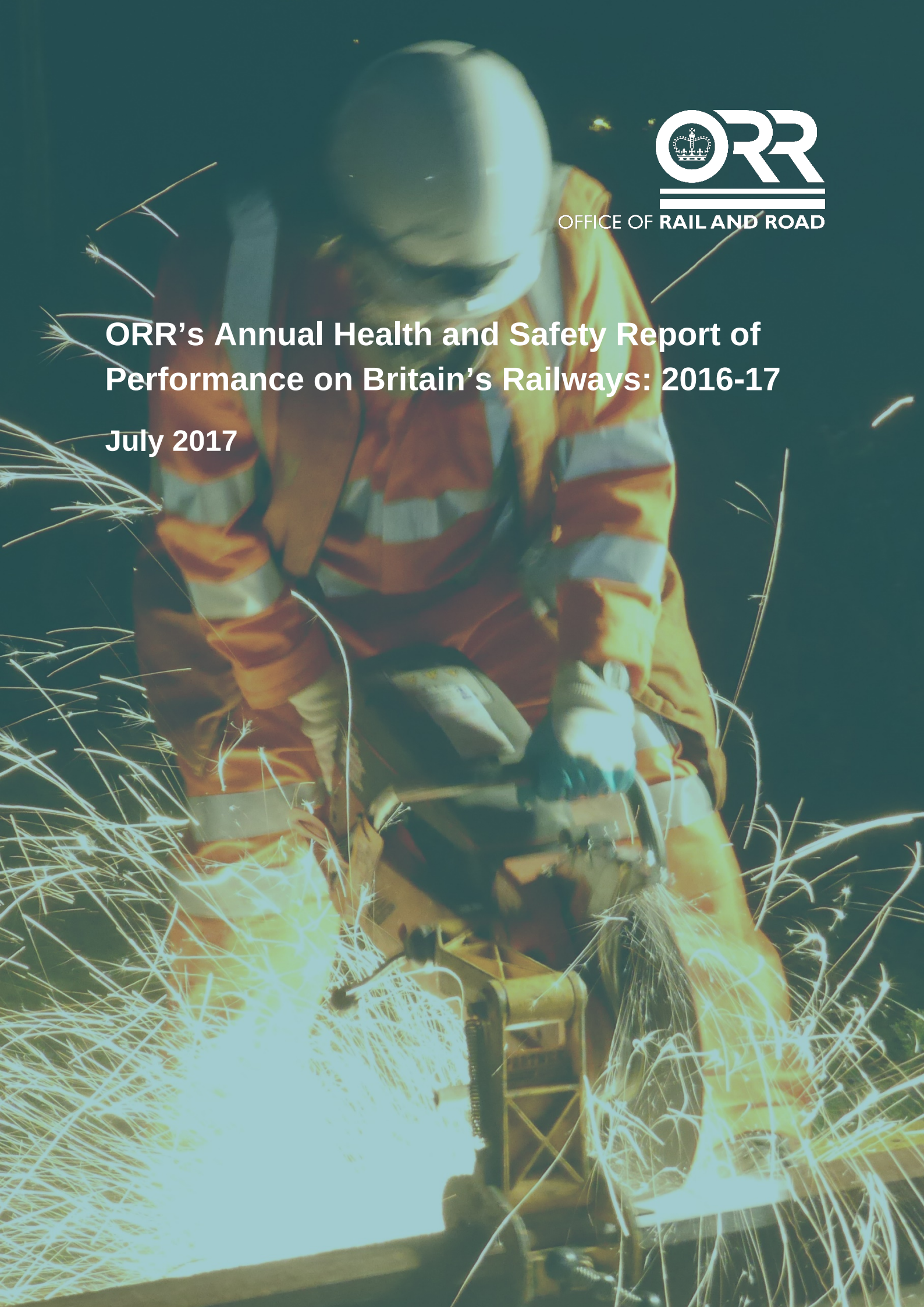


OFFICE OF RAIL AND ROAD

ORR's Annual Health and Safety Report of Performance on Britain's Railways: 2016-17

July 2017

Contents

Foreword

1. The past year has reinforced the importance of constant vigilance in the management of health and safety across the rail sector. The tragic Croydon tram derailment, which resulted in seven fatalities and injuries to many of those on board, was the most significant tram accident in over 50 years. Our investigation continues in parallel with those of the British Transport Police and the Rail Accident Investigation Branch. We will ensure that recommendations from the investigations are fully considered by the industry and ourselves, and that all appropriate action is taken.
2. Investigation is just one part of the work our health and safety inspectors and teams carry out. In response to public interest, this year we published the findings of our inspection into the safe dispatch by GTR-Southern of trains, and its compliance with health and safety law introducing driver controlled operation of doors (DCO) on to new routes. We followed this with the publication of a set of principles on DCO, which we developed with industry stakeholder involvement. These highlight the need for the industry to manage change well.
3. Safety performance on the mainline railway in 2016-17 remained broadly consistent with previous years as evidenced by the RSSB Precursor Indicator Model. Passenger safety remains very good, with the lowest level of harm to passengers and public ever seen on Britain's mainline trains and stations, when data is normalised (i.e. considering the rise in passenger journeys). However, there were several significant structural and earthwork failures which could have resulted in more serious train accidents. We are consequently inspecting and checking how well Network Rail is implementing the lessons it has learned from these incidents across its network.
4. We have continued to implement our Occupational Health Programme to encourage the railway industry to manage health risks. We secured agreement with the Rail Principal Contractors Group, on 'who should do what' in relation to Hand Arm Vibration risks and created a video for the Annual Railway Health and Wellbeing Conference in November 2016 on the importance of occupational health in the workplace.
5. We are placing an additional focus on safety by design, not only with major railway projects such as High Speed 2, but also with current railway operators, by monitoring to ensure that the right resource and focus on whole life risk management are embedded into a project at the early stages. Evidence shows that this is a highly cost effective approach to risk management.
6. Nonetheless, it is important to remember that Great Britain's railways continue to be among the busiest and safest in Europe. The Office of Rail and Road looks forward to playing its part in 2017-18.

Joanna Whittington
Chief Executive, ORR

Ian Prosser
Director of Railway Safety, ORR

Section 1 – Chief Inspector's review

7. As I near almost nine years as HM Chief Inspector of the railways, I am pleased to note that we have seen many areas of positive improvement in Health and Safety on Great Britain's railways. This assessment is based on evidence drawn from a wide range of sources. In addition to the statistics on actual harm and modelled risk I use the data gathered from our proactive inspections, audits, and investigations, and our RM3 assessments to inform my overall assessment.
8. However, 2016-17 has shown a plateauing of performance with positive developments taking place against a backdrop of incidents and accidents which show that the industry is still some distance from excellence. Following the tragic Croydon derailment, we continue to work with the British Transport Police, investigating whether or not there were any health and safety offences. We are also looking forward to the publication of the Rail Accident Investigation Branch (RAIB)'s final report into the accident. We will ensure that both the sector and ourselves thoroughly consider any recommendations that arise and that the lessons identified are applied wherever appropriate across the industry.
9. Mainline passenger and public harm on trains and at stations was at one of the lowest levels in the last 10 years during 2016-17, with five passenger and zero public fatalities in total - one onboard passenger fatality and four passenger fatalities at stations. Overall normalised harm (i.e. considering rise in passenger journeys) for train journeys was at its lowest level ever for 2016-17. There were also 33 public fatalities when considering trespass and non-station locations. Of the 33, 27 were trespassing; four were pedestrians at level crossings; and two were in road vehicles at level crossings.
10. However, in overall terms Network Rail's rate of improvement in asset safety has plateaued and some assets are vulnerable to failure in poor weather, especially earthworks and structures. There were a number of examples of this during the year, such as the landslip-caused train derailment at Hunton Bridge Tunnel (near Watford Junction). The deferral of renewals has also increased pressure on maintenance and inspection through which the risk has to be managed. These processes are heavily reliant on human intervention, which should always be the last line of defence. Combined with the evidence of inconsistent frontline implementation of standards which my inspectors have identified on numerous occasions (and the broader lack last year of growth in Network Rail's management maturity as measured by ORR's RM3 assessments set out in Section 2 of this report) these indicators give strong evidence of the vulnerability of its improved safety management record of recent years. ORR will continue to push, and if necessary, enforce to secure improvements, particularly around assurance and competence in order to promote more reliable and sustainable risk control. The issue of deferred renewals will also need to be addressed in the years ahead to ensure the situation is not allowed to worsen.
11. Following last year's milestone of zero workforce fatalities, there was one workforce fatality during 2016-17, when a worker died following a road traffic accident on the journey home from work.
12. It has now been a full year since the publication of *Leading Health and Safety on Britain's Railways*, a document which commits duty holders to work together on

resolving priority risk areas, and we encourage duty holders to publish their strategies for complying with its requirements.

13. This year Network Rail published its Home Safe Plan. This reduced and rationalised its initiatives to 21 targeted projects to provide the greatest health and safety benefits. The delivery of the plan is being closely monitored by ORR.
14. Public Health England launched its '*Guidance for Producing a Suicide Prevention Plan*' in November 2016. Adopted by Network Rail, it included nine points for each duty holder to follow to create or adapt their own suicide prevention plan so that there is consistency across the industry. This year saw the number of suicides and suspected suicides on Britain's mainline railway reduced from 251 in 2015-16, to 237 in 2016-17.
15. On London Underground, workforce safety remains stable, the fatalities and weighted injuries per year (FWI/yr) score was 6.25, with no fatalities since 2000. Passenger incidents showed a notable numerical increase but when considering the rise in journeys, passenger harm is at a historically low level. LU introduced the Night Tube successfully, but we had to deal with some concerns around the 'Fit for Future Stations' initiatives.
16. Our strong engagement with the Crossrail project has produced substantial benefits, particularly in respect to planning and scheduling of our role in authorising testing operating under Railways and Other Guided Transport System (Safety) Regulations (ROGS).
17. Looking forward, I believe the four key challenges facing the industry are:

- **Maintaining safe and sustainable assets:** Management of civil assets is a high priority for ORR. This is because of the age of the portfolio and its susceptibility to rapid deterioration in adverse weather. Initiating failure mechanisms are often difficult or impossible to detect by visual inspection and some of the work that Network Rail planned to carry out has been deferred because of funding constraints.
- **Managing change:** As well as growth continuing in some parts of the sector, the past year saw a number of new franchises awarded that will lead to an increase in the number of services, as well as new rolling stock. This increases the inherent risk which duty holders need to cooperate to mitigate. One of the ways of achieving this is through the introduction of new technology and working practices. However, it is imperative that these changes are managed well.
- **Culture and occupational health:** Although we see pockets of excellence, the sector still has some way to go in developing its overall safety culture and management of health to achieve widespread excellence. Evidence shows that focussing on improving the health of the workforce not only leads to a more engaged workforce, but also to a stronger culture and a more efficient business.
- **Safety by design:** As new strategic assets are introduced - whether a major infrastructure project, a rolling stock project or smaller enhancements - it is vital that the critical principles of excellent Safety by Design are employed by the sector. In some instances we have seen that this has not been the case and therefore, to help the sector, we have refreshed our Strategic Risk Chapter on the subject and included it in our Principles and Guidance documents.

18. Other particular risk areas we are scrutinising include:

- **Track:** Trends in performance indicators show a mixed and sometimes complex picture for 2016-17. Track geometry and fault measures all show an improvement compared to Control Period 4 (CP4) exit figures – but the rate of improvement on some has slowed or even begun to deteriorate.
- **Harm to the mainline infrastructure workforce:** In addition to the one workforce fatality in June 2016, RIDDOR reportable injuries went up from 72 last year to 90 this year.
- **Electrical safety**: Our inspections have revealed a mixed picture regarding the management of risks from electrical assets. This is unsurprising given the lack of progress in this area until around three to five years ago, when Network Rail acknowledged significant gaps in risk control and legal compliance and started to address the issue.
- **Level crossings:** 2016-17 showed that, despite progress over CP4 and Control Period 5 (2014-2019) to reduce risk at level crossings, vigilance must be maintained. Network Rail closed 67 crossings and downgraded seven during the year, yet still missed its target for risk reduction. This reflects the importance of managing risks effectively at each and every crossing as well as the increasing difficulty in securing level crossing closure.
- **Station management, train dispatch and the platform train interface:** Our inspections showed high standards, particularly in relation to written systems. It was found that where companies had migrated to electronic based competency management systems, the quality of staff training and ongoing management of skills had improved.

19. ORR published two ‘principles’ documents to help duty holders understand how to meet our expectations in complying with health and safety legislation, and six ‘principles’ specifically for duty holders which are introducing or extending driver controlled operation (DCO) and reviewing the operation of existing DCO services.

20. During the year there was some growth and change on the network. To engage with the industry concerning these developments, we published the principles (see above), and revised our strategic risk chapters throughout the year and will continue to update them. We encourage duty holders to use these key documents and monitor new and changing risks.

21. This year we have continued to engage the industry and other groups through our Railway Industry Health and Safety Advisory Committee (RIHSAC). We also engaged with our Trades Union colleagues at all levels.

22. We continue to play an active role within Europe by engaging with other Member States’ Regulators and the European Union Agency for Railways on the proposals for Common Occurrence Reporting.

23. Internationally, we enhanced our reputation as an effective railway health and safety regulator. This was shown by frequent requests for our advice from counterparts across the globe. We provided counsel and assistance to safety regulators in the United Arab Emirates, Hong Kong, Australia, and discussed similar work with other countries.

24. For the second year, I chaired the Health and Safety Regulators' Network, a forum for health and safety enforcement bodies to discuss good practice and procedures and share our experience of common issues, such as how to measure the impact of regulatory activities.

Ian Prosser

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 key findings across key risk areas and set out the evidence leading to our conclusions about each duty holders' risk management effectiveness, including the results of our 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.

