



ANNUAL HEALTH AND SAFETY REPORT OF PERFORMANCE ON BRITAIN'S RAILWAYS

2017-18

JULY 2018

CONTENTS

Foreword.....	5
Section 1 – Chief Inspector’s review	7
Section 2 - Health and safety across the railway sector: The regulator’s view..	13
Introduction	13
Mainline: Network Rail	17
Mainline: Train operating companies	33
Mainline: Freight operating companies.....	39
Heritage railways.....	41
Tramways	43
Transport for London, including London Underground and other metro services.....	46
Crossrail project and progress towards commencement of operation of the Elizabeth line	51
TfL Rail (MTR Corporation)	51
London Overground - Arriva Rail London Ltd (ARLL).....	52
Safety by Design	55
High Speed 2	55
Occupational health.....	57
The safety of the Channel Tunnel	60
Our safety policy work.....	61
Permissioning	61
Exemptions	62
Section 3 – Roles of key industry bodies	65
Section 4 - Our enforcement activities.....	69
Annex 1 – Glossary.....	71

FOREWORD

1. Railways continue to be safer than other forms of public transport, and British railways remain safer than their major European counterparts. Delivering this day in and day out requires constant vigilance and the ongoing commitment of all those who work in the industry.
2. The level of train accident risk on the mainline railway (as measured by the RSSB Precursor Indicator Model) in 2017-18 has reduced and is now at one of its historically lowest levels. There has also been a reduction in the number of Potential High Risk Train Accidents when compared to previous years.
3. Sustaining this level of risk in the years ahead requires, among other things, ongoing investment in the infrastructure. This year we have been reviewing Network Rail's spending plans for the five years from 2019. In our Draft Determination on those plans, we have sought additional spending on renewals by Network Rail with a view to securing improvement in the sustainability of its assets. We have also identified the need for additional spending to be targeted at other safety-related activities, including level crossings.
4. Investing in the people who work in the industry is another way in which this low level of risk can be maintained. We welcome the seriousness with which organisations are now addressing occupational health. We think that more can still be done - particularly in identifying and implementing sustainable solutions which design out the potential for health risk in future. For example, we have seen improvements to air conditioning filters for those working in the cab of yellow plant.
5. The work of our inspectors is targeted at those areas of greatest risk with the aim of proactively reducing it. It is also our responsibility to respond when incidents take place on Britain's railways. This year that has included the work that we are doing with tram operators following the publication of the Rail Accident Investigation Branch's report into the tragic Croydon Tram derailment in which seven people died. We have led the formation of an industry steering group to establish a Light Rail Safety and Standards Board. We will report fully on the progress made in implementing all of RAIB's recommendations in December.

Joanna Whittington
Chief Executive, ORR

Ian Prosser, CBE
Director of Railway Safety, ORR



SECTION 1 – CHIEF INSPECTOR'S REVIEW

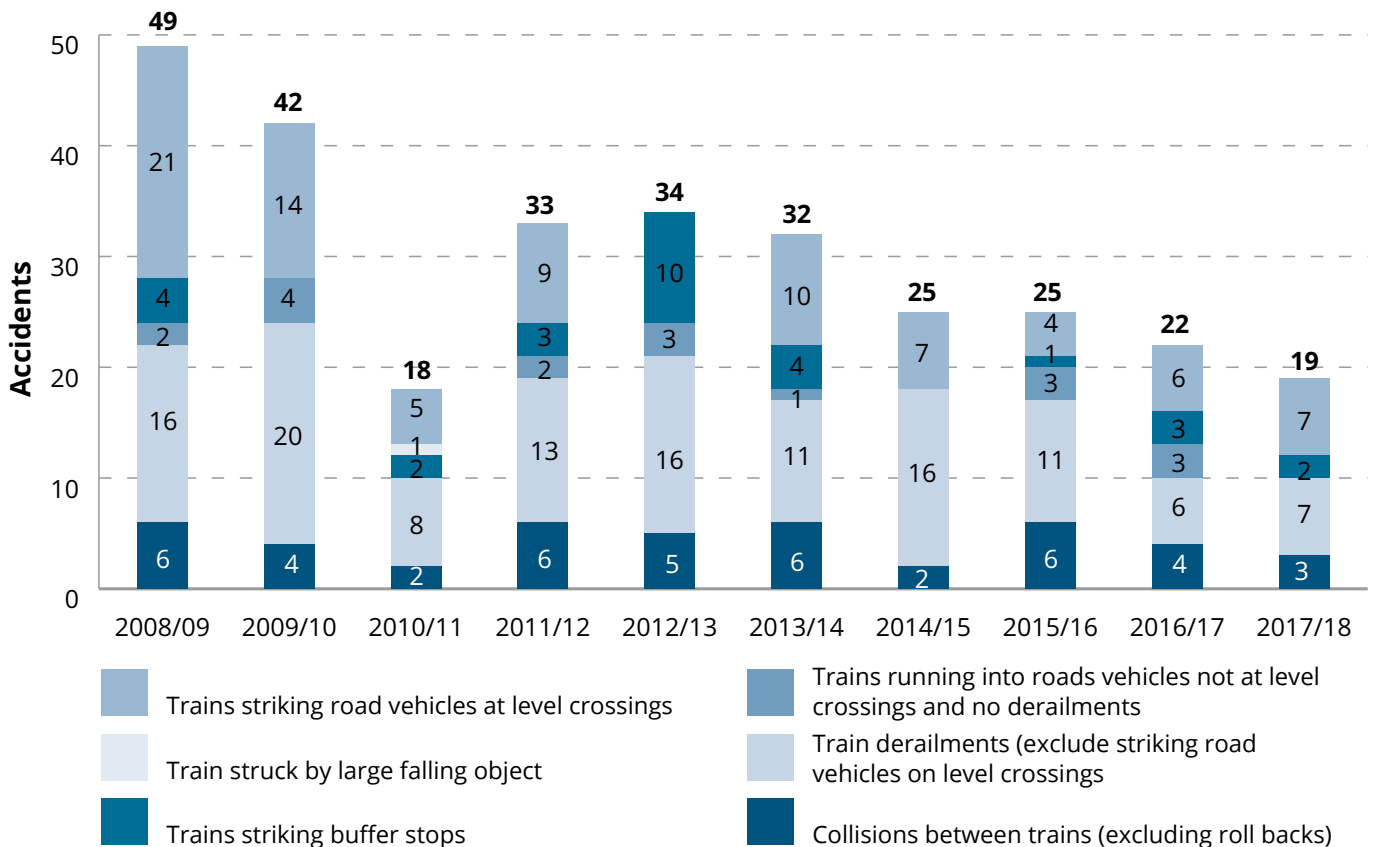


6. This year, our annual health and safety report highlights the actions we have taken to target the areas of greatest risk and also shows how we as a regulator strive to continuously improve. Throughout this report, we have used statistics on actual harm and modelled risk, in addition to the data gathered from our proactive inspections, audits and investigations, and our RM3 assessments.
7. Mainline passenger harm rose slightly when compared to last year. There were four passenger fatalities in 2017-18, one less than the previous year. However, overall normalised harm (i.e. considering the rise in passenger journeys over the past 10 years) for train journeys rose slightly from 25.0 to 27.2 fatalities and weighted injuries (FWI)¹ in 2017-18.
8. Mainline public harm is at its highest since 2012-13, with 44 fatalities in total in 2017-18. Of the 44, 36 people were trespassing and six were at level crossings.
9. The year began with two significant trespass incidents at freight depots, both of which involved children. Tragically in the case of the Daventry International Rail Freight Depot, a child lost his life. In response to this, I formally wrote to every freight operator demanding that they focus their attention on this area of risk to ensure that suitable steps are taken to prevent similar occurrences. Trespass fatalities have increased along with other near misses, particularly with children. We therefore support the strategy group set up by industry and continue to push for reasonably practicable actions to avoid these tragic accidents.
10. There were two workforce fatalities during 2017-18, of which one was related to railway operations and the other to natural causes. At Old Oak Common depot, a train maintenance worker lost their life during a lifting operation when a displaced load fell. We are investigating this incident.

1. Normalised passenger FWI has been revised since the original publication. Please see Errata (Page 73) for more details on the change.

11. This year we saw the number of Potential High Risk Train Accidents (PHRTAs) reduce to its second lowest level of the past 10 years. We have also seen a significant reduction in train accident risk as measured by the RSSB Precursor Indicator Model (PIM). We attribute this to improvement in Track and Level Crossing Assets, both key areas of focus and activity for ORR inspectors. Our inspections of track have focused on the capability of local maintainers, their knowledge of track assets, compliance with Network Rail's own standards, and how Network Rail nationally leads track asset management and assures itself that the risks are identified and properly managed at the local level. Our inspectors have pursued level crossing risk reductions nationally and locally by challenging Network Rail to close level crossings where possible, and to pursue innovative or alternative solutions to local risks rather than using off-the-shelf level crossing designs. We have also encouraged Network Rail to develop technological solutions that provide better warning at user-worked crossings. These in-depth inspections and central engagement continue to provide sound evidence that inspectors use to drive improvements. The chart below shows all mainline PHRTAs over the past 10 years²:

12. In last year's Annual Health and Safety Report I drew attention to the need for safe and sustainable assets on the mainline railway. Many of these assets remain vulnerable due to their age, the potential for rapid deterioration, and the deferral of remedial work. We saw some improvement in the management of these assets, for example in the assessment of scour risk and safety of drainage assets. Further work is needed to improve asset knowledge, examination compliance and evaluation, system risk management and control of third party risks. Provision of drainage at earthworks and risk management during adverse weather also remain priorities. Delays to the implementation of CSAMS (Civils Strategic Asset Management Solution) have hampered progress, and alternative measures are now being pursued. We found notable inconsistency in performance across the routes.



Source: RSSB

2. The number of PHRTAs has been revised from 18 to 19 since the original publication. Please see Errata (Page 73) for more details on the change.

13. In last year's report I also drew attention to the importance of managing change well and this year we committed to monitoring Transport for London undertake a major transformational programme of work. We also addressed challenges from new rolling stock where failure to manage change directly impacts on the travelling public. Network Rail has shown leadership and commitment to making a number of changes to safety management within the business, however, implementation of this change on the ground has faltered in some key areas: including the company processes for planning safe work, monitoring of worker health and asset data systems.
14. I also highlighted the importance of good culture and occupational health as a driver of excellence within the industry. Our assessment of Network Rail's safety culture, based on our national and route-based inspections and investigations, is broadly consistent with 2016-17. More broadly, their management maturity, assessed against the Risk Management Maturity Model (RM3) shows signs of improving consistency. Network Rail's management of occupational health risks is variable but shows signs of improvement. There were some notable failures but also some determined management action to remedy them, suggesting that Network Rail acknowledges the importance of positive occupational health management.
15. Finally, last year I drew attention to the importance of good design. Where health and safety by design has been implemented well, benefits can be gained at greatly reduced costs. The plans for the upgrades to the trains and stations of Merseyrail show the benefit of thinking early in a project about safety and looking for innovative ways to design out risk; the new trains with their low floors and sliding steps along with key platform upgrades should deliver a significant reduction in platform-train interface risk. We also considered how safety-by-design principles were embedded in various projects such as East-West Rail phase two, Liverpool Lime Street re-signalling, and the Northern Line extension.
16. Looking forward over the next three to five years, I believe the three key challenges facing the industry are:
- **Supporting our People:** Very often people are the last line of defence preventing a major failure. They perform safety-critical tasks with great professionalism and the fact that our railway is as safe as it has ever been is largely due to their dedication and professionalism. However, the modern world and changing pressures on passengers and the system as a whole, mean we need to focus on ensuring we support them through a strong culture of occupational healthcare, particularly mental health, as well as fatigue and competency management.
 - **Pressure on the System:** There are many pressures on the overall system, which we need to ensure are managed and risk controlled. There is a lot of change with plenty of new equipment being introduced now and over the next three years. Train frequencies have increased recently across large parts of the network and are set to increase further and our structures, earthworks and drainage assets are still primarily Victorian. There remain financial constraints and strains across parts of the system which, with an ever moving external environment, and a decline in performance, add to the pressures.
 - **Technology:** Technological developments offer great opportunities to improve safety, performance and value for money. In safety terms, they have the ability to create the extra barrier in the 'Swiss Cheese' model and so increase our defences. However, it is vital that we take human interaction into account and effectively manage the changes that support its introduction, for example, in working practices. This brings stress to people's lives and it is important to ensure the human interface is properly aligned with technology, ensuring jobs, processes and equipment are designed with people in mind. We also recognise this as a key competence for us a regulator in years to come.



17. Other areas of focus include:

- **Network Rail Asbestos Management Programme:** Although good progress is being made with overall delivery, there were problems with completing asbestos surveys for high priority assets in some Routes, most notably Anglia, while in the Western Route, there are no surveys are left outstanding.
- **Network Rail Hand Arm Vibration Syndrome (HAVS) health surveillance:** Following difficulties early in the year, extensive efforts were made to recover the situation. By the year end all but two routes achieved more than 95% compliance with their own health surveillance requirements. A recovery plan is in place to complete any outstanding assessments to provide formal HAVS diagnoses, and to prevent use of vibrating tools by the affected workers in the interim.
- **Heritage and Charter Operations:** We are continuing to monitor and concentrate on the top 25 largest operators in the heritage sector. We are also keen for charter operators to look for improvements to their current rolling stock, for example: to manage corrosion and thereby crash worthiness; fit Central Door Locking; restrict droplight window opening; and fit controlled emission toilets. The current exemptions for the Mk1 rolling stock expire by 2023, there will not be an automatic renewal of the exemptions
- **Air Quality:** We are also keen for the industry to tackle issues related to air quality and diesel emissions in maintenance depots, tunnels and stations, which may require close collaboration between dutyholders. We expect to see a robust precautionary approach to controlling diesel fumes, with proper consideration brought to reducing emissions at source and by improved ventilation control.

18. The industry safety strategy: Leading Health and Safety on Britain's Railways, has now been adopted by the Rail Delivery Group and we are keen to see progress within the industry. Industry groups are being established with RSSB support.
19. We are continuing to support various suicide awareness and prevention campaigns. ORR will be joining Network Rail and one train operator in the pilot for The Samaritans' "Million Hour Challenge". We will play a part in the commitment to volunteer working hours to improve suicide prevention.
20. We have completed our review of all of our Strategic Risk Chapters. They are now published and current and allow us as a regulator, and as a sector, to focus attention and resource. We are now working on a process for a risk-based review of the Chapters, drawing on the wealth of available data, to maintain their suitability in future.
21. The Risk Management Maturity Model (RM3) remains a critical tool for assessing Health and Safety Management System capability. This year saw greater use of the tool in industry, with Network Rail embracing its use. We have endeavoured to be even more transparent with RM3 data we hold throughout this year's report.
22. This year we have continued to engage the industry and other groups through our Railway Industry Health and Safety Advisory Committee (RIHSAC). We have engaged with our Trades Union colleagues at all levels. We have used the Health and Safety Regulators Network to collaborate with other regulators.
23. The upcoming year will see a change in the status of requirements in reporting by mainline operators into the RSSB Safety Management Information System (SMIS). The industry's ongoing safety management system arrangements are underpinned by tools such as the Safety Risk Model (SRM) and the Precursor Indicator Model (PIM). These tools fundamentally depend on robust industry use of SMIS and the consistency of data this supplies. We are keen that mainline operators continue to maintain at least the existing levels of reporting to meet their duty of co-operation.
24. Our work in Europe includes a collaborative effort with other member states and the European Union Agency for Railways to ensure that the "Fourth Railway Package" of legislation meets the intended purpose.



Ian Prosser, CBE

Director of Railway Safety, ORR
HM Chief Inspector of Railways



SECTION 2 - HEALTH AND SAFETY ACROSS THE RAILWAY SECTOR: THE REGULATOR'S VIEW

Introduction

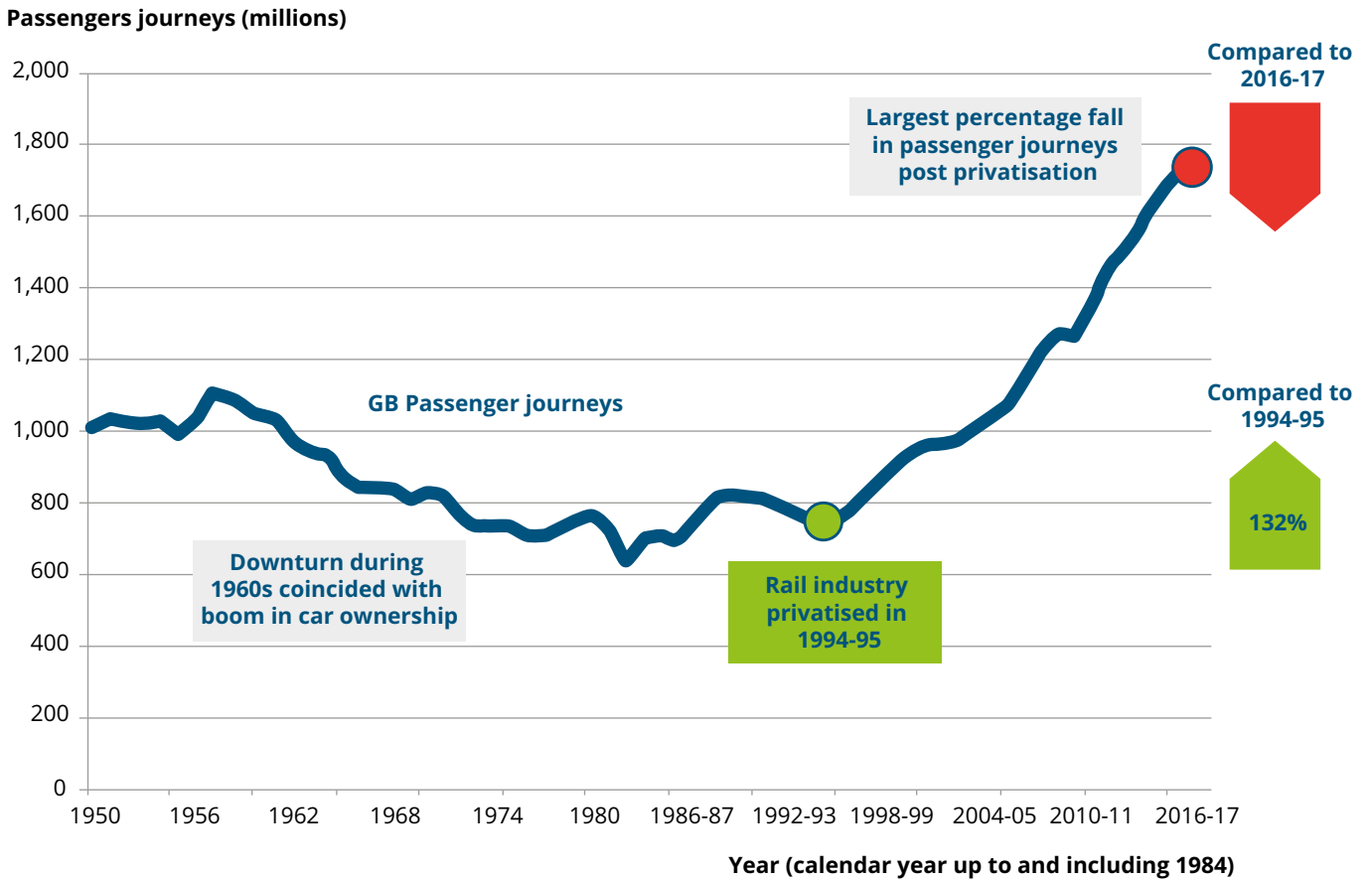
25. In this section we provide an overview of our main findings across key risk areas. We go on to set out the evidence supporting our conclusions about risk management effectiveness for each sector, including (where appropriate) the results of our Risk Management Maturity Model (RM3) assessments.
26. RM3 is one of our key assessment tools. It measures an organisation's ability to manage risk maturely and 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 level scale to assess performance and identify areas for improvement:
 - **level 1 'ad-hoc'**: processes that are typically undocumented and in a state of dynamic change, tending to be driven in an ad-hoc, uncontrolled and reactive manner by users or events. This provides a chaotic or unstable environment for the processes.
 - **level 2 'managed'**: processes are repeatable, possibly with consistent results. Process discipline is unlikely to be rigorous but where it exists it may help to ensure that existing processes are maintained during times of stress.
 - **level 3 'standardised'**: there are sets of defined and documented standard processes established and subject to some degree of improvement over time. These standard processes are in place and are used to establish consistency of process performance across the organisation.
 - **level 4 'predictable'**: use of process metrics. In particular, management can identify ways to adjust and adapt the process to particular projects without measureable losses of quality or deviations from specifications. Process capability is established from this level.
 - **level 5 'excellence'**: a focus on continual improvement through both innovative and incremental technological changes/improvements.

