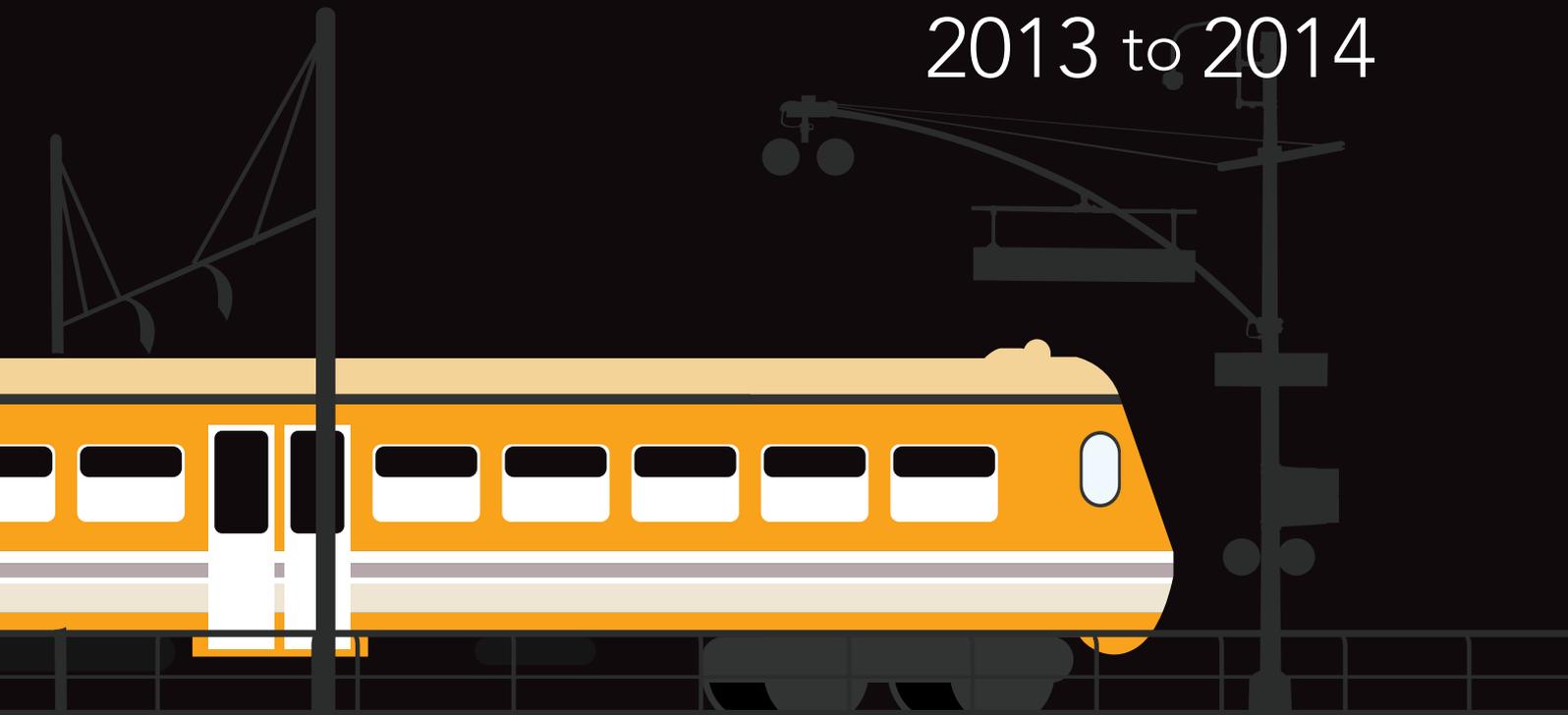


# Annual **Safety** Report

2013 to 2014







OFFICE OF THE

**national rail**  
**safety regulator**

# Annual **Safety** Report

2013 to 2014



## Abbreviations

<b>ARTC</b>	Australian Rail Track Corporation
<b>ATSB</b>	Australian Transport Safety Bureau
<b>CITS</b>	Chief Investigator Transport Safety (Victoria)
<b>DIRN</b>	Defined Interstate Rail Network
<b>ISO</b>	International Standards Organisation
<b>ITSR</b>	Independent Transport Safety Regulator (NSW)
<b>MRA</b>	Metropolitan Rail Area (Sydney)
<b>ONRSR</b>	Office of the National Rail Safety Regulator
<b>OTSI</b>	Office of Transport Safety Investigations (NSW)
<b>RISSB</b>	Rail Industry Safety and Standards Board (Australia)
<b>RRV</b>	Road/rail vehicle
<b>RSNL</b>	Rail Safety National Law 2012
<b>SPAD</b>	Signal passed at danger (without authority)
<b>TSV</b>	Transport Safety Victoria

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## Executive summary

The *Annual Safety Report 2013 to 2014* is the second annual safety report produced by the Office of the National Rail Safety Regulator (ONRSR). It summarises the safety performance of railways administered under the Rail Safety National Law (RSNL), namely those of South Australia, New South Wales, Tasmania and Northern Territory and the majority of railways in Victoria.

The foundation of this report is notifiable occurrence data which is drawn from incident reports submitted by rail transport operators in accordance with section 121 of the RSNL. The first part of the analysis considers rail safety performance in terms of the injuries and fatalities associated with rail operations. In 2013 to 2014 there were 93 notified fatalities on railways regulated under the RSNL. These consisted of:

- 84 acts of suspected suicide or trespass
- three passenger fatalities (all fall-related; two involving trains at the train-platform interface)
- five fatalities at level crossings (four pedestrians and one cyclist)
- one rail safety worker fatality associated with ill-health.

The report also considers hazardous events on railways that can lead directly to injury, such as train derailments, train collisions and fires on rail premises. In this regard the ONRSR notes some improvements in key areas of safety risk. Examples include a decrease over time in the number of arson-related fires on passenger trains, and a marked drop in level crossing collisions in 2013 to 2014 across several states. However, the findings also highlight several areas of concern, including the continued high number of train incursions into worksites and the high number of asset-related failures leading to train derailments.

The occurrence-based findings of this report support the continuation of the ONRSR's current set of regulatory priorities into the 2014 to 2015 financial year. These are:

- Public safety in underground railways
- Rail transport operator arrangements for contractors working on their behalf
- Engineering management systems for significant rail projects
- Rail transport operator approaches to safeworking
- Safety management system compliance including human factors obligations
- Drug and alcohol testing and an assessment of its overall effectiveness
- Development of asset management guidance
- Level crossing safety
- Education and compliance enforcement of road/rail vehicle safety
- Development of a safety management system maturity tool.

Beyond the immediate findings summarised in this report, the ONRSR continues to engage with industry on several important strategic and national priorities. These include harmonising and improving the quality of rail safety standards, the development of a quantitative safety risk model to inform standards development and risk-based decision making, and guidance on the ONRSR's expectations for major projects which provide the ideal opportunity to eliminate or minimise safety risks at the design stage of railway operations.

# 1. Regulatory outlook

The publication of the Annual Safety Report is a key milestone in the ONRSR calendar. This report brings together the rail safety occurrence data reported by the rail industry in the 2013 to 2014 financial year, and summarises our analysis and interpretation of the data from a safety risk perspective. Rail safety data is a key input to the ONRSR's regulatory planning and vital to the ONRSR's efforts to improve safety.

The *Annual Safety Report 2012 to 2013* was our first significant public report on safety performance and the report had two key messages.

The first message was that the Australian rail industry needs a better understanding of quantitative risk. It is our view that this understanding will be significantly enhanced through the development of a robust industry-led safety risk model. While historical data informs our understanding of risk, it is only via thorough and systematic modelling that we can identify and quantify root causes. Such analysis will enable the ONRSR and industry to identify the areas where further safety improvements are required to meet the legal obligation to ensure safety so far as is reasonably practicable. The current absence of such a model is limiting the ONRSR's and industry's effective allocation of resources to the most important safety priorities. We note that the Rail Industry Safety and Standards Board (RISSB) has been working to establish such a model and while we acknowledge the effort applied, the need still remains to be satisfied.

The second message was identification of priorities for operational regulation and safety improvement initiatives during the 2013 to 2014 financial year.

This regulatory outlook reflects on the national priorities we set for the 2013 to 2014 financial year, describes the activities that we have undertaken, and identifies activities that will continue during the 2014 to 2015 financial year to address areas of continuing concern. We note that changes to the overall risk profile of the railway cannot be achieved overnight, so it would be expected that many of the priorities from 2013 to 2014 will remain relevant for some time to come.

## 1.1. ONRSR PRIORITIES FOR 2013 TO 2014

### i. PUBLIC SAFETY IN UNDERGROUND COMMUTER RAILWAYS

The contained nature of underground railways means certain events, such as an underground fire, can have devastating consequences. Rail tunnels in Australia range considerably in age and the safety features that exist also vary considerably. Modern tunnels utilise sophisticated fire detection and smoke management technology while ageing infrastructure does not, and retrofitting is not always feasible. Our regulatory approach to tunnels is therefore scaled according to the nature of the asset and type of operation.

The development of the Safety Management System (SMS) maturity tool was scoped to standardise the ONRSR's approach to compliance activities and provide a consistent approach for rail safety officers to apply. The ONRSR has made progress in developing this tool. Once fully developed, the intention of the SMS maturity tool is that it can be applied to a wide range of strategically important safety issues. Its application to safety in underground commuter railways will be a priority for the coming year.

## **ii. RAIL TRANSPORT OPERATOR ARRANGEMENTS FOR CONTRACTORS UNDERTAKING WORK ON THEIR BEHALF**

The ONRSR remains concerned with the management and delegation of safety responsibilities, including how rail transport operators maintain effective management and control of railway operations. This becomes increasingly complex as the ways in which organisations structure and organise their businesses evolve. The RSNL does not permit the contracting out of parties' legal obligations and we have reviewed our approach to audit and compliance activities to ensure appropriate checks of rail transport operators are incorporated. The ONRSR's activity in this area during 2013–14 resulted in 12 non-conformance reports being issued to non-accredited contractors.

This topic will remain a regular feature of our work program.

## **iii. ENGINEERING MANAGEMENT SYSTEMS FOR SIGNIFICANT RAIL PROJECTS, INCLUDING FOCUS ON INTEGRATION OF HUMAN FACTORS CONSIDERATION INTO THE DESIGN**

The Australian rail industry is undertaking sizeable investment in new and enhanced assets, many of which promise improved safety or introduce new sources of risk. Such projects are typically delivered over many years, and the ONRSR expects that safety will be integral to the lifecycle of these projects to ensure that RSNL obligations are met and safety is ensured so far as is reasonably practicable. During 2013–14 we have included audit and compliance activity to target significant rail projects. For example, in Victoria, four audits and compliance inspections were conducted on the Regional Rail Link project.

To deliver confidence that major projects will deliver safe outcomes, in consultation with industry the ONRSR has drafted a Major Projects Guideline which will be finalised and published on the ONRSR website by the end of 2014. The ONRSR has initially identified seven major projects — the North West Rail Link (New South Wales), Sydney Central Business District and South East Light Rail, Inland Rail (Melbourne to Brisbane), Cranbourne-Pakenham Rail Corridor Project (Victoria), Canberra Light Rail, the Intercity Trainset replacement (New South Wales) and the Advanced Train Management System (national). It is anticipated that additional projects not initially flagged by the ONRSR will embrace the principles of this guideline in undertaking their work and in engaging with the ONRSR.

## **iv. RAIL TRANSPORT OPERATOR APPROACHES TO SAFEWORKING**

In the *Annual Safety Report 2012 to 2013* the ONRSR noted the high number of safeworking irregularities relating to train incursions into worksites. Safeworking continues to be a focus for the ONRSR. We have taken a multi-faceted approach to dealing with safeworking incidents.

During 2013–14 the examination of safeworking practice was a priority within our audit and compliance work program. We specifically targeted the competence and training of rail safety workers, and analysed voice recordings of safety critical communications to ensure compliance with established protocols. We also prioritised our compliance activities to increase the number of in-field inspections to assess the implementation of safeworking practices, focusing on worksite protection measures.

Control centre inspections were carried out to ensure that actual work practices reflected documented procedural practices. In cases where the ONRSR was not satisfied with the initial response of a rail transport operator to the findings from such inspections, follow up inspections were carried out to reinforce the importance the ONRSR places on these matters. The ONRSR's staff also ensured that concerns held in this area were communicated to an appropriate senior level within the organisations concerned.

The ONRSR responded to a number of significant safeworking incidents by attending the incident site and initiating our own investigation into the causes. There are several ongoing investigations that have the potential to lead to prosecution of organisations and/or individuals under the RSNL. Decisions to invest the time and resources necessary to pursue a potential prosecution are not taken lightly — but this is reflective of the emphasis the ONRSR places on driving improvement in safety by reducing the number and severity of safeworking incidents.

Safeworking remains a high priority for the ONRSR, and will remain a regular feature of our audit and compliance activities. Specifically, we will ask for greater information on certain types of worksite protection incidents to improve our understanding of these events, and to allow us to better target our work.

#### **v. SAFETY MANAGEMENT SYSTEM COMPLIANCE INCLUDING APPROACHES TO HUMAN FACTORS OBLIGATIONS**

The consideration of human factors in safety management is an area we believe requires further work. We also recognise that integrating human factors early into major projects is critical to ensure the design of assets adequately caters for their interactions with people. Our Major Projects Guideline incorporates requirements for human factors to be integral to all phases of an asset lifecycle.

We have commenced a safety improvement project in which our human factors specialists meet with selected rail transport operators in South Australia, Tasmania, New South Wales and Victoria to discuss their approaches to human factors and provide them with practical education and advice on how to meet the legislated human factors requirements. This project encourages knowledge sharing across industry.

#### **vi. DRUG AND ALCOHOL TESTING AND AN ASSESSMENT OF ITS OVERALL EFFECTIVENESS**

It is a legal requirement that rail safety workers are free from drugs and alcohol while at work. Drug and alcohol management plans of rail transport operators go a long way towards managing the very small percentage of workers who attempt to engage in rail safety work while under the influence. The ONRSR is also obliged to implement its own drug and alcohol testing program which incorporates post-incident, targeted and random testing. We prioritise our testing based on intelligence we receive, and in 2013–14 undertook testing at a number of sites including in the outback where access is limited.

During 2013–14 the ONRSR's testing commenced in South Australia and Tasmania. During 2014–15 we expect to extend our testing to New South Wales, Northern Territory and Victoria.

The legislative requirements for drug and alcohol, and its testing, vary across the jurisdictions. In 2015 the ONRSR will commence work to report options for a consistent regime to Ministers in 2017.

#### **vii. DEVELOPMENT OF ASSET MANAGEMENT GUIDANCE**

Good asset management is an important requirement of a rail transport operator's SMS. The business benefits of asset management go far beyond improved safety, extending to operational and financial benefits. The publication of ISO 55000 Asset Management by the International Standards Organisation<sup>1</sup> has also raised the profile of asset management across the industry.

To support the work of industry in asset management the ONRSR established a safety improvement project and formed an industry reference group to contribute to the development of an Asset Management Guideline. We have focused the guideline on the requirements of the RSNL, ensuring it is scalable and appropriate for use by all rail organisations. It will be used to promote

<sup>1</sup> International Standards Organisation, *ISO 55000. Asset management – Overview, principles and terminology*, ISO, Switzerland, March 2014

the ongoing safety of rail infrastructure and rolling stock assets and complement, rather than replace, standards like ISO 55000. This guideline will be published in late 2014 and we expect all rail transport operators to review it and identify what elements they should adopt in their own practice. Asset management will continue to be a feature of our audit and compliance activity and we will use our guideline as a yard stick of industry performance in this area.

