RAIL SAFETY REPORT 2014–2015

Sydney Light Rail
nearing Central Station,
New South Wales

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Trains in Southern Cross Station, Melbourne, Victoria

THE REGULATOR'S MESSAGE

The lessons of history are often harsh but they are a fundamental resource in exercising vigilance.

Everyone in the rail industry was touched by the tragic crash of an Amtrak Northeast Regional Train in the American city of Philadelphia on 12 May 2015. Eight people were killed and more than 200 were injured in a crash that was headline news around the world.

While we are all too aware of what happened that day, what is less well-known is that 72 years earlier, on that very same curved section of track, 79 people died in a derailment.

Obviously the passage of time means this is much more a case of coincidence than connection, but if nothing else it reminds us there should never be a limit on vigilance. We must always do everything in our power to make our rail industry as safe as it can be.

Fortunately these past 12 months have been much kinder to the Australian rail industry. As this report demonstrates, we continue to build on the significant gains made since the disasters that befell the sector in the final decade of the last century and the first of this one.

But it is vital that we take time, as an industry, to understand how we are performing and why.

The ONRSR Rail Safety Report 2014 –2015 documents safety performance across Australia's rail landscape and in doing so has helped us define the areas and issues we will focus on in developing our risk-based approach to rail safety regulation.

We have examined our sources of intelligence and identified four areas of focus for the next year:

1. Track condition;
2. Track work - competency and communication;
3. Rolling stock maintenance; and
4. Road Rail Vehicle (RRV) safety.

RRV safety has been a focus for some time and while progress has been made by industry and ONRSR in this area, the underlying issues have not yet been fully addressed. RRV safety will remain a priority until ONRSR is satisfied the industry has turned the corner in terms of safety improvement.

Here in Australia rail remains one of the safest modes of transport, but the stark reality is that in the last year 78 people lost their lives as a result of incidents on our network. A further 537 were seriously injured. Then there were the many additional incidents that while not resulting in death or injury, so easily could have escalated.

Only good management will take our industry to the next level where safety is concerned, and ONRSR remains steadfast in its belief that an industry-led risk model is fundamental and will continue to push hard for its development. Until then, data like that detailed in the following pages is our best resource as we strive for better safety outcomes.

In sharing this year's Rail Safety Report, I encourage everyone to remain vigilant, learn from the past and deliver a safe and prosperous future.

Sue McCarrey
Chief Executive
National Rail Safety Regulator

ABBREVIATIONS

ALCAM	Australian Level Crossing Assessment Model
ALTRAC	Light Rail consortium, which includes Acconia, Transdev Sydney, Alstom Transport Australia and Capella Capital
AMPEAK	Asset Management Promote Educate Assist Knowledge
ARA	Australasian Railway Association
ARTC	Australian Rail Track Corporation
ATMS	Advanced Train Management System
ATP	Automatic Train Protection
ATSB	Australian Transport Safety Bureau
AVA	Application for Variation to Accreditation
CBD	Central Business District
CITS	Chief Investigator Transport Safety (Victoria)
DIRN	Defined Interstate Rail Network
GPS	Global Positioning System
ICE	In-Cab Communications Equipment
ISO	International Standards Organisation
ITSR	Independent Transport Safety Regulator (NSW)
MEWP	Mobile Elevated Working Platform
MRA	Metropolitan Rail Area (Sydney)
NCO	Network Control Officer
NLCSC	National Level Crossing Safety Committee
OC-G1	Occurrence Classification Guideline
OEM	Original Equipment Manufacturer
ONRSR	Office of the National Rail Safety Regulator
ON-S1	Occurrence Notification Guideline
OTSI	Office of Transport Safety Investigations (NSW)
PO	Protection Officer
PPP	Public Private Partnership
REPCON	Rail Voluntary and Confidential Reporting Scheme
RIM	Rail Infrastructure Manager
RISSB	Rail Industry Safety and Standards Board (Australia)
RRV	Road Rail Vehicle
RSNL	Rail Safety National Law
SFAIRP	So Far As Is Reasonably Practicable
SPAD	Signal Passed At Danger (without authority)
SWMS	Safe Work Method Statement
TasRail	Tasmanian Railway Pty Ltd
TfNSW	Transport for New South Wales
TMACS	Train Management and Control System
TLIC	Transport & Logistics Industry Skills Council
TOA	Track Occupancy Authority
TOW	Train Order Working
TSV	Transport Safety Victoria
TWA	Track Work Authority
WHS	Workplace Health and Safety
XPT	Express Passenger Train

OFFICE OF THE NATIONAL RAIL SAFETY REGULATOR (ONRSR)

Functions

The functions of ONRSR are legislated in the Rail Safety National Law (RSNL)[1] and described in ONRSR's Statement of Intent[2]. In summary they include:

- working with Rail Transport Operators, rail safety workers and others involved in railway operations to improve rail safety nationally;
- facilitating and providing advice, education and training in relation to rail safety;
- conducting research, collecting and publishing information relating to rail safety; and
- monitoring, investigating and enforcing compliance with the RSNL.

Role

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

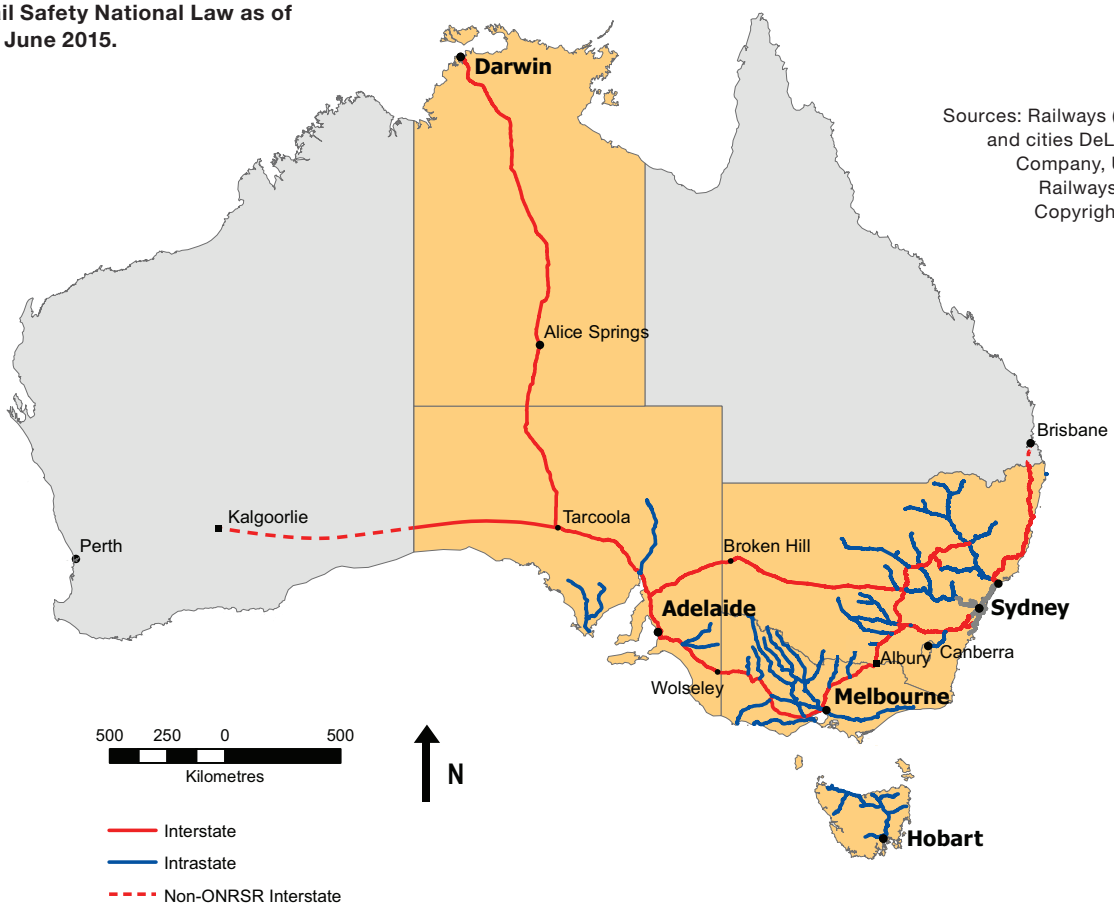
Coverage

At the start of the 2014–2015 financial year ONRSR had responsibility for rail safety regulation in the jurisdictions of South Australia, New South Wales, Tasmania, Northern Territory and Victoria[3]. ONRSR's coverage expanded on 20 November 2014 when the RSNL was enacted in the Australian Capital Territory.

The scope of ONRSR's regulatory responsibility as of 30 June 2015 is shown in Figure 1. Of the 196 accredited Rail Transport Operators within Australia, 127 (65%) conducted railway operations accredited by ONRSR. In addition to accredited railways, ONRSR has registered 118 rail infrastructure managers (RIM) 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 under the RSNL. They operate under the same safety duties that apply to accredited Rail Transport Operators.

FIGURE 1:

Major Inter and Intrastate Freight Networks Administered under the Rail Safety National Law as of 30 June 2015.



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

Rail safety regulation in practice

The RSNL defines the functions of ONRSR but does not describe the way in which ONRSR will deliver them. ONRSR's aim, as defined in its Corporate Plan[4] and Regulatory Approach[5], is to enhance and promote safety through effective risk-based regulation.

Risk-based regulation is an approach to regulation that prioritises regulatory effort on the basis of risk rather than merely focusing on compliance with prescriptive rules. Applying a risk-based approach to regulation has parallels to the RSNL's requirement for Rail Transport Operators to apply a risk-based approach to safety management. It also enables ONRSR to focus resources on the basis of risk and to improve the effectiveness of regulatory interventions.

ONRSR uses various sources of intelligence to inform its risk-based decision making, including notifiable occurrence data, investigation reports from the Australian Transport Safety Bureau (ATSB), Rail Voluntary and Confidential Reporting Scheme (REPCON) reports, Rail Transport Operator safety performance reports and the outcomes of audits, inspections and other regulatory activities.

The role of this report

ONRSR's Rail Safety Report provides a summary of rail safety performance in the 2014–2015 financial year. This performance is described in terms of safety statistics based on rail safety occurrences notified to ONRSR, and intelligence gathered through regulatory activities. ONRSR also summarises some of the key areas that have been the focus of regulatory attention. Analysis of these sources provides the focus areas for compliance and safety improvement in the coming year.

This report is designed to consider rail safety from a national perspective rather than to single out individual operators or specific incidents. It is an ongoing function of ONRSR to work with individual Rail Transport Operators on issues that pertain specifically to them. ONRSR does, however, highlight specific examples of both incidents and positive initiatives by industry where these examples demonstrate issues considered relevant to the wider industry.

ONRSR will continue to support initiatives by the Rail Industry Safety and Standards Board (RISSB) to develop an industry risk model which will inform ONRSR's knowledge of rail safety risks and, more importantly, provide risk-based intelligence for the broader rail industry. Such a model will allow for full analysis of rail safety risks faced by the industry.

SCOPE AND METHODS

The scope and methods used for the presentation of data 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 ONRSR's area of operation in the 2014 –2015 financial year — South Australia, New South Wales, Tasmania, Northern Territory, Australian Capital Territory and Victoria.

Reporting period

A minimum reporting period of 1 July 2014 to 30 June 2015 applies to this report. A longer period of data is considered where appropriate and available for analysis.

Operations

The analysis covers all railway operations within the aforementioned geographic bounds with the exception of Victoria. All tramways operating in Victoria, including the metropolitan tram operator in Melbourne and several Tourist and Heritage railways, are regulated under Victorian local law and are therefore not subject to the RSNL.

Data sources

The information presented in this report is principally based on notifiable occurrences — the initial written advice of a rail safety incident that a Rail Transport Operator submits to ONRSR in accordance with section 121 of the RSNL.

Definitions

Most statistical summaries in this report are based on the incident definitions of the national occurrence classification guideline (OC-G1, 2013)[6]. Some statistics are based on definitions specific to this report to support a more meaningful risk-based analysis of critical events.

[1] RSNL refers to the Rail Safety National Law (South Australia) Act 2012
[2] Office of the National Rail Safety Regulator, Statement of Intent 2015 to 2018, ONRSR, Adelaide, May 2015
[3] Victorian light rail operators and some Tourist and Heritage operators continue to be regulated under local Victorian law, administered by Transport Safety Victoria (TSV)
[4] Office of the National Rail Safety Regulator, Corporate Plan 2015 to 2018, ONRSR, Adelaide, July 2015
[5] Office of the National Rail Safety Regulator, ONRSR Regulatory Approach, ONRSR, Adelaide, July 2013
[6] Office of the National Rail Safety Regulator, Classifying Notifiable Occurrences. Occurrence Classification Guideline (OC-G1), Version 1.1, ONRSR, Adelaide, March 2013

RAIL SAFETY STATISTICAL SUMMARY

A large part of ONRSR's regulatory intelligence is gained from the thousands of rail safety occurrences reported each year. The RSNL in conjunction with ONRSR's occurrence notification standard[7] defines the types of events that must be notified to ONRSR and what information should be reported. Some of these events lead to an immediate response by ONRSR while others are categorised and analysed over time to build a picture of rail safety performance in the rail industry. This performance provides insight into which safety areas require focus by ONRSR and which sectors and individual operators should be the subject of this focus.

As ONRSR operates through risk-based regulation, the mere numbers of occurrences in particular categories are not the only consideration; we also consider the potential consequences of these events in order to consider the potential risk they represent. ONRSR applies this risk-based approach to the presentation of occurrence statistics by focussing on selected categories rather than all.

ONRSR is acutely aware that the capability to reliably estimate the level of risk across Australian railways does not currently exist. We welcome the work being undertaken by RISSB and acknowledge that its revised constitution explicitly includes the creation of a risk model. ONRSR will continue to support RISSB's work and the intended outcome to deliver a transparent analysis of risk that informs the work of both industry, in its management of risk, and ONRSR in its work as regulator.

The statistics presented in the following sections focus primarily on the events of the 2014–2015 financial year. The report continues a number of charts that have been published in previous years which show the last five years' performance. We have conducted benchmarking against international performance and highlighted selected events judged as the more serious in the year, from ONRSR's review.

As a national body, ONRSR presents the information in this chapter at a national level but includes jurisdictional breakdowns in Appendix A. This appendix also includes track km and train km for railway operations broken down by jurisdiction.

