poor track geometry and imbalanced wheel-loading. There were seven collisions between trains and road vehicles at level crossings, which resulted in two fatalities, and two low-speed train collisions between passenger trains and empty passenger trains at Glasgow Central high level station. For the second year in a row, there were no passenger train derailments – an unprecedented record. Most mainline passenger train collisions occur at low speed at stations, 26 of the 30 occurred there over the last decade.
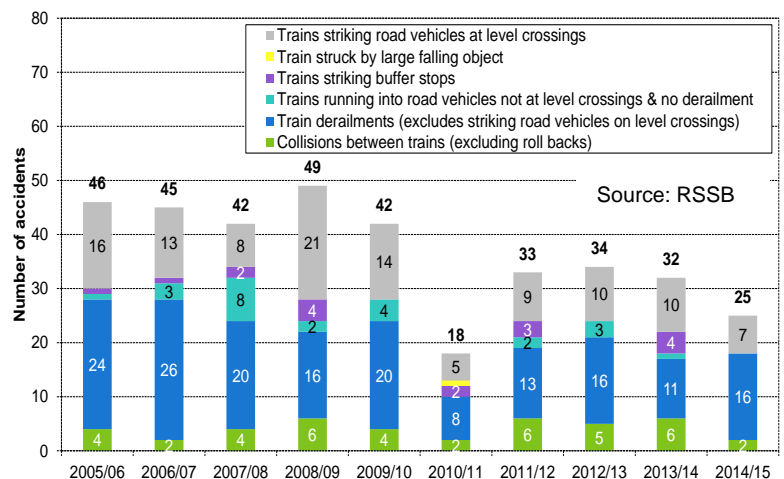
Mainline railway accident precursor risk as measured by the precursor indicator model

The precursor indicator model (PIM) provides an indication of changes in PHRTA risk by tracking incident frequency based on their average consequence. It does this using the

results of the safety risk model (SRM). The PIM acts as a proxy to the SRM to quantify the potential risk from the 51 high risk train incidents it monitors. The PIM covers most but not all mainline risks, for example, it does not include risks to passengers at stations.

The SRM provides a snapshot estimate of all significant mainline railway risk, based on a detailed analysis of likely harm caused by 23 hazards in around 1,700 risk events. It includes those 'near miss' incidents that had the potential, but did not, cause harm. It uses a longer dataset to avoid the potential for short-term volatility, and a common fatalities and weighted injuries index. RSSB recalibrates the SRM every 18-24 months to revise the assumptions on potential likelihood of risks using data from more recent incidents and incident precursors. It was last done in August 2014.

Britain's mainline network has made good progress in gradually reducing catastrophic train accident risk – partly through regulated improvement driven by law and via investments in new rolling stock and technologies. The SRM v. 8.1 predicted a serious train accident on Britain's mainline network once every 21 years; a significant improvement on where we were a decade ago.

Ten year trend in the overall PIM v. 8.1 (August 2014)

The PIM's risk group categorisations changed slightly in 2014-15 to align them more closely with those risk areas monitored by Network Rail on the mainline – *see PIM chart opposite*.

Improvements to the PIM's risk modelling over time mean that the trends shown in the chart between April 2005 and 2010 are only approximations of those processed by the new PIM modelled risk.
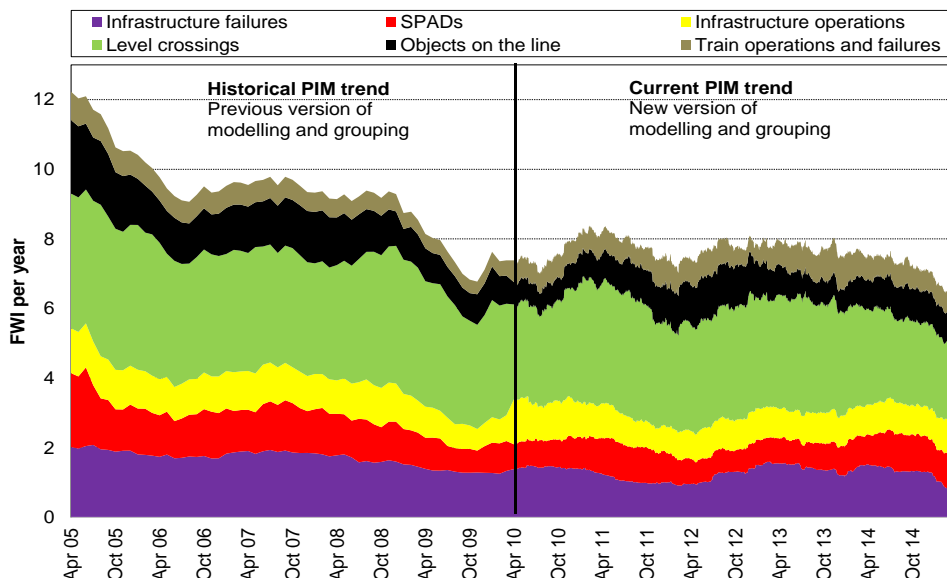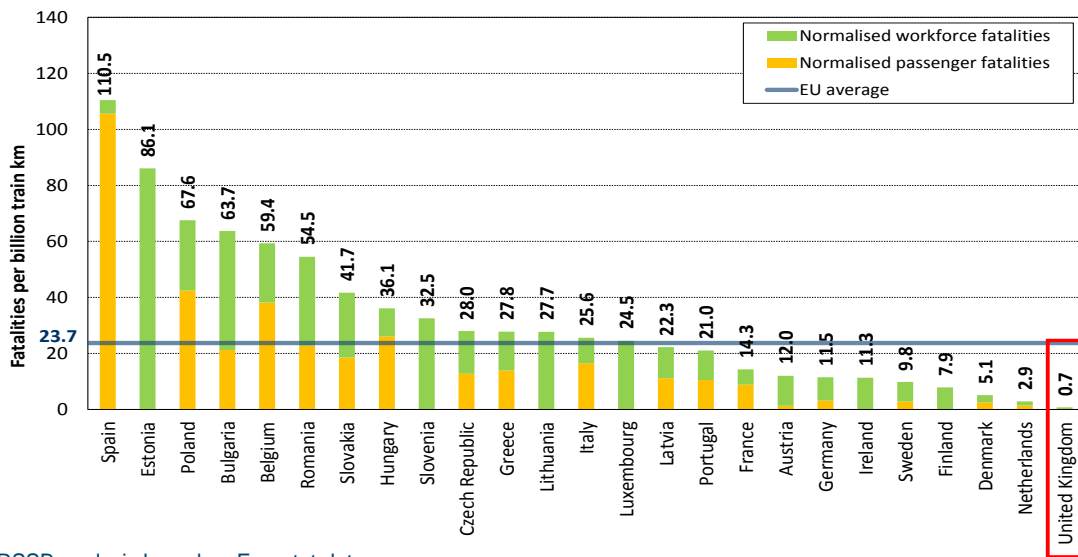

Source: RSSB.

PIM-measured train accident risk declined 15% and risks to passengers declined 16% in 2014-15. Currently, fatal train accident risk for passengers is at the lowest level ever achieved. Public behaviour at level crossings forms the biggest element of overall train accident risk modelled by the PIM, but most of that risk is to the crossing users themselves.

Comparison with European Union's railways

Passenger and workforce fatality rates on Britain's mainline railway involving moving trains remained well below the European Union (EU) average between 2009 and 2013 – the most recently available dataset. This was mainly because of the low levels of passenger and worker fatalities. The last passenger fatality in a train accident was in the Grayrigg derailment in 2007. Britain's mainline railways are currently the safest in the EU at managing overall risk to passengers and workers and at managing level crossing safety, and second best at managing public safety.