How we assess harm and risk performance

27. The collection of good data from across Britain's railways is critical in order to;
 - identify trends and quantify risk,
 - set the correct risk control priorities;
 - measure performance.
28. We use industry information about actual harm and modelled risk to measure health and safety performance on Britain's railways:
 - **actual harm** caused to individuals, which is measured on the mainline using the fatalities and weighted injury index.
 - **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.

29. However, these measures rely on, and are limited, by being outcome-based incident indicators: they measure harm-causing incidents to quantify current catastrophic train accident risk trends, but are not necessarily useful as future predictive or underlying risk indicators. We overcome this through use of our RM3 assessment to 'triangulate' our view of industry performance using a broad range of data and intelligence sources, such as performance indicators: for example, near-miss events, which had the potential to cause harm; content indicators, such as asset management performance and context indicators, such as measures of safety management culture and duty holders' risk management values.

- 30. When analysing passenger harm over time, it is important to consider the annual trends of passenger numbers. There were 1.7 billion passenger journeys on Britain's mainline network in 2017-18, a fall of 1.4% compared to the previous year. Since privatisation in 1994-95, passenger journeys have increased by 132%.
- 31. Post-privatisation, journeys have consistently shown year on year growth with the exception of 2009-10. However in 2017-18, journey numbers fell for the first time since 2009-10 and saw the largest percentage fall in journey numbers since 1993-94 – see chart below.



32. This report uses final and some provisional railway data. Confirmed 2017-18 safety data from mainline, London Underground Limited and non-mainline operators will be issued in our key safety statistics release in September 2018³. It will contain finalised numbers from both mainline and non-mainline operators.

33. Using our RIDDOR data, we have estimated harm across the sector for 2017-18 in terms of Fatalities and Weighted Injuries (FWI) in the table below:

34. Overall harm across the sector for 2017-18:

Person Type	Contractor	FOCs	Heritage	London Overground	LUL	Network Rail	Other Metros/ Light Rail	ROSCOs	TOCs	Trams	Grand Total
Passenger/ Public		1.01	0.19	0.01	1.40	46.92	0.10	0	3.11	1.31	54.05
Workforce	3.84	0.87	2.09	0.03	2.01	8.49	0.20	0.01	7.36	0.36	25.26
Grand Total	3.84	1.88	2.28	0.04	3.41	55.41	0.30	0.01	10.47	1.67	79.31

Source: ORR. **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013*⁴

35. These figures may differ from any equivalent figures produced by RSSB due to differences in how the FWI is calculated. For example, RSSB supply major/minor injuries for both public and workforce and calculate their FWI using this classification. However, under RIDDOR, dutyholders are only required to report specified injuries to workers, over-7-day injuries to workers and members of public transferred direct to hospital. We do not have the ability to determine whether 'member of the public' incidents are major or minor (other than for on the mainline, as reported to RSSB), therefore for the purposes of comparison between mainline and other operator types, we can only use the RIDDOR defined categories.

36. Our FWI figures are calculated on the following basis:

- 1 fatal = 1
- 1 specified injury to worker = 0.1
- 1 over 7-day injury to worker = 0.01
- Member of public direct to hospital = 0.01

37. It is important to note that these figures have not been normalised. Therefore harm is proportionate to size of operation and workforce.

3. <http://orr.gov.uk/statistics/published-stats/statistical-releases>

4. <http://www.hse.gov.uk/riddor/>



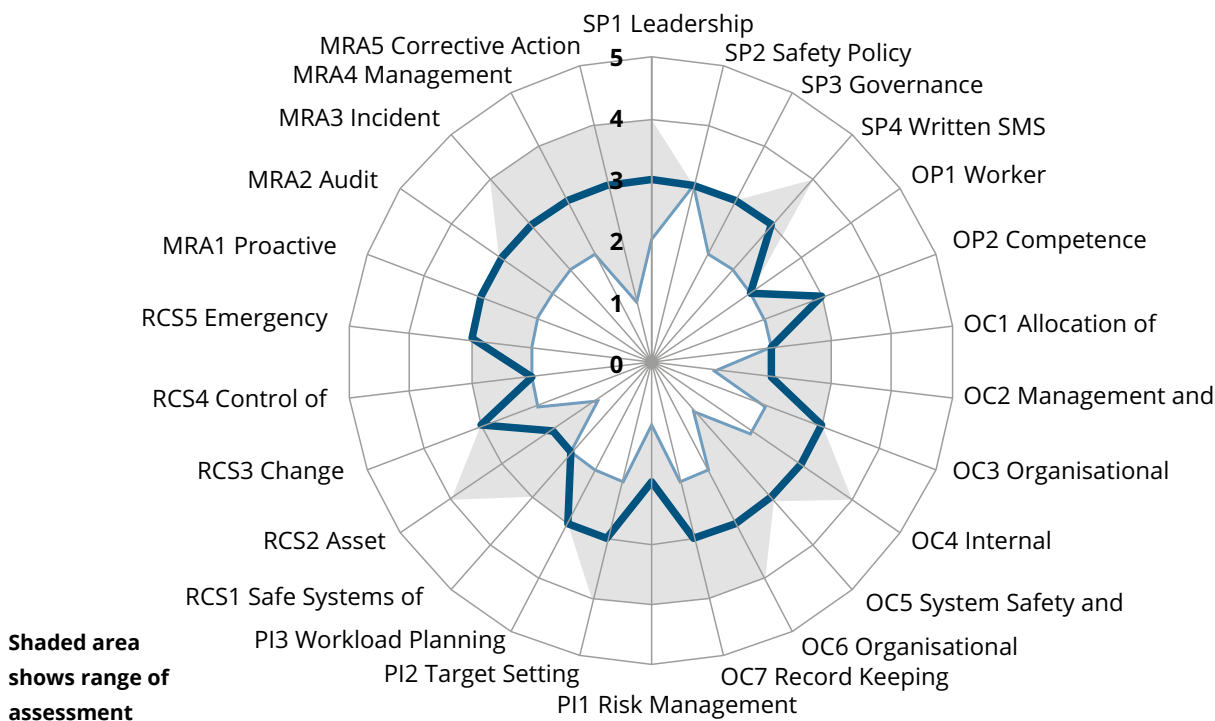
Mainline: Network Rail

Management maturity

Overview: Our assessment of Network Rail's management maturity in 2017-18 showed some improvement, with an increase in maturity at RM3 Level 3 ('standardised'), when compared with 2016-17. We continue to find inconsistent process maturity, risk management and risk control between routes and engineering disciplines. Giving flexibility to the routes makes it easier to find innovative solutions to fit local circumstances, and as such holds great promise. However, both nationally and locally, Network Rail needs to have in place strong safety leadership, effective risk assessment processes, and good assurance to ensure risks are managed consistently and reliably across the network.

38. Evidence: Our assessment of Network Rail's management maturity is based on our inspections, investigations and other contacts throughout the year. We chose our inspection topics according to our view of the priority risk areas, reflected in our Strategy Risk Chapters⁵ and informed by previous inspections, incidents, and intelligence from other sources (e.g. RAIB reports, RSSB safety reporting). They included: civils and track asset management, safety at user worked crossings, management of signallers and occupational health. Inspections considered both Network Rail's expectations centrally, and the reality in the routes. Our investigations provided an invaluable opportunity to test Network Rail's management arrangements.

Network Rail 2017-2018



5. <http://orr.gov.uk/rail/health-and-safety/health-and-safety-strategy/our-strategic-risk-chapters>

Network Rail year-on-year comparison 2016-2018



39. **Conclusions:** We have seen an overall improvement in Network Rail’s management maturity. Of 27 assessed elements, we assessed 19 at ‘standardised’, compared to 11 in 2016-17. This is a positive development that we hope to see sustained in future years. Nationally we have seen improved maturity in some key areas: competence management, workload planning, change management, proactive monitoring and management review have all improved.

40. We believe this improvement reflects an increasingly mature safety leadership at the centre of Network Rail. Network Rail’s central health and safety organisation has a clear idea of priorities and seeks to focus actions on improving risk control, particularly on worker health and, with less consistent success, on management of assets associated with catastrophic risks. The reduction in modelled derailment risk is a significant consequence of this focus.

41. Despite these overall improvements, we encounter considerable variations in maturity within disciplines and between the routes. The shaded area in the 2017-18 chart shows the range of assessed levels of maturity across routes and disciplines, whilst the solid line shows our assessment of maturity based on the majority of evidence. Our assessments of management maturity show a large range of attainment in some particularly safety critical areas such as interface safety, asset

management, and risk assessment and control. We assessed management of system safety interfaces overall as ‘standardised’, but within that there are some routes assessed at the lower levels of ‘ad-hoc’ and ‘managed’. Overall we assessed asset management as ‘managed’, but with wide variations between ‘predictable’ and ‘ad hoc’. Similarly, whilst centrally Network Rail is focussed on managing priority risks, our national, largely route-based assessment of attainment in risk assessment and management is only ‘managed’, and within this there are examples of ‘ad-hoc’ and the higher level of ‘predictable’ within the routes. The conclusion is that Network Rail cannot be certain that risks are managed consistently and effectively across the country. This inconsistency is preventing Network Rail from progressing in overall management maturity.

42. Our conclusions will inform our inspection priorities in the future. Whilst the routes have the ability to develop local solutions for particular risks, they need to do so in a way that underpins consistent risk management across the network. Our findings show that Network Rail needs to do more to assure itself that it applies its own risk controls and procedures consistently and robustly. Effective monitoring, audit and review processes will be important in obtaining this assurance and in driving greater consistency of maturity.

Workforce Safety

Overview: Network Rail's management of risks to its workforce has shown positive progress throughout the year, as measured by its performance indicators. It continues to develop technology to supplement existing ways for infrastructure workers to protect themselves from moving trains. The year saw the revision of the primary company standard for safety of people on or near the line (NR/L2/OHS/019 or "019"). Implementation of its requirements was staged, reflecting the more cautious, incremental approach Network Rail is taking to its planned changes. Our work during the year showed that even these modest improvements had not always been clearly communicated and executed.

43. **Evidence:** Promoting the improved safety of workers is central to the role of ORR and has always been a priority. Although mainline performance has transformed over recent decades, the railway still presents a hazardous working environment and there remains work to do to achieve and sustain ORR's vision of zero workforce fatalities.
44. Network Rail had no worker fatalities in 2017-18. The measure of fatalities and weighted injuries, normalised by hours worked, (FWI) stood at 0.076 at the year-end. This represents a decrease (improvement) of 14% from the previous year. Network Rail had set itself a target for the year to improve its lost time injury frequency rate (LTIFR), which is a measure of lost-time accidents per hundred thousand hours worked. The target was 0.402, a 10% reduction of the 2016-17 LTIFR. Network Rail improved on this target so that the rate at the end of 2017-18 stood at 0.364, a reduction of some 16%. It is notable that this aggregated corporate figure covers markedly different performance by separate parts of the organisation; Route businesses (all routes combined) achieved a 14% reduction, whilst Infrastructure Projects secured a much stronger 27% improvement.
45. Network Rail's corporate vision is described as 'Everyone Home Safe'. The practical implementation of its health and safety strategy is the 'Home Safe Plan'. 2017-18 has seen good progress in some important aspects of this plan, which is targeted at the most significant risks to the health, safety and wellbeing of the workforce. One example is the area of road risk reduction. Network Rail has focused on reducing risk in this increasingly hazardous aspect of its operations. Since the introduction of the Vehicle Speed Warning System (VSWS) to its fleet there has been a 75% reduction in road traffic accidents (RTAs) and a 35% reduction in injuries to staff caused by RTAs.
46. **Activities:** Following significant setbacks in 2016-17 to the introduction of Planning and Delivering Safe Work (PDSW), Network Rail set about working with its staff to learn lessons, consolidate plans and agree the way forward to improve worker safety. To support this effort, we closely monitored Network Rail's change management, rather than initiate major inspection activities to test performance in managing the risks to track workers.
47. The changes to PDSW enshrined the principle of one person in charge on site, and of involving that person in planning the work to identify and control site and task risks. The new 019 standard introduces the role of Safe Work Leader for Infrastructure Projects, whilst Maintenance and Works Delivery retains the more traditional Controller of Site Safety (COSS). The most recent revision of the 019 standard introduced a new term of Person In Charge (PIC). The aim of this change is to cover the range of competencies that could fulfil the role of being the sole accountable leader for site safety. Unfortunately, we received repeated feedback from staff and contractors alike that this attempt to clarify roles had introduced confusion. This shows the importance of effective communication in the management of change. Although this will always be a challenge for Network Rail given the large number of contract workers on Network Rail infrastructure.

48. We maintained scrutiny of the use of funds ring-fenced to develop technological assistance in delivering safe systems of work. Progress has been made throughout the year. There are now three products that can provide assistance to staff to protect them from or warn them of train movements. This is clearly preferable to systems of work that rely solely on people to follow procedures. Importantly, each of the initiatives can be deployed remotely from the track environment – eliminating the risk of staff exposure to trains whilst setting up safe systems of work. For each technological innovation there is now a lead route.
49. During 2017-18 we promoted the benefits of improved co-ordination of planning in order to maximise what can be achieved where there are opportunities to do work, albeit with constrained access. One Route has demonstrated the benefits of this approach with 'Safe and Effective Working': optimising work done during available access slots by co-ordinating and maximising all parties who need to do work, reducing road traffic journeys for staff and keeping signaller workload at manageable levels.
50. During 2018-19 we will be carrying out a more extensive inspection programme to gauge for ourselves how far the changes to the new standard have embedded and are delivering improvements. We will also identify where we think further improvements can be secured.
51. **Conclusions:** Network Rail must maintain its focus on delivering its strategic aims by implementing the Home Safe Plan. This will help to make every year fatality-free. It needs to consolidate the modest changes introduced by the revised track worker safety standard in this area and ensure that staff understand its requirements and have the time and resources to carry them out effectively. Network Rail has adopted challenging targets for the amount of lost time related to injuries for CP6. These will be particularly difficult for route businesses to achieve unless they start to understand the reasons for better results within Network Rail's Infrastructure Projects teams. Further, devolved routes will need to make careful choices about investing in technology to provide more reliable protection and warning for its staff.
52. Although performance indicators for workforce safety show a positive trend (FWI and LTIFR) there are still significant numbers of near misses and other high potential precursor events. Some precursor indicators, such as those involving signaller actions and operational irregularities, have not improved since 2015-16. We will be monitoring Network Rail's efforts to try to introduce improved management of these areas.



Occupational Health in Network Rail

Overview: Network Rail's management of occupational health risks is variable. The year has shown that, when focused and resourced, Network Rail can take positive action to manage health risks.

53. **Evidence:** Historically, Network Rail's control of occupational health risks is variable. In previous years we have monitored compliance in several key areas and seen intermittent, variable progress, particularly in the areas of hand arm vibration (HAVS) health surveillance, asbestos surveys in buildings and structures, control of respirable crystalline silica (RCS) and manual handling. All of these areas have been the subject of previous ORR inspections, and we placed actions on Network Rail to improve in these areas.
54. **Activities:** Our activities in 2017-18 were focused on ensuring tangible progress. We focused on monitoring central and route progress in these areas. We did this through reviewing progress updates, challenging Network Rail where we found programme slippage, and inspections of occupational health aspects of railway maintenance activities.
55. **Conclusions:** Exposure to RCS in ballast dust is an area where Network Rail is making improvements, such as at aggregate handling depots and in the High Output Fleet. We have seen committed moves away from simply relying on respiratory protective equipment (masks and respirators) to controlling dust in the first place by wetting down at handling plants and engineering controls on track laying and ballast renewal machinery. This relates to an outstanding action from the 2013-14 ORR inspection report on occupational health. We issued an improvement notice in June 2017 in one route because dust controls were inadequately controlled. Inspections elsewhere, however, found similar work being carried out with suitable controls. We will continue to monitor Network Rail's activities in this area.
56. In line with an action from last year's ORR inspection report, we made arrangements for Network Rail to report its progress in implementing its Asbestos Management Programme to ORR. Some aspects of the programme proceeded as planned. However, surveys of some 'high priority assets' were not completed in all routes. That is disappointing, particularly as central management of the programme has provided clear direction and good leadership. As a result, we placed an action on Network Rail to complete all asbestos surveys in routes for both 'high priority' and 'medium priority' assets in the 2018-19 year and we will continue to monitor progress.
57. Manual handling is one of Network Rail's priority areas and included in its Home Safe Plan, a centrally coordinated, national project designed to achieve improvements in health and safety. ORR inspections found that there is a structured approach to the project's management, with motivation and impetus for it to succeed. However, it is still early days, and much work is required if significant and sustainable improvements are to be achieved in a difficult topic area. This is reflected by findings from ORR's manual handling inspections.