[7] Office of the National Rail Safety Regulator, Reporting Notifiable Occurrences. Occurrence Notification Standard (ON-S1), Version 1.1, ONRSR, Adelaide, March 2013

RAILWAY RELATED INJURY

Injury data provides a reliable and direct measure of harm associated with some railway safety hazards. There were 78 fatalities in the 2014–2015 financial year on railways regulated under the RSNL. These consisted of:

- 75 incidents that resulted in fatality and involved suspected suicide or trespass, of which three occurred at level crossings;
- two passenger fatalities; one fell from the platform and one was caught between the train and platform; and
- one public fatality, tripped and fell.

There were no injury-related workforce fatalities arising from railway-related hazards in the 2014–2015 financial year.

Appendix A1 presents summary statistics, segmented by jurisdiction.

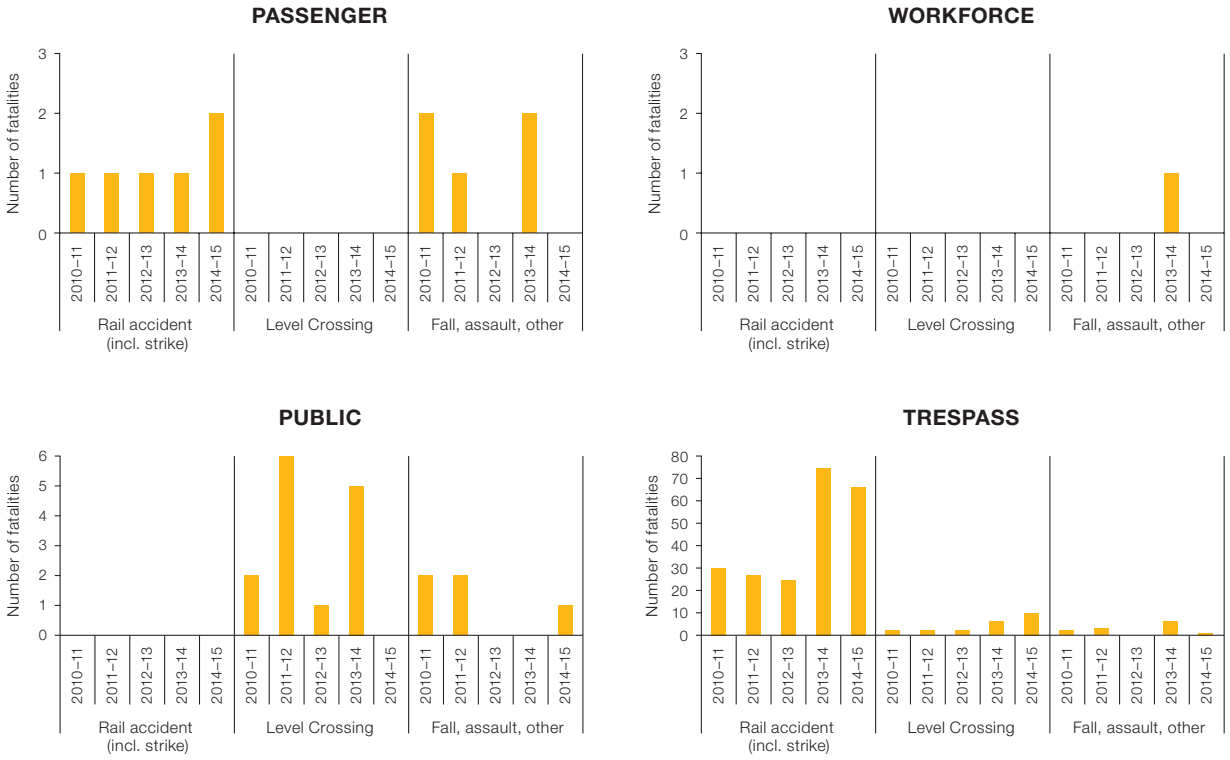
Approximately 537 people were recorded as receiving a serious injury on rail premises in the 2014–2015 financial year. More than three quarters of these cases involved falls, while another 9% were due to assault. Approximately 80% of recorded serious injuries involved passengers on the urban rail passenger networks of Sydney and Melbourne.

The five year history of fatality on railways is summarised in Figure 2.

FIGURE 2:

Railway fatal injury, July 2010 to June 2015

All rail operations regulated under RSNL as of 30 June 2015 (Victorian data from 2013–2014 onwards, ACT from 2014–2015). Non-passenger level crossing fatalities are classed as public if neither trespass nor suicide is suspected. Suspected suicide at level crossing is coded as trespass.



This figure shows:

- the number of passenger fatalities in the 2014–2015 financial year has reduced marginally;
- there were no public fatalities at level crossings in the 2014–2015 financial year, however there were eight suspected suicides and one trespass fatality at level crossings; and
- the number of trespass-related fatalities in the 2014–2015 financial year is slightly less than last year.

A comparison of the rate of fatality between ONRSR-regulated railways and selected overseas' railways is summarised in Table 1. The ONRSR-based data in Table 1 is a subset of the fatalities summarised in Figure 2 to align with the overseas data definitions. For example, for the purpose of benchmarking, local data excludes suspected suicide as these are also excluded from overseas data.

The comparison is most valid for the GB statistics because information on individual GB incidents is available to confirm consistency of scope with local data. GB is also a suitable benchmark to compare with ONRSR data because of its comparatively high rail safety performance compared with the other 27 member states of the European Union. The US data is less reliable because of definitional uncertainties.

The fatality rate for ONRSR's area of operation over the three year period (0.11 fatalities per million train km) is higher than that of GB (0.07), and is a statistically significant difference (at 95% level).

The ONRSR-based fatality rate over the three years is well below that of the US (0.62 per million train km). A review of the US figures by individual incident types suggests the rate reflects a significantly higher proportion of trespass and level crossing-related fatalities in the US compared to the figures within ONRSR's area of operation.

TABLE 1:

Railway fatality – ONRSR, Great Britain and United States

Fatalities involving passengers, workforce, public and trespass (excluding suspected suicide). These ONRSR statistics include Victoria data from 2013–2014 and ACT data from 2014–2015.

		2012–13	2013–14	2014–15	3 Years
ONRSR (SA, NSW, NT, Tas., Vic., ACT)	Fatalities Train km (million) Rate (fatalities per million train km)	5 79.2 0.06	19 118.2 0.16	9 115.7 0.08	**33** **313.1** **0.11**
Great Britain (GB)	Fatalities[1] Train km (million)[1] Rate (fatalities per million train km)	48 576.3 0.08	37 572.2 0.07	39 568.8 0.07	**124** **1717.3** **0.07**
United States (US)	Fatalities[2] Train km (million)[2] Rate (fatalities per million train km)	685 1182 0.58	744 1206 0.62	811 1220 0.67	**2240** **3608** **0.62**

[1] Source: Rail Safety and Standards Board, Annual Safety Performance Report 2014/15, RSSB, UK, 2015
[2] Source: Federal Railroad Administration Office of Safety Analysis: online database query (accessed 14 October 2015) <http://safetydata.fra.dot.gov/>

TABLE 2:

Fatalities and injuries by passengers, workforce and public, excluding trespass, July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL. Excludes fatality associated with trespass, suicide/suspected suicide.

Date	Location	Summary
05/12/2014	Footscray, VIC	A passenger was caught between the train and platform.
28/03/2015	Hurstville, NSW	A passenger fell from the platform and was struck and fatally injured.
15/05/2015	Orange, NSW	A member of the public fell down the footbridge at Orange Railway Station.

FIGURE 3:

Passenger train running line derailment July 2010 to June 2015

All railway operations regulated under RSNL (Victorian data from 2013–2014 onwards, ACT from 2014–2015). Includes derailments on non-running lines affecting the safety of running lines. "Other" here comprises of empty heavy rail passenger trains.

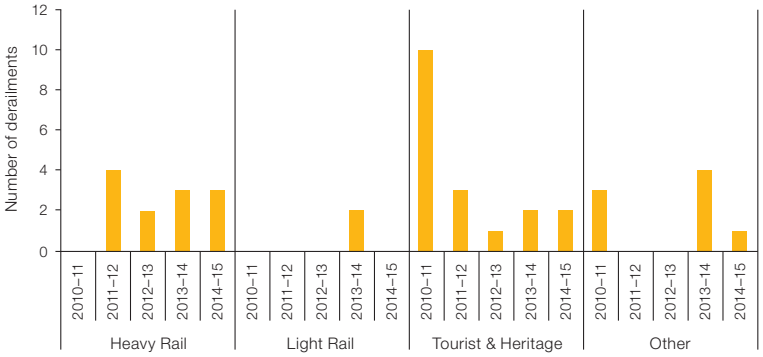


TABLE 3:

Passenger train running line derailment ONRSR and Great Britain

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. These ONRSR statistics include Victoria data from 2013–2014 and ACT data from 2014–2015.

		2012–13	2013–14	2014–15	3 Years
ONRSR (SA, NSW, NT, Tas., Vic., ACT)	Derailments	2	4	4	**10**
	Train km (millions)	48	82.9	82.3	**213.2**
	Rail (derailments per million passenger train km)	0.042	0.048	0.049	**0.047**
Great Britain (GB)	Derailments[1]	7	0	0	**7**
	Train km (millions)[1]	528	524	522	**1574**
	Rail (derailments per million passenger train km)	0.013	0.000	0.000	**0.004**

[1] Source: Rail Safety and Standards Board Annual Safety Performance Report 2014/15, RSSB, UK, 2015

PASSENGER TRAIN DERAILMENT

Passenger train derailment risk is characterised by rare events that have the potential to result in catastrophic outcomes, owing to the large numbers of passengers exposed to harm.

There were six running line passenger train derailments in the 2014–2015 financial year on railways regulated under the RSNL. These accidents involve a range of passenger train operations, as follows:

- three derailments involved heavy rail passenger trains;
- two derailments on Tourist and Heritage railways (one on mainline, one not mainline); and
- one derailment involved an empty passenger train.

Appendix A2 presents summary statistics, segmented by jurisdiction.

The five year history of passenger train derailment is summarised in Figure 3.

A comparison of the rate of mainline passenger train derailment between ONRSR regulated railways and the mainline railway of GB is summarised in Table 3.

The ONRSR data in Table 3 are a subset of the derailments summarised in Figure 3, and only includes heavy rail derailments together with mainline Tourist and Heritage passenger operations.

There is a statistically significant difference in the three year passenger train derailment rate between local and GB operations. The rate for Australian operations over the past three years (0.047 per million train km) is approximately 11 times higher than that of GB (0.004 per million train km). This result arises from GB having no passenger train derailments for two years running, which is the longest sustained period on record[8].

A summary of some significant passenger train derailments follows.

[8] Rail Safety and Standards Board Annual Safety Performance Report 2014/15, RSSB, UK, 2015

TasRail freight train, Tasmania

TABLE 4:

Selected passenger train running line derailments July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
11/07/2014	Nth Melbourne, VIC	A train derailed at low speed on the standard gauge network 1.7 km from Southern Cross Station. The train was carrying approximately 180 passengers, with some suffering minor injuries.
04/10/2014	Mangrove St. Loop, SA	Tram carrying 47 passengers derailed at low speed.
23/10/2014	Mulgrave, NSW	Passenger service derailed at catch points after the driver passed a signal at stop. There were no reported injuries. Passengers detrained and walked back to Mulgrave Station.
11/02/2015	Campbelltown, NSW	Passenger train passed signal at stop and derailed at catch points. No injuries, passengers escorted back to the platform at Campbelltown station.

FREIGHT TRAIN DERAILMENT

Freight train derailment risk is generally observed to have a higher frequency of occurrence but a lower consequence of event in comparison to passenger train derailment. However, depending on the location of the freight train derailment, there is potential for post-derailment interaction with other trains, including passenger, or members of the public in the vicinity of the rail corridor, in which cases the consequences can be higher. There were 24 running line derailments involving freight rolling stock in the 2014–15 financial year:

- 23 freight train derailments
- 1 light engine derailment

Appendix A3 presents summary statistics, segmented by jurisdiction.

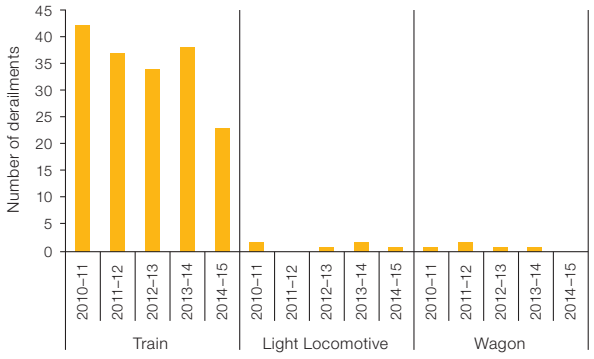
The five year history of freight train derailment is summarised in Figure 4.

The annual number of freight train derailments in the financial year 2014 –2015 is the lowest for the five year period.

FIGURE 4:

Freight train running line derailments July 2010 to June 2015

All railway operations regulated under RSNL (Victorian data from 2013–2014 onwards, ACT from 2014–2015). Includes derailments on non-running lines affecting the safety of running lines.



A comparison of the rate of mainline freight train derailment between ONRSR regulated railways and the mainline railway of GB is summarised in Table 5. The local data in Table 5 are a subset of derailments summarised in Figure 4.

TABLE 5:

Freight train running line derailments - ONRSR and Great Britain

Includes derailments on non-running lines affecting the safety of running lines. Excludes light locomotives. These ONRSR statistics include Victoria data from 2013–2014 and ACT data from 2014–2015.

		2012–13	2013–14	2014–15	3 Years
ONRSR (SA, NSW, NT, Tas., Vic., ACT)	Derailments	34	39	23	**96**
	Train km (millions)	31.2	35.3	33.4	**99.9**
	Rail (derailments per million freight train km)	1.090	1.105	0.689	**0.961**
Great Britain (GB)	Derailments[1]	6	8	14	**28**
	Train km (millions)[1]	47.8	48.5	47.2	**143.5**
	Rail (derailments per million freight train km)	0.126	0.165	0.297	**0.195**

[1] Source: Rail Safety and Standards Board Annual Safety Performance Report 2014/15, RSSB, UK, 2015

TABLE 6:

Selected freight train running line derailments July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
07/07/2014	Whyalla-Iron Duke, SA	A loaded iron ore train derailed 12 wagons.
26/07/2014	Marryat-Kulgera, SA	A container freight service derailed at 78 km/h. 15 wagons derailed, spilling containers.
23/10/2014	Ceduna (Thevenard), SA	A loaded gypsum train derailed 14 wagons, seven were on their side.
09/11/2014	Colebrook-Tunbridge, TAS	Two locomotives, and a number of wagons carrying intermodal containers derailed.
02/12/2014	Alice Springs, NT	Whilst shunting on the main line, two wagons of a train derailed, one of which was carrying mixed dangerous goods.
25/01/2015	Kimberley, TAS	Ten wagons of a twenty eight wagon train derailed and rolled on their side. This resulted in significant damage to the wagons and the freight being carried.
15/02/2015	Kankool, NSW	Nineteen wagons of a coal train derailed at Kankool.
20/05/2015	Charra-Moule, SA	Loaded gypsum train derailed 13 wagons, with 3 overturned.