Passenger and workforce fatality rates across the European Union's railways, 2009-13


Source: RSSB analysis based on Eurostat data

Comparing the mainline railway to London Underground

Direct and meaningful comparisons between the harm profiles on the mainline railway and LU require care due to the different style of mass transport systems involved. One is a national network and the other provides a very high frequency service in greater London.

However, both networks are facing big challenges from year-on-year passenger growth and vast, simultaneous infrastructure investment programmes.

There are similarities in the levels of passenger harm - there were no passenger fatalities in train accidents and similar levels of assaults on passengers, train accidents and on-board incidents – *see chart opposite.*

However, there were higher levels of 'other incidents' on the mainline, likely due to the larger potential harm scenarios, such as a higher level of non-fatal slips, trips and falls, as a result of the scale of the mainline infrastructure and its exposure to weather.
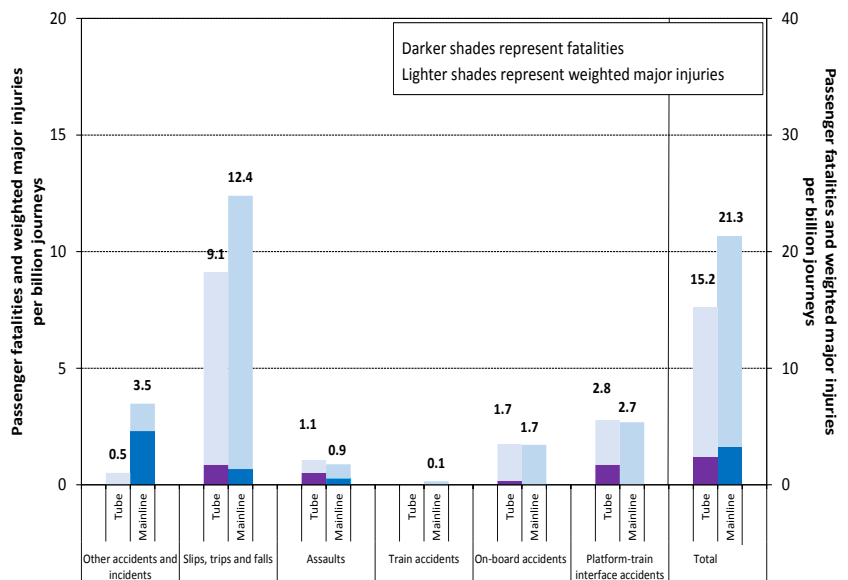

Source: RSSB.

Levels of PTI harm are higher on LU, due to the higher intensity of crowding and service frequency. A comparison of the harm on all mainline and LU workers are also similar once the higher level of slips, falls and other incidents harm levels on LU are sifted out.

Trends in SPAD number and underlying risk, September 2006 to March 2015

There were 299 mainline signals passed at danger (SPAD), an increase of 4%, but risk from SPADs that had the potential to cause train collisions reduced 7%. Nevertheless, SPADs form the single largest risk to passengers from train accidents.

The industry is developing a strategy to reduce SPAD risk, as the mainline moves towards automatic train control, with the implementation of the European Train Control System (ETCS). We will monitor this closely to ensure SPAD risk and service growth is managed safely.
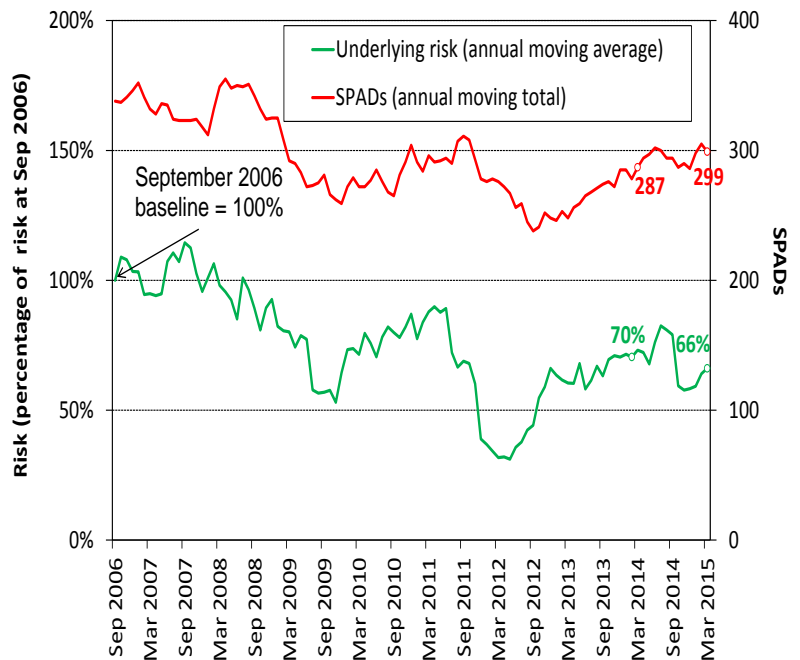
Track geometry

While not necessarily a direct safety indicator, we monitor immediate action levels and intervention track geometry faults as they provide a useful indicator of track condition. Network Rail's 'good' and 'poor' track geometry measures both improved - they are at their second best levels under the current measuring process.

Mainline track geometry faults per 100kms, 2008-9 to 2014-15
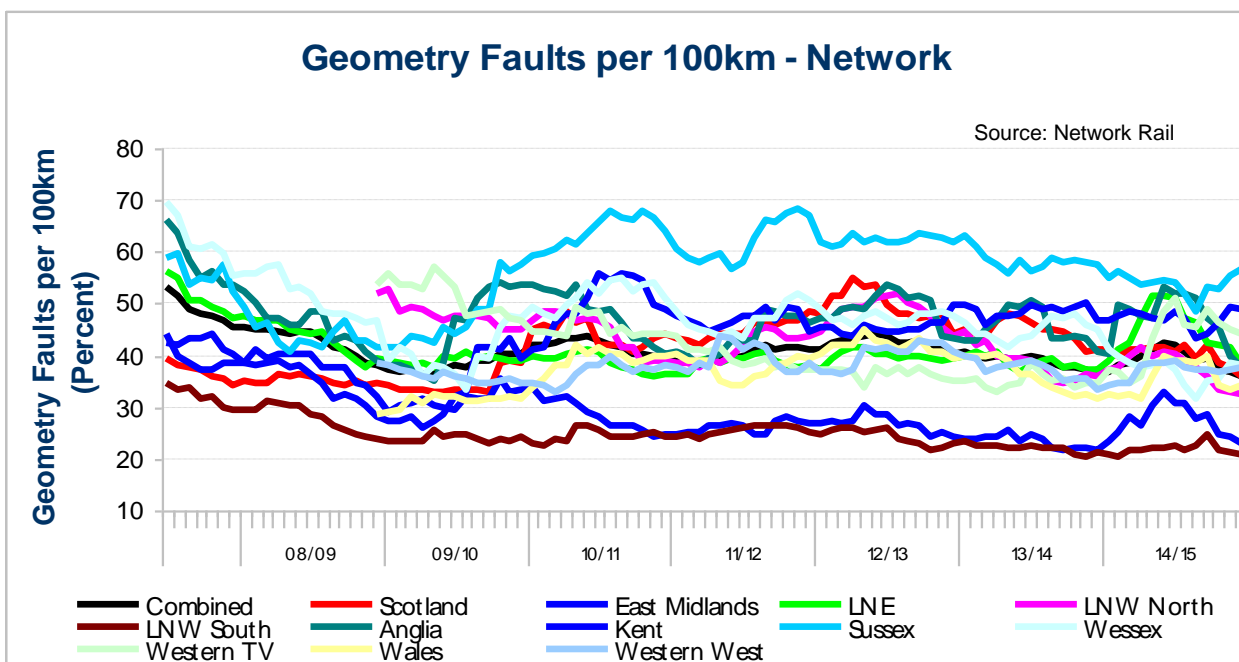
Source: Network Rail.

