OFFICE OF RAIL REGULATION

Health and Safety Report 2013

July 2013

Contents

Foreword

Like last year, this year's health and safety report contains positive evidence that Britain continues to have one of the safest railways in Europe, with a number of successes:

- London Underground Limited (LUL) again achieving zero workforce and passenger fatalities;
- a notable 6.4% reduction in the overall mainline system safety risk; and
- continuing improvement to mainline workforce safety.

Safety on Britain's railways is ORR's chief priority. Whilst evidence suggests that Britain's railways continue to manage risks well, we must not and will not become complacent. The recent runaway freight train incident and fire in Lac-Megantic Quebec, Canada and the passenger train derailment in Bretigny-sur-Orge in Paris, both starkly demonstrate the consequences of a single catastrophic incident: seemingly low levels of risk count for nothing when such tragic events occur.

Our draft determination for 2014-19 provides specific additional funding for Network Rail to improve track work safety, by improving electrical system isolations, the design of road-rail vehicles, alerts to warn workers on or near the track of approaching trains, reduce risks at level crossings. As part of our integrated regulatory approach, we decided to allow Network Rail more time to make their planned efficiencies in maintenance after careful consideration of their possible safety implications and we have also provided additional funding (a total of £400million) to enable Network Rail to make its civil assets, such as cuttings, tunnels and structures more sustainably resilient in the longer term and deliver the infrastructure outputs that taxpayers, passengers and others are funding it to deliver.

We applaud the successful delivery of a safe 2012 Olympics and Paralympics as a result of strong cross-industry co-ordination and cooperation, which included the involvement of our colleagues since 2009, during which London Underground Limited (LUL) and Transport for London's other services carried record-breaking numbers of passengers safely and efficiently, including enabling increased service accessibility. The lessons learnt from these successes are now being banked must become part of business as usual.

Further improvements to Britain's railways are possible. This report provides a detailed assessment for 2012-13, but looking ahead our priorities for 2013-4 include: continuing to promote further improved occupational health management, improving workers, especially track worker, safety and an integrated cross-office focus on ensuring the mainline industry's infrastructure assets are safer and more resilient.

Richard Price
Chief Executive, ORR

Ian Prosser
Director of Railway Safety, ORR

Section 1 - Director of Railway Safety's overview

The Office of Rail Regulation (ORR) has always been clear that health and safety on all of Britain's railways is its absolute priority and this has been reflected in our Control Period 5 (2014-19) draft determination for Network Rail published on 12 June 2013[1]: financial efficiencies must not come at the expense of safety.

Key overall messages:

- Britain's mainline railway remains amongst one of the safest in the European Union (EU) in terms of the number of unsafe events that have happened, and is the best in the EU at managing risks to passengers and at level crossings;
- London Underground Limited (LUL) again achieved zero workforce and passenger fatalities, with a 2.7% risk reduction across its network;
- a notable 6.4% reduction in the overall mainline system safety risk in 2012-13, with fewer fatalities to members of the public on the mainline railway;
- encouraging signs that mainline train operators are managing occupational health better, but Network Rail's occupational health management still needs further improvement over the next four to five years;
- overall mainline workforce safety continues to improve, the exception being an 8% worsening in track worker safety in 2012-13, primarily because of slips, trips and falls and contact with objects incidents. It's now 19-years since an LUL employee was killed at work. Track worker safety will remain a key focus of our inspection work;
- a disappointing and significant increase (34% since December 2011) in potential passenger train accident risk as a result of weather-caused structural failures in 2012; total accident risk in 2012-13 was at its highest level since 2009-10. Improving Network Rail's asset management is a specific focus of our CP5 draft determination;
- a 7% increase in normalised passenger risk due to slips, trips and falls at stations, and four tragic passenger fatalities at stations; none were industry-caused. We continue to ensure duty holders

[1] See ORR's periodic review 2013 draft determination: http://www.rail-reg.gov.uk/pr13/consultations/draft-determination.php

review their approach to station safety; and

- there was evidence of potential resource gaps in Network Rail's maintenance depots leading to an over-reliance on reactive, rather than planned preventative, maintenance. We continue to monitor infrastructure asset performance closely.

Despite the good recent safety record, we cannot be complacent because it is clear from the evidence in this report that there remain weaknesses in how health and safety risks are managed across the sector. I can reassure you that, in our role as regulator, we will continue to push and support railway duty holders to ensure that the industry focuses on improving health and safety management and risk control.

Where necessary, we use our regulatory tools to ensure those responsible follow the law. In 2012-13, we served fewer enforcement notices than in 2011-12, but brought a higher than usual number of prosecutions – see annex 1. We want and expect the industry to improve its own health and safety assurance processes. Looking forward, if the industry's management of risk moves towards excellence, I expect the number of enforcement notices and prosecutions to decline, or at least be focused on more complex aspects of risk control.

Briefly looking ahead to the start of Control Period 5 (2014-19), we have made a point of largely protecting Network Rail's proposed maintenance expenditure in our draft determination; we have deliberately delayed the phasing in of some of Network Rail's efficiency proposals because we did not think they could be achieved safely, efficiently and sustainably. We have provided significantly more (£400m) funding in CP5 then in CP4 to enable Network Rail to improve the condition of its civil structure assets, such as earthworks, drainage, bridges and tunnels. We have considered carefully and supported Network Rail's proposals for specific additional funding to:

- improve how workers take electrical isolations on AC and DC systems;
- improve the safety design of road-rail vehicles;
- develop alerts to warn track workers of approaching trains; and
- reduce level crossing risk.

Network Rail's objective of *'everyone home safe everyday'* is welcome, but the whole industry has some way to go to achieve this. It is with regret that I remember the avoidable deaths of a volunteer guard on a heritage line and two mainline track workers while on duty last year: one was struck by a train, an incident which is under investigation, and one died in a road accident. This was the second rail worker to die in a road traffic accident in two years. The rail industry should review its arrangements for managing risks,

including fatigue, associated with driving at work and the decisions managers take to help manage those risks[2].

The industry has made progress in a number of areas:

- Network Rail is on-target to meet its 25% reduction in level crossing risk over Control Period 4 (CP4) 2009-14, as measured by its own model;
- the successful delivery of a safe 2012 UK Olympics and Paralympics as a result of industry co-ordination, which included a record-breaking number of passengers were carried; with scope to build a post-Olympic legacy based on the coordination of a best practice approach to risk management;
- operators' management systems to address low adhesion issues were found to be generally fit-for-purpose, with improved sanding arrangements in place;
- we found evidence of improvement in the suitability of individual operators' risk assessments for evaluating Train Protection Warning System (TPWS) failures and weaknesses;
- a notable 10% reduction in platform-train interface (PTI) risk following a strong cross-industry focus after increases in risks and incidents since 2009-10, but further improvements are necessary; and
- improved safety standards and safety management arrangements on heritage lines after a rise in the need for enforcement action in 2011-12; further work remains and we aim to ensure the pace of improvement is maintained. We served three enforcement notices in the heritage sector in 2012-13, a marked improvement on the 11-notices served in 2011-12.

However, there are significant areas where improvement is needed:

- long-term SPAD risk continues to decline over time, but we saw a significant 87% increase in underlying SPAD risk in 2012-13 compared to 2011-12; this was mostly because of an increase in higher risk SPADs at lower risk signals not fitted with a train protection system;
- there has been a long-term trend of decreasing risk at level crossing, but despite this improvement, nine members of the public died on crossings in 2012-13: four pedestrians and five vehicle users. Level crossing risk increased by 7% in 2012-13, mostly because of misuse by level crossing users; and
- the regrettable high-level of rail suicides continued with 238 incidents in both 2011-12 and 2012-13. This is a sensitive area and we recognise the strong collaborative lead Network Rail has taken with

[2] See RSSB's recent guidance: http://www.rssb.co.uk/RESEARCH/Lists/DispForm_Custom.aspx?ID=1107

other industry duty holders to seek ways to prevent suicide, including working with the Samaritans and training its station staff, who now intervene in about 30-incidents a month.

The increase in mainline passenger risk in 2012-13 showed the limitations of the current Precursor Indicator Model; it is unable to help predict the susceptibility of civil structure failures caused by adverse but foreseeable weather. Building on the independent review I commissioned in 2011-12, we will continue to work with the Rail Safety and Standards Board and LUL to develop their safety risk models so that they provide a fully predictive picture of risk on our key railways. Improved outputs from safety risk models will help the industry and ORR set its strategic priorities. We expect modelling techniques to be kept under review and improved at every opportunity.

I look forward to the mainline industry being able to benefit from the use of the disaggregated safety data to benchmark performance, identify and learn from examples of good risk management and any associated cost reduction efficiencies, at regional and route levels.

We continue to respond to issues raised by rail trade unions and we routinely meet with their representatives at different levels throughout the year. I value the health and safety insight and perspective they provide to us.

In summary, I saw a number of positive indicators from across the sector in 2012-13, demonstrating that the industry as a whole continues to improve. However, we will not allow the industry to become complacent, or become complacent ourselves, because as this report illustrates, there remain underlying weaknesses in the industry's safety management systems and risk controls.

Section 2 - About us: the legislative framework for safety regulation

ORR as Britain's rail industry regulator[3]

As the independent safety and economic regulator for Britain's railways, ORR plays a pivotal role in ensuring the industry delivers a safe, effective and efficient railway, focused on the needs of its users and responsive to the priorities of its funders. We expect businesses to achieve proper control of risks by having excellent safety management systems. We expect the rail industry to understand the risks it creates and how to measure their performance in controlling these. We expect strong leadership to deliver a safe railway.

Our major concern is to ensure the industry controls the risks from train accidents, without losing sight of other risks that need to be controlled, such as slips, trips and falls by workers or on platforms, or the risk of track workers being hit by a train. We actively seek evidence of health and safety management and performance through our inspections, investigations of incidents and permissioning work. ORR can use its enforcement powers to secure legal compliance and require improvement if that is needed – *see annex 1 for* our enforcement *activities in 2012-13*. We encourage excellence, but will not enforce beyond the standard set down in law.

As an integrated regulator, we are committed to ensuring our regulation helps the industry continue to get a better grip on its costs, whilst delivering the levels of safety, performance and efficiency which passengers, freight customers and taxpayers rightly expect.

Our health and safety vision is for zero workforce and industry-caused passenger fatalities, with an ever decreasing overall safety risk.

Law

Our rail law comes from domestic and European legislation. We are the National Safety Authority (NSA) for European legislation on Britain's railways, particularly the Railway Safety Directive, and we also enforce domestic Health and Safety at Work Act and associated regulations on all of Britain's railways.

[3] For more information, see ORR's Annual Report and resource accounts 2012-13, at http://www.rail-reg.gov.uk/server/show/nav.1240

In practice, under these laws, we grant safety certificates and safety authorisations to allow duty holders to operate a railway business on the basis that they understand the risks they create and have a health and safety management system in place to control them. We are required to re-assess safety certificates and authorisation at least once every five years, and our re-assessment process conforms to a common European standard. We also check control of risks on a day-to-day basis by the management in each business, through our risk-based inspection work and investigations of incidents.

ORR and Europe

ORR works with other European regulators to help deliver sensible regulation and a common European approach; this allows trains to run through the Channel Tunnel to British and European destinations safely, and allows trains built in one country to operate in another and develop a common marketplace. Like our European neighbours, we keep the legal framework for safety on the railway under review and can propose changes if necessary. We do this in line with the principles of better regulation, which underpin all that we do.

ORR's health and safety regulation strategy

To realise our vision, we need to ensure that the industry prioritises health and safety issues in the right way. This is the basis of the inspection programmes in our business plan. Some of our inspection programmes are related to areas of physical risks such as workforce safety or asset safety, and others focus on areas of the safety management system that are key to protecting against harm, for example, the management of change and competence of people. The latter we call "enablers". By focusing on both areas simultaneously, to ensure rail businesses do the right things in the right way, we believe that we gain a rounded view of the rail industry's risk management capability and encourage the industry to adopt a risk-based mind-set.