27. This section covers Britain's:

- Mainline railway: Network Rail (pages 12-17), train operating companies (pages 17- 21) and freight operating companies (pages 21-23)
- Heritage railways (page 23)
- Tramways (page 23-24)
- Transport for London's operations, including London Underground (pages 24-27)
- Occupational health (pages 27-29)
- Our non-safety accessibility work (page 29-30)
- Our work in Europe (pages 30);
- The safety of the Channel Tunnel (pages 30-31)
- Our policy work (pages 31-32)

Mainline: Network Rail

Management Maturity

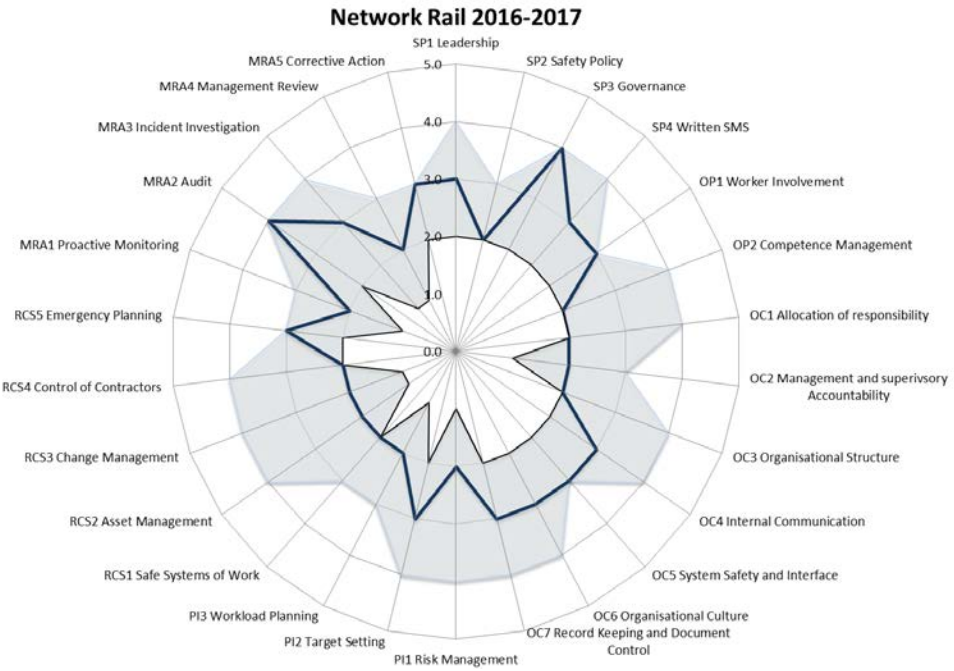
Overview: we use the outputs from our inspections and investigations to inform our judgements about how mature Network Rail's management systems are. We do this in a structured way by using RM3 criteria to highlight strengths and weaknesses in Network Rail's Safety Management System (SMS).

Using RM3, the majority of ratings are at levels 2 and 3 – 'managed' and 'standardised'. Two elements achieved level 4, 'predictable' – Audit and Governance. This is the same as for 2015-16 and, overall, there was little difference between the two years.

This is the fifth year we have used RM3 to evaluate Network Rail's management maturity (in line with the five-year cycle of its ROGS Safety Authorisation). Whilst there have been some fluctuations over the years (nine criteria have improved; four have worsened) there has been no substantive change; nine categories have remained unchanged at managed and four at standardised.

We served nine improvement notices on Network Rail over 2016-17, up from six in 2015-16 (see page 51).

28. **Evidence:** The chart showing our RM3 evaluations has a light blue shaded area. This describes the range of ratings for every criterion. Our final evaluation is determined by where the majority of evidence lies, but it can be seen that there is considerable variation in many of the SMS elements. This has been the case for each of the years we have carried out RM3 judgements. It indicates that there is undesirable inconsistency in the application of Network Rail's SMS across its network. It is not yet predictably reliable.



29. **Our activities:** we saw several potentially serious incidents over the year such as Hunton Bridge Tunnel (near Watford Junction). Some of these were caused by factors related to Network Rail's management of its aging infrastructure – see page 14.

30. The lack of improvement in Network Rail's risk management maturity, allied with the stalled improvements in performance indicators, give the strongest illustration yet of the potential vulnerability of its safety management record of recent years. ORR will continue working to secure targeted improvements, particularly in assurance activities, in order to promote more reliable and sustainable risk control.

Infrastructure worker safety risk

Overview: There was one workforce fatality – in a road traffic accident in June 2016. This followed the milestone achievement of no worker fatalities in 2015-16. The Lost Time Injury Frequency Rate (LTIFR) ended the year at 0.450 but narrowly missed its target of 0.447; this was Network Rail's best ever LTIFR.

A reduction in the number of lost time injuries was offset by an increase in the Reporting of Diseases, Injuries, Dangerous Occurrence Regulations (RIDDOR)-specified injuries went up from 72 last year to 90[1] this year. Harm to infrastructure workers whilst on the running line also increased by 21% over the year, including 72 major injuries.

31. **Evidence:** Overall harm to infrastructure workers on the running line increased 21%, with a 30% increase to 72 in the number of major injuries. Of these 72 major injuries, half comes from slip, trip and fall and a third from contact with object related events. There was a 23% increase in slip, trip and fall harm and a 26% increase in harm from contact with objects in 2016-17.

32. Network Rail's concentrated focus on road driving safety has secured a steady reduction in road traffic offences. Yet, at the same time, the number of road traffic accidents has increased. Network Rail's work continues to review its Life Saving Rules and to better understand the root causes of this apparently contradictory trend.

33. **Our activities:** ORR has used a balanced approach in its worker safety scrutiny during 2016-17. We recognised that, following the very difficult attempted introduction of Planning and Delivering Safe Work (PDSW), it would not be helpful to be too intrusive or prescriptive in assessing the renewed attempts to improve worker safety. We let Network Rail get on with reviewing the lessons learned from the failed initiative and in repairing its relationships with its staff and their representatives. We have monitored this process and provided advice as required.

34. We welcome the more cautious, incremental approach enshrined in the latest edition of the Network Rail's standard procedure - 'the Safety of People working on or near the line'. We endorse the efforts to regularise procedures across the network, including those parts that adopted PDSW without problems. We support the attempt to retain a single, accountable role for site safety and to involve that person in work planning. We also support a permit to work system. We accept that it is more realistic to let Delivery Units decide for themselves their degree of readiness and appropriate timescales to proceed with change.

Level crossings

Overview: the harm caused by and from level crossings to their users and railway operations represents about 8% of overall system harm (excluding railways suicides).

[1] Data provided by Network Rail's Safety Health and Environment Performance (SHEP) Report Period 13.

This has reduced gradually since 2010-11 following consistent focus by ORR, the industry and investment by the Government.

In 2016-17: there were six accidental fatalities at level crossings, compared to four in 2015-16. Unlike the previous two years, these included occupants of vehicles as well as pedestrians. Overall harm at level crossings increased by 46% from 2015-16, primarily due to the increase in fatalities. There is also an upward trend in near misses involving pedestrians at crossings and Q2 of 2016-17 saw the largest number of incidents in the last decade.

Since 2009-10, Network Rail has closed over 1,000 crossings, including 67 in 2016-17.

35. **Evidence:** 2016-17 showed that despite progress over CP4 and CP5 to reduce risk at level crossings vigilance must be maintained to make further improvement. Network Rail closed 67 crossings and downgraded seven during the year, yet still missed its overall annual target for risk reduction. This reflects the importance of managing risks effectively at each and every crossing, as well as the increasing difficulty in securing level crossing closures.

36. There were significant accidents at Hockham Road, Marston and Nairns 'No.117' level crossings. Hockham Road involved a train collision with a tractor, whilst Marston and Nairns 'No.117' involved a train collision with a road vehicle. All the crossings involved were 'user worked crossings', where the user is required to telephone the signaller before using it and illustrated the vulnerability of this as a means of controlling risk. These incidents emphasise the importance of Network Rail adopting a strategy to improve the accuracy of information provided to crossing users – as insisted on by ORR.

37. **Our activities:** Our main inspection programme in 2016-17 focused on risk control arrangements at whistle board crossings. We inspected 128 crossings across all routes. We found that:

    - the quality of asset information was generally better than in the first year this work was undertaken.
    - the sounding of train horns forms an unreliable warning – it was not always done, and when the horn was sounded it was not always at the correct location to give sufficient warning to crossing users.
    - Network Rail's risk assessments are improving – but the aspirations of local managers to improve risk control such as introducing additional warning technologies are frustrated by resource and slow industry processes.
    - whistle boards should be provided on both approaches to crossings – even where train approach sighting are sufficient – because it is a natural human instinct to expect to hear a warning when approaching from either direction.
    - consideration of additional risk during the 'night time quiet period' (NTQP) did not lead to additional local risk control measures.

38. Nationally, Network Rail recognised the significance of its growing intelligence of greater crossing usage than originally thought during the Night Time Quiet Period (NTQP) and as a result showed good leadership to secure industry adoption of an enhanced NTQP.

Infrastructure risks

Civils and drainage: Management of civil assets is a high priority for ORR, because of the age of the portfolio and its susceptibility to rapid deterioration in adverse weather.

Furthermore, initiating failure mechanisms are often hard or impossible to detect by visual inspection. And, finally, much of the work that Network Rail planned to carry out over the next two control periods has been deferred because of funding constraints.

Track: Trends in performance indicators show a mixed and sometimes complex picture for 2016-17. Track geometry and fault measures all still show an improvement compared to CP4 exit figures ,but some rates of improvement have slowed, or even begun to deteriorate. Broken rails, for example, show an improved trend in 2016-17 compared to 2015-16, but have not matched the 'best ever' levels of 2014-15. If immediate action level defects are included in the total – then the trend is once more at historically best ever levels.

Electrical safety: At a senior level within Network Rail, and particularly within its Safety, Technical and Engineering Directorate, there is a clear acknowledgement of and commitment to securing better compliance with the law and improved control of risks.

None of this is without significant challenge – the legacy infrastructure pre-dates most of the significant legislation and was not designed to comply and new electrification schemes have to be fitted on to existing infrastructure such as platforms, bridges and level crossings.

Evidence:

39. **Civils and drainage:** The importance of these assets is emphasised by their presence in many of the elements of Network Rail's Train Accident Risk Reduction Programme elements and not all were delivered in 2016-17. The achievement of the Civils Strategic Asset Management Solution (CSAMS) caused significant delay and the failure to deliver its national roll-out had a knock-on effect on several other initiatives.

40. Targets for high risk scour sites risk reduction measures were met. Drainage volumes, however, were not. These had been identified as delivering potential train accident risk reduction , but were not achieved in a majority of routes.

41. The Precursor Indicator Model (PIM) figures for both structures and earthworks are both on an improving trajectory – reflecting fewer incidents, largely as a result of more benign weather. However, a number of incidents provided graphic illustration of the potential for catastrophic consequences – and the vulnerability of some of the controls and mitigations. There is no room for complacency in Network Rail's management of the entirely foreseeable risks associated with this group of assets.

Our inspections found:

- The management of risk associated with deferred renewals of structures and earthworks renewals varies from route to route. No immediate significant concerns have been identified from ORR site visits, but Network Rail must improve the standard of its recording of the rationale for deferring a renewal and identifying mitigation measures.
- Although some progress was made, there are still gaps in Network Rail's asset knowledge, particularly in the field of drainage. However, work to complete the identification of all earthworks assets was completed.
- We told Network Rail that our investigations of a number of landslip incidents revealed too many barriers between asset disciplines, whose collective shared knowledge could have delivered more effective control of risk.
- Investigation of the derailment at Watford junction tunnel on 16 September 2016 revealed a weakness in Network Rail's arrangements for responding to short-

notice notification of adverse or extreme weather. Steps are being taken within the LNW Route to address this matter, and should also be considered by other routes.

- Several incidents during the year have demonstrated the potential impact of third-party activities on the safe operation of the railway. Network Rail, and the wider railway industry, needs to consider how best to minimise third-party risks.

42. **Track:** Repeat twist faults, although still better than CP4 exit levels, have deteriorated over the last year. It is a complex picture – most routes show improving trends in new twist faults, and some of the 'repeat' twist faults may have reported an anomaly. We are pressing Network Rail hard to establish the real level of repeat incidence and, thus, risk. We have escalated our concerns about management of repeat track geometry faults and are requiring Network Rail to demonstrate route and national improvement plans.

Our inspections in 2016-17 showed:

- there is a clear and systematic process for measuring and monitoring track geometry, but robustness of delivery could be improved, especially the management of the output of track recording vehicles.
- In respect of the assurance-related follow-up and escalated track geometry management concerns: we have more productive engagement with staff in the central technical authority of Network Rail, but it was harder to secure plans from routes.
- good progress with tubular stretcher bars fitment – year end saw an out-performance, achieving 1,948 point ends against a target of 1,850. However, there are regrettable indications that the post-Grayrigg improvements made to S&C asset data in Ellipse have been eroded.
- Delays in the implementation of Plain Line Pattern Recognition (PLPR) and Eddy Current testing for rolling contact fatigue.
- Business Critical Rules roll-out was limited in its impact and future implementation lacks ambition. The programme never attracted the priority, funding and resourcing required to be effective.
- Role-based competence roll-out is lagging. Without its full deployment Network Rail struggles to demonstrate that its competence management system (especially for Track Maintenance Engineers) is as effective as it should be.
- Extensive inspections across all routes of deferred track renewals showed that there was not a demonstrably consistent means to manage the impact of deferrals. We found no evidence of immediate safety risk, but it was not always clear that the effects of deferral had been assessed fully, or appropriate interim mitigations identified and implemented. We have made a number of recommendations for improvement.

43. **Electrical Safety:** Our inspections have revealed a mixed picture of maturity in relation to the management of risks from electrical assets.

44. A very significant development has been the production of decision support tool to aid investment and renewal decisions. Network Rail intends to use this to secure greatly improved control of risk and legislative compliance for its legacy assets over the next three control periods (15 years). If left to condition-related renewal, this

compliance process was estimated to take over a hundred years. ORR endorses the general approach described by Network Rail but will continue to scrutinise the detail of resulting plans.

45. Throughout 2016-17 we have monitored Network Rail's progress in delivering its electrical safety improvement plans. There are a number of strands to this programme, at varying stages of development. Some of the most important are 'Safer, Faster isolations' and 'Single Approach to Isolations'.