There is a statistically significant difference in the three year freight train derailment rate between local and GB operations. The rate for Australian operations over the past three years (0.961 per million train km) is approximately 5 times higher than that of GB (0.195 per million train km).

A summary of some of the more significant freight train derailments follows.

DERAILMENT NOT INVOLVING PASSENGER OR FREIGHT ROLLING STOCK

The level of risk associated with track maintenance rolling stock derailment is difficult to estimate because of the wide range of operating scenarios. In the 2014 –2015 financial year there were 10 derailments associated with rolling stock used for track maintenance, no injuries were reported for any of these incidents. These events tend to occur at low speed and on track closed to normal traffic.

Approximately 60% of these derailments involved RRVs. RRV safety is covered in more detail in a later section.

TABLE 7:

Selected Derailments Not Involving Passenger or Freight Rolling Stock July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
11/09/2014	Eden Hills, SA	Welding Inspector hi-railing between Belair and Mile End derailed with the front end facing the broad gauge track with 2 metres of clearance.
18/10/2014	Condobolin, NSW	Tamper derailed on the main line.
29/01/2015	Bowmans, SA	Two empty ballast hoppers were shunted over the derail. The wagons derailed onto the crossing loop.
01/04/2015	Sydney Terminal, NSW	Herbicide RRV derailed whilst traversing 240B end points Sydney yard (Down Bankstown to Down Suburban lines).
29/04/2015	Wynbring-Mt Christie, SA	RRV in the Wynbring to Mt Christie section derailed. Some damage occurred to the rail guidance system, no injuries.
27/05/2015	Boronia, NSW	Scheduled Rail Flaw Detection car on the Main North line, between Hawkesbury River and Cowan, derailed while traveling at about 10km/h.

Pitchi Ritchi steam train, South Australia

COLLISIONS BETWEEN TRAINS AND WITH ROLLING STOCK

Collision between trains and with rolling stock are some of the more potentially serious rail safety events. The likelihood and consequences of collisions vary according to factors such as the systems used to manage train movement (for example, signal-based, train order working) and the types of trains involved. A major determinant of risk is the involvement of a passenger train because of the potential exposure of large numbers of passengers to harm.

There were six running line collisions between trains and two running line collisions between trains and with rolling stock in the 2014–2015 financial year, on railways regulated under the RSNL consisting of:

- one collision between a passenger train and an empty passenger train;
- one collision between a passenger train and an infrastructure maintenance vehicle;
- one collision between two freight trains;
- one collision between a freight train and freight related rolling stock;
- four collisions between infrastructure maintenance trains.

Appendix A4 presents summary statistics, segmented by jurisdiction.

The five year history of collisions is summarised in Figure 5.

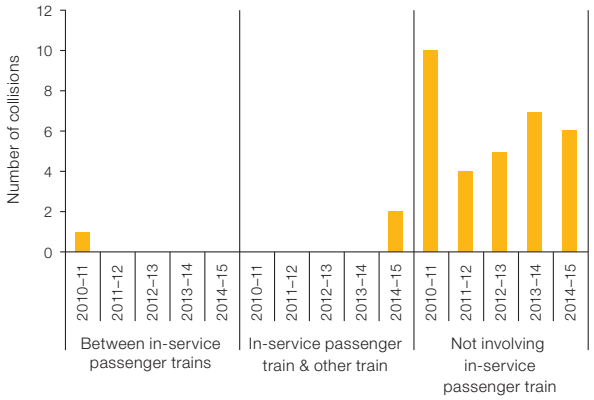


FIGURE 5:

Running line collisions July 2010 to June 2015

All rail operations regulated under RSNL as of 30 June 2015 (Victorian data from 2013–2014 onwards, ACT from 2014–2015). Includes collisions on non-running lines affecting the safety of running lines. Excludes trains striking or being struck by out of gauge equipment on trains on adjacent lines. Passenger trains include Tourist and Heritage trains on mainlines and isolated lines.

Collisions not involving passenger trains dominate the historical record in Figure 5. These occurrences involved freight, on-track infrastructure rolling stock, RRVs and out-of service passenger trains.

The collisions between trains as well as those between trains and rolling stock in the 2014–2015 financial year are summarised in Table 8 and Table 9.

TABLE 8:

Collisions involving in-service passenger trains July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
22/08/2014	Laverton, VIC	V/Line train collided with the rear of a stationary MTM train between Laverton and Newport. Train driver received serious injuries.
16/02/2015	Sale, VIC	Passenger train collided with an unattended track machine that was foul of the track.

TABLE 9:

Collisions not involving in-service passenger trains July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
25/08/2014	Boomley, NSW	Two track machines collided in a front to rear collision.
13/11/2014	Goondah, NSW	Two RRV tip trucks collided, low speed impact. Minor damage to vehicles.
8/02/2015	Goonumbla, NSW	RRV excavator hit RRV land cruiser causing smashed windows and panel damage, no injuries.
31/03/2015	Mile End Loop, SA	A low speed freight train collision resulted in wagons on each train derailing.
26/04/2015	Camberwell, VIC	RRV truck struck another RRV truck.
05/05/2015	Yarrawonga, VIC	Freight train collision with wagon, no injuries.

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 45% of all rail fatalities (excluding suspected suicides) noted in this report.

There are at least 23,000 level crossings in Australia[9]. Approximately 93% are road crossings with the remainder solely for pedestrian use. There were 19 level crossing collisions between trains or trams and road vehicles in the 2014–2015 financial year on railways regulated under the RSNL. They consisted of:

- 12 collisions involving in-service passenger trains;
- one collision involving a Tourist and Heritage train;
- one collision involving an in service passenger tram; and
- five collisions involving freight trains.

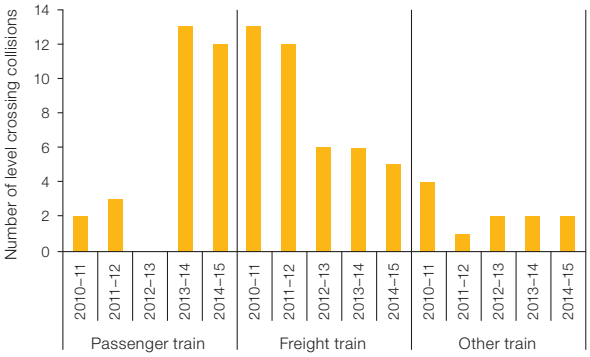
Appendix A6 presents summary statistics, segmented by jurisdiction.

The five year history of level crossing collisions between train and road vehicle is summarised in Figure 6.

FIGURE 6:

Level crossing collisions between train and road vehicle, July 2010 to June 2015

All rail operations regulated under the RSNL as of 30 June 2015 (Victorian data from 2013–2014 onwards, ACT from 2014–2015). Includes bicycles which are defined as road vehicles in the national occurrence classification scheme. "Other train" consists of infrastructure maintenance rolling stock, light engines, trams and Tourist and Heritage trains on isolated railways.



Of the 19 collisions in the 2014–2015 financial year, 16 involved trains colliding with cars or trucks, with one collision between a train and a tractor, one collision between a tram and car, while the other involved a train and a golf buggy. None of these collisions were fatal. In addition to the collisions involving road vehicles there were three collisions between trains and pedestrians.

TABLE 10:

Selected level crossing collisions with road vehicles July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic and ACT regulated under the RSNL.

Date	Location	Summary
19/12/2014	Eaglehawk, VIC	Train struck truck at passive level crossing. Train derailed single bogie of one car and ruptured fuel tank. Injuries to both occupants of truck.
02/04/2015	Barnet Road, Gawler, SA	Passenger service from Adelaide to Gawler struck a motor vehicle (whilst traversing the Active Control Level Crossing) that was reported to have driven around the half boom gates and proceeded into the crossing. Motor vehicle driver was taken to hospital.

WORKFORCE STRUCK BY ROLLING STOCK

One of the largest risks to railway workers is associated with being struck by rolling stock while working in the rail corridor. On 10 February 2015 a track worker was struck and killed by a passenger train in Perth, an incident subsequently investigated by the ATSB. While Western Australian railways were not regulated by ONRSR at the time of the incident (and are not included in the scope of this report), the incident still has tragic significance for the broader rail industry.

Rail Transport Operator approaches to safeworking were identified in previous years as a priority for ONRSR and is covered in more depth on page 29. Track Work - Competency and Communication has been identified as a national priority for ONRSR moving forward.

FIRE

There were 541 fires in the 2014–2015 financial year on railways regulated under the RSNL. These consisted of:

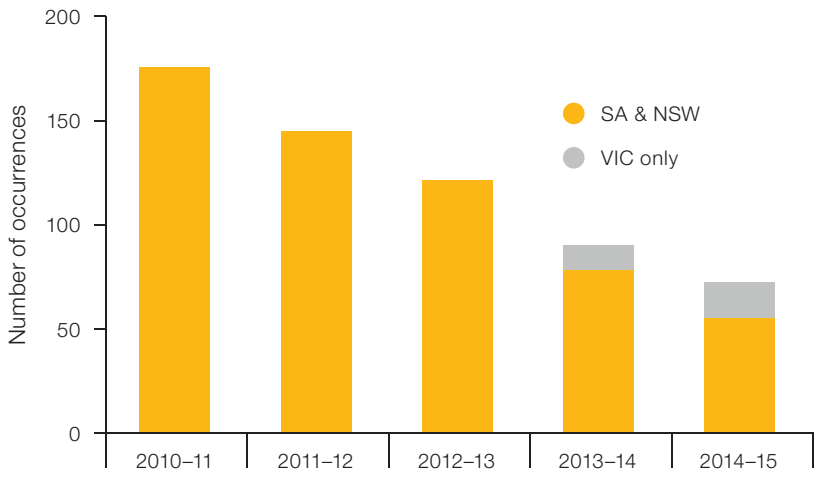
- line side fires (approximately 65% of notifications). The majority were grass and rubbish fires either within or adjacent to the rail corridor;
- train fires (approximately 19% of notifications). Most of these involved arson on metropolitan passenger trains. Freight train fires were associated primarily with locomotives faults; and
- fires on or adjacent to stations (approximately 16% of notifications). These generally involved small fires in bins, station toilets or sleeper fires adjacent to platforms.

No fatalities or serious injuries due to fires were reported for the 2014–2015 financial year. There were two minor injuries to employees — one worker was taken to hospital in relation to minor smoke inhalation while attempting to extinguish a fire in a carriage, and a driver inhaled a small amount of fire extinguisher powder, while extinguishing a fire in a train's toilet. There were 74 passenger train fires in the 2014–2015 financial year with most involving arson on the Sydney Metropolitan Rail Area (MRA). The five year history of passenger train fires is summarised in Figure 7. Victoria data is included from 2013–2014 onwards and is demarcated from NSW and SA data for 2013–2014 and 2014–2015. There is a downward trend over the five years for SA and NSW equating to an approximate 25% reduction each year. A number of factors are likely to have contributed to this reduction in fires including additional cleaning requirements to reduce combustible materials on trains, and increasingly modern train fleets with updated fire retardation properties.

FIGURE 7:

Passenger train fires July 2010 to June 2015

SA and NSW data for full period, Victorian data is included from 2013–2014 onwards. Victorian data is shown above the demarcation line for 2013–2014 and 2014–2015. Data shown is that classified as OC-G1 top event category Fire – on train



[9] Rail Industry Safety and Standards Board, Level Crossing Stocktake, RISSB, Canberra, May 2009

TABLE 11:

Selected passenger train fires July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
07/07/2014	Meeks Road, NSW	Train exhaust caught fire, started as a result of newly placed turbo failing and rupturing.
21/08/2014	Snowtown, SA	Train carrying hazardous substance, container caught fire. Fire emergency services attended, no casualties.
18/11/2014	Sydney Terminal, NSW	Smoke was emanating from the battery box. Batteries boiling led to the fire starting. The train was evacuated as well as nearby platforms 3 to 5.

OTHER RISKS

Infrastructure irregularities are a significant contributor to passenger derailment risk, noting these consist of a wide range of failures including rail breaks, track misalignment, points failures and track obstructions. The frequency of broken rail occurrences is summarised as one indicator of passenger train derailment risk. The five year history of broken rails is summarised in Figure 8.

An initial rise in the number of broken rails for SA and NSW over the 2010–2014 period is evident, followed by a slight reduction when comparing the 2013–2014 and 2014-2015 financial years. Not withstanding this recent reduction, the five year level of broken rails is high and one of ONRSR's regulatory priorities is to address track condition as a contributor to derailments.

SPADs

Instances of passenger trains exceeding the limit of their authorised movement, are seen as important precursors to collisions. On signalled systems these occurrences are notified as a signal passed at danger without authority (SPAD). SPADs are also an important precursor to derailments with two passenger train derailments in Sydney during the 2014 – 2015 financial year following SPADs. The five year history of passenger train SPADs is summarised in Figure 9.

FIGURE 8:

Broken rail July 2010 to June 2015

All rail operations regulated under RSNL (Victorian data from 2013–2014 onwards. Victorian data is shown above the demarcation line for 2013–2014 and 2014–2015). Data shown is that classified as OC-G1 top event category broken rail – detected outside maintenance inspection.

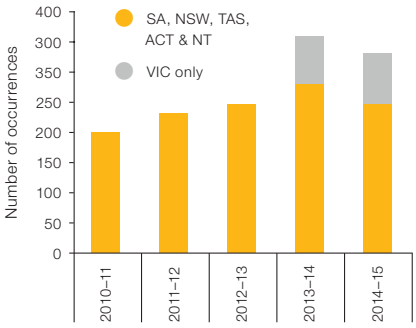
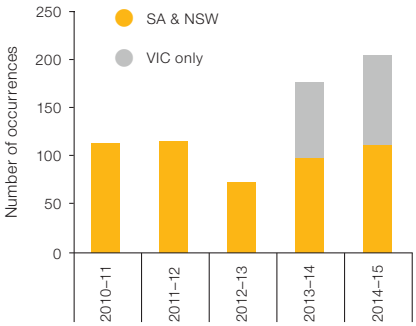


FIGURE 9:

Signal passed at danger without authority – passenger train June 2010 to 2015

SA and NSW data for full period, Victorian data is included from 2013–2014 onwards. Victorian data is shown above the demarcation line for 2013–2014 and 2014–2015. Data shown is that classified as OC-G1 top event categories; Driver misjudged, completely missed while running and start against signal. Excludes Tourist and Heritage operators.