For each sector of the railway (mainline, Transport for London (TfL), trams and light railways and heritage) we understand the different risks they manage. Together these form a "risk landscape" which informs our own priorities and our planned activities and resource allocation, so that they are best targeted on improved risk control – *see annex 2 for our 2013-14 plans*.

Our use of RM3

Our railway management maturity model (RM3)[4] helps us, and the industry, demonstrate what excellent health and safety management and risk control looks like. RM3 uses a five-point management maturity scale, which we use to help make a careful, balanced and objective judgement of duty holder's health and safety management systems and their capability to consistently and continually manage risk.

We use the results of our RM3 assessments to gauge whether a duty holder's health and safety management system can deliver excellence in safety culture and risk control and perhaps more importantly, to identify a duty holder's strengths and weaknesses. These assessments are used to frame a mature conversation about how the duty holder can achieve future improvement. ORR's inspectors are careful to consider the currency, quantity, consistency and quality of the evidence used as the basis of RM3 assessments to support a mature risk-based regulatory approach that avoids unintended consequences.

[4] See: http://www.rail-reg.gov.uk/server/show/nav.1098

Section 3 - Health and safety across the rail sector: the regulator's view

Network Rail

Overall assessment:

The findings from our inspection work is judged against our RM3 model to assess Network Rail's performance against a number of key components which are necessary to deliver an effective safety management system; for example, leadership, competence and risk management. Our analysis shows that since last year, Network Rail has improved some aspects of its management capability nearer towards excellence, but other components are some way below excellence and require improvement. Where we found evidence of significant weaknesses in Network Rail's activities, we took appropriate enforcement action – *see annex 1.*

Key messages:

- for the first time, Network Rail has set out a strategic direction for its workforce's health and safety in Transforming Safety & Wellbeing strategy for 2012-24[5]. The strategy has a number of long and short term objectives including of 'eliminating all fatalities and major injuries and reducing train accident risk by 50%' by 2019;
- leadership in safety culture has shown a marked improvement at senior-levels in 2012-13, where safety performance is clearly important. However, actions at supervisory-level and in the workforce do not always reflect the right safety culture. There is evidence of underlying tensions between safety and train punctuality and train performance;
- the management of track, structures, drainage and vegetation has improved, but more is needed to continually ensure safety. Some asset registers are incomplete and this can lead to inaccurate estimates of the necessary maintenance work and an over-reliance on reactive maintenance;
- Network Rail has insufficient resource to deliver all the maintenance work it planned in track and off-track assets, such as fencing and vegetation management, which can create the potential for an

5 See: http://www.networkrail.co.uk/browsedirectory.aspx?root=&dir=%5CStrategicBusinessPlan%5CCP5%5CSupporting%20documents%5CTransforming%20Network%20Rail

increase in asset failures and risk of train accidents. Although the dataset is small, we saw increases in the number of rail breaks and track geometry faults on some routes;

- occupational health management has improved, but there is a long way to go before Network Rail can demonstrate a coordinated and robust process for managing occupational health and wellbeing particularly at route-level; and

in many of the areas we inspected, we found poor quality risk assessments and consequently risks were not being controlled *so far as is reasonably practicable*. We found a lack of competence in some people required to complete risk assessments.

What we found:

Level Crossings

Network Rail is committed to reducing level crossing risk 25% by 2019 and it is currently on-target, as measured by its own model, to deliver this. This improvement has come through strong leadership from senior managers and demonstrates what can be achieved with the right focus. We found that in the routes, some level crossing risk assessments were poor and did not identify the best risk controls.

We also found that risk assessments were not always being carried out at the right stage of the renewal and enhancement process, which introduced delays and additional costs at the level crossing commissioning stage. We note that Network Rail has recently introduced route-level crossing managers and a national level crossing team, which should improve the quality of the risk assessment process.

Maintenance of the infrastructure

It is important to carry out the right amount of planned maintenance to prevent faults from occurring. Track faults can cause train derailments and poor fencing, drainage and vegetation can increase potential train accident risks. For example, poor drainage can affect track quality and overgrown vegetation can affect how well train drivers can see signals. Our inspections found that not all the planned maintenance work was delivered, partly because there were not enough people to do the work and partly because Network Rail does not always have the right information to plan its work effectively, including complete asset registers.

We found that track inspection and reactive maintenance was being carried out, but using a 'find and fix' approach is not the most reliable way to ensure a safe and resilient track and infrastructure. A proactive 'predict and prevent' approach to planned maintenance is a better way to control underlying train accident precursor risks.

During the year, we saw an increase in the number of track faults including track geometry faults and an increase in the number of rail breaks on some routes, particularly the East Coast mainline and Sussex routes. Track geometry faults do not necessarily present an immediate safety risk, but can be precursors to more serious track faults and are often indicative of insufficient planned maintenance or renewal.

Network Rail has acknowledged that some maintenance depots are under-resourced and intends to increase the amount of planned maintenance work this year. We will continue to monitor this issue closely and take action where we find evidence that health and safety risk is not being managed adequately.

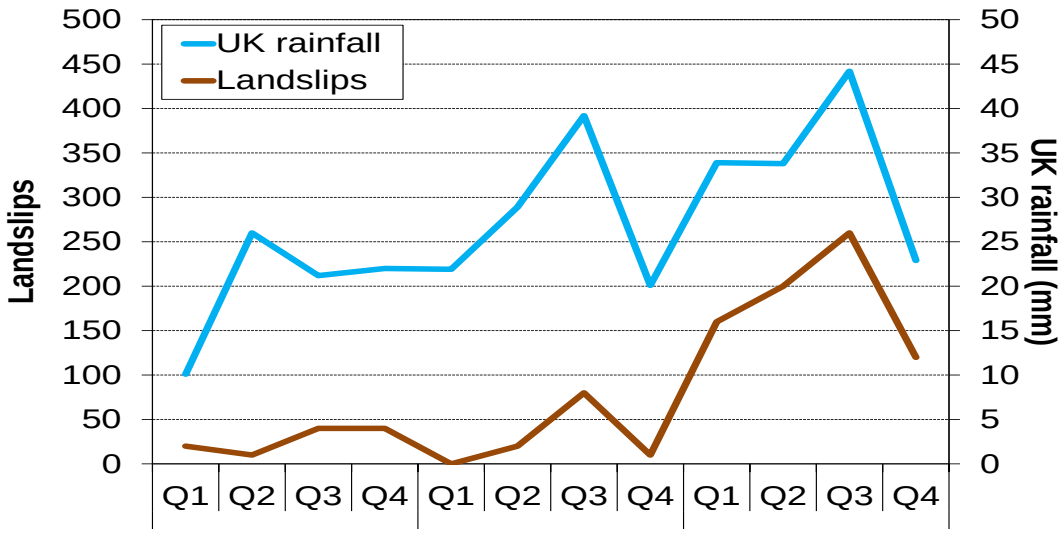
Earthworks

There has been a significant increase in the number and severity of earthwork failures in 2012, mostly associated with periods of heavy rainfall. The graph below shows the correlation between rainfall and earthwork failures.

Our inspections and investigation of earthwork incidents found that many slopes are vulnerable to severe weather because they are in a poor condition and have not been properly maintained. These pose the potential to cause serious incidents. We served an enforcement notice requiring Network Rail to use operational controls to reduce the likely consequences from a train hitting failed earthworks; for example, by introducing proportionate and risk-based speed restrictions.

Network Rail Scotland has introduced a severe weather procedure to reduce the risk from infrastructure failures and other routes are in the process of implementing similar measures. We see operational controls as a temporary solution and we expect Network Rail to improve its earthworks management to prevent them failing in the first place and make them resilient to potential future climate change.

Close correlation between high rainfall and landslips in 2010-13



Source: SMIS and Centre for Ecology and Hydrology

The quality of the drainage can affect the stability of earthworks. Network Rail made a commitment to complete its asset register for drainage and carry out an initial examination by 2012; some progress has been made but the work is not complete and therefore, Network Rail cannot demonstrate that its drainage asset is maintained to reduce risks *so far as is reasonably practicable*. We found some positive initiatives to improve slope drainage in some routes, such as the active use of local water management groups.

Structures

Structures include bridges, tunnels and viaducts; it is important that structures are examined regularly to ensure they are in a safe condition and to prioritise future maintenance requirements. Our inspections found that Network Rail's examination reports for structures generally gave an accurate picture of their physical condition, but in some cases the recommendations made following the examination were too general; they did contain specific actions or effective arrangements to ensure defects were rectified. We found that route asset managers did not have the time or resource to fully evaluate the implications of examination reports, especially from site inspections.

Network Rail has a backlog of bridge capability assessments and we considered that the normal planned work programme was inadequate to rectify this. Network Rail has engaged contractors to address the backlog and priority was given to structures with the highest risks. Although the bridge assessment process was in backlog, we found that generally Route Asset Managers are using a risk-based approach to the high-risk structures they manage, for example by restricting train speed over higher risk bridges.

Safety-by-design

Safety should be considered at a project's design stage to ensure that early and efficient opportunities are taken to control risks *so far as is reasonably practicable* in later operation and maintenance. We found some improvement in using this approach compared to previous years, but the pace of change is too slow and safety-by-design is not yet considered 'business as usual'. We found occasional examples of good practice but in most cases project development failed to take full account of opportunities to reduce later maintenance and operational requirements.

We will continue to press Network Rail on this because it provides a big opportunity to efficiently and effectively remove risks from the system.

Workforce health and safety

Workforce health and safety is another area where Network Rail recognises it can and must improve. Network Rail has developed a workforce safety strategy and takes an active part in the cross-industry track worker safety group, which is well-led and highly energised. The Rail Safety and Standards Board's (RSSB) data shows that harm to the workforce across the railway industry reduced by 11% in 2012-13. However, track workers are still the most at risk from fatal and major injury risks and improvements to track worker safety are lagging behind improvements in other areas. In our inspections, we found examples of

poor planning and poor systems of work, which meant that track workers are unnecessarily exposed to additional risks.

Network Rail is proposing or implementing a number of initiatives to improve track worker safety, including:

- exploring better track worker protection systems and using new technologies and innovation;
- implementing a new system that will involve a 100% check of competence and log of workers in and out of worksites to better manage the hours they work and improve fatigue management; and
- implementing a new permit to work system as part of a safe system of work.

In the medium to long term, Network Rail proposes to have fewer people working where they can be accidentally hit by trains, through the mechanisation of track inspections and the use of remote condition monitoring processes. Network Rail has proposed a number of track worker safety initiatives in recent years, some of these have been implemented, but others have failed or not delivered the expected outputs. Therefore, we will monitor the development and implementation of the current proposals and activities to improve worker safety, described in Network Rail's new strategy and we expect Network Rail to measure the effectiveness of any new processes to identify where it can make further improvements.

Workforce safety is also important during construction-type activities on the railway; this work is often carried out by Network Rail's Infrastructure Projects division or by its contractors. We generally find that health and safety management is less good in this part of Network Rail's business, when compared to its other maintenance and renewals work.

This year, we found that overall site conditions were better than in previous years, but there were still too many examples of poor practice, unsafe behaviours and a lack of impetus from supervisors or from within the workforce to challenge work not being done as planned. We found that improvements are required in basic housekeeping standards to reduce worksite slips, trips and falls. On a more positive note, we found evidence of improvements in lifting operations and in the use of road-rail vehicles, but more consistency is needed.

Occupational health

During the year, we inspected the risks and controls associated with hand-arm vibration, exposure to silica dust when ballast is being handled, exposure to dust and fume when cutting, grinding and welding rail, and the management of asbestos. We found poor on-site control measures, because of poor risk assessments and little evidence of proactive monitoring to check that the planned controls were actually in use.

We found a general lack of ownership and accountability for health management, particularly at route-level and a lack of good data to allow Network Rail to prioritise areas for action in the future at national level. Network Rail lags behind other UK industries in its management of occupational health issues. We are

encouraging Network Rail to remedy this situation through our draft determination, where we have assumed that improvements in occupational health and wellbeing will generate savings for Network Rail through reduced workforce absence.