46. We have continued to liaise closely with electrification projects throughout the year. The following should be noted:

    - We have been dealing with optioneering decisions often made five to seven years ago, when industry understanding of compliance requirements was not as well developed. Retrospective design solutions will often be more difficult and expensive.
    - All of our guidance and engagement has been with the aim of securing improved control of risk and compliance with the law at the earliest opportunity – to avoid costly remedial solutions.
    - We never demand compliance at any cost; just what is *so far as is reasonably practicable*.

47. Nevertheless, we have sometimes seen projects go to heroic lengths to try to comply with electrical clearance requirements. Some of these may be grossly disproportionate. It is hard to be sure, because often project personnel lack the skills to carry out a suitable and sufficient assessment of the risks that would inform a competent judgement about gross disproportion factors involved. We have seen some good examples, but Network Rail's projects are not good at sharing knowledge, so good practice is not spread around consistently.

48. We continue to work with Network Rail to promote a better understanding of risk, so that proportionate decisions are made for new and legacy electrical infrastructure.

49. We are inspecting the efficacy of Life Saving Rules (LSRs) for electrical safety. The work is not yet complete, so we have not finally reported. However, we have communicated our interim finding that one rule, 'Test before earth' was well understood and adopted, but the other LSR 'Test before touch' rule was not observed at any of the ten isolations at the worksites we inspected.

50. It is very disappointing that such an important means of managing risk has such poor traction on the ground. We have progressed our concerns and will secure improvements. This is an illustration of the importance of Network Rail strengthening its own assurance processes - our findings should not have been a surprise to the company.

Mainline: Train operating companies

Management maturity

Overview: Overall our RM3 assessments found a predominantly 'Standardised' level 3 performance, with train operators reaching an improved 'Predictable' level 4 performance for six of the RM3 assessment criteria. However, the criteria - Control of

Contractors was now found to be at the level of 'Managed' level 2 overall, which is down from level 3 performance observed in 2015-16.

We served two improvement notices on train operators in 2016-17 and took one prosecution case against a charter operator – see page 52.

51. **Evidence:** Passenger journeys travelled increased 0.8%, passenger kilometres travelled increased 2.0%, however overall train kilometres travelled decreased 0.3% since 2015-16.

52. When compared to 2015-16, overall harm to passengers and public in stations and on trains decreased 16%. This was due to a reduction to five fatalities, down from nine last year. These were:

    - A passenger fell at an empty platform and was struck by a non-stopping service at Hither Green.
    - A passenger fell at an empty platform and was struck by an approaching train at Drumgelloch.
    - A passenger fell between the train and platform while alighting at Chester station. He/she died approximately four months later.
    - A passenger fell from the platform edge and was struck by a non-stopping service at Saltcoats station.
    - An on-board passenger was struck by fixed infrastructure whilst leaning out of a window.

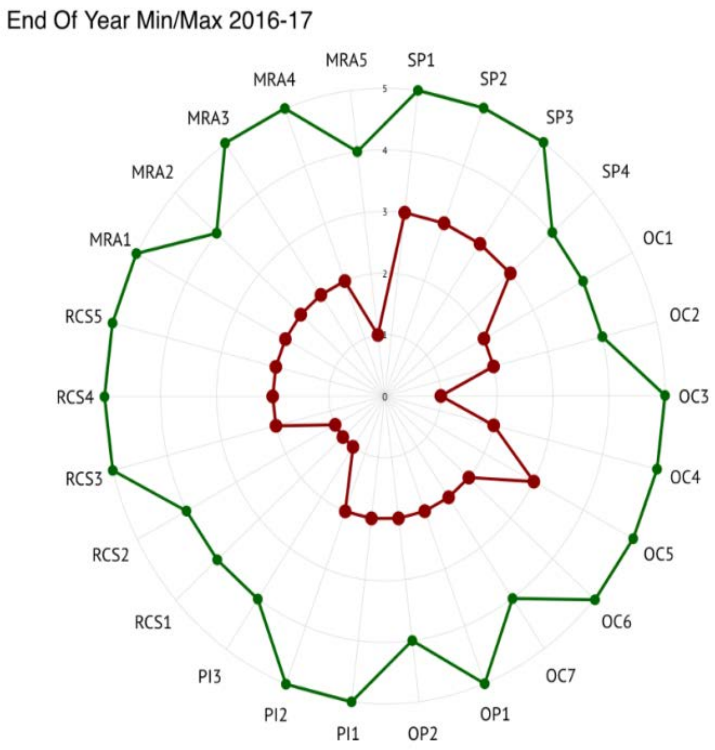
53. Tragically, 2016-17 was overshadowed by the first passenger fatality on board a train since the Grayrigg derailment in 2007. A male passenger travelling on a Gatwick Express service from Gatwick Airport to London Victoria suffered fatal injuries as a result of putting his head out of a window and striking a signal gantry near Balham in South London.

54. RAIB has made two recommendations and identified one learning point from this incident, namely to improve the industry's management of the interacting risks between infrastructure and rolling stock, reduce the risk from people leaning out of opening train windows and to highlight the need for regular monitoring and management of structure clearances when those clearances are reduced from normal.

55. **Our activities:** the incident at Balham Junction is still under investigation by ORR.

56. ORR's safety inspectors have also worked alongside ORR colleagues dealing with wider regulatory and economic issues over this year, including tengaging with Transport for Wales and the bidders for the forthcoming Wales & Borders franchise.

A sampled and composite RM3 assessment of train operators risk management maturity in 2016-17 with maximum scores (in green) compared to minimum scores (in red).



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.

Station management, train dispatch and the platform train interface

Overview: High standards were identified in our inspections, particularly regarding written systems, and it was found that where companies had migrated to electronic based competency management systems the quality of staff training and ongoing skills management was of a better standard than where reliance was still placed on paper based systems. This may be due to competency assessments being recorded in real time which allows interaction with the individual being assessed. It was also noticeable that where electronic systems have been introduced there appears to be more use made of 'non-technical skills'.

57. **Evidence:** there were four passenger fatalities at stations and zero members of public (excluding trespass):

58. Overall harm to passengers and the public at stations decreased 21% compared to 2015-16.

59. **Our activities:** Over the year we inspected a variety of platform dispatch methods, which included: guard self-dispatch; platform staff dispatch; driver only operation including look back, use of platform mirrors and also platform CCTV-mounted cameras. Throughout the year, as part of the on-going industrial disputes relating to driver controlled operations (DCO), our inspections examined the arrangements for dispatch involving train-mounted camera equipment.

60. The inspections identified that risk assessments did not always capture all methods of dispatch and often did not consider the resource levels required to dispatch trains safely, particularly during peak periods. Further, the assessments were not always revised following changes at stations (e.g. where signalling changes had made platform signal sighting more problematic). A common issue within most of the companies related to the quality of investigations following incidents and the failure to identify the root cause accurately. This clearly has an impact on the ability of the companies to effectively address the failures and ensure similar issues do not arise in the future.

61. We have noted the improvements to platform-train gaps that will result from the introduction of new rolling stock for routes in East Anglia and in Merseyside and the positive safety outcomes that are part of conscious design decisions made at early stages of procurement.

Rolling Stock Maintenance

Overview: No significant areas of concern was identified in relation to rolling stock maintenance where inspection activity was undertaken. The companies were able to demonstrate a consistent approach to maintenance and good interfaces with external organisations, including Rolling Stock Operating Companies (ROSCOs) and third party suppliers. Areas of good practice included the use of IT to ensure that staff had up to date information of vehicle maintenance procedures, and long term planning of special events to ensure the availability of rolling stock.

62. **Evidence:** PIM-measured risk from train operations and failures as of 4 March 2017 (the last time the PIM was updated), increased by 66% particularly due to a 164% increase in runaway trains. There was a 9% decrease in the number of actual train operations and failure incidents compared to 2015-16. The number of incidents of displaced or insecure loads rose by 124% from 17 in 2015-16 to 38 in 2016-17.

63. **Our activities:** Whilst interface arrangements with third party suppliers are improving, ORR is aware of continuing issues relating to sub-standard workmanship. It is, therefore, important that train operating companies (TOCs) have the correct level of scrutiny to ensure work is undertaken to the requisite standard.

64. Our inspection found areas of improvement at several depots in relation to worker safety issues; for example, enhance work at height and depot protection arrangements. This was particularly true when our inspectors visited less modern depots, but duty holders have a responsibility to ensure effective control of these risks.

65. Once again our inspectors identified the need for greater use of pro-active indicators particularly at a sub-system level.

Safety certificate and franchising

66. **Our activities:** The year has seen a large number of safety certificate submissions and re-certifications, which is a legacy of the original five-year cycle whereby a large number of certificates were issued in a short period of time after the introduction of ROGS regulations. There have also been a number of new franchises let and we assessed a total of 20 certificates/authorisations during the year.

67. We have also worked closely with DfT to achieve better engagement throughout the franchising process in order that we can contribute more effectively to secure appropriate safety enhancements within new franchises.

National SPAD Strategy

68. Work continues on the development of a national SPAD strategy and it is now at ready to be presented to the Train Accident Risk Group (TARG) for their endorsement before it goes to System Safety Review Group (SSRG) and the Rail Safety and Standards Board (RSSB) board. This is the first of three stages. Stage one is to deliver the strategy.

69. **Our activities:** ORR has been working closely with the steering group and working groups to identify its key themes to achieve reductions in the number of incidents.

Change Management

70. We found some weaknesses in procedures to meet the requirements of railway-specific risk assessment legislation. There remains scope for improvement in identifying and managing changes relating to organisational structure and alterations at stations. Further action is also required to ensure that appropriate audit systems are in place for competence management when change management is reviewed.

71. **Our activities:** We carried out inspection work on the subject of change management with about 25% of TOCs last year. The findings of these inspections were mostly positive, with evidence of good practice seen in the areas of leadership, board governance, objective/target setting, record-keeping, change management, proactive monitoring arrangements and management review. In general, the most significant changes were seen to be around managed safely. It was apparent that the best performers carried out effective post-implementation reviews to understand how well the change had been done and to learn lessons for future change processes.

Mainline: Freight operating companies

Overview: It has been another challenging year for Freight Operating Companies (FOCs) with further reductions in traditional freight flows such as coal and steel. In 2016-17, other types of traffic such as intermodal and construction, recorded an increase in traffic levels. As a result, many FOCs are adjusting their organisational structure to take into account the changes to freight traffic. It is important, therefore, that FOCs have robust change management arrangements in place to ensure that health and safety performance is maintained throughout organisational change.

Our small sample of RM3 assessments found a predominantly ‘Managed’ level 2 performance, with evidence of ‘Predictable’ level 4 performance for Record-keeping and document control.

We served one prohibition notice against a freight operator in 2016-17.

72. **Evidence:** there were four Potentially High Risk Train Accidents PHRTAs involving freight trains in 2016-17. Three involved derailments and one was related to a collision with a road vehicle on a level crossing.

73. Of these four PHRTAs, we are currently investigating two significant Freight Train derailments at Lewisham and East Somerset Junction.

74. A specially convened cross-industry working group continues to review the interaction of common factors that appear in many freight train derailments: sub-optimal track geometry (particularly track twist), wagon suspension sensitivity and asymmetrical loads.

75. The group is undertaking four key enabling activities to improve its understanding of risk and capability to identify and mitigate the factors that influence track/vehicle/load interaction. The first two enablers are complete initiating further work investigating solutions that could improve current control measures. A new load measurement system called GOTCHA that measures wheel load is live at around 20 sites and Network Rail is assessing its capabilities to reliably and repeatedly identify imbalanced vehicles.

76. **Our activities:** During 2016-17 we consolidated work with FOCs that had been undertaken in 2015-16 .We also renewed a number of safety certificates for FOCs, using the intelligence gathered to inform the FOC inspection work plan for 2017-18.

77. ORR inspectors, working with colleagues from the French National Safety Authority under the auspices of the Channel Tunnel Safety Authority, undertook a series of inspections focusing on the arrangements for pre-departure checks carried out by FOCs operating international freight services. Inspectors found robust arrangements in place for the development and maintenance of staff competence but issued a number of recommendations in relation to monitoring of work carried out by contractors.

78. We use RM3 to push operators' systematic analysis of their safety management systems, and to identify areas for improvement, examples of good practice and commitments to continuous improvement. We continue to engage with the work of the cross-industry freight derailment working group and the National Freight Safety Group and Rail Freight Operators Group.

79. As well as supporting the work of the cross-industry freight derailment working group to improve risk control, ORR continues to urge the freight community to improve its risk controls with particular focus on load management; and Network Rail on improving its management of track.

Heritage railways

Overview: The heritage sector continues to liaise with the Heritage Rail Association (HRA) as it strives to promote high safety standards in all their operations, with a key priority being improving their health and safety culture.

We continue to encourage the HRA in its leadership role for the sector engaging particularly with the HRA Operating and Safety Committee, and attending the bi-annual Directors and General Managers meetings. We continue to encourage the HRA to develop and maintain, revise and update its core guidance and standards for the industry.

We have also had input to the HRA's Road Rail Vehicle Working Group.

We will continue to promote the use of RM3 assessments of operators' safety management systems (SMSs) as a tool to identify weaknesses and target improvement. We will continue to work to ensure all heritage operators use strong and effective SMSs.

80. **Our activities:** we continue to focus on getting heritage operators to maintain, develop and importantly to comply with the SMSs they have drawn up and produced. Consistent adherence by heritage operators to their individual SMS', internal standards and rule books needs more work.

81. 2016-17 saw a number of worrying accidents and an increase in complaints to ORR. The industry needs to focus on reducing these.

82. We noted one workplace connected death on a heritage railway where a member of staff died from natural causes.

83. Accidents included:

- a haulage contractor driver injured when caught between his lorry and a concrete wall,
- collisions at Automatic Open Crossings Locally Monitored between a steam locomotive on driver experience and a car and another incident where a diesel hauled train was in collision with a car,
- scalding injuries from injector overflows or steam cylinder drains,
- operational incidents, such as SPADS

84. We were pleased to note positive responses from some of the smaller heritage duty holders actively seeking to embrace health and safety requirements for SMSs.