Train derailment risk is also influenced by discrete track geometry faults that present site-specific potential derailment risks if not properly managed. Their performance has been relatively stable since 2009-10 – *see chart above.*

Numbers of intervention and immediate action level track geometry faults were at their lowest levels under the current recording process. The trend is now below the end of CP4 (2009-14) target we set. However, absolute levels between some routes have varied. The overall trend has remained broadly stable: it peaked around period 6 and then declined.

Mainline repeat track twist faults, 2011-12 to 2014-15

The trend in track twist faults, a particular type of higher risk track geometry fault, declined 12% nationally. It increased marginally on Kent, Sussex, and Western routes. Levels of 'repeat twist fault' - where initial work to rectify track twist faults failed - were stable, but varied between routes. We took targeted enforcement on this in 2013.

Levels of repeat twist faults increased slightly. Nearly half of all track twist faults involved repeat track twist events.

Source: Network Rail
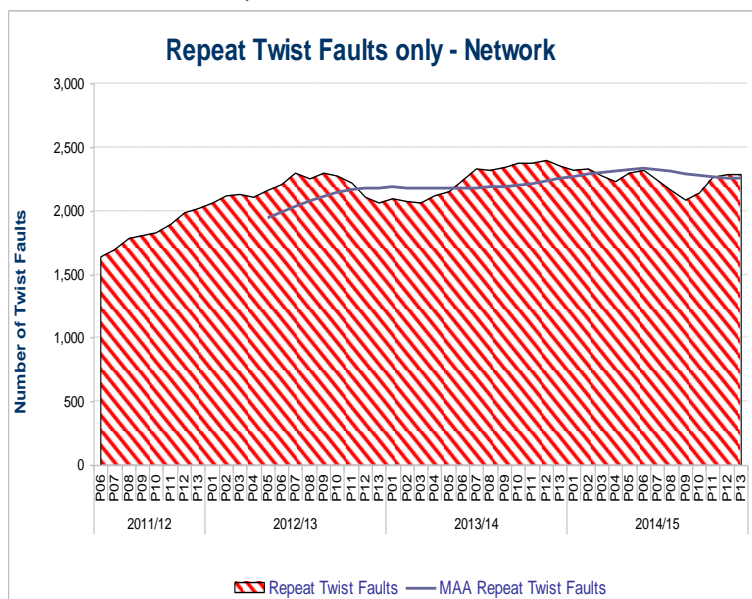
Network Rail has reduced the number of track twist faults and other track geometry faults, but has struggled to reduce repeat twist fault numbers – *see chart above.*

The under-delivery of maintenance and renewal activities and continued focus on short-term fixes, rather than longer term solutions can lead to increasing maintenance and renewal backlogs. These increase pressures on degraded assets, on potential catastrophic risk and on people to reliably and repeatedly implement processes to identify and correct faults.

Over Control Period 5 (2014-19), Network Rail has set itself efficiency target challenges which require significant annual savings - maintenance savings greater than have ever been required. Any further infrastructure renewal deferrals, plus the pressures from a growing railway, will only add to the demands on maintenance arrangements and the potential to increase risk.

We are challenging Network Rail to provide us with assurance of how their delivery units plan to manage the potentially elevated levels of risk, including any appropriate remedial action. Our multi-disciplinary track safety team continue to monitor track geometry trends closely. We will enforce if we find evidence of deteriorating risk control.

Suicide and trespass

Suicides

Dealing with suicides is a difficult and sensitive matter for all involved. There were 293 suicides, a 5% increase on 2013-14, the highest number ever recorded and 38 major injuries. These caused 600,000k delay minutes. The trend aligns broadly with 4% increase in the suicide rate nationally compared to 2012. Around 4% of all suicides in Britain occur on our railways and involve a high number of men aged 30-55. Around 11% of railway suicides occur at level crossings. There were 21 suicides on London Underground, down four on 2013-14.

Workforce days lost due to the impact on staff from dealing with suicides reduced to around 26,000 days lost.

The mainline industry has shown considerable and commendable leadership and concerted efforts, including working closely with the Samaritans[27], to prevent railways suicide and reduce their impact on the workforce and other witnesses.

This has included front-line staff being trained in active suicide prevention work, enhanced post-incident support for the railways workforce and other witnesses, and responsible media reporting. For example, 848 interventions were made by the railway workforce, including BTP officers, in 2014-15 to prevent events that may have led to a suicide.

Source: RSSB

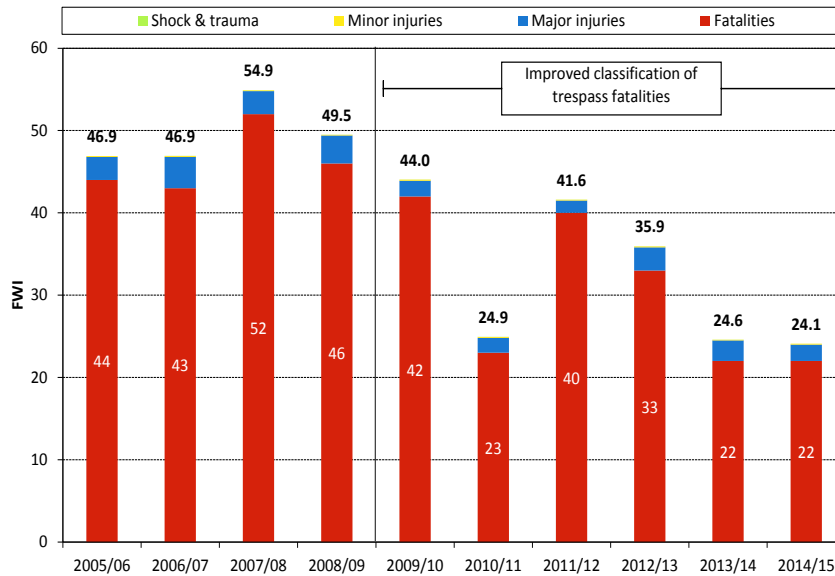### Trends in suspected/confirmed suicides since 2005-06
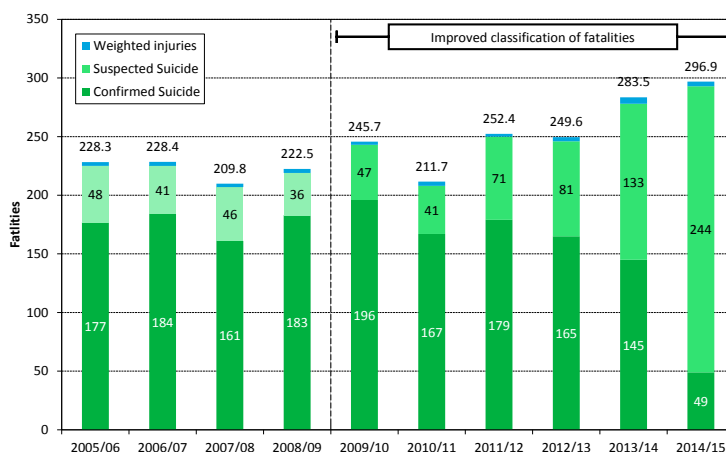
Trespass

There were 22 trespass fatalities, the same as in 2013-14 - the second lowest total for a decade. Two of these included passengers who went on to the track to change station platforms, one was electrocuted and one was hit and killed by a train.

Trespass represents around 30% of the overall harm to the public on the mainline railway. Reported levels of trespass increased slightly in 2014-15. The categories and proportion of harm to railway trespassers over the last five years are 70% being hit by a train, 15% by electrocution and 10% involved a fall from height.