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 risk is associated with freight or passenger rolling stock colliding with the buffer stop at terminal or 'dead end' station platforms or sidings.

There were a few such incidents in the 2014 – 2015 financial year involving shunting of passenger rolling stock, however they were not in-service at the time of the buffer stop collision.

One injury to an employee was reported from a collision with a buffer stop during a shunting incident at Southern Cross Station, Victoria.

Train collision with other objects

Results of risk modelling and analysis of local data show that collisions between trains and track obstructions are a possible cause of derailment. For the vast majority of collisions with objects however, these incidents 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, traffic cones and birds.

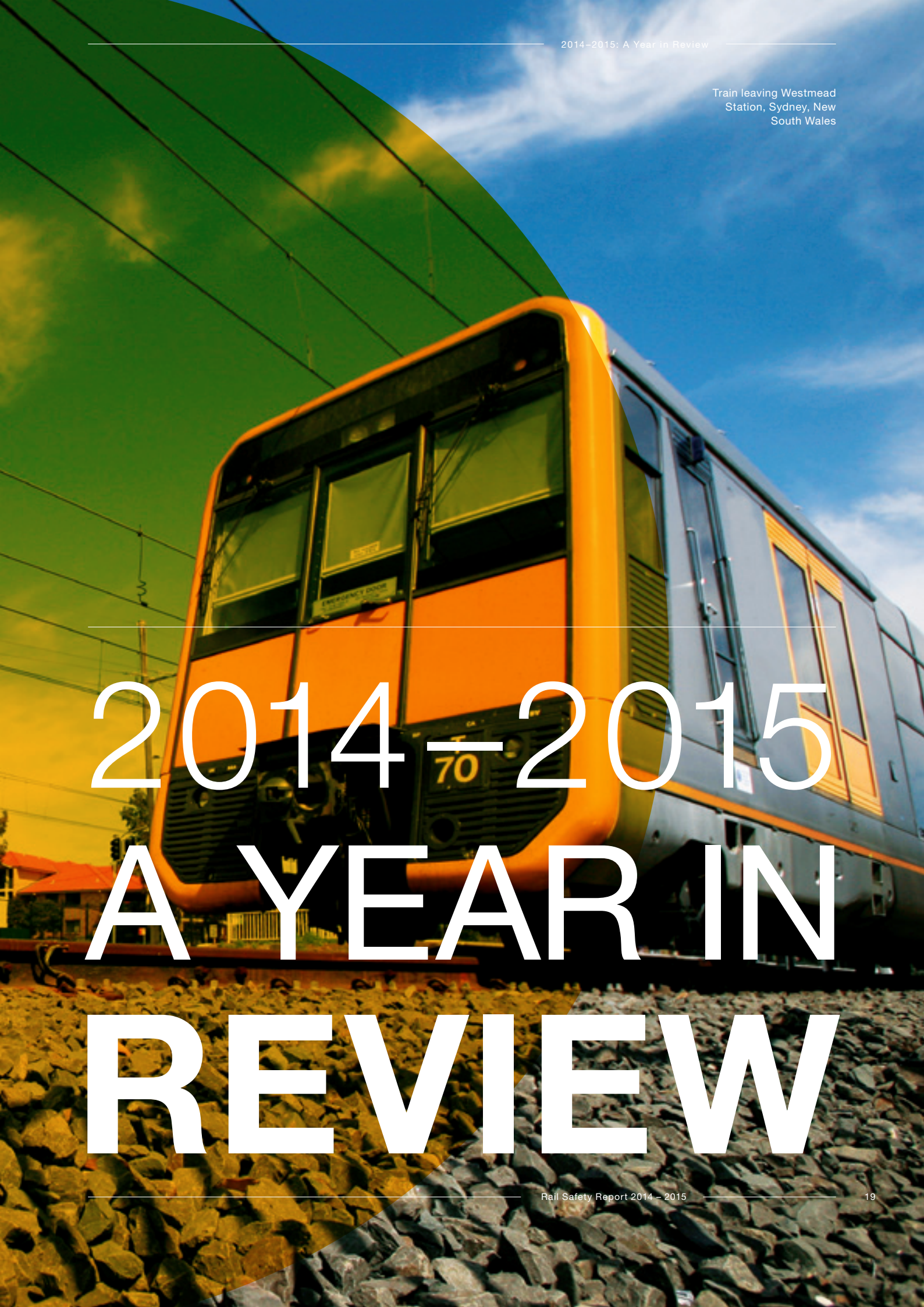
Within the large pool of minor incidents notified there exists a small number of events representing the precondition for escalation to a serious consequence. These include larger or high mass objects fouling tracks such as road vehicles, entire trees and landslips. Some of these are more relevant to certain types of operation, for example, the likelihood of collisions 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 12.

TABLE 12:

Selected collisions between trains and objects July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary	Summary
12/10/2014	Katherine, NT	Freight	Freight train struck a car stuck on the tracks not at a level crossing, dragging it for approximately 500 metres over the Katherine River Bridge. No injuries.
19/02/2015	Crib Point, VIC	Passenger	4WD vehicle driving across track not at a level crossing struck by Sprinter, minor injury to 4WD driver.
05/05/2015	Chidda, SA	Passenger	Passenger train struck abandoned road vehicle. No injuries reported.



Train leaving Westmead Station, Sydney, New South Wales

2014–2015 A YEAR IN REVIEW

THE YEAR IN SUMMARY

In terms of the broader theme of rail safety and regulatory activity, the story does not stop with summary statistics and this chapter provides a deeper dive into some of these occurrences and also outlines some of the specific work that ONRSR and industry has undertaken in the year.

ONRSR believes it is important to highlight examples that show how industry initiatives have helped address some of the more challenging problems in rail safety. They are not however meant to represent the only, or indeed the best, approach to these issues – ONRSR recognises that there is a lot of positive work being undertaken by industry, far more than can be documented in this report.

OUR AREAS OF REGULATORY FOCUS IN 2014–2015

In the two previous years that ONRSR has produced a yearly account of rail safety performance in Australia, the focus has necessarily been big picture in nature. As a new entity the priority had to be making sure ONRSR cast its net far and wide in order to most effectively establish a credible presence in the rail safety arena. ONRSR did that by identifying ten on-going priority areas central to the overall risk profile of the Australian rail industry that have, and continue to, provide an overarching framework for ONRSR's operational activities. Those priority areas 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; and
- development of a safety management system maturity tool.

ONRSR remains steadfastly committed to addressing those areas. However, as it matures as a national regulator, and through the collation and examination of increasingly robust data, the focus has sharpened on those areas most vital to ONRSR's efforts to improve safety for the people that operate, use and interface with rail across the country.

For the remainder of this section, we focus on five of these areas for ONRSR and describe in more detail what we have observed to date through our regulatory activity and examination of occurrence data, and what we see as necessary going forward.

ROAD RAIL VEHICLES

Road Rail Vehicle (RRV) safety has been a focus of the rail industry and rail safety regulators for some time. Several serious RRV incidents in recent years, some with fatal consequences, have led ONRSR to raise RRVs as a priority area of attention. Since 2013, ONRSR has worked closely with industry to tackle RRV safety and this section of the report summarises some of the findings from the 2014–2015 financial year and outlines where further work is required.

Overview of RRV use in Australia

RRVs are usually modified road vehicles, produced by fitting rail gear to an existing vehicle, although some RRVs are purpose-built from scratch. As they can be easily constructed, these vehicles come in many different forms, from vehicles that tow trailers, to vehicles with boom arms to reach vegetation and infrastructure above the rail (crawler excavators), and mobile elevated work platforms (MEWPs). Generally speaking RRVs are used for track inspection or maintenance purposes within a worksite possession.

There are three 'Type 9'[10] subclasses of RRVs, with the main distinctions being the wheels (road or rail) that the brakes and traction forces are being transmitted to:

- Type I (9A) - braking and traction directly on the rail wheels, i.e. self-powered rail wheels;
- Type II (9B), also known as high ride vehicles (comes in two variations);
  - Indirect traction from road wheels to rail wheels with braking directly on the rail wheels;
  - Indirect traction from road wheels to rail wheels with braking indirectly from road wheels to extension hub;
- Type III (9C) - also known as low ride vehicles - braking and traction on road wheels with the load shared between the road and the rail wheels.

An early challenge in ONRSR's work on RRV safety was determining how many RRVs were in operation, the types and where they were operating. From surveys and industry intelligence, ONRSR has estimated that there are more than 1,000 RRVs in Australia. The lack of precise numbers presents a challenge in managing safety in this area. From the information gathered, the percentage breakdown is shown in Table 13.

TABLE 13:

Current estimated proportion of RRVs in Australia

Date	Summary	Proportion
Type 1: Self Powered Rail Wheels	Equivalent to European Type 9A classification (RIS-1530-PLT)	28%
Type 2: Friction Drive	Equivalent to European Type 9B classification (RIS-1530-PLT)	7%
Type 3: Direct Drive	Equivalent to European Type 9C classification (RIS-1530-PLT)	37%
Type unknown	—	28%

[10] European Standard EN 15746, Railway Applications – Track – Road-rail machines and associated equipment

[11] Includes those incidents reported to ONRSR and previous regulators, 1 January 2010 to 30 June 2015 (SA, NT, Tas., NSW) and 19 May 2014 to 30 June 2015 (Victoria)

TABLE 14:

Selected occurrences involving RRVs July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary	Findings
20/11/2014	Sydney Harbour Bridge, NSW	A road /rail truck derailed as it was travelling north towards North Sydney. There were workers travelling on the tray of the RRV truck at the time of the derailment.	There were two possible causes of the derailment: i) The road/rail pivot frame did not achieve a balanced position before it was operated on track; ii) The RRV operator accidentally operated the switch that controls the rear rail guidance system which caused it to partially retract from the balanced position. Although the cause of the derailment was not determined, the following was discovered (note that these were not deemed contributing factors to the derailment): • Non-compliant wheel profile and back to back wheel dimensions • Overdue rail guidance system 10-year crack testing • Lack of maintenance procedures and records by the owner of the road/rail truck • The workers who travelled on the tray of the truck were not aware of the prohibition to do so.
07/01/2015	Islington Yard, SA	Safeworking breach by RRV operator as he failed to clear points prior to proceeding onto the main line from Islington Siding.	The Rail Transport Operator originally had four RRVs that were fit for purpose. Upon further inspection during the investigation into this occurrence, the operator identified that all vehicles were missing Original Equipment Manufacturer (OEM) certificates and would need to be re-tested before re-entering into service
23/05/2015	Woodford, NSW	A RRV ran away through Woodford Station for a distance of approximately 384 metres.	In preparation to remove the RRV from track, the park brake was not applied. This left the vehicle with no braked wheels as the RRV gear was raised. The high-rail gear was operated in the wrong sequence and no interlocking was fitted to prevent this. The certification process of the vehicle did not consider the potential that an operator may use the wrong sequence.

While only representing a small percentage of total numbers based on ONRSR estimates, Type II (9b) RRVs have been of particular interest as they present a different profile of runaway risk not shared by the other two configurations.

Safety Performance of RRV operations and response to date

Over the last six years RRVs have featured in a high proportion of significant safety occurrences including collisions, derailments and runaways - some of which have involved fatalities. Between January 2010 and June 2015 there were over 450 RRV incidents reported[11] with anecdotal evidence suggesting underreporting. Examples of these incidents include:

- the collision between an RRV and Rail Motor on the Zig Zag Railway at Clarence, New South Wales on 1 April 2011 that injured two of its occupants;
- the collision between two RRVs at Haig, Western Australia on 24 May 2012 that killed one worker; and
- the collision between two RRVs Rinadeena, Tasmania on 4 June 2013 that seriously injured a driver.

The high number of rail safety incidents involving RRVs and compliance issues led to various responses from different sections of industry. Regulators issued safety alerts and undertook compliance activity, while industry responses included some Rail Infrastructure Managers (RIMs) prohibiting the use of Type II (9b) RRVs on their networks.

In 2012 industry and the New South Wales Independent Transport Safety Regulator (ITSR) worked together to host a series of workshops to consolidate industry knowledge on RRV safety issues. The outputs from these workshops included the development of bow tie analyses on some of the loss of control events associated with RRV operation. Industry also agreed that a comprehensive industry standard covering requirements for RRVs across their life cycle including design, construction, testing/certification, operation, maintenance, modification and disposal was required. RISSB committed to develop this standard.

Inform, Check, Enforce

Shortly after its establishment, ONRSR reviewed the work undertaken by industry in RRV safety and following a number of serious RRV incidents confirmed that RRVs would remain a regulatory focus. ONRSR established a multi-tiered program for RRV safety using an approach of: Inform, Check, Enforce. This tiered approach provides for education and knowledge sharing (inform), compliance audits and inspections (check) and a scaled response depending on the nature of the issues found through the compliance activity (enforce).

Inform

The inform stage involved six workshops held around the country to build on the messages previously communicated through the joint ITSR and RISSB workshops. A safety bulletin on RRV safety was subsequently published to reiterate the findings from the work-shops and the risks identified with RRV operations. In it ONRSR urged Rail Transport Operators to utilise the tools provided to re-evaluate the risks associated with their management of RRVs, and apply relevant controls to reduce these risks SFAIRP.

A short survey was also provided to 109 Rail Transport Operators aimed at gauging the number and type of RRVs that were present and how they were used and managed. The survey did not get the uptake expected with only 50% of Rail Transport Operators responding. This survey was followed up by a more comprehensive questionnaire to selected Rail Transport Operators to compile data on the design, manufacture and use of RRVs. A baseline analysis of RRV occurrences reported to ONRSR and previous regulators[12] from 2010-2013 was also undertaken to gauge the existing level of RRV safety performance.

[12] SA, NT, TAS & NSW

The baseline analysis of RRV data showed that out of the 314 RRV occurrences that were notified,

- 8% were due to technical defect of the RRV;
- 52% were the result of employee oversight. More than half resulted in a collision or derailment, and majority of the remaining occurrences being Proceed Authority Exceeded, Safeworking (Network) Rule or Procedure Breach & Signals Passed at Danger;
- 16% were caused by other irregularities, i.e. track and environment conditions; and
- The remaining 24% did not have sufficient information to determine specific causes.