In terms of railway construction activities, while strategy and improvement programmes are being developed, the key issue for Network Rail is to encourage proper delivery, ownership and effective implementation of new systems, competences and culture at Route and track-level. Overall, on-site conditions continue to improve and consistency is better than it was, but Network Rail still needs to improve in areas such as site traffic management and site housekeeping to reduce basic slips, trips and falls and occupational health risks.

Railway operators

Our inspection teams specialise in passenger train operators, freight operators, heritage and light rail operators and TfL's rail businesses. Our teams apply our RM3 model to the evidence we collect from all our activities to ensure consistent and comparable in-depth assessment and analysis of duty holder's health and safety management capability.

In many cases, we were pleased to identify good health and safety management arrangements although there are some specific topics where we made recommendations for improvement. We will seek to ensure that heritage operators continue to maintain the pace of change to have in place strong and effective safety management systems, staff competence and board governance arrangements.

Mainline Train and Freight Operating Companies

Key messages:

Strengths

- we delivered a tailored training programme for train operators on the application of our RM3 model; most operators have now been trained on its use;
- some TOCs and FOCs have carried out their own RM3 audits and assessments;
- we have captured some emerging trends from our own RM3 analysis, including examples of excellence in leadership, board governance, emergency planning, policies and procedures;
- PTI risk remains a major passenger fatality concern, but we have seen good evidence that duty holders are proactively exploring practical measures to reduce risks. Mainline PTI risk fell 10% in 2012-13 – *see the later PTI section about the ORR/RSSB industry workshop*;

- we found evidence of more consistently reliable train operator's sanding rates and equipment reliability to reduce low adhesion risk, this is due in part to better management focus;
- improvements in the suitability of individual duty holder's train protection system risk assessments and actions to upgrade train protection and warning system equipment and alarms;
- our occupational health strategy is beginning to yield benefits and we are working with one owner group to develop a health surveillance programme; and
- we issued 14-safety certificates/authorisations and a further 16 are under assessment; the documentation provided by duty holders to support these was generally of a good standard.

Weaknesses

- the industry needs to develop a more balanced and effective set of safety Key Performance Indicators (KPIs) which would provide assurance and to help change behaviours;
- evidence of weaknesses in rolling stock maintenance, including those with the potential to result in catastrophic failures, such as deficiencies in supply chain processes contributing to causal factors in incidents. We continue to seek to address these issues in our inspection and meetings with duty holders;
- examples of where our RM3 analysis highlights where more work needs to be done includes industry monitoring, audit and review; and
- weaknesses in third-party maintenance arrangements causing potential safety and reliability risks. We continue to address these in our inspection and meetings with duty holders planned for 2013-14.

Safety performance indicators

The rail industry now has a specific guidance document[6] to complement the Health and Safety Executive's (HSE) guidance on setting and monitoring activity and outcome indicators[7], often referred to as leading and lagging indicators. We are committed to helping the rail industry establish a more balanced suite of safety performance indicators (SPIs) which can help provide assurance of risk control performance, particularly those controls that are safety-critical.

The majority of TOCs report that most safety-critical incidents are caused by unsafe acts or behaviours by passengers or staff. We believe that a suitable suite of SPIs could help monitor the effectiveness of operators' initiatives to improve these behaviours.

[6] See: http://www.rssb.co.uk/RESEARCH/Lists/DispForm_Custom.aspx?ID=698

[7] See: HSE's a guide to measuring health and safety performance, December 2001.

Low adhesion

A continued focus of our attention this year was low adhesion. All multiple unit vehicles are now fitted with sanding systems and sand depositing rates on some units are 2kg/min, which increased adhesion during the leaf-fall season.

We made unannounced inspections of sanding maintenance procedures across virtually all train operators in autumn 2012 and we generally found a much improved situation, with more consistently monitored sanding deposit rates, good data recording and general management arrangements.

There were some isolated pockets of poor maintenance, for example water contamination of sand in storage, low-levels of sand in on-train equipment and some slackness in maintenance record keeping.

We intend to continue monitoring train operators and we will inspect how well the infrastructure manager controls low adhesion risks arising from poor railhead conditions.

Train Protection and Warning System (TPWS)

We continued to seek assurances from train operators that potential risk arising from on-board TPWS equipment failures have been addressed properly. We saw improvements in the suitability and sufficiency of specific risk assessments undertaken by TOCs, focused on the risks of their own TPWS operations.

Following on from the on-going work we did with operators over recent years on TPWS in-service monitoring and “reset and continue” weaknesses in TPWS, we have seen that some train operators now have firm plans to upgrade their TPWS equipment and encouraging initiatives to display alarm indications via the existing Train Management Systems.

Platform train interface (PTI)

Train dispatch remains a concern despite improvements in 2012-13. There were no train dispatch fatalities last year but there were several incidents where passengers fell between the train and platform, including after the train had been dispatched properly and was in motion. Several of the passengers involved were impaired through alcohol and were fortunate not to sustain fatal injuries. Overall PTI risk fell by 10% in 2012-13.

To help ensure the industry takes a consistent approach to the management of PTI risks, we hosted a joint-RSSB/ORR PTI workshop on 27 March 2013. This was well-attended and helped to identify a number of industry initiatives, for example, the need to have a long-term cross-industry strategy to progressively minimise existing gaps between train and platform. Large but historic platform-train gaps remain a concern, but we are encouraged by examples of improvements made to enhance platform edges. We will continue to press for reasonably practicable improvements, including reviewing options for applying new technologies and processes, and identifying and applying good practice.

The Rail Accident Investigation Branch's report into the tragic fatality at Merseyrail's James Street station in October 20118 highlighted the need for duty holders to be satisfied that employees who despatch trains are properly trained and monitored to ensure they remain vigilant when carrying out their safety responsibilities during train despatch.

Our inspection and investigation work into PTI issues highlighted the following:

Good practice:

- leadership, governance and policy;
- recruitment, training and competence;
- competence management system - we are seeing an improving picture because of the benefits of computerised systems; and
- some examples of very good standards of train despatch.

Areas for improvement:

- risk assessments should include local factors, be realistic and genuinely have staff involvement;
- make use of techniques to better monitor and improve passenger and staff behaviours, such as the use of CCTV and more effective unobtrusive monitoring; and
- have systems in place to effectively monitor fatigue.

Driver management

We continue to be concerned about the effects of interrupted concentration and distraction for drivers. We are pressing train operators to consider what further steps can be taken to help understand why train drivers become distracted as they approach signals; RSSB has recently begun further research on this. In addition, RSSB is considering research into the use of in-cab CCTV monitoring to aid incident investigation. Train driver distraction by the use of a personal mobile phone was a likely contributor to at least one serious collision during the year. We support the enhanced use of remote data recorders on trains, to help managers identify emerging trends in poor behaviour and take action to prevent operational incidents.

The industry has improved its management of fatigue and we have seen examples where hours worked by individuals have been restructured to reduce fatigue risks.

[8] http://www.raib.gov.uk/publications/investigation_reports/reports_2012.cfm

Emergency planning

Generally, we found evidence of a good appreciation and capability of emergency planning issues. We saw good practice in emergency preparedness during the Olympics with increased passenger numbers. However, weaknesses still exist including some lengthy failed-train recovery times and some examples of inadequate management of large numbers of passengers during service disruption.

Rolling stock

We continue to be concerned about weaknesses in the management system that can result in components falling from a moving train. In 2012-13, we took enforcement action against one operator when train cover panels became detached from a passenger train when it was in-service. This will remain a focus for us in future inspections and contacts with train operators.

We inspected another train operator's rolling stock maintenance arrangements following a number of incidents, including a train panel becoming detached and the failure of a drive-shaft due to a low-level of oil. We found poor maintenance arrangements but we did not take enforcement action; we required the train operator to improve its maintenance arrangements.

The industry has taken positive steps to reduce the number of final drive-shaft failures and detachments on Pacer units, by increasing the use of temperature monitoring on final drive-shafts to mitigate the risk from failure. We continue to encourage the industry to use proactive monitoring processes that can provide early indication of potential failures which might lead to catastrophic events.

We note that a persistent level of deficiencies in the supply chain processes is a contributory causal factor in failure incidents. This is an area which the industry continues to find challenging and we will continue to encourage it to find a workable solution.

Health strategies

Last year we reported that a number of train operators have produced strategies to address occupational health issues and we believe this work is now yielding industry benefits. This year we encouraged an operator owner group to develop their health strategy and produce a health surveillance programme across their business.

Freight-specific operations

Safety performance over the last year has remained relatively unchanged compared to previous years. There have been a number of significant freight train derailments; some were related to issues of wagon loading or suspension operation, but many were due to poor track condition. The industry has worked together to reduce derailment risk from suspension systems and is installing technology to detect poorly loaded wagons. We will continue to seek improvement.

Most freight train operators have now adopted the RM3 model to assess their safety management systems which is encouraging and we continue to support this process.

Both we and the industry have put a significant amount of effort into preparing for the start of the Entities in Charge of Maintenance (ECM) Regulations for freight wagons. We certified nine organisations as ECMs during 2012-13 in advance of the 31 May 2013 deadline. We believe compliance with these regulations will drive safer freight operations.

We supported the creation and now attend the new National Freight Safety Group and other cross-industry groups to promote health and safety, encourage the industry to focus on priority issues and to pick up intelligence and feedback.

London Underground Limited and other Transport for London (TfL) companies

Key messages:

- the findings of our extensive pre-Olympic inspection work confirmed the safe and reliable delivery of services by TfL duty holders; they had all made comprehensive and thorough preparations for the event. We are pleased to note the efforts made to build a post-Olympic legacy based on learning best practice changes from the Olympic period;
- safety performance of TfL duty holders (LUL, London Overground (LOROL) and Docklands Light Railway (DLR)) remains high; as a result we allocate less of our resource to these duty holders compared to the mainline railway; and
- passenger numbers continue to grow steadily and demand for services remains a strong pressure on all of TfL's duty holders.

What we found:

Railway operations

We continue to monitor carefully the number of potentially higher risk SPADs on LUL, although the long-established train protection system continued to mitigate effectively the consequences of SPADs by automatically bringing trains to a halt. We note the roll-out of automatic train operation (ATO) should result in a progressive decline in SPADs as traditionally recorded. ATO is now fully functional on the Jubilee line, has been updated on the Victoria line to a modern standard and has started to be rolled out on the Northern line. We note LUL's move to align its SPAD-assessment descriptors with those of the mainline railway.

We have continued to monitor LUL's introduction of S-stock trains on the Metropolitan line and the start of their roll-out onto other sub-surface lines. During 2012-13, we noted a numerically small but definite increase in the number of PTI-related incidents involving S-Stock trains at a small number of stations with curved platforms. Next year we will continue to monitor LUL's efforts to identify the underlying causes of these incidents and their measures to improve safety.

We were pleased by DLR's continued safe operation and their proactive early engagement with us before starting the re-franchising process.

LOROL successfully commissioned and brought into operation the extension to Clapham Junction. This demonstrates the value and effectiveness of its UKAS-recognised driver training programme and competency management system.

The London 2012 Olympic and Paralympic Games

Since 2009 we have carried out specific planned inspection work to test the effectiveness of health and safety preparations for the 2012 London Olympic and Paralympics games. The successful delivery of the 2012 games and the reliable and safe transport of a record passenger numbers confirmed the comprehensive robust arrangements of our pre-games findings. We have been assured that as a part of the post-games legacy that LUL is making efforts to permanently adopt 'blue light' emergency response vehicles to more quickly get to and deal with incidents and to provide permanent access ramps for passengers with disabilities at 16-specific stations, with more planned for 2013-14.

Worker safety

We continued to inspect a range of operational activities at LUL, LOROL and DLR/Serco depot's risk control measures. Generally, we found a high-standard of safety and risk control, but we served an improvement notice on LUL's Ruislip depot because of ineffective precautions to prevent on-train electrical equipment from being energised accidentally, when work was being done nearby. TfL completed timely improvements as required by our notice. We identified a number of other weaknesses in safe working in depots and we will continue our inspections in 2013-14.