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[27] http://www.samaritans.org/your-community/reducing-railway-deaths-0/samaritans-and-network-rail-partnership

Trends in trespass harm since 2005-06

As reported in our 2013-14 report, at least part of the lower level of trespass incident reporting is due to the provision of enhanced incident data from the BTP going back to 2009-10.

Nonetheless, this highlights that the industry's more recent work to better control infrastructure access is proving effective.

Source: RSSB

Vandalism

Reported vandalism levels have declined 62% over the last decade. It continued to decline over 2014-15, but there were increases in 'obstructions on the line' and 'missiles thrown or fired' at trains in early 2015. The costs of dealing with cable theft are now at their lowest for six years. Cable theft costs the industry around £2.5m and 37,000 service delay minutes – a significant reduction on the peaks of 2010-12.

Level crossings

To date, Network Rail has closed 25 crossings using approximately £1m of the CP5 allocation funding to achieve approximately 4% risk reduction. Network Rail closed a total of 118 level crossings and made nine crossing downgrades in 2014-15 using its own funding.

There have been lower rates of level crossing fatalities since 2010. There were 10 level crossing fatalities, up two on 2013-14. They included seven pedestrians, one cyclist and two road vehicle users at footpath, automatic half-barrier and user-worked crossings. None of these events led to enforcement. There were also five major injuries and 52 minor injuries reports at level crossings.

The trend in level crossing fatalities, 2005-06 and 2014-15 (excluding suicides)

There were seven collisions between trains and cars at level crossings over 2014-15, down three. As a proportion, pedestrian level crossing fatalities have increased over the last decade, 75% of crossing fatalities have involved pedestrians.
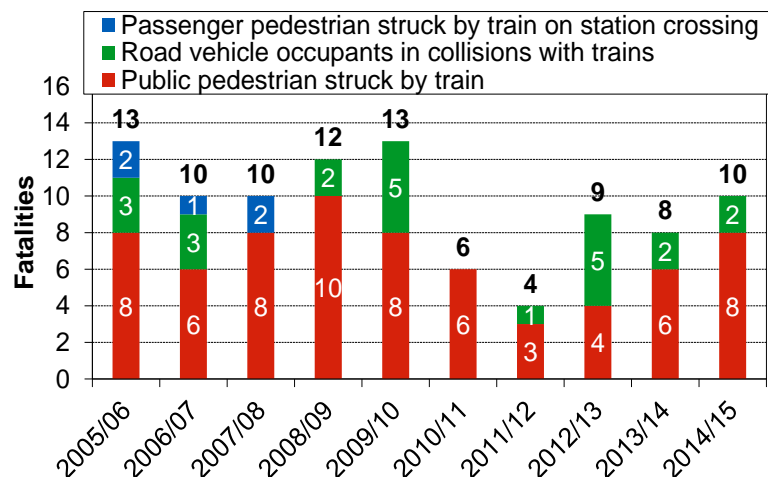
Source: RSSB.

Vehicles and objects on the line

There were 57 recorded vehicles on the line, an increase of 13 reports. Of those, 65% involved vehicles crashing through railway boundary fences; a trend that increased 61% in 2014-15. None of the 57 incidents resulted in a collision between the vehicle and a train. There was a significant increase in objects obstructing the railway line with 696 incidents, up over 150%. There was an increase in train collisions with animals with 304 incidents, up 13% on 2013-14.

Bridge strikes

There were 46 serious and potentially serious bridge strikes, up 11 or 24% on 2013-14. This is likely to form part of a wider trend in large vehicles using inappropriate routes.

Our assessment of the mainline SMIS data and its quality

Our use of mainline data

Some of the data in this report is provisional and may be subject to future change. For example, the cut off point for the Safety Management Information System (SMIS) data provided by RSSB was 28 April 2015. SMIS is the mainline railway's national database to collect safety-related events. It is mandatory for mainline railway infrastructure managers and train operators and others to record relevant safety incidents. Where available, data has been provided using both actual and normalised harm formats.

Our safety statistical release

Data within this report may differ from those due to be published within our safety statistical release[28] in September 2015. This also combines data from both mainline and non-mainline operators.

Data quality

In 2014, the mainline industry's national data quality score was 92%, up from 88% in 2013. This reflects a general improvement in the quality and timeliness of SMIS data entry across the industry. We monitor RSSB's annual quality health check closely to make sure the quality of data it collects and uses, including for its safety risk modelling, is reliable and robust.

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[28] http://orr.gov.uk/statistics/published-stats/statistical-releases
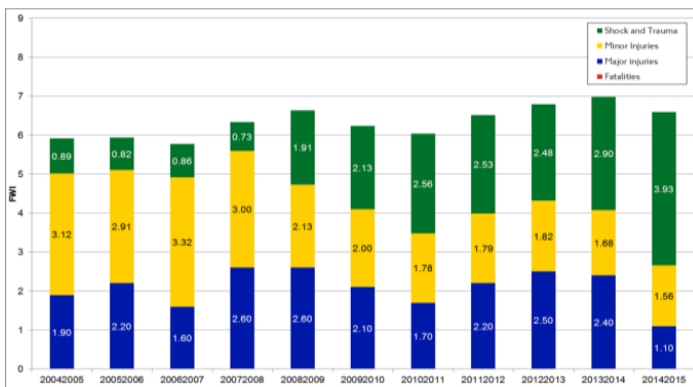
Transport for London

Passenger harm on London Underground
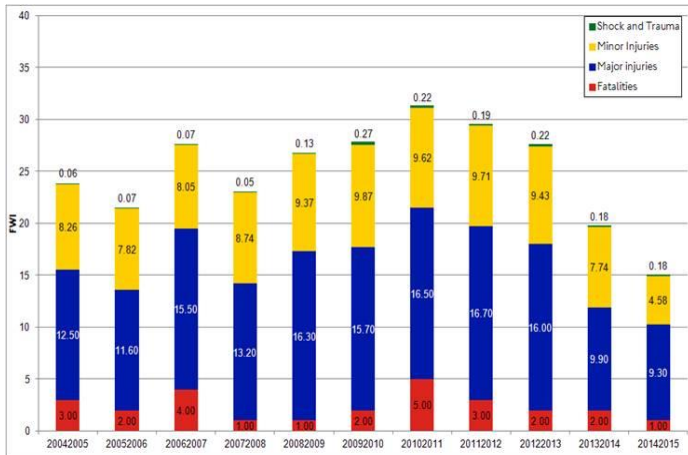
Harm to London Underground (LU) passengers continued to decline, due to slight reductions in fatality and major injury harm; and a more significant 41% reduction in minor injuries to passengers.

Source: London Underground

Trend in harm to London Underground's workers since 2004-05

Overall harm to LU workers declined slightly. A notable increase in the 'shock and trauma' category (in green) reflects specific LU's staff roles. For example, revenue protection officers' experiences of assaults by passengers and train operators' experiences of suicides and suicide attempts involving their trains.

Source: London Underground

Trend in harm to London Underground's infrastructure workers since 2004-05
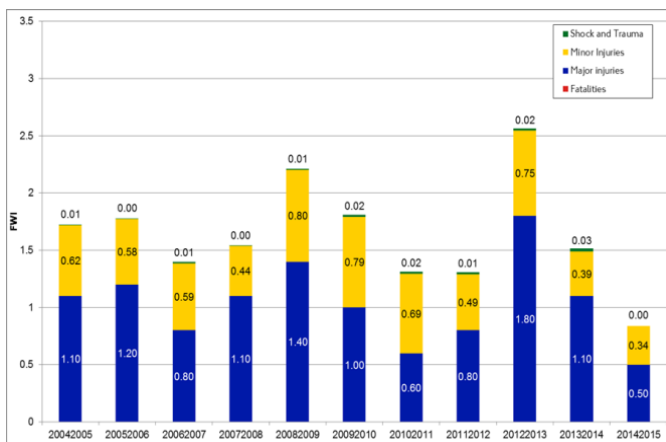
Major and minor harm to LU infrastructure workers harm is at historic lows, but compared to the mainline, the risks are different. It only manages 420kms of track, which is maintained and renewed during its 1am-5am engineering hours, when it is closed to passenger.

