

Health and safety report 2013-14



OFFICE OF RAIL REGULATION

July 2014



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Foreword

Britain's railways have a good recent safety record. They remain one of the safest in Europe. As we enter the new control period, we can look back and see that passenger and workforce risk decreased during the five years of the last control period (CP4: 2009 to 2014). The industry deserves credit for this improving picture and our health and safety teams have played a part – we devote close to half our resources to health and safety work. We have always been clear that better health and safety management on Britain's railways is integral to plans to expand and strengthen the industry.

This 2013-14 annual report on the state of health and safety in the industry also makes clear there is some way to go before we rate this as 'excellent' and achieve our ultimate goal of zero industry-caused fatalities. This report highlights areas where risks to passengers and workers may be on the increase. Against a backdrop of plans for significant expansion over the next five years, neither the industry nor its regulator can afford to be complacent about safety management.

Growth can intensify safety challenges. More trains running and more passengers travelling on the rail network means greater potential for an increase in risk. Overall we are seeing the decline in total risk over recent years on the mainline network is beginning to plateau, and that in some cases rise. Our report highlights increases in the number of trains passing signals at danger, the numbers of passenger slips, trips and falls at stations, and an increase in work-related injuries. Network Rail must also do more to get the basics right on their existing infrastructure – things like increasing repeat track faults and earthworks too overgrown to be inspected effectively are not good enough.

Our inspection activity over the coming year will be focused on ensuring the industry manages growth safely, including a targeted programme on station management. There are many examples of safety excellence on Britain's railways and we want to see the industry sharing best practice more often. For example, London Underground's management of stations is world class, and there are lessons to be learnt from its effective approach to managing busy stations and platforms.

We are determined to see better workforce safety. Network Rail's record is poor compared with other sectors, including other parts of the railway industry and we expect a major improvement. We will continue to work closely with the company and enforce changes where necessary to ensure that this is effectively managed. We are saddened to report on the deaths of three mainline track workers this year. We welcome the focus of Network Rail's new chief executive on prioritising worker safety over the coming year. Leadership is critical to securing better safety standards.

Safety culture remains key and we are seeing evidence that organisations using our railway management maturity model (RM3) to gauge how well they are operating their safety

management systems are focusing on the right areas to improve their management of risk. We are currently pressing the railways to predict and prevent problems on the network before they create a safety problem or cause disruption for passengers. This is the surest way to secure safety and growth.



Richard Price

Chief Executive, ORR



Ian Prosser

Director of Railway Safety, ORR

Section 1 - Director of Railway Safety's overview

In many ways we have seen positive improvements to health and safety on Britain's railways in 2013-14. The risk from train accidents reduced over the year and for the seventh consecutive year there were no related passenger fatalities. The level of harm to passengers from all types of accidents declined. The number of trespass fatalities decreased in 2013-14. For the first year since records began there were no passenger train derailments. There were also no industry-caused fatalities on Transport for London's managed infrastructure. These are all welcome developments.

However, our assessment of the overall mainline system risk over 2013-14 shows that the improving trend over the last few years has slowed – it was static over the period covered by this report. Similarly, the industry's level of management maturity over 2013-14 showed only gradual improvements. We are some way from excellence in health and safety management and a mature risk control and asset management culture.

This report shows a mixed picture of actual and potential injuries to people across the industry. It is with great sadness that we should look back on a year where three mainline track workers lost their lives while at or travelling from work. These tragic events were avoidable. We have also seen an increase in the risk to mainline infrastructure workers.

Set against this, we have seen reductions in risk to passengers and the wider public according to industry-measured risk, using the fatality and weighted injury (FWI) index, a weighted way of measuring actual harm. In 2013-14 we saw that:

- passenger harm reduced 9%; and
- harm to the public (excluding suicides or suspected suicides) reduced 28%.

However we have seen increases in workforce and infrastructure worker harm:

- workforce harm increased 10%; and
- infrastructure worker harm increased 22%.

There are particular risk areas from across the sector which this report highlights:

- **station safety:** the industry has worked hard to make getting on and off trains safer over the year, but overall harm to passengers at the interface between the platform, train and track increased. Longer-term station management and engineering solutions will help, but as passenger numbers grow and station improvements continue this remains a risk management priority in the short-term;

- **signals passed at danger:** the number of signals passed at danger (SPAD) on the mainline network has increased – in some categories to a seven year high but overall level of SPAD risk has remained broadly static. We continue to challenge train operators’ driver management processes and their approach to upgrading train protection systems, to reduce the risks from SPADs;
- **mainline workforce safety:** the trend in infrastructure worker FWI harm is now at its highest-level for seven years. We have taken, or are in the process of taking, enforcement action where appropriate. Progress to introduce new technology to remove or reduce such risk has been too slow. Duty holders clearly need to improve the management of occupational road safety and initiatives to achieve this are discussed later in this report – *see page 14*;
- **occupational health:** industry improvements were made during the course of our 2009-14 occupational health programme but part of the industry’s management of occupational health remains worse than comparable sectors. Leadership and policy improvements made at senior management-levels have yet to filter down and drive on-the-ground improvements;
- **infrastructure risk:** Network Rail’s management of infrastructure risk showed some evidence of improvement but not in all areas. We took enforcement action because we found evidence of weaknesses in some asset management areas, such as increases in the proportion of repeat track twist faults and electrical earthing of signal cabinets;
- **level crossings:** risk reduction continues to improve with a 12% reduction in FWI harm. However, the proportion of fatalities at pedestrian user-worked crossings increased in 2013-14, showing the need to improve user understanding. We found that Network Rail’s new dedicated crossing managers have contributed to the overall improvement in risk management by delivering better individual crossing risk assessments; and
- **safety-by-design:** our enforcement action in April 2014 identified underperformance by Network Rail in seizing risk removal and reduction opportunities. The industry is some way off the pace compared to other sectors, such as the UK petro-chemical industry, in considering if risks can be reduced or removed at the project design stage. The large programme of renewals and enhancements across CP5 provides a significant opportunity for the industry to address this and we aim to ensure duty holders consider safety-by-design as a matter of course.

Our determination for CP5 set aside specific funding for Network Rail to address key mainline safety issues on worker safety, civil structures, and level crossings. It is now up to the sector to deliver.

Suicide prevention is an area where Network Rail, has shown strong leadership collaborating closely with other partners including the Samaritans. Therefore, it is with sadness that I note

the total of trespass, suicide and suspected suicide fatalities reached their highest-level for over a decade – even though this aligns broadly with national and international suicide rates.

Transport for London has maintained a high-level of safety for its passengers and workforce as passenger numbers and services grow. However, we found only marginal improvements in risk management maturity. Passenger congestion at stations continues to pose a significant challenge as the Tube's modernisation programme progresses.

We continued to discuss health and safety matters with the railway's trade unions at our liaison meetings throughout the year. The front-line insight and perspective they provide forms part of our overall evidence picture for the industry and helps set our improvement priorities.

We have responded to the risks highlighted in this report by establishing four dedicated Network Rail-focused teams in 2014-15 to look at: level crossings; track; civil structures; and electrical and workforce safety. These align with the safety-targeted funding included in our final CP5 determination¹ to: improve the protection and warning provided to those on or about the track, taking of electrical isolations, introduction of better and safer road-rail vehicles and continued level crossing safety risk reductions. Our train operator, metro, heritage, and Transport for London (TfL) teams are focused on their specific key risk areas such as station, passenger and workforce safety.

ORR resources: over 2013-14 we utilised 132 full-time equivalents to discharge our health and safety responsibilities to deliver of strategic objective of driving for a safer railway (46% of our total office resource)².

We will continue to monitor the changing profile of the risk landscape and reflect any changes to our approach in our strategy for regulation of health and safety risks³ and future business plans, in order to deliver our 'drive for a safer railway' overall strategic objective.

Finally, I want to pay tribute to Bob Crow who led the National Union of Rail, Maritime and Transport Workers for over a decade and his dedication to improving railway safety until his untimely death on 11 March 2014. On a happier note, I want to record the richly deserved awarding of an M.B.E to Tina Hughes in the recent Queen's Birthday Honours' list. Tina's daughter Olivia Bazlington and her friend Charlotte Thompson were killed when struck by a

¹ <http://orr.gov.uk/what-and-how-we-regulate/regulation-of-network-rail/how-we-regulate-network-rail/periodic-review-2013/pr13-guide>

² See our 2013-14 business plan at: <http://orr.gov.uk/consultations/policy-consultations/closed-consultations/closed-consultations-2013/orr-business-plan-2013-14-consultation>

³ <http://orr.gov.uk/publications/corporate-publications/health-and-safety-strategy>

train at Elsenham station crossing in 2005. Hearing Tina speak about her personal experience of that incident is undeniably moving and her important work with Network Rail has demonstrably helped to make Britain's level crossings safer.



Ian Prosser

Director of Railway Safety, ORR

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

Introduction

In this section we look at each duty holder in turn. We give an overview of ORR's key findings divided by risk area and we set out the evidence leading to our conclusions on duty holders' effectiveness at managing risk in that area.

We cover:

- mainline: Network Rail, train and freight operating companies;
- London Underground and other London Transport Companies;
- heritage railways; and
- tramways.

Mainline: Network Rail

Management maturity

Overview: Network Rail is currently heavily regulated because its health and safety management systems are still developing. Similar high-hazard sectors are less heavily regulated because they have a mature safety management culture. Successes, such as reducing risks at level crossings, show that with the right leadership Network Rail can manage risk maturely, but as our enforcement action shows – see *annex 1* - we still find significant examples of failures to recognise and act quickly to control risk effectively. Network Rail's corporate safety audit process has begun to look at individual risk areas from basic principles rather than just checking standards compliance. This can have an important role in driving safety leadership.

Network Rail's recent in-depth reviews have helped develop a better understanding of specific risk areas, their causes and how effectively they are being managed.

Evidence: our 2013-14 inspections and interventions, using our RM3⁴ management maturity model, found a slight improvement in duty holders' overall scores compared to 2012-13.

Our interventions found some improvements in safety culture and safety leadership; positive improvements in the management of risks associated with level crossings; in managing

⁴ Available at http://orr.gov.uk/_data/assets/pdf_file/0013/2623/management-maturity-model.pdf

earthwork risks; and in responding to severe weather. However, our work found too many cases where the performance and efficiency target focus of people's day jobs eclipsed the delivery of safety.

We found evidence of a lack of consistent and robust safety leadership. The slow pace of change means many long-standing issues remain around the quantity, complexity and resourcing of initiatives to drive health and safety improvements.

We found evidence of under-performing change management processes. Projects and initiatives are insufficiently embedded or evaluated to ensure risks are managed effectively.

Level crossings

Overview: level crossing safety continues to improve with a 12% reduction in the level of FWI. This momentum must be maintained, including improving users' understanding of the risks, especially at pedestrian user-worked crossings where there was a proportionate increase in fatalities in 2013-14.

Network Rail's new dedicated crossing managers have improved individual crossing risk assessments in 2013-14. Network Rail closed a total of 804 crossings and achieved a 33% reduction on a normalised basis in CP4 compared with CP3; and is funded to reduce level crossing risk further in CP5.

Evidence: at the start of 2013-14, Network Rail successfully recruited and trained over 100 level crossing managers to proactively inspect and provide customised risk assessments at individual crossings – an area we had previously pushed Network Rail to improve. We found evidence that these managers had developed good personal knowledge of issues affecting individual crossings which resulted in immediate risk reduction action.

Nevertheless, there is an over-reliance on an old assessment model designed for national risk-ranking purposes (the 'all level crossing risk model'), and an underperformance in carrying out more suitable risk assessments. Our work showed that level crossing managers received insufficient initial training. Network Rail is currently rolling out a new risk assessment process – with ORR input – and updates to the risk model. In the longer term this should address the issue.