Heritage railways

Key messages:

- increasingly operators accept the need for good board governance and competence management;
- safety management systems (SMS) are now largely in place but further work remains; we will continue to ensure the pace of improvement is maintained; the next step is to ensure operators' refine their SMSs to improve their appropriateness, effectiveness and application; and

- the sector has further work to do to improve its staff's competence in addition to the work it has already done.

The year was overshadowed by the death of a volunteer guard at the North Yorkshire Moors Railway. After a careful review of the evidence in the case both we and the British Transport Police concluded that no criminal offences had been committed and no formal enforcement action was taken. We are following up RAIB's investigation recommendations into the incident.

During 2012-13, we concluded two prosecution cases against heritage railways, served one prohibition and three improvement notices[9].

Following our work with the mainline railway, we are now reviewing the use of RRVs by minor railways. We checked automatic level crossings on heritage lines to ensure compliance with legal requirements and good practice; we continue to focus on level crossing risk on heritage lines.

Generally, we believe that safety standards and governance arrangements in the sector have improved and we welcome the increased level of leadership, guidance and direction provided by the Heritage Railway Association (HRA). ORR and HRA held a number of successful joint seminars for directors of heritage railways to promote best practice in risk management in 2012-13. We will seek opportunities to collaborate further with HRA to ensure all heritage operators have strong and effective safety management systems, staff competence and board governance arrangements in place.

We worked closely with the HRA to develop guidance on the inspection and maintenance of steam locomotive boilers which will help to reduce risks of catastrophic failures in this area. The publication of HRA's guidance on level crossing sighting-distances provides a significant contribution to deal with a major potential hazard on minor railways.

We look to heritage operators to have more robust and credible complaint-handling processes to deal with complaints from staff, volunteers, passengers and the public.

Tramways

Key messages:

- good standards of safety performance, but no room for complacency; and
- considerable opportunity for the industry to cooperate collectively to deliver common guidance, standards and good practice.

[9] For a complete list see: http://www.rail-reg.gov.uk/server/show/nav.1283

Britain's tramways are some of the safest in Europe, but further design-focused safety improvements can be made. Evidence of collisions between trams and pedestrians on crossings remains an area of concern, such as the death of a pedestrian on Nottingham tram system in November 2012.

While post-incident reviews often show that lack of attention on the part of pedestrians is normally a root-cause of such incidents, we recognise that tramway designers and operators could look critically at crossing layouts and tram design to understand how to better minimise possible causes and the effects of collisions.

We worked on extensions of tramways in Manchester, Birmingham and Nottingham this year and provided statutory consent for significant new lines being opened for public operation in Manchester. We continue to monitor the on-going construction of the Edinburgh tramway.

We look to UK Tram, the industry trade body, to complete its reorganisation in 2013-14 and become a respected industry leader and the sector's sole source of guidance for the development of new tramways and the custodian of sector–specific standards and guidance for technical and operational practice.

We have not needed to take formal enforcement action with any of Britain's tramways in the last 12-months, but a number of incidents remain under on-going investigation.

Section 4 – The wider health and safety landscape

Legislative framework

Our work to ensure Britain's railway industry improves its health and safety culture, and has effective risk control measures, relies on having the right goal-setting health and safety law in place. We are responsible for preparing proposals for railway-specific safety regulations and for ensuring that these are accompanied by simple, clear guidance to support compliance. Most railway-specific safety law now originates from Europe and we work closely with the Department for Transport (DfT) to ensure the UK has the appropriate framework of law and meets its obligations under European requirements.

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

To achieve these goals, we believe that the future priorities are:

- ensuring proper implementation throughout Europe of the existing obligations and responsibilities in the Railway Safety Directive, and other measures in the second railway package; and
- developing cooperation arrangements between National Safety Authorities (NSAs) to ensure effective supervision and enforcement.

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

- working with DfT, UK stakeholders and other NSAs to influence the outcome of the European Commission's fourth railway package;
- promoting a coordinated approach by NSAs, and effective liaison with the European sector, on key issues in the European safety regulatory regime;
- taking forward the development of a common approach to post-certification supervision by NSAs and monitoring of duty holders' management systems;
- influencing the development of a revised European regulation for risk assessment; and
- ensuring a pragmatic approach to the certification regime for entities in charge of maintenance for freight vehicles.

Fourth railway package

The European Commission has proposed changes to the Railway Safety Directive and Interoperability Directive, as part of its fourth Railway Package proposals. We support the general approach reached in the EU Transport Council for interoperability, which gives ERA the role of issuing authorisations for vehicles to be used in more than one Member State and gives the proposer a choice of using ERA or the NSA (ORR in the UK) for domestic-only vehicles authorisations.

The Council is now considering safety certification and ORR is liaising with the DfT, other NSAs and stakeholders to ensure that practicable arrangements are agreed for the future, We support the concept of a single safety certificate, which combines current Part A and Part B, but there are significant differences in the process that may mean that the approach to interoperability, i.e. giving ERA a direct role may not be the optimum solution for safety certification.

Legislative policy work during the year:

We have:

- continued to work with the Law Commissions for England and Wales, and Scotland to finalise their joint-policy to modernise and simplify the way in which level crossing risks are governed[10]. Their final report is expected in summer 2013. We will work with DfT on the long-term implementation of subsequent draft regulations and a draft Bill;
- introduced further amendments to the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS)[11] and supporting guidance covering the certification of entities in charge of maintenance (ECMs) for freight vehicles[12] and other changes to secure better regulation;
- managed processes required by the train driver licensing Directive, including issuing around 200- train driver licences and the recognition of relevant doctors, psychologists, training and examination centres[13];
- continued to work with DfT on the Government's Red Tape Challenge[14], including a project to review, consolidate and improve three sets of out-dated rail safety legislation. Consultation on this is planned for summer 2013; and

[10] See: http://www.rail-reg.gov.uk/server/show/nav.1565

[11] See: http://www.rail-reg.gov.uk/server/show/nav.1511

[12] See: http://www.rail-reg.gov.uk/server/show/nav.2628

[13] See: http://www.rail-reg.gov.uk/server/show/nav.2447

[14] See: http://www.redtapechallenge.cabinetoffice.gov.uk/home/index/

- worked closely with the HSE to reform its health and safety legislation, including securing the retention of reporting requirements under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) that remain important to the rail sector[15]. This included persuading HSE to retain the legal requirement for rail industry to report and record occupational diseases.

Occupational health

Our vision is of a rail industry that consistently achieves best practice in occupational health. We continue to develop our occupational health programme16 to improve the way in which the industry tackles health issues. In particular we want the industry to:

- encourage greater health management leadership;
- promote awareness of health issues; and
- encourage a culture of excellence in the management of health.

A number of duty holders responded to our programme by developing their own tailored company health programmes; common themes included managing stress and wider employee health and wellbeing initiatives. We also found evidence of operators working collaboratively with external agencies to develop their ideas.

There was a mixed picture across the industry on health risk management; HSE's Labour Force Survey found that rail workers reported ill-health rates 40% higher than across other sectors and 18% higher than non-rail construction workers. We found that this was because of issues such as:

- low-levels of competence and engagement amongst managers and supervisors on health risk control;
- an absence of work-activity health risk assessments;
- poor control and implementation of risk control measures to prevent conditions such as hand-arm vibrations; and
- insufficient attention to the "hierarchy of control" principles, with missed opportunities to remove, design or engineer-out risk and too much reliance on the use of personal protective equipment to ensure safety.
- We found some examples of positive actions:

[15] See: http://www.hse.gov.uk/news/red-tape-challenge/

[16] See: http://www.rail-reg.gov.uk/server/show/nav.2497

- collaborative work by the ballast dust working group, led by Network Rail, on controlling the risks posed by exposure to silica dust;
- activity to better manage the health risks arising from welding and cutting of rail; and
- improved cleaning regimes to reduce the risk of legionella-related disease or microbiological hazards in aerosol water.

The work we have done on our occupational health programme identified the pivotal role of managers and supervisors in health risk management. We issued new web-based guidance and advice on rail managers' occupational health competence; the key knowledge areas they need and good practice training resources. We held an event attended by 70-people from the industry focusing on the financial case for good health management. Case studies showed there is a compelling financial case that can be made in any cost-benefit analysis.

Safety of the Channel Tunnel

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

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

The benefits of our approach were demonstrated by IGC's decision in June 2013 to issue a Part B safety certificate allowing Deutsche Bahn (through its subsidiary DB Schenker UK Ltd) to operate passenger services through the Channel Tunnel. The past year has also seen the removal by IGC of many unnecessary safety and technical requirements; a positive change that is already being exploited through the successful testing of two new types of freight locomotive in the Tunnel and the authorisation of several new types of freight wagon to transit the Channel.

Other key achievements in 2012-13, include:

- full implementation of the 2008 Interoperability Directive for the Channel Tunnel, establishing a vehicle authorisation process that aligns with European requirements;
- development of a published procedure for the certification of train operators, again in accordance with European requirements;

- revision of IGC and CTSA's change approval arrangements to provide a more proportionate regulatory approach and reduce administrative burdens on Eurotunnel; and
- closure of all outstanding recommendations arising from the serious Eurotunnel Shuttle fire of November 2008.

Staff competence

Industry competence and skills capability are essential elements in delivering future industry investment plans. We commissioned the National Skills Academy for Railway Engineering (NSARE) to produce a comprehensive skills-forecasting model to predict the number of additional skilled people required to either meet anticipated growth or to compensate for those leaving the industry[17].

Poor non-technical skills (NTS) amongst the rail operator workforce, including the inability to maintain concentration, anticipate risk and diagnose and solve problems, contribute to the majority of operational incidents that we investigate. We are encouraged by the recent efforts by Network Rail and some train operators to improve NTS in key roles and improve competence management.

Rail Accident Investigation Branch (RAIB)

Relationship between ORR and RAIB

RAIB's role[18] is to conduct 'no blame' investigations into rail accidents to identify factors that may have contributed to an incident or made its outcome worse and publish reports which can contain recommendations for industry improvement. Our role is to influence and monitor industry actions to implement RAIB recommendations and respond to RAIB accordingly.

We continue to strengthen our senior management-level dialogue with RAIB to improve understanding, emerging issues from incidents and investigations and consequently, how recommendations from RAIB reports are constructed and addressed.

We continue to work closely with RAIB colleagues from the early stages of their investigations to understand how industry weaknesses may be rectified and provide appropriate advice. This helps to ensure RAIB's recommendations are proportionate, effective and that we gain a strong insight into their purpose. More recently, we have worked more closely with RAIB when we are considering the industry's response to RAIB's recommendations.

Our inspectors liaise with RAIB investigators at all stages of the process, particularly if there is uncertainty about responses from end-implementers.

[17] See NSARE's *Forecasting the skills challenge* report, January 2013.
[18] For further details about RAIB's role - see: http://www.raib.gov.uk/about_us/index.cfm

We recognise that there is a small number of recommendations (43), amounting to 4% of the total published by RAIB, still in progress two years after publication of the RAIB reports and that some of the issues and original actions from end-implementers may no longer be relevant. We continue to work with the industry to close out these issues.

Rail Safety and Standards Board (RSSB)

Relationship between ORR and RSSB

We participate as an observer at RSSB's board, which annually reviews mainline rail safety risks to passengers, the workforce and public[19]. RSSB's board annually reviews and issues reports on the completeness of the data it collects[20].