Level crossings

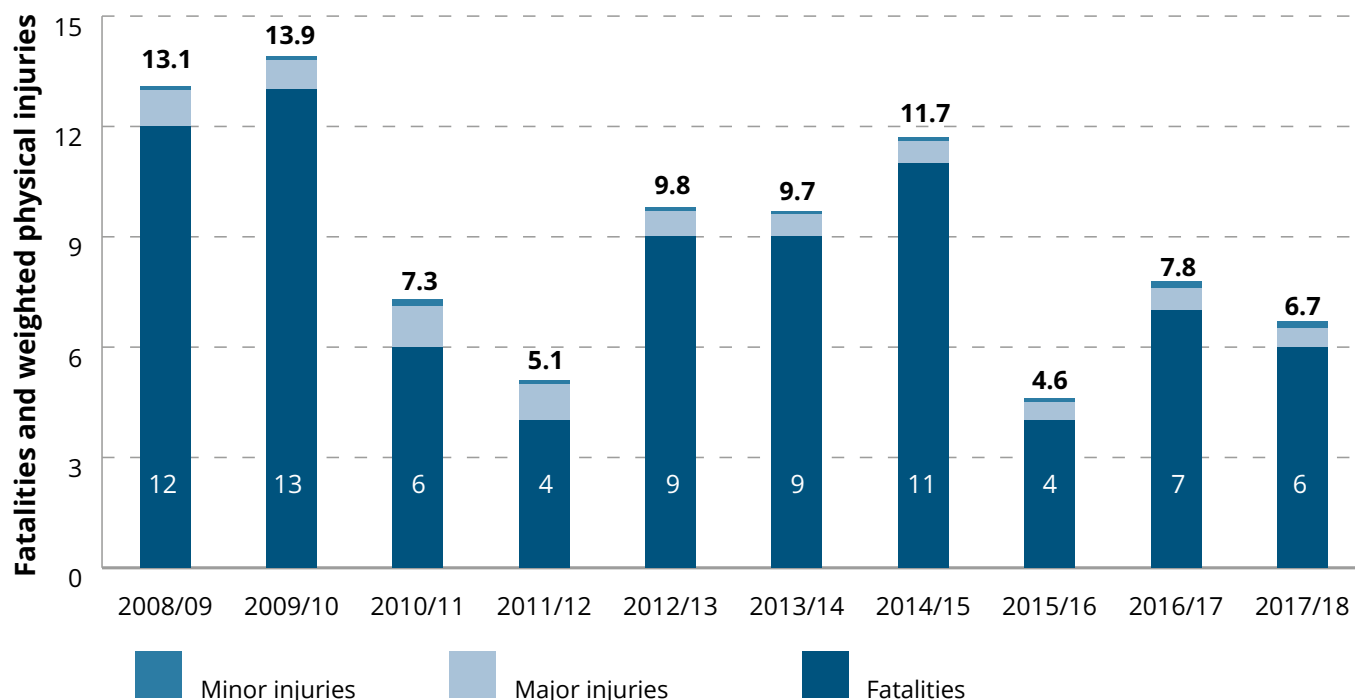
Overview: During CP5 Network Rail's 'modelled' risk at level crossings has fluctuated – mainly as a result of increasing numbers of trains or more accurate data about actual numbers of crossing users. Despite these adverse pressures, risk has shown a reducing trend during 2017-18. This is because of Network Rail's targeted use of its Level Crossing Risk Reduction fund. Fatal incidents continue to occur and Network Rail will be going into CP6 with the continued challenge of targeting high priority crossings to achieve the most effective use of funding.

58. **Evidence:** Level Crossing Safety is a priority topic for ORR because level crossing use kills and injures significant numbers of people each year. In 2017-18 there were six fatalities at Network Rail crossings, although overall,

significant level crossing incidents (actual deaths, injuries and near misses) decreased by 1.3% over the year. At the end of the year, risk at level crossings, as calculated by Network Rail's level crossing risk model, stood at 11.27 FWI. This is the lowest figure ever.

59. Whilst fatality figures at level crossings have varied over the past 10 years, the long-term trend is reducing. This reflects Network Rail's risk reductions, continued focus by ORR on level crossing risk controls locally and nationally through inspections and investigations, and oversight of strategic direction and the level crossing risk reduction fund. We have pushed Network Rail to adopt technological solutions at higher risk crossings, and to adopt bespoke designs rather than off-the-shelf solutions to accurately address site-specific risks.

60. Level crossing harm over time⁶:



Source: RSSB

6. 2017-18 figure has been revised from 6.6 to 6.7 since the original publication. Please see Errata (Page 73) for more details on the change.

61. Network Rail has targeted improved safety by means of its level crossing Risk Reduction Fund. This is a dedicated funding to enable 'extra' interventions, going beyond the legal baseline of what is reasonably practicable. The main focus of the fund has been to secure crossing closures. The fund, in CP5, has enabled closure of 114 crossings and commissioning of 65 asset improvement schemes. Combined with 'business as usual' activity, Network Rail has closed some 322 crossings since the start of CP5. The total risk reduction in FWI is 19.5% so far this control period.
62. Network Rail has worked throughout 2017-18 to further develop the range of technologies to supplement and improve warning and protection at crossings where risk control is historically very weak. There are proven solutions available now for user worked and footpath crossings that previously relied on users' own vigilance or telephoning a signaller to gain permission to cross. Many of these have become more affordable. As Network Rail moves into CP6, we will be maintaining pressure on routes to ensure they make appropriate investment decisions to deploy reasonably practicable solutions.
63. **Activities:** Our main inspection programme was of user worked crossings with telephones (UWC-T) in long signal sections. The risks here arise from the signaller having little or no information about the whereabouts of a train in the section – and the consequent problems in giving accurate information to crossing users. These crossings have been associated with a number of serious incidents and have been the subject of ORR enforcement action. We found weaknesses in a number of aspects of Network Rail's operation of these crossings and have made nine recommendations for improvement.
64. Network Rail had a strategy for introducing technological solutions to these crossings – mainly warning systems that can be overlaid onto existing signalling. During 2017-18 it revised the strategy and removed the timescales associated with introducing improvements. This reflected the anticipated level of funding for CP6. We have challenged Network Rail to commit to spending at the highest priority crossings as we believe that is reasonably practicable and therefore legally required.
65. We had regular liaison meetings with Network Rail to monitor the spending of the CP5 risk reduction fund and to discuss the best means of improving crossing safety. Network Rail has been alert to the changing nature of challenging user behaviour and has targeted its public safety campaigns at priority groups – young people, smart phone users, those wearing headphones etc.
66. We will be revising our processes and guidance around the legislative framework for approving changes to level crossings in 2018-19.
67. **Conclusions:** Our engagement with routes during the Periodic Review revealed that they are at varying levels of maturity and have differing understanding of the legal duty to introduce safety improvements 'so far as is reasonably practicable'. The main challenge for Network Rail is to get its whole business to a shared understanding of what this means – in a climate of competing calls on available funds and in the absence of any dedicated additional funding. We will maintain pressure to ensure it delivers optimal risk control.



Track and lineside

Overview: Performance indicators have been positive throughout 2017-18 with many measures at historically best ever levels. Our RM3 ratings for track management activities saw improvement in a number of areas – but we saw a correlation between these scores and where we have focused our efforts – we will be looking to see that these improvements are maintained. Where there had not been sustained previous ORR scrutiny, the scores were lower. Our inspections showed some improved outcomes, but highlighted once again the potential vulnerability of Network Rail’s risk control framework and the importance of assuring its effective delivery. We took enforcement action on the topic of Track Maintenance Engineer Competence.

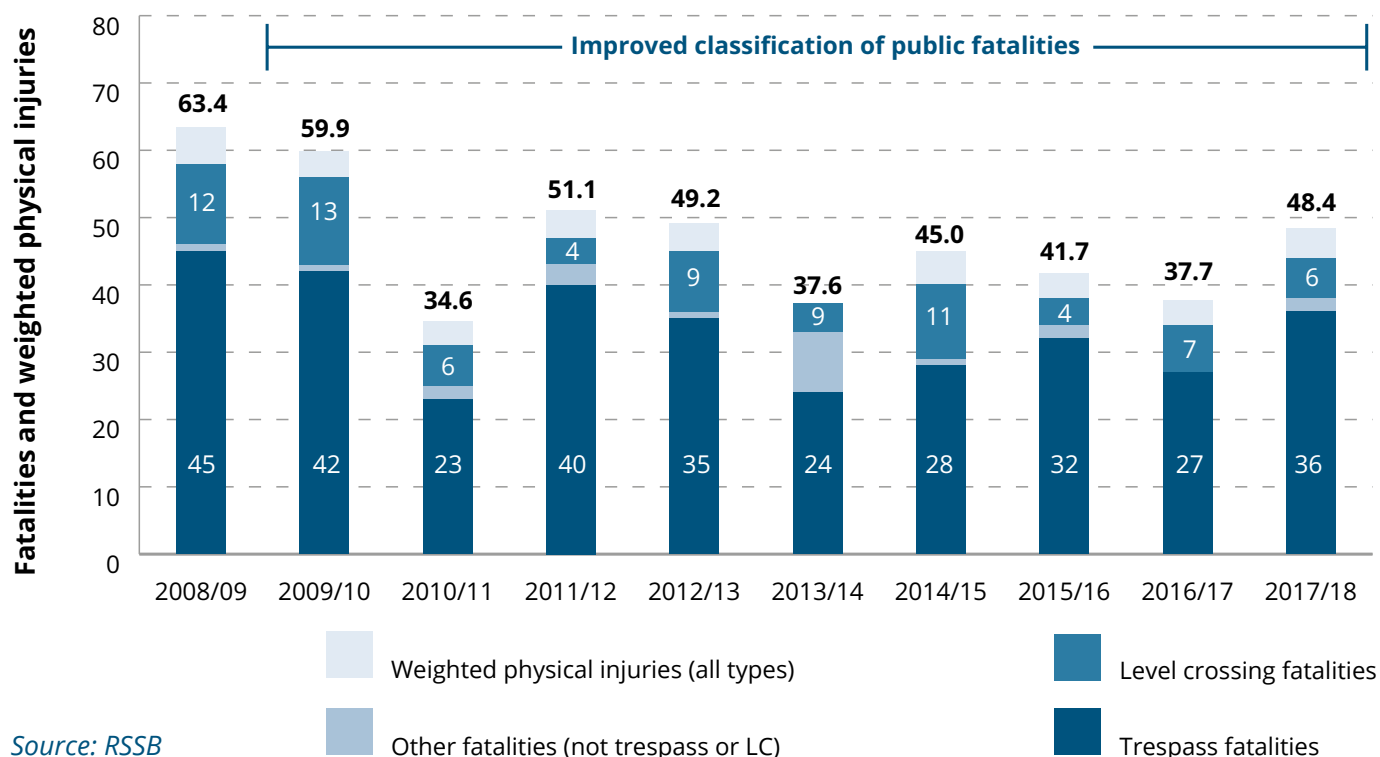
- 68. **Evidence:** The Track system showed steady improvement over the course of 2017-18. Many performance indicators, such as numbers of broken rails and fishplates, are at historically low levels. Most measures are significantly better than the CP5 target. Incidence of twist faults and repeat twist faults has been more volatile, but Network Rail has worked hard during 2017-18 to better understand this risk and emerging work suggests that around 8% of repeat twist faults are due to ineffective maintenance.
- 69. Our assessed level of Network Rail’s maturity in its safety management system as applied to the track and lineside asset in 2017-18 finds signs of improving maturity in six key areas compared to the assessments made in the previous three years.
- 70. Six areas have increased in maturity: OP2 competence management, OC6 culture, OC7 record keeping, MRA1 proactive monitoring, MRA3 incident investigation and MRA5 corrective action. The enabling areas of competence and monitoring have the potential to drive improvements in other areas, as seen by early signs of improvements in the controls criterion. Four of the six RM3 criterion seen as priorities in ORR’s Track Strategy have improved.
- 71. The improvements we found in our 2016-17 assessment have been maintained, with the exception of SP1 Leadership. This priority criteria in our H&S track strategy is the only criterion to have regressed, back to ‘standardised’.
- 72. The improvements in criterion OP2 (competence management) resulting in the assessed level moving from ‘managed’ to ‘standardised’ is a reflection of the work Network Rail’s Safety, Technical and Engineering directorate (STE) and the routes delivered (in response to ORR enforcement action) to demonstrate that their track maintenance engineers are competent to deliver their role, from technical, management, and leadership perspectives. The continued delivery of the Role Based Competence programme should move this maturity up towards ‘predictable’.
- 73. Improvements in monitoring are largely based on STE’s activity to improve the assurance framework, and the results evident in terms of improvements in the management of track geometry. The new assurance framework has the potential to improve the quality of assurance activity in the routes, and increase the visibility of the findings to key roles in the organisation. The STE Track team are demonstrating a more systematic enquiring mind set across track and switches and crossings, initiating and sharing investigations into ‘class failures’ (e.g freight derailments, crossing failures) to identify systemic issues beyond the technical. Better leading indicators for CP6 has the potential to secure improved quality of risk controls and provide early indication of potential areas of failure.



74. All railway duty holders need to play their part in preventing and deterring trespass through security and deterrence measures. There is a high-level NR/TOC/BTP initiative currently running to try to reduce trespass, and we are supporting that, recognising that the issue encompasses wider societal factors such as

child/youth behaviour, criminality and social deprivation. We routinely investigate injuries and deaths caused by trespass to identify weaknesses in trespass prevention, and support local work to identify and manage trespass hotspots.

75. Overall Public Harm over time⁷:



76. **Activities:** We inspected Network Rail's management of the risks from its track and lineside system. These included: management of track geometry; management of rail breaks and serious defects; derailment risk at switches and crossings; Works Delivery handback procedures and risk based maintenance. Centrally, we liaise regularly with STE staff on a wide range of topics. During 2017-18 we brought greater priority to our scrutiny of lineside safety and have drawn up detailed plans for 2018-19 as a result. We continued our follow up with routes and STE regarding assurance and also monitored the cross-industry freight derailment working group outputs.

77. **Conclusions:** 2017-18 has demonstrated the extent to which Network Rail's central 'technical authority' (STE) has matured and developed over the past 10 years. It is vital that this learning is not lost or diluted by the greater devolution introduced in preparation for CP6. The matrix organisation needs to maintain an appropriate balance between central direction and route innovation and differentiation. Further – for the risk control framework to be predictably reliable and effective, effort must be maintained in improving assurance, monitoring and review. This is particularly true at the front line, supervisory level. Finally – some significant improvements to track management, such as the 'TIGER' system for improved data analysis and decision support, have suffered delays. There is considerable scope for Network Rail to improve its project management and introduction of change – and to be more realistic about what it promises.

7. Data between 2008/09 and 2017/18 has been revised since the original publication. Please see Errata (Page 73) for more details on the change.

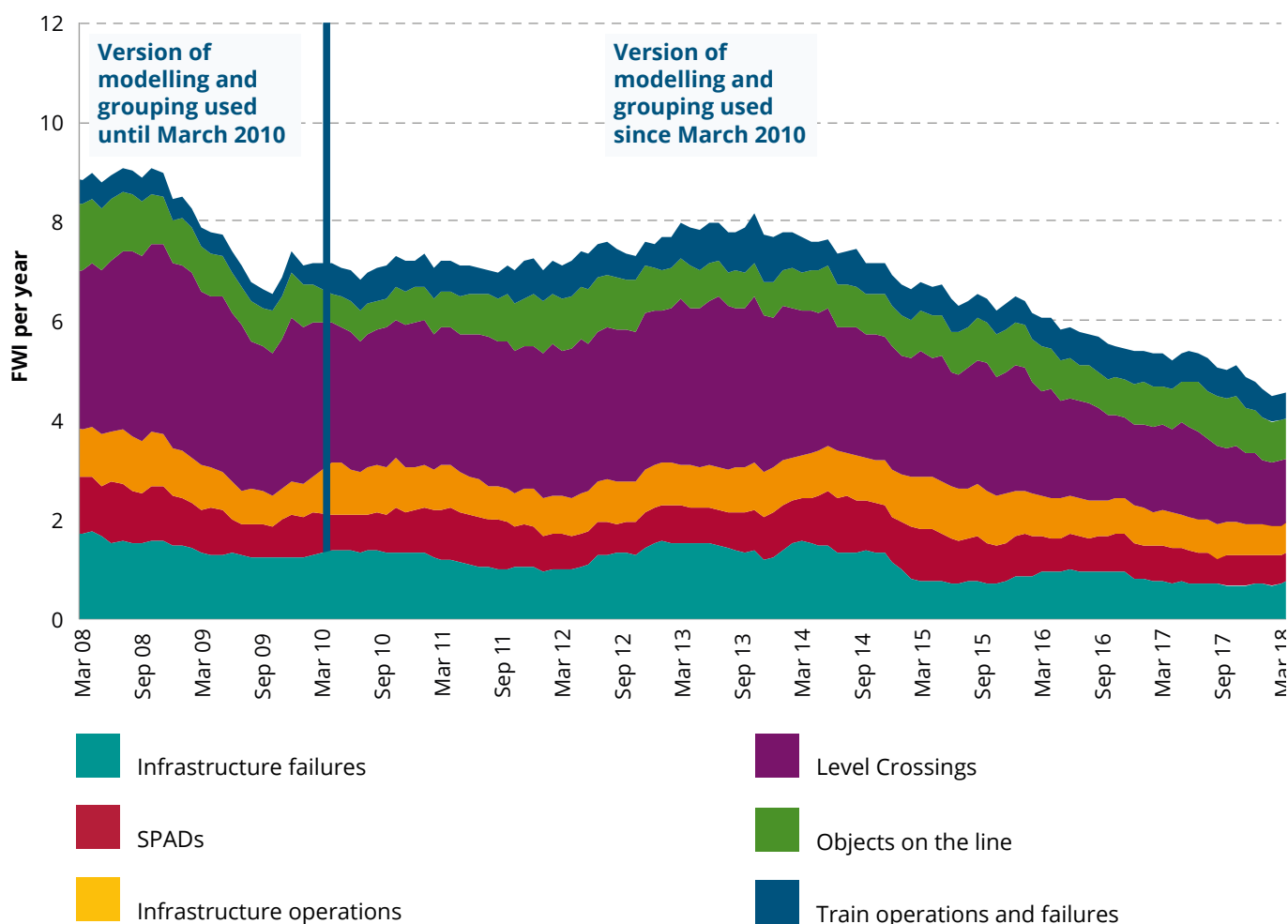


Civils and drainage

Overview: ORR has continued to seek improvements to risk control across a wide portfolio of civils assets, including earthworks, structures, tunnels and buildings. Many of these assets remain vulnerable due to their age, the potential for their rapid deterioration and the deferral of remedial work. Small improvements were seen in the management of these assets, for example in the assessment of scour risk and safety of drainage assets, but further work is needed to improve asset knowledge, asset examination compliance and evaluation, system risk management, and control of third party risks.

78. Evidence: According to the RSSB's Train Accident Precursor Indicator Model (PIM), train accident risks have reduced over the past 12 months and the overall level of risk continues to be at historically low levels. The PIM is very susceptible to adverse weather events affecting earthworks, track, and signalling wrong side failures and is perhaps best seen as a historical indicator of risk rather than a predictor of levels of safety in the future, so that some of the improvement may be a result of a period of benign weather conditions. The PIM tracks higher risk (20+) wrong side failures (events/failures with the potential to cause higher risk accidents) in key areas.