We found evidence that Network Rail's engagement with authorised users of user-worked crossings was inconsistent. Looking ahead, Network Rail is using new technology to better actively warn crossing-users of approaching trains at currently passive crossings. To ensure these technologies are used effectively, we are working with Network Rail to develop a passive crossing strategy to improve crossing safety in and after CP5. We will consider RSSB's recent research into level crossing safety and those recommendations from investigations carried out by the Rail Accident Investigation Branch (RAIB).

Over 2013-14, Network Rail commissioned manually-controlled barriers with obstacle detector crossings; a new type of crossing fitted with radar and laser systems that can detect obstacles blocking the running line. The limited initial trials of these systems have left some technical issues which we have challenged Network Rail to resolve.

Infrastructure risks

Overview: Network Rail's management of infrastructure risk showed evidence of improvement in its structures and earthworks and reductions in stretcher bar failures. We still had to enforce because of its failure to deliver basics like increases in the proportion of repeat track twist faults and the absence of electrical earthing at signal cabinets.

We are concerned about the capability of its maintenance function to deliver sustained safe management of track and off-track assets. This is why, in our final CP5 determination, we ring-fenced maintenance budgets. Our pressure has led to Network Rail carrying out its own capability review of its maintenance functions. The outcomes of which will be known later in 2014.

Network Rail still has much work to do to introduce measures to predict and respond to earthwork failures. Although there were similar numbers of failures to previous years, derailments declined which demonstrates improvement. Better understanding and management of drainage is a vital element to control of risks at earthworks. Network Rail has finally identified and begun to plan proactive inspection of its drainage assets. We will use our interventions to ensure it carries these out.

Network Rail has improved its management of structures, reducing its backlog of examinations and condition assessments, nearer to the level we would expect. The importance of safe maintenance of structures to the integrity of the network is reflected in the increased funding we allocated to Network Rail for its civil assets in CP5.

Evidence

Network Rail's shift away from a rules-based towards a risk-based approach to asset inspection and management will help to better align its resources to close demonstrable asset risk gaps. Network Rail also needs to make better use of engineering solutions to control risk.

Track and off track: we found evidence of an inability to deliver sustained safe track asset management. For example, there was a 7% under delivery of Network Rail's corrected track renewal programme and a rise in its maintenance work-bank volumes. Our inspections of maintenance delivery units in 2013-14 found a general compliance with minimum standards, characterised mainly by a reactive 'find and fix', rather than our preferred 'predict and prevent' approach.

A consequence of this reactive approach is that faults are not always fixed in the lasting way we would expect. During 2013, the proportion of repeat 'level 2' track twist faults (where a track twist fault reappears) increased across the country. This shows a missed opportunity to secure effective long-term repairs.

Our enforcement on this topic in Scotland in November 2013 revealed the scope for Network Rail to improve its staff competence, infrastructure access, work planning and resource levels. The freight train derailments in 2013 at Gloucester and Camden in London were caused by several different factors including poor track quality, the result of inadequate long-term maintenance and renewal. This included underlying track precursor conditions such as poor drainage.

There has been a notable reduction in the stretcher-bar failures trend at switches and crossings and we anticipate further improvements driven by the planned roll-out of a new fatigue-resistant design, after our pressure following the 2007 Grayrigg derailment prosecution against Network Rail.

We support Network Rail's initiatives to change its basic asset management philosophy. This includes a shift away from extensive, prescriptive written standards and rules, to a more risk-based, competence-reliant approach called 'business critical rules'. Similarly, Network Rail's depot project is aimed at introducing best practice to delivery units in areas such as work visualisation, planning and risk assessment.

The volume and pace of planned changes over CP5 poses a large challenge, particularly in the first couple of years. We are looking to see a well-managed, staged approach to delivering these programmes – with appropriate resources, governance, assurance and review. These planned initiatives have the potential to move Network Rail towards excellence in asset management. Without the necessary management maturity that we would expect, they risk becoming missed opportunities.

Earthworks: during 2013, we continued to press Network Rail to improve its understanding of the risks arising from failed earthworks during extreme weather, including taking enforcement in Scotland.

We found evidence that poor vegetation management was reducing earthworks inspectors' ability to carry out examinations to assess the condition of these assets. Our efforts to secure better vegetation management arrangements came to a head with enforcement action in November 2013 to ensure adequate assessment of slope condition. Network Rail complied with our notice which required improvements to be delivered by mid-January 2014.

Structures: Network Rail's own review of its asset management capability identified significant under-resourcing. We will continue to check how this is addressed and how well its engineer competency regime is embedded. These measures should build on the

evidence we have seen of improved stewardship in the management of bridges, tunnels and viaducts.

As assessment of civil asset conditions becomes more sophisticated, we expect that Network Rail may need to identify more interim risk controls at certain structures, in order to ensure it maintains a safe structures portfolio.

Incidents at Sunderland and Denmark Hill led us to challenge Network Rail to develop an action plan to address the risks of delamination (a failure resulting from layers of different materials separating and losing their strength) at bridges with concrete encasement. Our inspection work will focus on this in 2014.

Safety-by-design

Overview: we have found insufficient evidence that Network Rail has considered the whole-life costs of major changes to infrastructure – not just the project capital costs – and taken the opportunity to improve safety. Changes may only be reasonably practicable at an early point in an infrastructure’s life-cycle. It is important that Network Rail uses these opportunities to make advances to comply with the law, secure improvements for the next generation, and set standards for the rest of the network.

Evidence: we inspected a number of Network Rail’s projects and found good safety features in all the designs we considered, but noted further opportunities to secure safety benefits in some others. In some projects, our inspectors were satisfied that the choices Network Rail made were on the basis of a good understanding of risk.

On the western development project, despite review and evaluation processes being applied, Network Rail did not show evidence of sufficient risk assessments that clearly demonstrated hazards had been eliminated or reduced so far as is reasonably practicable. This led us to serve improvement notices in April 2014. Maintenance and other stakeholders were influencing design decisions whereas the routes were not being sufficiently demanding clients in providing vision and strategic direction to push projects towards major safety improvements.

Infrastructure worker safety risk

Overview: Network Rail accepts our view that it must do much more to protect infrastructure and particularly track workers. Key developments such as ‘Sentinel 2’ have now been implemented and good use is being made of Network Rail’s close-call procedures by workers to identify incidents that could have proved dangerous. The 10-point plan for improved worker safety has the potential to bring significant improvement, but needs maturity and commitment to be implemented successfully.

Evidence: our analysis of incidents and risk evidence very clearly illustrates that actual FWI harm to infrastructure workers worsened by 22% in 2013-14 and remains far too high. It is now at its highest level for seven years. In recent years, the two biggest causes of worker fatality are being struck or crushed by trains or being involved in an at-work road accident – see *below*.

There were three fatalities and major injuries were up 16% and minor injuries up 15% in 2013-14 – see *pages 25-26*. Workforce harm, normalised by workforce hours worked, increased 10% over the year due to overall increases in harm across all sections of the workforce, with the exception of on-board train crew and train drivers. We took action on several prosecution and enforcement cases relating to incidents involving infrastructure workers' safety – see *annex 1*.

Progress to introduce new technologies that would help remove or reduce risk to infrastructure workers has been too slow and needs improvement. The lookout struck and killed by a train at Newark Northgate station in January 2014 was part of a track gang using ultrasonic equipment to test the rails. The use of available train-mounted equipment, such as plain line pattern recognition (rail defect identifying) equipment, would have helped to remove the need for workers to be on or about the track.

Our CP5 final determination included targeted funding to improve protection and warnings to track workers, taking electrical isolations, and better and safer road-rail vehicles.

While there were no working- at-height fatalities in 2013-14, worker falls from height still represent 28% of all worker FWI risk. Most incidents involve falls from scaffolding or other temporary structures. We still see too many working at height incidents involving poor risk assessment and/or insufficient provision and usage of fall-arrest, edge protection and other risk control equipment.

Occupational road safety

Overview: industry managers must remain alive to the role of fatigue in a mobile workforce, particularly the often overlooked drive home or back to the depot after a long shift. RSSB has issued useful guidance⁵ on its road driving risk website⁶.

Evidence: four infrastructure workers were killed in road accidents while on-duty over the last three years. The risk is not new but can benefit from improved industry reporting. The volume of confidential incident reporting and assessment system (CIRAS) reports about

⁵ <http://www.rssb.co.uk/Library/improving-industry-performance/2013-good-practice-guide-t997-managing-occupational-road-risk.pdf>

⁶ <http://www.rssb.co.uk/improving-industry-performance/workforce-passenger-and-the-public/road-driving-risk>

workforce fatigue management in 2013-14 confirms that this is a risk that the industry must manage better. Nottinghamshire police's investigation into the road accident that killed two welders on the A1 on 26 June 2013 is on-going.

Both road risk and worker fatigue issues were identified by the trade unions' 2014 workers risk surveys. Network Rail's own analysis showed that occupational road safety incidents made up over 50% of its serious workforce accidents in CP4. Common causes included: reverse parking, speeding, unsupervised manoeuvres, reckless driving, using mobile phones when driving and faulty road vehicles.

Occupational health performance

Overview: Network Rail's overall occupational health performance levels are still lower than other comparable sectors and need significant improvement.

Evidence: in 2013-14 we continued our on-going assessment of Network Rail's occupational health management performance. It focused on specific health risk areas:

- hand-arm vibration syndrome (HAVS);
- silica dust from ballast handling; and
- control of exposure to asbestos.

Our site inspections found varying standards of compliance and a general lack of ownership and accountability. Often there was no suitable, co-ordinated and systematic approach to health management at route and site-levels, either by Network Rail or its contractors. During the year we also identified a number of specific areas of poor health management:

- over 300-Network Rail employee HAVS cases over CP4 – a high number;
- the lack of an effective plan to manage risks from handling asbestos; and
- poor arrangements for managing the health risks arising from silica dust.

Network Rail's new health and wellbeing strategy⁷ puts effective management of occupational health at its heart and identifies appropriate key topic areas for specific attention. We note the commitment made at senior-level to improve health management through the proposed appointment of additional occupational health professionals and full-time health and wellbeing managers for each route. We have developed an additional RM3 element to assess duty holders' management of occupational health.

⁷ <http://www.networkrail.co.uk/publications/sustainability-update/2013/health-and-wellbeing/>

Mainline: Train operating companies

Management maturity

Overview: our railway management maturity model (RM3) is now embedded in most operators' safety management systems and is being used as part of their own auditing arrangements.

We continue to encourage more progress on the use of activity-based safety performance indicators and outcomes. These change behaviours and reduce unsafe acts. We will seek further evidence of established safety activity indicators amongst every mainline operator in 2014-15.

Evidence: Train operating companies (TOCs) are making progress in moving to RM3 predictable (level 4) levels of risk management RM3 scores in several criteria but we noted that implementation and monitoring lags behind policy and planning criteria. We found some isolated examples of excellence in discrete topics, such as change management and auditing.

Some TOCs have started to introduce proactive indicators and are already seeing positive changes in behaviours where this monitoring has started.

Train protection and warning system (TPWS)

Overview: The available evidence shows that some operational trends worsened in 2013-14 and we expect the industry to improve its management of these risks, including signals passed at danger (SPAD) risk management. The SPAD reduction strategy being developed by the train operations risk group should help improve SPAD management.

We continue to seek evidence of operators' plans to enhance their driving cab's warning system equipment and fit further train protection on the network. A recent double SPAD highlighted the benefits of upgrading in-cab TPWS modules.

Evidence: there was an increase in SPAD numbers, including a new seven-year high in those risk-ranked 16 to 19. There were 293 category 'A' SPADs during the period (up 17% on 2012-13) with 92 risk-ranked 16-19 (up 31%) and 16 risk-ranked 20+ SPADs (the same as 2012-13).