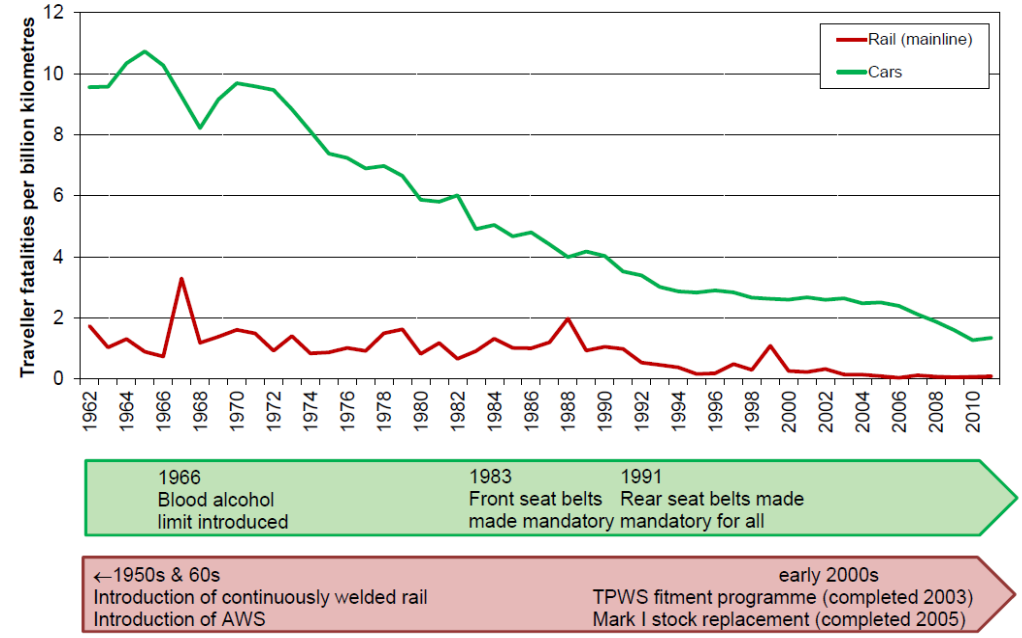
We use RSSB's Safety Risk Model and Precursor Indicator Model, and their other periodic safety reports, to help inform our view of the mainline industry's safety performance, including providing data for mandatory European reporting requirement. We pay particular attention to RSSB's annual quality health check reports, which help ensure the quality of data RSSB collects and uses, on behalf of the mainline industry, is reliable and improves over time.

We also participate in the various RSSB-facilitated groups that oversee or make decisions about the mainline industry's standards and research.

[19] See: http://www.rssb.co.uk/spr/reports/pages/default.aspx
[20] See: http://www.rssb.co.uk/Pages/Main.aspx

Section 5 – an overview of the mainline railway's health and safety performance in 2012-13

Rail remains a safer mode of transport than road, but both are growing ever safer because human factor risks are being increasingly designed-out, innovative technology and processes are being applied, lessons are being learnt from other industries; and the sustained cultural shift from a remedy and compensate cultures to an invest and prevent approach.

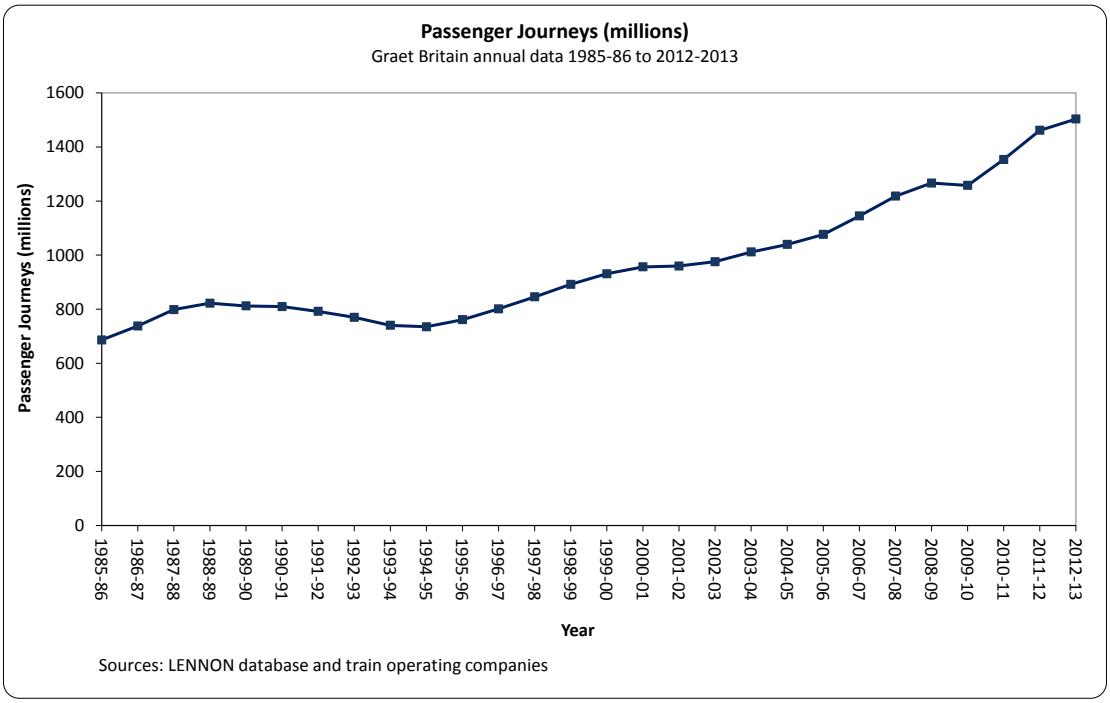


Source: RSSB

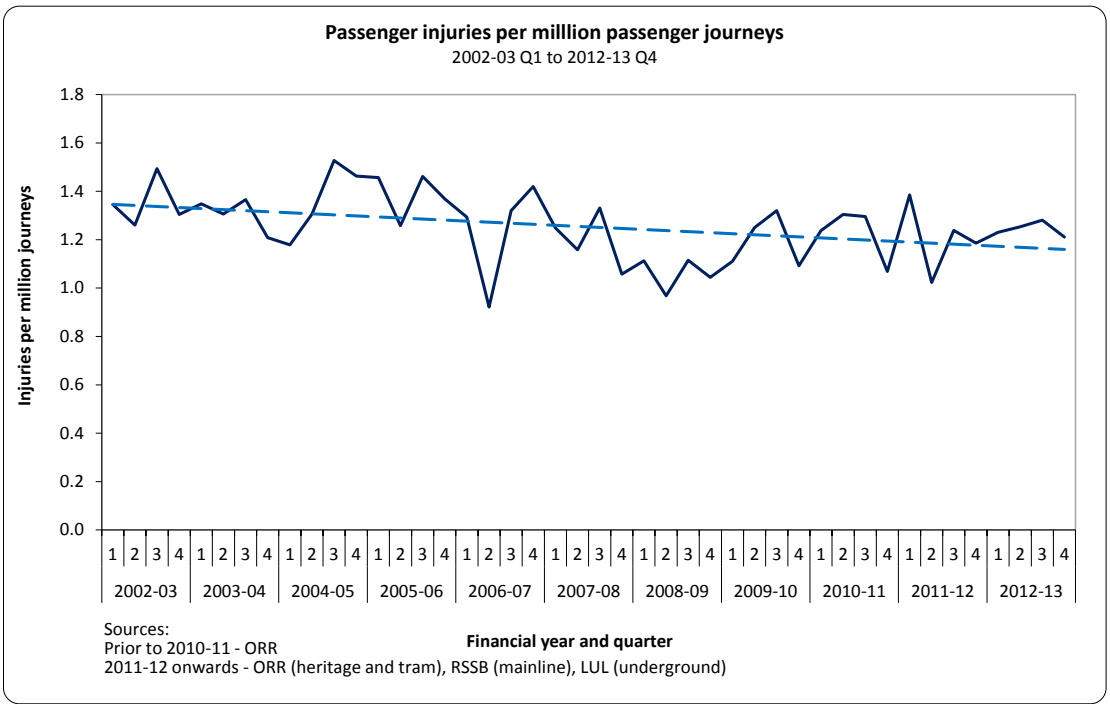
Passenger safety – overall picture

Passenger usage continues to grow and has increased by over 45% in the last decade, despite global macro-economic pressures.

The long- term trend in passenger injuries per million journeys has continued to decrease gradually since 2002-03.



Source: ORR data.

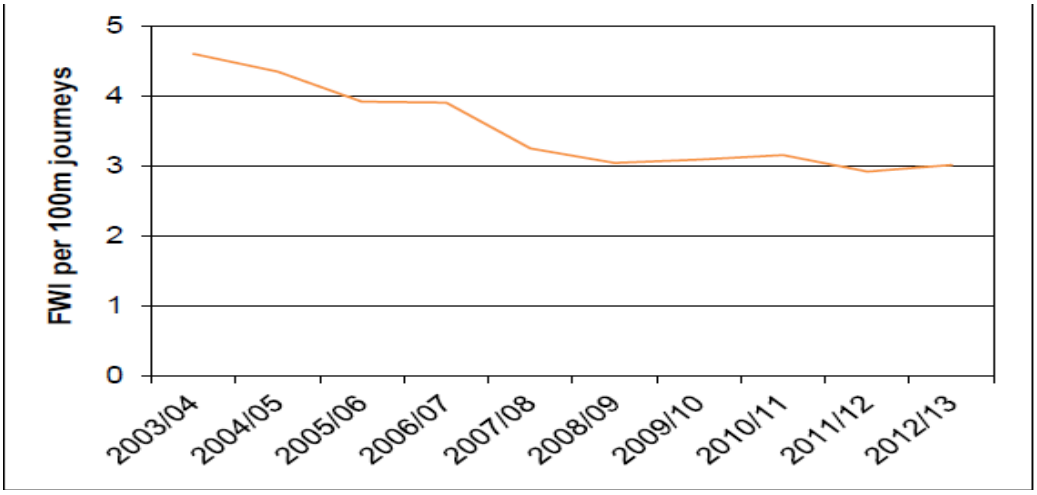


Source: ORR data.

Passenger fatalities and weighted injuries

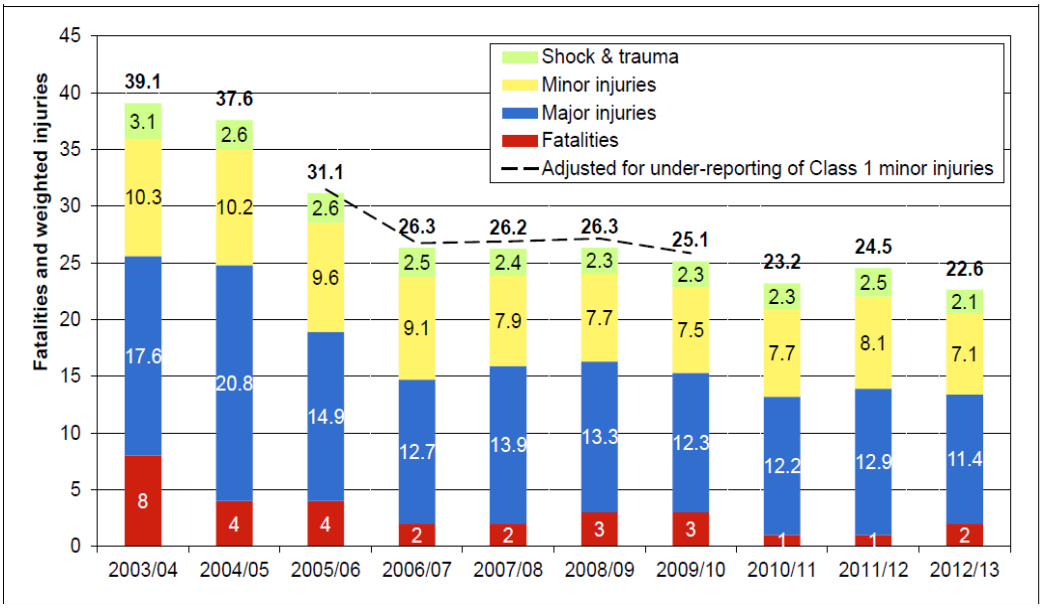
When normalised by increases in passenger journeys, the passenger fatalities and weighted injuries measure has remained broadly static since 2008-9, but normalised passenger harm since 2008-9, but normalised passenger harm increased 3% in 2012-13.