#### **viii. LEVEL CROSSING SAFETY**

Industry and state and territory governments are taking a leading role in addressing safety risks at level crossings and the ONRSR is providing its full support.

A number of jurisdictions have level crossing committees, and the ONRSR provides regular occurrence data and information to assist these committees in their work to improve level crossing safety locally.

During 2013-2014 the ONRSR has supported the Rail Centre for Cooperative Research (Rail CRC) and subsequently the Australasian Centre for Rail Innovation (ACRI), to develop alternative technology level crossings, and it is hoped this research will provide level crossing safety at a reduced cost.

As a minimum, we also expect all rail infrastructure managers to, have interface agreements in place for their level crossing assets and to develop or review their level crossing improvement plans. These plans should be based on the reasonable practicability of closing the level crossing or upgrading controls to improve safety.

The ONRSR is currently developing a Level Crossing Policy and Strategy which will clearly articulate the Regulator's position and expectations, and will support work being done by the new National Level Crossing Safety Committee and local committees.

#### **ix. EDUCATION AND COMPLIANCE ENFORCEMENT OF ROAD/RAIL VEHICLE SAFETY**

Road/rail vehicle (RRV) safety has been a key focus for the ONRSR in the past 12 months. We have built on work undertaken previously in New South Wales and by RISSB to hold six workshops around the country covering both metropolitan and regional areas. Following this we surveyed 109 operators to help understand the numbers and diversity of RRVs in use today. We also published the first ONRSR Safety Bulletin on RRV safety to highlight our concerns.

Inspections of RRV management and operations have been undertaken, with an initial focus in Tasmania. These inspections have highlighted concerns with the level of attention that is being given to the design and specification of these vehicles as railway vehicles. Also of concern is the gap between training and competency assessment of rail safety workers and the specific vehicles that are being used. In the coming year our compliance strategy will involve undertaking compliance inspections, focusing on the specification, maintenance and competency assessment associated with RRVs, with a priority given to operators of Type II (9B) RRVs and those rail transport operators who have purchased second hand equipment.

We recognise the good work that parts of industry have already undertaken in RRV safety, and our compliance program will be responsive to organisations that have demonstrated leadership in improving RRV safety. A number of organisations have shown great leadership in this area and, in some cases, taken proactive steps to modify RRVs to improve safety. We also recognise that RISSB is writing a standard for RRV safety. This standard requires further work to make it add the value required and we believe it is a necessary step in national harmonisation. We will continue to support the development of this standard.

## **x. SAFETY MANAGEMENT SYSTEM (SMS) MATURITY TOOL**

With the bringing together of multiple jurisdictions under the ONRSR, there is now an opportunity to develop a more standardised and consistent approach to oversight activities. The ONRSR has a corporate goal to 'develop an SMS maturity tool methodology for rail safety officers to consistently apply', to help the ONRSR and industry move beyond compliance. A safety improvement project was established to support SMS assessment, and as a result the ONRSR has now developed the following tools:

- the SMS wheel – a conceptual model of layered SMS elements based on the RSNL and structured around core organising principles of a safety management system
- the SMS maturity tool guide – a document which expands each wheel element with guidance, and examples of compliance, SMS capability, and performance outcomes
- the iAuditor app – an application for mobile devices to plan and conduct compliance activities as well as produce standardised reports.

A field trial with selected rail transport operators is underway to evaluate the tools and provide feedback for any future development.

## **1.2. FOCUS AREAS FOR 2014 TO 2015**

Our initial analysis of data for 2013–14 generally supports last year's priorities remaining a focus for the coming year. Our focus on RRV safety will remain until we see a quality standard and safety improvements in this area. The expansion of the ONRSR coverage into Victoria gives level crossings a larger exposure and renews our efforts in level crossing safety, and the high number of asset-related failures, such as many of the notified derailments, reinforces our commitment to quality asset management.

A key focus moving forward is improving the quality and harmonisation of standards in the rail industry. We will continue to encourage industry to develop risk-based standards which requires the development and implementation of a quantitative safety risk model, one of the benefits of which is to drive standard prioritisation and focus. We will also seek to identify where deficiencies exist with current standards and where focus by industry is required.

Looking forward nationally, the commitment to new major infrastructure projects runs to tens of billions of dollars over the coming years and the ONRSR will resource itself to engage with these projects as they work to eliminate or reduce safety risks in the design phase. Our Major Projects Guideline should be of significant safety and financial benefit to funding bodies and future operators.

# 2. Introduction



## 2.1. OFFICE OF THE NATIONAL RAIL SAFETY REGULATOR

### THE ONRSR'S FUNCTIONS

The functions of the ONRSR are legislated in the RSNL and described in the ONRSR's *Statement of Intent*.<sup>2</sup> In summary they are to:

- improve rail safety for the Australian community
- decrease the regulatory burden on the rail industry
- provide seamless national safety regulation
- enforce regulatory compliance.

### THE ONRSR'S ROLE

The ONRSR performs its functions under a co-regulatory framework, in which responsibility for regulation and safety is shared between the ONRSR and industry. The principle of shared responsibility is underpinned by specific duties defined under the RSNL. In particular, section 52 of the RSNL states a rail transport operator must ensure, so far as is reasonably practicable, the safety of railway operations. This duty is consistent with the principles of safety risk management generally — those responsible for safety risks must ensure measures are in place to protect people from the harm that may arise from those risks.

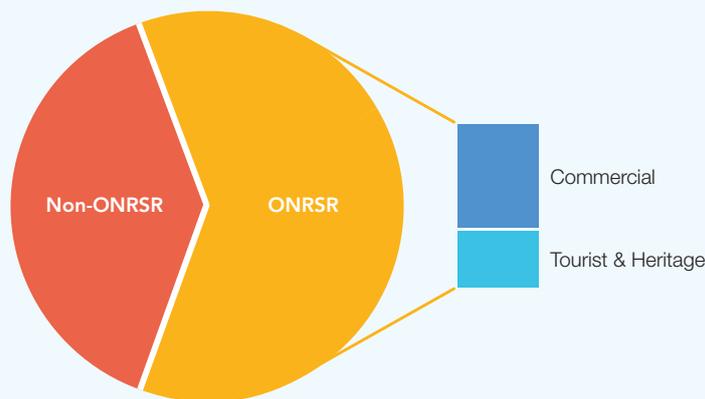
### THE ONRSR'S COVERAGE

At the start of the 2013 to 2014 financial year the ONRSR had responsibility for rail safety regulation in the jurisdictions of South Australia, New South Wales, Tasmania and Northern Territory.

The ONRSR's coverage expanded on 19 May 2014 when the RSNL was enacted in Victoria. From that date, the operations of 45 rail transport operators in Victoria came under the regulatory authority and responsibility of the ONRSR. However, Victorian light rail operators and some tourist and heritage operators continue to be regulated under local Victorian law, administered by TSV.

The scope of the ONRSR's regulatory responsibility as of 30 June 2014 is shown in Figure 1. Of the 207 accredited rail transport operators within Australia, 126 (61%) were wholly or partly administered by the ONRSR. These operations collectively account for just over 50% of track length and train kilometres (km) travelled nationally.<sup>3</sup>

In addition to accredited railways, the ONRSR has registered 144 rail infrastructure managers of private sidings. They are exempt from the requirement to be accredited in relation to rail infrastructure-related operations in these sidings, but they must be registered or hold an exemption from registration. They operate under the same safety duties that apply to accredited rail transport operators.



**Figure 1: Proportion of rail transport operators in Australia accredited by the ONRSR at 30 June 2014**

Non-ONRSR includes Victorian operators administered under Victorian local law.

2 Office of the National Rail Safety Regulator, *Statement of Intent 2014 to 2017*, ONRSR, Adelaide, July 2014

3 Based on latest available figures for RSNL and non-RSNL operations

## 2.2. RAIL SAFETY REGULATION IN PRACTICE

The RSNL defines the functions of the ONRSR but does not describe the way in which the ONRSR will deliver them. The ONRSR's aim, as defined in its Corporate Plan<sup>4</sup> and Regulatory Approach<sup>5</sup>, is to enhance and promote safety through effective risk-based regulation. The way in which the ONRSR incorporates risk into its decision making is summarised below, noting the framework, data systems and analytical techniques to support this approach will take several years to develop.

### RISK CONTEXT

Under the RSNL rail transport operators are responsible for managing safety risks associated with their railway operations. This involves a continuous process of hazard identification, risk estimation, evaluation and control to ensure safety so far as is reasonably practicable. While the ONRSR does not manage safety risk, it does require knowledge of risks in order to prioritise its regulatory activities and evaluate the adequacy of operators' safety management systems.

### SCOPE OF RISKS

The matters the ONRSR considers in its regulatory activity are framed in terms of the:

- individuals whose safety is potentially endangered by railway operations
- specific types of hazards to which this population may be exposed.

**Individuals:** section 4 of the RSNL defines safety as the safety of people, including rail safety workers, passengers, other users of railways, users of rail or road crossings and the general public. The ONRSR therefore considers the safety of a wide range of individuals. These include people who interact directly with railways such as rail safety workers and passengers, as well as those who gain no direct benefit from railways but may be at risk from rail activities; for example, people on property adjacent to railways.

**Hazards:** a hazard is a source of potential harm.<sup>6</sup> It is sometimes described as an intrinsic property or attribute of something that can cause harm. Examples of hazards include the energy associated with a moving train and the gap between a train and platform that must be traversed by a passenger when boarding or alighting from a train.

The hazards of interest to the ONRSR are those that threaten the target population of individuals (above), and they vary widely in their nature and origins.

### DECISION MAKING IN PRACTICE

A key principle of the ONRSR's regulatory approach is to match regulatory effort to risk. In practice, several factors affect how the ONRSR prioritises risks and applies regulatory effort:

**Level of uncertainty:** where the level of risk is unknown or uncertain, the ONRSR's approach will include an appropriate strategy to improve its knowledge. This may include further analysis to understand the nature of the risk and its control within the safety management systems of rail transport operators.

**The way risk is imposed:** the ONRSR assigns a lower priority to unnecessary self-imposed risk, except where such activity imposes risk on other parties. For example, in the case of railway trespass the ONRSR expects industry to do all that is reasonably practicable to reduce such occurrences but recognises the balance of responsibility for ensuring safety in such case lies with the individuals who voluntarily expose themselves to danger.

4 Office of the National Rail Safety Regulator, *Corporate Plan 2014 to 2017*, ONRSR, Adelaide, June 2014

5 Office of the National Rail Safety Regulator, *ONRSR Regulatory Approach*, ONRSR, Adelaide, July 2013

6 Standards Australia, Standards New Zealand, *AS/NZS ISO 31000:2009. Risk management—Principles and guidelines*, SA, SNZ, Sydney, Wellington, November 2009

**Complementary law:** regulation of rail safety is undertaken through two main sets of law — Workplace Health and Safety legislation and the RSNL. The ONRSR has entered into agreements with workplace safety authorities around Australia<sup>7</sup> to coordinate efforts and ensure the most efficient and effective use of regulatory resources and expertise to reduce workplace-related safety risks.

**Coordination:** for risks associated with some externally imposed hazards such as road user behaviour at level crossings or violent conduct on rail premises, the ONRSR has limited power to directly influence some of the important contributory factors to accident risk. In such cases, the ONRSR regulatory approach involves coordination with, and provision of support to, other regulatory and stakeholder bodies to achieve effective outcomes.

## 2.3. THE ROLE OF THIS REPORT

### CONTEXT

This report summarises key rail safety risks and the ONRSR's regulatory approach to them. Some of the information needed for a detailed analysis of risk does not currently exist, so the ONRSR is reliant on a mix of Australian information and information from other sources. The ONRSR is committed to working with the Australian rail industry to build its capability to analyse and prioritise risks nationally. Outcomes from this work will form the basis of annual safety reports in future years.

### SCOPE AND METHODS

The scope and methods are described in Appendix B. The general approach is outlined below:

**Geographic coverage:** except where explicitly stated, all descriptions and statistics in this report apply only to those railways within the ONRSR's area of operation — currently South Australia, New South Wales, Tasmania, Northern Territory and Victoria.

**Reporting period:** a minimum reporting period of 1 July 2013 to 30 June 2014 applies to this report. A longer period of data is considered where appropriate and available for analysis. Due to the transition of Victoria to regulation by the ONRSR close to the financial year end, data for Victorian operations prior to 2013–2014 is not currently available.

**Operations:** the analysis covers all railway operations within the above-stated geographic bounds with the exception of Victoria. All tramways operating in Victoria including the metropolitan tram operator in Melbourne and seven tourist and heritage railways are regulated under Victorian local law.

**Data sources:** the information presented in this report is based on notifiable occurrences — the initial written advice of a rail safety incident that a rail transport operator submits to the ONRSR in accordance with section 121 of the RSNL. The types of rail safety incidents defined as notifiable occurrences under the RSNL are summarised in Appendix D.

**Definitions:** most statistical summaries in this report are based on the incident definitions of the national occurrence classification guideline (OCG1, 2013).<sup>8</sup> Some statistics are based on definitions specific to this report to support a more meaningful risk-based analysis of critical events.

7 Heads of Workplace Safety Authorities, Office of the National Rail Safety Regulator, *Memorandum of Understanding between the ONRSR and the Workplace Safety Authorities*, effective from 20 January 2013

8 Office of the National Rail Safety Regulator, *Classifying Notifiable Occurrences. Occurrence Classification Guideline (OC-G1)*, Version 1.1, ONRSR, Adelaide, March 2013

# 3. Industry overview



Australian railways are diverse. This reflects a historical legacy of separate development by individual states and territories, as well as a practical need to customise railways to the specific industries, demographics and geography across the country.

Railways are generally described in terms of above rail and below rail assets:

- above rail includes rolling stock such as locomotives, freight wagons and passenger carriages
- below rail includes infrastructure such as track, tunnels and signalling.

The accreditation provisions of the RSNL also define the roles of rail transport operators in the same way. Rail infrastructure managers have effective control and management of the below rail infrastructure such as track, while rolling stock operators have effective control and management of the operation or movement of rolling stock. Rail transport operators are accredited to perform one or both of these roles.

### 3.1. BELOW RAIL

#### URBAN PASSENGER NETWORKS

Three of the five capital cities within the ONRSR's area of operation have metropolitan passenger networks. The urban heavy rail passenger networks of Adelaide, Sydney and Melbourne are summarised in Table 1. Each of these networks is owned and operated by the respective state government with the exception of Melbourne's network, which is operated by a private operator.

Light rail complements the heavy rail networks of each capital city. Light rail operations in Adelaide and Sydney are regulated by the ONRSR and account for 20.3% and 1.3% of metropolitan passenger rail journeys in these cities respectively. Melbourne's light rail network is regulated under local Victorian law and accounts for approximately 45% of the metropolitan passenger rail journeys in the city.

**Table 1: Summary of metropolitan heavy rail passenger networks regulated by the ONRSR**

CITY POPULATION (MILLION) <sup>1</sup>	TRACTION SUPPLY	GAUGE	TRACK LENGTH (KM)	STATIONS	PASSENGER JOURNEYS (MILLION)
Adelaide (SA) (1.2)	Electric Diesel	Broad	251	88	10.4
Sydney (NSW) (4.4)	Electric	Standard	1790	262	306 <sup>2</sup>
Melbourne (Vic) (4.0)	Electric	Broad	950	218	227

1. Greater metropolitan area (Australian Bureau of Statistics, 2011 Census QuickStats, accessed 18 September 2014)

2. 2012–13 figures for the greater metropolitan rail area; includes some services to surrounding non-metropolitan areas

#### INTERSTATE FREIGHT NETWORKS

The Defined Interstate Rail Network (DIRN) is the standard gauge line linking Brisbane in Queensland to Perth<sup>9</sup> in Western Australia, as well as the cities of Adelaide, Sydney, Darwin and Melbourne (Figure 2). The primary use of the DIRN is interstate freight transport, but it also carries longer distance interstate and intrastate passenger services.