Evidence from incidents and our investigation of their causes has identified weaknesses in the original TPWS equipment: it does not self-check or provide an indication to the driver of the reasons for an automatic brake application. In 2013, we asked operators to review their train protection equipment and controls in light of the increase in operating incidents, particularly the increase in SPADs – see *page 29* – and the continued existence of so-called 'reset and continue' incidents, where the driver fails to alert the signaller about an automatic TPWS brake application and drives on.

We investigated an incident where shortcomings in the functionality of a basic form of TPWS equipment helped exacerbate the causes of a multiple SPAD. The incident's circumstances are complex but fitting an enhanced form of TPWS would have reduced the risk. We look to all operators to follow the lead of others and plan upgrades to their TPWS equipment using existing overhaul programmes, or when faulty units need to be replaced. Some operators are now unilaterally replacing basic TPWS modules with enhanced versions.

Driver management

Overview: we remain concerned about the impact of drivers losing concentration and becoming distracted as a cause of operational incidents, especially the increase in SPADs in 2013. We encourage the analysis of remote on-train data recorder downloads to provide more reliable driver performance data.

Evidence: we continue to see evidence of interrupted concentration and distraction of drivers. This is an area that the industry must improve by considering what further steps can be taken to help understand what distracts drivers as they approach signals. Operating trend statistics worsened in 2012-13 and although the SPAD numbers stabilised at a higher-level towards the end of 2013-14, their overall rise over 2013 highlights scope for improvement – see page 29.

Low adhesion

Overview: Train operators have made significant improvements in railhead low adhesion management. Both through improvements in the volume and consistency of sand applied to the track during brake applications, the reliability of those application rates and through improved general levels of maintenance and housekeeping.

Evidence: the buffer stop collision at Chester on 20 November 2013 demonstrated that railhead low adhesion remains a risk to all operators and identified scope to further reduce risk, where reasonably practicable.

Station management, train dispatch and the platform train interface

Overview: evidence suggests that train dispatch standards are generally satisfactory, but more work needs to be done to improve the station-specific risk assessments used. We encourage operators to proactively monitor the risks to passengers from getting on and off trains and at the platform train interface (PTI) more generally, including in the absence of trains. There is now cross-industry support to proactively use station CCTV to ensure dispatch duties are correctly resourced and carried out.

Station crowd congestion poses a difficult challenge across the network, from increasing passenger numbers, service disruption and station construction work. Our 2012-13 report noted the decrease in PTI risks in 2012-13, particularly during train dispatch procedures. We are pleased to note the industry built on this positively with a number of initiatives and

programmes aimed at better managing the risk, including setting up the cross-industry PTI strategy group in which we take part.

Evidence: overall PTI FWI harm increased 5.6% in 2013-14 and 7.6% over CP4, but these increases should be viewed in light of the growth in passenger numbers. About a quarter of the passenger fatality risk at the PTI involves circumstances where no trains were involved.

Crowd congestion is now emerging as a challenge at more stations around the network; not only from increased patronage, but also during service disruption and station construction work. We found some examples of good practice: at one location crowding was well managed by a dedicated control room. Automated congestion monitoring of crowds, once they reach critical levels, is potentially beneficial and can ensure effective control of passenger flows during train dispatch. The industry's people on trains and station risk group are seeking to improve crowd management both on trains and at stations.

In order to better manage the risks, there is a need and opportunity to look at ways to carry out unobtrusive monitoring of the PTI. This includes the use of platform CCTV to identify issues, to improve the understanding of passenger behaviour and staff resourcing levels so that control arrangements are appropriate at all times. Following discussions, we are pleased that all sides of the industry now support this initiative.

Rolling stock risks

Overview: we found evidence of too many vehicles returning to service with failures after overhaul or external maintenance. We expect operators to improve the management of such risk.

Evidence: evidence from incidents led us to warn operators to improve their control arrangements of third-party maintenance processes. We saw too many examples of vehicles returning to service after overhaul or external maintenance experiencing failures. This could lead to components falling from them or have caused safety-critical faults. This year we examined operators' return-to-traffic arrangements and operators' audits identified corrective action plans to improve contractors' standards. This remains an area where the industry has more work to do.

Mainline: Freight operating companies

Overview: we are pleased with freight duty holders' increased adoption of our RM3 model. It has helped us to build up a clearer picture of in-sector performance.

We are generally satisfied that the management systems of all companies are performing at acceptable levels, though there are inevitably areas for improvement. Restructuring in some companies resulted in some areas of reduced performance. This is set against increasing freight operations and service growth: up 5.8% on 2012-13 to 22.7 billion net tonnes per

kilometres in 2013-14.

Evidence: progress on the implementation of the entities in charge of maintenance (ECM) requirements for freight wagons has continued above our expectations and we have completed appropriate surveillance visits. The structure of the ECM process should, in due course, improve freight wagon reliability and safety, as maintainers apply more rigorous maintenance and inspection processes; and performance aligns with best practice.

There were eight freight train derailments in 2013-14. The majority of these demonstrated system interface issues between track condition and wagon performance which were previously considered acceptable. The incidents have demonstrated that the assumptions on which the cross-industry standards are based may not be correct and we are working with the industry to determine if changes or different processes may be required, which include managing sector growth, wagon-loading, worker fatigue and safety-critical communication.

As noted previously, SPAD numbers have continued to increase over 2013-14, including amongst freight operators. Most freight train SPADs are low-speed and relatively low risk but nevertheless add to the existing accident precursor risk gap.

Occupational health: train and freight operators

Overview: several operators have seen the benefits of robust occupational health strategies: better staff attendance, improved health and reduced employee absence costs.

We continue to monitor progress against operators' health strategies. There is evidence that significant benefits have been achieved from a more proactive approach, which has enabled operators to identify gaps in their health monitoring and to improve their staff's sickness absence and overall wellbeing-levels.

Evidence

Legionella and bacteria: we published a case study with a train operator highlighting good practice in the management of water systems at carriage cleaning wash facilities. Rolling stock without toilet effluent retention tanks remains a threat to the health of track workers and presents an unattractive environment for passengers. Whilst with proper precautions the risk to health is relatively low, discharged effluent makes track inspection and maintenance more time consuming and costly.

Innovative engineering solutions are being sought to reduce the risk, including the introduction of global positioning system-controlled signal systems to prevent discharge at prescribed locations. This is a partial solution, but evidence suggests that it is better than improving on the procedural controls currently used on older rolling stock.

Manual-handling: we continue to check train operator's on-board manual-handling activities and some operators' assessments of such processes were not good enough. We found examples of staff carrying out activities which they were not required to do by their company.

There is also a balance to be struck between staff being keen to assist passengers and ensuring trains run on time, while ignoring their own health and safety. We found examples of well-meaning staff pulling luggage at the same time as pushing wheelchair passengers. While this avoided passengers having to carry luggage on their lap, it could present a risk of injury to both passengers and staff. We have asked the train operator to review its arrangements.

We have worked with the industry to produce a wheelchair good practice guide for staff, managers and users⁸ aimed at preventing muscular skeletal injuries to staff. This can present a particular challenge at stations where there are large platform-train stepping distances, as this can pose manual-handling risks when using platform to train ramps. We are encouraging duty holders to assess and manage the risk of injury to their staff and ensure that they have adequate provisions in place to safely assist turn-up-and-go wheelchair users.

Heritage railways

Overview: we formally agreed that the Heritage Railway Association (HRA) would take over managing and publishing the sector's core safety guidance that is currently covered by our RSP5 guidance on minor railways document. This is a key milestone for the heritage sector. We continue to work closely with the HRA to develop such guidance. This year HRA added seven useful guidance notes⁹.

Evidence: our 2013-14 inspections identified improvements above what we found in recent years in the quality of heritage railway operators' safety management systems (SMS), but improvements must maintain momentum. We served two improvement notices and one prohibition notice on operators to bring aspects of their SMS up to an appropriate standard.

⁸ <http://www.rssb.co.uk/research-development-and-innovation/research-and-development/research-project-catalogue/T759>

⁹ http://www.heritagerrailways.com/mem_docsdb.php.

Tramways

Overview: safety performance on Britain's tramways was above our expectations. Overall passenger numbers continued to grow. There were 94.4 million passenger journeys on Britain's trams in 2013-14, up 2.2% on 2012-13¹⁰.

Evidence: Manchester, Nottingham and the West Midlands tram systems have grown and many extensions are now complete and in operation. Our inspectors have monitored the development and bringing those lines into operation, including liaising with operators and promoters to close-out specific safety issues as they arise. Edinburgh tram began operation on 31 May 2014. We kept oversight of the project under the Railways and Other Guided Transport System safety verification process.

We continue to monitor the sector's development of a consolidated incident recording database which should improve the level and consistency of cross-industry data collection. (See pages 34-35 for details of reported tram collisions with motor vehicles and pedestrians, 2011-14). The small dataset involved makes any definitive analysis difficult.

London Underground Limited and other Transport for London companies

Overview: there were no railway operational-caused fatalities on Transport for London's (TfL) managed infrastructure in 2013-14. TfL continues to maintain a high-level of safety for its passengers and workforce as passenger numbers and services grow.

Station crowd congestion remains a challenge for London Underground due to the unprecedented amount of construction work involved in the Tube's modernisation. Well-practiced station monitoring procedures are used to ensure this risk is managed properly.

Evidence: there were 1.72 billion passenger journeys on TfL systems in 2013, with London Underground responsible for 1.27 billion of those. Our interventions in 2013-14 confirmed that London Underground has the necessary health and safety procedures in place to manage its operational risks. However, we found variations, some of which could be improved on, in the way procedures are applied across its network.

Using the evidence collected from our intervention and inspections over 2011-14 and our RM3 audit, we assessed London Underground as having a between 'standardised' (level 2)

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/320645/light-rail-and-tram-statistics-2013-14.pdf.

and ‘managed’ (level 3)¹¹ level of health and safety performance. This is very much a ‘middle of the road’ rating, which shows that London Underground has scope to improve. London Underground, along with other TfL companies, has embraced the use of the RM3 model to help develop its own SMS improvement programme. We continue to work with London Underground to support it in its RM3 assessment.

Our inspections identified some good practices and encouraging signs of forward, proactive risk control, such as the use of a Brokk-breaker in tunnels removes exposure to vibratory tools. However, there were weaknesses at some train depots in controlling the risk from spraying of isocyanate paint (a known cause of asthma) resulting in two enforcement notices on a contractor. Prompt subsequent action by London Underground rectified this.

Our non-safety related accessibility work

In addition to our routine health and safety work, we monitor operators’ compliance with the passenger information elements of *The Rail Vehicle Accessibility (Non-Interoperable Rail System) Regulations 2010* (RVAR). Most incidents investigated in 2013-14 related to wheelchair usage:

- the provision of staff assistance and ramps at the platform train interface, available station seating; and
- monitoring operators’ announcements and passenger information displayed on trains.