79. The RSSB Precursor Indicator Model (PIM) for Train Accident Risk to end March 2018:



Source: RSSB

80. In 2016-17 we reported that Network Rail needed to maintain its focus on improving its management of civils and drainage assets. We continued to monitor progress in this area throughout 2017-18. There were fewer structures and earthworks serious wrong side failures in 2017-18 compared to 2016-17, continuing the reduction seen throughout CP5. Although the reduction in numbers of events is positive, it is possible this relates to lower rainfall. Our inspections continued to find areas of significant weakness in the control of risks from these assets.

81. Network Rail has a Train Accident Risk Reduction programme based on contributory work streams and monitored by completion of milestones. At the end of 2017-18 Network Rail had met 36 out of 38 milestones, but failed to deliver: CSAMS (Civils Strategic Asset Management Solution), a system intended to consolidate a number of databases and other records in order to facilitate more effective management of civils assets; and progress towards the implementation of Remote Condition Monitoring. These initiatives are intended to deliver improved asset management and timely maintenance and are therefore critical to improving the safety of civils assets. Network Rail will need to continue to focus on these projects. In the case of CSAMS we required Network Rail to take interim measures in several areas: ancillary structures, retaining walls risk prioritisation and evaluation of examination reports.

82. **Activities:** We carried out inspections across Great Britain to assess routes' management of ancillary assets (mainly trackside structures) and their delivery of drainage management plans. We also monitored progress and delivery with a range of topics including earthworks, drainage asset knowledge, hidden tunnel shafts and management of scour.

83. **Conclusions:** Our inspections and investigations confirmed that Network Rail's asset knowledge remains a challenge in several areas. Drainage asset records were substantially incomplete in most routes and a programme to identify hidden tunnel shafts has not been completed. Network Rail has committed to a target date to identify 95% of drainage assets, and has made progress in identifying tunnel shafts.



84. Delivery of examination regimes that are compliant with their own standards remains a problem for Network Rail across the civils discipline. For structures, we found an increased emphasis on effective planning to enable more reliable delivery of scheduled examinations. We hope that this will lead to long-term improvements to the compliance picture. Network Rail also needs to improve its evaluation of reports so that they take the correct remedial action.

85. Risks arising from the activities of third parties to the railway have been present in a number of significant incidents during the year. These include;

- Landslips at Loch Eilt (started on 3rd party land);
- Landslips at Trealaw (a blocked 3rd party drain) in January 2018; and
- significant corrosion on an OLE gantry (beneath a 3rd party raft) at Liverpool Lime Street, discovered in January 2018.

86. This continues a line of previous incidents related to, or coincidental to, the activities of third parties. Network Rail needs to manage and mitigate these interface risks.

Electrical Safety

Overview: 2017-18 saw Network Rail make considerable progress in the delivery of its electrical safety programme. There is now a clear policy to achieve improved risk control and legal compliance both at new and legacy infrastructure. Network Rail's Safety, Technical and Engineering directorate (STE) succeeded in securing continued spend to deliver electrical safety work throughout CP6. However, their negotiations with routes about what investments to prioritise revealed the variable maturity of route staff in their understanding of risk and of what the law requires. STE has had to retain significant central oversight until maturity improves within the routes.

Our inspections in 2017-18 confirmed that there is often a gap between the excellent leadership within STE and the delivery witnessed at route level.

87. **Evidence:** Much of the legacy electrical infrastructure on Network Rail's network predates specific legal requirements regarding electrical safety and does not comply with current statutory duties in some significant areas. With new generation electrification, we have had the opportunity to challenge historic custom and practice and deliver better risk control and legal compliance – and transfer that learning in a proportionate way to management of legacy electrical assets. There are always inherent significant risks of death or serious injury to staff, passengers and members of the public arising from electrical assets.
88. Network Rail has focused its improvement efforts into an 'Electrical Safety Delivery Programme', which began to deliver tangible improvements in risk control during the year. The ESDP is directing the spend of ring-fenced funds to deliver safer, faster isolations – but, additionally, drawing up policy and strategy to set the direction for coming control periods, so that there is better understanding of what the law requires and what the priorities should be when investment decisions are made.
89. 2017-18 has seen the deployment of negative short circuiting devices (NSCDs) and Circuit Main Shorting devices (CMS) to deliver improved risk control and quicker possession taking in third rail areas. There is a programme to roll out fitment throughout the next control period. There has been good progress on remote securing of isolations and a number of trials will prove the concept during 2018-19. In this area, too, there is a funded programme for CP6 roll-out. Work has also continued on more short term improvements such as demarcation tools in isolations to remove doubt about the physical limits of what is live and dead.
90. There has been a lot of work to rationalise and document the instructions around isolations and electrical safety. This has not been straightforward – and has already caused confusion with some of its proposed terminology being potentially misleading. We have encouraged Network Rail to be cautious and not introduce changes until convinced they are well understood.
91. **Activities:** We have held regular meetings to monitor the development of the Electrical Safety Development Programme. We have been impressed by the leadership and enthusiasm of the team. They have ensured that a clear framework for decision making is available to Projects and Routes and have pushed to develop value for money solutions to the many challenges of legal compliance for legacy infrastructure.
92. We inspected work in several routes. In all cases we found that there was significant non-compliance with Network Rail and Rule Book procedures. For example, a lack of understanding of the need to test 'before and after' isolations were granted represented a failure to comply with Network Rail's Life Saving Rules. We found examples of innovative alternatives to the requirement for a nominated person to conduct a physical walk-out before a job, a task that can be difficult under time pressure and in itself involves risk. In all cases, local and central staff responded positively to our findings and were committed to securing improvement.



93. We investigated some electrical safety incidents and made recommendations to Network Rail to ensure improved risk control. Some of these related to the management of changing isolation limits during engineering work. These are undesirable, from a human factors perspective, but occasionally unavoidable. They should only be used as a last resort – and with information provided in as clear a format as possible.

94. **Conclusions:** There has been a transformation in Network Rail's understanding of the risks from its electrical assets and in what it needs to do to improve safety and comply with the law. It needs to ensure that it implements the Electrical Safety Delivery Programme and assures itself that route businesses and Infrastructure Projects are maturing sufficiently to deliver what is required of them. It should only introduce changes to process when it is confident they are consistently well understood.

Mainline: Train operating companies

Management maturity

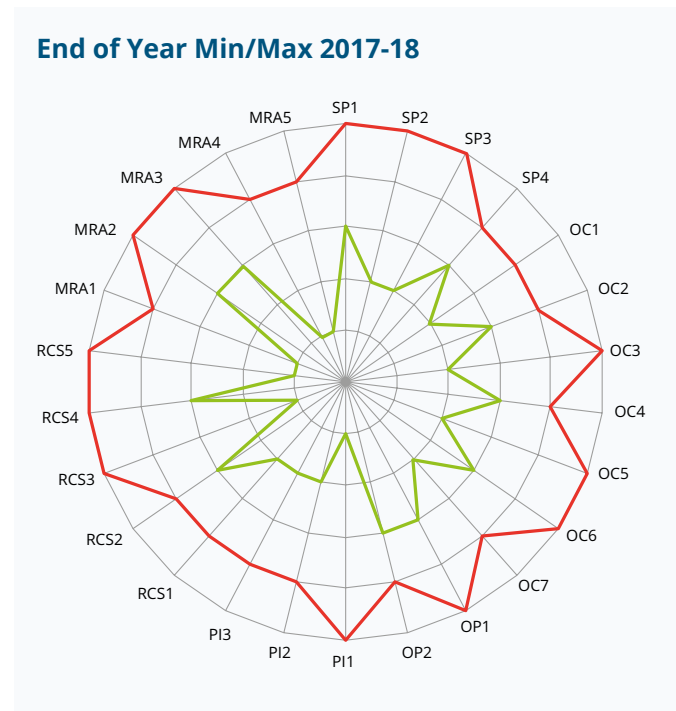
Overview: In 2017-18, we produced RM3 assessments for 16 TOCs. Six criteria were at AdHoc, Nine were at managed and 11 at standardised. In 2016-17, the numbers were Five at “AdHoc”, 16 at “managed” and Five at “standardised”. At the top of the range of assessed scores, 13 criteria were at “excellent”, 13 at “predictable”. In 2016-17, 16 were assessed at “excellent” and 10 at “predictable”.

Overall, there has been an improvement in the management maturity of GB’s TOCs. It is pleasing to see the 11 criteria where the minimum assessed value from all of the TOCs was “standardised”.

This year we have been required to dedicate more resource to respond to events, especially to ensure that the TOCs are managing the risks of prolonged industrial action effectively. We intend to return to a proactive inspection program driven by our strategic chapters.

At Old Oak Common depot, a train maintenance worker lost their life during maintenance on a bogie, when a traction motor fell on to them. We continue to investigate this incident.

A sampled and composite RM3 assessment of train operators risk management maturity in 2017-18 with maximum scores (in red) compared to minimum scores (in green).



95. **Evidence:** Our RM3 data comes from the assessment of the following TOCs: Arriva Trains Wales, Serco Caledonian Sleeper, South Western Railway, Great Western Railway, Virgin Trains, Virgin Trains East Coast, First Trans Pennine Express, Hull Trains, Abellio Greater Anglia, ScotRail, Govia Thameslink Railway, Chiltern, East Midlands Trains, Arriva Rail Northern, Cross Country and Merseyrail.

SP1 – Leadership.
 SP2 – Safety policy (not including a written safety management system).
 SP3 – Board governance.
 SP4 – Written safety management system.
 OC1 – Allocation of responsibilities.
 OC2 – Management credibility and Supervisory performance.
 OC3 – Organisational structure (management cascade).
 OC4 – Communications arrangements.
 OC5 – System safety and interface arrangements.
 OC6 – Culture management.
 OC7 – Record keeping.
 OP1 – Worker involvement and internal cooperation.
 OP2 – Competency management system.
 PI1 – Risk assessment and management.
 PI2 – Objective target setting.
 PI3 – Workload planning.
 RCS1 – Safe systems of work including safety critical work.
 RCS2 – Management of assets (including safe design of plant).
 RCS3 – Change management processes, engineering and organisational).
 RCS4 – Control of contractors.
 RCS5 – Emergency planning.
 MRA1 – Proactive management arrangements.
 MRA2 – Audit.
 MRA3 – Incident investigation and management.
 MRA4 – Review at appropriate levels.
 MRA5 – Corrective action/change management.



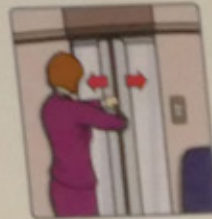
Safety information

Please read these instructions, which are provided for your safety in the event of an emergency.
If there is no immediate danger, await instructions from on train staff.

- 01** Remain on the train.
Move to another coach if necessary.
Do not take personal belongings with you.



Move to another coach if necessary



If the internal sliding door does not open, slide the doors apart manually

- 02** If it is not safe to remain on the train:
Once the train is stationary, leave through the coach doors.
Before leaving the train, be aware of other moving trains and potential hazards.
Do not step on **any** rail.
Do not take personal belongings with you.



Strike cover of emergency release with fist (located above external door).



Remove cover and pull where marked.

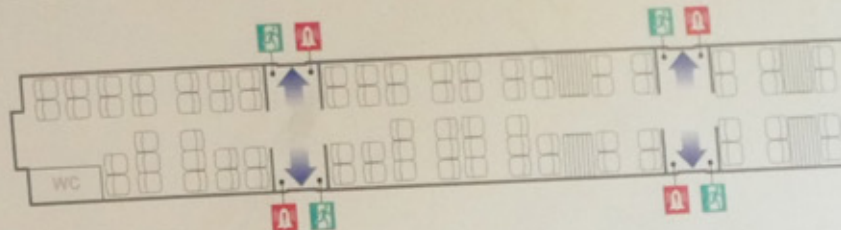


Slide the door to open.



Sit on the steps, jump down to the ground.

Emergency equipment:
The location of emergency equipment may vary.
It is important that you familiarise yourself with the location of emergency equipment in your coach.



External door

Fire extinguisher
Fire extinguishers are located at one entrance to each coach.

Emergency door release

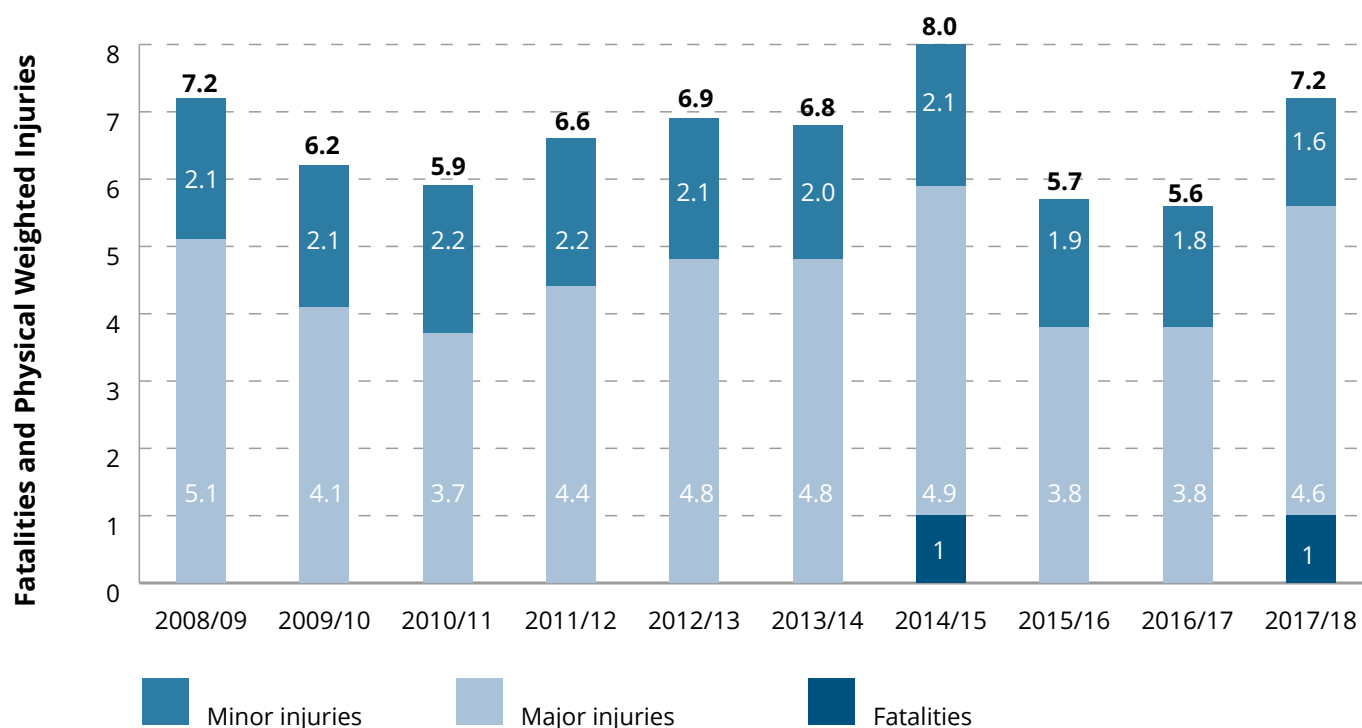
Emergency alarm
Pull the lever down.
Speak into the intercom to the Driver.
Stay at the intercom for further information.

First aid emergency kit
Located by the first aid kit.

Workforce Health and Safety

96. **Activities:** A train maintenance worker lost their life at Old Oak Common when a traction motor fell off a bogie and hit them during an operation to remove it. We continue to investigate this incident.
97. We have dealt with a number of complaints about Diesel Engine Exhaust Emissions (DEEE) from trains in depots and in enclosed stations. We have seen a new depot, where the DEEE ventilation system did not work effectively due to poor coordinated design of the whole system. When presented with strong evidence from a trade union of very poor DEEE control at one of its depots, the relevant TOC engaged well with the Union and staff representatives and developed a good outcome to control DEEE exposure.
98. Concerns about DEEE build up in an enclosed station has led to the main TOC concerned trialling automatic shutdown systems on idling trains waiting in the station. This reduces exposure to both staff and passengers. The station operator is trialling the use of Nitrogen Oxide sensors in addition to CO₂/CO sensors to trigger the ventilation system to control the build-up of DEEE.
99. A significant part of our resource was dedicated to a defended prosecution of London and Southeastern (LSER) and Wetton Cleaning Services Limited (Wettons), following the death by electrocution of a member of staff at West Marina depot. SouthEastern and Wettons were fined £2.5m and £1.1m respectively.
100. We have continued to concentrate our inspections on depot safety. This has revealed some continuing significant failures, e.g. we came across a cleaner washing down electrically live shoe gear in a 3rd rail depot. This resulted in the immediate stopping of all external manual cleaning by the TOC until they could demonstrate that they had effective risk controls in place. TOCs and Network Rail are investing significantly to improve safe walking routes around depots and 3rd rail safety.
101. The chart below is a mix of TOC and FOC operators. The 2017-18 fatality is the one at Old Oak Common and the 2014-15 fatality occurred at West Marina. Work force harm in yards, depots and sidings has largely remained flat over the past 10 years. ORR has devoted significant resource in recent years to this topic.

102. Workforce harm in Yards, Depots and Sidings:



Source: RSSB



Industrial Action

103. **Activities:** Industrial action involving a number of trade unions has continued over the past year, this was primarily due to disputes about the extension of Driver Controlled Operation (DCO). Early this year we published five key principles for the future introduction/extension of DCO on the network⁸, to set out our expectations to the TOCs.
104. We received complaints from trade unions that the staff TOCs were using to keep the service running during the strike were not competent and that dangerous occurrences had occurred as a result. We carried out inspections of the control measures the TOCs put in place and made enquiries into the serious incidents. This was to satisfy ourselves that the provision of contingency staff during the industrial action was robust and in particular, that the contingent staff were competent to fulfil their roles. We gave formal advice to some of the TOCs, particularly around competency. The number of incidents during this period was similar to that found during normal operation and no one was harmed.
105. To help our inspectors and ensure consistency, we produced some internal guidance⁹ for our inspectors on the use of contingency staff and made it publically available.