Source: London Underground.

Tramways

Tram operator collisions with motor vehicles, 2010-11 to 2014-15

Tram operator	2010-11	2011-12	2012-13	2013-14	2014-15	Totals
Blackpool Tramway	-	-	1	-	1	2
Croydon Tramlink	-	1	1	2	11	15
Edinburgh Trams**	n/a	n/a	n/a	n/a	7	7
Manchester Metrolink	1(*)	-	1	6	29	37
Midland Metro	-	-	1	-	1	2
Nottingham Express Transit	-	1	6	-	18	25
Sheffield Supertram	-	2	-	-	14	16

*Edinburgh Trams opened for services on 31 May 2014.
**plus one low-speed collision with another tram at a platform. Slippery rails were believed to have been a causal factor.

For a detailed discussion of the reason underlying the apparent rise in reported train collisions with cars are see pages 21-22.

On-tram passenger incidents

There's a low levels of incidents causing harm to passengers on board trams. There were 11 on Sheffield Super Tram, two on Croydon Tramlink, one on Manchester Metronet and one on Midland Metro in 2014-15.

Tram operator collisions with pedestrians, 2010-11 to 2014-15

Tram operator	2010-11	2011-12	2012-13	2013-14	2014-15	Totals
Blackpool Tramway	-	-	-	-	1	1
Croydon Tramlink	1	2	1(*)	-	-	4
Edinburgh Trams	n/a	n/a	n/a	n/a	-	0
Manchester Metrolink	1	-	1	-	6	8
Midland Metro	-	-	-	-	1	1
Nottingham Express Transit	1	1	-	-	4	6
Sheffield Supertram	1	-	1	-	1	3

*plus a relatively low-speed buffer-stop collision which damaged the tram's nose cone.

As noted earlier, UKTram is working with its members to improve the sector's data collection and standardisation around incidents and accidents. As this work progresses, we anticipate seeing more reliable data emerging from the sector.

Section 4 – Roles of key industry bodies

Office of Rail and Road* (ORR)	Railway industry duty holders
- enforces compliance with Health and Safety at Work Act and subordinate regulations for Britain's railways by: - setting railway-specific policy; - producing guidance; - inspection, audit and investigation or risk controls; - driving improvement through advice and formal enforcement; and - ensuring research is carried out. - ensures duty holders comply with processes which deliver system safety for the mainline railway; and - acts as Britain's National Safety Authority in Europe.	- duty to eliminate risk by: - conducting risk assessments; - implementing control measures within a Safety Management System (SMS) through setting safe systems of work, instruction, training, supervision, monitoring and review of the effectiveness of their controls; and - co-operating with other operators and parties. - licence condition requires railway group members (but only on the mainline) to join RSSB. Others, such as suppliers, can join voluntarily.
Rail Safety and Standards Board (RSSB)	**Rail Accident Investigation Branch (RAIB)**
- scope is the mainline railway; - manages railway group standards for interfaces (operational/performance benefits as well as safety); - supports the industry in securing health and safety by: - data gathering, analysis and risk modelling; - running the industry research, development and innovation programme; - encouraging and facilitating cooperation; and - providing technical expertise.	- independent investigation body for railway accidents/incidents; - has no enforcement powers; - produces reports with recommendations about preventing a reoccurrence; - can produce urgent safety advice; and - does not apportion blame or liability.

* as explained on page 4, ORR changed its name on 1 April 2015, but this will not formally take effect until later in 2015.

Rail Accident Investigation Branch

We continued to build our good working relationship with the Rail Accident Investigation Branch (RAIB) at all levels during 2014-15. RAIB's investigation managers regularly presented preliminary findings of their investigations to our inspectors as part of RAIB's consultation process.

We met RAIB and Network Rail together periodically over the year to exchange information on current issues as well as our regular high-level meetings with RAIB's senior executives. Our role is to influence and monitor actions, to consider and implement RAIB's recommendations and report action being taken to address each recommendation to RAIB within 12 months it being published.

In 2014-15, we received 22 RAIB reports containing 82 recommendations and reported to RAIB on 158 recommendations: 44 implemented[29]; 61implementation ongoing[30]; 52 in progress[31] when further information is available; zero non-implementation[32] recommendations; and one 'another public body' recommendation.

We reorganised our recommendations handling team on 1 April 2015 and agreed work to progress or reduce the number of outstanding older recommendations by March 2016. As part of this process, we held a series of workshops with Network Rail to identify:

- groupings of older recommendations that may be progressed or closed out due to new Network Rail's health and safety initiatives; and

- any areas of concern that can be addressed through closer working and/or changes in process.

At the end of 2014-15, we had:

- 75 recommendations less than 12 months old; and

- 142 recommendations where we had previously reported to RAIB that actions were in hand or incomplete information had been provided by recommendation 'end-implementers'. We will continue to work with 'end-implementers' to address this. We expect to update RAIB on these recommendations within the timescales advised. There are 43 recommendations reported as 'in progress' and 21 where implementation is still ongoing that are over two years old and 21 where implementation is still ongoing. We will continue to work with the industry to address these remaining recommendations.

Our relationship with RSSB

We participated as an observer at RSSB's board, which annually reviews mainline railway safety risks to passengers, the workforce and public[33]. RSSB's board annually reviews and reports on the completeness of the data it collects[34].

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[29] all actions were complete and the recommendation addressed fully.
[30] an appropriate action plan with completion dates was received from the end-implementer.
[31] discussions are on-going with the end-implementer to agree actions to address the recommendations.
[32] valid reasons have been accepted by us as to why the recommendations should not be subject to implementation.
[33] http://www.rssb.co.uk/spr/reports/pages/default.aspx
[34] http://www.rssb.co.uk/Pages/Main.aspx

We participated in a number of RSSB-facilitated groups focused on collaboratively managing risk effectively within the industry. They oversee, or make decisions about, the mainline industry's standards and research.

We use RSSB's safety risk and precursor indicator models, and their other periodic safety reports to help inform our view of the mainline industry's safety performance, including providing data for mandatory European reporting requirements.

Key documents RSSB published over 2014-15 included:

- overview of safety performance for 2014[35];

- the details of RSSB's new leadership team[36];

- Great Britain's Rail Safety Performance and Trends in 2013-14[37] and Learning from Operation Experience Annual Report[38];

- Great Britain's Rail Safety Performance and Trends in 2014-15 and Learning from Operation Experience Annual Report; and

- guide to the Great Britain mainline railway's platform train interface strategy, January 2015[39].

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[35] http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/SafetyPerformance-Overview-2014.pdf

[36] http://www.rssb.co.uk/Library/about-rssb/2015-02-26-press-release-senior-leadership-team.pdf

[37] http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2014-07-aspr-2013-14-full-report.pdf

[38] http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2014-07-loe-2013-14-annual-report.pdf

[39] http://www.rssb.co.uk/Library/improving-industry-performance/2015-pti-strategy-mind-the-gap-overview-document.pdf

Section 5 - Our policies and approach to health and safety regulation

Our regulatory approach

Our regulatory approach focuses on the business, commercial, and health and safety risks that may cause harm to employees, passengers and the general public. Health and safety is not an optional add-on, but a fundamental legal requirement – and it is good for business. The railway industry in Britain is made up of many businesses and we oversee them and how they work together to keep the railway system safe.

A business will be safe if its people manage risks effectively every day. This is best achieved by businesses having excellent health and safety management systems that coordinate their people and have processes to identify, assess and control risks effectively. Our role is to check that they do this and comply with the law.