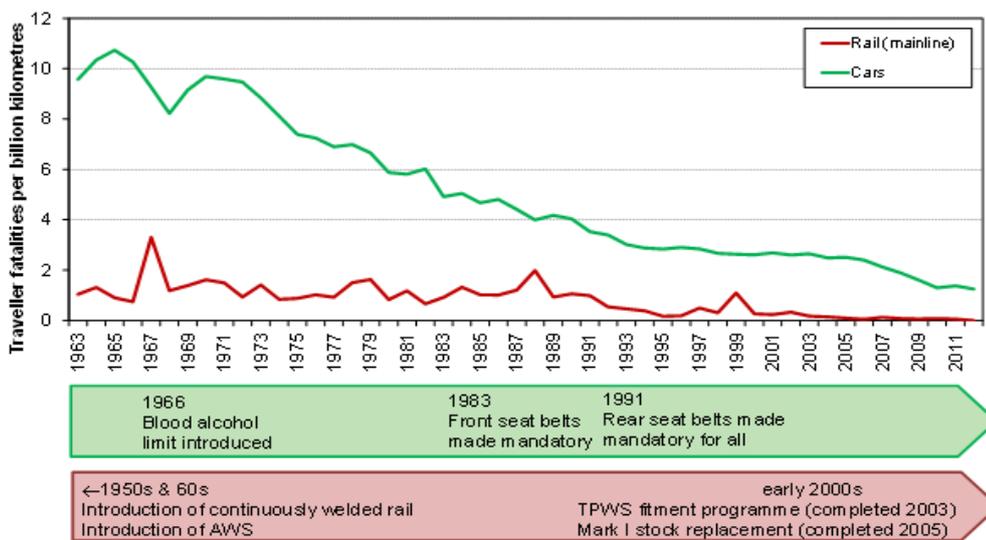
In two separate incidents in 2013-14, a wheelchair and a child’s pushchair rolled across station platforms and on to the track. The wheelchair user was fortunate in only breaking her hip – such incidents could have resulted in serious injuries. The industry’s PTI strategy group is looking at accessibility issue as they relate to the PTI.

We periodically find examples of imperfect compliance with accessibility legislation, but more generally see evidence of the industry progressively removing accessibility barriers as we move towards the Department for Transport’s target of all railway vehicles being accessible by 1 January 2020.

¹¹ See page 17 of: http://orr.gov.uk/_data/assets/pdf_file/0013/2623/management-maturity-model.pdf.

Section 3 – an overview of the mainline railway’s health and safety performance in 2013-14

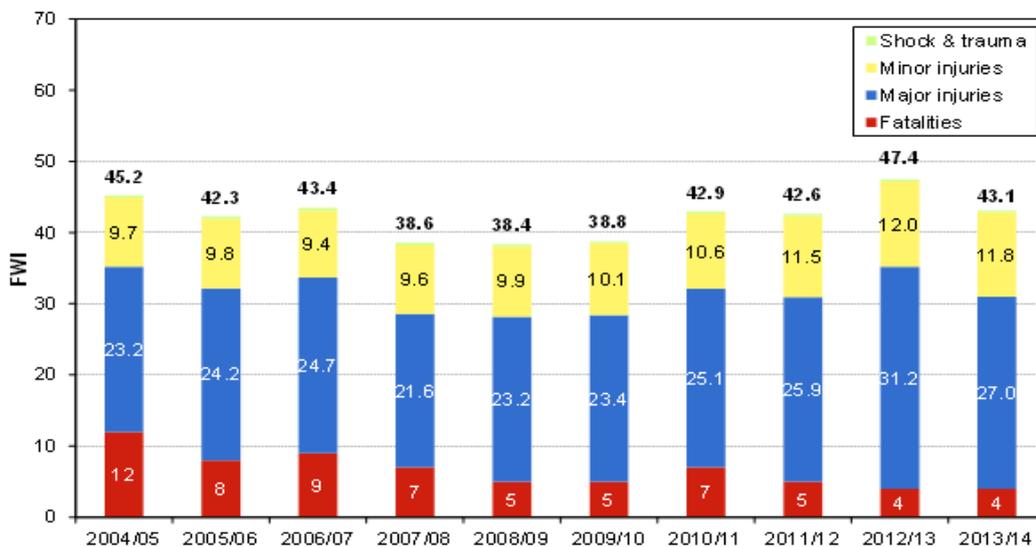
Passenger safety – overall picture



Source: RSSB analysis based on data from DfT, ORR and RSSB.

The graph above clearly shows that safety on Britain’s mainline railways continues to improve. Traveling by railway remains a safer form of transport than road, but both are growing ever safer as risk is designed out, new technologies and processes are applied; and lessons are learnt from other industries.

Passenger fatalities and weighted injuries

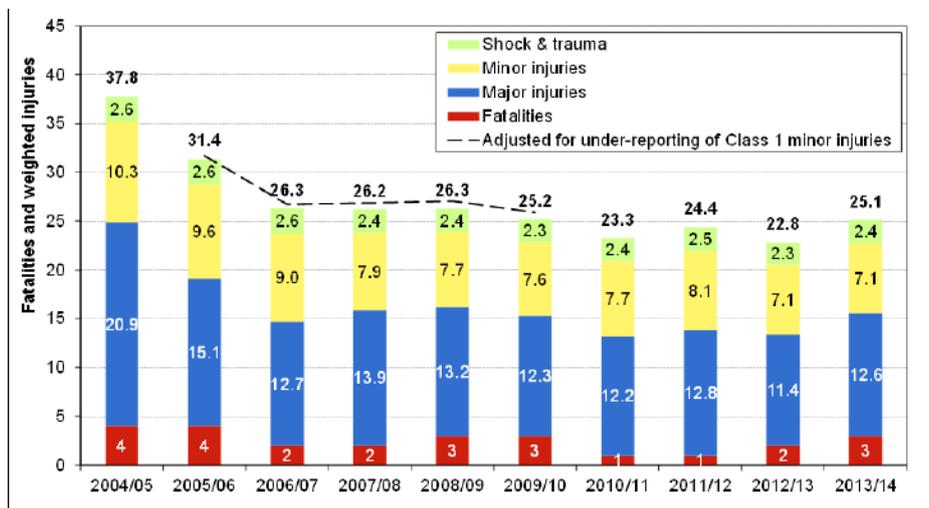


Source: RSSB.

There were four passenger fatalities in 2013-14. All occurred at the PTI and involved passengers falling from the platform edge on to the track. Slips, trips and falls incidents represent 47% of the fatalities weighted index (FWI) risk to passengers. The PTI risk represent 48% of the fatality risk to passengers. Around 80% of the FWI harm to passengers occur at stations – mostly involving slips, trips and falls incidents on stairs, escalators and at the platform edge, including incidents where passengers are struck by a train while standing too close to the platform edge. However, once increases in passenger numbers were taken in account in 2013-14, normalised passenger boarding and alighting risks declined 19% and normalised slips, trips and falls harm declined 17%.

Common causal factors in PTI passenger incidents are passenger intoxication; 66% or 21 out of the 32 passenger fatalities in the last decade.

Workforce fatalities and weighted injuries



Source: RSSB.

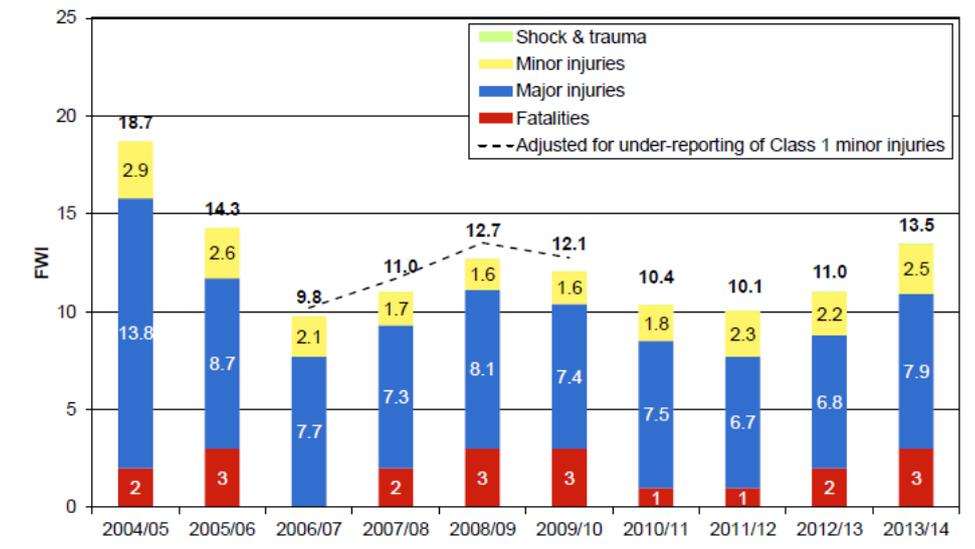
The workforce fatalities and injuries trend has remained broadly static over CP4, but normalised workforce risk worsened 7% in 2013-14 compared to 2012-13. Overall workforce fatality, major and minor FWI risk all increased over 2013-14, which shows the industry’s performance is still some way off achieving excellence in health and safety risk management. Although there was a 20% reduction in normalised workforce risk between control periods 3 (2005-209) 4 (2009-14). The top-five workforce injury incidents were slips, trips and falls; contact with objects; on-board injuries; struck and/or crushed by train; and assaults and abuse incidents.

Infrastructure worker fatalities and weighted injuries

Of the overall workforce risk during CP4, 47% of the total harm was borne by infrastructure workers. Over the last decade, 20 of the last 25 worker fatalities have involved infrastructure workers and 60% of overall major injuries occurred to infrastructure workers. Slips, trips and

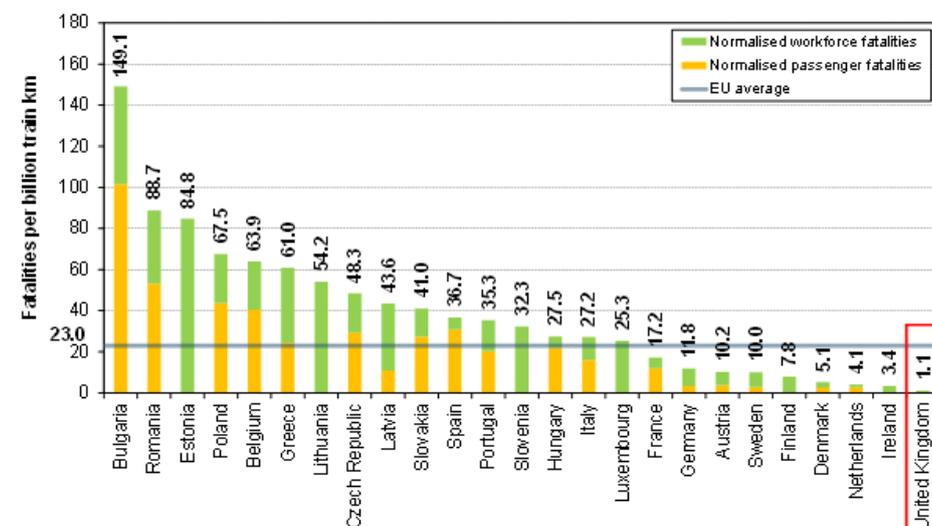
falls represent 37% of the recorded harm to infrastructure workers. Major injury risks to infrastructure workers are mostly caused by: slips, trips and falls (44%) and contact with objects (32%). The number of major injuries to infrastructure workers increased 16% in 2013-14 compared to 2012-13 and is at its highest level for five years. On 37 occasions over the last decade infrastructure workers have been struck by trains resulting in 42 injuries including 11 fatalities, 18 major and 9 minor injuries. This is far too high, which is why it remains a key focus of our future intervention plans.