Normalised passenger fatalities and weighted injuries rate since 2003-4



Source: RSSB.

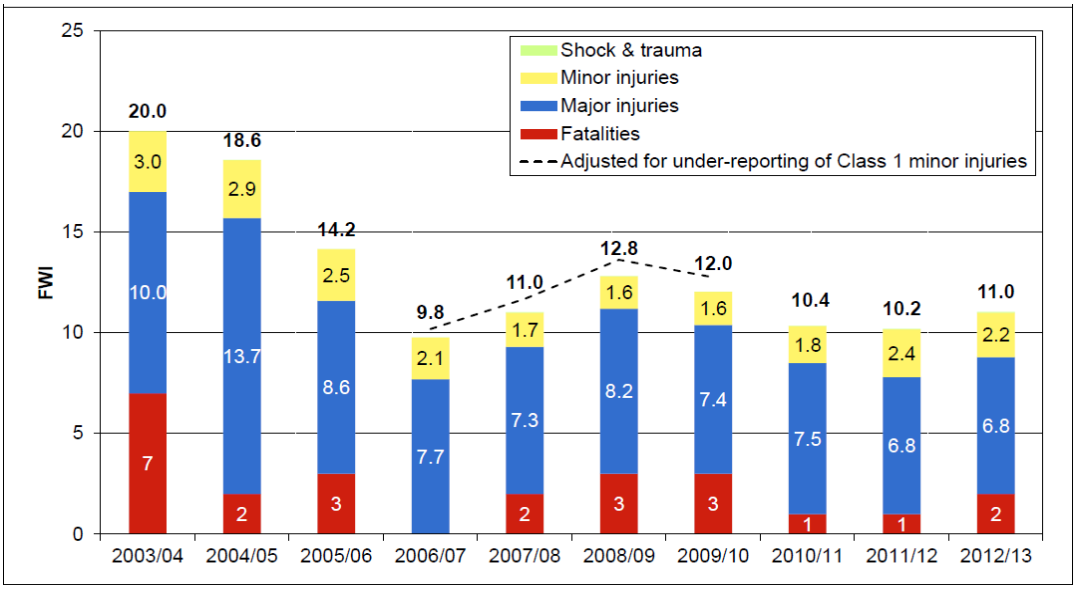
Workforce fatality and weighted injuries



Source: RSSB.

When normalised by workforce hours worked, workforce harm reduced 11% compared to 2011-12 which aligns with the gradual decline in workforce risk since 2006-7.

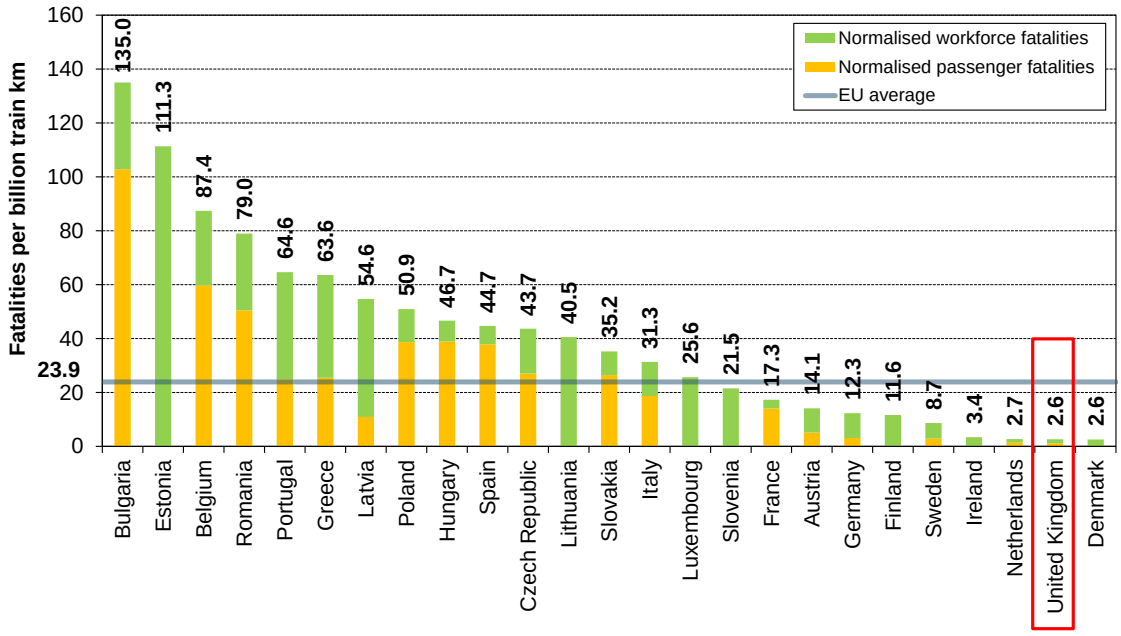
Trends in infrastructure worker fatalities and weighted injuries



Source: RSSB. Class 1 are minor injuries requiring employees to be off work for more than three days.

Since 2008-09, the infrastructure workers fatalities and weighed injury trend has improved, but this reversed in 2012-13; primarily because of the risk weighting associated with the two mainline infrastructure worker fatalities – *see section 3.*

Comparison of passenger and workforce fatality rates across the European Union railways, 2007-11



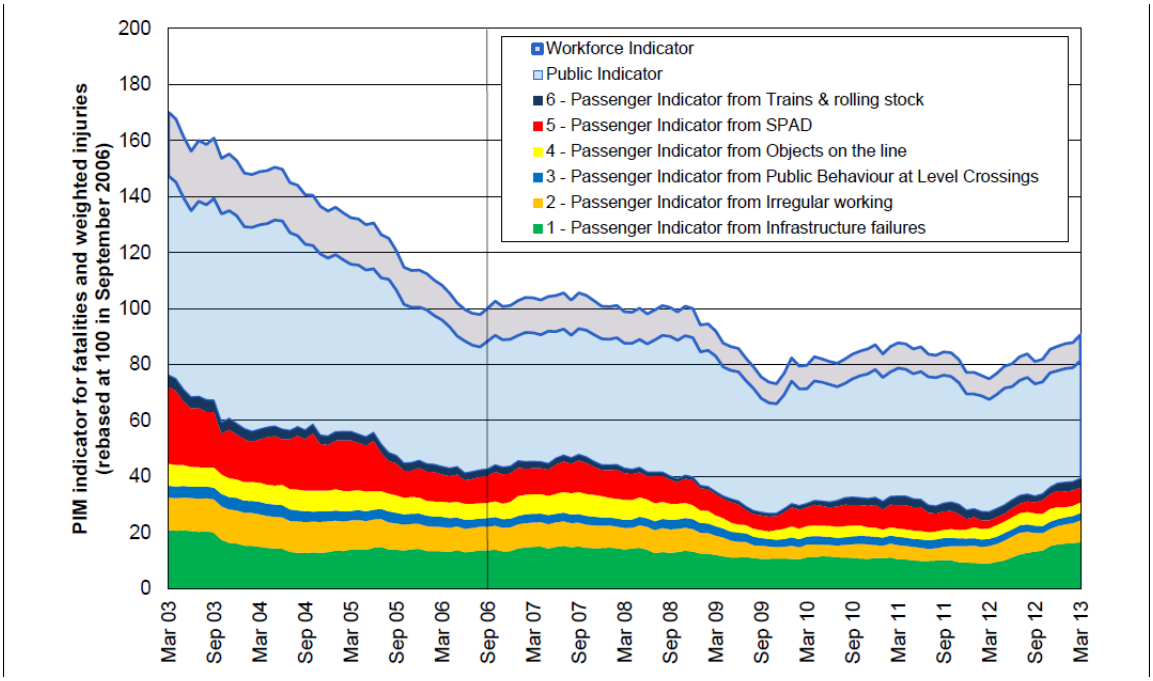
Source: RSSB analysis based on Eurostat data normalised by train kilometres. The analysis is based only

on train in motion data. The ERA is seeking to improved data quality by clarifying current disparities in different countries accident data definitions.

Overall, the UK ranks as joint-first safest with three other European countries based on the number of train safety incidents. The UK was best amongst all European rail countries in managing passenger and level crossing rail safety; third at managing employee safety; and fifth for trespass, according to ERA safety common safety indicators. The relatively small train safety datasets the ERA uses are susceptible to the heavy weighting applied to fatal rail accidents; Britain's last passenger train incident fatality was at Grayrigg in 2007.

The overarching picture on the mainline railway: Precursor Indicator Model (PIM)

The PIM measures the underlying risk from the potential to cause train accidents and therefore the potential to cause harm to passengers, members of the public, including users of level crossing motorists, on Britain's mainline railways.

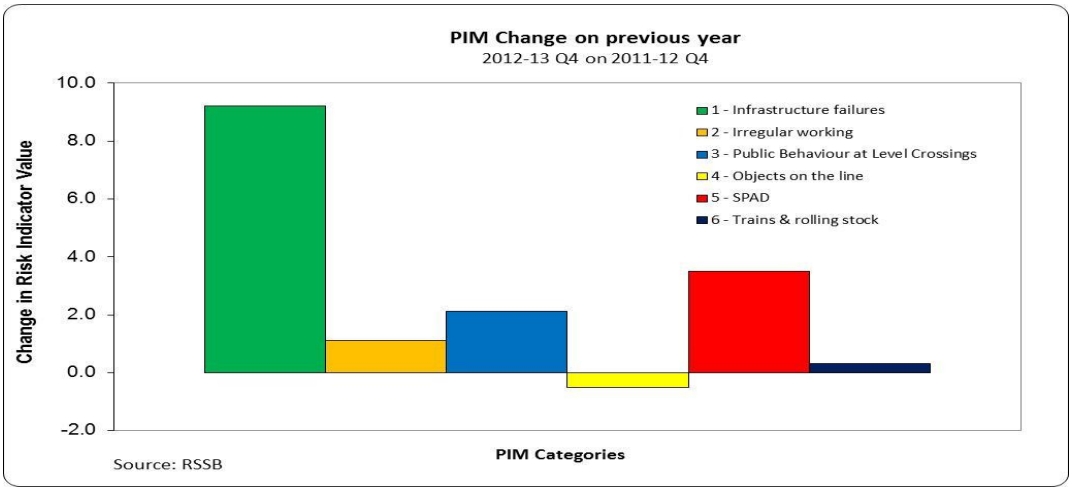


Source: RSSB PIM v. 7.5. (Up to March 2013)

It is important to view the PIM as an illustrative model; it shows changes in the potential risk based on historical data. The current PIM shows that train accident risk has remained at about the same level since September 2009 and has increased over 2012-13. The increase in risk over 2012-13 was primarily because of a significant increase in infrastructure failures, including landslips, flood damage and track faults. The poor condition of the infrastructure made it less resilient to heavy rain and severe weather. This lead to a 34% increase passenger train accident risk since December 2011.

With the exception of a fall in objects on the line events, all five other incident precursor elements of the PIM increased in 2012-13 compared to 2011-12; the second largest increase was SPAD risk, followed by public behaviour at level crossings, irregular working and train and rolling stock risks – *see comparative PIM precursor trend chart below*.

PIM precursor trends over 2012-13



Improving industry safety risk modelling

The changes in PIM scores because of mainline infrastructure failures in 2012-13 has helped to identify the limitations in how well the current PIM accurately models the risks from such precursors. As currently designed, the PIM is insufficiently sophisticated to show the susceptibility of lower-order infrastructure risk precursors to adverse weather.

We have continued to encourage the industry to improve safety risk modelling. RSSB is working to provide a greater understanding of the composition of their safety risk models and enable evaluation of route-related health and safety performance analysis, reflecting Network Rail's devolved structure.

Network Rail is progressing work using a technique known as 'Bow Tie' approach to risk analysis which focus effort on ensuring that risk controls are implemented, operating and effective. This is a significant step-change from focussing mainly on the PIM and historical incidents and accidents to model risk. The two models are complementary and together provide greater understanding and assurance of health and safety performance.