To implement this regulatory approach we spend our time:

- setting objectives, outputs and expectations for health and safety duty holders;

- gathering evidence about their management of risks through our regular audits, inspections, investigations of incidents or complaints and monitoring of health and safety performance indicators, including reports by RAIB, RSSB, Transport for London, passenger groups, trade unions and the travelling public;

- using our evidence, taking an efficient risk-based approach to regulation through regular systematic reviews of our strategic risk priorities and enablers which enables us to target our resources on the right things;

- responding to health and safety incidents;

- using our powers and influence to help the industry work together to tackle common issues, such as staff competence, health management, and managing change;

- using appropriate enforcement tools to ensure duty holders take immediate action to deal with serious risks and are if necessary are held to account in the Courts;

- supporting the development of the legal framework in Europe; and

- preparing, as necessary, proposals for railway specific health and safety regulations and guidance; using our RM3 model (RM3) to help encourage businesses towards excellence in health and safety management.

We will not settle for a culture of complacency. We will always ask whether improvement can be made, but we recognise that the law sets minimum standards and that an excellent organisation is one that delivers compliance with the law efficiently and consistently. We encourage excellence, but will not enforce beyond the standard set down in law. If designed carefully at the outset, risks can be eliminated or reduced and a railway system is more likely to be operated and maintained safely and efficiently.

Our legislative policy and better regulation work

A sound legal framework and continuous improvement of our regulatory approach are vital if the industry is to achieve our vision for health and safety on the railway[40]. We are responsible for preparing proposals for railway safety regulations and to ensure these are accompanied by simple, clear guidance to support compliance.

Most railway safety law now originates from Europe and we work closely with DfT to ensure the UK has the appropriate framework of law and meets its obligations under European requirements.

Level crossing law reform

We have actively pursued implementation of the Law Commission's 2013 recommendations to reform level crossing law[41]. We are working with DfT to help secure this much needed reform.

Our health and safety policy work

In 2014-15 we:

- consulted on railway safety regulations[42] that cover the safety of certain operations on the railway, including train protection system;
- improved our policies and guidance on:
  - third rail DC electrification systems[43]
  - new level crossings in exceptional circumstances [44]
  - train driver licensing[45]
- implemented RIDDOR[46] requirements;
- developed an agreement to take enforcement responsibility for the prevention of road vehicle incursion onto the railway;
- began work to take enforcement responsibility for safety by design of new railway infrastructure; and
- revised the European common safety method for risk evaluation and assessment[47].

Our statutory functions:

Our proactive and reactive inspection work

Our inspectors spent 54% of their time carrying out proactive inspections that were targeted in line with our risk priority strategy[48]. Our inspectors spent 16% of their time responding to accidents, incidents and complaints from members of the public through their reactive inspection work.

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[40] http://orr.gov.uk/about-orr/what-we-do/our-vision-and-strategy
[41] http://lawcommission.justice.gov.uk/docs/lc339_level_crossings.pdf
[42] http://orr.gov.uk/what-and-how-we-regulate/health-and-safety/regulation-and-certification/railway-safety-regulations-1999
[43] http://orr.gov.uk/__data/assets/pdf_file/0017/17621/dc-electrification-policy-statement.pdf
[44] http://orr.gov.uk/__data/assets/pdf_file/0003/16527/rgd-2014-06.pdf
[45] http://orr.gov.uk/what-and-how-we-regulate/licensing/train-driving-licences-and-certificates
[46] http://orr.gov.uk/__data/assets/pdf_file/0010/2332/riddor-guidance.pdf
[47] http://orr.gov.uk/__data/assets/pdf_file/0006/3867/common_safety_method_guidance.pdf

[48] http://orr.gov.uk/publications/corporate-publications/health-and-safety-strategy

Safety certification and authorisation

We received and processed 17 ROGS safety certifications and authorisations[49]:

- three were non-mainline safety certificates and two authorisations; and

- 14 mainline certifications and authorisations, of which four were for part 'A' and three were part 'B' certifications, and seven applications for both parts A and B.

Train driver licences

We are processing train driver licences manually. We received 1,826 train driver licence applications and issued 1,574 applications in 2014-15. We have specified and will build an IT system to enable operators to submit applications remotely.

Our work in Europe

We support the development of a European framework which promotes market opening, and improves the railways' competitiveness, while ensuring that a robust safety regime is in place. To achieve these goals, our priorities in Europe continue to be:

- ensuring that safety management systems are at the heart of the European safety regime;

- encouraging proper implementation throughout Europe of the obligations and responsibilities in the Railway Safety Directive, and developing practical arrangements to deliver improvements envisaged in the fourth railway package; and

- developing working arrangements between national safety authorities (NSAs) to achieve a more harmonised approach to supervision and enforcement.

We have worked constructively with the European Commission and the European Railway Agency (ERA) throughout the year. Key aspects of our engagement included:

- leading an initiative by NSAs to work with ERA to prepare for the changes which will be introduced by the technical pillar of the fourth railway package. The changes will give ERA responsibility for issuing single safety certificates for cross-border operators, and for issuing vehicle authorisations for cross-border services. Applicants for domestic-only safety certificates or vehicle authorisations will have the choice of applying to the NSA of that country, or to ERA;

- assisting ERA to develop and introduce its Regulatory Monitoring Matrix, which examines railway safety regulation in a member state and how the systems set up by the Ministry, NSA and National Investigation Body work together; and

- influencing the development of changes to the common safety methods (CSM) on conformity assessment and supervision. These changes are designed to ensure a more harmonised approach by NSAs and to align the CSMs with industry's safety management systems and with the structure of International Organisation for Standardization (ISO) management standards.

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[49] http://orr.gov.uk/what-and-how-we-regulate/health-and-safety/regulation-and-certification/rogs

Our own plans for continuous improvement

We have used, and will continue to use, our own RM3-R model to help us to identify opportunities for continuous improvement in our own management systems.

The safety of the Channel Tunnel

We regulate health and safety of the Channel Tunnel and the companies that use it via the Channel Tunnel Intergovernmental Commission (IGC) and the Channel tunnel Safety Authority (CTSA) in close co-operation with our French counterparts. The key principles of our health and safety vision and strategy for the railway in Britain apply equally to the Channel Tunnel. We continue to provide leadership, expert advice and secretariat support to the Channel Tunnel's IGC and CTSA. Our inspectors are appointed to lead and deliver CTSA's inspection plan, which aims to provide assurance that Eurotunnel and train operators' management systems are capable of managing the specific risks associated with the operation of the Channel Tunnel. In the past year, IGC and CTSA have:

- commissioned an independent investigation into Eurotunnel's management of the causes and consequences of serious disruption incidents, following the serious fire of 17 January 2015;

- carried out a major study gathering evidence to improve how emergency evacuations are managed in the Channel Tunnel, and started working closely with Eurotunnel and train operators to implement the findings;

- been audited by a team from ERA, and agreed a plan to improve our processes, guidance and safety risk modelling following their recommendations; and

- completed an inspection plan that examined aspects of Eurotunnel's management of risk and train operators' management systems.

Annex 1 - Our enforcement activities

In most cases we secure improvements in health and safety for passengers, the workforce and public through evidence-based advice and encouragement to duty holders to improve and adapt their risk management. But occasionally we use our formal powers to ensure compliance with the law or deal with immediate risk. Mostly, we use enforcement notices to stop an activity involving serious risk or to rectify serious gaps in risk control. Our enforcement policy statement[50] sets out how we ensure rigour and consistency in our enforcement decisions by using our enforcement management model.