With a direct cause unclear in nearly a quarter of occurrences and other data items being of variable quality, ONRSR developed a supplemental reporting form for Rail Transport Operators to complete for all RRV incidents. These forms were launched in January 2015 and will run until the end of December 2015. They are designed to provide richer detail on the nature and cause of RRV incidents.

Check

Following the inform phase of the program, ONRSR began specifically targeting compliance activity toward RRV safety. This phase of activity focussed on areas of RRV safety identified as weak through previous work with industry, including the specification and maintenance of RRVs and competency assessment of staff involved in RRV operations.

A campaign of 21 compliance inspections was conducted to ensure compliance with the RSNL with respect to RRV management and to ensure that the Rail Transport Operators had considered and addressed risks associated with RRV operations. ONRSR's Rail Safety Officers were supported by internal guidance developed to promote consistency for compliance inspections in the field.

The overall outcome of the inspections was disappointing. Consistent findings included:

- little evidence that the bow-tie analyses provided in previous workshops had been utilised;
- risk assessments of RRVs were often too generic and did not take account of the different risks posed by RRVs of different ages, or those with different levels of on-board safety systems, such as reversing beepers, flashing beacons or automatic braking systems;
- there was a lack of management of change processes in the purchasing, modifying and disposal of RRVs - particularly in relation to changes to procedures; and
- a review of contractor management and training programs indicated that there were inconsistent requirements in obtaining registrations to operate RRVs and the training programs that were offered did not adequately meet the requirements of RSNL.

Enforce

The compliance inspections undertaken have led to specific targeted enforcement on a little under half of the operators whose RRVs were inspected. A summary of the enforcement measures taken is included in Table 15 and a case study of an RRV compliance inspection follows.

TABLE 15:

Enforcement measures taken as part of RRV program January 2015 to October 2015

Enforcement measure	Number issued
Non-Conformances	52
Improvement Notices	4
Prohibition Notices	1 (covering multiple RRVs)

Road Rail Vehicle
at Dry Creek,
South Australia

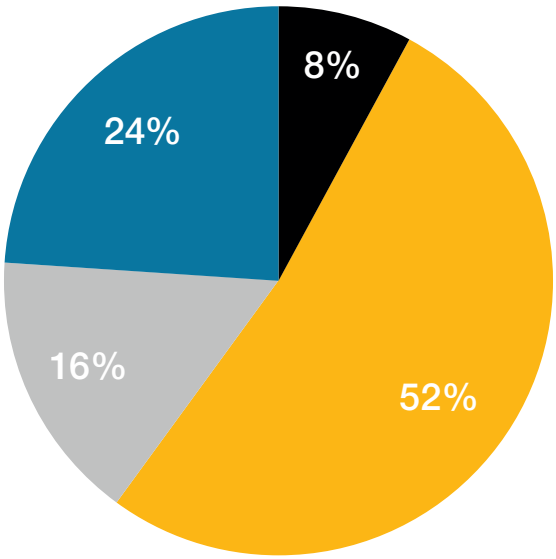


FIGURE 10:

Causes of RRV incidents
January 2010 to December 2013

- Employee Oversight
- Insufficient Information
- Other Irregularities
- Technical Defect

CASE STUDY: ROAD RAIL VEHICLE COMPLIANCE INSPECTION

INSPECTION METHODOLOGY

The intention of the inspection was to determine the Rail Transport Operator's compliance with RSNL, the Notice of Accreditation and its Safety Management System. The railway operations undertaken by the Rail Transport Operator were also inspected to verify compliance requirements of specific elements of the RSNL in the context of the RRV Guidance Tool. The inspection was restricted to areas listed in the scope and findings based on provided samples of the operator's activities.

INSPECTION SUMMARY

As the inspection did not cover all of the operator's activities and only selected elements were explored, other opportunities for improvement may still exist.

INSPECTION FINDINGS

Two RRVs were inspected with six non-conformances identified.

ANALYSIS

1. Risk Management

The Rail Transport Operator's Safe Work Method Statements (SWMS) detailed risks in relation to on/off tracking, runaways and collisions. However, risks associated with RRV operations in different types of worksites and other operational risks such as operating grades, visibility and wheel condition were not addressed. The steps for runaway were also contradictory. Another SWMS and plant hire risk assessment that were provided only dealt with workplace health and safety (WHS) risks relating to the machine and did not detail rail specific risks.

Non-conformance: The Rail Transport Operator was unable to demonstrate that it had identified all risks associated with the rail mode operation of owned and hired RRVs used for carrying out rail safety work.

2. Design, Construction and Commissioning Processes

RRV 1 – The Rail Transport Operator advised the commissioning process had not been developed when the vehicle was brought into service. The process comprised of a series of tests that proved the vehicle's conformance to the RIM's standards in order to qualify for the RIM's certification.

RRV 2 – The Rail Transport Operator did not request formal evidence of commissioning tests undertaken for contracted vehicles. Commissioning was considered successful as long as the vehicle was approved by the RIM.

Non-conformance: The Rail Transport Operator could not demonstrate that it had a process to verify and ensure that contractors providing RRVs had conducted engineering and commissioning tests.

3. Operating Procedures

A copy of the operating manual is contained inside each vehicle. Monthly task observations were carried out on RRV operators, but they were general in nature and did not directly relate to specific RRVs or tasks associated with their operations when being used in rail mode.

Non-conformance: The Rail Transport Operator was unable to demonstrate a process for regular monitoring of the performance of the RRVs in rail mode.

4. Inspection & Maintenance Regime

A pre-start check list was used to record minor defects, which were transcribed into a form each week. However, the daily checklist did not contain acceptance criteria for wheels or rail equipment and there was no formal process to prioritise correction of the defects found on the vehicles.

Two non-conformances: The Rail Transport Operator could not provide a formal process for prioritising repairs on the RRVs and the daily checklists did not include acceptance criteria for wheels or rail equipment.

5. Rail Safety Worker Competence

A familiarisation assessment document for RRVs was reviewed against the performance criteria listed in one of the Transport and Logistics Industry Skills Council's (TLIC) competency documents and was found to be deficient as it did not include the following criteria: advise and obtain appropriate permission if required after taking machine off track; monitoring and responding to warning systems; completing repair sheets and notifying relevant persons of faults prior to and post operation.

Non-conformance: The assessment document was deficient as it did not cover all the performance criteria contained in the TLIC Module.

Next Steps

The findings from the compliance inspections to date indicate that issues affecting RRV safety have not yet been adequately addressed. It is also noted that less than 3% of RRVs have been inspected by the program so far and, due to contracting arrangements and difficulty locating specific vehicles, a small number of these were Type 2 Friction Drive.

ONRSR has undertaken an internal review of the RRV program and concluded that RRV safety should remain a national priority for the coming year. ONRSR does not believe it can take the focus off this important safety area and will continue with the following activities:

- further engagement with industry to identify opportunities for greater take-up of the RRV information available to industry;
- working with RISSB to complete its standard for RRVs to become a comprehensive and effective benchmark for RRV safety for all of industry; and
- continued targeted compliance inspections and application of the necessary enforcement tools as part of these engagements.

MAJOR PROJECTS

The past year has seen ONRSR review its strategy for engagement with the rail industry in relation to major rail projects. One of the catalysts for the review was the unprecedented number of major rail projects that have recently been announced. Since 2012, their value has risen from an estimated $15 billion to $64 billion.

Coupled with increased investment, there has been an increase in the number of major rail projects being delivered through Public Private Partnership (PPP) arrangements where the responsible party is not necessarily an existing accredited rail operator. Some projects are delivered through a model where an entity responsible for the oversight of the planning and design phase of a project is different from the entity responsible for construction and then operations. From a rail safety perspective it is possible for different entities to be accountable during construction and operations.

Following a review, ONRSR identified four key regulatory challenges in relation to major projects:

- ensuring concept design minimises macro risk;
- identifying who holds effective management and control;
- demonstrating effective management and control; and
- assuring safe outcomes.

To address these challenges, ONRSR reviewed its engagement with industry and sought to identify good practice safety management principles for major rail projects. The result, following extensive consultation with the rail industry, was the publication of ONRSR's Major Projects Guideline in December 2014[13]. The guideline is designed to:

- promote the safe delivery of rail infrastructure and rolling stock assets by major rail projects;
- provide guidance to major rail projects about their duties and related obligations under RSNL; and
- explain ONRSR's minimum expectations in relation to the processes and evidence used to demonstrate that safe outcomes are being planned and, ultimately, have been achieved by major projects.

By introducing a national approach to engaging with, and providing regulatory oversight of, major rail project development, ONRSR sought a 'no surprises' approach for all parties involved in the accreditation process. In so doing, the intent is to provide a smooth transition from construction to revenue operations at the completion of a project.

A key approach is early dialogue between a major rail project and ONRSR, specifically during a project's development phase. This early involvement is important as the decisions made have a significant impact on the safe outcomes for the project. Retrofitting a design or changes to construction at the end of a project can be hugely expensive and can cause significant delay to the introduction of a new service. Major rail projects will define the future level of safety for decades to come, so ensuring that all elements are correct first time is best for safety and best for the project's on-budget delivery.

The regulatory oversight described in ONRSR's Major Project Guideline covers a range of safety assurance and accreditation activity, with major rail projects being expected to:

- identify an accreditation strategy;
- identify safety roles and responsibilities;
- plan safety assurance activities; and
- adopt system engineering principles.

For ONRSR, key principles for industry's attention within the guideline include:

- the adoption of an independent safety assessment;
- the use of quantitative safety risk assessment techniques for complex or significant safety risks;
- the identification of appropriate safety limits; and
- the focus on the management of operational and maintenance safety risks.

Whilst it is still early days for the adoption of the guideline, ONRSR welcomes the broad acceptance of these areas by industry and the work that some operators have already undertaken to address them.

By clearly articulating the expectations of ONRSR during the design, construction and commissioning phases of projects, the guideline adds value to the rail industry by:

- reducing delivery uncertainty in terms of ONRSR's expectations;
- providing a nationally consistent approach to major projects; and
- encouraging good practice and supporting safe outcomes.

[13] Office of the National Rail Safety Regulator, Major projects guideline, Version 1, ONRSR, Adelaide, November 2014

ONRSR engaged with a number of major rail projects across Australia, examples include:

- Advanced Train Management System (ATMS) with ARTC;
- Inland Rail with ARTC;
- Sydney Metro with TfNSW;
- Sydney Metro Northwest with Metro Trains Sydney;
- Sydney Central Business District (CBD) & South East Light Rail with the ALTRAC Partnership;
- Automatic Train Protection (ATP) with TfNSW;
- New Intercity Fleet with TfNSW and NSW Trains;
- Advanced Train Control System with TfNSW;
- Canberra Light Rail with the Capital Metro Authority;
- Melbourne Metro Rail Project with the Melbourne Metro Rail Link Authority;
- Cranbourne - Pakenham Line and technology upgrades with Public Transport Victoria and Metro Trains Melbourne;
- Forrestfield Airport Link with the Public Transport Authority of Western Australia.

For ONRSR, significant regulatory activity with major rail projects during the year included:

- working with Metro Trains Sydney to progress their application for accreditation to commence construction activity on the Sydney Metro Northwest project;
- working with the ALTRAC Partnership to progress their application for accreditation to commence construction activity on the Sydney CBD & South East Light Rail project; and
- working with the ARTC to vary their existing accreditation to commence further trials of the ATMS in South Australia.

To date, ONRSR is encouraged by the positive reception of the Major Project Guideline from industry stakeholders and their willingness to adopt the guidance. Over the coming financial year, ONRSR looks forward to working with the rail industry in the development and delivery of major rail projects that provide safe outcomes for the Australian community.

LEVEL CROSSINGS

Level crossing safety continued to be a regulatory priority for ONRSR during the 2014-2015 financial year. The year saw continued work by the National Level Crossing Safety Committee (NLCSC), improvements to the Australian Level Crossing Assessment Model (ALCAM), and the commencement of a level crossing removal program in Victoria. ONRSR has also undertaken reviews of interface agreements established by rail and road authorities to manage the interface risks at crossings.

Level Crossing Failures

Rail Transport Operators have a duty to notify ONRSR of instances of level crossing defects and failures. These range in severity from minor equipment failures through to more significant failures where equipment may have failed to a dangerous condition.

ONRSR continually monitors these incident reports and has performed a high level review of the 1,731 level crossing equipment failures reported by Rail Transport Operators during the 2014–2015 financial year.

Based on the information presented in the initial occurrence reports and the definitions contained in ONRSR's classification guideline, 1,680 of the 1,731 incidents were classified as incidents where the equipment had failed to a safe condition.

Each of the 1,680 safe state failures were reviewed and categorised by cause. The precise cause of the failure could not be identified in 653 cases, due to insufficient information in the associated occurrence report. Figure 11 presents the top ten most common level crossing incident causes for the remaining 1027 safe state failures.

FIGURE 11:

Level crossing incidents where equipment has failed to a safe state July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

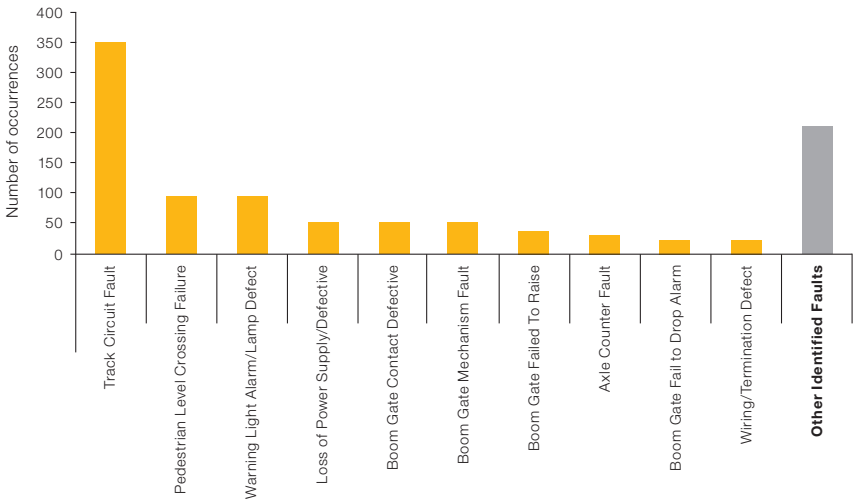
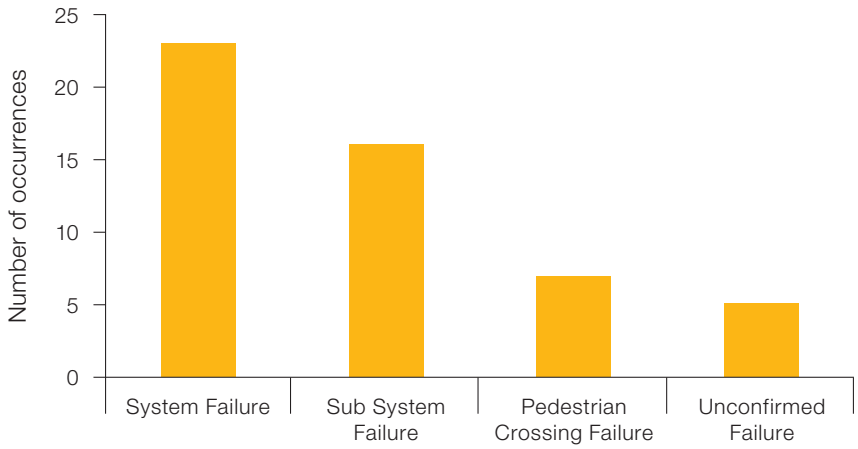


FIGURE 12:

Level crossing incidents where equipment may have failed to a dangerous state July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.