Tramways

Overview: Safety on Britain's trams has been overshadowed by the tragic derailment at Croydon Sandilands where seven people lost their lives and a further 49 reported injured. Working with the British Transport Police (BTP) and alongside RAIB, ORR inspectors are involved in investigation of the circumstances of the crash and its underlying cause.

Other than this this tragic incident, the British tramways continue to show steady signs of improvement in the health and safety culture within their organisations.

85. **Evidence:** Tram networks in Britain continue to show year on year increases. Growing commitment to trams as a means of urban transport is reflected in the expansion plans being developed by many of the British tram networks.

86. **Our activities:** We have worked closely with and provided technical support to BTP who are leading the investigation into the incident at Croydon. We have also worked collaboratively with RAIB as it conducts it independent investigation into the causes of the accident. In particular, we have worked to ensure effective cross-authority working for examination of the tram involved in the incident to ensure that mechanical and technical elements are examined by all interested authorities at the same time rather than independently. We are pursuing a number of our own lines of inquiry with a view to determining compliance with health and safety at work requirements. These include reviewing working hours and patterns, as well as risk assessment processes and procedures.

87. Tram collisions with pedestrians remains an area of concern and ORR inspectors have been involved in a number of inquests relating to such incidents.

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 2016-17. As in previous years passenger numbers and services have continued to grow and again there were no workforce fatalities arising from railway operations. A high level of safety was maintained during infrastructure modernisation and rolling stock replacement investment work.

There were 1.735 billion passenger journeys on TfL services in 2016-17, of which 1.375 billion were on London Underground, a 3% increase on 2015-16. The number of incidents involving harm to passengers from incidents at the platform edge continue to increase, a trend which has gradually increased in line with passenger growth.

Performance by London Overground has remained stable following takeover of the franchise by operator ARLL (Arriva Rail London Ltd) we will undertake a full intervention in 2017-18.

The Docklands Light Railway (DLR) franchisee operator Keolis Amey Dockland Ltd was able to provide a full year's health and safety performance data following its take-up of the franchise in 2015-16.

Similarly, TfL franchisee MTR, produced a good first year health and safety performance.

Our strong engagement with the Crossrail project has continued to produce benefits, particularly with respect to the planning and scheduling of our role in authorising testing and operating under ROGS, as well as our input in to the changes to accommodate introduction of new 345 trains.

We served four improvement notices on metro services over 2016-17.

88. **Evidence:** Once again, London Underground recorded no workforce fatalities in connection with its operations. There were 24 recorded major injuries (RIDDOR specified injuries') and 1302 minor injuries. This represents an increase of 2.2% in FWI compared to the previous year (2015-16) but is lower than any other year since 2011-12.

89. Similarly in connection with infrastructure no workforce fatalities occurred. There were eight major injuries and 289 minor injuries. This gives an increase in FWI compared to the previous two years but is lower than any other year since 2004-05

90. With regard to passengers there were two fatalities, 80 major injuries and 4174 minor injuries. This represents a significant increase, particularly in minor injuries. However, when adjusted for FWI, this is the lowest level recorded and reflects the significant decrease in major injuries on previous years (80 for 2016-17 compared to the previous lowest 94 in 2014-15)

91. **Our activities:** We served an improvement notice in relation on to the Chorleywood landslip requiring LU to use the arrangements it implements when its infrastructure may be compromised.

92. We served improvement notices on London Underground Ltd and Balfour Beatty Rail Ltd (a contractor working on London Underground Infrastructure) to implement a safe procedure for moving rail vehicles to site following an incident where a worker suffered crush injuries when trapped between the tracks of a road rail vehicle and a platform edge while the vehicle was travelling to site.

93. All notices were complied with.

94. Our inspections found that overall LU's health and safety procedures continued to ensure it managed its operational risks well. In 2016-17, we focused on:

- infrastructure electrical safety
- the implementation of controls for risks posed by passengers' use of escalators
- the introduction of the Night Tube services
- Development of automated train operation in connection with the Four Lines Modernisation project.
- follow-on from introduction of Fit-for-the-future stations

95. We particularly noted the introduction of Red Combs at the head and foot of escalators, a development for which LU's escalator project in previous years had produced strong evidence was beneficial in reducing incidents – see photo opposite.

96. Our inspection of infrastructure electrical safety as part of our five-year programme again showed LU progress toward best practice arrangements in compliance with Electricity at Work regulations 1989.

97. We were pleased to note that the Night Tube" was introduced without major incident, although subsequent inspection revealed at least one incident of insecure segregation of closed parts of the network. We note LU's prompt action to address this.

98. We have benefited from LU's proactive engagement with us on the development of its automated train operations arrangements for the four Lines modernisation project.

99. Our follow-up on the fit for the future stations caused us to raise concerns with LU at the level of resilience within the system. While we found no evidence of failure to

staff stations, we did find a heavy reliance on overtime working. We noted LU's subsequent moves to recruit additional staff in relation to this.

Progress on High Speed 2

100. **Our activities:** we have continued to monitor the development of key technical principles in support of the specification being prepared for the various design and construction contracts for the project. We are focusing at this stage on the assurance process. We have also worked jointly with the Health and Safety Executive (HSE) and the Environment Agency to ensure a consistent and efficient approach by regulators to the project.

101. The Hybrid Bill for the scheme ascended as an Act in February 2017 and the project is now moving forward to seek tender responses for a number of packages of work.

Crossrail

102. **Our activities:** We are now engaged fuly with Crossrail as the project progresses towards operational working in 2018-19. We now have an agreed timetable for the various ROGS certification and authorisation processes to allow testing of the train and commissioning of the infrastructure. We have had constructive engagement with the design team and those responsible for the building of the new Old Oak Common depot.

103. Construction is approaching completion with testing and commissioning of the central operating section planned for November 2017 and the gradual introduction of the new trains first on the Shenfield- Liverpool Street route.

104. Our cross-office coordinated approach is well embedded internally and our with colleagues are engaged with different parts of Crossrail working together e.g. on interoperability, licensing and ROGs authorisation matters. This has resulted in positive and productive engagement with Crossrail, TfL, and MTR Crossrail train operating company.

105. We have reached agreement with the various dutyholders on a timetable and what action is required by when from each one to gain the relevant certificates, authorisations and amendments under ROGs to bring each stage of Crossrail into operational use.

MTR Crossrail

106. **Our activities:** The main inspection work undertaken with MTR Crossrail was of driver competence management arrangements because they will be recruiting and expanding their driver complement rapidly and will have a high proportion of newly and recently qualified drivers. It was apparent that MTR Crossrail has done a lot of work to develop the basic driver training programme and the electronic competence management systems. Our inspection showed that the Competency Management System (CMS) is delivering competent drivers to MTR standards and the promotion of a positive safety culture was evidenced by the professional commitment of managers and employees in managing driver competence.

107. The challenge ahead will be to ensure robust driver management and monitoring arrangements are maintained as those driver complement and management arrangements expand.

108. Our engagement through regular liaison meetings have demonstrated that the company has a positive approach to actively engaging with ORR and other duty holders engaged in the Crossrail project.

Dockland Light Railway / Keolis Amey Docklands Ltd (KAD)

Overview: Despite a serious electrical shock incident to a First Line Response Technician) resulting in us issuing of an improvement notice KAD has overall had a positive year in terms of its health and safety performance.

109. **Evidence:** In 2016 KAD focused on continuing the development of a robust safety culture, with the 'Your Time for Safety Campaign', the introduction of Safety Representatives Roadshows, a revised Drugs and Alcohol policy, Kelvin Topset Accident Investigation and Institution of Occupational Health and Safety (IOSH) Managing Safety training and the standardization of Personal Protective Equipment across the business. KAD has encouraged greater staff engagement in safety discussions and moves to promote confidence among its staff to feel able to challenge potential safety issues. We have seen a significant increase in the number of Incident Report Forms (IRFs) generated within KAD – a development KAD has promoted.

110. Supporting the development of the safety culture has been the continued development of the Safety Management System (SMS), which resulted in KAD achieving international certification. Work has also commenced on preparing to move over to a revised management system standards by the end of 2017. The management of risk has continued as an evolution in 2016, with key stakeholders actively managing the review of risk and ensuring the control measures remain adequate, supporting the ability to 'Take Safe Decisions'.

111. **Our activities:** Our intervention to examine the arrangements KAD has in place to monitor the effectiveness of its health and safety risk controls confirmed their overall effectiveness, but identified a need for improved consistency across the business.

Occupational health

Overview: ORR's Occupational Health Programme covers a range of activities arranged under its '4E's' structure of Excellence in health risk management, Engagement, Efficiency (concerned with the costs and awareness of return on investment (ROI)) and Enabling (including development of the ORR website, competency and information). Within Excellence, our inspection work has focused on sector compliance with occupational health law. Other priority key areas requiring further work include: hand arm vibration (HAV) and associated health surveillance; respiratory hazards, such as asbestos, silica dust and diesel exhaust fume; and musculoskeletal hazards, including those from manual handling.

In 2016/17 we served one improvement notice on Network Rail (in relation to occupational health) for a failure to manage HAV risks and implement effective protective and preventive measures. Hand arm vibration syndrome is irreversible, but preventable.

112. **Evidence:** The number of RIDDOR reportable health cases rose to 100 in 2016-17 (see Table below), with reports for HAVS and carpal tunnel syndrome dominating the figures. Both conditions are associated with vibration exposure from power tools.

113. Despite progress in some areas ORR continues to see a mismatch between the occupational health policies and procedures developed by Network Rail centrally and consistent delivery in the Network Rail Routes. Sample Inspection activity at Arriva Rail North Ltd identified a number of actions for improvement but was generally well managed when considering noise, hand arm vibration, hazardous substances, asbestos management, legionella and diesel exhaust emissions. Active monitoring, the introduction of health surveillance and the operation of a “close call” procedure proved to be particularly significant.

114. **Our activities:** Work on improving management of HAVS health surveillance in Network Rail’s external supply chain commenced with an ORR survey of Network Rail’s external main contractors and the labour suppliers on their arrangements for health surveillance. Securing agreement by the Rail Principal Contractors Group (RPCG) on HAVS for ‘who should do what’ was fundamental to progress, and included careful consideration of ‘principles of good practice’ for managing HAVS risk. RPCG members are testing procedures for exchanging information on HAVS exposure and the labour suppliers are progressing their health surveillance arrangements. Formation of this Working Group, triggered by the HAVS health surveillance report, has prompted a more proactive approach by labour suppliers in other areas of health. Risk management through increasingly complex supply chains has been a long standing challenge for ORR and the industry, and piloting this targeted risk management approach for HAVS has the potential to establish a way forward for wider health and safety risks.

115. We have worked with Network Rail to secure improved engineering control of silica in ballast dust on their new BCS5 ballast cleaning system, as well as a programme of retro-fitting dust controls to their existing high output ballast cleaning fleet. This health by design work includes protecting operator cabs with high efficiency dust filters and fitting water spray dust suppression externally to reduce worker exposure to fine silica dust. We have noted a positive change in the way the High Output Ballast Cleaning (HOBC) sites have been organised to manage and control exposure to silica dusts over the last two years.

116. We are continuing to work with Network Rail at Route level and centrally to secure a risk based improvement programme for managing asbestos under Network Rail's priority HomeSafe plan. We have also continued to oversee compliance with the Registration, Evaluation, Authorisation & Restriction of Chemicals (REACH) exemption conditions on asbestos in rail vehicles and components, including progress in removing asbestos from leased rail vehicles.

117. A consultation document was provided to the industry on fitness for work. Alongside this, an audit of the ORR Recognised Doctors considered the adequacy of governance arrangements. Follow-up activity is underway with developing a periodic audit regime and education sessions on medical requirements for train driver medical assessments.

118. ORR has supported cross-industry collaborative groups on health, such as the Ballast Dust Working Group and Association of Rail Industry Occupational Health Practitioners on competency frameworks. We have seen rapid growth in the number of RSSB-led working groups and participation from the industry collaborating on progressing health data, musculoskeletal concerns, planning for a HAVS workshop,

involvement in economic workshops testing the RSSB Return on Investment tool and development of health indicators, in addition to coming together at the Industry Annual Conference, Health & Wellbeing Policy Group and Health & Wellbeing Professionals Committee. ORR continues to contribute to RSSB health working groups and events, where we can add value.

119. ORR published its position paper on Effluent Management on its website; four Health Updates and e-Bulletins; and renewed its case study pages with an example of good practice from London Underground Limited on the savings it had made from asbestos surveying work.

Disease cases reported to ORR under RIDDOR* from across Britain's railways: 2011-12 to 2016-17[2] (most relate to the mainline railway):

Disease type	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Carpal tunnel syndrome	0	2	2	4	1	12
Cramp in the hand or forearm due to repetitive movements	0	2	1	0	0	0
Hand arm vibration syndrome (HAVS)	95	97	74	**77**	**28**	**85**
Infectious disease due to biological agents	1	3	0	0	0	0
Occupational asthma	0	0	1	**2**	0	0
Occupational cancers	0	0	0	0	0	1
Occupational dermatitis	0	0	0	1	0	1
Tendonitis or tenosynovitis in hand or forearm	1	0	0	1	0	1
Total	**97**	**104**	**78**	**85**	**29**	**100**

Source: RSSB and ORR.

*Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013[3]

Our non-safety accessibility work

120. **Our activities:** Our work on accessibility continued with further discussions on the requirements placed on duty holders in regard to the Railways (Interoperability) Regulations 2011 (RIR) and the standards necessary to ensure compliance with the

[2] data covers 1 April 2016- 4 March 2017 as RSSB introduced a new Safety Management Intelligence System on 5th March 2017 that did not map to existing categories

[3] http://www.hse.gov.uk/riddor/

European TSI for Persons of Reduced Mobility (PRM) and Rail Vehicles Accessibility Regulations 1998 (RVAR).

121. In particular, With DfT and the industry we discussed the different standards which apply to rolling stock authorised under RVAR or the PRM, specifically the requirement to deploy a ramp which is an absolute requirement under RVAR but not within the TSI.

122. The GTR Southern dispute brought the issue of ramp deployment to the fore and we spent some considerable time with GTR on this matter. We have concluded that the company has systems in place to enable it to meet the intent of RVAR on their OBS staffed services.