Improvement notices in 2014-15 (the full list is available on our website[51])

We served 17 improvement notices - 13 on Network Rail, two on its contractors, one on TfL and one on Tyne and Wear Metro. We served five more improvement notices on Network Rail compared to 2013-14. The reasons for our notices – the first 10 of which had potentially network-wide implications, included:

- unsuitable and insufficient consideration of safety by design controls for Network Rail's Western infrastructure enhancements (one at Swindon and one at Reading);
- poor delivery, storage and redistribution of work and maintenance equipment within Network Rail's Stafford maintenance delivery unit;
- failure by Network Rail to implement safety control measures at facing points (notice served under ROGS);
- insufficient risk assessment at Network Rail's Carlisle delivery unit, particularly the management of off-track teams' pre-work briefings;
- under-resourcing of maintenance and renewal arrangements to prevent derailment risks at Network Rail's Bristol delivery unit;
- failure by Network Rail nationally to implement maintenance and repair controls to ensure the safety of points;
- poor management of substances potentially hazardous to health at the Wales and Western delivery units (but relevant to Network Rail's delivery units nationally);
- failure by Network Rail to provide suitable and sufficient risk assessment following the collapse of a signal across the Western mainline following signal post corrosion. Our notice had relevance across the whole Western route;
- insufficient bridge parapet heights, despite Network Rail's previous commitments, to protect risk from overhead line electrical equipment;
- insufficient risk assessment and plans (two notices) by Network Rail to manage the presence of asbestos at Euston station;
- poor management which led to the manual handling of heavy signal cable 'troughing' by Network Rail employees; and
- insufficient procedures to assess the presence and locate any live electrical services by H.S. Carlsteel Engineering Limited and Amalgamated Construction (a Network Rail principal contractor) at Poulton-le-Fylde, near Blackpool.

Our other non-mainline improvement notices were on:
- DB Regio's ineffective platform train dispatch procedures on the Tyne and Wear Metro;

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[50] http://orr.gov.uk/__data/assets/pdf_file/0016/5650/hswa-enforcement-policy-statement.pdf
[51] http://orr.gov.uk/publications/notices/legal-notices/improvement-notices

- poorly planned lifting arrangements at London Underground's Ruislip depot.

**ORR's improvement notices, 2009-10 to 2014-15**
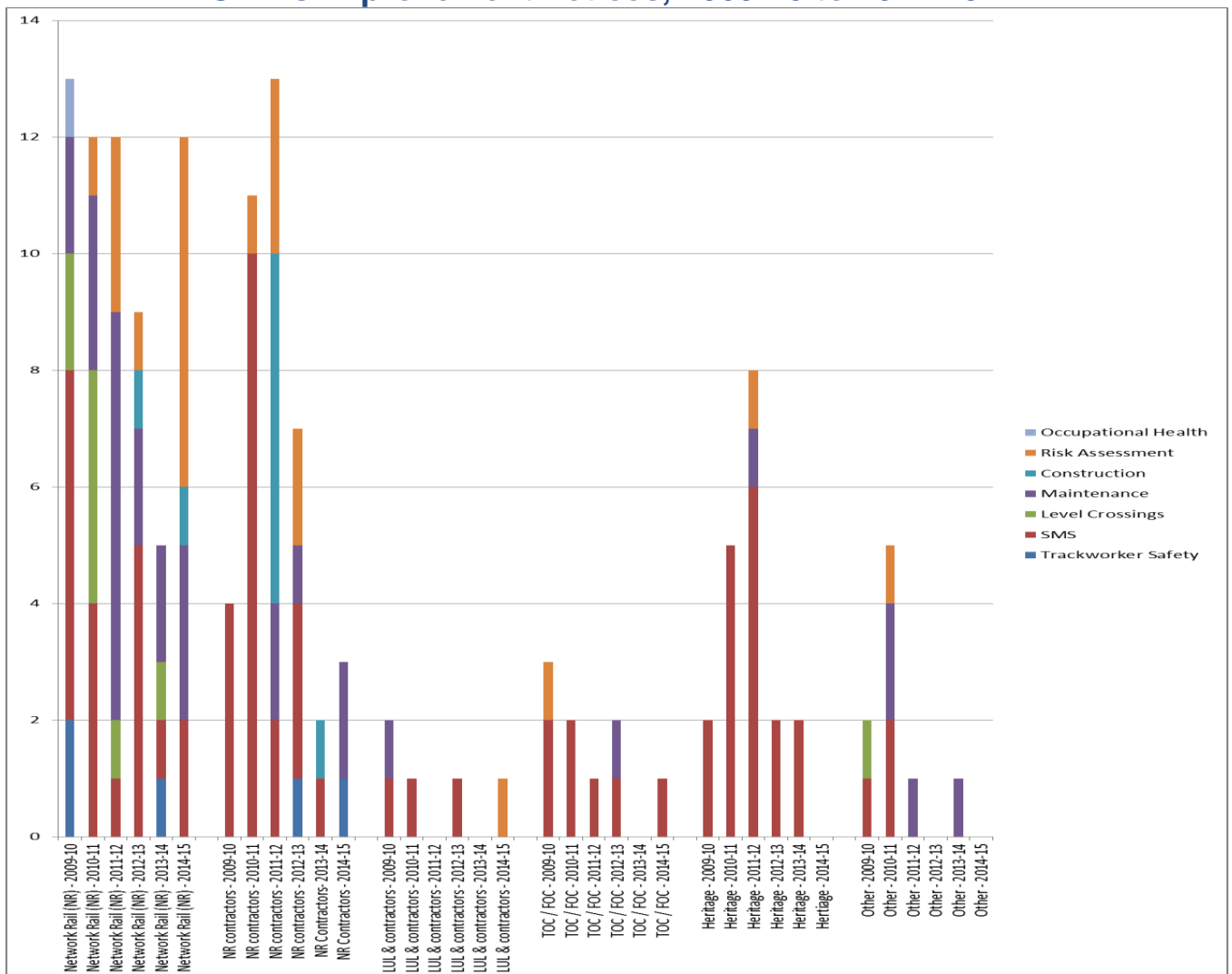
Source: ORR

Prohibition notices in 2014-15 (the full list is found on our website[52])

We served 10 prohibition notices, two are currently subject to appeal and therefore not included in the above chart. Of the other eight: one was served on Network Rail and another on its contractor, one on a train operator and another on their depot contractor, one on a metro operator, four on London Underground and one on a county council. The 10 prohibition notices were double the figure in 2013-14. The reasons for our notices included:

- failures to manage working at height and to set up scaffolding safely;
- failure to manage risks from working with or from electricity sources; and
- failure to manage manual handling risks.