Australian Rail Track Corporation (ARTC) leases and manages the interstate network in both New South Wales and Victoria (approximately 2,900 and 1,330 km of track respectively).

In South Australia, ARTC owns and manages the east west corridor (2,000 km) linking Sydney and Melbourne with Perth. Genesee & Wyoming Australia owns and manages the 2,200 km section of the DIRN between Tarcoola in South Australia and Darwin in the Northern Territory.

9 The ARTC-managed section of the DIRN in Western Australia connects at Kalgoorlie with a private standard gauge line running to Perth

## INTRASTATE FREIGHT NETWORKS

The major intrastate networks regulated under the RSNL are shown in Figure 2 and summarised below.

### South Australia

Major networks comprise 500 km of narrow gauge line on the Eyre Peninsula and 300 km of standard gauge line in the Murray/Mallee region. South Australia also has several smaller lines servicing specific industries, including coal transport for power generation at Port Augusta and iron ore for steel manufacturing at Whyalla.

### New South Wales

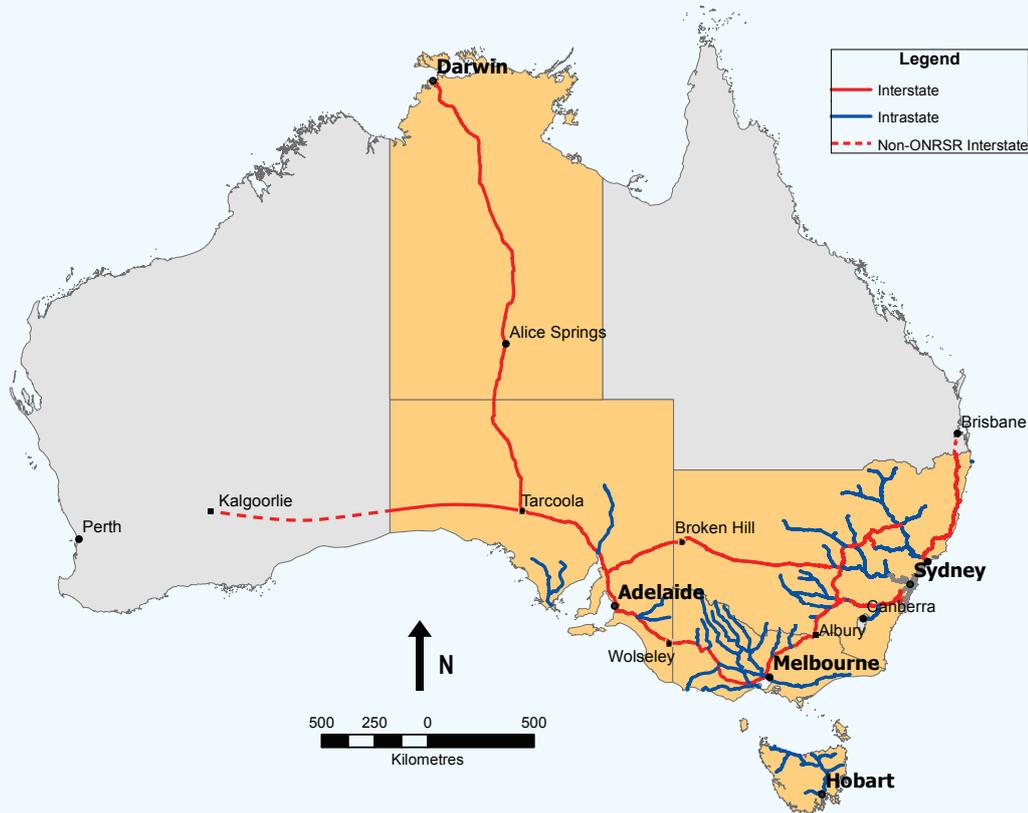
The New South Wales Country Regional Network comprises approximately 2,800 km of track used for bulk commodities as well as other freight and long distance passenger services. The Hunter network comprises approximately 1,100 km of track primarily for transport of coal to the Newcastle ports.

### Tasmania

Tasmania's freight network comprises 630 km of single line narrow gauge railway used solely for intermodal and bulk freight services operated by Tasmanian Railway Pty Ltd (TasRail).

### Victoria

The Victorian Country Regional network comprises approximately 3,250 km of broad and standard gauge lines used by both passenger and freight services.



**Figure 2: Major inter and intrastate freight networks administered under the Rail Safety National Law.**

Sources: Railways (excluding NSW) and cities DeLorme Publishing Company, USA, 2011; NSW Railways: Rail Centreline Copyright RailCorp 2007.

## OTHER NETWORKS

The ONRSR has accredited a range of other operators for management of below rail infrastructure. The majority of these comprise tourist and heritage railways that are physically or operationally separate to mainline networks.

Dedicated metropolitan freight lines are relatively small in terms of their cumulative track length but serve a critical role in the effective management of the freight and passenger rail traffic in and through metropolitan areas.

## 3.2. ABOVE RAIL

Of the 126 rail transport operators accredited by the ONRSR, 109 are accredited for rolling stock operations. The two main above rail tasks are urban passenger services and commercial freight transport. Tourist and heritage services and specialist rolling stock operations for infrastructure construction and maintenance are also accredited.

### PASSENGER OPERATORS

There are eight major commercial passenger operations administered under the RSNL. The heavy rail metropolitan operations of Adelaide, Sydney and Melbourne collectively travelled 51 million train km in 2013–14. The light rail operators of Adelaide and Sydney collectively travelled 1.5 million train km in 2013–14.

There are three passenger operators running regional and interstate passenger services. These operators collectively travelled 30 million train km in 2013–14.

### FREIGHT OPERATORS

Freight is generally transported in one of two main forms — bulk freight (such as coal, grain and minerals) and non-bulk or intermodal freight, which is typically transported as containerised freight. There are 20 operators accredited by the ONRSR for mainline freight operations.<sup>10</sup> Freight trains in the ONRSR's area of operation travelled approximately 35 million train km in 2013–14.

### TOURIST AND HERITAGE OPERATORS

The ONRSR has accredited 46 tourist and heritage operators, with most accredited for rolling stock operations. The nature of operations and rolling stock varies widely but most involve the operation of historical passenger rolling stock hauled by various traction types including steam and early diesel locomotives. Operations range from short duration trips on isolated railways through to longer distance services on mainline networks.

### OPERATORS OF INFRASTRUCTURE MAINTENANCE ROLLING STOCK

Infrastructure maintenance rolling stock is used primarily for inspection, maintenance and construction of rail infrastructure. There are two main types:

- *Road/rail vehicles (RRV)*, which are capable of running on road and rail. These are often standard road vehicles that have had flanged rail wheels fitted to the front and rear. There is a wide range of RRVs operating in Australia including excavators, tippers and utilities.
- *On-track infrastructure maintenance vehicles*, which are rail-bound and designed for specific maintenance and construction-related tasks such as track laying, sleeper renewal and ballast cleaning. They are far fewer in number than RRVs.

10 An additional number of rolling stock operators are involved in freight-related operations in yards such as shunting and marshalling

# 4. Rail safety occurrences 2013 to 2014



## 4.1. SAFETY RISK OVERVIEW

The capability to reliably estimate the level of risk across Australian railways does not currently exist, and a priority for the ONRSR and the rail industry is the development of an appropriately scaled quantitative risk model. For its first annual safety report in 2013<sup>11</sup>, the ONRSR used pre-existing sources of information to help it describe the types of risks relevant to Australian railways. These sources included outputs from a quantitative model of safety risks for mainline railways in the United Kingdom (UK).<sup>12</sup>

The main risk areas highlighted in the 2012–13 review are summarised below as a reference point for the summary of safety incidents that follows in sections 4.2 and 4.3.

**Suicide** is the largest safety risk for many railways around the world and accounts for approximately 70% of all fatalities in the ONRSR's area of operation over recent years.

**Slip trip and fall and assault** are the two primary contributors to non-fatal injury risk. They occur frequently but typically result in a non-fatal consequence. Passengers are the primary exposed group. Railway workers are also exposed to these hazards, and the ONRSR supports workplace safety authorities in the regulation of these risks.

Beyond suicide and general personal injury risks such as falls and assault, there is a set of hazards associated with rail operations that are a primary focus for the ONRSR. These rail system-related risks are summarised below.

**Train striking a person** is defined separately to suicide. This type of event is relatively infrequent but typically results in a single fatality. The major contributor to this risk is trespass, and in such cases the primary responsibility for control often lies with the individuals who voluntarily expose themselves to danger. However, trains striking passengers and members of the workforce are a regulatory priority and are considered in section 4.2.

**Train derailment and train collision** (both between trains and with other objects) collectively account for a small proportion of total risk on railways generally. However, they have a multi-fatality potential and are generally associated with a set of hazards over which rail transport operators have direct control. These risks are also a priority for the ONRSR and are considered in section 4.2.

**Level crossings** present a unique set of safety hazards. Risks and exposures vary depending on the event. In the case of pedestrian strikes, the primary threat is to the individual level crossing users. In the case of collisions between trains and road vehicles, the greater mass of road vehicles imposes a significant risk to the trains. A multi-fatality threat is particularly relevant to passenger trains because of the potentially large number of people exposed. This risk is a priority for the ONRSR and is discussed further in section 4.2.

**Fire, electrical hazards and toxic releases** are hazards common to various heavy industries and have the potential to cause multiple fatalities in a single accident. In the case of electrical hazards, rail workers are the primary exposed group and the ONRSR supports workplace safety authorities in the regulation of this workplace risk. Regulation of dangerous goods is led by nominated state-based competent authorities responsible for oversight of compliance with the Dangerous Goods Code. Fire-related risks are considered further in section 4.2 of this report.

There is a wide range of risks beyond those that are normally the focus of incident analysis and risk modelling. Most of these comprise higher-frequency lower-consequence personal injury risks such as people struck by equipment, burns and manual handling injuries. A small number of risks take

11 Office of the National Rail Safety Regulator, *Annual Safety Report 2012 to 2013*, ONRSR, Adelaide, December 2013

12 Rail Safety and Standards Board, *Safety Risk Model: Risk Profile Report Version 7.5. Issue 1.1*, RSSB, UK, March 2013

the form of low-frequency but potentially catastrophic events and fall within the scope of the ONRSR's regulatory planning — structural collapse is one such risk highlighted in the *Annual Safety Report 2012 to 2013*. The ONRSR continuously monitors a range of information sources to identify new sources of risk specific to local operations or new design that may not be routinely described or represented as accident scenarios in theoretical models.

## 4.2. RAILWAY-RELATED INJURY

Injury data provides a reliable and direct measure of harm associated with some railway safety hazards, specifically those associated with higher-frequency lower-consequence risk. There were 93 fatalities in 2013–14 on railways regulated under the RSNL. These consisted of:

- 84 incidents involving suspected suicide or trespass
- three passenger fatalities
- five fatalities at level crossings (four pedestrians and one cyclist)
- one rail safety worker fatality associated with ill-health.

Each of the passenger and level crossing fatalities is summarised in Table 2.

There were no injury-related workforce fatalities arising from railway-related hazards in 2013–14. However, the ONRSR was notified of a rail safety worker (network controller) suffering a fatal heart attack while on duty. This type of fatality is not an outcome of a hazardous event but does represent a potential risk to the safe operation of railways dependent on human performance.

**Table 2: Railway fatality, 2013–2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under the RSNL. Excludes fatality associated with trespass, suicide/suspected suicide and ill-health. Some of the listed fatalities at level crossings may involve acts of trespass but are included on the basis that members of the public may legitimately access level crossings.

DATE	LOCATION	CATEGORY	SUMMARY
12 Feb. 2014	Windsor, Vic.	Level crossing – collision with person	Passenger train struck person running across the track at a pedestrian crossing.
22 Feb. 2014 <sup>1</sup>	Heyington, Vic.	Slip, trip, fall – between platform and train	Person attempting to board departing train fell between the train and platform.
5 Mar. 2014	Dulwich Hill, NSW	Train collision – running line – with person	Person fell between platform and departing train. Following train struck and fatally injured person.
11 Mar. 2014	Springvale, Vic.	Level crossing – collision with person	Passenger train struck person walking onto pedestrian crossing.
1 Apr. 2014	Bentleigh, Vic.	Level crossing – collision with person	Passenger train struck person walking onto pedestrian crossing.
15 Apr. 2014	St Marys, NSW	Slip, trip, fall – on stairs	Person fell on stairs leading to platform. First aid administered but person died in hospital.
5 June 2014	Claremont, Tas.	Level Crossing – collision with person	Freight train struck person at level crossing. Person died in hospital.
17 June 2014	Edithvale, Vic.	Level Crossing – collision with road vehicle <sup>2</sup>	Passenger train struck person riding bicycle across crossing.

1. Subject of investigation by the Chief Investigator Transport Safety (CITS) (Vic.) on behalf of the ATSB
2. A bicycle is defined as a road vehicle under the ONRSR national occurrence classification scheme

There were several thousand occurrences in 2013–14 involving injuries to people on railway premises. Approximately 660 people were attended to by an ambulance<sup>13</sup>, with three quarters of these cases involving falls and another 10% involving assault. Approximately 85% of people attended to by an ambulance were passengers on the metropolitan rail networks of Sydney, Melbourne and Adelaide. Another 10% involved members of the workforce but the ONRSR recognises some workforce injuries associated with common workplace hazards such as manual handling may not be notified in all cases.