Infrastructure worker fatalities and weighted injuries



Source: RSSB

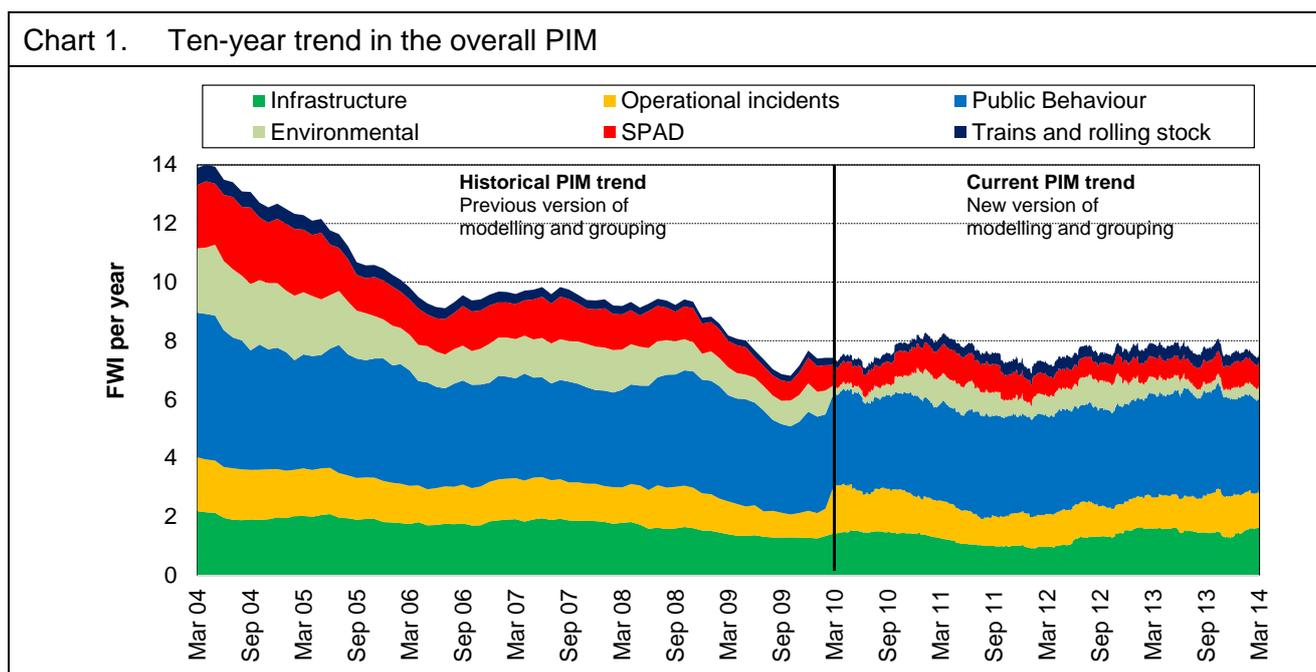
Comparison of passenger and workforce fatality rates across the European Union's railways, 2008-12



Source: RSSB analysis based on Eurostat data¹².

Passenger and workforce fatality rates on Britain's railways were well below the European Union (EU) average over the five-year period 2008-2012, mainly because the last passenger fatality was in the Grayrigg derailment in 2007. Britain is the best in the EU at managing passenger and level crossing safety, third-best at managing employee safety and fifth-best at managing public safety.

The current picture on the mainline railway: precursor indicator model (PIM)



Source: RSSB

Based on version 8 of the SRM (up to April 2014), train accident risk accounts for around 5% of the overall risk on Britain's mainline railways. Over 2013-14, the precursor indicator model (PIM), which monitors the risk from potentially higher risk train accidents (PHRTAs) based on accident precursor trends, reduced 4.8%; down from 7.90 FWI at the end of 2012-13 to 7.52 FWI at the end of 2013-4. This was mainly because of reductions in trains and rolling stock, public behaviour and environmental PIM precursor sub-groups. Over the same period, the risk to passenger component of the PIM increased 1.2%, from 3.28-FWI at the end of 2012-13 to 3.32-FWI at the end of 2013-14, because of slight increases in operational incidents and SPAD risks.

¹² See page 55 of RSSB's annual safety performance report for 2013-14: <http://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2014-07-aspr-2013-14-full-report.pdf>

Slight differences between the PIM and SRM models trend results

The SRM and PIM models are designed to capture two slightly different aspects and purposes of safety on Britain mainline railways:

- the PIM provides an on-going indication of changes in train accident risk from PHRTAs by tracking common precursors and mapping their frequencies risk using information on the average consequences from such events using the SRM. The PIM is intended to flag up short-term fluctuations in specific categories of accident precursor trends;
- the SRM provides a snapshot estimate of all train accident risk, based on the analysis of likely harm caused by specific categories of risk events using a longer dataset period, in the form of a quantified risk assessment, as measured by the fatalities and weighted injuries (FWI) index. It also models risk from 'train accidents' that did not happen but had the potential to do so. The SRM is intended to avoid short-term volatility and be used to inform duty holders' cost-benefits analysis and assessment of their underlying risk profiles. Periodically (about ever 18-12 months), the assumptions on which the SRM is based are revised using the new observations of the most recent accidents and precursors.

Improving industry safety risk modelling

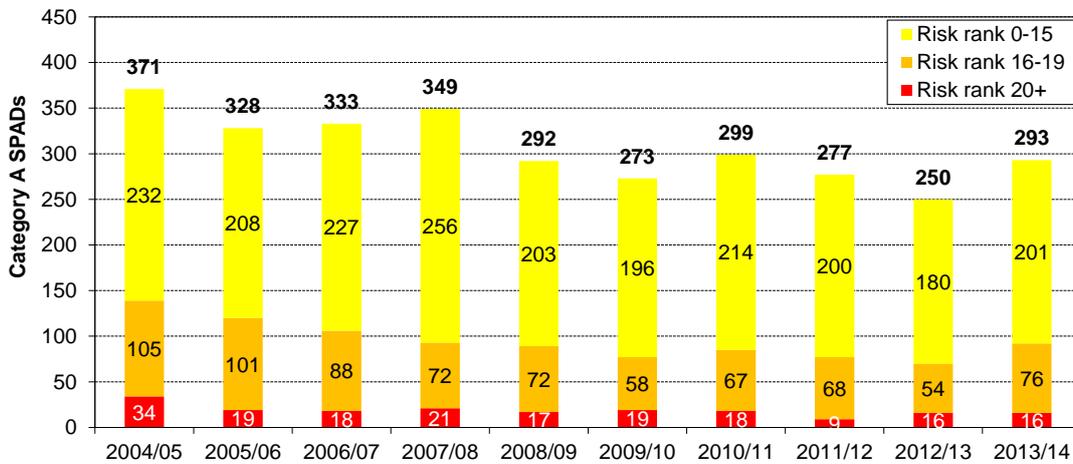
The earlier versions of the industry's SRM and PIM risk models were based on insufficiently sophisticated data sources to capture the detail of underlying infrastructure precursor risks, but important work has since been done by RSSB and Network Rail in 2013-14 to improve this. The PIM is now able to be updated more frequently.

The project to expand the activities recorded by the mainline railways' safety management information system (SMIS) by 2015 is underway, which reflects the RSSB-led initiatives to develop an even better understanding of system safety. This will include improved reporting on workforce occupational road risk, railway replacement services, railway construction sites and other workforce risk, as well as areas of workforce activities, which SMIS has not traditionally captured, such as signal centres and off-site work offices. We commend this continuous improvement to deepen the system risk landscape picture as it helps identify risk priorities.

Benefits of more disaggregated CP5 data

There are real potential benefits in using disaggregated CP5 data to benchmark comparative data and help build a regional and route-level safety performance picture of accident precursor and potential risk. We plan to use more disaggregated data in our future CP5 health and safety reports.

Trends in SPAD number by risk-ranking score, 2004-5 to 2013-14



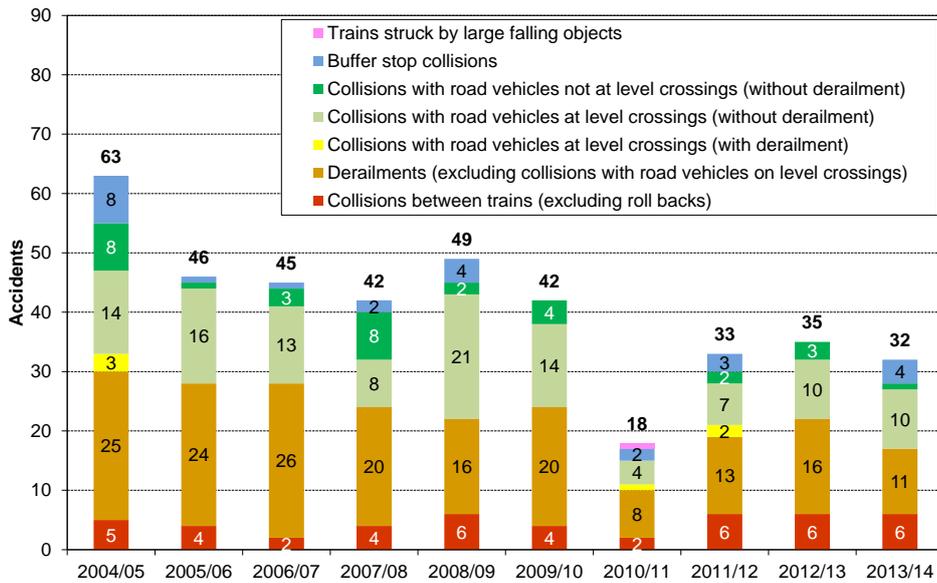
Source: RSSB.

The mainline industry's SPAD performance worsened in 2013-14, especially compared to 2012-13 and our work with the industry to respond to this is set out on pages 7 and 17-18. In summary, SPAD numbers increased 17% across the mainline network, but overall levels of SPAD risk remained broadly static. In the longer-term the industry is seeking whether there are 'systematic influences' on the reason for the increase in SPAD numbers.

Trends in potentially high risk train accidents (PHRTAs)

Potentially higher-risk train accident trend has been relatively static since 2011-12, following a significant decline in 2010-11. The 32 PHRTAs in 2013-14 included the two 'cyclic-top' caused freight train derailments at Gloucester and Camden Town in London. There were no passenger train derailments in 2013-14. The industry's and our focus on PHRTAs is because they represent 93% of train accident risk on the mainline railway, but account for only around 5% of RIDDOR-reportable events. The numbers of PHRTA events normalised by train kilometres travelled on Britain's mainline railway, reduced 39% in CP4 (2009-14) compared to CP3 (2005-09).

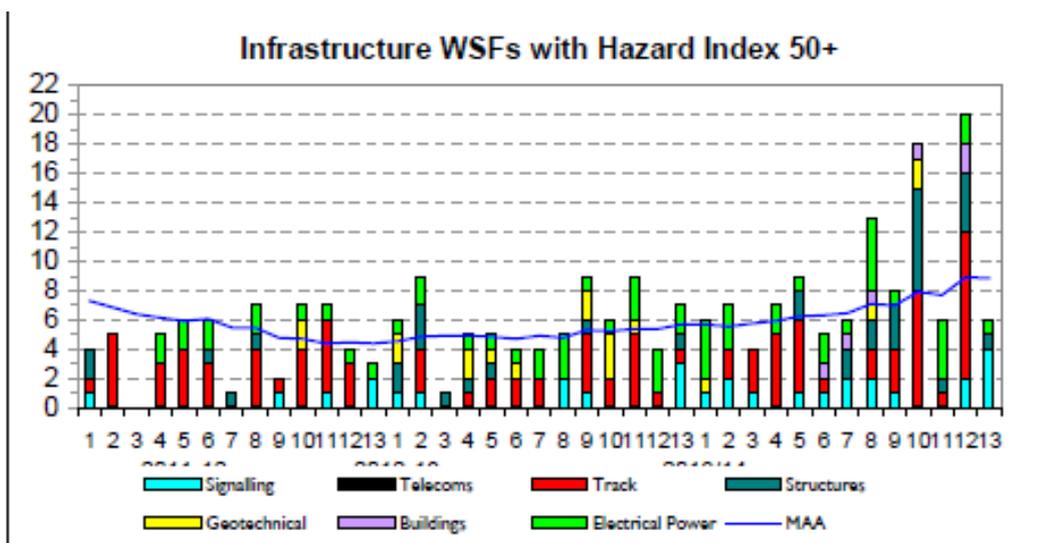
Trends in potentially high risk train accidents (PHRTAs)



Source: RSSB.

Wrong-side failures with a '50+' hazard index categorisation

The moving annual average of wrong-side failures with a '50+' hazard index categorisation increased over 2013-14, mostly because of track and structure-related incidents during the adverse wet and windy weather of the winter 2013-14 and spring 2014.