National SPAD Strategy

106. **Activities:** ORR has worked closely with RSSB and other key stakeholders in order to develop a national strategy for to further reduce the number of signals passed at danger (SPADs). Across the network there has been an increase of SPADs in later months, however the overall SPAD risk is reducing, as the proportion of SPADs ranked as high risk reduces. Phase one of the Strategy was launched at the end of 2017, and has identified five key areas for the development of good practice:
- The role of the driver and signaller manager
 - Driver and signaller self-management
 - Competence management
 - On-board systems
 - Infrastructure management

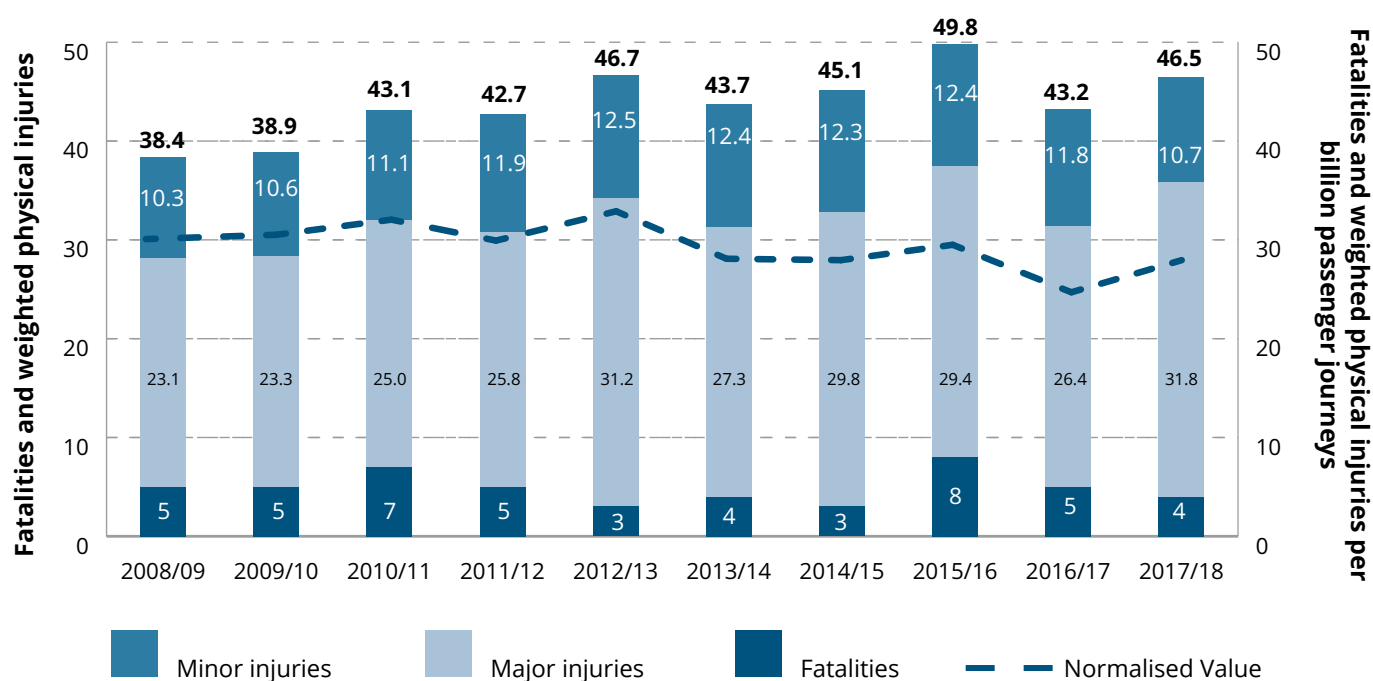
8. <http://orr.gov.uk/rail/health-and-safety/health-and-safety-strategy/driver-controlled-operation-dco>

9. http://orr.gov.uk/_data/assets/pdf_file/0003/27048/rig-2018-01-principles-for-contingency-staff.pdf

Mainline Passenger Harm

107. Mainline passenger harm rose slightly when compared to last year, however there was one less fatality with a total of four passenger fatalities in 2017-18. Overall normalised harm (i.e. considering the rise in passenger journeys over the past 10 years) for train journeys rose slightly from 25.0 to 27.2 fatalities and weighted injuries (FWI) in 2017-18. Passenger harm has generally been flat over the past 10 years, which is set against increased passenger numbers using primarily Victorian infrastructure. See Chart below:

108. Overall passenger harm over time¹⁰:



Source: RSSB

10. Data between 2008/09 and 2017/18 has been revised since the original publication. Please see Errata (Page 73) for more details on the change.

Introduction of new rolling stock

- 109. **Activities:** We have seen a lot of new rolling stock introduced to the network, this has not always gone smoothly and we have had to intervene to ensure a clear understanding of the problem and to encourage prompt changes to the equipment and its operation.
- 110. Examples include a software fault onboard new rolling stock which left the driver with no warning/ alarm for 22 seconds in the event of the traction brakes failing (a separate system operated to effectively apply the emergency brakes).
- 111. This move to software driven equipment has highlighted some safety critical software risks for an industry used to dealing with heavy engineering and highlighted weaknesses in rolling stock acceptance standards.

Accessibility

- 112. **Activities:** ORR's safety inspectors have worked alongside ORR colleagues dealing with wider regulatory and economic issues over this year. In particular, we have looked at our approach to accessibility; there is a key sensitivity between accessibility and the expansion of Driver Controlled Operation. ORR's objective is to ensure that the operators of trains and stations enable disabled passengers to make their journeys easily and confidently, whether those journeys are made independently or with assistance. Whilst the experience of using assisted travel is generally positive, where the service fails this can have a severe impact on passengers. ORR has commenced a range of work to improve the experience of assisted travel and update the guidance for operators in this area. This will clarify and update our requirements and strengthen our monitoring and compliance regime.
- 113. Our safety inspectors will continue to investigate complaints about failures by the industry to comply with the relevant legislation. However, this area of legislation¹¹ is complex, difficult to enforce and dependant on when the relevant infrastructure and / or rolling stock was introduced. What is clear is that all rolling stock must comply with the Rail Vehicles Accessibility Regulations 1998 or the European Technical Standards for Interoperability (TSI) for Persons of Reduced Mobility (PRM) by 2020. ORR has been working with the DfT, ROSCOs and TOCs to ensure that rolling stock has been upgraded to comply e.g. the replacement of slam doors on High Speed Trains with power doors.

11. The Railways (Interoperability) Regulations 2011 (RIR), European Technical Standards for Interoperability (TSI) for Persons of Reduced Mobility (PRM) and Rail Vehicles Accessibility Regulations 1998 (RVAR)

Mainline: Freight operating companies

Overview: 2017 -18 was another challenging year for Freight Operating Companies, with the total volume of railfreight moved continuing to decline to 17 billion net tonne kilometres, the lowest level since the 1990's. The sector continues to see changes in the type and amount of commodities moved, with coal traffic experiencing the greatest decline due to the closure of coal-fired power stations to meet 2025 emissions targets. Domestic Intermodal and Construction traffic are now the two greatest commodities moved by rail.

There were three serious incidents during 2017- 18; two incidents of young people sustaining serious or fatal injuries after having gained access to freight sites and the derailment of an intermodal freight train.

An increase in the number of applications for new, and renewals of existing, Entities in Charge of Maintenance (ECM) certificates meant that the freight inspection team has spent more time on permissioning activities this year, rather than proactive inspection.

We served two improvement notices during 2017-18, both relating to the prevention of unauthorised access at freight sites.

Unauthorised access to freight sites

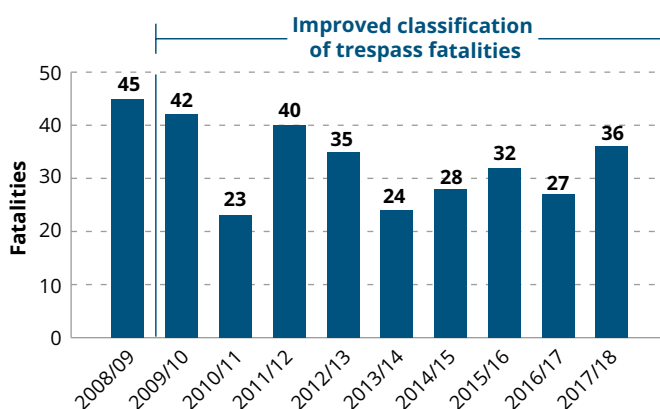
114. In June 2017 there were two incidents where young people gained access to freight sites and received electric shocks after coming into contact with live overhead line equipment. The incident on 1 June 2017 at Bescot Yard, West Midlands resulted in a 13 year old youth sustaining serious electrical burns. On 27 June 2017, an 11-year-old boy was fatally injured at a rail freight terminal in Daventry.

115. **Activities:** Immediately following each of the incidents, ORR launched investigations. These investigations are still ongoing. Inspectors also took action to address immediate risks at the time of the incident, issuing improvement notices to require railway dutyholders to take steps to prevent, so far as is reasonably practicable, unauthorised access to railway infrastructure. We wrote to railway infrastructure managers and dutyholders to remind them of their legal duties to prevent unauthorised access and have engaged with a number of freight customers on these issues. ORR inspectors have checked arrangements to prevent unauthorised access at freight sites during announced and unannounced inspection visits.

116. **Conclusions:** The challenge of reducing unauthorised access to Britain's railways is one that requires input from all railway stakeholders. However, the law imposes very clear duties in relation to prevention of unauthorised access on those organisations in control of railway infrastructure.

117. The incidents at Bescot and Daventry highlight the importance of dutyholders carrying out suitable and sufficient risk assessments and putting in place appropriate control measures to prevent unauthorised access. Furthermore the incidents demonstrate the tragic consequences that can result from people gaining access to railway sites.

Number of trespass fatalities over time:



Source: RSSB

Rolling stock maintenance

118. **Evidence:** We carried out inspections of FOCs arrangements for the management of rolling stock maintenance and undertook surveillance inspections and certification assessments of Entities in Charge of Maintenance. Our interventions identified the following trends:

- All dutyholders had established systems were in place to manage the risks to health and safety associated with rolling stock maintenance;
- All dutyholders had established arrangements in place for managing the competence of staff involved in delivering maintenance, with our RM3 assessments identifying either “standardised” or “predictable” performance in this area. However, our inspections highlighted the importance of dutyholders having suitably robust arrangements in place to manage the competence of staff making technical and managerial decisions that relate to rolling stock maintenance.
- Site inspections revealed a number of areas where workforce safety was not being managed as effectively as possible. Our inspectors identified issues with risk control from work at height activities, worker protection systems and training for maintenance staff that deal with out of course events. ORR inspectors provided advice and guidance to dutyholders in order to secure the required improvements.

119. There were two incidents of note involving freight trains, the derailment of an intermodal train at Ely, Cambridgeshire in August 2017 that resulted in considerable disruption to rail traffic in the East of England and an incident near Swansea where damage to the brake rigging and bogie of the leading wagon in a train carrying petroleum products resulted in damage to the track over a distance of around 20 miles. The latter incident remains under investigation by both the RAIB and ORR to ascertain the cause of the failure.

120. **Conclusions:** We found that dutyholders had established arrangements for the management of rolling stock maintenance, however there is a need for dutyholders to have effective control measures in place to manage the risks to the health and safety of staff involved in maintenance. Furthermore, the events at Ely and Swansea show that this is not an area where the freight sector can afford to be complacent.

Industry engagement

121. **Activities:** We continue to engage with a number of freight-specific industry forums and working groups. The production of the Integrated Plan for Freight Safety by the National Freight Safety Group is a positive move and represents a step change in collaboration between freight dutyholders on health and safety issues.

122. The Cross Industry Freight Train Derailment Working Group continues to make progress on reviewing the interaction of common factors that appear in many freight train derailments: sub-optimal track geometry (particularly track twist), wagon suspension sensitivity and asymmetrical loading. The group has identified a number of workstreams that aim to improve current control measures, this includes using the GOTCHA wheel monitoring system to identify offset loading of wagons and the development of a set of loading guidelines for bulk aggregate traffic.

123. It is important that all working groups continue to expedite their work programmes in order to deliver tangible improvements to health and safety risk control across the freight sector.

Heritage railways

Overview: Our focus remains on the quality and maturity of heritage operator's safety management systems (SMS), either during our proactive inspection activity or increasingly in response to incidents and accidents. Evidence from our inspection and investigation activity indicates that more remains to be done by operators to bring their SMSs up to an appropriate standard. Weak SMSs featured strongly in our enforcement action during the year.

The Heritage Rail Association (HRA) plays an important role in providing leadership to the sector and promoting high safety standards. We continue to encourage and support the HRA in its leadership role, engaging with the Operating and Safety Committee and providing input into its core standards and guidance development activities.

Looking forwards we will be promoting the use of key elements of RM3 as a tool to assist in identifying weaknesses and targeted actions to drive improvements in the largest operators' SMSs, particularly in areas such as leadership, governance, and competence.

124. **Evidence:** Heritage operators across Britain continue to demonstrate enthusiasm to manage their operations safely. Although risk is generally being controlled on a day-to-day level, SMSs remain immature in some operators with room for improvement to provide greater reliability of the implementation of risk control arrangements.
125. **Activities:** Our work has been skewed towards reactive inspection activity during the year, reflecting the increasing number of incidents and complaints to ORR that required follow up. Incidents investigated included volunteer injuries during engineering activity, steam boiler events, and level crossing & slow speed / heavy shunt collisions. We use these opportunities to test the effectiveness of an operator's SMS, with particular focus on governance and leadership, competence and rolling stock maintenance. In each case, the operator responded positively to our advice and guidance, indicating that there is a desire to effectively manage safety when direction is provided.



126. We served three improvement notices relating to the absence of a suitable safety management system, which contributed to the operator's lack of understanding of the level of risk present and the effectiveness of controls. Of particular note is the improvement notice served on South Devon Railway Trust due to the lack of an adequate and maintained SMS. This follows our investigation into a significant near miss incident where a child fell through a missing floor in a toilet cubicle on board a mark I coach hauled by a steam locomotive. Whilst the Trust's response has been positive and should benefit the wider heritage community, this incident demonstrates the risks associated with a lack of understanding of the condition of mark I rolling stock, a challenge that not unique to this operator. We are pleased to note that the HRA are taking a leading role in promoting the findings of the RAIB investigation, and intend to prepare guidance on the inspection and maintenance of carriages and wagons.

127. Asbestos management during rolling stock maintenance and overhaul work also featured in our supervisory work this year; in one instance resulting in the Health and Safety Executive serving a prohibition notice on a train care and maintenance provider.

128. **Conclusions:** The heritage sector is a diverse collection of different types of railway with very different scales of operation. It is a growing sector but with significant challenges ahead relating to the age of rolling stock and assets, and reliance on an enthusiastic but largely voluntary community performing safety critical tasks professionally. Strong leadership and a positive health and safety culture will help support them ensure a safe operating environment.

Tramways

Overview: The tragic fatal tram incident at Sandilands Junction, Croydon in 2016 continues to cast a shadow over tram safety performance. It is however a catalyst for positive change and the tram sector is responding professionally to RAIB's 15 recommendations. Working alongside BTP, ORR inspectors continue investigating the circumstances of the crash to determine if there were breaches in health and safety legislation.

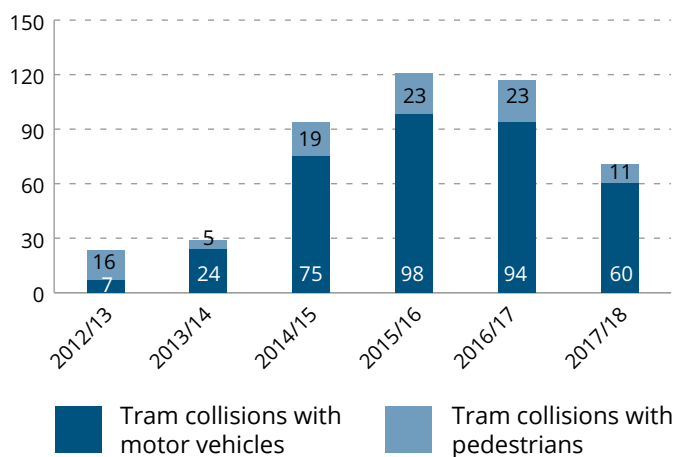
More broadly, the tram sector continues to show steady signs of improving health and safety culture and management within their organisations, with several exploring technological solutions to improve the risk control effectiveness of their largely people based controls.

129. **Evidence:** There are seven tram systems in Great Britain: Blackpool Tramway, Edinburgh Trams; London Tramlink (Croydon); Manchester Metrolink; Midland Metro; Nottingham Express Transit; and Sheffield Supertram. Confidence on the tram sector continues to grow, which is reflected in several owning authorities developing plans to expand their network.
130. The British tramways continue to show steady signs of improvement in the health and safety culture within their organisations. Several operators are looking to new technology to support the performance of their people, and novel solutions to reduce the impact of their infrastructure on the environment. A new development for the Britain's railway is the Tram Train, linking heavy and light rail infrastructure, systems and operations together. This potentially brings better access into and through urban areas making the rail journey more attractive to passengers. ROGS
131. Sheffield Supertram commenced trialling Britain's first modern Tram Train operation in early 2018.
132. However the sector's progress in gathering and sharing reliable consolidated incident and accident data remains slow. We see this as one of the key deliverables in the work of the industry's proposed safety and standards body. This will help develop an improved understanding of the level of risk and the effectiveness of control arrangements.
133. **Activities:** In response to the overturning of the tram at Sandilands we have been reviewing our approach to regulating the sector. Our primary objectives are to:
- remain in a strong position to ensure reasonably practicable safety improvements are pursued by the whole tram sector in a timely way.
 - ensure demonstrable progress is made towards establishing a sustainable approach to ensuring greater collaboration and standardisation in the sector.
 - assure ourselves we have the right supervision strategy in place.
134. The tram sector is demonstrating good collaboration and engagement in how it is responding to RAIB's recommendations. We hosted a well-attended conference in January 2018 with all of the UK's tram operators and owners to discuss and agree a joint approach to improve safety. DfT supported the event and provided a commitment to provide funding to help create and operate the proposed safety and standards board. We are supporting the industry establish a steering group to oversee implementation of the recommendations, particularly those relating to system risk analysis and establishing a safety and standards body.
135. We continue to work closely with and provide technical support to BTP who are leading the investigation into the incident at Croydon. We are pursuing a number of our own lines of inquiry to determining the level of compliance with health and safety at work requirements. We also worked collaboratively with RAIB as it conducted its investigation.



136. Sheffield Supertram developed and implemented its ROGs safety management system to support Tram Train operation during 2017-18, successfully applying for a non-mainline safety certificate and authorisation. This allowed it begin operating over Network Rail infrastructure between Sheffield and Rotherham.
137. Unlike other rail borne transport systems the tram sector operates in potentially close proximity to road vehicles, cyclists and pedestrians in non-segregated sections. Tramway and tram design takes account of other highway users and is intended, for example, to be 'pedestrian friendly' to minimise risk and encourage pedestrians to cross the tramway at safe locations. This is supported by the operator's safety management system that describes the arrangements in place to deliver operational safety. Recent reductions in the number of collisions reported by the sector is welcomed and our own enquiries find that vast majority of these events are not as a result of deficiencies in the operator's SMS or how it was implemented - See chart below:
139. We continued our proactive inspection of the sector during the year; finding, for example, positive approaches to managing rosters and fatigue, and improvements to the management of driver competence. Whilst the sector puts in place its own arrangements to capture and analyse incident data, we are reviewing how to best utilise RIDDOR data with greater granularity for tramways.
140. **Conclusions:** The tram sector is responding professionally to the challenges laid down by RAIB's report into the tram overturning at Sandilands in 2016. The sector recognises that the creation of a safety and standards body and a better understanding of risk are important enablers to help it target effort to achieve greatest safety risk benefit. We expect this professional risk based approach to continue in 2018-19, assisted by appropriate support from key stakeholders.