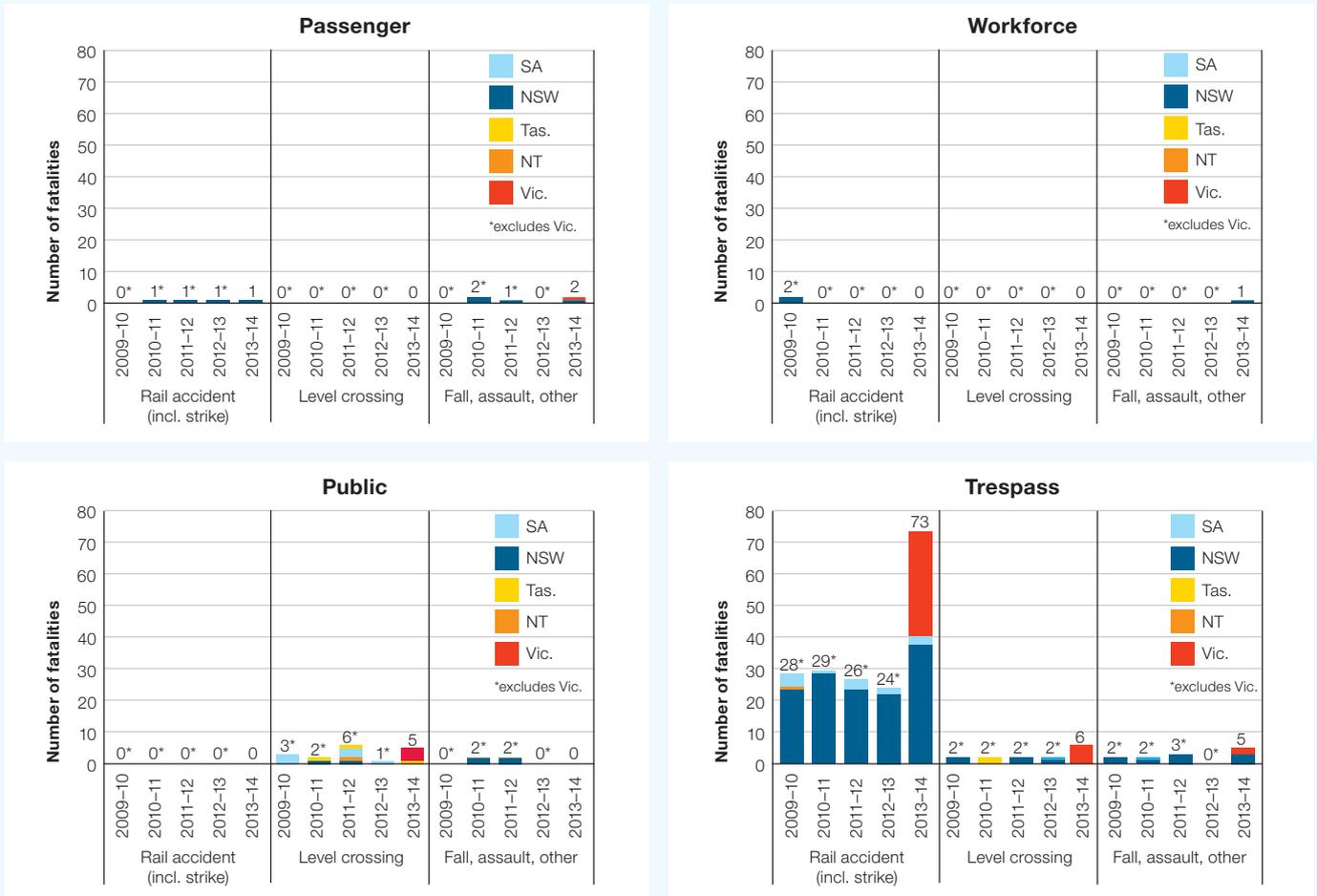
There were two other serious incidents during 2013–14 in which multiple passengers were unnecessarily exposed to the hazard of a moving train. In May 2014 at Kilbride (New South Wales) the driver of a long distance passenger service was forced to apply emergency brakes when he observed five passengers on the track. The passengers were being transferred to a bus following a disruption to rail services associated with an earlier freight train breakdown. This incident is currently the subject of investigation by the Australian Transport Safety Bureau (ATSB).<sup>14</sup> A similar event occurred in Melbourne in February 2014 when a large number of passengers on a train sitting between stations forced open doors and disembarked to the track. Other train services were halted and emergency services were called due to the large number of people on the tracks at night.

The five year history of fatality on railways is summarised in Figure 3. For those jurisdictions with data for the full period, this figure shows:

- the nature of passenger fatalities in 2013–14 is consistent with that observed over the past four years, reflecting personal injury risks rather than rail system-related hazards
- 2013–14 was the fourth consecutive year without an injury-related workforce fatality. However, workforce strikes and near misses were notified and are considered further in section 4.3.6
- the average number of public fatalities at level crossings in recent years remains comparable to that observed over the past decade
- the number of trespass-related fatalities in 2013–14 is higher than in recent years and is primarily associated with suspected suicide on the Sydney metropolitan rail area (MRA).

13 Appendix B explains the definitions of non-fatal injury used in this report.

14 Australian Transport Safety Bureau, *Safeworking breach near Kilbride NSW on 22 May 2014*, Rail Occurrence Investigation RO-2014-009, <[www.atsb.gov.au](http://www.atsb.gov.au)> viewed 14 October 2014



**Figure 3: Railway fatality, 2009–10 to 2013–14**

All railway operations regulated under RSNL. Some level crossing fatalities may involve acts of trespass but are classed as Public on the basis that members of the public may legitimately access level crossings. Suspected suicide at level crossing is coded as trespass. The 2013–14 workforce occurrence was an ill-health incident involving on-duty rail safety worker. Victorian data not available prior to 2013–14.

A comparison of the rate of fatality between the ONRSR-regulated railways and selected overseas railways is summarised in Table 3. The ONRSR-based data of Table 3 is a subset of the fatalities summarised previously (Table 2, Figure 3) to align with the overseas data definitions. For example, local data excludes suspected suicide because these are also excluded from overseas data.

The UK statistics are a better benchmark for comparison because information on the circumstances of individual incidents is available to confirm consistency of scope with local data. The UK is also a suitable benchmark because of its comparatively high safety performance amongst the 27 member states of the European Union. The US data is less reliable because of definitional uncertainties.

The fatality rate for the ONRSR's area of operation over the three year period (0.15 fatalities per million train km) is higher than that of the UK (0.09). However, this does not necessarily reflect a difference in underlying safety because the size of the observed difference is comparable to the degree of statistical uncertainty associated with the year-to-year variation in estimates.

The ONRSR-based average fatality rate over the three years is well below that of the United States (0.61 per million train km). A review of the US figures by individual incident types suggests the average rate reflects a significantly higher proportion of trespass and level crossing-related fatalities compared to the ONRSR's area of operation.

**Table 3: Railway fatality – the ONRSR, United Kingdom and United States**

Fatalities involving passengers, workforce and the public (including trespass other than suicide-related incidents). US data may include cases of 'suspected suicide' which is excluded from local data. The ONRSR statistics exclude Vic. (data not available for full period).

		2011–12	2012–13	2013–14	3 YEAR
ONRSR (SA, NSW, Tas. NT)	Fatalities	19	5	11	35
	Train km (million)	79.0	79.2	79.9	238.1
	Rate	0.24	0.06	0.14	0.15
United Kingdom <sup>1</sup>	Fatalities <sup>1</sup>	53	48	36	137
	Train km (million) <sup>2</sup>	536.2	536.4	538.4	1611
	Rate	0.10	0.09	0.07	0.09
United States <sup>3</sup>	Fatalities	683	706	790	2179
	Train km (million)	1171	1190	1214	3575
	Rate	0.58	0.59	0.65	0.61

1 Source: Rail Safety and Standards Board, Annual Safety Performance Report 2013/14, RSSB, UK, 2014

2. Source: *Network Rail, Annual Return 2014*, Network Rail, London, 2014

3. Source: *Federal Railroad Administration Office of Safety Analysis: online database query* (accessed 30 October 2014)  
<<http://safetydata.fra.dot.gov/>>

While the local rate of fatality is potentially higher than that of the UK, it consists primarily of trespass, pedestrian incidents at level crossings and fall-related events. The ONRSR recognises that in most of these cases the balance of responsibility for ensuring safety lies with the individuals who voluntarily expose themselves to danger. Further, the statistics do not necessarily reflect safety performance in terms of the railway system hazards that pose a multi-fatality risk and are a priority for the ONRSR. The following sections of this report consider these risks in more detail.

### 4.3. TRAIN ACCIDENTS AND OTHER HAZARDOUS EVENTS

This section summarises safety occurrences associated with rail operations regulated by the ONRSR. It focuses on the risks of greatest regulatory concern as summarised previously (section 4.1).

Most statistical summaries are based on occurrence category definitions in the national occurrence classification guideline. However, some are based on alternative definitions according to the purpose of the analysis. Appendix A presents summary statistics for notified occurrences generally.

#### 4.3.1. PASSENGER TRAIN DERAILMENT

Passenger train derailment risk is characterised by rare events that are potentially catastrophic because of the large number of passengers often exposed to harm in such instances.

There were 11 running line passenger train derailments in 2013–14<sup>15</sup> on railways regulated under the RSNL. These accidents involved a range of passenger train operations, as follows:

- three derailments involved heavy rail passenger trains
- two derailments occurred on Sydney's light rail network. These happened within several hours of one another albeit at separate locations
- two derailments occurred on a tourist and heritage railway. Both occurred at low speed
- four derailments involved empty heavy rail passenger trains. Three of these cases were the result of a train passing a signal at stop without authority (SPAD).

Each of these derailments is summarised in Table 4. No fatalities or serious injuries were reported, however minor injuries to passengers were reported for two heavy rail derailments (Edgecliff and Currabubula in New South Wales). These two incidents are also the subjects of independent investigation.

15 Excludes one derailment resulting from a level crossing collision (see section 4.3.5)

Additionally, at the time of writing, an investigation has commenced<sup>16</sup> on a derailment at North Melbourne (Victoria) in July 2014. The train was carrying 193 passengers and was travelling at approximately 20 km/h when it derailed over a set of points. Minor injuries were reported for six members of the train crew and 10 passengers.

**Table 4: Passenger train running line derailment, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL. Includes derailments on non-running lines affecting the safety of running lines.

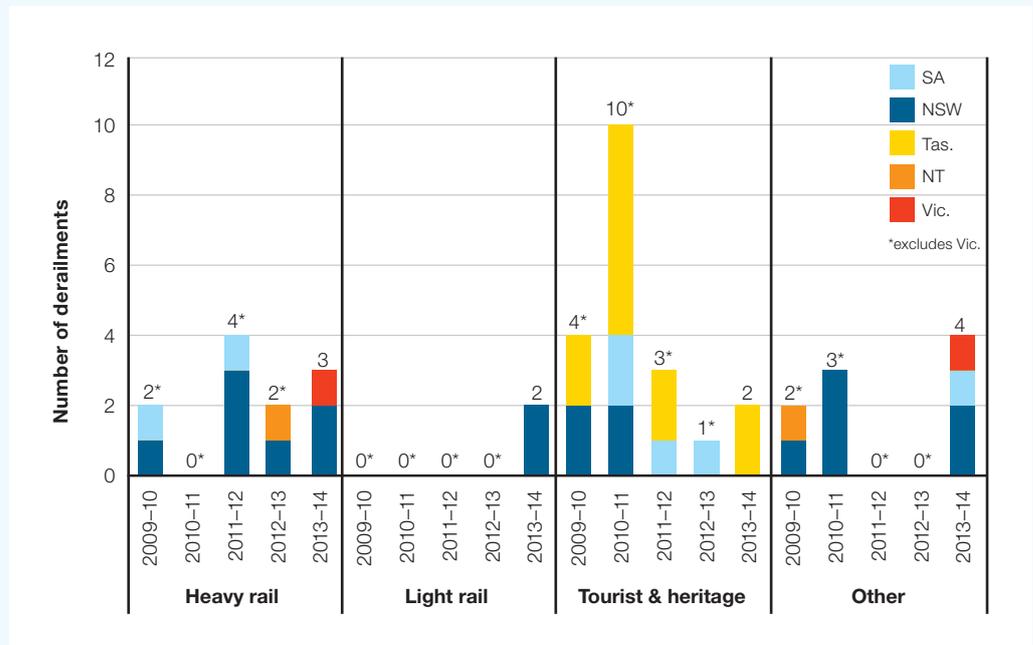
DATE	LOCATION	CATEGORY	SUMMARY
6 Aug. 2013	Blackwood, SA	Heavy rail	Empty passenger train passed signal at stop without authority and derailed over catch points. No injuries reported.
7 Oct. 2013	Rozelle Bay, NSW	Light rail	Light rail train carrying one passenger derailed one bogie. No injuries reported.
7 Oct. 2013	Wentworth Park, NSW	Light rail	Light rail train carrying four passengers derailed. No injuries reported.
29 Nov. 2013	Lidcombe, NSW	Heavy rail	Empty passenger train derailed all wheels of one bogie while travelling through points. No injuries reported.
15 Jan. 2014 <sup>1</sup>	Edgecliff, NSW	Heavy rail	Metropolitan train service derailed due to broken axle. Minor injury to one passenger reported.
31 Jan. 2014 <sup>2</sup>	Currabubula, NSW	Heavy rail	Long distance passenger train service derailed. Two passengers transported to hospital for treatment.
26 Mar. 2014	Lynchford, Tas.	Tourist and heritage	Passenger service travelling derailed on section of track subject to maintenance. No injuries reported.
5 Apr. 2014	Newport, Vic.	Heavy rail	Empty passenger train passed signal without authority and derailed at catchpoints. No injuries reported.
15 Apr. 2014	Waterfall, NSW	Heavy rail	Empty passenger train passed signal without authority and derailed at catch points. No injuries reported.
24 Apr. 2014	Lynchford, Tas.	Tourist and heritage	Passenger service derailed over section of track subject to maintenance. No injuries reported.
26 June 2014	McIntyre, Vic.	Heavy rail	Sydney to Melbourne passenger train service derailed and then re-railed over set of points. No injuries reported.

1. Subject of investigation by ATSB
2. Subject of investigation by OTSI (NSW)

The five year history of passenger train derailment is summarised in Figure 4. For those jurisdictions with data for the full period this shows the nature and number of incidents in 2013–14 is similar to that observed historically, with the exception of light rail as a result of aforementioned derailments in Sydney.

The 'heavy rail' derailments in Figure 4 are in primary concern because of the potentially higher running speeds and larger passenger numbers compared to other categories. There have been 10 such derailments over the past five years for those jurisdictions with data for the full period. The immediate causes of these incidents included SPADs, collisions with objects and irregularities of track and rolling stock.

16 Australian Transport Safety Bureau, *Derailed of ST24 near North Melbourne Station, Victoria on 11 July 2014*, Rail Occurrence Investigation RO-2014-013, <[www.atsb.gov.au](http://www.atsb.gov.au)> viewed 20 October 2014



**Figure 4: Passenger train running line derailment, 2009-10 to 2013-14**

All railway operations regulated under RSNL. Includes derailments on non-running lines affecting the safety of running lines. Tourist & heritage includes operators on mainline networks. Other includes empty passenger trains. Victorian data not available prior to 2013-14. Victorian light rail operations are regulated under local Victorian law.

A comparison of the rate of mainline passenger train derailment between the ONRSR-regulated railways and the mainline railway of the UK is summarised in Table 5. The ONRSR data in Table 5 are a subset of derailments summarised previously — essentially the heavy rail derailments of Figure 4 together with any associated with mainline tourist and heritage passenger operations.

There is a statistically significant difference in the three-year derailment rate between the local and UK operations. The average rate for Australian operations over the past three years (0.055 per million train km) is almost 10 times higher than that of the UK (0.006 per million train km).

**Table 5: Passenger train running line derailment – the ONRSR and United Kingdom**

Heavy rail in-service passenger trains only, including tourist and heritage mainline operations. Includes derailments on non-running lines affecting the safety of running lines. The ONRSR statistics exclude Vic. (data not available for full period).

		2011-12	2012-13	2013-14	3 YEAR
ONRSR (SA, NSW, NT)	Derailments	4	2	2	8
	Train km (million)	48.8	48.0	49.3	146.1
	Rate	0.082	0.042	0.041	0.055
United Kingdom <sup>1</sup>	Derailments <sup>1</sup>	2	7	0	9
	Train km (million) <sup>2</sup>	492.3	492.5	493.3	1478.2
	Rate	0.004	0.014	0.000	0.006

1 Source: Rail Safety and Standards Board, Annual Safety Performance Report 2013/14, RSSB, UK, 2014

2. Source: Network Rail, Annual Return 2014, Network Rail, London, 2014

### 4.3.2. FREIGHT TRAIN DERAILMENT

Freight train derailments risk is generally characterised by higher-frequency but lower-consequence events compared to passenger trains, albeit with a marked variation in the nature of risk across different types of operation. There were 41 running line derailments involving freight rolling stock in 2013–14 as follows:

- 38 freight train derailments. Approximately half of these were associated with low speed movements to or from yards that affected the operation of running lines.
- Two light locomotive derailments.
- One freight wagon derailment. The wagon ran away in a siding, passed a signal at danger and derailed on catch points protecting a running line that carries passenger services.