123. We continue to talk to industry and DfT on how we can improve accessibility for passengers. We would like to move towards a more aligned regulatory framework so that the industry can present a more consistent and easily understood standard of service for passengers.

Our work in Europe

124. **Our activities:** We have continued to engage with the European Commission, the EU Agency for Railways and our colleagues in other national safety authorities over the past 12 months. The focus of our activity has been on influencing the development of new regulations on safety certification and vehicle authorisation at the EU level, which are due to come into effect across Europe in 2019.

125. ORR officials have significantly influenced new Common Safety Methods (regulations) on conformity assessment (certification) and supervision (inspection). We have also chaired a key EU working group developing the co-operation arrangements between ERA and national authorities that will be necessary to ensure ERA's new certification role is successful.

The safety of the Channel Tunnel

126. **ORR's role:** Health and safety regulation of the Channel Tunnel is carried out by the bi-national (UK and French) Channel Tunnel Intergovernmental Commission (IGC). 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.

127. **Overview of safety performance:** The past 12 months have seen a distinct recovery in operational and safety performance in the Channel Tunnel, following the challenging operational problems during 2015. Eurotunnel and the two Governments collaborated on a range of security and safety measures including the installation of new fencing around the perimeter of the concession area and all potential access points; the installation of thermal imaging, high definition CCTV cameras and monitoring of footage by dedicated cross-organisation teams; permanent surveillance of the site by the local authorities; and the scanning of all freight trucks by 'drive through' x-ray equipment and the introduction of sniffer dogs focused on identifying stowaway migrants. Eurotunnel also improved its the risk controls in order to comply with the two improvement notices we served in August 2015. Following the

introduction of these new measures, there were no fatalities on the concession last year.

128. **Our regulation and certification activities:** The IGC and CTSA have continued to regulate the Channel Tunnel in a way that aims to support the safe operation and growth of cross-Channel railway traffic. In February 2017, our inspectors, experts and officials were instrumental in ensuring that Eurotunnel's three new carrier and loader shuttle wagons, which will provide 20% more freight capacity to its existing fleet, were authorised into service in a timely manner. The IGC has also continued to authorise the latest tranche of seven new Siemens Velaro passenger trains for Eurostar. Our inspectors also provided the IGC and CTSA with support in the bi-national assessment of applications for the renewal of Channel Tunnel safety certificates from DB Cargo (which the IGC granted in March 2017) and Eurostar (April 2017).

129. **Our inspection activities:** In the past year, IGC and CTSA have completed a programme of CTSA inspections:

- Following the serious fire in 2015, analysing Eurostar's revised evacuation procedures in the event of an on-train emergency and staff competence to deliver them.
- Looking at pre-departure checks for freight trains transiting the Channel Tunnel, including staff competence and checking/monitoring arrangements.
- Reviewing Eurotunnel's arrangements for the management of engineering change.
- Overseen improvements and revisions to Eurotunnel's processes and procedures in the wake of the 2015 fire in the Channel Tunnel.
- Begun to consider Eurotunnel's application to install GSM-R voice equipment on freight shuttle locomotives.

Engaged with Eurotunnel about its risk analysis for the roof structures on the "Arbel" type of freight shuttle.

Our safety policy work

130. **Our activities:** Following a review of railway safety guidance which aimed to replace, remove or consolidate existing guidance, we published our 'Principles for health and safety on the railway' in January 2017[4]. The Principles aim to help duty holders understand how to meet our expectations for the outcomes that should be achieved by the railway when complying with health and safety legislation. They highlight the factors which should be addressed by anyone designing and putting into use new railways or rail vehicles, including major upgrades and renewals from the earliest stage of such projects.

131. We concluded a post implementation review (PIR) of the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS)[5] and made recommendations to the Secretary of State. The review, supported by a public consultation, concluded

[4] http://www.orr.gov.uk/rail/health-and-safety/health-and-safety-strategy/goal-setting-principles-for-railway-health-and-safety

[5] https://www.gov.uk/government/publications/review-of-the-implementation-of-rogs-2006

that the regulations are working well and that the objectives have largely been met with no unintended effects. The Secretary of State accepted the recommendation that ROGS should remain in place with some minor regulatory changes to improve clarity and consistency with other newer regulations.

132. We delivered our better regulation commitments to produce Business Impact Target Assessments for projects to review our safety guidance (see above), updates to our guidance on staff competence and our new driver licensing web-based facility. Each of these assessments – which were peer reviewed by the independent Regulatory Policy Committee – demonstrated that our regulatory approach is supporting businesses to comply with the law without creating undue costs.

133. We have been exploring the options for improving the existing approach to Level Crossing Orders within the current legal framework. This work is aimed at shifting to a risk based approach which fits better within our broader regulatory approach and encourages improvements in level crossing risk management.

134. We have maintained an overview of developments in general health and safety legislation and worked closely with the Health and Safety Executive on new Control of Electromagnetic Fields Regulations 2016 to ensure that the implications for the rail sector were understood and managed.

Permissioning

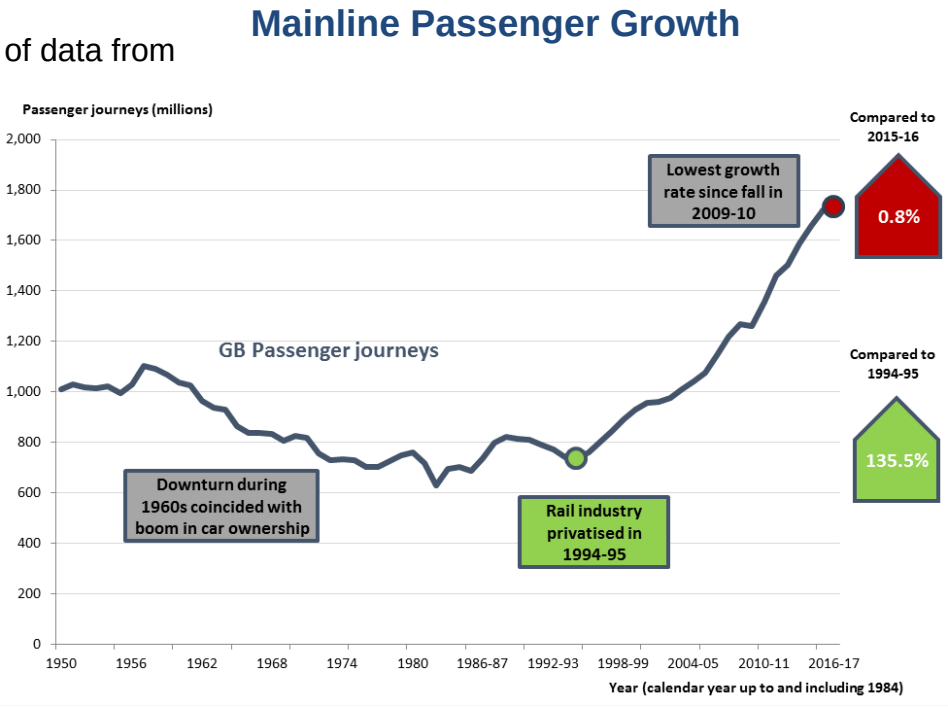
135. During 2016-17 we have:

- Received 3,019 train driver licence applications and issued 2,823 licences (including 42 applications carried over from the previous year).
- Delivered 43 level crossing orders, 12 variations, five Christmas directions, three traffic signs authorisations and six revocations.
- Issued 24 Safety Certificates and 12 Safety Authorisations. In addition, we also processed three exemptions (one issued and two declined).

Section 3 – Overview of health and safety performance on Britain's railways in 2016-17

Introduction

137. We use a range of data from various sources together with our inspectors' assessments, observations and findings to develop a full picture of the state of health and safety across Britain's railways. A large amount of data for this report is provided by RSSB and has been affected by changes to the industry reporting database. See *SMIS and RSSB data provision* section on page 34.



138. This section sets out key data in the context of historical trends. There were 1.7 billion passenger journeys on Britain's mainline network in 2016-17, the highest level since the series began; up 136% from the 735.1 million at privatisation in 1994-95.

139. The trend in passenger journeys was steady in the early 1950s before hitting a 1.10 billion peak in 1957, which remained unsurpassed until 2006-07 – see chart above.

How we assess harm and risk performance

140. This report uses 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.

141. 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.

Putting the common causes of harm into context

142. Britain's railways are commonly characterised by having high frequency but low consequence events; train accidents have become increasingly infrequent. Most common are high frequency and relatively low consequence events, such as passenger slip, trip and fall injuries. While annual reports such as these tend to over-focus on year-on-year comparisons, it's important to keep in mind how trends in individual harm-causing events fit into the overall level of system harm.

143. Using the 2014 SRM (the last time it was published), the two biggest harm-causing events are from passenger and worker slip, trip and fall events – a typically high frequency, but mainly low consequence event which represent 20% of the overall system risk. Public trespass, a relatively low frequency but potentially very high consequence event, accounts for 24% of the overall system risk. Together, public trespass and slip, trip and fall events represent nearly half of the overall harm caused on Britain's mainline railways.

Our safety statistical release

144. The collection of good data from across Britain's railways is critical in identifying trends and quantifying risk, and in setting the correct risk control priorities and measuring performance. This report uses final and some provisional railway data. Confirmed 2015-16 safety data from mainline, LUL and non-mainline operators will be issued in our key safety statistics release in September 2017[6]. It will contain finalised numbers from both mainline and non-mainline operators.

SMIS and RSSB data provision

145. The rail industry's new Safety Management Intelligence System (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 March 5 were recorded in the new SMIS.

[6] http://orr.gov.uk/statistics/published-stats/statistical-releases

146. However, there has been a short-term impact on the accuracy and completeness of some records as users become familiar with the data model and user interface, and while RSSB develops user guidance, rebuilds its data quality processes and resolves system issues.

147. To provide confidence in the data, RSSB has conducted additional checks. All fatalities, SPADs and potentially higher risk train accidents (PHRTAs) have been manually validated by RSSB. Other reports with missing components have been identified and amended within the analysis. RSSB will work with industry to ensure these records are correct within SMIS.

148. RSSB's additional checks have helped to create a transition between systems so that the information is consistent with that presented in previous Annual Safety Performance Reports and covers the full year 2016-17. The exception to this is the Precursor Indicator Model (PIM). The full PIM is shown to 6tMarch in this report because the new data model introduces discontinuities in some precursor trends. RSSB is progressively working to improve existing metrics to track train accident risk and develop new ones so that all themes of the PIM can continue to be monitored.

Our use of mainline data and data quality

149. SMIS is the way the mainline railway collects safety-related and other event data. It is mandatory for mainline railway infrastructure managers, train operators and others to record such events. When compared to 2015, in 2016 the mainline industry's national data quality score mark was 99%, down 1%.

Mainline worker, passenger and public fatalities in 2016-17

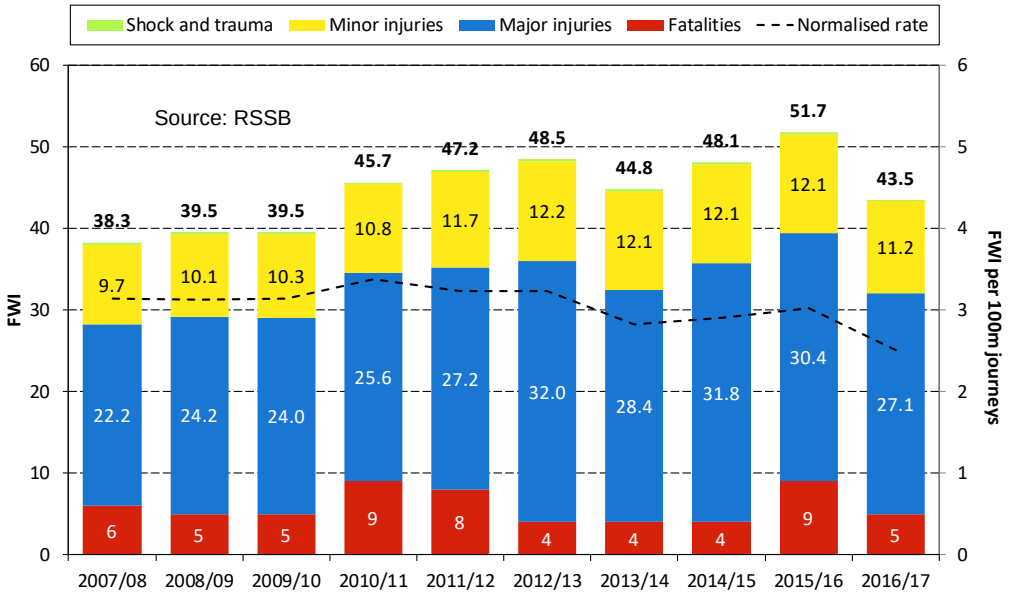
150. There was one worker fatality in 2016-17, compared to zero worker fatalities in 2015-16 (for the first time since reliable records began). See page 37.

151. A total of 33 members of the public were killed on the mainline railway in 2016-17. Of these 33: 27 were trespassing, four were pedestrians at level crossings, and two were in road vehicles at level crossings.

152. There were five passenger fatalities. None were industry-caused, one occurred on board and all others occurred at stations – see section below.

Mainline passenger and public fatalities and weighted injuries at stations and on trains

Passenger/public harm on trains and at stations by injury type



153. Overall harm levels to passengers/public on trains and at stations decreased 16% compared to last year and is at the lowest level since 2009-10. – see chart opposite.

154. There was a 11% reduction in major injuries, down 33 to 271 and a 5% reduction down 337 to 6513 in minor injuries compared to 2015-16. Of the 271 major injuries, 152 involved slip, trip and fall events – a reduction of 18%. Harm on trains increased by 16% compared to 2015-16. Platform train interface harm decreased 19% compared to 2015-16, with 48 major injuries.

155. When normalised by journeys, overall harm to passengers and public on trains and at stations is at its lowest level in the last decade.

156. Risk modelling (from the SRM in 2014) suggests that slip, trip and fall harm to passengers and the public represents almost half of the risks to them on stations and trains.