138. Tramways - Collisions with Motor Vehicles and Pedestrians (Including Cyclists and Mobility Scooters)



Source: RIDDOR data

Transport for London, including London Underground and other metro services

Overview: Health and safety performance on Transport for London's (TfL) managed infrastructure, including London Underground (LU), remained consistent in 2017-18.

Unlike previous years there has been a slight decline in passenger numbers (approx. 1%) across TfL railway services. Yet again, there have been no workforce fatalities arising from TfL railway operations and a high level of safety has been maintained during infrastructure modernisation.

Health and safety performance by London Overground franchisee ARL (Arriva Rail London Ltd) has remained stable despite an unauthorised detrainment at Peckham Rye.

The Docklands Light Railway (DLR) franchisee Keolis Amey Docklands Ltd (KAD) continued to deliver a stable health and safety performance with a low incidence of workforce and customer harm.

Similarly, TfL Rail franchisee MTR Corporation, produced a second good year health and safety performance including the successful introduction of new 345 trains operating between Shenfield and Liverpool Street.

Our strong engagement with the Crossrail project continued and ORR has delivered its ROGS exemption and authorisation commitments to the project to time.

We served one improvement notice on TfL railway services over 2017-18 and initiated one prosecution.

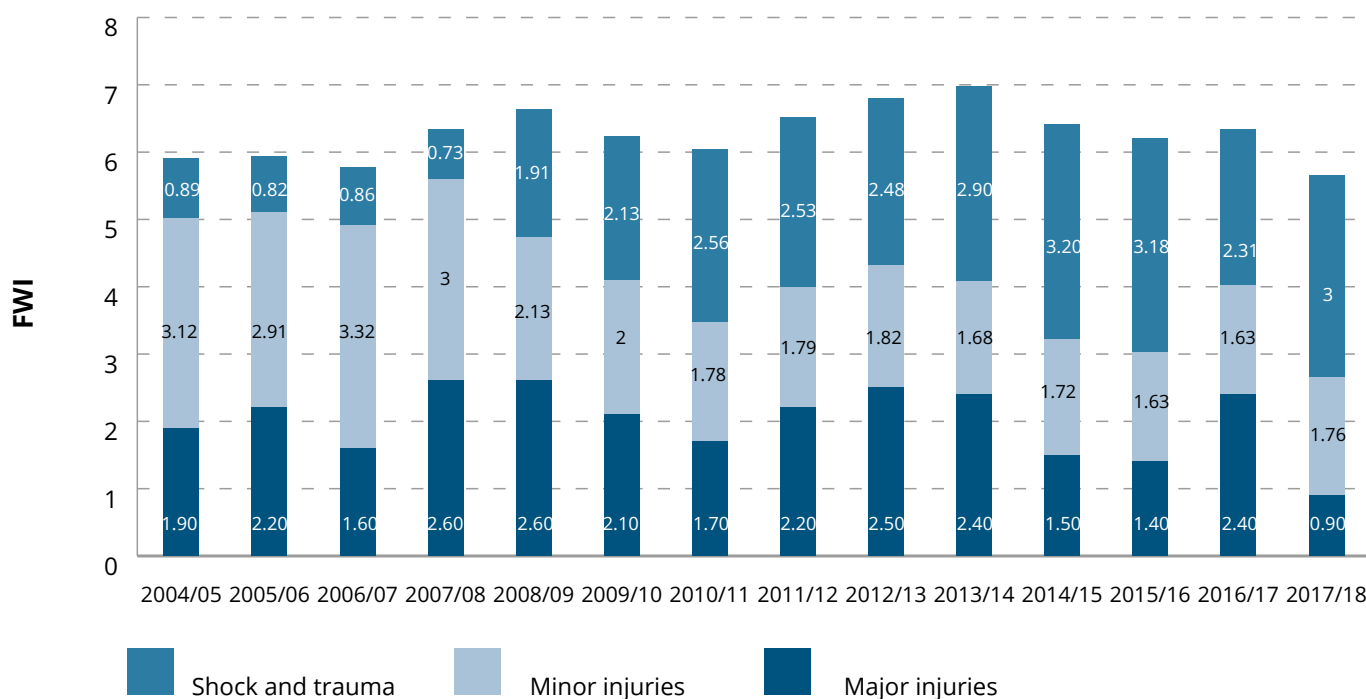


London Underground Ltd (LUL)

Overview: London Underground continues to deliver a high level of safety for its workforce and the travelling public. Its progress through the TfL transformation programme during 2017-18 continuing into 2018-19 remains a challenge and in particular ensuring that changes in configuration do not result in key health and safety issues being left unaddressed.

141. Evidence: Once again, London Underground recorded no workforce fatalities in connection with its operations. LU recorded its lowest ever FWI for workforce major injuries (0.90) although minor injuries and shock and trauma both showed minor increases. Overall LU recorded its lowest workforce FWI since 2006-07.

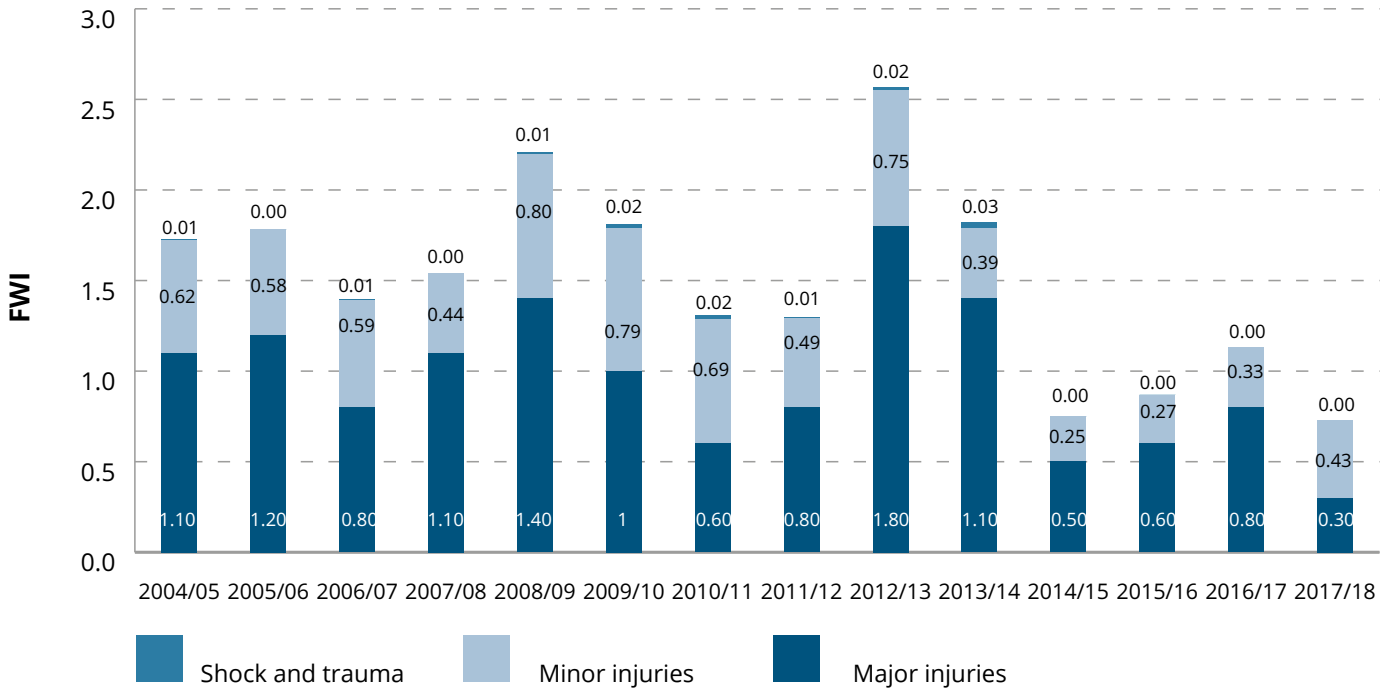
142. LUL All Workforce Harm:



Source: London Underground

143. Similarly in connection with infrastructure no workforce fatalities occurred. LU recorded its lowest ever number of workforce major injuries (three) with a resultant FWI for workforce major injuries in connection with infrastructure of 0.30. There was a slight increase in minor injuries (0.43).

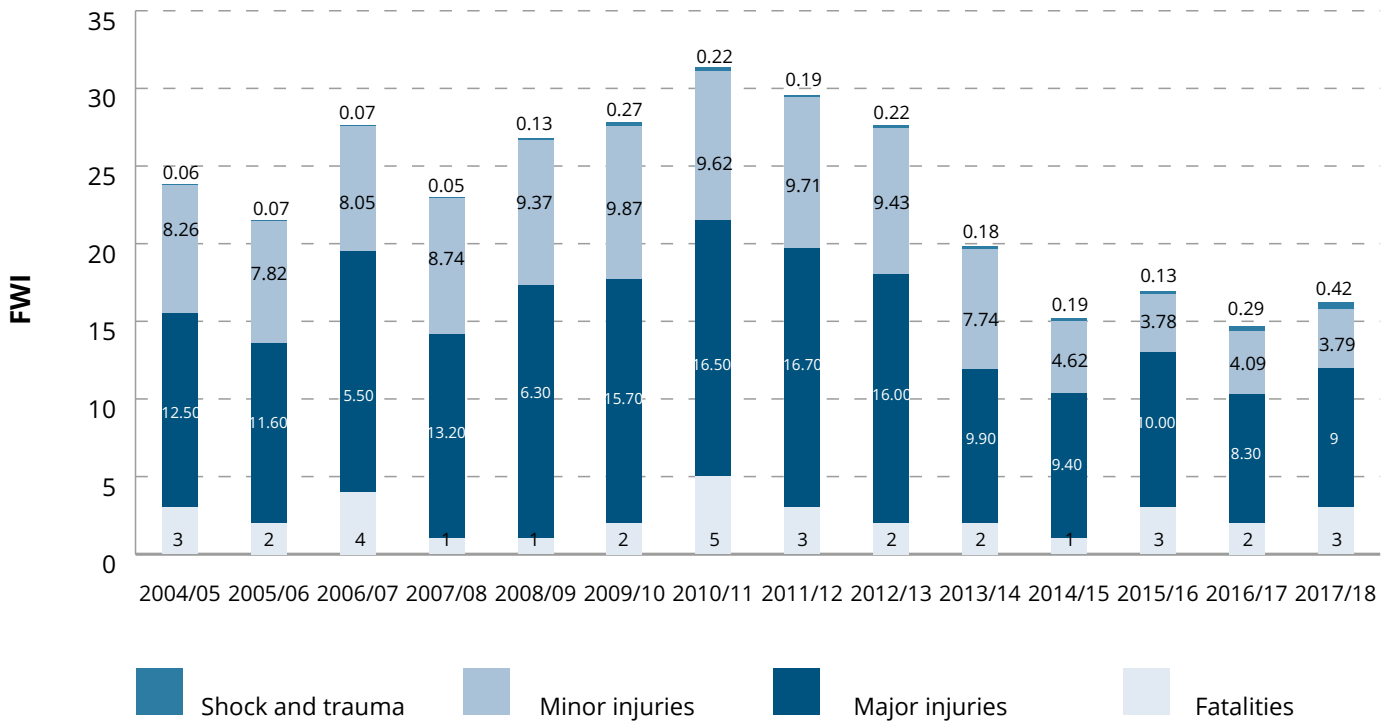
144. LUL Infrastructure Worker Harm:



Source: London Underground

145. With regard to passengers there were three fatalities (one more than 2016-17). The passenger FWI for major injuries was 9.0, a slight increase on 2016-17, while the passenger minor injuries FWI was slightly lower than the previous year at 3.79.

146. LUL Passenger Harm:



Source: London Underground



147. **Activities:** Our inspections carried out under our intervention programmes found that overall LU's health and safety procedures continued to ensure it managed its operational risks well. In 2017-18, we focused on:
- Infrastructure electrical safety.
 - Construction activities associated with preparation of infrastructure and cable runs as part of the 4 lines modernisation programme.
 - LU's work to develop improved risk assessment processes.
148. We noted the ongoing improvement in compliance with the Electricity at Work Regulations 1989 and in particular the reduction in situations where 'live working' needed to be undertaken and improved provision of protective covers in signalling switch rooms.
149. Our inspection of 4 Lines Modernisation sites raised some concerns relating to compliance with obligations under the Construction (Design and Management) Regulations 2015, in particular in relation to tidiness and order of sites; a particularly significant issue given the restricted nature of the working areas in proximity to the railway. We noted LUL's prompt action to resolve these issues
150. Our intervention to review LUL's risk assessment processes was radically cut back as LU undertook its own comprehensive review. We were pleased to note that LU's own review identified amongst its areas for improvement, aspects of risk assessment that we had highlighted in the course of previous interventions. We will continue to monitor LUs development and implementation of its revised processes.
151. The TfL transformation programme has been at the forefront of activity for LU during 2017-18 with significant reconfiguration of the organisation. Throughout the year we have monitored the transition of LU into its new configuration with a view to ensuring that changes taken through the LU change process did not result in failure to ensure safety. We found no significant anomalies.
152. We comprehensively investigated the Canning Town fatality involving a member of the public who entered a restricted area of the station through emergency escape doors and became locked within the area during a period of 24 hour 'night-tube' running. He subsequently fell down a staircase and suffered fatal injuries. While Canning Town station is an above ground station and is not legally obliged to have minimum staffing levels for fire safety purposes, we nonetheless served an improvement notice on London Underground requiring a comprehensive assessment of the risks associated with operating such an extensive station on a 24 hour basis. We required LU to determine the levels of staffing required for safe operation under such circumstances. The improvement notice was complied with, within the timescales agreed.

Crossrail project and progress towards commencement of operation of the Elizabeth line

Overview: ORR's cross-office coordinated approach to commencement of operation of the Elizabeth line continues; encompassing interoperability, licensing and ROGS authorisation matters. To date we have dealt effectively with all the key dutyholders – ATC, RFLI, Crossrail and MTR Corporation – to ensure that regulatory requirements have been clearly understood and that they understand what is needed and the timescales.

153. **Activities:** ORR granted an exemption from the ROGS requirement to hold a certificate and authorisation to allow testing and commissioning of the Crossrail central operating section from 1 November 2017. The exemption was granted on time although for technical reasons the start of testing and commissioning was delayed until February 2018. The whole of the central section is energised and testing and commissioning with remaining construction works (mostly at stations) expected to be completed by 1 October 2018 followed by trial running / operations prior to opening on 9 December 2018.
154. In February 2018, Rail for London Infrastructure Limited (RfLI) submitted its application for ROGS authorisation as infrastructure manager of the Crossrail central operating section (CCOS) to ensure it is fully prepared for the commencement of trial running and operations on the target date of 1 October 2018.

TfL Rail (MTR Corporation)

Overview: Our intervention and the subsequent liaison meetings have shown that MTR Corporation continues to demonstrate a positive and planned approach to health and safety issues as their operations expand.

155. **Activities:** The main inspection work with TfL Rail operator MTR Corporation was inspection of their management of platform train interface (PTI) risks involving driver controlled operation (DCO) and platform-assisted dispatch. The inspection identified generally good arrangements in place with only a few areas identified for improvement. Overall MTR Corporation demonstrated an active approach to managing PTI risk. MTR Corporation had previously conducted an audit of platform-assisted dispatch and themselves identified areas for improvement. We were encouraged to note that they recognised the importance of managing customer behaviour generally on platforms and provide additional platform staff at busy stations like Stratford, with the aim of managing such behaviour before it potentially manifests itself as a risk at the PTI.
156. An amended ROGS certificate for MTR Corporation to allow operations in the west to Heathrow airport was issued on time and a further amendment to allow operations in the central operating section is currently being evaluated and is planned for issue before the end of July 2018.

London Overground - Arriva Rail London Ltd (ARLL)

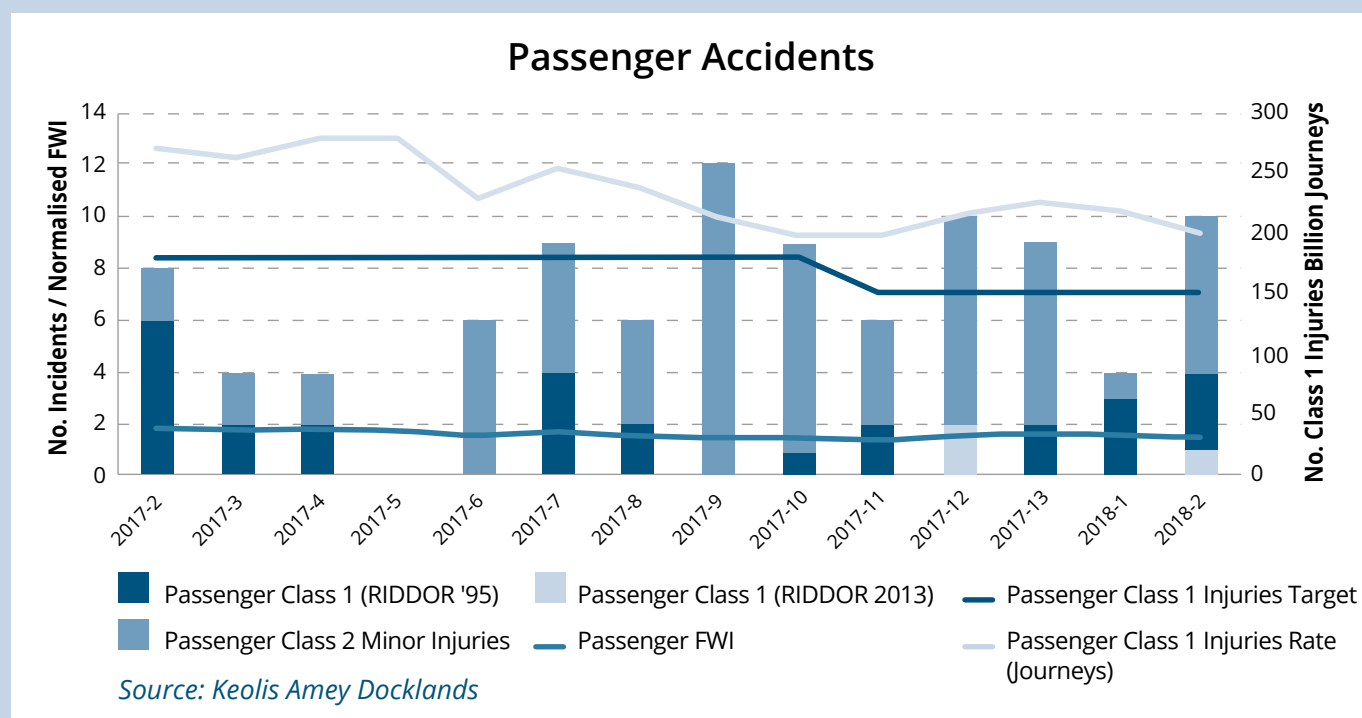
Overview: ARLL completed its first full year as the operator for London Overground. This brought some health and safety challenges as it worked to ensure effective delivery of its contractual obligations. These were notably in relation to the incidence of SPADs and to the unauthorised detrainment of passengers at Peckham Rye station; an incident investigated by RAIB.