No injuries were reported for any of these occurrences. Nine of the derailments are the subject of independent investigation and these are summarised in Table 6.

**Table 6: Freight train running line derailments subject to independent investigation, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL.

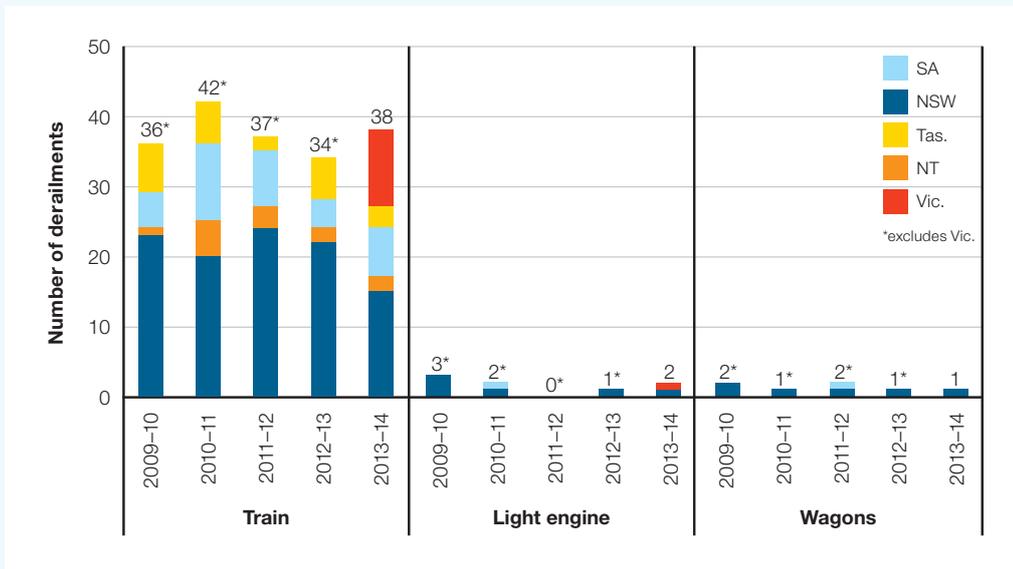
DATE	LOCATION	SUMMARY
25 July 2013 <sup>1</sup>	South Dynon, Vic.	During shunting locomotive and wagon passed signal at danger without authority and derailed over points. No injuries reported.
10 Aug. 2013 <sup>2</sup>	Ouyen, Vic.	Freight train derailed nine wagons over a failed rail joint. Three wagons fell on their side. No injuries reported.
30 Oct. 2013 <sup>2</sup>	Newport, Vic.	Freight train with 29 wagons derailed over a set of points. No injuries reported.
4 Dec. 2013 <sup>2</sup>	Sim Street Junction, Vic.	Broad gauge freight train derailed locomotive and one wagon when route was set for standard gauge track. No injuries reported.
30 Dec. 2013 <sup>1</sup>	Union Reef, NT	Freight train derailed on entry to crossing loop. Three locomotives, a crew van and fuel wagon derailed at low speed. No injuries reported.
31 Jan. 2014 <sup>3</sup>	Currabubula, NSW	Freight train parted. Subsequent investigation shows train derailed then rerailed. A passenger train derailed in the same vicinity later on the same day. No injuries reported.
12 Feb. 2014 <sup>2</sup>	Emu, Vic.	Grain train derailed 10 wagons with some coming to rest on their side. Level crossing obstructed by the derailment. No injuries reported.
10 Apr. 2014 <sup>1</sup>	Malbooma, SA	Freight train from Melbourne to Perth derailed along a section of track subject to flooding. 21 wagons derailed with nine on their side. No injuries reported.
14 May 2014 <sup>1</sup>	Nambucca Heads, NSW	Freight train derailed one wagon entering a crossing loop and travelled for another 1.7 km in a derailed state. No injuries reported.

1. Subject of investigation by ATSB

2. Subject of investigation by CITS (Vic.) on behalf of the ATSB

3. Subject of investigation by OTSI (NSW) as part of an investigation of a passenger train derailment in the same vicinity later in the day

The five year history of freight train derailment is summarised in Figure 5. The annual number of train derailments in 2013–14 for those jurisdictions with data for the full period is the lowest of the five year period, but the size of the observed difference is consistent with the year to year variation in counts of the historical record.



**Figure 5: Freight train running line derailment, 2009-10 to 2013-14**

All railway operations regulated under RSNL. Includes derailments on non-running lines affecting the safety of running lines. Victorian data not available prior to 2013-14.

A comparison of the rate of freight train derailment between the ONRSR-regulated railways and the mainline railway of the UK is summarised in Table 7. The local data of Table 7 are a subset of derailments summarised previously — essentially the train and wagon derailments of Figure 5.

There is a statistically significant difference in the three year derailment rate between local and UK operations. The ONRSR-based rate over the past three years (1.09 derailments per million train km) is almost six times greater than that of the UK (0.19 per million train km). The difference is likely to be due in part to the extremely diverse nature of freight operations in Australia compared to the UK. Australia's freight operations include industry-specific networks for coal and ore operations, cross continent intermodal freight, seasonal traffic on grain lines as well as freight on shared passenger lines.

**Table 7: Freight train running line derailment – the ONRSR and United Kingdom**

Includes derailments on non-running lines affecting the safety of running lines. Excludes light locomotives. The ONRSR statistics exclude Vic. (data not available for full period).

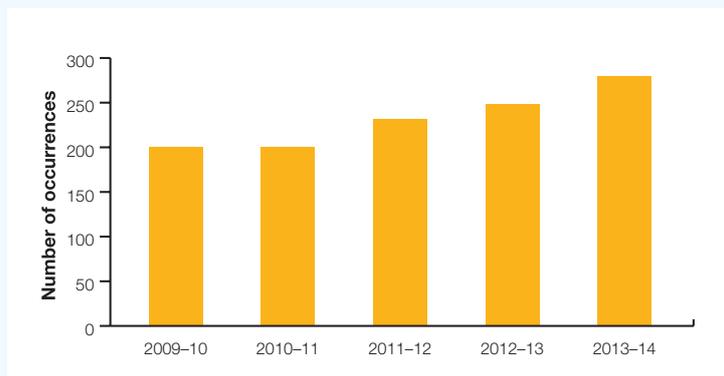
		2011-12	2012-13	2013-14	3 YEAR
ONRSR (SA, NSW, Tas. NT)	Derailments	38	34	28	100
	Train km (million)	30.3	31.2	30.5	92.0
	Rate	1.26	1.09	0.92	1.09
United Kingdom <sup>1</sup>	Derailments <sup>1</sup>	7	6	8	21
	Train km (million) <sup>2</sup>	37.3	37.2	38.6	113.0
	Rate	0.19	0.16	0.21	0.19

1 Source: Rail Safety and Standards Board, Annual Safety Performance Report 2013/14, RSSB, UK, 2014

2. Source: Network Rail, Annual Return 2014, Network Rail, London, 2014

The ONRSR's *Annual Safety Report 2012 to 2013* reviewed the immediate causes of train derailment. Infrastructure irregularities were highlighted as a significant contributor to passenger derailment risk. These comprise a wide range of failures including rail breaks, track misalignment, points failures and track obstructions. The ONRSR routinely monitors occurrence data for the conditions that can lead to hazardous events such as derailment. The five year history of broken

rails for railways other than those in Victoria is summarised in Figure 6. This shows a significant rise in the number of broken rails over time. The pattern of change over time varies between different sections of the network, and reflects both reporting-related changes as well as increases in the frequency of breaks on certain sections. One of the ONRSR's regulatory priorities is to address asset-related failures as a contributor to rail safety risk.



**Figure 6: Broken rail, 2009-10 to 2013-14**

All railway operations regulated under RSNL except Vic. Data shown is that classified as OCG1 top event category Broken rail – detected outside maintenance inspection.

#### 4.3.3. DERAILMENT NOT INVOLVING PASSENGER OR FREIGHT ROLLING STOCK

There were almost 80 derailments of infrastructure maintenance-related rolling stock in 2013-14 across all railways regulated under the RSNL. The majority occurred on the mainline networks but several were reported for isolated networks and tourist and heritage railways. There were no injuries notified for any of these incidents other than minor bruising to a machine operator in one instance.

The level of risk associated with track maintenance rolling stock derailment is difficult to estimate because of the wide range of operating scenarios. Most of the derailments in 2013-14 had little potential for escalation to serious harm; for example, they occurred at low speed and occurred on track closed to normal traffic. However some incidents involved higher speeds or vehicles carrying multiple crew members, or gave rise to additional hazards such as obstructing adjacent running lines or damaging track.

Approximately 55% of these derailments involved RRVs, which were highlighted in last year's report as a regulator focus. Several examples of the more significant RRV derailments in 2013-14 are presented in Table 8.

**Table 8: Examples of significant road/rail vehicle derailments, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL. Occurrences shown are either (i) the subject of independent investigation or (ii) an example of an occurrence that has escalated to the point of a near miss.

DATE	LOCATION	SUMMARY
2 Aug. 2013	Campania, Tas.	Road/rail excavator involved in re-sleepering derailed front wheels while holding a sleeper and rolled onto its side. No injuries reported.
16 Oct. 2013	Berrybank, Vic.	Road/rail vehicle on track patrol derailed when wheel bearing collapsed. No injuries reported.
9 Jan. 2014	Leppington, NSW	14 seater road/rail vehicle carrying 13 people travelling in reverse direction at low speed derailed. No injuries reported.
27 Jan. 2014	Gunning, NSW	Four wheel drive road/rail vehicle travelling under 50 km/h derailed during track inspection. No injuries reported.

#### 4.3.4. COLLISION BETWEEN TRAINS

Collision between trains constitutes a single accident class within Australia's national occurrence classification guideline. However, the likelihood and consequences of collision vary according to factors such as the systems used to manage train movement (for example, signal-based or train order working) and the types of trains involved. A major determinant of risk is the involvement of a passenger train because of the exposure of potentially large numbers of passengers to harm.

There were seven running line collisions between trains in 2013–14 on railways regulated under the RSNL consisting of:

- two collisions between freight trains or freight-related rolling stock
- three collisions between infrastructure maintenance rolling stock
- two collisions involving empty passenger trains.

Each of the collisions is summarised in Table 9. No injuries were reported for any of these occurrences and none were the subject of accident investigation.

While there were no collisions involving in-service passenger trains in 2013–14, at the time of writing an investigation has commenced<sup>17</sup> on a collision at Altona (Victoria) in August 2014 in which an empty passenger train collided with the rear of a stationary loaded passenger train. Two crew members of the empty passenger train and two passengers on the other train received minor injuries.

**Table 9: Running line collisions between trains, July 2013 to June 2014**

All railway operations in SA, NSW, Tas., NT and Vic. regulated under RSNL. Includes collisions on non-running lines affecting the safety of running lines. Excludes events in which one train is struck by an out of gauge component of another train on an adjacent line.

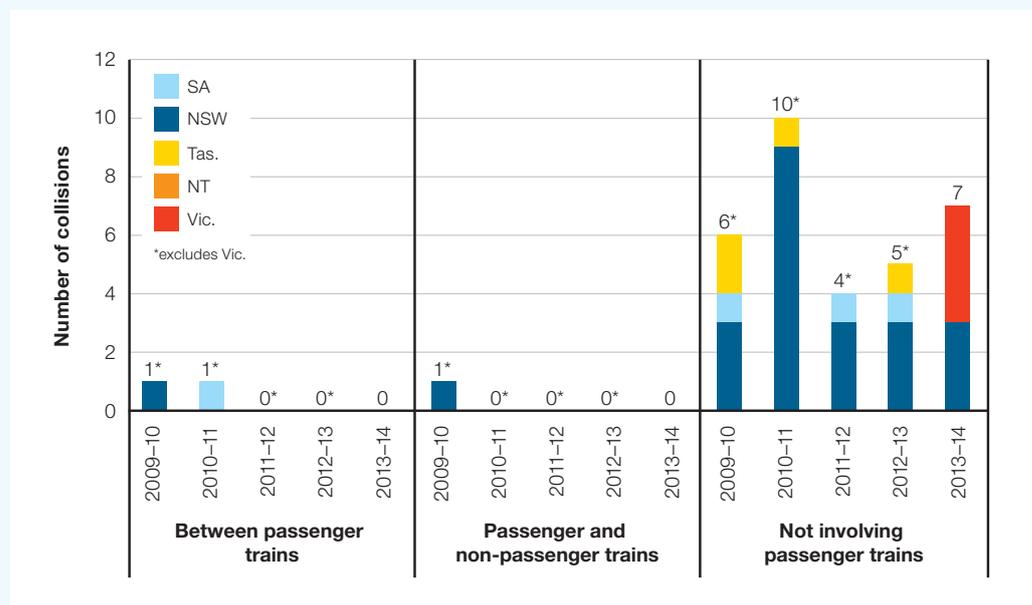
DATE	LOCATION	CATEGORY	SUMMARY
8 Oct. 2013	South Dynon, Vic.	Empty passenger train and freight locomotive	Collision between empty passenger train and freight locomotive stabled foul of line. No injuries reported.
23 Sept. 2013	Kankool, NSW	Freight train and light locomotives	Bank engines assisting freight train collided with the rear of the train. No injuries reported.
13 Nov. 2013	Springhurst, Vic.	Road/rail vehicles	Road/rail excavator ran into the rear of another road/ rail vehicle. No injuries reported.
29 Nov. 2013	Dunolly, Vic.	Road/rail vehicle and on – track infrastructure maintenance vehicle	Road/rail vehicle collided with the rear of a rail flaw detection vehicle. No injuries reported.
29 Dec. 2013	Wodonga, Vic.	On-track infrastructure maintenance vehicles	Tamper collided with the rear of a ballast regulator that had stopped to avoid traversing incorrectly set points. No injuries reported.
24 Jan. 2014	Weedallion, NSW	Freight train and wagons	Wagons being shunted back into a siding struck lead wagon of rake still on the mainline. No injuries reported.
26 June 2014	Port Kembla, NSW	Empty passenger trains	Empty passenger train rolled back and attached to another passenger train at station. Neither train was in-service. No injuries reported.

17 Australian Transport Safety Bureau, *Collision between a V/Line train and Metro Trains Melbourne (MTM) train at Altona, Victoria on 22 August 2014*, Rail Occurrence Investigation RO-2014-016, <[www.atsb.gov.au](http://www.atsb.gov.au)> viewed 10 October 2014

The five year history of collisions between trains is summarised in Figure 7. Three collisions involving in-service passenger trains have occurred over the past five years in those jurisdictions with data for the full period. One involved the former Sydney monorail.<sup>18</sup> The remaining two were the subject of investigation by ATSB as follows:

- February 2011, Adelaide (South Australia): collision between two suburban passenger trains. One train carrying 17 passengers struck another train carrying 22 passengers. There were no injuries as a result of the collision but both trains sustained minor damage. The immediate cause of this collision was a signal passed at danger without authority.
- May 2010, Newbridge (New South Wales): an long distance passenger train carrying 71 passengers collided with a stationary on-track excavator. The operator of the track machine was fatally injured. The immediate cause issue was an irregularity in the issue of the authority for track work.