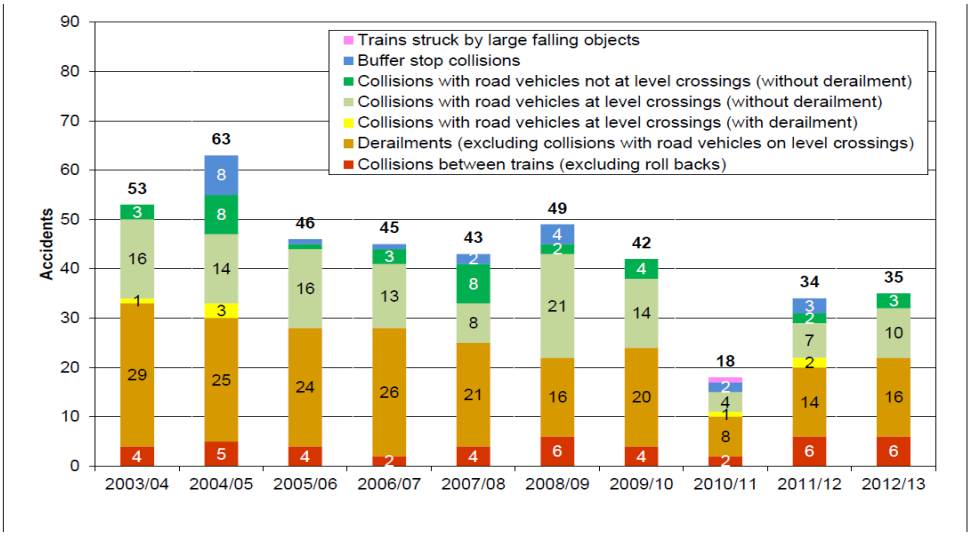
LUL continues to use the QRA approach to model system risk. The QRA is structured differently to the SRM; its strength is it draws out a much greater link to causal factors in the management chain. This enables it to assess the effectiveness of risk controls and provide assurance. It relies less on the historical incident information and more on the judgement of expert to identify what could go wrong in the future, and

how that may happen. The QRA tool is widely used to understand risk within the engineering and operations functions on a Line-basis.

We continue to work with LUL as they systematically review their risk health and safety models. LUL is looking at root-cause to improve their risk assessment processes and a second, producing a long-term update plan for the major accident risk models across all of TfL's operations.

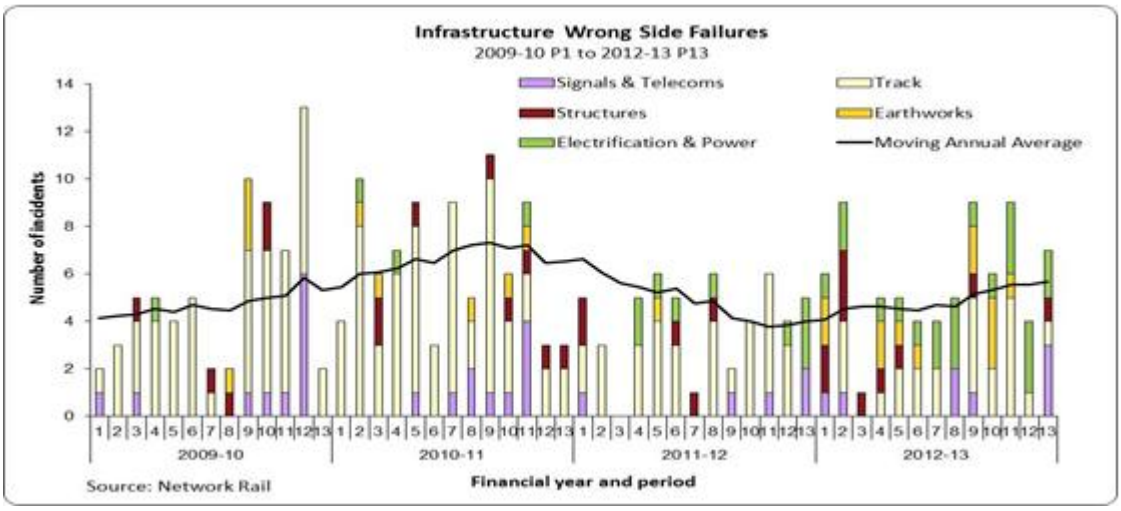
Trends in Potentially High Risk Train Accidents (PHRTAs)

There was one more PHRTA than in 2011-12; overall there has been a gradual downward trend since 2008-9. Derailments and 'collisions with road vehicles not causing a derailment' are the primary incidents that make up the PHRTA trend in 2012-13; this is similar to 2011-12.



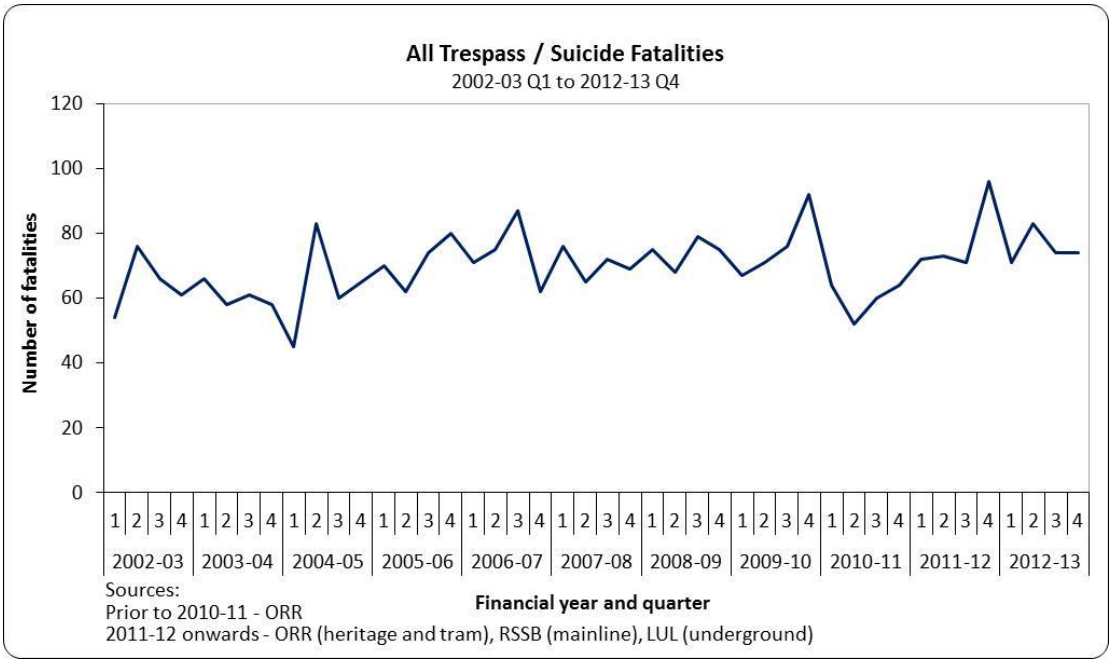
Wrong-side failures

The moving annual average of wrong-side failure incidents increased in 2012-13, ending at its highest level since early 2011-12, but still lower than 2010-11. All categories, with the exception of track failures, increased in 2012-13 compared to 2011-12: earthworks, electrification and power failures increased, which illustrates weaknesses in Network Rail's asset management. Several of these incidents also caused heavy impacts on service delivery.



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

All trespass and suicide fatalities



Source: ORR data.

There were 238 rail suicides in 2011-12 and 2012-13; the incident trend has varied annual but has gradually increased since 2002. This is a sensitive and sometimes over-looked area, so Network Rail should be commended for its sustained leadership and work with the Samaritans in trying to reduce potential suicide events. We will continue to ensure that all duty holders follow health and safety legislation that might reduce incidents of trespass and suicide.

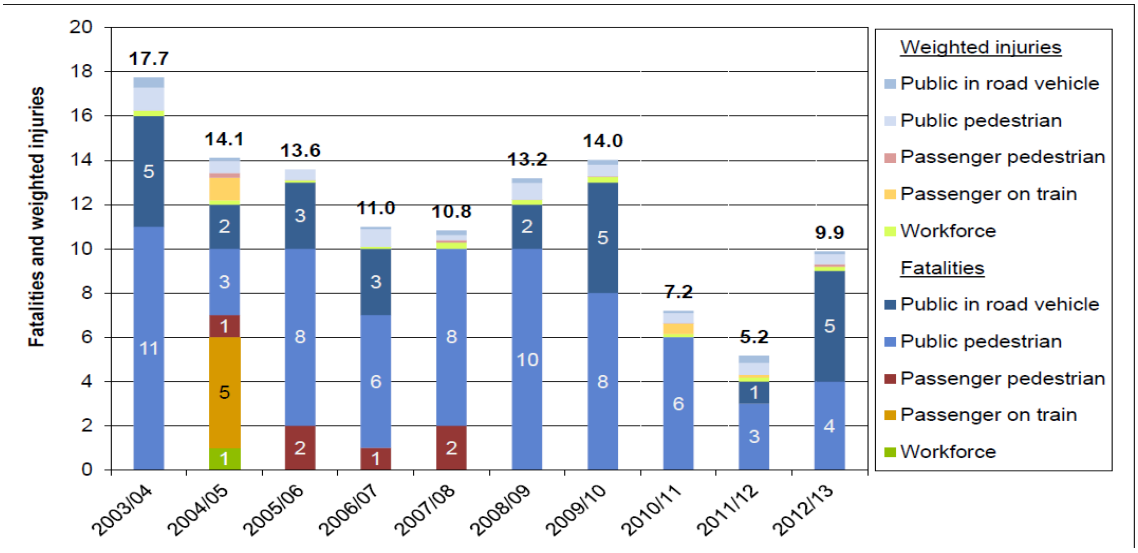
Level crossings

There were nine level crossing fatalities in 2012-13: four pedestrians and five occupants of road vehicles, which resulted in a 7% increase in the PIM measured level crossing risk, mostly attributed to unsafe user-

behaviour at crossings. This increase follows two years of improvements. The small datasets involved make analysis difficult but level crossings risk still represents about half of the potential catastrophic train accident risk. We hope the additional resourcing proposed for CP5 will help build on the improvements in level crossing risk reduction seen in 2010-12.

Network Rail reports that up until April 2013, its had reduced level crossing risk by 22.8%, putting it on-target to meet its 25% risk reduction target by the end of CP4. In CP5, we expect Network Rail to maximise the risk reduction at level crossings using funding provided by the final determination.