157. **Activities:** Our activities in 2017-18 focused on ARLL's action to implement the changes to its ROGS safety management system that ORR identified as necessary in the course of its successful 2016 application for a safety certificate and authorisation. While the great majority of these changes were initiated during 2017-18 not all were completed within the work year as originally proposed.

158. We also noted that ARLL recognised the need for improvement to its control room environment in light of the Peckham Rye incident and other issues drawn to our attention. We are pleased to note that action has been taken to implement improvements to the control room and working practices, which should reduce the likelihood of recurrence of incidents such as Peckham Rye.

Dockland Light Railway / Keolis Amey Docklands (KAD) Ltd

Overview: KAD has delivered another positive year in terms of its health and safety performance characterised by the absence of significant incidents involving either staff or customers. We are pleased to note the continuing downward trend in passenger injury rate and passenger FWI.



159. Evidence: In 2017-18, KAD has continued to focus on the development of a robust safety culture particularly in promoting confidence among its staff to raise challenges on potential safety issues.

160. ORR continues to support KAD's development of its safety culture. KAD's work to move over to revised management system standards by the end of 2017 progressed well. We noted that KAD continued to embed the approach into its risk management process and that its trade unions are aware of, and engaged in, the process. KAD has sought to use RM3 assessments and audits as a route to greater transparency on health and safety issues.

161. Activities: Our intervention examined KAD's health and safety monitoring arrangements. We found sound workable arrangements in place but also concluded that there was a need for improved consistency across the business.



Safety by Design

Overview: The UK continues to invest in expanding both the light and heavy rail networks through major upgrade, enhancement and new build projects. Safety by design offers opportunities to eliminate or control health and safety risks by addressing those potential risks at the design stage. Many of these activities are outside the scope of existing railway dutyholders. In 2016, ORR entered into an agency agreement with the Health and Safety Executive to give ORR an enforcement role at an earlier stage in a scheme; giving us a better chance to influence health and safety by design.

We use our role to encourage developers to incorporate good health and safety by design practices in their schemes. We also monitor and influence the development of major schemes where there is currently no existing railway dutyholder, such as with High Speed 2 (HS2).

High Speed 2

Overview: Phase 1 (London to Birmingham) of the scheme has moved forwards. 'Early works' contracts, and tendering for the main civil engineering design and construction packages have progressed during the year. Development of Phases 2a and 2b (beyond Birmingham to Crewe and Leeds) continues. The project has continued to refine the functional specification for the work packages based on the high level specification of the DfT.

162. Activities: We have continued to monitor the development of key technical principles in support of the specification for the various design and construction contracts for the project. Whilst we continue to focus on assurance processes we have also monitored key areas such as the approach to occupational health. We continue to work jointly with the Health and Safety Executive (HSE) and the Environment Agency to ensure a consistent and efficient approach by regulators to the project.

163. Evidence and conclusions: The Phase 1 teams appear to be working hard in areas that should pay dividends in health and safety in the longer term if the current focus is retained. Cooperation with other dutyholders and regulators appears to be good at this stage.

Major projects by parties new to the railway

Overview: The UK continues to see a number of major new rail projects being promoted that sit outside the activities of the existing major dutyholders such as Network Rail or London Underground. ORR is engaging with these schemes at an early stage where possible to promote our policies on Health and Safety by Design and to ensure that our strategic risk priorities are being addressed.

164. **Activities:** We have provided advice to major schemes such as East - West Rail project, the Wales & Borders refranchising exercise, and the Heathrow Southern Railway to ensure that the regulatory landscape is understood. ORR's desire for risks to be designed out of schemes at the earliest stage has been made clear to these projects.



Occupational health

Overview: ORR published its revised Strategic Risk Chapter 9: Occupational Health in October 2017. This sets out the actions we want to see railway companies take in order to improve the health of their workforce, and also identified our planned activities for the next three years. It uses a 4Es framework of Excellence in health risk management, Engagement, Efficiency (concerned with the costs and awareness of return on investment) and Enabling tasks, such as continuing to develop inspectors guidance on specific health topics. We note continuous improvement on many health topics in the rail industry, with a focus on mental health, hand-arm vibration, musculoskeletal and respiratory risks. Industry processes for managing risks from individuals' fitness (e.g. diabetes, visual acuity) are not robust and, therefore, we are anticipating progress in this area. There remains a need for a concerted effort in order to close the gap in the arrangements and maturity seen in safety.

165. Evidence: In 2017-18, we served three Improvement Notices on Network Rail (in relation to occupational health). This included one for a failure to have a risk assessment for manual handling steel sleepers and another for failing to monitor whether control measures for manual handling ironmen were being implemented. The third notice was for not preventing exposure to respirable silica dust during a common construction activity, the grinding of mortar.

166. Disease cases reported to ORR under RIDDOR* from across Britain's railways: 2011-12 to 2017-18 (most relate to the mainline railway):

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Carpal tunnel syndrome	0	2	2	4	1	13	1
Cramp in the hand or forearm due to repetitive movements	0	2	0	0	0	0	0
Dermatitis	0		0	1		1	3
HAVS	95	98	76	83	30	96	21
Occupational asthma	0	0	1	2	0	0	0
Tendonitis or tenosynovitis in hand or forearm	1		1	1	0	3	0
Infectious disease due to biological agents	1	1	0	0	0	0	0
Occupational cancers	0	0	0	0	0	1	0
Grand Total	97	103	80	91	31	114	25

Source: RSSB and ORR. *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013¹²

12. <http://www.hse.gov.uk/riddor/>

167. The use of powered hand tools continues to dominate annual RIDDOR reporting, being associated with HAVs and carpal tunnel syndrome. The reporting level appears to be significantly lower in 2017-18 but, as in 2015-16, this is believed to be because of problems with Network Rail's health surveillance reporting system, rather than any significant change in the extent of vibration exposure and control.
168. We plan to resume publication of our health data on the ORR data portal, which has been impacted by implementation issues with the new SMIS platform.
169. **Activities:** In our inspection activity there was close monitoring of dutyholders arrangements for hand-arm vibration (HAVs) health surveillance, with Network Rail putting in significant work to ensure at-risk workers participated in the surveillance regime. Whilst the challenges remain to keep health surveillance compliance high and to strengthen the management of HAVs in the Routes. We want to see a re-focusing of effort on eliminating and reducing exposure to vibration by better job design. The Industry Hand Arm Vibration Conference demonstrated much good work in the contractor community on this topic. ORR showed the impact of failing to properly manage HAVs risk using a powerful video, 'One Man's Story', of a worker living with hand-arm vibration syndrome. This conference also saw the launch of the Rail Principal Contractors Group guidance on managing HAVs in the supply chain, now being trialled prior to publication. ORR worked closely with RPCG to develop this good practice guidance for sharing of information on vibration exposures and HAVs health surveillance arrangements for contingent labour. In 2017, ORR included worsening HAVs cases as a mandatory investigation and developed an investigation question set to support inspectors.
170. ORR's 'One Man's Story' video interview also describes the impact of living with silicosis, a disease associated with exposure to respirable crystalline silica, present in ballast dust and common construction materials such as concrete, brick and mortar. Network Rail has continued its focus on better management of ballast dust throughout its journey from quarries, to its ballast handling depots and on to work sites. We have seen positive progress by Network Rail in pursuing a healthy by design approach by controlling ballast dust at source, by fitment of dust suppression to its highest risk ballast handling plant. We want to see a similar approach taken by more contractors involved in track renewals. We have started detailed work with Network Rail to embed health by design principles for dust control into the industry standards for new ballast handling plant.
171. Increasing concern about air quality and diesel exhaust emissions has led to significant engagement work with dutyholders and consideration to further technical and organisational improvements to protect workers in enclosed areas such as tunnels as well as passengers in enclosed stations. We have published guidance for our inspectors on managing exposures to silica and diesel engine exhaust emissions this year.
172. Inspection activity in train operating companies included arrangements for managing manual handling risk and musculoskeletal disorders, and we noted an increased appetite in the industry for supporting those with mental health disorders by providing access to a wider source of mental health support and guidance.
173. In December 2017, ORR published guidance on Fitness for work, following an upturn in enquires resulting from changes in medical assessment found in Schedule 1 of the Train Driver Licences & Certificate Regulations. Education briefings of the Recognised Doctors continue. We outlined our concern about the rise in cases of diabetes with the Rail Delivery Group. A line of inquiry in incident investigations has included if impaired fitness for work has been a contributor, notably looking into train and tram drivers with obstructive sleep apnoea or diabetes or other pre-existing ill-health complaints.

174. ORR published its final industry quarterly occupational health programme update in the spring before the lead for this important work was transferred to RSSB's Health and Wellbeing team.
175. Presentations were made at the Society of Occupational Medicine Conference on HAVS, Health at Work Conference at the UIC Medical group conference. ORR attended the launch of the IOSH No Time To Lose (NTTL) Asbestos campaign, and continued to report to the NTTL cross industry silica pledge.
176. This is the final year of ORR's 2014-2019 programme for occupational health "Making It Happen". Beyond the end of our dedicated health programme we will continue to review our priorities, develop our work activities, and publish our delivery plans within the Health Strategic Risk Chapter.
177. **Conclusions:** We are seeing an upturn in activity in specific areas such as risks from diesel fumes and concern about the rail industry's arrangements for assuring medical fitness for work. While we have seen strong leadership and effective industry collaboration in some areas, such as mental health, ballast dust, and HAVs in the supply chain, improved compliance in many areas has often been driven by ORR intervention. There are many examples of strategies and initiatives and improving engagement with the industry. We are keen to see better performance, but there remains much scope for continuous improvement.

Human Factors

Overview: Human factors is about the people in the system and how human performance is affected by job, organisational or individual factors. ORR deal with human factors on a topic basis, some key areas being competence, fatigue management, safety critical communications, and human error, with a focus on designing out the potential for error.

178. **Evidence:** In 2017, an enforcement notice was served on Network Rail, following an incident at Hockham Road level crossing involving communication failure and where the design of the level crossing workstation screens did not sufficiently support the signaller's tasks.
179. **Activities:** Following revision of the recast Railway Safety Directive and the development of the Common Safety Method (CSM) Safety Management System and their inclusion of requirements for human factors and safety culture, we provided support to the EU Agency for Rail in providing content for its proposed guidance documents. If implemented in the UK, the CSM SMS will make much more explicit the currently implicit requirements for operators and infrastructure managers to take a strategic approach to risks from human performance, and to apply human factors tools and approaches in managing their operational risks.
180. As more advanced technology and automation is considered for application in the rail sector, it is important to consider how this supports people, to ensure error potential is not unintentionally introduced, and its design makes the best of human capabilities. Inspection work has featured consideration of the number of CCTV images to be scanned by train drivers before departing the platform. With the introduction of new trains, the shape of windscreens to avoid distorted images, the design and layout of cabs and control positions are all areas that have been given consideration.

181. Following a multi-fatality incident involving contracted welders driving home, we have been alert to the potential for management or organisational arrangements giving rise to road risk. ORR has continued to update its inspectors' guidance on this topic and support the industry's working group on Road Risks. A significant contributory factor is fatigue. We continue to promote continuous improvement in how operators manage fatigue risks, especially when staff face significant travelling distance in road vehicles.
182. Other fatigue management efforts include - contacting all mainline train and freight operators to highlight common fatigue problems and expected controls, leading operators to progress improvements more collectively; providing information on ORR's website on factors which contribute to fatigue, and on using Key Performance Indicators on fatigue management to measure and drive improvements in controls; and progressing research to develop decision-aids on fitness for duty. These initiatives have been communicated to industry to further encourage uptake.
183. We have been active in sharing our approach on improved fatigue controls with other stakeholders, for example, presenting at: Parliamentary Advisory Committee on Transport Safety, Transport for London Bus Safety Summit and sessions with labour suppliers.
184. In 2017, a small Digital Railway human factors group was established between ORR, RSSB and Network Rail to help ensure a joined-up, co-ordinated approach on digital railway human factors. Activity will grow as the scope, nature and timescale for implementation of digital railway initiatives clarify.
185. **Conclusions:** We anticipate an upturn in human factors activity, in training on tools and approaches within the industry to facilitate compliance with the proposed CSM SMS. Plans are advancing for updating ORR's safety certification guidance in readiness.

The safety of the Channel Tunnel

186. Health and safety regulation of the Channel Tunnel is carried out by the bi-national (UK and French) Channel Tunnel Intergovernmental Commission (IGC). To assist in this role we continue to provide leadership, expert advice and secretariat support to the IGC and Channel Tunnel Safety Authority (CTSA), applying the key principles of our health and safety vision and strategy for the railway in Britain equally to the Channel Tunnel. Our inspectors are appointed to lead and deliver, alongside their French counterparts, the CTSA inspection plan, which aims to provide assurance that Eurotunnel's and train operators' management systems are capable of managing the specific risks associated with Channel Tunnel operations.
187. During the year, the IGC and CTSA have continued to regulate the users of the Channel Tunnel in a way that facilitates the safe operation and growth of cross-Channel railway traffic. Key areas of activity undertaken to deliver this have been the monitoring of Eurotunnel's approach to safety related in issues in respect of its new ElecLink project and the reintroduction of pagodas to its Arbel shuttle wagon fleet to reduce the risk of over height objects coming into contact with catenary in the Channel Tunnel. The IGC also took a close interest in the resolution of security issues associated with the new Eurostar direct service between London and Amsterdam, participating in a number of quadripartite meetings with interested Member States. In May 2017, the IGC convened its inaugural annual performance meeting all operators that use the Fixed Link to review Eurotunnel's performance system and the data collected during 2016.
188. The IGC completed its authorisation of the latest tranche of seven new Siemens Velaro passenger trains for Eurostar. It also commenced the authorisation of the Valero e320 Type II trains that are being modified to enable them to use the ERTMS signalling system, thus allowing them to run between Brussels and Amsterdam on Eurostar's new service. Our inspectors also provided the IGC and CTSA with support in the authorisation of Wascosa wagons for use through the Channel Tunnel (approved in October 2017) and in the bi-national assessment of an application from DB Cargo for the renewal of its Channel Tunnel Part B safety certificate (which the IGC authorised in March 2018).

Our safety policy work

- 189. Activities:** We carried out statutory post-implementation reviews of two sets of Regulations – The Train Driving Licences and Certificates Regulations 2010 (TDLCR) and the Health and Safety (Enforcing Authority for Railways and Other Guided Transport Systems) Regulations 2006 (EARR). These reviews looked at whether the Regulations had met their objectives and whether they should remain in their current form. Following surveys of our stakeholders, we submitted reports to the Secretary of State, which recommended that both sets of Regulations should remain in place. We also recommended that our current guidance on TDLCR could be improved and that our enforcement role under EARR could be further clarified in our Memorandum of Understanding with the Health and Safety Executive (HSE). This work will be taken forward in 2018-19.
- 190.** We have continued to provide advice and support to train operators, train drivers and registered medical practitioners on the requirements of TDLCR as we approach the final deadline for all train drivers to be licensed by 31 October 2018.
- 191.** We reviewed our approach to enforcing the Rail Vehicle Accessibility Regulations and have clarified how we will respond to enquiries and complaints in this area, which is outside of our normal health and safety responsibilities.
- 192.** Following a consultation in early 2017, we completed our preparations for withdrawing from the role of certifying organisations known as Entities in Charge of Maintenance (ECMs) who are responsible for the maintenance of rail freight wagons. After further consultation it became apparent that some ECMs had not prepared to transfer to another certifying organisation so we deferred the date for our withdrawal to 31 May 2018 to allow more time for ECMs to establish new arrangements with other organisations. We have also been engaging with the European Railway Agency to influence their proposals for extending ECM certification requirements to non-freight vehicles. Our effort is designed to ensure that any new proposals do not create unnecessary burdens for the UK rail industry.
- 193.** During the year, the Department for Transport decided not to pursue reform of level crossings legislation or to implement new regulations updating the Railway Safety Regulations 1999 and Railway (Miscellaneous Provisions) Regulations 1997. While ORR feels it would have been preferable to modernise the law in both cases, we will look to achieve some of the benefits by bringing forward improved guidance and processes around the existing regulations in 2018-19.