157. Overall harm at the PTI decreased by 19%, mainly due to two fewer fatalities. Of the four fatalities at PTI in 2016-17: one of these incidents related to the boarding/alighting. Also, harm for passenger boarding and alighting incidents increased 13%, but platform edge incidents not involving passenger boarding or alighting decreased 43%.

Assaults on passenger and the public at station and on trains

158. Assaults on the public and passengers on stations and trains, as reported to the BTP's CRIME database increased 24%. BTP recorded a total of 5,011 assaults on trains and stations; harassment up 45% and common assaults up 20% compared to 2015-16. Enhanced BTP reporting processes over 2015-16 may be a part of reason for these increases.

Mainline workforce fatalities and weighted injuries

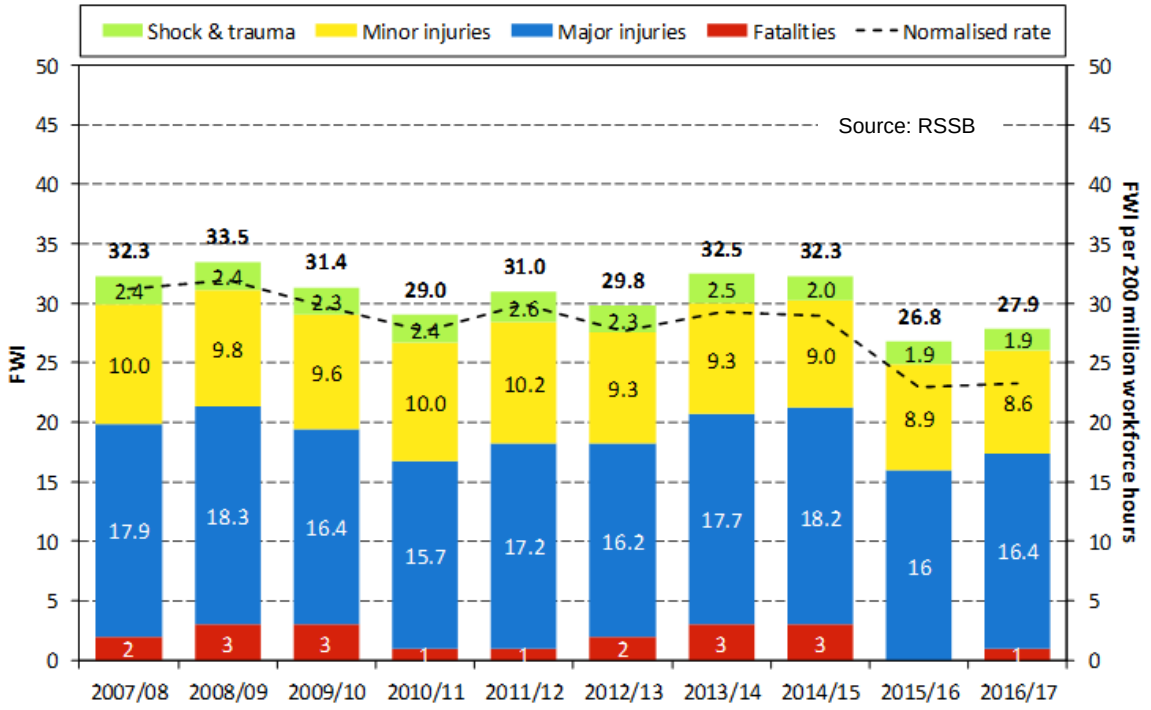
159. Overall mainline industry workforce (including infrastructure, train operation and maintenance staff) fatalities and injuries harm increased 5%, mainly due to the single workforce fatality compared to zero in 2014-15. However when normalised by the hours worked, the overall harm to workforce is at one of the lowest levels of harm over the past decade.

160. There were 166 major injuries to all workers, and a 4% increase in actual major injury harm compared to 2015-16; and of those, 42 occurred in stations or on trains – a 21% decrease compared to last year and a similar level to years previous to 20175-16. Workforce slip, trip and fall incidents on stations decreased 39%, however this still represents the highest contribution to major injuries at 26%.

Source: RSSB

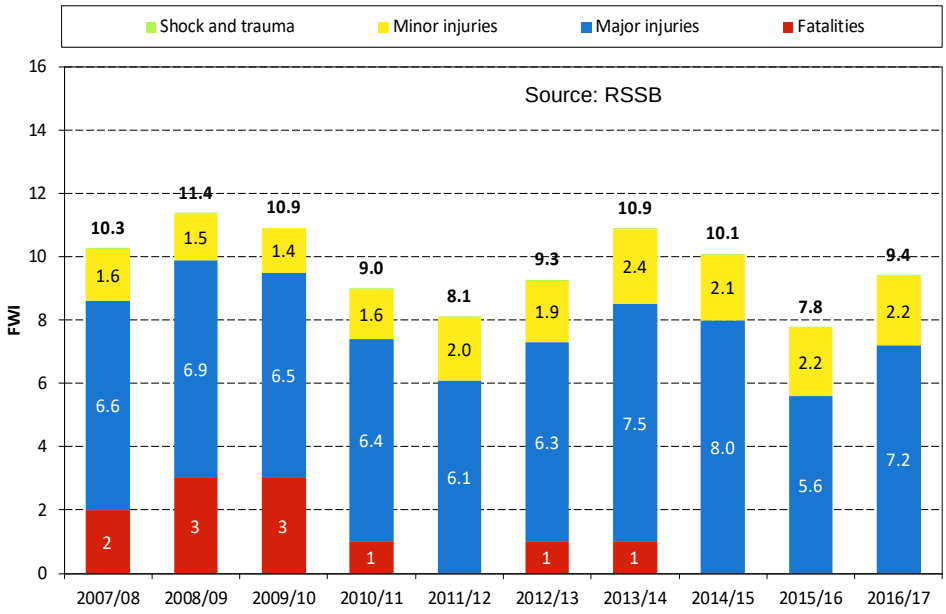
161. Assaults on the workforce increased 7% to 510 incidents at stations and 16% to 327 cases on trains. They have reduced over the last decade as employers adopted a zero-tolerance of violence to their staff.

Harm to the workforce by injury type



Mainline infrastructure worker fatalities and weighted injuries

Infrastructure worker harm by injury type on running line



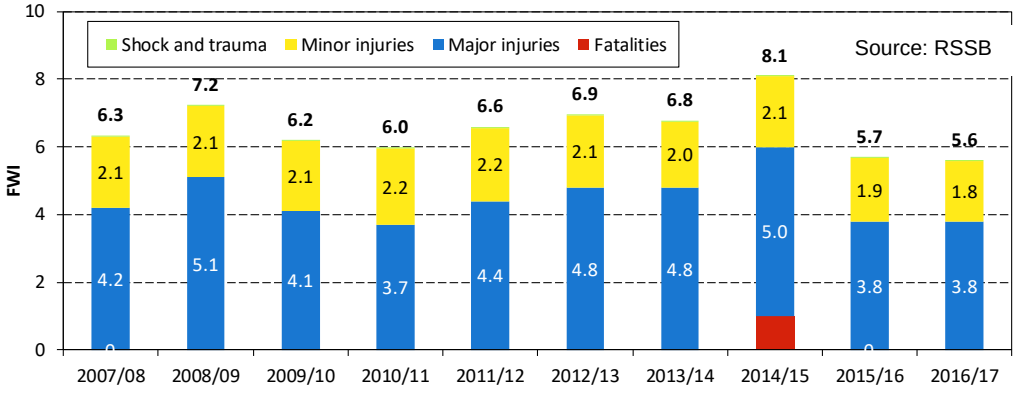
162. There was one infrastructure worker fatality in 2016-17, which occurred in a road traffic accident. There were 36 slip, trip and fall, 24 contacts with objects/other people and four machinery or tool-related major injuries.

163. Overall harm to mainline infrastructure workers on the running line increased 21%, due to a 33 % increase in slip, trip and fall and a 33 % increase in contact with objects causing major injuries.

164. Harm in yards, depots and sidings reduced 1% compared to 2015-16.

165. For the second year in a row, the overall harm at yards, depots and sidings was at its lowest level since detailed data was first recorded in 2007-08. This reduction in harm was due to fewer major injuries involving slip, trip compared to previous years. There was a reduction in harm across all worker types.

Trends in harm to workers harm in yards, depots and sidings

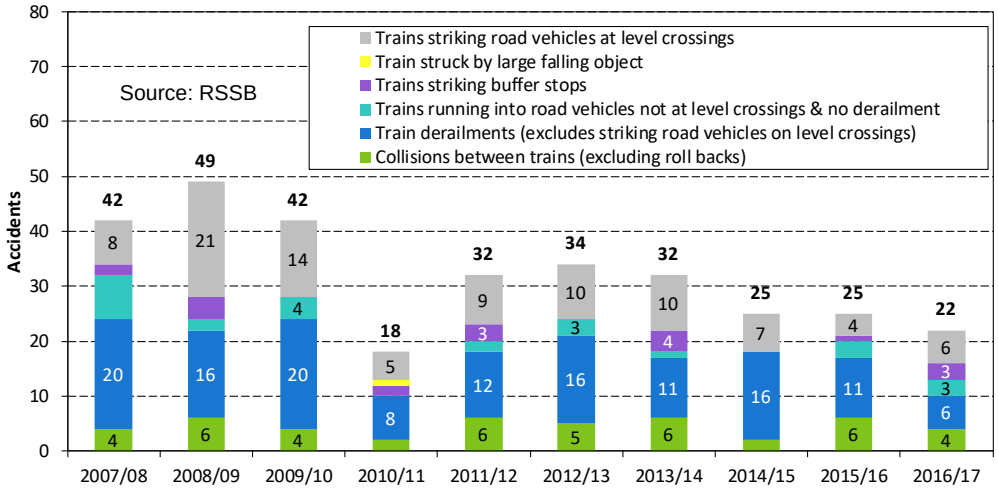


Trends in mainline potentially high risk train accidents

166. Potentially High Risk Train Accidents (PHRTAs) represent around 6% of potentially serious incidents on the mainline railway, but 91% of the potential train accident risk, which is why we monitor them closely.

167. There were 22 PHRTAs in 2016-17, compared to 25 last year and the lowest since 2010-11 – see chart right – which suggests a more systematic control of potentially serious operational risks. It included:

Potentially High Risk Train Accidents, 2007-8 to 2016-17



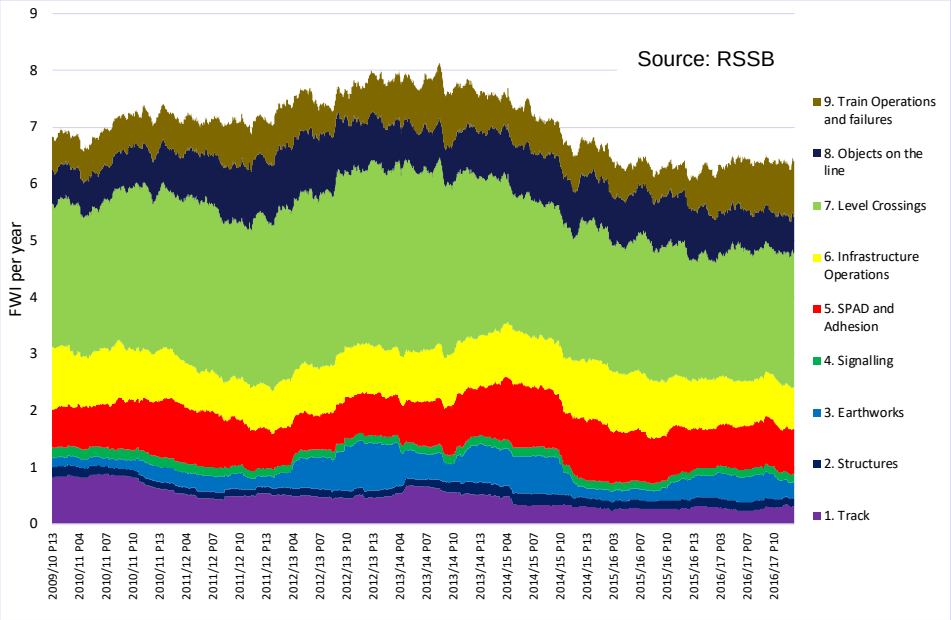
- Six train derailments, of which three involved freight trains;
- Three passenger train collisions, including two collisions between passenger trains at low speed in stations one during permissive working arrangements and the other through accidental reverse movement. The third passenger train collision was during a shunting operation. There was also one instance of a collision between two empty coaching stock at a station;
- Six collisions between trains and road vehicles at level crossings, of which five were passenger trains;
- Three passenger train collisions with road vehicles left foul of the running line; and
- Three instances of trains colliding with a station buffer-stop at low-speeds, of which two were passenger trains and one was empty coaching stock.

Mainline railway accident precursor risk as measured by the precursor indicator model

168. PIM-measured train accident risk increased 4.5% as of 4 March 2017 (the last time the PIM was updated), when compared to the end of 2015-16. This was mostly due to a 66% increase in train operations and failures and a 25% increase at level crossings – *see chart below.*

169. However, over the same period risk from objects on the line decreased 26%, earthworks failure risk decreased 23% and infrastructure operations risk decreased 14%.