Based on the information presented in the initial occurrence reports, the remaining 51 incidents were categorised as level crossing equipment failure that may have failed to a dangerous condition. These incidents have been sub-categorised as follows:

- System Failure: The level crossing did not activate for the passage of a train, flashing lights not operating, booms not descending, and audible warning devices not activating.
- Sub System Failure: Although the level crossing activated correctly, individual boom(s) did not descend for the passage of a train, some warning lights did not activate, or audible warning devices did not activate.
- Pedestrian Crossing Failure: Booms did not descend, pedestrian gates not closing, or warning lights and audible warnings not activating.
- Unconfirmed Failure: Level crossing incidents, where insufficient detail has been provided to make a clear determination in relation to a dangerous failure.

Figure 12 presents the key results of this review.

ONRSR views all level crossing equipment failures as serious events, particularly those where a level crossing has failed to a dangerous condition. ONRSR will continue to monitor level crossing reports to ensure that Rail Transport Operator's are managing and responding to this risk. Where level crossings have been identified as failing to a dangerous state, ONRSR will be requiring the Rail Transport Operator to undertake a detailed investigation and provide a copy of their report. ONRSR may choose to undertake its own investigation where deemed necessary.

National Level Crossing Safety Committee

ONRSR has been a strong supporter of a national approach to level crossing safety and continued to support the National Level Crossing Safety Committee (NLCSC) during the 2014–2015 financial year. The committee acts as an inter-organisational and inter-jurisdictional forum which supports members in continuously improving safety at level crossings and serves as the national authority on level crossing issues.

Membership of the committee includes representatives from ONRSR, Rail Transport Operators, the Australasian Railway Association (ARA), state government transport agencies, heavy haul and the Australia New Zealand Policing Advisory Agency.

The strategic objectives of the NLCSC are to:

- reduce the likelihood of crashes and near misses at railway crossings;
- improve coordination between road and rail infrastructure managers, governments and other member organisations through maximising knowledge sharing, skills and good practice; and
- develop and recommend initiatives to align and coordinate safety mitigation strategies developed by member organisations where it is agreed a national perspective provides safety benefits.

The committee is supported by working groups in the areas of education, engineering, enforcement and data, which bring together subject matter experts from across industry to progress level crossing safety initiatives.

Furthermore, a number of jurisdictions have their own level crossing committees which complement the work undertaken by the national committee at a local level. As a member of the NLCSC, ONRSR provides representatives on its working groups as well as supporting the state-based level crossing committees with reports on level crossing occurrences. ONRSR will continue this support as it believes this involvement can assist both jurisdiction and national level crossing committees in their work to improve level crossing safety.

ALCAM Improvements

The Australian Level Crossing Assessment Model (ALCAM) is used to assess potential risks at level crossings and to assist in the prioritisation of safety improvements at level crossings according to their comparative safety risks. ALCAM is currently applied across Australia and in New Zealand, and is overseen by the national ALCAM committee.

The ALCAM methodology has been independently reviewed by third party risk specialists and a number of significant enhancements to the model have been implemented. These enhancements have been calibrated against incident data and include a new Traffic Exposure Model, revised Infrastructure Model and new event tree Consequence Model.

Each of these models has a single 'factor' as an output that, when combined, produces a risk score for each level crossing. Some of the key benefits of the new ALCAM model include:

- an evidence based model, which was validated against 10 years of Australian and New Zealand level crossing crash data;
- better identifications of site specific risk, with an improved weighting and scoring algorithm;
- better correlation between traffic flow and level crossing crash risk, by adopting a new accident prediction formula;
- takes account of the whole range of possible outcomes (including both direct and escalation) of a level crossing crash as well as the associated probabilities, by using an event tree approach;
- a fine balance between the impact of likelihood and that of consequence on ranking level crossings for safety improvement; and
- outputs from the new ALCAM model are in common quantitative terms (probability and fatalities), which enables cost-benefit analysis.

ONRSR supports the improvements made to the ALCAM model, particularly the shift to a risk based approach when assessing level crossings for improvement. The previous model was adversely influenced by the number of road vehicles and trains using the level crossing. The new model has addressed this anomaly.

Railway Crossing, Victoria

Level Crossing Removal Program, Victoria

Victoria is commencing a program to grade separate (remove) 50 level crossings over eight years, with the aim of the first 20 crossings being removed by 2018. The Level Crossing Removal Authority was established to oversee the delivery of this program, with initial contracts being awarded towards the end of the 2014 –2015 period and construction commencing soon after This project aims to deliver substantial reductions in the risks to safety by removing the risk of train to motor vehicle collision at these locations. ONRSR will keenly monitor the progress of this initiative.

SAFEWORKING

In the ONRSR Annual Safety Report 2013–2014, Rail Transport Operator approaches to safeworking were identified as a national priority for ONRSR. Safeworking systems are fundamental to effective safety management and ONRSR has had a particular focus on operator approaches to worksite protection. ONRSR highlighted in the last report that approximately 10 serious near misses between trains and workers in worksites happen every year. Despite the challenge of both running an effective and efficient railway and eliminating workers from the danger zone, ONRSR believes more can be done to manage this issue.

Worksite protection in Australia relies heavily on rules and procedures to protect people undertaking rail safety work. These administrative controls are highly vulnerable to human error and the potential consequence of non-compliance can be fatal. Over 400 occurrence reports relating to track work safeworking breaches, ranging in severity, have been reported during the financial year 2014–2015. While there were no reported serious injury incidents in the 2014–2015 financial year there is cause for concern that these incidents keep occurring and that the consequences could be severe.

TABLE 16:

Selected Safeworking incidents July 2014 to June 2015

Railway operations within SA, NSW, Tas., NT, Vic. and ACT regulated under the RSNL.

Date	Location	Summary
17/07/2014	Burradoo, NSW	One worker grabbed another and dragged him to safety (in front of a train) on the Wingecarribee viaduct near Moss Vale. Lookout working was in force.
23/07/2014	Puttapa, SA	A RRV was given permission to traverse an area on the Leigh Creek coal line where a Track Occupancy Authority (TOA) was in force. The holder of the TOA fulfilled it without remembering that the RRV was still there, leaving it unprotected for half an hour.
08/09/2014	Narromine, NSW	A train controller granted a TOA from Narromine to Goobang Junction, but recorded it only from Peak Hill to Goobang.
17/10/2014	Beecroft, NSW	A passenger train approached a worksite near Beecroft without warning to the track workers.
19/10/2014	Ingleburn, NSW	Adjacent line protection was not provided near Ingleburn when a worksite was adjacent to another operator's track.
24/11/2014	Morisset, NSW	A breakdown of Absolute Signal Blocking procedures at Morisset allowed two freight trains to approach a worksite at Warnervale, with the second train fortuitously being stopped only when the workers set an automatic signal back to stop just before the train reached it.
24/11/2014	Kooragang, NSW	Emergency braking was applied on Kooragang North Fork when the driver observed two workers apparently sitting on the track with their backs to the approaching train.
02/12/2014	Seaford Meadows, SA	A network control officer issued a TOA on the Seaford line but failed to implement any blocking facilities or in-field protection. The problem was only realised after 34 minutes but with the nearest train still 10 km away.
19/12/2014	Melbourne, VIC	A contractor accessed the Melbourne Underground Rail Loop under the protection of Absolute Signal Blocking. The train controller removed blocking from the incorrect work site, resulting in the protection being removed from the work group in the tunnel.
29/01/2015	Dulwich Hill, NSW	A Protection Officer (PO) on ARTC track at Dulwich Hill made multiple requests for a TOA, which were not granted. The controller advised that in due course there would be a break between trains in which the TOA could be granted. When the PO thought that that time had arrived, he allowed workers on to the track without actually having further contact with the controller.
3/04/2015	Homebush, NSW	A lookout at Homebush incorrectly identified the track on which a train was approaching, resulting in late notification to the workers and requiring emergency braking by the train.
23/06/2015	Orton Park, NSW	Simultaneous TOAs were in force between Bathurst and Newbridge, one for a track patrol and one for a fixed worksite. The PO for the fixed worksite incorrectly informed the network controller that the RRV had passed his worksite when it had not.
26/06/2015	Somerton Loop, VIC	A standard gauge contractor's RRV remained on track at Somerton without any authority after the track warrant had been cancelled, standing foul of the live broad gauge crossing.
25/06/2015	Wolli Creek, NSW	During trackwork on the Illawarra main lines south of Wolli Creek, adjacent line protection by a Track Work Authority (TWA) was in force on the down Illawarra local line. The signaller incorrectly removed blocking facilities and permitted automatic route setting to apply, resulting in a signal protecting the TWA being cleared improperly. Fortunately a worker noticed the incorrect clearance and challenged it before the approaching train actually entered the unprotected track.
30/06/2015	Bylong, NSW	A concrete truck disobeyed instruction from a PO near Bylong tunnel, resulting in it standing on the track in the face of an approaching train which had to apply emergency braking.

Passenger trains heading in and out of the city, Melbourne, Victoria

The following are considered to be the broad categories in which most significant worksite protection problems have occurred during the year (only some of which are represented by the individual incidents in table 16):

(a) Working (intentionally or otherwise) with no protection in place

(b) Working or travelling outside the area which has been protected (including exceedances of authority by RRVs)

(c) Misplaced or absent protection, e.g. absence of blocking facilities, and placing detonators, stop signs etc. on the wrong track

(d) Premature clearance of protection, i.e. before all work has been completed (including cases where the Protection Officer does not know or has forgotten the full set of activities covered by the authority)

(e) Premature commencement of work before authority has been granted and/or before protection is in place

(f) Fulfilment of the wrong authority

(g) Movements being carried out in possession areas without ensuring correct authority for the move (notably SPADs and points run through)

(h) Train crews failing to obtain protection for repairs to or examination of trains in service

(i) Encroachment on unprotected adjacent tracks

(j) Errors and omissions by hand signallers.

Throughout the 2014–2015 financial year, ONRSR continued to focus on worksite protection through a range of compliance inspections targeting worksites, communication protocols and control centres. From these compliance activities, the recurring issues of rail safety worker competence and safety critical communication kept emerging.

The compliance inspections covered urban and regional areas and also extended into remote parts of Australia including the Nullarbor. In addition to planned activities, ONRSR encouraged Rail Safety Officers to stop and undertake unplanned inspections whenever they came across an appropriate work site.

The ATSB has also continued to focus on significant safeworking incidents. Incidents deemed significant by the ATSB have led to investigations. Since January 2013, the ATSB has conducted six investigations into safeworking related matters:

1. Safeworking breach involving a Local Possession Authority Revesby, NSW, 10 July 2013
2. Safeworking Breaches at Blackheath on 13 June 2013, Newcastle on 13 July 2013 and Wollstonecraft 17 July 2013
3. Safeworking irregularity at Glenrowan, Victoria on 29 October 2013
4. Safeworking irregularity involving train 5SM2 near Springhurst, Victoria on 6 March 2014
5. Safeworking breach near Kilbride NSW on 22 May 2014
6. Incident involving Absolute Signal Blocking at Warnervale, NSW on 24 November 2014

Despite there being no major adverse consequences of these types of events during the 2014-2015 financial year, the potential for such consequences is evident. In many cases serious consequences have been avoided only by good fortune or by the application of other defences which also have a potential for failure. It is imperative that no complacency should exist.

With the issues raised through the compliance program regarding worker competence and safety critical communication, ONRSR has determined that track work – competency and communication should be a national priority of focus for the coming year.

HUMAN FACTORS INTEGRATION STRATEGY

In the 2014–2015 financial year work has begun on the ONRSR Human Factors Integration Strategic Plan comprising three key strategies: Education, Engagement and Evaluation.

This plan is currently under development and will involve collaboration between Human Factors specialists and other relevant stakeholders both within and external to ONRSR. This is consistent with ONRSR's dual roles of collaborating with industry in safety improvement and assisting industry in meeting the requirements for Human Factors Integration under the RSNL.

Current and future Human Factors initiatives will be incorporated into the plan with the objective of producing practical, effective, sustainable and acceptable solutions for the rail industry in Australia.

Over the 2014–2015 financial year such initiatives have included:

Human Factors in Major Projects

As outlined on page 25, ONRSR has published a Major Projects Guideline for industry containing a dedicated section on Human Factors Integration. This outlines ONRSR's expectations for Human Factors Integration Plans to ensure that Human Factors related risks are managed throughout all phases of the asset lifecycle. Important elements include requirements to consider human reliability analysis, human-system interface assessment, risk-based training needs assessment and assessment of human factors issues in degraded modes of operation.

Human Factors Integration plans are now routinely submitted to ONRSR as part of the accreditation process. Some of the significant major project Human Factors Integration Plans reviewed this year by ONRSR Human Factors specialists included the Sydney Metro Northwest Project in Sydney, the Sydney CBD and South East Light Rail Project and the Cranbourne-Pakenham Rail Upgrade Project in Melbourne.

Human Factors in new technologies

The increasing use of new technology in rail has seen a number of applications for variation of accreditation being assessed by ONRSR Human Factors specialists. The Human Factors Integration Strategy will aim to develop guidance on the selection, evaluation and integration of new technologies, especially those involving automation.