Collisions not involving passenger trains dominate the historical record of Figure 7. These comprise freight, on-track infrastructure maintenance rolling stock, RRVs and out-of-service passenger trains. While the likely consequences are less than that of passenger trains, serious accidents do occur. A collision between two RRVs on an isolated tourist and heritage railway in June 2013 resulted in serious injury to the driver of one vehicle.<sup>19</sup> The ATSB also investigated a fatal collision in WA in May 2012 between track machines running in convoy.<sup>20</sup>



**Figure 7: Running line collisions between trains, 2009-10 to 2013-14**

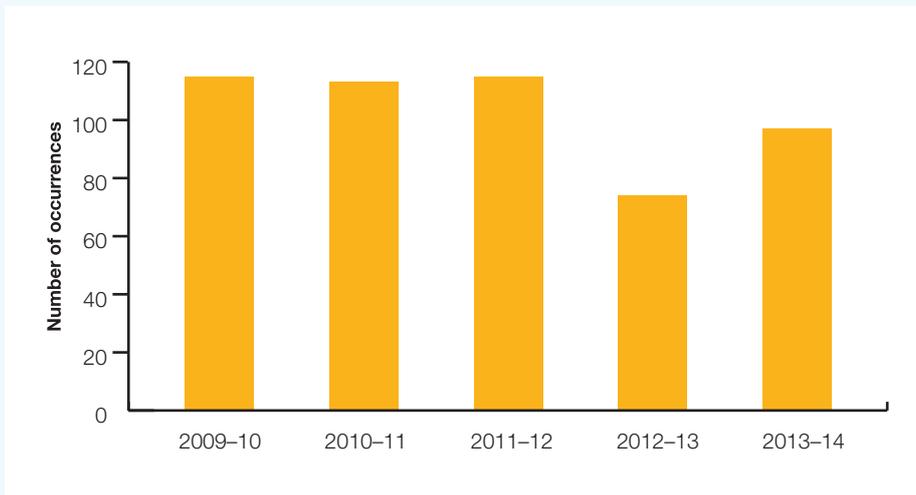
All railway operations regulated under RSNL. Includes collisions on non-running lines affecting the safety of running lines. Excludes events in which one train is struck by an out of gauge component of another train on an adjacent line. Passenger train include tourist and heritage trains on mainlines and isolated lines. Victorian data not available prior to 2013-14.

The *Annual Safety Report 2012 to 2013* reviewed some of the immediate causes of collisions involving passenger trains, and highlighted instances of trains exceeding the limit of their authorised movement as important precursors to collisions. On signalled systems these occurrences are notified as a signal passed at danger without authority (SPAD). A SPAD was the immediate cause of the February 2011 collision in Adelaide and the application of rules for passing signals at danger is also being examined for the aforementioned passenger train collision at Altona in August 2014. The five year history of SPADs for passenger operations other than those in Victoria is summarised in Figure 8. While the aggregated count for 2013-14 across operators is higher than the previous year, the count across recent years remains well below the longer-term historical levels.

18 The Sydney monorail ceased operation on the 30th June 2013

19 Australian Transport Safety Bureau, *Collision between two road-rail vehicles near Rinadeena, Tasmania, on 4 June 2013*, Rail Occurrence Investigation RO-2013-014, ATSB, Canberra, 11 June 2014

20 Australian Transport Safety Bureau, *Collision between two road/rail vehicles at Haig, WA on 24 May 2012*, Rail Occurrence Investigation RO-2012-006, ATSB, Canberra, 15 September 2014



**Figure 8: Signal passed at danger without authority – passenger train, 2009–10 to 2013–14**

SA and NSW railway operations only. Data shown is that classified as OCG1 top event categories Driver misjudged, Completely missed while running, Start against signal. Excludes tourist and heritage operations.

#### 4.3.5. LEVEL CROSSING COLLISION

Level crossings are the primary means by which the general public may legitimately traverse the rail corridor and they present a unique set of safety hazards. Collisions between trains and road vehicles at level crossings accounted for approximately 30% of all rail fatalities in Australia between 2005 and 2009.<sup>21</sup>

There are at least 25,000 level crossings in Australia.<sup>22</sup> Approximately 95% are road crossings, with the remainder solely for pedestrian use. Over half of all road crossings are private or maintenance road crossings, usually equipped with passive warnings devices such as stop or give way signs. The remainder are public road crossings. One third of public road crossings are actively controlled; for example, equipped with flashing lights and boom gates to manage road traffic movement.

There were 21 level crossing collisions between trains and road vehicles in 2013–14 on railways regulated under the RSNL. They consisted of:

- 13 collisions involving in-service passenger trains
- two collisions involving empty passenger trains
- six collisions involving freight trains.

Two of the 21 collisions involved trains hitting cyclists with one cyclist fatality recorded (Table 2). The remaining 19 collisions are summarised in Table 10. While none of these collisions were fatal, one collision in Victoria between a passenger train and a fully laden truck and trailer resulted in minor injuries to five train passengers and two train crew. This accident was the subject of investigation by the ATSB. Three other collisions involving light road vehicles caused serious injuries to the drivers of those vehicles.

In addition to the collisions involving road vehicles, there were 16 collisions between trains and pedestrians in 2013–14. Seven of these incidents occurred in Victoria and six in South Australia, with three pedestrians receiving fatal injuries (Table 2).

21 Excluding incidents involving suspected suicide; Independent Transport Safety Regulator (ITSR), *Level crossing accidents in Australia*, ITSR, Sydney, August 2011

22 Rail Industry Safety and Standards Board, *Level Crossing Stocktake*, RISSB, Canberra, May 2009

**Table 10: Level crossing collision between train and road vehicle, July 2013 to June 2014**

All railway operations in SA, NSW, Tas., NT and Vic. regulated under RSNL. Excludes occurrences classed as suspected suicide. Excludes collisions between trains and cyclists.

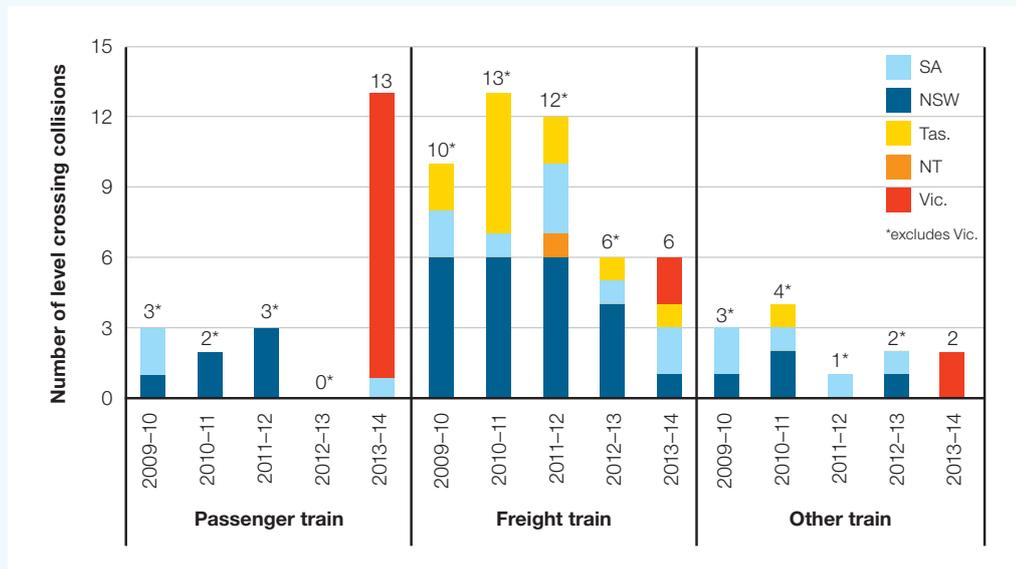
DATE	LOCATION	CONTROL	TRAIN TYPE	ROAD VEHICLE <sup>3</sup>	INJURY
10 July 2013	Whyalla, SA	Lights only	Freight	Light passenger	None reported
17 July 2013	Glenthompson, Vic.	Unprotected	Freight	Other (tractor)	None reported
19 July 2013	Frankston, Vic.	Lights and booms	Passenger (empty)	Light passenger	None reported
1 Aug. 2013	St Albans, Vic.	Lights and booms	Passenger	Light passenger	Minor injury to driver of road vehicle
7 Aug. 2013	Dandenong South, Vic.	Lights and booms	Passenger	Described as 'truck'	None reported
30 Aug. 2013	Bonbeach, Vic.	Lights and booms	Passenger	Described as 'truck'	None reported
31 Aug. 2013 <sup>1</sup>	Inverleigh, Vic.	Lights and booms	Passenger	Light passenger	Serious injury to driver of road vehicle
7 Sept. 2013 <sup>2</sup>	Mt Moriac, Vic.	Stop sign	Passenger	Heavy freight	5 minor (passengers) 2 minor (train crew)
17 Sept. 2013	Moonah, Tas.	Lights only	Freight	Light passenger	None reported
20 Nov. 2013	Chelsea, Vic.	Lights and booms	Passenger	Light passenger	None reported
4 Dec. 2013	Edithvale, Vic.	Lights and booms	Passenger	Not specified	None reported
5 Dec. 2013	Inglewood, Vic.	Give way	Freight	Light passenger	None reported
6 Dec. 2013	Epping, Vic.	Lights and booms	Passenger	Heavy freight	None reported
26 Jan. 2014	Kyogle, NSW	Stop signs	Freight	Light passenger	Serious injury to driver of road vehicle
26 Mar. 2014	Reservoir, Vic.	Lights and booms	Passenger	Light passenger	Serious injury to driver of road vehicle
15 May 2014	Aspendale, Vic.	Lights and booms	Passenger	Light passenger (trailer)	None reported
12 June 2014	Wendouree, Vic.	Lights and booms	Passenger (empty)	Light passenger	None reported
15 June 2014	Two Wells, SA	Lights and booms	Freight	Light passenger	None reported
24 June 2014	Caulfield, Vic.	Lights and booms	Passenger	Light passenger	Minor injury to driver of road vehicle

1. Subject of investigation by ATSB

2. Subject of investigation by CITS (Vic.) on behalf of ATSB

3. As per OCG1 2013 road vehicle category type or alternative descriptor as available

The five year history of level crossing collisions between trains and road vehicles is summarised in Figure 9 according to train type. For those jurisdictions with data for the full period, this figure shows the number of collisions in 2013–14 was markedly lower than the annual count of the past four years. While this suggests improvement in the management of level crossing risk, there are still many collisions each year including those involving in-service passenger trains, which expose large numbers of passengers to potential harm. Further, the ONRSR received almost 400 notifications of near misses between train and road vehicles at level crossings in 2013–14.



**Figure 9: Level crossing collision between train and road vehicle, 2009–10 to 2013–14**

All railway operations regulated under RSNL. Includes bicycles which are defined as road vehicles in the national occurrence classification scheme. Other train consists of infrastructure maintenance rolling stock, light engines, tourist and heritage on isolated railways and empty passenger trains. Victorian data not available prior to 2013–14.

#### 4.3.6. WORKFORCE STRUCK BY ROLLING STOCK

The exposure of a rail worker to the hazard of a moving train occurs in various ways. Risk modelling and analysis of local accident data highlight two primary scenarios:

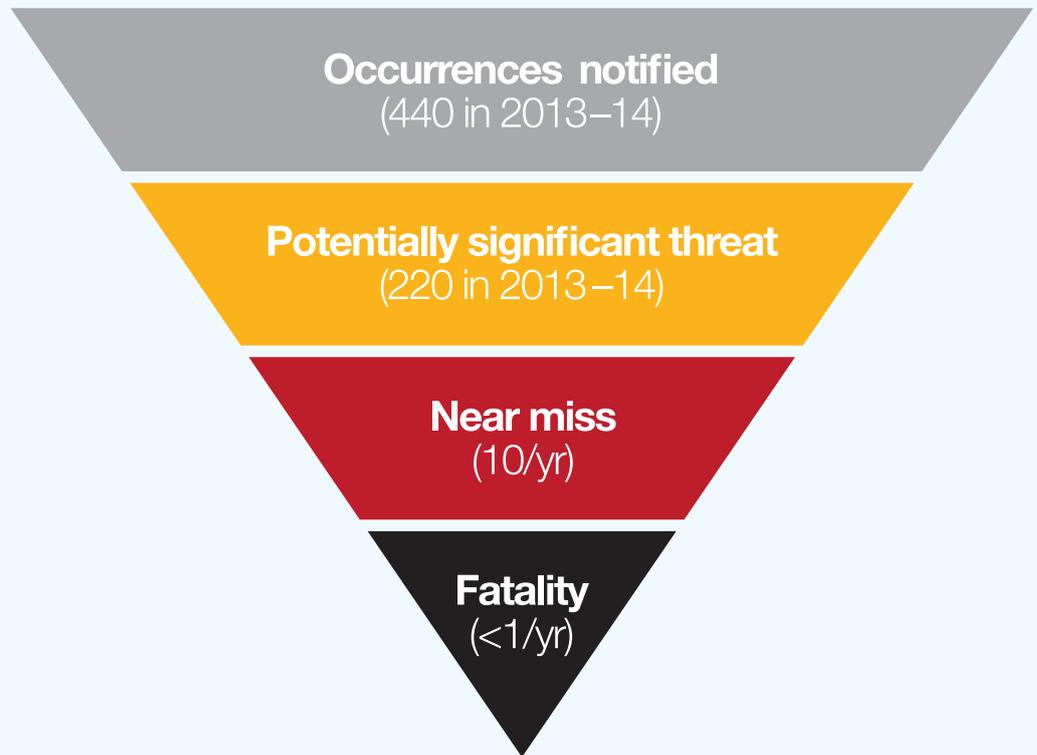
- i. Events involving individuals in close proximity to moving rolling stock; for example, shunters, train crew, security guards. A likely worst consequence in such cases is a single fatality.
- ii. Events involving a train entering a section of track where work is undertaken without authority or without protection in place. These are commonly referred to as 'worksites protection' incidents. They have a multi-fatality potential because infrastructure work usually involves multiple workers on the track at one time.

There was a single occurrence in 2013–14 in which a member of the workforce was struck by a train, reflecting the first of the above two scenarios. During shunting at Port Botany (New South Wales) a member of a freight train crew was struck by a passing wagon, though no injury resulted. The ONRSR also received several notifications of near misses involving shunters and cleaners in 2013–14.

There were no reports of track workers being struck in 2013–14. The two most recent examples of fatal strikes in the ONRSR's area of operation are May 2010 (Newbridge, New South Wales) when a passenger train collided with a RRV killing its operator, and April 2010 (Kogarah, New South Wales) when a train struck and killed one worker and narrowly missed four others.

Despite the absence of any fatalities or strikes associated with worksite protection in 2013–14 the risk remains high. Approximately 440 work-site protection breaches were notified across all railways regulated under the RSNL in 2013–14. These covered a range of circumstances in terms of the nature of 'work', the method of protection in use and the number of workers exposed. Consequently, the nature of the irregularity and potential for harm also varied.

Due to the wide variation in occurrence definitions, safeworking rules and coding conventions between data sources a review of each notified incident was performed to provide a consistent basis for discerning minor from more significant occurrences. A summary of the outcome of this exercise for 2013–14 is shown in Figure 10.



**Figure 10: Annual breakdown of work-site protection occurrences**

All figures approximate because the circumstances of each incident and significance in terms of likelihood and severity of consequence cannot be reliably determined from the limited information typically provided in an initial notification.

Approximately half of the notified occurrences involved minor breaches. An example of this type of incident is failing to remove equipment such as flags at the end of track work. The remaining occurrences appeared to represent a situation in which the safe separation between trains and work-sites was not adequately ensured i.e. a potential for significant harm. These include instances where work was undertaken without any protection being established at all; protection being placed in the wrong position; work conducted outside of the designated protected area; and work continuing after an authority had been withdrawn.