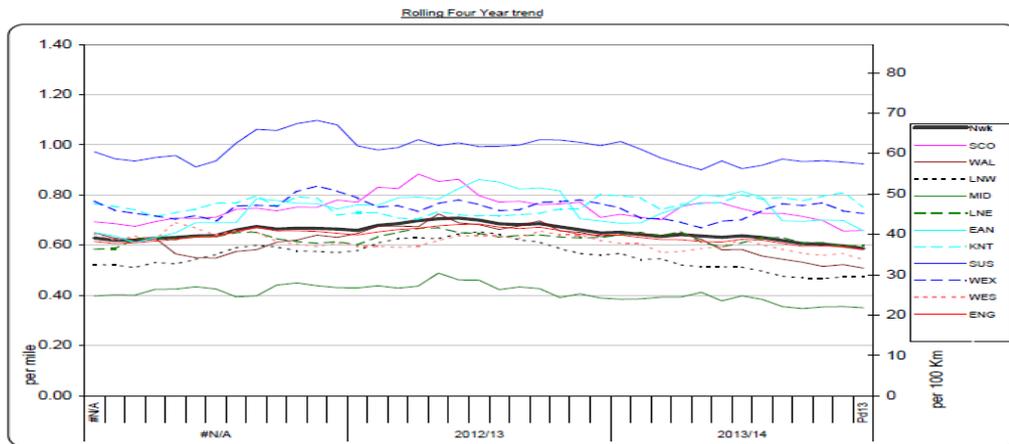


Source: Network Rail's Safety, Health and Environment Performance report.

Track geometry faults

While not necessarily a direct safety indicator, 'level 2' track geometry faults can provide a potentially useful leading underlying safety indicator because they can lead to more significant and potentially catastrophic accident precursors.

Track geometry faults: level 2 exceedances (per mile and per 100 kms)



Source: Network Rail.

The national 'level 2' exceedance trend has declined gradually since mid-2012-13, but has remained historically high on Sussex Route because of: insufficient resources to deal with long-term underperformance in track geometry; low-level of renewals; poor planning and contractor failures; poor track access levels, especially on the Brighton main line and inner-London routes; and inherent design problems associated with the south London metro area.

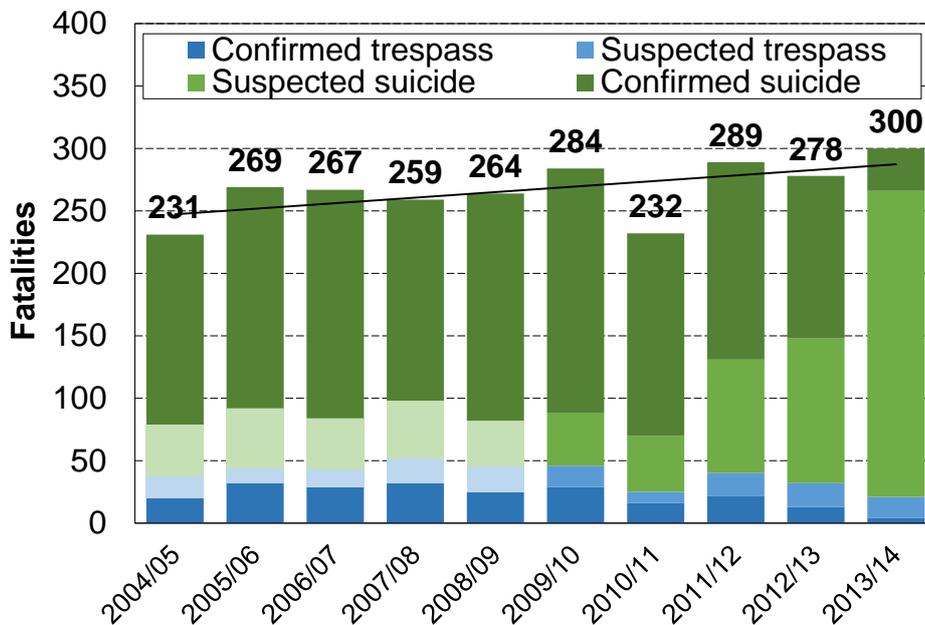
To combat this we have maintained an intensive monitoring of Sussex's track performance over the past two years. While numbers remain high, we found evidence that the route's delivery units do take appropriate remedial action to deal with the faults, but note the underlying problems, outlined above, that can led to repeat 'level 2' defects.

Confirmed/suspected trespass and confirmed/suspected suicide fatalities since 2004

Suicides have continued to increase to a record high of 279 'suicides or suspected suicides' in 2013-14, compared to 246 in 2012-13, but trespass fatalities notable declined in 2013-14. There were 21 trespass fatalities in 2013-14, compared to 32 in 2012-13. The slowing trend of trespass fatalities, illustrates that the industry's work to better control infrastructure access is being increasingly effective. Over CP4, the two key causes of trespass fatalities are from being struck by a train (70%) and electrocution (18%).

Of the risks to the public on Britain’s mainline railway, as modelled by the SRM version 8, 76% is caused by trespass and 11% by pedestrians and 5.5% by road vehicle collision at level crossings. While the combined confirmed/suspected trespass and confirmed/suspected suicide fatalities trend has continued to rise over the last decade, there’s also a subtly changing underlying causation message. The reasons for this change are two-fold:

- railway-related suicides increased notably since 2011-12; part of an international trend often associated with the impact of the global economic downturn. Nationally, Britain’s suicide rates increased in 2011-2012. Around 4.4% of suicides in Britain occur on the railways, of which around 46% involved 15-44 year old men; and
- the provision of enhanced incident data (from 2009-10 to the present) by the BTP has enabled RSSB to use of the Oventstone suicide classification criteria¹³ and more accurately classify incidents, which has led to more trespass incidents being reviewed and re-categorised as suspected suicide.



Source: RSSB.

Dealing with suicides is a difficult and sensitive matter. The 17% rise in railway suicide numbers over CP4 is similar to the rise in the trend nationally. Nonetheless, it is disappointing for the industry considering the significant efforts to prevent railways suicide and the damaging impact such events can have on the railway’s workforce and other witnesses. For example, since 2010, Network Rail’s on-going work with the Samaritans¹⁴ has

¹³

http://www.rgsonline.co.uk/railway_group_standards/traffic%20operation%20and%20management/guidance%20notes/gegn8510%20iss%201.pdf

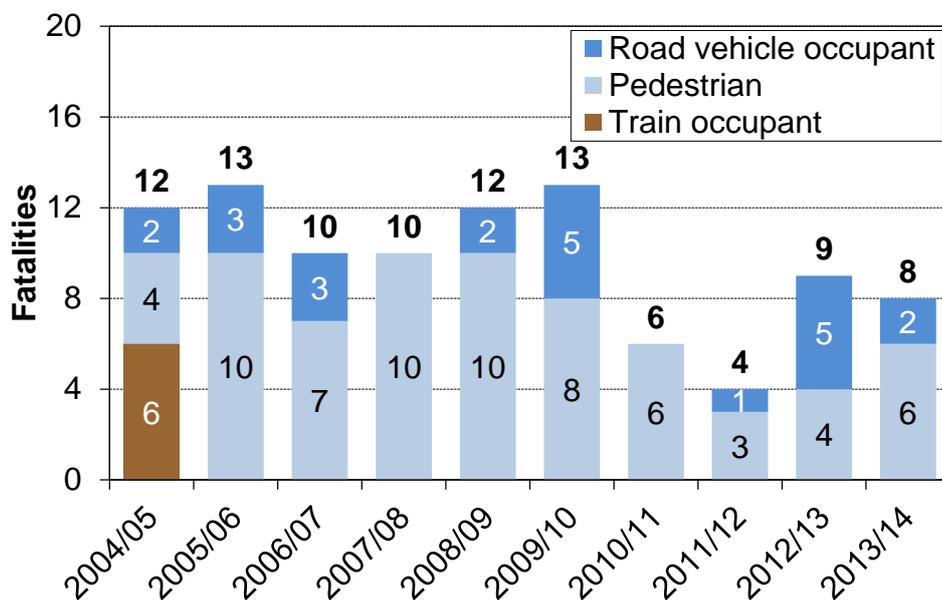
¹⁴ <http://www.samaritans.org/your-community/reducing-railway-deaths-0/samaritans-and-network-rail-partnership>

led to over 5,000-front-line staff being trained in active suicide prevention work. They made over 600 such interventions in 2013-14. There has also been good work to improve post-incident support for the railways workforce and other witnesses; and to encourage responsible media reporting of such incidents.

We will continue to proactively apply health and safety law to ensure duty holders control risks of trespass and suicide so far as is reasonably practicable. Levels of reported vandalism declined 63% over the last decade and the costs of dealing with incidents of cable theft are now at their lowest since before 2006.

Level crossings

Level crossing risk continues to decline following our focus and significant industry efforts: over CP4 (2009-14) the total level of level crossing FWI harm, when normalised by train kilometres travelled, reduced 33% compared to CP3 (2005-2009) and 804 crossings were closed. There was a notable reduction in level crossing fatalities in 2009-10 which has been broadly sustained over the last four years. There were eight level crossing fatalities in 2013-14: two-car occupants in the same incident at an automatic half-barrier crossing, five pedestrians and one cyclist (five of these were at passive user-worked crossings and one at a manually-controlled crossing). None were industry-caused.



Source: RSSB

There were 10-collisions between train and cars at level crossings over 2013-14. Overall, the level crossing risk long-term trend is declining, but as a proportion, there was a slight increase in pedestrian fatalities at level crossings in 2013-14.

There were a total of 48 recorded vehicle incursions on the mainline infrastructure, down 15.8% in 2013-14, of which one resulted in a collision between the vehicle and a train.

Mainline data quality

In 2013, the national data quality score was 88.2%, which was similar to the level recorded in 2012. We pay particular attention to RSSB's annual quality health check reports which help ensure the quality of data RSSB collects and uses, on behalf of the mainline industry, is reliable and improves over time.

Tram operator collisions with motor vehicles and pedestrians, 2011 to 2013-14

Reported tram collisions with motor vehicles

Tram operator	2011	2012	2013	2014	Totals
Blackpool Tramway	-	-	1	-	1
Croydon Tramlink	-	1	1	2	4
Manchester Metrolink	1(*)	-	1	6	8
Midland Metro	-	-	1	-	1
Nottingham Express Transit	-	1	6	-	7
Sheffield Supertram	-	2	-	-	2

*plus one low-speed collision with another tram at a platform in which slippery rails were a causal factor.

Reported tram collisions with pedestrians

Tram operator	2011	2012	2013	2014	Totals
Blackpool Tramway	-	-	-	-	0
Croydon Tramlink	1	2	1(*)	-	4
Manchester Metrolink	1	-	1	-	2
Midland Metro	-	-	-	-	0

Tram operator	2011	2012	2013	2014	Totals
Nottingham Express Transit	1	1	-	-	2
Sheffield Supertram	1	-	1	-	2

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

This forms a small and potentially volatile dataset that makes detailed analysis futile. The tram sector is developing a national accident database which should help enable operators to learn common lessons from across Britain's tram networks.

Section 4 – Roles of key industry bodies

Office of Rail Regulation (ORR)	Railway industry duty holders
<ul style="list-style-type: none"> • enforces compliance with Health and Safety at Work Act and subordinate regulations for Britain’s railways by: <ul style="list-style-type: none"> ➢ setting railway-specific policy; ➢ producing guidance; ➢ inspection, audit and investigation or risk controls; ➢ driving improvement through advice and formal enforcement; ➢ ensuring research is carried out. • assures system safety for mainline railway; and • acts as Britain’s National Safety Authority in Europe. 	<ul style="list-style-type: none"> • duty to eliminate risk by: <ul style="list-style-type: none"> ➢ 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)
<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➢ data-gathering, analysis and risk modelling; ➢ running the cross-industry research, development and innovation programme; and ➢ encouraging and facilitating cooperation; and providing technical expertise. 	<ul style="list-style-type: none"> • 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.