PIM Chart – 31 March 2016 to 4 March 2017

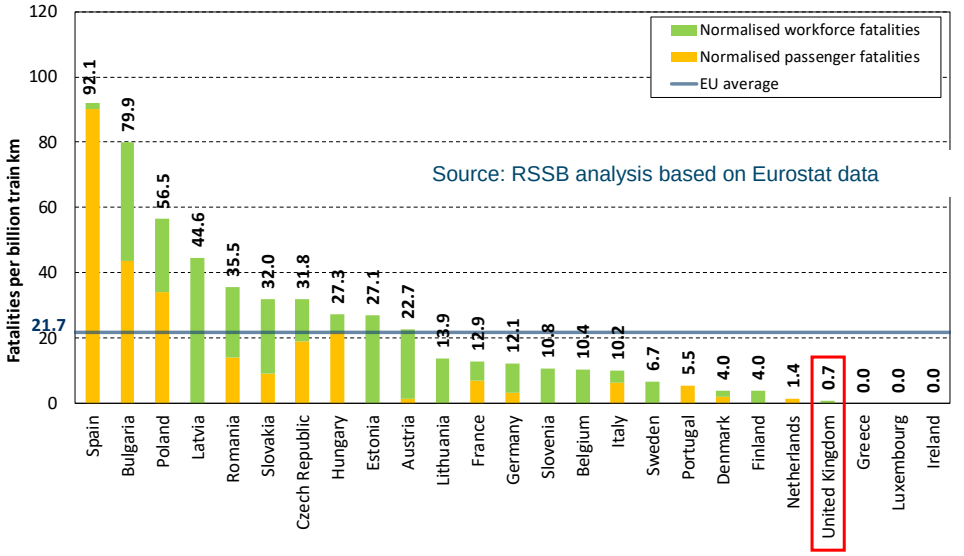


170. As of 4 March 2017, fatal train accident risk to passengers increased by **2%** when compared to 31 March 2016. Public behaviour at level crossings forms the biggest element of overall train accident risk modelled by the PIM, but most of that risk is to the crossing users themselves. The next biggest risk to train accidents is from train operations and failures.

Comparison with railways in the European Union

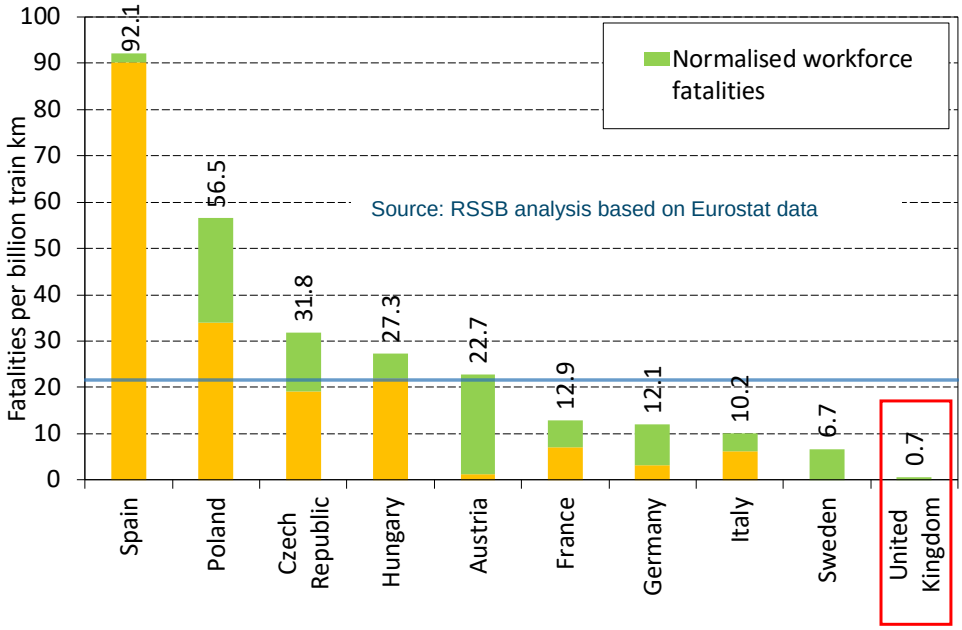
Passenger and workforce fatality rates in the European Union railways, 2011-2015

171. 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 opposite. It remained well below the EU average between 2011 and 2015 – the most recent dataset available.



172. The UK came top amongst the 10 most comparable large railways during 2010-15 – see chart over page. This was mainly due to low levels of passenger and worker fatalities in train accidents and a gradual increase in train kilometres travelled - up 10% over the decade.

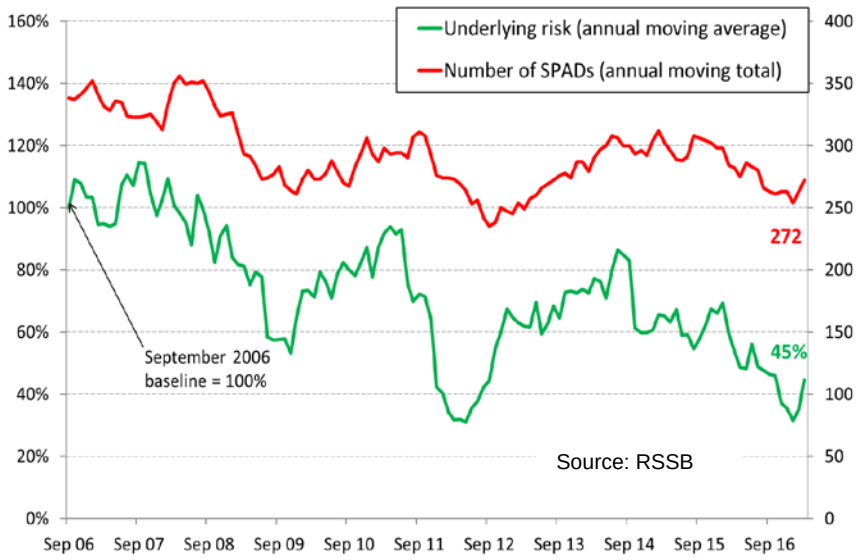
Europe's top-10 biggest railways



173. During 2010-2015, the UK's railways were among the safest overall in the EU and was the best at managing risks to passengers and second best at managing risks to level crossing users. Level crossing incidents in the UK were well below the EU average over the five-year period 2011-2015.

Trends in SPAD numbers and underlying risk, September 2006 to March 2017

174. There were 272 mainline signals passed at danger (SPADs), a decrease of 4% or 10 compared to 2015-16.



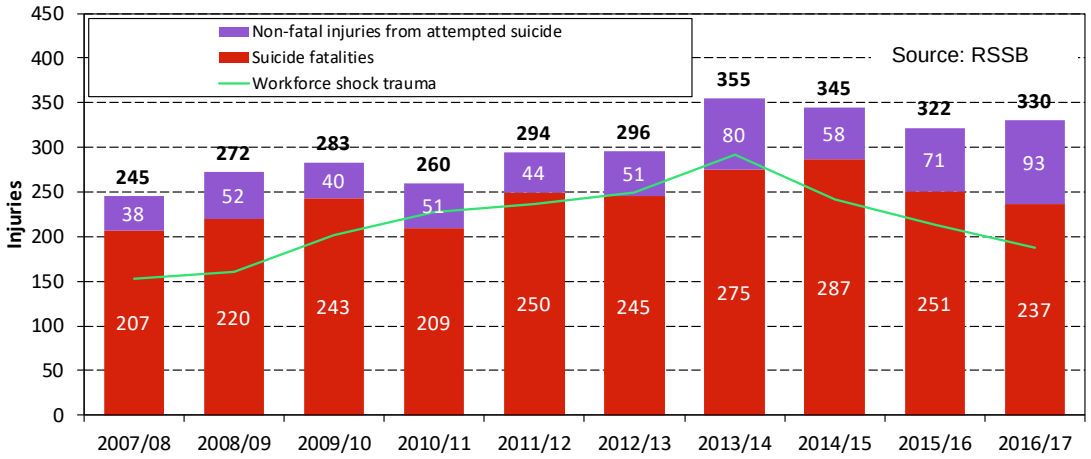
175. There were seven potentially serious SPADs, one fewer than in 2015-16.

176. SPAD numbers involving freight trains per billion train kilometres travelled have increased gradually since 2009-10, until this year when it decreased 6% compared to 2015-16.

177. The industry continues to develop a strategy to reduce the risk of and from SPADs, as the mainline railway gradually moves towards automatic train control systems. The European Train Control System, which is installed on the Cambrian line, is now being trialled on the network and will be used on the Crossrail's core section. We continue to monitor this closely to ensure the sector manages SPAD risk and service growth safely, including the future risks from the necessary in-service shifts between different train control systems.

Suicides and attempted suicides

Trends in suspected/confirmed suicides since 2005-06



178. The causes of suicide are often a complex mix of societal and psychological factors and are both a challenging and sensitive matter for all those affected, whether family, friends, passengers, or to those who work on Britain's railways.

179. There were 237 suicides, a reduction of 6% or 14 on 2015-16 – but still a high number – and a further 93 attempted suicides, an increase of 31% or 22 compared to 2015-16.

180. The mainline industry has shown considerable and commendable leadership and concerted efforts, including working closely with the Samaritans for the last six years, to prevent railways suicide and reduce their impact on the workforce and other witnesses. Over 10,000 people have been trained in suicide prevention work and train industry staff made over 1,100 interventions in 2015-16 to prevent events that may have led to a suicide.

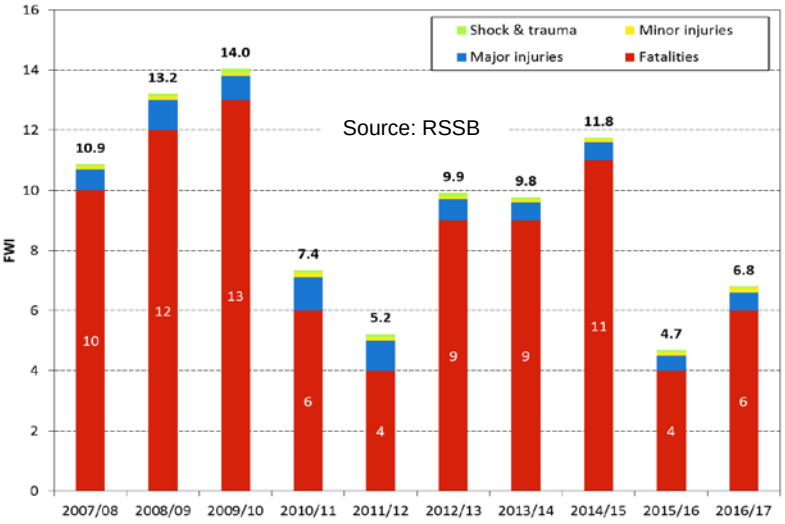
Trespass

181. There were 27 trespass fatalities, a decrease of four compared to 2015-16, and the third-lowest in the last decade. There were 17 major injuries caused to members of the public while trespassing. Trespass represents around 30% of the overall harm to the public on the mainline railway.

Vandalism

182. Reported vandalism levels have declined **62**% over the last decade, with a notable reduction in cable theft since 2013-14. Vandalism-caused delay minutes is at its lowest level for a decade at just under 25,000, a 53% decrease compared to 2015-16.

Level crossing fatalities, 2007-08 to 2016-17 (excluding suicides)



Level crossings

183. There were **six** fatalities at level crossings in 2016-17; **four** involved pedestrians and **two** involved occupants in road vehicles being struck by trains.

Objects on the line

184. In 2016-17, there were a total of 460 instances of trains striking non-vehicle objects on the line, of which 366 involved a passenger train. A 14% increase on 2015-16.

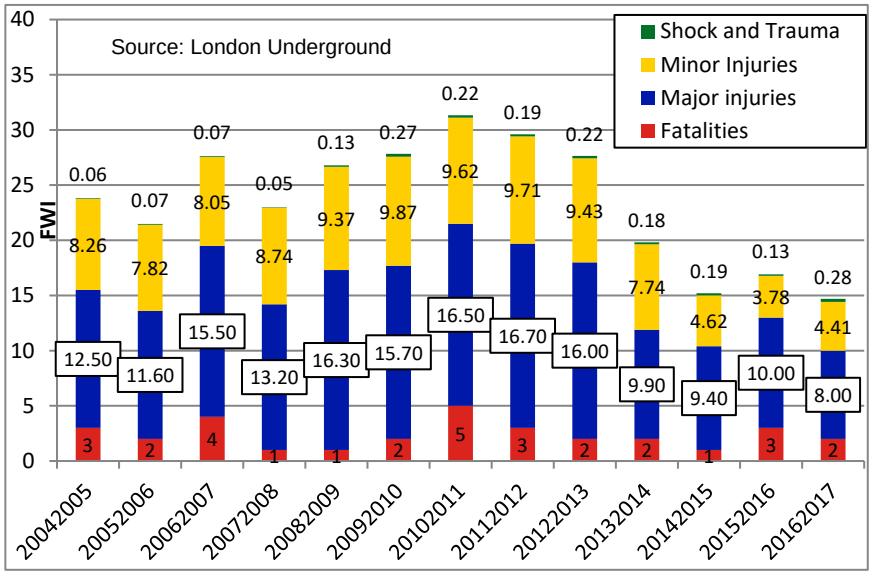
Bridge strikes

185. In 2016-17, there were a total of 1,650 bridge strikes. A 3% increase on 2015-16.

Transport for London:

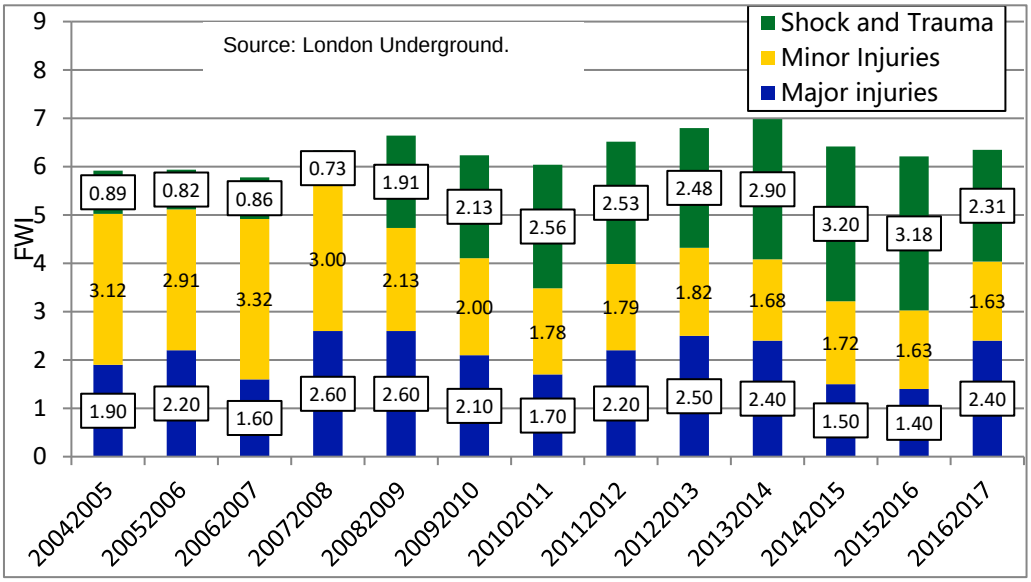
186. With regard to passengers there were two fatalities recorded, 80 major injuries and 4174 minor injuries. This is a significant increase, particularly in minor injuries. However, when adjusted for FWI, this indicates the lowest level recorded which continues the