Only a small number of incidents in any given year escalate to the point where the only remaining defence against injury is emergency action on behalf of the individual(s) involved; for example, emergency braking of trains or workers jumping clear of an oncoming train. It is difficult to determine the number of these incidents because of the typically brief descriptions provided in incident reports but it is estimated to be in the order of 10 occurrences per year on average. A sample of such incidents in 2013–14 is presented in Table 11.

**Table 11: Examples of significant worksite protection occurrences, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL. Shown are occurrences that are either (i) the subject of independent investigation or (ii) an example of an occurrence that has escalated to the point of a near miss.

DATE	LOCATION	SUMMARY
10 July 2013 <sup>1</sup>	Revesby, NSW	Area controllers set worksite protection limits at the wrong location resulting in passenger train entering section of track where work was to be performed.
16 Aug. 2013	Whittingham, NSW	Driver of freight train travelling at 60 km/h sighted worker on track facing away from the train. Sounded horn and worker jumped clear of the train.
18 Sept. 2013	Bondi Junction, NSW	Driver of passenger train travelling at 40 km/h observed three workers cross the tracks in front of the train. Emergency brakes applied and train stopped short of workers by 60 m.
29 Sept. 2013	Wayville, SA	Three workers disembarked from track machine and commenced track work. Other workers in the area warned workers to get out of the way of approaching freight train.
29 Oct. 2013 <sup>2</sup>	Glenrowan, Vic.	Protection officer removed protection equipment (signage and detonators) without informing workers. Passenger train service narrowly avoided hitting track equipment.
27 Nov. 2013 <sup>3</sup>	East Maitland, NSW	Driver of freight train observed workers on track and applied emergency brakes. The lookout's view of the approaching train was hindered by a train on an adjacent track.
21 Dec. 2013 <sup>1</sup>	Moss Vale, NSW	Passenger train passed a stationary freight train on an adjacent line. This alerted freight train crew to the fact that worksite protection they had sought was not in place.
1 Jan. 2014	Moss Vale, NSW	Driver of freight train travelling at approximately 70 km/h observed crew from another train standing on the track. Train was within 70 m of crew when they moved clear.
24 Jan. 2014	Beveridge, Vic.	Driver of passenger train observed an excavator and worker on the track. Driver applied emergency brakes and excavator and worker moved clear before train passed.
2 Feb. 2014	Kingsgrove, NSW	Driver of passenger train observed two workers on track facing away from the train. Driver sounded horn and applied emergency brakes.
6 Mar. 2014 <sup>2</sup>	Springhurst, Vic.	Freight train approached a flagman displaying a yellow flag indicating the need to stop at a second flagman protecting a worksite. Despite emergency braking the train stopped 100 m beyond the second flagman.
1 June 2014	Melbourne, Vic.	Workers entered City Circle tunnel on the understanding it was protected from train movements. They had entered the wrong tunnel (protection applied to another tunnel).

1. Subject of investigation by OTSI (NSW) on behalf of ATSB

2. Subject of investigation by ATSB

3. Subject of investigation by OTSI (NSW)

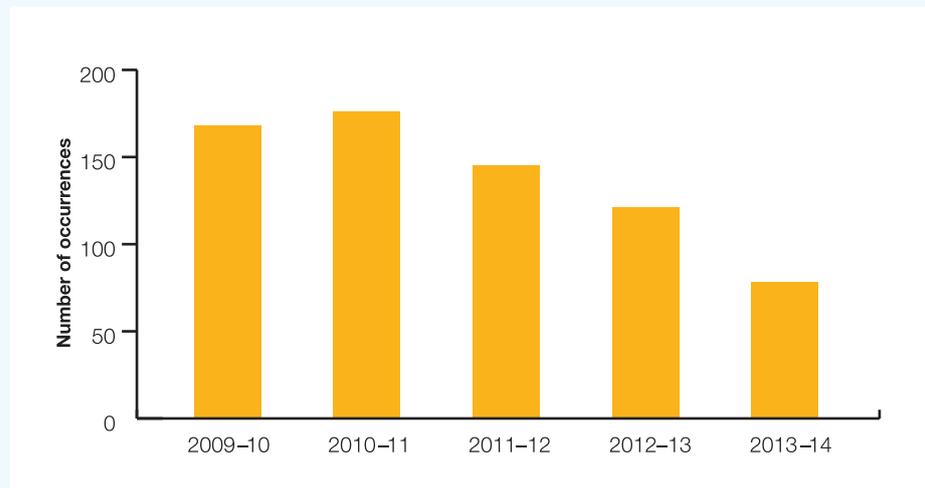
#### 4.3.7. FIRE

There were 611 fires in 2013–14 on railways regulated under the RSNL. These consisted of:

- line side fires (more than 60% of notifications). The majority were grass and rubbish fires either within or adjacent to the rail corridor. Several large bushfires in Victoria in early 2014 caused extensive damage to track and infrastructure and closure of lines for several days.
- train fires (approximately 20% of notifications). Most of these involved arson on metropolitan passenger trains. Freight train fires were associated primarily with locomotives faults.
- fires on or adjacent to stations (less than 20% of notifications). These generally involved small fires in bins, station toilets or sleeper fires adjacent to platforms.

No fatalities or serious injuries were reported for 2013–14. There were two minor injuries to employees – a worker received a minor burn while attempting to extinguish a grass fire at Junee (New South Wales) and one worker was taken to hospital in relation to a large electrical fire in a rolling stock maintenance centre at Eveleigh (New South Wales).

The *Annual Safety Report 2012 to 2013* noted that at least half of the fire safety risk on the rail network is associated with passenger trains, by virtue of large numbers of people exposed in such situations. There were 94 passenger train fires in 2013–14 with most involving arson on the Sydney MRA. The five year history of passenger train fire on railways other than those in Victoria is summarised in Figure 11. This shows a significant decrease over the five year period, associated with the MRA which represents approximately 95% of the passenger train fires shown.



**Figure 11: Passenger train fires, July 2012 to June 2013**

SA and NSW railway operations only. Data shown is that classified as OCG1 top event category Fire – on train.

Despite the apparent improvement in management of passenger train fires, potentially high risk incidents occurred on passenger trains and in other situations during 2013–14. Several examples of these are provided in Table 12. The majority of incidents involved passenger trains on open sections of track. As noted in last year's report, fires in underground stations pose a unique set of risks relevant to underground sections of the Sydney and Melbourne networks. Apart from several small paper and sleeper fires in underground sections of these networks no significant incidents were observed for 2013–14; for example, fires leading to emergency station evacuations.

**Table 12: Examples of significant train fires, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL. Shown are occurrences that are either (i) the subject of independent investigation or (ii) an example of an occurrence that has escalated to the point of a near miss.

DATE	LOCATION	SUMMARY
3 July 2013	Parramatta, NSW	Air conditioning unit of passenger train caught fire. Train evacuated and emergency services attended. No injuries reported.
8 Aug. 2013	Elphinstone, Vic.	Freight train locomotive caught fire in tunnel. Driver reversed train out of tunnel and before evacuating. Fire extinguished by country fire authority. No injuries reported.
4 Sept. 2013	Broadford, Vic.	Sticking brake on passenger train caught alight. Driver manually released doors on carriage and transferred passengers to other cars. No injuries reported.
22 Oct. 2013	Morisset, NSW	Fire in toilet of interurban passenger train. Passengers were evacuated from train and fire extinguished by fire brigade. No injuries reported.
22 Nov. 2013	Katoomba, NSW	Fire in toilet of interurban passenger train. Passengers were evacuated from train and fire extinguished by fire brigade. No injuries reported.
26 May 2014	Eastwood, NSW	Guard of passenger train reported flames from underneath train and sparks from above train. Train terminated and passengers evacuated from platform. No injuries reported.
5 June 2014 <sup>1</sup>	Awaba, NSW	Fourth locomotive of coal train caught on fire. Fire brigade called to extinguish fire. No injuries reported.
14 June 2014	Sandgate, NSW	Driver of diesel passenger train reported an engine fire. Fire brigade attended but train's fire suppression system activated and extinguished fire. No injuries reported.

1. Subject of investigation by OTSI (NSW) on behalf of the ATSB

#### 4.3.8. OTHER RISKS

Some of the risks identified previously in the ONRSR *Annual Safety Report 2012 to 2013* are not readily estimated or monitored directly from occurrence-based data. This is because they occur infrequently, relevant precursor events are not defined as occurrences, or significant events are not easily distinguished from a larger pool of events within a broadly defined category. Key risks in this regard are summarised below.

##### **Train collision with buffer**

A buffer stop is a structure positioned at the end of a rail line to prevent rolling stock moving beyond the end of the track. The collision risk is associated with passenger trains arriving at terminal or 'dead end' station platforms.

There was one collision between a passenger train and a buffer stop in 2013–14. In September 2013 a passenger train struck a wooden buffer stop at Sydney Terminal. No injuries were reported although the buffer stop and train were damaged. Several other incidents in 2013–14 involved shunting of passenger rolling stock, however they were not in-service at the time of the collisions.

The ATSB has recently completed an investigation of a serious collision between a passenger train and buffer stop in Queensland<sup>23</sup> in January 2013. The train was carrying 19 people and struck the buffer stop at approximately 30 km/h, subsequently colliding with a station building. Several people were treated for minor injuries resulting from this accident.

The ATSB investigation highlighted potential situations where conditions and circumstances relevant to this type of accident are not clearly defined within the national occurrence notification and classification guidance; for example, trains sliding along rails due to reduced adhesion. The ONRSR will incorporate a revision to OCG1 to address this matter as an interim measure, pending a general update to the suite of notification-related guidance and documentation.

##### **Train collision with other objects**

Results of risk modelling and analysis of local data show that collisions between trains and track obstructions are a common immediate cause of derailment — four of the past 10 passenger train derailments on railways regulated under the RSNL (Figure 4) were associated with a train striking an object.

The vast majority of collisions with objects represent hazards and events that pose no direct threat to safety and have little chance of escalation; for example, trains hitting small objects such as umbrellas, witches hats and birds.

Within the large pool of minor incidents notified there exists a small number of events representing the precondition for escalation to a serious consequence. These include larger or high mass objects fouling tracks such as road vehicles, entire trees and landslides. Some of these are more relevant to certain types of operation; for example, the likelihood of collision between passenger trains and cars is higher on light rail networks where corridors are shared with road traffic.

While the likelihood of such events is lower on heavy rail, consequences can be greater due to higher train speeds. Examples of some potentially serious occurrences are shown in Table 13.

23 Australian Transport Safety Bureau, *Collision of passenger train T842 with station platform, Cleveland, Queensland, 31 January 2013*, Rail Occurrence Investigation RO-2013-005, ATSB, Canberra, December 2013

**Table 13: Examples of significant collisions between trains and objects, July 2013 to June 2014**

All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL. Shown are occurrences that are either (i) the subject of independent investigation or (ii) an example of an occurrence that has escalated to the point of a near miss.

DATE	LOCATION	TRAIN	SUMMARY
8 July 2013	Capital Square, NSW	Light Rail	Light rail vehicle struck taxi which failed to stop at road traffic signal. No injuries reported.
26 Nov. 2013	Creswick, Vic.	Freight	Freight train hauling empty wheat wagons struck an abandoned car trailer. Minor damage to brake pipe on locomotive. No injuries reported.
16 Dec. 2013	Chiltern, Vic.	Passenger (empty)	Passenger train struck abandoned road vehicle. No injuries reported.
10 Jan. 2014	Blaxland, NSW	Freight	Freight train struck a road vehicle that fell off overhead bridge onto track. Driver of road vehicle escaped before collision.

### Structural collapse

Structural collapse and the crushing forces of large objects generally were highlighted as relevant risks in 2012–13. The most frequent type of event associated with this risk is workers being crushed. There were no events of this nature notified in 2013–14. The last fatality on railways regulated by the RSNL was in 2009 at Farley (New South Wales) — a track worker was killed and four others seriously injured when struck by a load falling from a crane at a construction site. The ONRSR has a Memorandum of Understanding with the Heads of Workplace Safety Authorities for coordinated regulatory response in such cases.

A small proportion of this risk is associated with trains being crushed. These are rare events — the average frequency of these types of events in the UK is estimated at less than one event every 100 years. This profile aligns generally with the accident history in Australia. Over 35 years ago, 83 people were killed when an urban passenger service derailed, struck and was then crushed by an overline road bridge in Granville, Sydney.

The risk of structural collapse in the ONRSR's area of operation is associated with specific points of the network. Examples include underground lines and stations on sections of the Sydney and Melbourne central business district. On above-ground sections of the network, the threat is posed by a variety of lineside structures including overline bridges, car parks and commercial/residential development adjacent to the rail corridor.

# Appendices



## Appendix A: Data tables

Regulation 57 of the RSNL requires rail transport operators to notify the ONRSR of defined rail safety occurrences (Appendix D).

The following table summarises notified occurrences and periodic activity data for the 2013 to 2014 financial year, based on information notified to the ONRSR or its predecessors. Victorian data includes data supplied by TSV for the period 1 July 2013 to 18 May 2014.

Users of this data should note the following:

- Different occurrence category definitions and coding conventions apply to the data for some categories.
- Some occurrence categories are broadly defined in OCG1 and data may therefore include events of both major and minor significance.
- Data for some categories will differ to that summarised elsewhere in the report, for example, activity data covers a broader scope of operations than the benchmarking analysis of section 4.3.
- As part of its ongoing work program, the ONRSR progressively reviews and validates historical records according to priorities for regulatory information.

## Annual count of notifiable occurrences, July 2013 to June 2014

Number of fatalities and number of top event occurrences. All railway operations within SA, NSW, Tas., NT and Vic. regulated under RSNL.

CATEGORY <sup>(a)</sup>	SA	NSW	TAS.	NT	VIC. <sup>(b)</sup>
Fatality – passenger	0	2	0	0	1
Fatality – workforce	0	1 <sup>(c)</sup>	0	0	0
Fatality – public <sup>(d)</sup>	3	40	1	0	45
Derailment – running line	15	28	6	2	25
Collision – running line – between trains	0	2	0	0	3
Collision – running line – with rolling stock	0	1	0	0	1
Collision – running line – with person	2	21	0	0	14
Collision – running line – with infrastructure	11	27	0	1	66
Collision – running line – with road vehicle not on a level crossing	5	3	0	0	4
Level crossing collision – with road vehicle	3	1	1	0	16
Level crossing collision – with person	6	1	1	1	7
Signal passed at danger without authority (driver misjudged, completely missed, start against signal)	33	174	0	0	92
Signal passed at danger without authority (signal restored as train approached)	38	283	0	0	290
Load irregularity (door open, load shift, out of gauge, uneven distribution, lashings loose)	225	181	1	14	34
Running line track irregularities (broken rail – detected outside of maintenance inspection; misaligned track)	233	668	42	8	172
Industry alcohol testing <sup>(e)</sup>					
no. tests	18,584	207,264	426	1,106	650 <sup>(f)</sup>
no. positive (detection rate %)	8 (0.04%)	55 (0.03%)	2 (0.47%)	1 (0.09%)	1 (0.15%)
Industry drug testing <sup>(e)</sup>					
no. tests	3,522	19,894	146	215	783 <sup>(f)</sup>
no. positive (detection rate %)	8 (0.23%)	89 (0.45%)	3 (2.1%)	0 (0%)	1 (0.13%)
Passenger train kilometres (million km)	5.1	45.5	0.04	0.21	33.8
Freight train kilometres (million km)	9.2	19.1	0.8	1.5	4.7
Track length (as of 30 June 2014) (km)	4,722	10,050	896	1,738	5,640

(a) Top event occurrence categories as defined in OCG1 2013 except for Victoria

(b) Excludes operations regulated under Victorian local law. Refer to TSV for more information <[www.transportsafety.vic.gov.au](http://www.transportsafety.vic.gov.au)>

(c) Health-related fatality of an on-duty rail safety worker

(d) Includes fatality associated with trespass and suspected suicide

(e) Excludes refusal to be tested; NSW data has a broader coverage than other jurisdictions because it includes data collected for the purposes of regulation 28, in addition to the requirements under regulation 57 (notifiable occurrences)

(f) June 2014 data only. Victorian drug and alcohol testing data prior to 19 May 2014 not available at the time of writing

# Appendix B: Scope and methods

## GEOGRAPHIC COVERAGE

Descriptions and statistics in this report generally apply only to railways within the states and territories regulated under the RSNL as of 30 June 2014 — South Australia, New South Wales, Tasmania, Northern Territory and Victoria.