[52] http://orr.gov.uk/publications/notices/legal-notices/prohibition-notices

ORR's prohibition notices 2009-10 to 2014-15
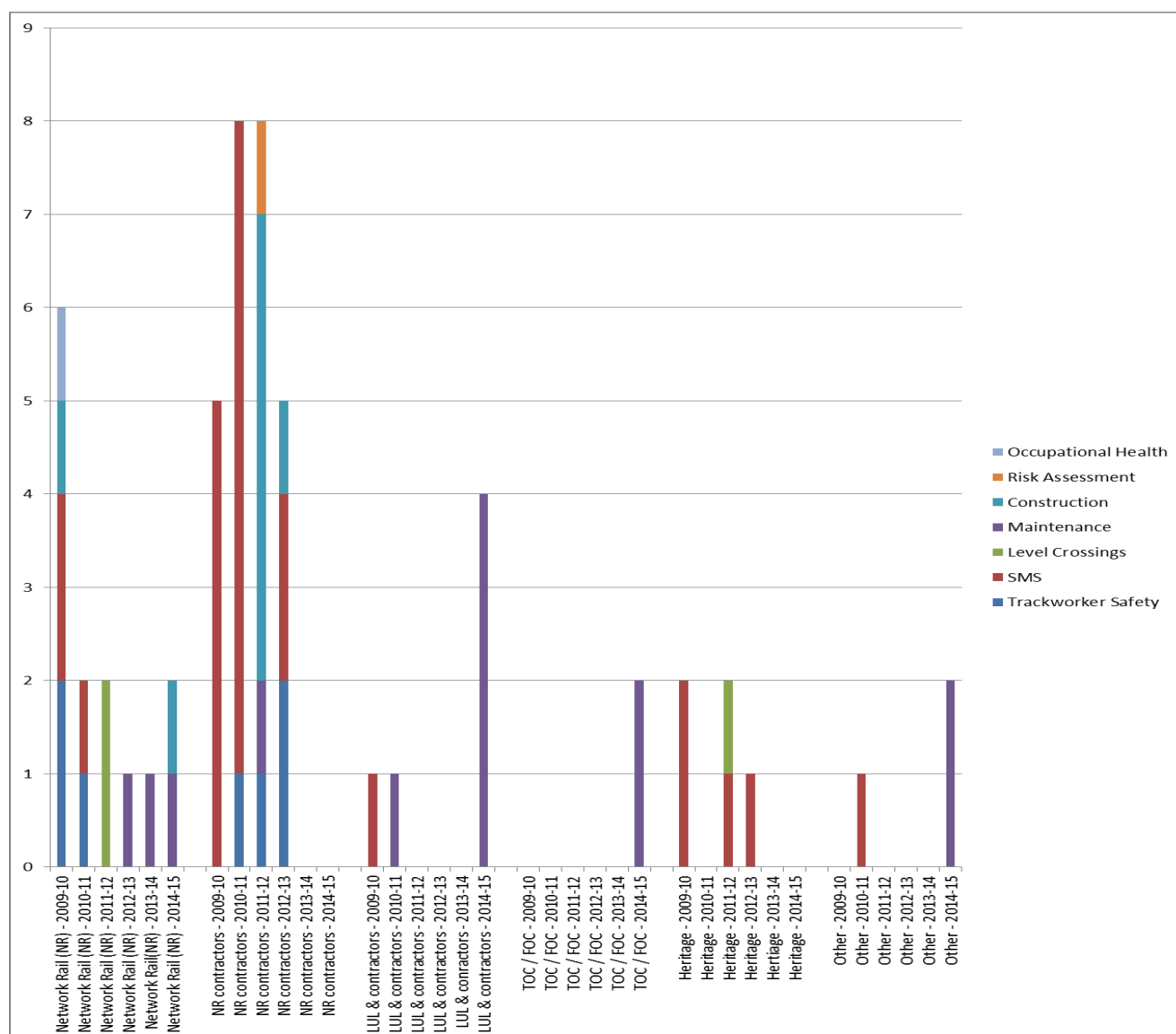
Source: ORR

Review of our enforcement in 2014-15

Of the 27 notices we served in 2014-15, two were appealed. A significant amount of our enforcement focused on what are essentially basic and preventable construction work issues, resulting from weaknesses in health and safety management by Network Rail and its contractors. Specifically this was around the management of asbestos/control of substances hazardous to health, working at height, working with electricity, lifting operations, manual handling, the poor planning of maintenance activities and storage of equipment.

We served five enforcement notices on London Underground around working at height, scaffolding set-up, lifting operations and working with electricity (including sub-surface cables) in a switch gear room.

Prosecutions in 2014-15

In England and Wales, we completed four successful prosecutions against eight defendants with a total of £690k fines - *see table below.*

The defendants were: Balfour Beatty, SW Global Resourcing Limited, BAM Nuttall Ltd and a former First Capital Connect train driver.

Prosecutions this year were related to: failure to manage risk from working with electricity, working at height, lifting operations and a failure follow the rules when driving a train.

England, Wales and Scotland		
Defendant	**Incident**	**Fine**
Balfour Beatty	A railway worker received a severe electric shock and was burned seriously (45% burns) after coming into contact with overhead lines while working at height using a cherry-picker to install overhead line cables near Cricklewood in March 2011.	£350k
SW Global Resourcing Limited	An employee using a mobile elevated work platform positioned on temporary concrete plinths to provide a level work surface but without edge protection. The mobile elevated work platform drove off the edge of the plinth and overturned, throwing the employee 40 feet on to the shallow river bed below at Annick Water Viaduct, Stewarton, Ayrshire, in 2010. He died from his injuries.	£200k
BAM Nuttall Ltd	A heavy beam toppled onto a worker during an unloading process, which resulted in him losing one leg and receiving severe damage to other limbs at Pouparts Bridge, between Clapham Junction and Battersea Park in South London in 2010.	£140k
a former First Capital Connect train driver	A former train driver failed to follow safety rules, including continuing after a SPAD without checking with the signaller that it was safe. He also failed to set up his GSM-R radio correctly before setting off on his shift. The driver received a three months suspended sentence and was ordered to pay £500 costs.	n/a
	Total	**£690k**

Annex 2 - Glossary

Abbreviation	Definition
CCTV	Closed-circuit television.
CIRAS	Confidential incident reporting and assessment system; an industry funded but independent system which enables workers to 'whistle-blow' confidentially.
CP4/5	Control period 4 (2009-14) and control period 5 (2014-19): the usually five year period in which ORR reviews and sets track access charges and Network Rail's funding and output levels.
Cyclic-top	Poor track geometry can lead to and amplify a side-to-side wobble in the train movements which can cause, or be a factor in, train derailments.
FOC	Freight Operating Company.
FWI	Fatality and Weighted Injury index: the common way of measuring harm to people on Britain's mainline railways. The fatalities and weighted injury ratio used is: one fatality = 10 major injuries = 200 class 1 minor injuries (where the injured person is taken directly to hospital) = 1,000 class 2 minor injuries = 200 class 1 shock and trauma injuries = 1,000 class 2 shock and trauma injuries.
HAVS	Hand Arm Vibration Syndrome.
HLOS	High-level output specification: the government's statement of the additional outputs it requires from the Network Rail over the next five years.
OH	Occupational health.
ORR	Office of Rail and Road, as of 1 April 2015: the economic regulator of Britain's mainline railway and health and safety regulator on all Britain's railways. It also monitors England's Strategic highways network. It was previously the Office of Rail Regulation.
PIM	Precursor Indicator Model: models accident precursor trends on Britain's mainline railway.
PTI	Platform-train interface: the gaps both in terms of width and height between a station platform and a train. It also includes risks from electrocution and falls from platforms without trains being present.
RM3	Railway Management Maturity Model: the tool we use to assess an organisation's ability to achieve excellence in controlling health and safety risks.
RRV	Road-rail vehicles: vehicles which can operate on rails and conventional roads.
RSSB	Rail Safety and Standards Board: a body by and for the mainline industry, involved in understanding and modelling risk (see SRM and PIM), guiding standards, managing research and development and industry collaboration.
SMIS	Safety management information system: the system managed by RSSB that Britain's mainline railways uses to report safety information.
SMS	Safety Management System.
SPADs	Signals Passed at Danger: where a train passes a red signal without permission and runs the risk of compromising safety.

Abbreviation	Definition
SRM	Safety Risk Model: models the long-term risk trends on Britain's mainline railways and is recalibrated periodically to take account of the harm caused by incidents.
TfL	Transport for London.
TOC	Train Operating Company.
TPWS	Train Protection and Warning System: a system that automatically activates a train's brakes if it passes a signal at danger, or is over-speeding (at selective sites), or to prevent risks of buffer stop collisions.
WSF	Wrong Side Failures: incidents where for various reasons the railway's safety is compromised in some way.

Use of the name, the Office of Rail and Road, reflects the new highways monitor functions conferred on ORR by the Infrastructure Act 2015. Until this name change is confirmed by legislation, the Office of Rail Regulation will continue to be used in all documents, decisions and matters having legal effects or consequences.