Recent applications include Remote Control Locomotive Operations (for Pacific National's BlueScope Steel operations), ATP for TfNSW and Automatic Train Warning Systems for Sydney Trains. Preliminary examination of the ARTC's ATMS and increased automation for network control centres in South Australia has also begun.

Human Factors capacity building for ONRSR staff and industry

ONRSR Human Factors specialists have this year delivered educational workshops for internal and external audiences on effective integration of Human Factors into risk and safety management systems.

These included:

- Half-day workshops delivered to ten Rail Transport Operators entitled Human Elements of System Safety delivered as part of the ONRSR safety improvement program.
- Briefings on Human Factors Integration for Rail Safety Officers in ONRSR's offices.
- Invited speaking engagements on both Human Factors Integration and Fatigue Risk Management delivered to over 500 participants at mixed industry events such as the Victorian WorkCover Authority's Work Health & Safety Week and the Asset Management Council of Australia's AMPEAK conference.

Integration with accreditation and compliance teams

The Human Factors team is actively involved in assessing Human Factors and Human Factors Integration issues in applications to vary accreditation (AVA) (including new applications under the RSNL), compliance inspections and investigations. Tools and methods to assist in this process for ONRSR and industry are under development.

INCIDENTS REQUIRING ONRSR RESPONSE

ONRSR encourages the rail industry to review incidents for lessons learned. The examination of rail incidents that have been investigated by organisations such as Rail Transport Operators, ONRSR, the ATSB, or even international rail agencies, can provide duty holders with information to improve the management of safety risks specific to their operations.

A sample of incidents that ONRSR responded to during the 2014–2015 financial year, from which relevant lessons can be learned follow.

Intercity passenger train derailment (Victoria)

At approximately 7.38 am on Friday, 11 July 2014 an express passenger train (XPT) derailed at the dual gauge (standard gauge and broad gauge) turnout located adjacent to North Melbourne station. This train was attempting a standard gauge diverge and trailing movement whilst travelling in an up direction towards Southern Cross Station. The train subsequently re-railed and continued its journey to Southern Cross Station, with the train driver reporting a rough ride at this location.

A second derailment involving the same XPT occurred a short time later at approximately 08:30 am whilst it attempted a standard gauge diverge and facing movement over another dual gauge turnout located adjacent to North Melbourne Station. The train was travelling in the down direction having recently departed Southern Cross Station. As a result of the derailment, there were minor injuries to some passengers and the train's crew, as well as damage to track and rolling stock.

ONRSR conducted independent investigations into the derailment.

Empty coal train derailment (NSW)

In February 2015 at Kankool, an empty coal train derailed resulting in extensive damage to 19 wagons and over 2,000 metres of track. The investigation is continuing and is looking at train management as well as the condition and maintenance of the rolling stock and track.

Collision between two freight trains (SA)

Two freight trains collided on the defined interstate railway network at Mile End on 31 March 2015. One of the freight trains, passing a 'proceed at low speed but be prepared to stop' signal, collided with the rear of an intermodal freight train that was already stopped at Mile End, resulting in damage and the derailment of the stopped train. ONRSR's inspections identified specific conditions on the day, associated with train configuration, and available sight distance as principal contributing factors involved in this collision. ONRSR did not require any specific action given its satisfaction with the operator's response to this incident and will monitor for any issues associated with such signalling during 2015–2016. The ATSB is also currently conducting an investigation into this incident.

Collision between train and road vehicle (NT)

A collision between a vehicle and a train at Katherine on 12 October 2014 resulted in a road vehicle becoming stuck on railway tracks outside a designated level crossing. The road vehicle became trapped under the train's locomotive and was dragged across the Katherine River Bridge. Fortunately the train did not derail as a result of the collision as the potential consequences of a train derailing across the Katherine River Bridge could be catastrophic. Whilst no systemic issues were identified in the ONRSR inspection in regard to the Rail Transport Operator's activities and actions, the incident triggered ONRSR to liaise with Northern Territory Police to authorise potential prosecution under the RSNL.

Derailment of a locomotive near Teepookana (Tas.)

A locomotive hauling an empty passenger carriage derailed near Teepookana on the West Coast Wilderness Railway on 9 December 2014. ONRSR's attendance and enquiries identified locomotive specific issues to be the likely cause of this derailment and that no action was needed to be taken by ONRSR in relation to the resumption of passenger rail services. Improvements to the inspection and maintenance regime for the locomotive have been implemented. The ATSB has released its investigation report into this occurrence.

ONRSR response and investigations by the ATSB

As rail safety regulator, ONRSR makes determinations on events that occur and in some cases may undertake investigations into these events. Similar determinations are also made by the national transport safety investigator – ATSB – and investigations can be mounted by one or both agencies depending on the nature and seriousness of the circumstances.

ONRSR led investigations rely upon the fundamental principles underpinned within the RSNL. Examples of when an ONRSR investigation may commence include (but are not limited to):

- in response to a notifiable occurrence;
- adverse finding from a compliance activity;
- confidential reports;
- intelligence reports; and
- a written direction from a responsible Minister for a participating jurisdiction on a rail safety matter relating to that jurisdiction.

Investigations are undertaken by ONRSR in response to a suspected breach of the RSNL, which may lead to the prosecution of a person or an organisation. However, as indicated within the ONRSR Compliance and Enforcement Policy, ONRSR will also conduct an investigation in order to:

- determine whether appropriate action has, or needs to be taken;
- prevent a recurrence of an incident and /or to secure compliance with the law;
- identify lessons to be learned and whether there is a requirement to influence the law and industry guidance; and
- identify what response is appropriate to a breach of the law, if a breach is identified.

(Above) Track at Tennant Creek, Northern Territory

(Left) Derwent River Bridge, Tasmania

The ATSB performs its functions in accordance with the provisions of *the Transport Safety Investigation Act 2003 (Cth*) and associated Regulations. Investigations undertaken by ATSB do not apportion blame or provide a means for determining liability. When analysing the differences between ATSB and ONRSR investigations, it is vital to understand that the ATSB 'does not investigate for the purpose of taking administrative, regulatory or criminal action.'

ONRSR and ATSB work co-operatively during the course of safety investigations, providing assistance where required. Similarly, the ATSB assists ONRSR in responding to matters warranting further attention and action by ONRSR.

When ATSB prepares safety investigation reports, ONRSR is provided the opportunity to review and comment on the factual accuracy of ATSB's draft safety investigation reports.

Following the publication of the ATSB safety investigation reports, ONRSR reviews the reports and identifies key safety issues which are then factored into ONRSR's regulatory work program accordingly.

Examples of the effective working relationship between ONRSR and the ATSB is both organisations' responses to the following incidents.

- The ATSB conducted an investigation into the proceed authority exceeded by train 9104 on 26 November 2012 in Tarcoola, South Australia. The ATSB concluded that the procedure for the use and verification of the Conditional Proceed Authority was a contributing factor to this occurrence. In response to the ATSB investigation, ONRSR is now working closely with operators who are using Conditional Proceed Authorities to identify and explore solutions that reduce the associated risk/s SFAIRP.
- The ATSB conducted an investigation into the derailment of freight train 9054 on 5 March 2013 in Pyramid Hill, Victoria. It was deemed that the derailment was caused by a rail that broke away during the passage of the previous train. The fracture had occurred as a result of the rail's heavily corroded and wasted condition on an unsealed level crossing. This derailment followed a similar event at Warracknabeal, Victoria in 2011, which was also subsequently investigated by the ATSB. ONRSR enquiries identified that action taken by the network manager following that event did not fully address the identified limitations of the inspection regime for unsealed level crossings. As such, ONRSR is now liaising with the operator to ensure remedial actions are undertaken and implemented.

TOURIST AND HERITAGE

The Tourist and Heritage sector represents 36% of the Rail Transport Operators regulated by ONRSR and collectively operated 0.3% of the train kilometres in the 2014–2015 financial year. The sector faces different challenges to their commercial counterparts including a workforce often largely made up of volunteers, limited funding, and operation of assets which are usually extremely old. ONRSR applies the principle of scalability to its regulatory approach whilst ensuring regulatory efforts achieve compliance with RSNL.

In the 2014–2015 financial year a programmed schedule of audits and inspections was undertaken across the Tourist and Heritage sector as part of ONRSR's normal work program. In addition, a targeted program was initiated in ONRSR's Central Branch to undertake a comprehensive review of the safety management systems of Tourist and Heritage Rail Transport Operators in South Australia. The aim of this project was to identify deficiencies and plan, prioritise and implement compliance and education activities aimed at addressing areas of concern on an individual or, where identified, collective basis across the sector.

As part of the project, all Tourist and Heritage operators in South Australia provided a current version of their safety management system to enable ONRSR to undertake a systematic desktop audit with individualised feedback provided to all operators on individual issues. Broader sector issues were also identified for ONRSR to consider including:

- Rail Transport Operators updating the structure, format and content of safety management systems, are struggling to complete this task due to personnel changes, available resources not engaged in the operation of the railway, and because of a lack of clear understanding of the intent of the law and expectations of the regulator.
- Rail Transport Operators have developed safety management systems that are highly compliant with legislative requirements but in turn impose significant administrative burden to implement alongside maintaining the ongoing operation of the railway.
- Rail Transport Operators having difficulties applying their risk management processes to obtain and comprehensively capture a record of the complete risk profile of their operations.

To date ONRSR views the project as successful in helping determine the most effective regulatory compliance and education strategy for the sector. As the project continues, ONRSR will continue to work with the Tourist and Heritage sector to help them understand the requirements of the RSNL and in particular, how to scale their systems appropriately in response to specific operating environments.

For small isolated line Tourist and Heritage operators, ONRSR identified the need for more information to assist with compliance with the RSNL. Small isolated Tourist and Heritage operators are able to comply with RSNL with safety systems that are relatively simple compared to commercial mainline rail operators.

To assist in our dealings with this part of the Tourist and Heritage sector it became clear they would benefit greatly from guidance material specifically tailored to their scope and type of operations. It was clear these operators were looking for greater clarity in what compliance 'looked like'.

The concept was welcomed by the sector and ONRSR prepared draft material which at the time of this report is being trialled with two relevant operators in New South Wales and one in South Australia. Rail Safety Officers from ONRSR are visiting and briefing each of the three trial operators to seek their feedback and comments on the draft. The results of the trial will be factored in to a final version of the guidance which ONRSR anticipates publishing in early 2016.

POSITIVE INITIATIVES BY INDUSTRY

The 2014–2015 financial year represented a busy year for the rail industry nationally, with the progression of a broad range of safety initiatives, from education programs to major infrastructure investments. In this section ONRSR highlights some of the 2014–2015 financial year's key safety initiatives:

John Holland Rail – Introduction of Electronic Train Orders (NSW)

Train Order Working (TOW) is a system of safeworking that was introduced on single lines on the NSW rail network in 1997 and had been in place in other states for some years before. This system of safeworking was designed to replace life expired token systems (electric staff and staff and ticket) in use since the early 1900's.

Although these token systems operated safely, operationally they were inefficient with all trains having to stop regularly to obtain the token for the next section. All Staff/Ticket and Electric Staff systems of safeworking were removed from the John Holland network in 2012.

TOW is supported by the Train Management and Control System (TMACS) computer which monitors the issue and release of authorities for compliance with network rules. By using global positioning system (GPS) the TMACS can monitor the position and movement of trains for compliance with the authority. Paper authorities were issued and fulfilled by voice communications between the train driver and the network controller.

The use of voice communications for authority issue and release was considered a relatively inefficient process by John Holland Rail. This process was time consuming for train crew and Network Control Officers (NCOs). While train operations have been conducted safely, errors from voice authority delivery occur which causes delays and increases the potential for further errors as information is re-read and re-verified.

The Electronic TOW has been integrated with the In-Cab Communications Equipment (ICE) train communication system installed on all rail operator locomotives. The introduction of technology to electronically deliver authorities to train drivers for display on ICE provides significant efficiencies. These include operational efficiency, workload reductions for train crew and NCOs, and safety improvements resulting from eliminating voice authority delivery errors and the subsequent requirement to retransmit the order.

John Holland Rail implemented Electronic Train Orders on its network in July 2015.

Rail Transport Operator Collaboration - Rule 1, Section 3 (Vic.)

On 22 August 2014, an empty regional passenger train collided with the rear of a stationary metropolitan train at Altona, Victoria. One of the contributing factors to the collision was the failure of the administrative control, which permits trains to pass permissive signals at stop (Rule 1, Section 3, Book of Rules and Operating Procedures 1994). Failure of this control has also been identified in previous accidents (Craigieburn 2010, Holmesglen 2000). In the Altona, Craigieburn and Holmesglen incidents the requirement to stop at the signal for 30 seconds and then travel at a reduced speed was not complied with. In response to the Altona occurrence ONRSR directed the relevant operators to undertake systemic investigations and a joint risk assessment.

The Rail Transport Operators identified a number of additional potential controls to manage the risks of train to train collision due to the failure to comply with Rule 1, Section 3. ONRSR has worked with these operators in the assessment of these additional potential controls. The Rail Transport Operators have introduced the requirement for train drivers to call a voicemail box prior to passing a permissive signal at stop. The voicemail message highlights the critical requirements of the rule and at the end the train driver must state their name, the lead vehicle identification and the signal being passed at stop. This control allows for:

- positive reinforcement of the critical requirements of Rule 1, Section 3 at the time of use;
- the identification of how often the rule is utilised;
- hot spots where the rule is applied, which may require additional localised controls; and
- the ability to perform random compliance checks of train data loggers to measure compliance to the requirements.

Initial results from implementing this control indicate there is a high compliance rate with train drivers calling the voicemail and complying with the requirements of Rule 1, Section 3.

Tasmanian Railway Pty Ltd (TasRail) Rail Recovery Plan

During the 2014-15 financial year, TasRail has continued the implementation of its Rail Recovery Plan - a capital works program to rebuild, revitalise and grow the rail freight business in Tasmania. Some of the key safety projects within the Rail Recovery Plan, which have either been completed, progressed or have delivered safety benefits during the report period, are summarised below:

- **Concrete Sleeper Program**
  Completed in June 2014, the supply and installation of nearly 100,000 concrete sleepers has led to improved track, stability and reliability, thereby reducing the risk of track buckles and derailment.
- **Advanced Network Train Control System**
  A new Advanced Network Train Control System was delivered during the reporting period to replace paper-based procedures and an ageing radio-based network control system. The new system provides train controllers with live visibility and monitoring of the position and speed of on-track vehicles. Vehicle operators are provided with an on-board display of their track authority, track topography and speed limits. Additional protection is provided by ANCS automatically warning and generating alarms to vehicle operators and Train Control where excess vehicle speed and breaches of track occupancy authorities are anticipated or have occurred.
- **New Rolling Stock Fleet**
  The ongoing replacement of TasRail's ageing and mostly life-expired rolling stock fleet, which includes brand new PR22 Locomotives, providing improved reliability and driver safety. Final acceptance of the fleet is expected to occur late in 2015.