## RAILWAY OPERATIONS

The analysis covers all railway operations in each state and territory administered under the RSNL with the exception of Victoria. Some Victorian railways continue to be regulated under local Victorian law administered by TSV.<sup>24</sup> These comprise the metropolitan tram operator and standalone tourist and heritage tram railways.

## REPORTING PERIOD

A minimum reporting period of 1 July 2013 to 30 June 2014 applies to this report. This includes Victoria which enacted the RSNL on 19 May 2014. For states and territories other than Victoria longer term data was used when available, for example, to examine incident trends over time. A maximum period of five years applied in these cases.

## DATA AND SOURCES

Notifiable occurrence data is based on reports submitted by rail transport operators in accordance with section 121 of the RSNL and regulation. The sources of notifiable occurrence records were:

- South Australia – ONRSR RegIS database.
- New South Wales – Independent Transport Safety Regulator (ITSR) PRISM database.
- Tasmania – ONRSR RegIS database (2013 and 2014); local spreadsheet (2009 to 2012).
- Northern Territory – ONRSR RegIS database (2011 to 2014); local spreadsheet (2009 to 2011).
- Victoria – ONRSR RegIS database (from 19 May 2014); TSV TSAARS database (to 18 May 2014).

Activity data (for example, train km travelled) is based on monthly returns supplied by rail transport operators in accordance with section 120(3) of the RSNL. The specific information to be provided is defined in regulation 56 of the National Regulations. The sources of activity data were:

- South Australia, Tasmania and Northern Territory – ONRSR spreadsheets.
- New South Wales – ITSR PRISM database.
- Victoria – ONRSR spreadsheets (from 19 May 2014); TSV (to 18 May 2014).

## DEFINITIONS

Most of the statistics in this report are based on the top event occurrence category definitions of the national occurrence classification guideline, OCG1 2013. The primary exception to this is Victorian data prior to 19 May 2014, some of which is classified according to an earlier version of the classification guidelines. This Victorian data has not been recoded to OCG1 2013 but in most cases there is direct correspondence between Victorian data definitions and of OCG1 2013.

24 Further details are available at TSV's website <[www.transportsafety.vic.gov.au](http://www.transportsafety.vic.gov.au)>

Some report-specific definitions are used and these are generally described in the body of the report. Noteworthy cases are:

**Non-fatal injury:** the national occurrence guideline defines two categories of non-fatal injury:

- serious injury – requiring admittance to hospital
- minor injury – requiring medical attention but not hospital admission.

The quality of injury-related data varies markedly across data sources. The main issues are:

- absence of injury-related data items; for example, severity, description, person type
- injury classification reduced to a presence/absence scale
- little or no information on the level of medical attention received<sup>25</sup>
- use of alternative severity criteria such as occupational-type injury scales ('lost time injury')
- conceptual differences; for example, 'injury' in terms of energy-related damage, emotional stress or a health-related condition
- different conventions used to grade injury when supporting information is lacking.

For this report, the event of ambulance transported has been adopted as a criterion to differentiate between injuries of greater and lesser significance. Information to support this criterion is generally available in the occurrence description and provides a consistent basis for comparison. It should be noted that this criterion will be far broader than the hospital admittance criterion of OCG1 2013 and also could not be reliably determined in all cases.

**Serious and minor injury:** when these terms are used they have the same meaning as the definition in the national occurrence classification scheme (noting judgement is required in some cases).

**Strike:** is a train or rolling stock colliding with a person.

## DATA COMPARABILITY

Issues of consistency are relevant both within the report and between this report and other information products, for example, the former ATSB safety statistics bulletin.<sup>26</sup>

**Internal consistency:** statistics for a given incident category may differ between sections of this report because definitions and 'top event' conventions vary according to need. For example, some benchmarking statistics are based on an initiating event rather than a top event to align with the overseas data to which it is compared. Another example is collision between trains — some risk-based summaries exclude instances of out of gauge equipment on one train hitting a train on an adjacent line whereas such events are included the standard OCG1-based summary of Appendix A.

**Comparability with other sources:** The data within this report may differ to other sources that utilise the same data sources and coding specifications. This will be due in part to the specific data collection and preparation methods used for this report, which included identification and correction of some longstanding and significant errors in historical data.

**Past and future releases:** The statistics presented in this report may be subject to future change as the ONRSR develops and refines its systems for data capture, validation and reporting.

25 For example, whether or not the person was admitted to hospital as a definitive basis for coding as a serious injury

26 Australian Transport Safety Bureau (ATSB), *Australian Rail Safety Occurrence Data, 1 July 2002 to 30 June 2012*, ATSB Transport Safety Report, RR-2012-00, ATSB, Canberra, 2012

# Appendix C: Glossary

## SOURCE OF DEFINITIONS

Most definitions are taken from the national occurrence classification guideline (OCG1, 2013), the Glossary for the National Codes of Practice<sup>27</sup>, the Glossary of Railway Terminology<sup>28</sup> and the Sydney Trains Railsafe website.<sup>29</sup> Level crossing definitions are from the NSW Staysafe Committee.<sup>30</sup> Some descriptions may differ from definitions contained in the legislation — for compliance purposes readers should refer to section 4 (Interpretation) of the RSNL.

**Accreditation** requirements are outlined in the RSNL. Rail transport operators must be accredited by the ONRSR or be exempt from the requirement to be accredited under the Law. The granting of accreditation indicates that a rail transport operator has demonstrated it has the competence and capacity to manage the risks to safety associated with the railway operations for which it is accredited.

**Ballast** refers to material, usually stone, that surrounds the sleepers to hold them in place.

**Bank locomotive** is an additional locomotive provided at the rear of a train to assist it up a steep hill.

**Broad gauge** is track gauge of 1600 mm (5'3").

**Buffer stop** is a structure erected across and at the end of a track at main line terminals or dead end sidings which is intended to stop rolling stock.

**Catchpoints** are single or double bladed points used to derail trains or rolling stock that might enter or foul an adjacent running line.

**Consist** is the listed order of the vehicles arranged to make up a complete train.

**Freight trains** are designed and used for carrying goods such as coal and minerals, grain, fuel, livestock and containers.

**Infrastructure** generally includes the track and its components, for example, rails, sleepers, bridges, ballast, and signalling equipment. Generally the term does not include stations or terminals.

**Intermodal** is freight carried via at least two different modes of transport such as rail to road, rail to sea. The usual form of intermodal freight is containerised freight.

**Level crossing** is any crossing of a railway at grade, providing for both vehicular traffic and other road users including

pedestrians. The control of railway crossings is classified as either active or passive according to the following criteria:

- active control – control for the movement of vehicular or pedestrian traffic across a railway crossing by devices such as flashing signals, gates or barriers, or a combination of these, where the device is activated prior to and during the passage of a train through the crossing
- passive control – control for the movement of vehicular or pedestrian traffic across a railway crossing by signs and devices, none of which are activated during the approach or passage of a train and which rely on the road user, including pedestrians, detecting the approach or presence of a train by direct observation.

In addition to actively and passively controlled crossings there are also occupational or accommodation crossings between private property and public roads, maintenance crossings and illegal crossings.

**Light locomotive(s)** means one or more locomotives coupled together without any non-powered vehicles attached.

**Marshalling** is the process of arranging the order of wagons in a train's consist.

**Narrow gauge** is the track gauge of 1067 mm (3'6").

**National Regulations** means the Rail Safety National Law National Regulations 2012, approved by the Standing Council on Transport and Infrastructure and made under the Rail Safety National Law.

27 Australasian Railway Association, *Glossary for the National Codes of Practice and Dictionary of Railway Terminology*, ARA, Canberra, May 2009

28 Rail Industry Safety and Standards Board, *National Guideline, Glossary of Railway Terminology, Version 1.00*, RISSB, Canberra, December 2010

29 <railsafe.org.au>, viewed 8 October 2014

30 NSW Staysafe Committee, *Report on updating progress on railway level crossing safety, rep. no. 254/09*, Staysafe Committee, Parliament of NSW, June 2009

**Near miss** in the national occurrence classification scheme is any occurrence where the driver of a moving train takes emergency action, or would have if there was sufficient time, to avoid impact with a person, vehicle or other obstruction and no collision occurred. Emergency action includes continuous audible warning and/or brake application.

**Network Control Officer** authorises and may issue occupancy authorities, and manages rail traffic paths to ensure safe and efficient transit of rail traffic in the network.

**Passenger journeys** in urban areas measures the number of point to point journeys for each passenger, irrespective of the number of vehicles or mode used for the trip. For non-urban areas, it measures the number of point to point journeys for each passenger, but each change of vehicle along the route is a separate journey.

**Passenger trains** are trains designed and used for carrying passengers.

**Rail infrastructure manager** is the person who has effective control and management of rail infrastructure of a railway, whether or not the person owns the rail infrastructure or has a statutory or contractual right to use the rail infrastructure or to control, or provide, access to it.

**Rail Safety National Law** means the law which has been enacted as a Schedule to the Rail Safety National Law (South Australia) Act 2012.

**Rail safety worker** is an individual who has carried out, is carrying out or is about to carry out rail safety work. Rail safety work is defined in section 8 of the Rail Safety National Law.

**Rail transport operator** is a rail infrastructure manager, a rolling stock operator, or both.

**Rake** is rolling stock, usually not formed as a train, moved as a unit during shunting and marshalling.

**Risk** is the effect of uncertainty on objectives. Risk is often expressed in terms of a combination of the consequences of an event and the associated likelihood of occurrence.

**Road/rail vehicle** is a vehicle that is capable of running on both road and rail. Often these are standard road vehicles that have a pair of flanged rail wheels on the front and rear.

**Rolling stock** means any vehicle that operates on or uses railway track but does not include a road/rail vehicle when the vehicle is not operating on a railway.

**Rolling stock operator** is a person who has effective control and management of the operation or movement of rolling stock on rail infrastructure for a particular railway, but does not include a person merely because the person drives the rolling stock or controls the network or the network signals.

**Running line** is railway track used primarily for the through movement of trains.

**Safeworking system** is an integrated system of operating procedures and technology for the safe operation of trains and the protection of people and property on or in the vicinity of the railway.

**Shunt** is the movement of trains or rolling stock for the purpose of marshalling trains or altering their consist.

**Siding** is a portion of railway track, connected by points to a running line or another siding, on which rolling stock can be placed clear of the running line.

**Standard gauge** is the name given to the gauge of track of 1435mm (4'8½").

**Terminal** is a place where freight is loaded onto or unloaded from trains. A passenger terminal is a place where passenger trains commence or terminate for passengers to board or alight.

**On-track infrastructure maintenance vehicle** is a specialised piece of rail-bound rolling stock used to maintain infrastructure.

**Train** is two or more units of rolling stock coupled together, at least one of which is a locomotive or other self-propelled unit; or a unit of rolling stock that is a locomotive or other self-propelled unit.

**Train kilometre** refers to the total kilometres travelled by a rolling stock operator's trains.

**Train order** is an instruction issued by the Train Controller using a computerised system that maintains blocking facilities against the issue of main orders for conflicting movements and occupancies.

**Wrong side failure** refers to a failure in the signalling system which results in the signal displaying a less restrictive aspect than required, for example, showing a proceed indication when the correct indication should be stop.

**Yard** is a network of railway tracks and sidings for marshalling, storage, and/or maintenance of locomotives, engines or wagons.

## Appendix D: Notifiable occurrences

Under section 121 of the RSNL rail transport operators are required to report to the Regulator, or another authority specified by the Regulator, all notifiable occurrences that happen on, or in relation to, the operator's railway premises or railway operations.

Notifiable occurrences are defined in the section 4 of the RSNL as any accident or incident associated with railway operations (a) that has, or could have, caused significant property damage; or serious injury; or death; or (b) that is, or is of a class that is, prescribed by the national regulations to be a notifiable occurrence or class of notifiable occurrence.

For the purposes of reporting notifiable occurrences, regulation 57 of the National Regulations defines the following notifiable occurrence classes:

### (a) Category A notifiable occurrences

- i. an accident or incident that has caused death, serious injury or significant property damage
- ii. a running line derailment
- iii. a running line collision between rolling stock
- iv. a collision at a road or pedestrian level crossing between rolling stock and either a road vehicle or a person
- v. a suspected terrorist attack
- vi. an accident or incident involving a significant failure of a safety management system that could have caused death, serious injury or significant property damage
- vii. any other accident or incident likely to generate immediate or intense public interest or concern

### (b) Category B notifiable occurrences

- i. a derailment, other than a running line derailment
- ii. a collision involving rolling stock, other than a collision described in paragraph (a)(iii) or (iv)
- iii. an incident at a road or pedestrian level crossing, other than a collision described in paragraph (a)(iv)
- iv. an incident in which a vehicle or vessel strikes an associated railway track structure
- v. the passing of a stop signal, or a signal with no indication, by rolling stock without authority
- vi. an accident or incident where rolling stock exceeds the limits of authorised movement given in a proceed authority
- vii. a rolling stock run-away
- viii. a failure of a signalling or communications system that endangers, or that has the potential to endanger, the safe operation of trains or the safety of people, or to cause damage to adjoining property
- ix. any slip, trip or fall by a person on railway premises

- x. a person being caught in the door of any rolling stock
- xi. a person suffering from an electric shock directly associated with railway operations
- xii. any situation where a load affects, or could affect, the safe passage of trains or the safety of people, or cause damage to adjoining property
- xiii. an accident or incident involving dangerous goods that affects, or could affect, the safety of railway operations or the safety of people, or cause damage to property
- xiv. any breach of a network rule
- xv. any breach of the work scheduling practices and procedures set out in the rail transport operator's fatigue risk management program
- xvi. the detection of an irregularity in any rail infrastructure (including electrical infrastructure) that could affect the safety of railway operations or the safety of people
- xvii. the detection of an irregularity in any rolling stock that could affect the safety of railway operations
- xviii. a fire or explosion on, in, or near, rail infrastructure or rolling stock that endangers the safety of railway operations or the safety of 1 or more people, or causes service terminations or track or station closures
- xix. any incident on railway property where a person inflicts, or is alleged to have inflicted, an injury on another person
- xx. a suspected attempt to suicide
- xxi. the notification that a rail safety worker employed by a rail transport operator has returned a result to a test designed to determine the concentration of drugs or alcohol in a sample of breath, blood, oral fluid or urine that suggests that the worker was in breach of a relevant safety requirement concerning the use of drugs or alcohol at a relevant time
- xxii. the infliction of wilful or unlawful damage to, or the defacement of, any rail infrastructure or rolling stock that could affect the safety of railway operations or the safety of people
- xxiii. a security incident associated with railway premises that affects the safety of railway operations, including an act of trespass, vandalism, sabotage or theft that could affect the safety of railway operations.





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ISSN: (Online) 2204-258X

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