Harm at level crossings (excluding suicides)



Source: RSSB

Data quality

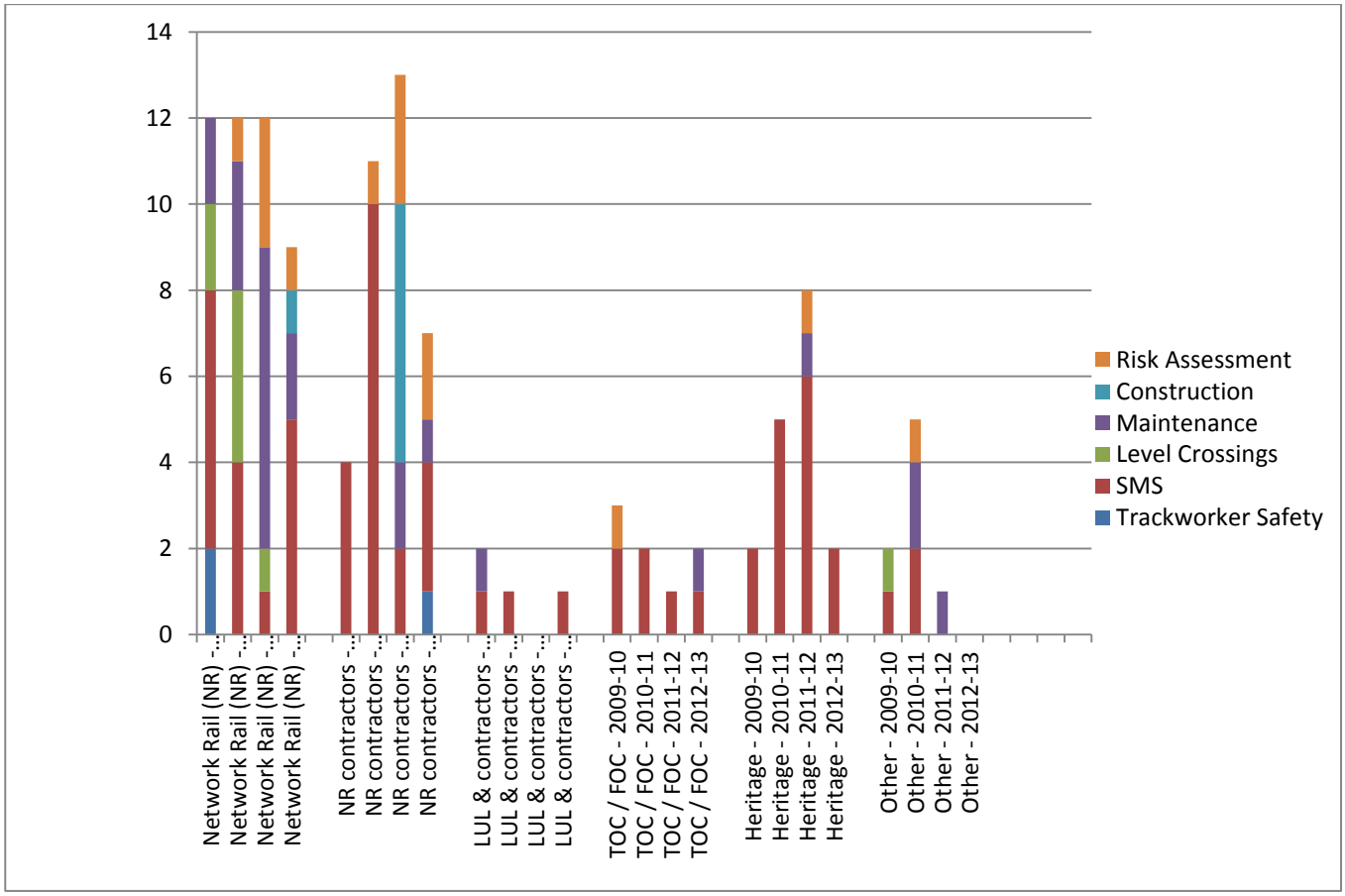
RSSB annually uses different tools to health-check the data it collects from its mainline members to ensure reliability. Its 2012 assessments found a slight deterioration in the data quality rate to 88% from 90% in 2011; something they will need to seriously work on to review: seven of its stakeholders improved; eight worsened; and 15-companies maintained similar data quality.

Annex 1

Enforcement activity

In most cases we secure improvements in health and safety for passengers, the workforce and public through evidence-based advice and encouragement to duty holders to improve and adapt their risk management. But occasionally we use our formal powers to ensure compliance with the law or deal with immediate risk. Mostly, we use enforcement notices to stop an activity involving serious risk or to rectify serious gaps in risk control. Our enforcement policy statement sets out how we ensure rigour and consistency in our enforcement decisions by using our enforcement management model[21].

Improvement notices in 2012-13[22]



Source: ORR.

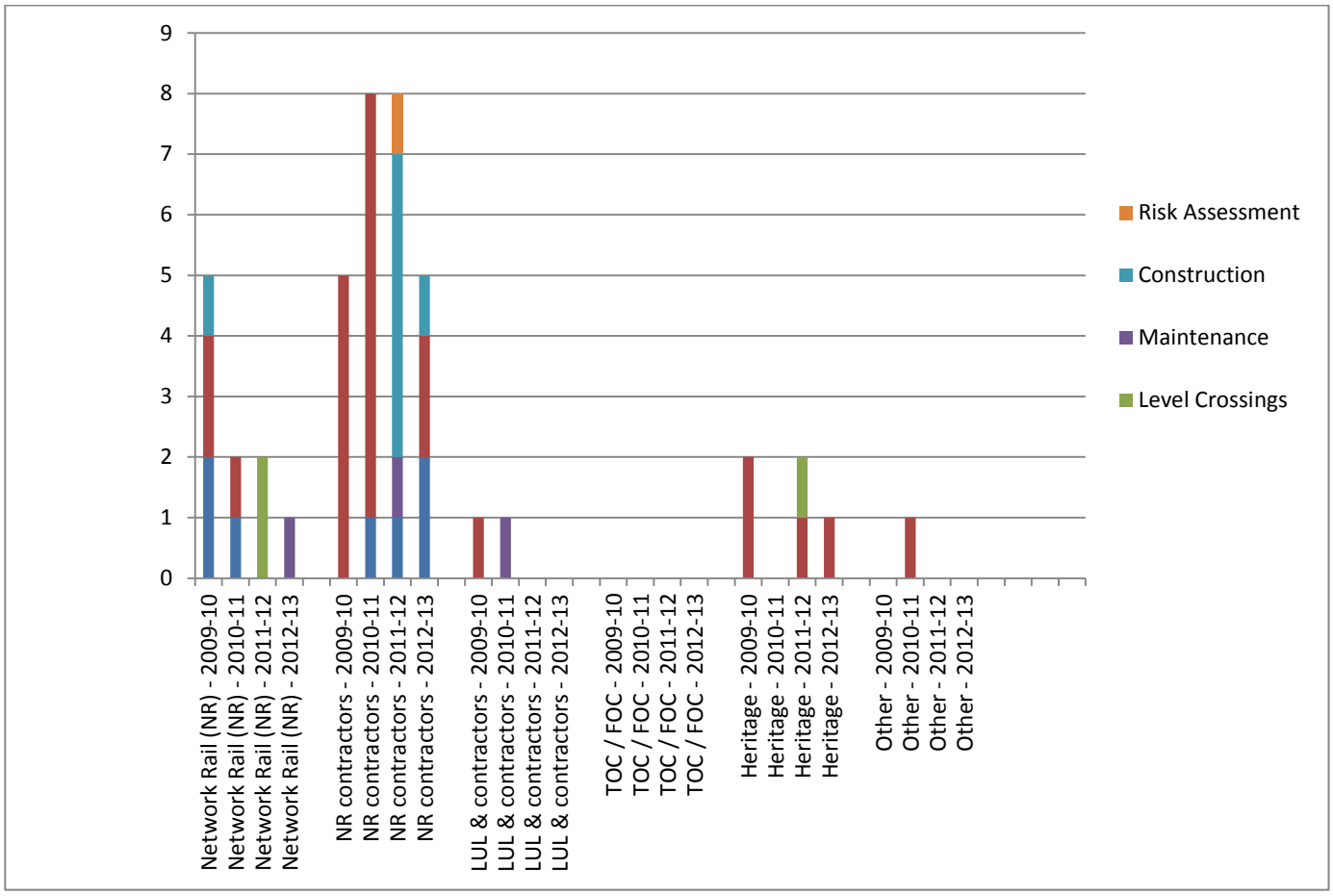
[21] http://www.rail-reg.gov.uk/server/show/nav.1120
[22] For a complete list see: http://www.rail-reg.gov.uk/server/show/nav.1283

SMS = Safety Management Model; TOC = train operating company; and FOC = freight operating company.

Key specific reasons for improvement notices in 2012-13, included failures to:

- **provide suitable an**d sufficient risk assessment to manage earthworks and landslip failures during adverse weather and provide a process to manage the incomplete visual examination of structure;
- ensure risk control measures used to prevent risks to trains running on adjacent open lines from on-track vehicles, or to provide effective risk assessments for employees and contractors carrying out work on or near the railway where trains are running;
- ensure that access to the dangerous parts of on-track machinery is adequately prevented; and
- comply with regulations, included the Electricity at Work Regulations, 1989.

Prohibition notices in 2012-13[23]



Source: ORR.

SMS = Safety Management Model; TOC = train operating company; and FOC = freight operating company.

[23] For a complete list see: http://www.rail-reg.gov.uk/server/show/nav.1585

Key specific reasons for prohibition notices in 2012-13 included failures to:

- manage a rail lifting operation using road-rail vehicles, and separately to manage lifting operations to prevent fouling of the adjacent line, and the unloading of road-rail vehicles;
- manage risks at a heritage workshop and the potential for a platform canopy collapse; and
- manage risks to worker while erecting scaffolding over a river.

Prosecutions

We concluded 11-successful prosecutions for serious breaches of health and safety law[24] against 13-companies and one individual with fines totalling around £5.5m.

Companies prosecuted included Network Rail and two mainline train operating companies, heritage organisations, Transport for London and contractors working for railways companies.

Company	Issue	Outcome
Network Rail Infrastructure Ltd	Grayrigg derailment in 2007	£4,000,000 fine. Costs £118,052.
Frank Smith (individual)	Train overrun at station.	£400 fine. Costs £500.
Network Rail Infrastructure Ltd	Failure to protect the safety of track workers during 'red zone' (with train movements) working activities.	£150,000 fine. Costs £32,500.
Network Rail Infrastructure Ltd	Failure to address concerns about sighting at a level crossing, resulting in the death of pedestrian using a footpath.	£356,250 fine. Costs £19,485.
Southeastern	Failure of a train's braking system causing it to overrun for more than three miles.	£65,000 fine. Costs £22,589.
Telford Steam Railway	Member of staff suffered extensive injuries by being struck by length of rail being moved from a wagon to the trackside by a crane.	£5,000 fine. Costs £3,000.
Wensleydale Railway	Collision between a train and a car at a level crossing.	£4,000 fine. Costs £4,000.

[24] See: http://www.rail-reg.gov.uk/server/show/nav.1848

Company	Issue	Outcome
English, Welsh and Scottish Railways International (EWSI)	Failure to adequately prevent trespass at a depot resulting in fatality and serious injuries to teenage boys.	£180,000 fine. Costs £59,554.
Network Rail Infrastructure Ltd	Track worker struck by train diverted on to a line on which he was using as a position of safety.	£100,000 fine. Costs £25,000.
London Underground Limited	Runaway engineering train that travelled out of control for over four miles on London's Northern Line.	£100,000 fine. Costs £14,691.
Tube Lines Limited		£100,000 fine. Costs £14,691.
Schweerbau GMBH		£100,000 fine. Costs £14,691.
Network Rail Infrastructure Ltd	Fatality of maintenance worker trapped due to electrical fault on a rail engineering machine.	£200,000 fine. Costs £140,000.
GT Railway Maintenance Ltd		£112,500 fine. Costs £40,000.

Annex 2

ORR's health and safety plans for 2013-14

ORR's key strategic health and safety objective, as set out in our 2013-14 business plan,[25] is:

Drive for a safer railway: Enforce the law and ensure that the industry delivers continuous improvement in the health and safety of passengers, the workforce and public, by achieving excellence in health and safety culture, management and risk control.

Our activities in 2013-13 will deliver this objective will build on our findings from our 2012-13 inspection work and continue to be informed by our 2012 health and safety strategy.[26] In particular we will focus on:

- reviewing the industry response to safety issues;
- further extending the use of RM3 across industry sectors;
- how well the industry is managing safety risks from infrastructure, including: structures, earthworks and track safety, responding to changes in SRM/PIM model trends.
- ensure duty holders protect the safety of their workers;
- investigating incidents and accidents;
- taking enforcement action where required;
- overseeing the industry delivery of EU Common Safety Methods;
- delivering our statutory duties, for example, level crossing orders, safety certificates and authorisations and train driving licences; and
- continuing to promote greater occupational health management across the railway industry.

The ORR health and safety resource, measured as full-time equivalents (FTEs), reduced from 150 FTEs in 2008-09 to 112 in 2013-14.

[25] See: http://www.rail-reg.gov.uk/upload/pdf/business-plan-2013-14.pdf.
[26] See: http://www.rail-reg.gov.uk/server/show/nav.1243.