Rail Accident Investigation Branch (RAIB)

Building on previous years, our good working relationship with the Rail Accident Investigation Branch (RAIB) continued to develop at all levels during 2013-14. RAIB's investigation managers regularly presented preliminary findings of their investigations to our inspectors as part of the RAIB's consultation process.

We also participated in tripartite meetings with the RAIB and Network Rail as a vehicle for exchanging information on current issues. Regular productive high-level meetings with RAIB's senior executives took place. RAIB attended ORR's Safety Regulatory Committee in March 2014, where RAIB's Chief Inspector confirmed the view that relationships and work between the organisations continued to be positive.

Our role is to influence and monitor end-implementer actions to consider and implement RAIB's recommendations and report action being taken to address each recommendation to RAIB within 12-months of a recommendation being published.

During 2013-14, we reported to RAIB on 199 recommendations¹⁵. Of these: 87 were reported as 'Implemented'¹⁶; 11 were reported as 'Implemented by alternative means'; 33 as 'Implementation on-going'¹⁷; 62 as 'In progress'¹⁸; and 6 as 'non-implementation'¹⁹. We update RAIB on recommendations classed as 'implementation on-going' and 'in progress' when further information is available.

In the same period RAIB, published 24 reports with a total of 94 recommendations for Great Britain.

At the end of 2013-14 we had:

- 80 recommendations less than 12-months old; and
- 91 recommendations where we had previously reported to RAIB that actions were in-hand or incomplete information had been provided by end-implementers. We will continue to work with end-implementers to address this. We expect to update RAIB on these recommendations within timescales advised. During the year we reduced the number of recommendations reported as 'In-progress' that are over two years old from 43 to 16. We will continue to work with the industry to address these remaining recommendations.

¹⁵ Our responses to RAIB are published on our website and can be seen at: <http://orr.gov.uk/what-and-how-we-regulate/health-and-safety/investigating-health-and-safety-incidents/handling-raib-recommendations>

¹⁶ All actions complete and recommendation fully addressed.

¹⁷ Appropriate action plan with completion dates received from the end implementer.

¹⁸ Discussions on-going with the end-implementer to agree actions to address the recommendations.

¹⁹ Valid reasons have been accepted as to why the recommendations should not be subject to implementation.

An independent audit of our recommendation-handling process and of our relationship with RAIB was carried out during the year. This resulted in a number of proposals designed to further strengthen the working relationship. Work has already begun to address these and will continue in the coming year.

During the reporting period, the RAIB and ORR worked on developing a joint database to track and report actions taken by the industry in response to RAIB recommendations.

Our relationship with RSSB

In 2013-14 we approved amendments to RSSB's constitution agreement and the addition of HS2 as a member.

We participated as an observer at RSSB's board, which annually reviews mainline railway safety risks to passengers, the workforce and public²⁰. RSSB's board annually reviews and issues reports on the completeness of the data it collects²¹.

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

We use RSSB's safety risk model and precursor indicator model, 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.

During 2013-14, RSSB published an industry road-map to improve occupational health and issued a range of guidance materials on their website to which we contributed. This included a filmed case study on our stress risk assessment using the HSE's management standards and for the Track Safety Alliance about the risks posed from ballast dust.

RSSB's 'costs of impaired health across the network' report noted that the total annual cost of impaired health to the industry was around £790m. By comparison, the total spend on occupational health and wellness programmes is evaluated at approximately £24m each year, which averages out at £201 per person per annum. Using these figures, for every £13 lost to sickness absence amongst railway employees, only £1 is spent on supporting their health. A 10% reduction in overall impaired health costs would realise a saving of £79 million.

²⁰ <http://www.rssb.co.uk/spr/reports/pages/default.aspx>

²¹ <http://www.rssb.co.uk/Pages/Main.aspx>

Section 5 - Our policies and approach to health and safety regulation, including the railway management maturity model

ORR's approach

We aim to ensure that the railway industry manages risks adequately, and continuously improves its health and safety performance so far as is reasonably practicable. Informed through our regular audits, inspections, investigations of incidents and handling of complaints, we are able to take an efficient risk-based approach to regulation.

Our regulatory approach²² includes:

- using our railway management maturity model (RM3) which helps to identify how well duty holders are meeting the requirements of their safety management systems;
- proactive inspection and audit of industry duty holders to inform RM3;
- monitoring health and safety performance indicators, including the assessments undertaken by other bodies, such as the Rail Safety and Standards Board (RSSB) and the Rail Accident Investigation Branch (RAIB);
- providing industry advice and guidance to help duty holders comply with the law;
- using our powers and influence to help the industry tackle common issues, such as competence, supervision, managing change and safety awareness; and
- using appropriate enforcement to:
 - ensure duty holders take immediate action to deal with serious risks;
 - ensure duty holders meet the legal requirements; and
 - if appropriate, ensure duty holders are held to account in the courts for any health and safety failings.

Legislative framework

Our work focuses on ensuring Britain's railway industry improves its health and safety culture, and has effective risk control measures, relies on having the right goal-setting health and safety law in place. We are responsible for preparing proposals for railway-specific

²² See: http://orr.gov.uk/_data/assets/pdf_file/0017/5606/hs_regulation_policy_statement_april_2010.pdf

safety regulations and for ensuring that these are accompanied by simple, clear guidance to support compliance. Most railway-specific safety law now originates from Europe and we work closely with the Department for Transport (DfT) to ensure the UK has the appropriate framework of law and meets its obligations under European requirements.

We support the development of a European framework which promotes market opening, and improves railway's competitiveness, while ensuring that a robust safety regime is in place.

To achieve these goals, our future priorities are:

- ensuring proper implementation throughout Europe of the obligations and responsibilities in the Railway Safety Directive, and ensuring practical arrangements are set up to deliver improvements envisaged in the fourth railway package; and
- developing cooperation 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:

- working with DfT, UK stakeholders and other NSAs to influence the outcome of the 'technical pillar' of the fourth railway package and the development of a single safety certificate;
- promoting a coordinated approach by NSAs, and effective liaison with the European sector, on key issues in the European safety regulatory regime;
- taking forward the development of a common approach to post-certification supervision by NSAs and monitoring of duty holders management systems; and
- liaising with ERA to improve the work of the network of NSAs, and its relations with other networks of stakeholders.

Fourth railway package

The EU Transport Council has reached 'general approach' agreement to changes in the technical pillar of the fourth railway package, to the Railway Safety Directive, Interoperability Directive and ERA Regulation. The proposals make provision for a single safety certificate (combining the current Part A and Part B components). Applicants who operate in only one country will be able to apply for the certificate either to the NSA in that country or to ERA. Applicants operating in more than one country will apply to ERA for a certificate. These provisions are similar to those agreed for interoperability authorisations of vehicles. Further discussions, expected to start in late 2014, are needed between the European Commission, member states and the European parliament before any changes are finalised.

We have worked closely with DfT, and other NSAs, on the implications of these changes and we will continue to work to ensure that practical arrangements are put in place to manage the changes.

Our legislative policy work during the year included

- working effectively with the Law Commissions for England & Wales and Scotland to finalise proposals, published in September 2013²³, to modernise and simplify the way in which level crossing risks are governed. We also submitted evidence and assisted the Transport Select Committee inquiry on level crossings safety²⁴;
- managing processes required by the train driver licensing directive, including issuing around 2,000 train driver licences and the recognition of relevant doctors, psychologists, training centres and examination centres;
- continuing to improve the regulatory framework for railways and to work with DfT on the Government's Red Tape Challenge. For example, we took forward a project to review, consolidate and improve three sets of out-dated rail safety law. Our consultation²⁵ on this was opened on 8 July;
- ensuring we have a robust process for our role as certification body for entities in charge of maintenance (ECMs) for freight wagons, and that all certificates were issued on time. We issued 32-operator's safety certificates and authorisations, of which seven were for non-mainline operators; and
- working closely with HSE on the reform of general health and safety legislation to ensure that the implications for railways are fully taken into account. This included input on the reform of provisions for self-employed workers and the proposed revision of construction regulations in 2014-15.

Railway management maturity model

We are in our third cycle of railway management maturity model (RM3) evaluations to assess operators' safety management systems. This process forms a key part of our supervision strategy and informs our reassessment of safety certificates. We continue to work with Network Rail and train operators to support their own use of RM3; to drive improvement in their risk management arrangements; and to test the effectiveness and efficiency of their risk controls.

²³ <http://lawcommission.justice.gov.uk/areas/level-crossings.htm>

²⁴ <http://www.parliament.uk/business/committees/committees-a-z/commons-select/transport-committee/news/level-crossings---tor/>

²⁵ <http://orr.gov.uk/consultations/policy-consultations/open-consultations/revising-railway-safety-regulations>

In April 2014, we published our new occupational health programme²⁶ - making it happen which sets out our approach to engaging with duty holders over the next five years. We have added a new occupational health section to RM3 to support this programme.

Occupational health

We have worked extensively with the industry to help duty holders improve their understanding and management of occupational health issues and understand the associated costs of not managing this effectively.

Our own plans for continuous improvement

As an integrated safety and economic regulatory office, we are determined to support the industry's successes and enable improvement; and also improve the way we do things. For example, this year we will work with the sector to improve our RM3 model based on the findings of an independent review that we commissioned. We will also be developing plans to help us improve as an inspectorate to ensure we are fit for when the sector has progressed further in its management maturity.

Taking up the safety-by-design principles mentioned earlier, the Department of Work and Pensions' Triennial Review of the Health and Safety Executive (HSE), which concluded in January 2014²⁷, recommended that HSE liaise with ORR on the design aspects of major railway infrastructure development projects. We already liaise closely on the construction of London's Crossrail project and we have formed a dedicated group to work closely with the HSE's construction team over the design aspects of the High Speed 2 project.

The safety of the Channel Tunnel

We provide the UK secretariat for the bi-national Channel Tunnel Intergovernmental Commission (IGC) and the Channel Tunnel Safety Authority (CTSA). In addition we provide representatives to both bodies and other expert assistance, including policy expertise and inspectors.

With the co-operation of our French IGC and CTSA colleagues and Eurotunnel, we aim to regulate the tunnel in the same way we regulate the rest of Britain's railway infrastructure. We believe this will help the UK and French governments to ensure the Tunnel's good safety record is maintained, while delivering benefits in terms of greater competition through new operators and services.

²⁶ <http://orr.gov.uk/news-and-media/email-alerts/2014/orr-publishes-occupational-health-programme-2014-2019-to-mark-workers-memorial-day>

²⁷ <https://www.gov.uk/government/publications/triennial-review-report-health-and-safety-executive-2014>

Our inspectors are appointed to lead and deliver CTSA's inspection plan, which aim 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 turn, what we learnt from this activity informed our consideration of Eurotunnel's application to renew its authorisation as infrastructure manager of the Channel Tunnel – which the IGC granted them in April 2014. Our inspection work this year focused on:

- Eurotunnel's approach to change management and risk analysis;
- monitoring the transition to a new, private provider of "first line of response" emergency services in France;
- Eurotunnel's strategy for maintenance of its fleet of locomotives and vehicles;
- DB Schenker's systems for maintaining the Tunnel-specific competence of its employees; and
- Eurotunnel's revised approach to managing re-railing works in the Tunnel, following some incidents in January 2014 where track workers were exposed to elevated levels of carbon monoxide.

Our officials continue to drive improvements to the Tunnel's regulatory framework, and to the pace and transparency of IGC's safety regulatory activity. In this area, key achievements in 2013-14, included:

- publication of a clear set of technical rules for railway vehicles using the Tunnel, which is already allowing manufacturers and train operators to get their equipment authorised; and
- adoption of a risk-based strategy for safety supervision (inspection), which aligns with European better regulation requirements.