Harm to passengers on London Underground since 2004-05



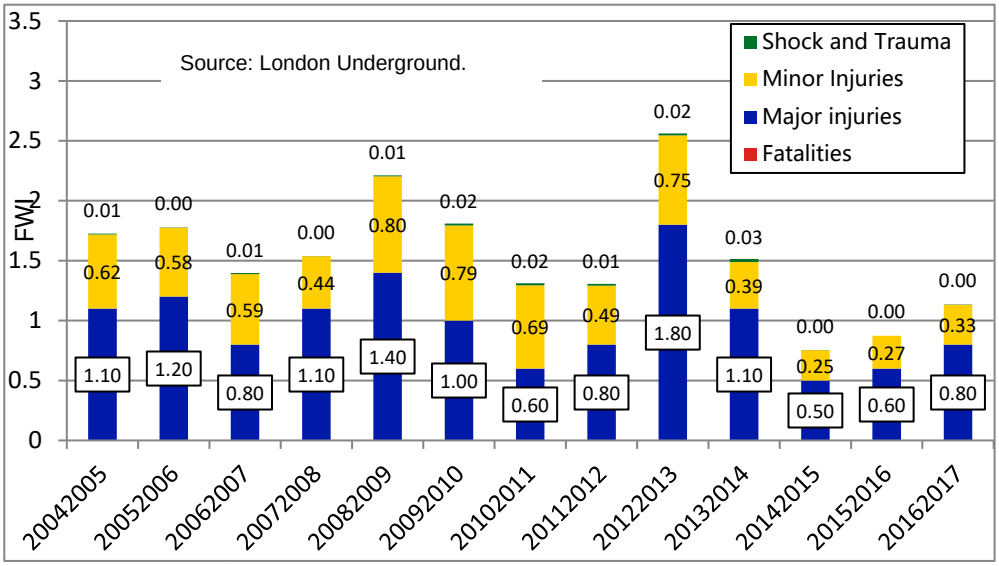
trend of the significant decrease in major injuries on previous years (80 for 2016-17 compared to the previous lowest 94 in 2014-15).

Trend in harm to LU's workers since 2004-05



187. Once again London Underground recorded no workforce fatalities in connection with its operations. There were 24 recorded major injuries (RIDDOR specified injuries) and 1302 minor injuries. This gives a very slight increase in FWI over the previous year (2015-16) but is lower than any other year since 2010-11.

Trend in harm to LU's infrastructure workers since 2004-05



188. Similarly in connection with infrastructure no workforce fatalities occurred. There were 8 major injuries and 289 minor injuries. This represents an increase in FWI compared to the previous 2 years but is notably lower than any other year back to 2004-05.

Tramways

Tram operator collisions with motor vehicles, 2011-12 to 2016-17

Tram operator	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Blackpool Tramway	-	1	-	1	0	0
Croydon Tramlink	1	1	2	11	8	2
Edinburgh Trams	n/a	n/a	n/a	7	6	9
Manchester Metrolink	-	1	6	29	40	25
Midland Metro	-	1	-	1	3	0
Nottingham Express Transit	1	6	-	18	22	15
Sheffield Supertram	2	-	-	14	24	34

189. Changes to RIDDOR[7] incident reporting legislation and enhanced industry procedures has led to a notable increase in the reporting of tram collisions with road vehicles over the last three years – see figures above above.

On-tram passenger harm

190. There were 56 passengers injured on board trams in 2016-17: 49 on Croydon Tramlink five on Metrolink, one each on both Midland Metro and Blackpool Tramway. This is up from 13 in 2015-16.

191. The large number of on-tram passenger injuries on Croydon Tramlink is related to the Sandilands Tram derailment on 9 November 2016.

Tram operator collisions with pedestrians, 2010-11 to 2016-17

Tram operator	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Blackpool Tramway	-	-	-	1	0	0
Croydon Tramlink	2	1*	-	-	0	0
Edinburgh Trams	n/a	n/a	n/a	-	2	0

[7] http://www.hse.gov.uk/riddor/

Manchester Metrolink	-	1	-	6	6	6
Midland Metro	-	-	-	1	0	0
Nottingham Express Transit	1	-	-	4	9	3
Sheffield Supertram	-	1	-	1	2	4

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

192. As noted earlier, UKTram and its members are working to improve the sector's safety data collection and standardisation – see tram collisions with pedestrians table above. Therefore, we anticipate seeing increasingly more reliable sector trend data over the next few years to help inform the identification of the sector's future risk control priorities.

Section 4 – Roles of key industry bodies

Office of Rail and Road* (ORR)	Railway industry duty holders

• enforces compliance with Health and Safety at Work Act and subordinate regulations for Britain's railways by:
  o setting railway-specific policy;
  o producing guidance;
  o inspection, audit and investigation of risk controls;
  o driving improvement through advice and formal enforcement;
  o assessing and authorising safety certificates and authorisations; and
  o 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.
	• have legal duties to eliminate risk by:
	  o conducting suitable and sufficient risk assessments;
	  o 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
	  o 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)**

• 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:
  o data gathering, analysis and risk modelling;
  o managing the industry research, development and innovation programmes;
  o encouraging and facilitating cooperation; and
  o providing technical expertise.
	• 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

193. We continued to build on our strong working relationship with the Rail Accident Investigation Branch (RAIB) during 2016-17. RAIB's inspectors regularly presented preliminary findings and draft recommendations from their investigations to ORR as part of the early engagement and consultation processes.

194. Having a good working relationship with RAIB has helped us influence the drafting of recommendations, monitor actions taken to deliver them, and to meet our statutory obligation to report to RAIB on the action being taken to address each recommendation within 12 months of them being published.

195. We held quarterly working-level liaison meetings with RAIB and Network Rail respectively to exchange information on current issues around recommendation handling. A number of meetings were held with Network Rail to focus on recommendations in specific asset areas. We also continued our regular high-level meetings with RAIB's senior executives and worked closely with RAIB on reviews of the legislation and memorandum of understanding that underpin recommendation handling.

196. In 2016-17, we received 24 RAIB reports containing 78 recommendations. RAIB also produced two interim reports, two pieces of Urgent Safety Advice and 16 Safety Digests.

197. In the same time period we reported to RAIB action on 115 recommendations: 42 as implemented[8]; 30 as implementation on-going[9]; 32 were in progress or progressing[10]; nine as receiving an insufficient response[11]; and two as being addressed to 'another public body'. No new recommendations were placed upon ORR during 2016-17; three recommendations against ORR remain outstanding.

198. Of the 42 recommendations that were reported as implemented, more than 50% of these were recommendations that were two or more years old and more than 10% fell into the four years or more category.

199. In the latter part of 2016-17 we commenced a review of how we manage RAIB recommendations alongside similar ORR-led reviews of how we approach our statutory obligations in other areas (for example in respect of level crossing orders). We would expect this review to conclude later in 2017 and will work closely with RAIB in implementing any changes that may arise.

[8] all actions were complete and the recommendation addressed fully.
[9] an appropriate action plan with completion dates was received from the end-implementer.
[10] discussions are on-going with the end-implementer to agree actions and timescales to address the recommendations.
[11] no response provided or we are not adequately satisfied that sufficient action is being taken to address a recommendation.

Our relationship with RSSB

200. 2016-17 saw us complete our quinquennial, independent review of the RSSB. The review took place in two phases, the first examining the delivery of recommendations made at the time of ORR's 2010 review, and the second looking at the RSSB's strategy and future direction. We published our final report with our findings and recommendations in November 2016.

201. We continue to participate as an observer on RSSB's board, which annually reviews mainline railway safety risks to passengers, the workforce and public and monitors the completeness of the data it collects.

202. We continue to participate as observers on various RSSB-facilitated groups that work to collaboratively manage risk effectively within the industry. These oversee, or make decisions about, the mainline industry's standards and research.

203. Like the industry, we use RSSB's safety risk and precursor indicator models, and periodic safety reports to help inform: our view of the mainline industry's safety performance, to provide data for mandatory European reporting requirements and to underpin our work on our strategic risk chapters[12].

204. In January 2016, RSSB issued *'Leading health and safety on Britain's railway',* an important document which we support fully. We have now seen all mainline duty holder's commit to deliver the Strategy and we would encourage these due holders to publish their compliance to its implementation. Additionally, we will maintain oversight of RSSB's monitoring of Industry's maturity and progress in the 12 risk priority areas.

205. Key documents RSSB published over 2016-17 included:

- Overview of safety performance for 2016[13]
- Annual health and safety performance in 2016-17[14].

[12] http://orr.gov.uk/rail/health-and-safety/health-and-safety-strategy/our-strategic-risk-chapters

[13] https://www.rssb.co.uk/Library/risk-analysis-and-safety-reporting/2017-02-overview-of-safety-performance-in-2016-calendar-year.pdf

[14] https://www.rssb.co.uk/risk-analysis-and-safety-reporting/safety-performance-reports

Section 5 - Our enforcement activities

206. In most cases, we secure improvements in health and safety for passengers, the workforce and public through evidence-based advice and encouragement to duty holders to improve and adapt their risk management. But occasionally, we use our formal powers to ensure compliance with the law or deal with immediate risk. Mostly, we use enforcement notices to stop an activity involving serious risk, or to rectify serious gaps in duty holders' risk control. Our enforcement policy statement[15] sets out how we ensure rigour and consistency in our enforcement decisions by using our enforcement management model.

Improvement notices in 2016-17 (a full list is available on our website[16])

207. We served 16 improvement notices[17], compared to 11 in 2015-16. Of those 16, nine were on Network Rail, which compares to six in 2015-16. The reasons for our notices, included:

- Inadequate management of train driver competency and route knowledge.
- Manual handling risk associated with liquid petroleum gas canisters.
- Two identical improvement notices from failure to carry out a suitable and sufficient risk assessment of permissive working[18] arrangements.
- Failure to safely manage the risk arising from an embankment collapse.
- Two similar improvement notices after a failure to conduct a suitable and sufficient risk assessment of on-track plant travelling in convoy to a worksite.
- Unsuitable and insufficient risk assessment was carried out on staff involved in working on or near live electrical conductors.
- Leaving level crossing gates open to road traffic and causing risks to the train and crossing user traffic
- Failure to assess the risk of exposure to vibration and identify measures to reduce the risks of vibration.
- Failure to provide suitable pedestrian access for staff accessing hand points[19].
- Failure to guard dangerous parts of escalator machinery.
- Inadequate control of risk from exposed dangerous parts of railway swing bridge.
- Failing to provide a clear view for operating a CCTV level crossing.

[15] http://orr.gov.uk/__data/assets/pdf_file/0016/5650/health-and-safety-compliance-and-enforcement-policy-statement-2016.pdf
[16] http://orr.gov.uk/publications/notices/legal-notices/improvement-notices
[17] This figure also includes one improvement notice issued to Network Rail Infrastructure Ltd, that was subsequently withdrawn .
[18] Normal operations require that no more than one train occupies a section of line at any time. Permissive working is an exception to this rule and allows two trains in the same section of line.
[19] Hand points are accessed at ground level and are manually changed by an operative to determine the route of travel for a train.

- Two similar improvement notices for failing to provide means for signallers to consistently and reliably determine train movements and failing to adequately assess signaller's workload.

Prohibition notices in 2016-17 (for a full list on our website[20])

208. We served one prohibition notice DB Cargo. This compared to the six prohibition notices we served in 2015-16. The reason for our notice was related weaknesses in managing risk associated with staff walking on or near the line at Bridgend ground frame in South Wales.

Prosecutions in 2016-17

209. In England and Wales, we completed five prosecutions against three different defendants during 2016-17 - see table below. This compares to four in 2015-16. Four of our prosecutions this year were on historic events.

210. There was an additional prosecution of Network Rail carried out by the Scottish Crown Office and Procurator Fiscal Service following the Ardrossan South Beach electric shock incident. This prosecution arose from an investigation carried out by ORR.

211. **Summary overview of our concluded 2016-17 prosecutions**

England and Wales		
Defendant	**Incident**	**Fine**
West Coast Railways	A signal passed at danger (SPAD) near Wootton Bassett junction in Wiltshire.	**£200k**
Network Rail Infrastructure Ltd	Insufficient progress against two improvement notices relating to the management of electrical cabinets.	**£70k**
Network Rail Infrastructure Ltd	A fatality at Gipsy Lane crossing in Needham Market, Suffolk.	**£4m**
London Underground Ltd	An employee falling from a tower scaffold while cleaning a former lift shaft and suffering a number of injuries.	**£500k**
Network Rail Infrastructure Ltd	A train striking a track worker performing rail maintenance work near Redhill in Surrey, resulting multiple serious and life-changing injuries	**£800k**

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

Annex 1 – Glossary

Abbreviation	Definition
CCTV	Closed-circuit television.
CIRAS	Confidential incident reporting and assessment system; an industry funded but independent system which enables workers to 'whistle-blow' confidentially.
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.
FOC	Freight Operating Company.
FWI	Fatality and Weighted Injury index: the common way of measuring harm to people on Britain's mainline railways. The fatalities and weighted injury ratio used is: one fatality = 10 major injuries = 200 class 1 minor injuries (where the injured person is taken directly to hospital) = 1,000 class 2 minor injuries = 200 class 1 shock and trauma injuries = 1,000 class 2 shock and trauma injuries.
HAVS	Hand Arm Vibration Syndrome.
HLOS	High-level output specification: the government's statement of the additional outputs it requires from the Network Rail over the next five years.
Mainline Railway	A railway is a 'mainline railway' unless: a) we determine that it falls within one or more of these categories: • 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 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 c) c) it is privately owned infrastructure that exists solely for use by the infrastructure owner for its own freight operations.
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.

Abbreviation	Definition
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.

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