Permissioning

- 194. ECM Certificates:** We received 10 applications for ECM certificates during 2017-18. Three of these were for a new ECM certificate and seven for renewal of existing certificates.
- 195.** We assessed and issued nine ECM certificates during 2017-18 although one of these was carried forward from the previous work year. Two were for a new certificate and seven were for renewals of existing certificates.
- 196. Safety Certificates and Authorisations:** We received 18 applications during 2017-18 for safety certificates and authorisations.
- 197.** We issued 12 part A safety certificates, 15 part B safety certificates and seven safety authorisations during 2017-18 for the mainline. Of these figures, three part As, three part Bs and two safety authorisations were new. For renewals, it was seven part A safety certificates, seven part B safety certificates and four safety authorisations. In terms of updated safety certificates, there were three part Bs issued. For amended safety certificates, there were two part As and two part Bs.
- 198.** We issued six non-mainline safety certificates and five non-mainline safety authorisations during 2017-18. Of these; five of the six non-mainline safety certificates were renewals and one was for a new non-mainline safety certificate. For the non-mainline safety authorisations issued; one was new and the other four were renewals.¹³

13. Some of the applications for issued certificates and authorisations were received in 2016-17

Exemptions

199. There were six exemptions processed and issued during 2017-18 from the Railway Safety Regulations 1999. Broken down by type, these related to:
- Three issued for Regulation 5 – Use of hinged doors on passenger carrying vehicles
 - Two issued for Regulation 4 – Operating Mark I rolling stock
 - One issued for Regulation 3(1) – Use of a train protection system

SMIS and RSSB data provision

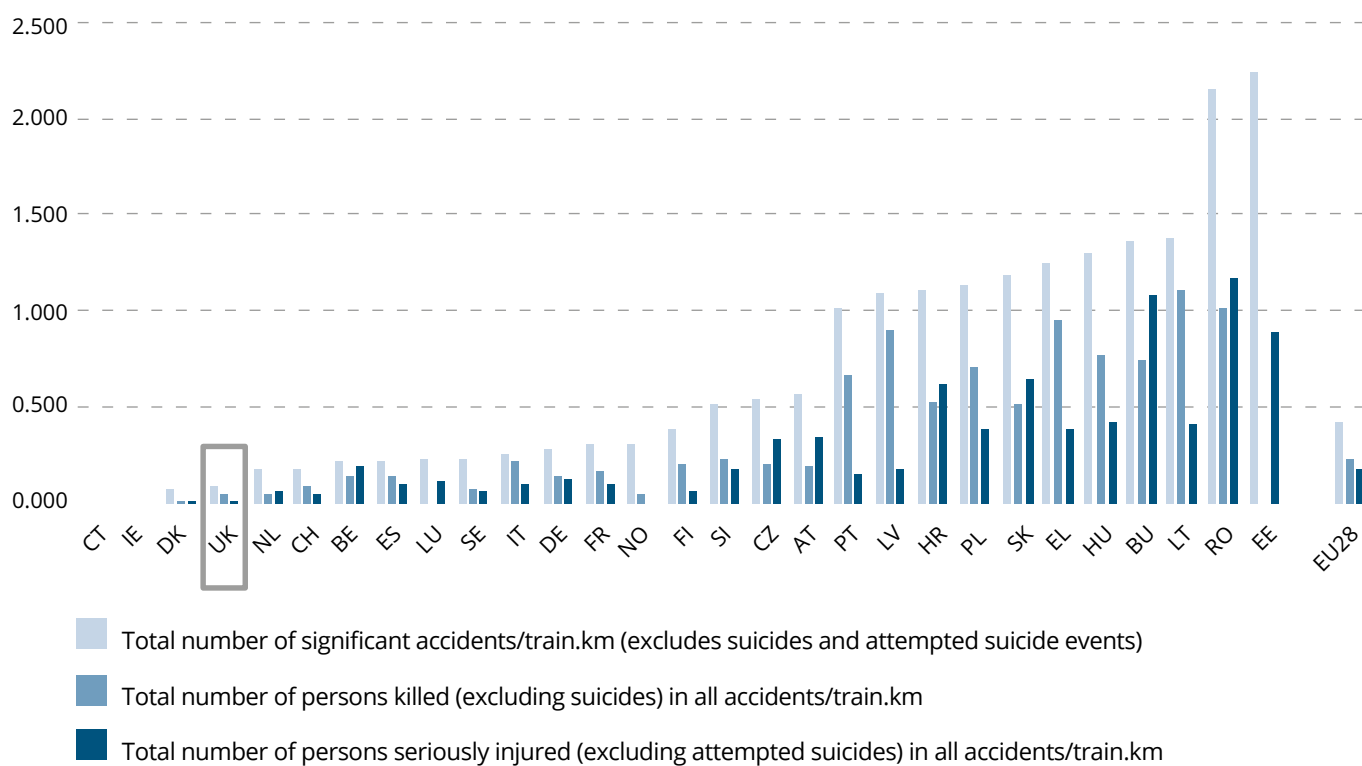
200. The Safety Management Intelligence System (SMIS) is used across the mainline rail industry to collect and analyse information about safety-related and other events. Use of SMIS is mandatory for infrastructure managers and railway undertakings on the GB mainline.
201. The new SMIS was launched on 6 March 2017 and replaced the old Safety Management Information System. The analysis of RSSB data in this report is therefore based on data from both systems. Events up to and including 4 March 2017 were entered into the old system and migrated into the new system so that users could update records if more information came to light. Events occurring on and after 5 March were recorded in the new SMIS, as well as any late reported events.
202. The change of system required users to become familiar with a new data model and user interface, and RSSB continues to develop user guidance, rebuild its data quality processes and resolve system issues. Generally, the data in the new system is of high quality and the level of reporting of injuries and accidents has been maintained. Furthermore, the new data model will allow richer analysis of many risk areas. However, there has been a short-term impact on the completeness and quality of some records.
203. To provide confidence in the data provided by RSSB in this report, RSSB has introduced additional quality assurance processes. These included manually checking and validating all fatalities, major injuries, SPADs and potentially higher risk train accidents (PHRTAs). RSSB also checked a sample of other records to understand and model the potential impact of missing information, which was discovered in a number of events that resulted in minor injury. To present an accurate picture of safety performance the minor injury figures presented in this report have been adjusted to account for these data quality issues. RSSB will work with industry to ensure affected records are appropriately corrected within SMIS. For further details of SMIS data quality and the analysis methods used, please reference the 2017-18 RSSB ASPR.
204. RSSB previously produced SMIS data quality metrics for each company and for the system as a whole. There was no data quality score produced for the new system in 2017. RSSB is currently working with SMIS user organisations to rebuild the SMIS Data Quality Programme. A new data quality metric based on common areas that industry has collectively agreed will be available later in 2018-19.

Comparison with railways in the European Union

Passenger and workforce fatality rates in the European Union railways, 2016

205. While it is based on a limited train movement accident dataset, passenger and workforce fatality rates on the UK's railways were fourth-best overall amongst European Union (EU) railways (see chart below). It remained well below the EU average in 2016 (the latest figures) when the data is normalised for Train Kilometres – the most recent dataset available from the European Union Agency for Railways.

Significant Accidents, Fatalities and Serious Injuries normalised by Train kilometres 2016



Source: European Union Agency for Railways



SECTION 3 – ROLES OF KEY INDUSTRY BODIES

Office of Rail and Road* (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 of risk controls; • driving improvement through advice and formal enforcement; • assessing and authorising safety certificates and authorisations; and • ensuring appropriate 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. 	<ul style="list-style-type: none"> ■ have legal duties to eliminate risk by: <ul style="list-style-type: none"> • conducting suitable and sufficient 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 conditions require railway group members (but only on the mainline) to join RSSB. Others, such as suppliers, can join voluntarily by agreement.
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; • managing the industry research, development and innovation programmes; • encouraging and facilitating cooperation; and • providing technical expertise. 	<ul style="list-style-type: none"> ■ the independent investigation body for accident and incidents on the railways ■ issue reports making recommendations aimed at preventing a recurrence ■ do not apportion blame or liability and have no enforcement powers ■ can issue urgent safety advice to industry where they identify a shortcoming they consider needs addressing without delay

Rail Accident Investigation Branch

206. The Rail Accident Investigation Branch (RAIB) is the independent investigation body for accidents and incidents on UK mainline, metro, tram and heritage railways. RAIB are not a prosecuting body and do not apportion blame or liability.
207. ORR has a good working relationship with RAIB, as demonstrated by the cooperation between our organisations during the Sandilands investigation. Having a good working relationship with RAIB has helped us engage with them and share our understanding of incidents and the key learning from them.
208. We have worked with RAIB on their effective recommendations project, identifying areas where RAIB has had a positive impact and where a new approach may be needed.
209. In 2017-18 RAIB published 19 reports and made 66 recommendations addressed to ORR, as the National Safety Authority.

Sandilands Investigation

210. The Sandilands investigation was one of the most significant RAIB has done since they were established. ORR worked closely with RAIB throughout their investigation, particularly in areas of common interest to our own investigation, such as examination of the tram vehicle.
211. RAIB's report was published on 7 December 2017, making 15 recommendations on the tram industry and ORR. We carefully considered the report and its recommendations, including discussions with the UK tram industry at a sector safety conference held in Manchester on 22 January 2018. We have also played an active role in the Light Rapid Transit Safety and Standards Board (LRTSSB) steering group that was established following the conference.
212. The role of the LRTSSB steering group is to take collective ownership of the recommendations that apply on a cross-industry basis to tramway owners, operators and infrastructure managers. Once formally established, the aim of the LRTSSB will be to improve the management and collaboration on safety risk in the Light Rapid Transit industry and to enable more effective industry cooperation.

RAIB areas of concern

213. In their 2017 Annual Report, RAIB pinpointed five areas of concern they had identified from their investigations. The areas of concern reflect the three key challenges facing the industry around performance of our people, pressure on the system and technology.

Reliance on signallers to ensure the safety of level crossing users

214. The reliance on signallers to ensure user safety at level crossings is a concern for us and something we have been working with Network Rail on to try and improve safety and prevent similar incidents. The increase in train frequencies puts greater pressure on the system and increases the workload of signallers.
215. Work done by ORR in this area includes:
- Ensuring Network Rail has a long-term strategy which is committed to remove reliance on telephones and signallers at User-Worked Crossings.
 - Encouraging Network Rail to develop new technologies to provide a warning at the crossing so removing the first line reliance on the signaller.
 - Working with Network Rail and DfT to design better signage at crossings to help users understand how to use the crossing and when to contact the signaller.
 - Approved expenditure from the CP5 ring fenced fund to fit new technologies at high risk level crossings.

Failures of structures and earthworks

216. We share RAIB's concern about the risk posed by unexpected failure of structures and earthworks assets and the impact of increasing pressure on the railway system.
217. We are currently pursuing a number of workstreams aimed at improving Network Rail's management of risk in these areas, many of which align with RAIB's specific areas of concern. Key workstreams already underway include:
- Ensuring that drainage is provided and effectively managed at high risk earthwork locations (this includes consideration of water concentration features).
 - Completing the drainage asset inventory.
 - Ensuring that appropriate arrangements are in operation for the mitigation of risk at earthworks during extreme weather.
 - Ensuring that high risk scour sites are remediated, and that plans are in place for taking action in the event of adverse weather.
 - Improving the management of risk associated with retaining walls.
 - Considering how third party risks to the safe operation of the railway should be minimised.

Safety of track workers

218. As RAIB has also identified, the railway industry has made progress in reducing the risk to those working on or near the line, although recent performance in this area has plateaued.
219. We promote holistic thinking in terms of identifying failure(s) of a safety management system, considering all the factors that contributed to an incident, rather than placing too much emphasis on reinforcing existing industry procedures.
220. An additional factor is the pressure on the railway industry to provide more services, as this reduces access for maintenance and requires more effective planning of work.

Fatigue

221. We agree with RAIB's observation that the industry needs to manage fatigue risk more effectively, through sustained effort to strengthen each layer of fatigue defences in each organisation's fatigue risk management system. In particular, we will continue to press the industry on the following areas:
- Employers and trade unions need to cooperate to ensure that working patterns minimise those features which cause fatigue – "fatigue factors".
 - Industry groups should continue efforts to agree and implement approaches to fatigue controls which adequately control risks and minimise the opportunity for commercial undercutting (especially in the freight and infrastructure maintenance sectors).
 - Employers should monitor the effectiveness of their fatigue controls – devising and tracking appropriate Key Performance Indicators (KPIs) for fatigue risk management has a key role.
 - All parties – employers, trade unions, and individual members of staff - should continuously strive to build and maintain an open, honest culture in relation to fatigue and the need for adequate, quality sleep.

Errors during installation and commissioning of new infrastructure

- 222. We agree with RAIB that the planning of some large, complex projects has lacked rigour and changes within Network Rail around the introduction of IELP should help reduce the chance of this happening again.
- 223. We further agree with RAIB that the lessons learned from past incidents (such as Clapham in 1988) are key to Network Rail and their contractors preventing similar incidents from occurring in future.

Reporting to RAIB

- 224. ORR has a statutory obligation to report to RAIB on the action being taken by a dutyholder to address each recommendation within 12 months of publication.
- 225. In 2017-18 we received 19 reports, which included a total of 66 recommendations.
- 226. During the year we reported to the Railway Accident Investigation Branch (RAIB) on a total of 110 recommendations with 50 being implemented; 19 reported as implementation ongoing; 31 as progressing; eight as having an insufficient response; two as being non-implementation; and none being addressed to another public body.
- 227. In their 2017 Annual Report, RAIB identified three recommendations where they were concerned that a dutyholder response did not sufficiently address it. This reflects an overall high standard of responses and ORR diligence in reporting.
- 228. There are four outstanding recommendations on ORR, two of which were made in the Sandilands report. The two other outstanding recommendations date from 2014 and 2015, both of which are related to changing our level crossing guidance, to reflect anticipated changes to signage requirements following legislative changes by DfT. Following DfT's decision not to pursue reform of level crossings legislation, we nevertheless intend to improve our guidance and processes around the existing regulations in 2018-19, which will satisfy these two outstanding recommendations.

Insufficient responses

- 229. We are concerned about the number of recommendations that currently have the status of "Insufficient response". Under our RAIB recommendation handling process, if an end implementer fails to provide a suitable and sufficient initial response within the statutory reporting deadline of 12 months of the publication of the report, the relevant recommendations are given the status of "Insufficient response", reported to RAIB as such and published on our website. Our expectations are that these would be limited in number and that, even if the 12-month deadline was initially missed, responses would be forthcoming shortly after.
- 230. However, we currently have 21 recommendations with the status of "insufficient response", the highest amount ever – all are Network Rail. We have raised this at both a Network Rail recommendation handling team meeting and (more senior) Joint Review meeting and expect improvement. We will also be alerting RAIB to our concerns.

Safety Digests

- 231. As well as full investigation reports, RAIB also publish Safety Digests. Safety Digests are a useful alternative to full RAIB reports as they are produced more quickly after an incident and are focused on identifying safety learning rather than making recommendations. Safety Digests cover many of the same topics as RAIB's full reports, such as the five areas of concern they have focused on.

SECTION 4 - OUR ENFORCEMENT ACTIVITIES

232. In most cases, we secure improvements in health and safety for passengers, the workforce and public through evidence-based advice and encouragement to dutyholders 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 dutyholders' risk control. Our enforcement policy statement¹⁴ sets out how we ensure rigour and consistency in our enforcement decisions by using our enforcement management model.

Improvement notices in 2017-18 (a full list is available on our website¹⁵)

233. We served 13 improvement notices, compared to 15 in 2017-18. Of those 13, seven were on Network Rail, which compares to nine in 2016-17. We also withdrew one notice (not included in the previous figures). The reasons for our notices, included:

- Not implementing revised measures for controlling risk from manually propelled rail handlers ("Ironmen").
- A lack of process to cover a change in layout or asset configuration initiated by track maintenance teams.
- Poor condition of the railway infrastructure on a heritage level crossing.
- Two instances of poor measures at two separate half barrier level crossings.

- Insufficient fencing at a railway siding.
- Two separate instances of an insufficient Safety Management System.
- Poor management of Respirable Crystalline Silica (RCS) dust.
- Insufficient arrangements to demonstrate staff competence.
- Insufficient fencing at a railway depot.
- A lack of suitable and sufficient risk assessment for lone working.
- Poor management of operating level crossing on one Route.

Prohibition notices in 2017-18 (for a full list on our website¹⁶)

234. We issued no prohibition notices in 2017-18. This compared to one prohibition notice served in 2016-17.

Prosecutions in 2017-18

235. In England and Wales we completed two prosecutions against three defendants during 2017-18 – see table below. This compares to five prosecutions in 2016-17. Both prosecutions were on historic events.
236. There were no prosecutions by Crown Office and Procurator Fiscal Service in Scotland during 2017-18.

14. http://orr.gov.uk/__data/assets/pdf_file/0016/5650/health-and-safety-compliance-and-enforcement-policy-statement-2016.pdf

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

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

238. Summary overview of our concluded 2017-18 prosecutions:

England and Wales		
Defendant	Incident	Fine
London & Southeastern Railways	Cleaner electrocuted after falling onto 750 volt live rail at West Marina Depot, East Sussex on 24 May 2014	£2.5 million
Wettons Cleaning Services	Cleaner electrocuted after falling onto 750 volt live rail at West Marina Depot, East Sussex on 24 May 2014	£1.1 million
Network Rail Infrastructure Ltd	Failure to undertake adequate maintenance to prevent derailment of a freight train near Gloucester in October 2013	£733K

ANNEX 1 – GLOSSARY

Abbreviation	Definition
BTP	British Transport Police
CCTV	Closed-circuit television.
CIRAS	Confidential incident reporting and assessment system; an industry funded but independent system which enables workers to 'whistle-blow' confidentially.
CP5/6	Control period 5 (2014-19) and control period 6 (2019-24): the usually five year period in which ORR reviews and sets track access charges and Network Rail's funding and output levels.
CSM	Common Safety Method(s). A series of European railway legislation that are directly applicable to Mainline Railway operations.
DfT	Department for Transport
FOC	Freight Operating Company.
FWI	<p>Fatality and Weighted Injury index: the common way of measuring harm to people on Britain's mainline railways.</p> <p>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.</p>
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.
Mainline Railway	<p>A railway is a 'mainline railway' unless:</p> <p>a) we determine that it falls within one or more of these categories:</p> <ul style="list-style-type: none"> ■ metros and other light rail systems; ■ networks that are functionally separate from the rest of the mainline railway system and intended only for the operation of local, urban or suburban passenger services, as well as transport undertakings operating solely on these networks; ■ heritage, museum or tourist railways that operate on their own networks; or <p>b) we determine that heritage vehicles that operate on the mainline railway and comply with national safety rules are deemed not to operate on the mainline railway; or</p> <p>c) it is privately owned infrastructure that exists solely for use by the infrastructure owner for its own freight operations.</p>
NSA	National Safety Authority in the European Union.
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.
PDSW	Planning and Delivering Safe Work – A Network Rail programme.

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.
RPCG	Rail Principal Contractors Group.
RM3	Railway Management Maturity Model: the tool we use to assess an organisation's ability to achieve excellence in controlling health and safety risks.
ROSCO	Rolling Stock Operating Company.
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.
SPAD	Signal 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.
Running line	A line shown in Table A of the Sectional Appendix as a passenger line or as a non-passenger line.
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.

ERRATA

26 July 2018

Office of Rail and Road (ORR) published mainline data within the Annual Health & Safety Report based on initial data sets received from the Rail Safety and Standards Board (RSSB) before 6 July 2018.

After providing the initial data sets to ORR, RSSB identified some inconsistencies within their data and corrected them ahead of publishing their own *Annual Safety Performance Report* on 17th July 2018. However, these changes were received too late for publication of ORR's *Annual Health & Safety Report*.

These changes affect **Passenger Harm, Public Harm, Level Crossing Harm and Potentially Higher Risk Train Accidents (PHRTAs)**. The changes to **Level Crossing Harm** and **PHRTAs** only affect 2017/18. The changes to **Passenger and Public Harm** affect the whole time series.

Please find below descriptions of the changes made to this report.

Metric	2017/18 Original	2017/18 Corrected	Description of change
PHRTAs	18	19	A buffer stop collision was identified in the week leading up to RSSB's publication of their <i>Annual Safety Performance Report</i> .
Passenger harm (FWI)	43.5	46.5	RSSB adjusted minor injury harm to take into account the impact of missing information (i.e. where the record contained no injury component). In addition to the 2017/18 correction, all other years in the time series have been revised by between 0.4 and 0.8 FWI. A small number of major injuries were also re-categorised.
Level Crossing harm (FWI)	6.6	6.7	A major injury was re-categorised.
Public harm (FWI)	50.4	48.4	RSSB identified inconsistencies between current and historic levels of minor injury harm. As there is no consistent way to distinguish between passengers and public in the new reporting system, RSSB limited the public harm chart to fatalities and major injuries only and re-classified public minor injuries as passengers. In addition to the 2017/18 correction, all other years in the time series have been revised by between 0.4 and 0.8 FWI.

We apologise for any inconvenience this has caused. If you have any further queries on these changes, please contact simon.belgard@orr.gov.uk



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