We delivered a well-attended frank and open stakeholder conference in March 2014, about IGC's approach which provided useful intelligence to plan our work in future.

Annex 1

Enforcement activity

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 statement²⁸ sets out how we ensure rigour and consistency in our enforcement decisions by using our enforcement management model.

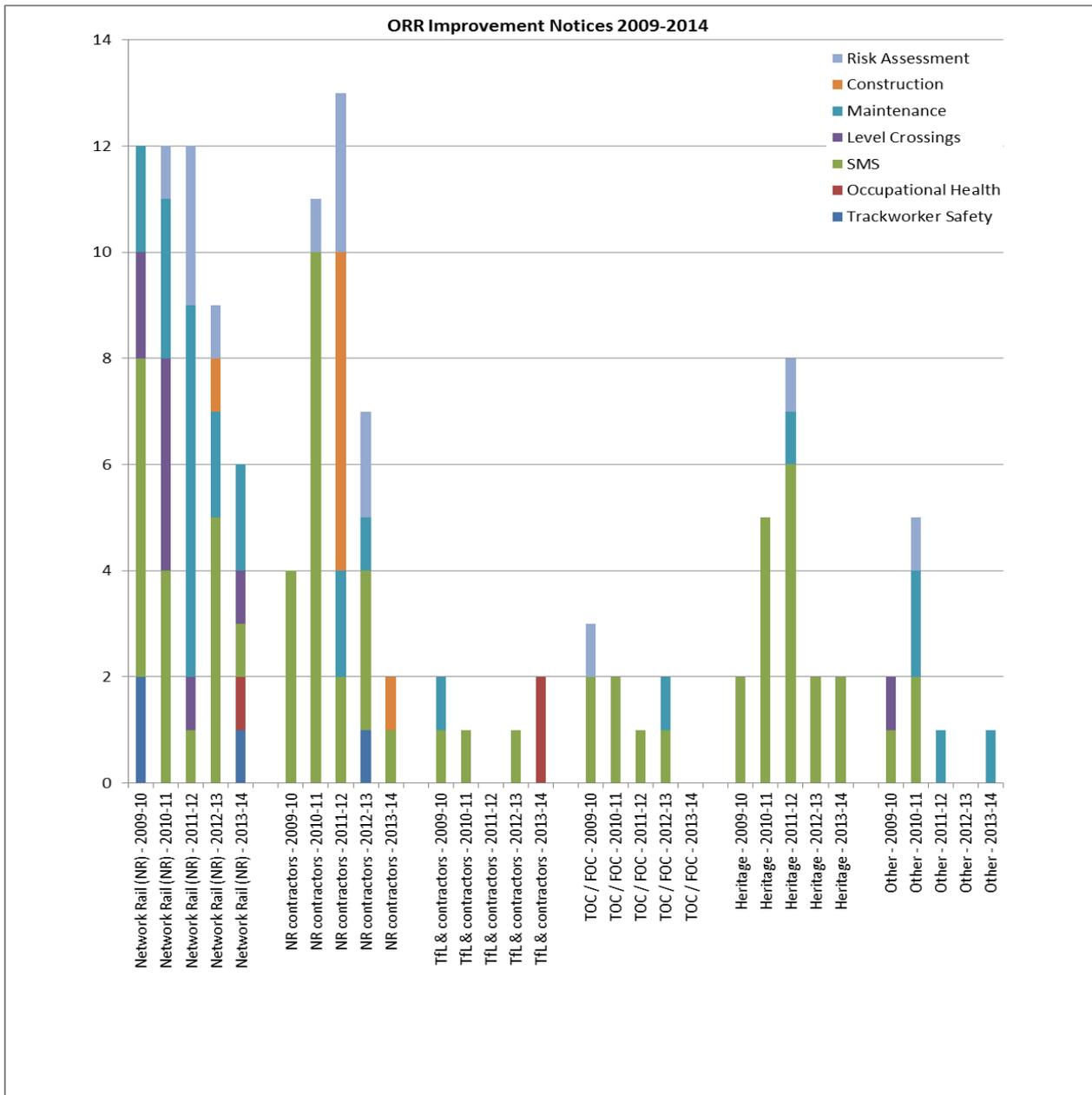
Improvement notices in 2013-14 (the full list is available on our website²⁹)

We served a total of 13-improvement notices: six on Network Rail, two on its contractors, two on TfL's contractors, two on heritage operators and one on a passenger transport body. We served three fewer improvement notices on Network Rail in 2013-14 compared to the nine in 2012-13. The reasons for our notices – the first three of which had potentially network-wide implications - included:

- the rise in track geometry twist faults;
- the significant number of unearthed/unbounded signalling location cabinets, including some on station platforms;
- the absence of sufficient vegetation clearance to enable examination of earthworks;
- worker safety - safety of staff carrying out patrols and inspection, and work in unsupported excavations; and
- occupational health - underperformance in health risk management from the spraying of paint containing isocyanate.

²⁸ http://orr.gov.uk/_data/assets/pdf_file/0016/5650/hswa-enforcement-policy-statement.pdf

²⁹ <http://orr.gov.uk/publications/notices/legal-notices/improvement-notices>



Source: ORR

Key: SMS = safety management system; OH = occupational health; TfL = Transport for London; TOC = train operating company; and FOC = freight operating company.

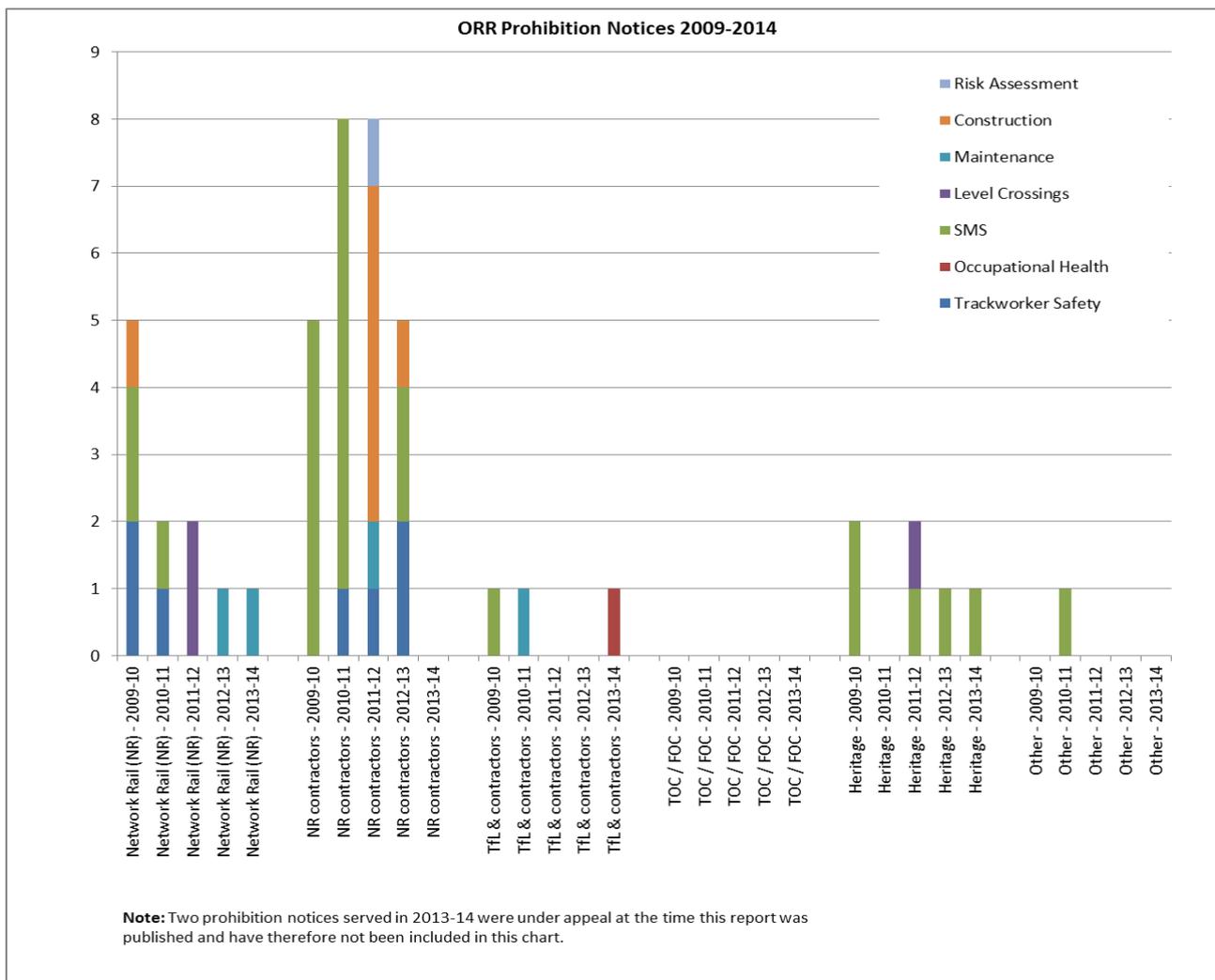
Prohibition notices in 2013-14 (the full list is found on our website³⁰)

We served a total of five prohibition notices, two of which are currently subject to appeal and therefore not included in the following chart. Of the other three: one was served on Network Rail, one on a TfL contractor and one on a heritage operator.

³⁰ <http://orr.gov.uk/publications/notices/legal-notices/prohibition-notices>

Key specific reasons for prohibition notices in 2013-14

- failure to implement effective engineering controls to prevent braking failures;
- occupational health - the spraying of paint containing isocyanate without adequate controls; and
- the unsafe operation of a heritage railway.



Source: ORR

Prosecutions in 2013-14

In England and Wales, we completed a total of six successful prosecutions against eight defendants with a total of £821k fines in 2013-14 - *see table*.

The defendants were: Network Rail in- two cases; Network Rail contractors in five cases; and a train operating company in one case.

Prosecutions this year were related to: failure to implement safe systems of work during construction and maintenance work on the railway, or repairs to machinery; poor site-related

risk assessment; inadequate sighting line for the user of a level crossing; and failure to manage risks to passengers when a crowded train became stranded.

In Scotland, we reported to the Procurator Fiscal following an investigation into track patrolling practice. The Procurator Fiscal prosecuted an individual under section 7 of the Health and Safety at Work Act. The defendant was found guilty and admonished in lieu of a fine – see *final entry on table below*.

England, Wales and Scotland		
Defendant	Incident	Fine
Network Rail Infrastructure Management Ltd.	An elevated platform fell killing one worker and injuring two others at Margaretting in Suffolk.	£125k
Barhale Construction PLC.	Failure to protect construction workers from electrocution while using heavy machinery under energised overhead power lines near the Gowy river, Chester.	£13k
First Capital Connect	Failure to manage crowd and detraining at a failed train incident between Kentish Town and St. Pancras.	£75k
Network Rail Infrastructure Management Ltd.	Child car passenger injured at an unmanned level crossing with poor user sighting lines near Beccles in Suffolk.	£500k
Geoffrey Osborne Ltd. and SSE Contracting Ltd	Electrician fell from height at Winchester station.	£48k
Babcock Rail PLC. and Swietelsky Construction Company Ltd.	Two rail workers were injured seriously when carrying out repairs to a ballast regulator.	£60k
Scotland track patroller (individual)	Irregularities in track patrolling.	n/a
	Total	£821k

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.
FWI	Fatality and Weighted Injury index: the common way of measuring harm to persons on Britain's mainline railways.
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.
ORR	Office of Rail Regulation: the economic regulator of Britain's mainline railway and health and safety regulator on all Britain's railways.
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, but also includes electrocution and falls from platforms without trains being present-related risks.
RM3	Rail 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.

Abbreviation	Definition
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-related information.
SPADs	Signals passed at danger; where a train passes a red signal without permission and runs the risk of compromising safety.
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.
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.

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