CURRENT REGULATORY & SAFETY IMPROVEMENT FOCUS

NATIONAL OPERATIONS PRIORITIES

ONRSR has identified the following four national priority areas of regulatory focus which will extend into the 2016 calendar year:

1. Track condition;
2. Track work - competency and communication;
3. Rolling stock maintenance; and
4. RRV safety.

A national priority area is defined as an area of regulatory focus, which has the following characteristics:

- is an issue appropriate to focus compliance and enforcement effort on;
- applies to multiple jurisdictions;
- applies to multiple Rail Transport Operators; and
- requires a sustained focus by ONRSR of at least one year.

A structured, evidence-based, risk assessment process was used to identify the national priority areas for 2016 to ensure that regulatory effort and compliance activity will be commensurate with the level of safety risk and potential for improvement.

Safety intelligence inputs into the process included ATSB reports, REPCON reports, Rail Transport Operator Notifiable Occurrence Reports, Rail Transport Operator Safety Performance Reports, and outcomes of audits and inspections. These reports were reviewed to identify common themes, trends, systemic issues and areas of concern for consideration as ONRSR national priorities. Each area of concern was then risk assessed, and the most significant issues selected as priority areas of focus for 2016.

Further information in relation to each of the identified national priority areas is provided below:

Track Condition
Analysis of occurrence reports for the 2014–2015 financial year identified a concerning number of broken rails and track irregularities across all jurisdictions. Over 500 broken rail occurrences were reported, the majority of which were detected outside maintenance inspections.

There were also over 600 reports of track misalignments. ONRSR's concern with the number of occurrences in this area is supported by a review of the ATSB's investigation reports, which identified poor track condition as the most common causal factor of the derailment events investigated.

Track Work - Competency and Communication

Over 400 occurrence reports relating to track work safeworking breaches have been raised during the 2014–2015 financial year, with rail safety worker competence and safety critical communication a recurring theme. Due to the breadth of this priority area and potential scope for improvement, ONRSR plans to utilise a multi-pronged approach to facilitate industry improvement. This will involve promotion and collaboration with industry through a safety improvement project, as well as targeted audit and inspection activities.

Rolling Stock Maintenance

Over 4,000 rolling stock irregularities have been reported during the 2014 –2015 financial year, many of which involved substantial rolling stock component failures. Furthermore, a NSW Branch led audit of rolling stock maintenance contractors yielded poor results across operators in all sectors. There is also an increasing trend of contractors performing maintenance activities, which warrants monitoring to ensure adequate contract management arrangements are in place. Poor maintenance has the potential to lead to safety critical rolling stock component failures with catastrophic consequences.

Road Rail Vehicle (RRV) Safety

This area was already a national priority and will remain an area of focus for at least another year. A post-implementation review of the work undertaken by ONRSR in the area of RRV safety identified that whilst some improvements have been made, the overall results have been disappointing. ONRSR believes that there is more to be done to improve industry-wide behaviour in this area and that momentum must be maintained.

IMPROVEMENTS TO OCCURRENCE NOTIFICATION AND CLASSIFICATION FRAMEWORK

ONRSR is currently reviewing the reporting framework for notifiable occurrences under the RSNL for its efficiency and effectiveness. It will not result in significant changes to ON-S1 or OC-G1 categories, or require significant reporting systems change for industry.

The review will involve combining the ON-S1 and OC-G1 documents to ensure ONRSR's guidance material is clear, concise and consistent. This process will also consider major reporting concerns raised by industry as well as within ONRSR, including:

- the definition of wrong side failures at level crossing occurrences and how they are reported within the framework;
- 72 hour timeframe for reporting notifiable incidents and the updating of submitted reports;
- definition of serious injury; and
- overall improvement to the definition of what ONRSR expects to be reported and what it does not.

It is important to note the amendments made to the reporting framework will not increase regulatory burden for industry. The changes are designed to ensure that ONRSR's safety reporting requirements are clear and consistent. This will improve the accuracy of reported data, improve the quality of ONRSR's database and improve safety data analysis.

SAFETY IMPROVEMENT PROJECTS

ONRSR undertakes safety improvement and education initiatives to help drive safety improvements nationally across the rail industry. These initiatives complement the targeted safety improvement activities occurring with individual operators as part of the ONRSR's regulatory activities.

During the 2014–2015 financial year, three safety improvement projects were undertaken and are ongoing. These projects related to RRV safety, Human Factors Integration and Fatigue Risk Management.

ONRSR has worked extensively with the rail industry to seek industry-wide improvement in the safe operation of RRVs and our work with industry to date is described in-depth on page 20.

The Human Factors Integration and Fatigue Risk Management projects involved initial work with a small number of industry participants. ONRSR now has a focus on developing Human Factors Integration material to assist Rail Safety Officers in supporting industry and broader Fatigue Risk Management program guidance material.

To identify new projects for the 2015–2016 financial year, national rail occurrence data and trends were examined, key stakeholders have been consulted and rail safety investigation findings were considered. As a result, three rail safety priority areas were identified for inclusion as safety improvement projects for 2015–2016.

ONRSR's initial focus will be on supporting industry to work together in a targeted way to reduce worksite incursions. As noted in the previous section, incursions into worksites are an area of concern for ONRSR due to the continued high number of incidents and ONRSR will tackle this through a program of safety improvement and compliance activity.

The two other safety improvement initiatives to be undertaken later in the 2015–2016 financial year will see ONRSR work with industry to enhance the quality of their investigations, and the understanding and application of risk management within their operations, which will complement current work being undertaken with Rail Safety Officers.

(Above) ONRSR staff on site at Mt Barker, South Australia

APPENDICES - DATA TABLES

Provide the underlying data for selected figures from the main body of the report. Appendix A6 provides a summary of other data not elsewhere reported.

APPENDIX A1

Railway fatal injury, 2010–2011 to 2014–2015 (Figure 2)

Passenger		**SA**	**NSW**	**NT**	**TAS**	**VIC**	**ACT**	**Total**
Rail accident (incl. strike)	2010–11	0	1	0	0	n/a	n/a	**1**
	2011–12	0	1	0	0	n/a	n/a	**1**
	2012–13	0	1	0	0	n/a	n/a	**1**
	2013–14	0	1	0	0	0	n/a	**1**
	2014–15	0	1	0	0	1	0	**2**
Level crossing	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	0	0	**0**
Fall, assault, other	2010–11	0	2	0	0	n/a	n/a	**2**
	2011–12	0	1	0	0	n/a	n/a	**1**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	1	0	0	1	n/a	**2**
	2014–15	0	0	0	0	0	0	**0**

Workforce		**SA**	**NSW**	**NT**	**TAS**	**VIC**	**ACT**	**Total**
Rail accident (incl. strike)	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	0	0	**0**
Level crossing	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	0	0	**0**
Fall, assault, other	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	1	0	0	0	n/a	**1**
	2014–15	0	0	0	0	0	0	**0**

Public		**SA**	**NSW**	**NT**	**TAS**	**VIC**	**ACT**	**Total**
Rail accident (incl. strike)	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	0	0	**0**
Level crossing	2010–11	0	1	0	1	n/a	n/a	**2**
	2011–12	3	1	1	1	n/a	n/a	**6**
	2012–13	1	0	0	0	n/a	n/a	**1**
	2013–14	0	0	0	1	4	n/a	**5**
	2014–15	0	0	0	0	0	0	**0**
Fall, assault, other	2010–11	0	2	0	0	n/a	n/a	**2**
	2011–12	0	2	0	0	n/a	n/a	**2**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	1	0	0	0	0	**1**

Trespass		**SA**	**NSW**	**NT**	**TAS**	**VIC**	**ACT**	**Total**
Rail accident (incl. strike)	2010–11	1	28	0	0	n/a	n/a	**29**
	2011–12	3	23	0	0	n/a	n/a	**26**
	2012–13	2	22	0	0	n/a	n/a	**24**
	2013–14	3	37	0	0	33	n/a	**73**
	2014–15	1	27	0	0	37	0	**65**
Level crossing	2010–11	1	0	0	1	n/a	n/a	**2**
	2011–12	0	2	0	0	n/a	n/a	**2**
	2012–13	1	1	0	0	n/a	n/a	**2**
	2013–14	0	0	0	0	6	n/a	**6**
	2014–15	2	1	0	0	6	0	**9**
Fall, assault, other	2010–11	1	1	0	0	n/a	n/a	**2**
	2011–12	0	3	0	0	n/a	n/a	**3**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	3	0	0	2	n/a	**5**
	2014–15	0	0	0	0	1	0	**1**

Steam Train, Tasmania

APPENDIX A2

Passenger train running line derailment 2010–2011 to 2014–2015 (Figure 3)

		SA	NSW	NT	TAS	VIC	ACT	Total
Heavy rail	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	1	3	0	0	n/a	n/a	**4**
	2012–13	0	1	1	0	n/a	n/a	**2**
	2013–14	0	2	0	0	1	n/a	**3**
	2014–15	0	2	0	0	1	0	**3**
Light rail	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	2	0	0	0	n/a	**2**
	2014–15	0	0	0	0	0	0	**0**
Tourist & Heritage	2010–11	0	2	0	6	n/a	n/a	**10**
	2011–12	0	0	0	2	n/a	n/a	**3**
	2012–13	0	0	0	0	n/a	n/a	**1**
	2013–14	0	0	0	2	0	n/a	**2**
	2014–15	1	0	0	1	0	0	**2**
Other	2010–11	0	3	0	0	n/a	n/a	**3**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	1	2	0	0	1	n/a	**4**
	2014–15	0	1	0	0	0	0	**1**

APPENDIX A3

Freight train running line derailment 2010–2011 to 2014–2015 (Figure 4)

		SA	NSW	NT	TAS	VIC	ACT	Total
Train	2010–11	11	20	5	6	n/a	n/a	**42**
	2011–12	8	24	3	2	n/a	n/a	**37**
	2012–13	4	22	2	6	n/a	n/a	**34**
	2013–14	7	15	2	3	11	n/a	**38**
	2014–15	6	9	2	2	4	0	**23**
Light engine	2010–11	1	1	0	0	n/a	n/a	**2**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	1	0	0	n/a	n/a	**1**
	2013–14	0	1	0	0	1	n/a	**2**
	2014–15	0	1	0	0	0	0	**1**
Wagon	2010–11	0	1	0	0	n/a	n/a	**1**
	2011–12	1	1	0	0	n/a	n/a	**2**
	2012–13	0	1	0	0	n/a	n/a	**1**
	2013–14	0	1	0	0	0	n/a	**1**
	2014–15	0	0	0	0	0	0	**0**

APPENDIX A4

Running line collisions, 2010–2011 to 2014–2015 (Figure 5)

		SA	NSW	NT	TAS	VIC	ACT	Total
Between in-service passenger trains	2010–11	1	0	0	0	n/a	n/a	**1**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	0	0	**0**
In-service passenger train & other train	2010–11	0	0	0	0	n/a	n/a	**0**
	2011–12	0	0	0	0	n/a	n/a	**0**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	0	0	0	0	0	n/a	**0**
	2014–15	0	0	0	0	2	0	**2**
Not involving in-service passenger train	2010–11	0	9	0	1	n/a	n/a	**10**
	2011–12	1	3	0	0	n/a	n/a	**4**
	2012–13	1	3	0	1	n/a	n/a	**5**
	2013–14	0	3	0	0	4	n/a	**7**
	2014–15	1	3	0	0	2	0	**6**

(Right) Freight train, South Australia

APPENDIX A5

Level crossing collision between train and road vehicle, 2010–2011 to 2014–2015 (Figure 6)

		SA	NSW	NT	TAS	VIC	ACT	Total
Passenger train	2010–11	0	2	0	0	n/a	n/a	**2**
	2011–12	0	3	0	0	n/a	n/a	**3**
	2012–13	0	0	0	0	n/a	n/a	**0**
	2013–14	1	0	0	0	12	n/a	**13**
	2014–15	1	1	0	0	10	0	**12**
Freight train	2010–11	1	6	0	6	n/a	n/a	**13**
	2011–12	3	6	1	2	n/a	n/a	**12**
	2012–13	1	4	0	1	n/a	n/a	**6**
	2013–14	2	1	0	1	2	n/a	**6**
	2014–15	1	3	0	1	0	0	**5**
Other train	2010–11	1	2	0	1	n/a	n/a	**4**
	2011–12	1	0	0	0	n/a	n/a	**1**
	2012–13	1	1	0	0	n/a	n/a	**2**
	2013–14	0	0	0	0	2	n/a	**2**
	2014–15	1	0	0	0	1	0	**2**

APPENDIX A6

Track km and Train km, July 2014 to June 2015

Category	SA	NSW	NT	TAS	VIC	ACT	Total
Passenger train kilometres (million km)	6.0066	43.2422	0.2222	0.0437	33.6822	0.0013	**83**
Freight train kilometres (million km)	8.2531	18.8216	1.3900	0.7538	4.1666	0.0005	**33**
Track length (as of 30 June 2015) (km)	4721	9727	1738	903	5711	16	**22818**

APPENDIX - 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 2015 — South Australia, New South Wales, Tasmania, Northern Territory, Victoria and the Australian Capital Territory.

Railway operations

The analysis covers all railway operations in each state and territory administered under the RSNL. Twelve Victorian railways continue to be regulated under local Victorian law administered by Transport Safety Victoria (TSV)[14]. These comprise the metropolitan tram operator and 11 standalone Tourist and Heritage railways.

Reporting period

A minimum reporting period of 1 July 2014 to 30 June 2015 applies to this report. For Victoria, most data was available for the period 1 July 2013 to 30 June 2015. For states and territories other than Victoria longer term data was used when available, for example, to examine incident trends over time.

Data and sources

Notifiable occurrence data is largely based on reports submitted to ONRSR by Rail Transport Operators in accordance with section 121 of the RSNL and *Rail Safety National Law National Regulations 2012* (SA) (National Regulations). Data collected by previous state regulators prior to ONRSR and used in this report were collected under different legislative regimes. The sources of notifiable occurrence records were:

- South Australia - ONRSR RegIS database
- New South Wales – ITSR PRISM database until 28 August 2014, ONRSR RegIS database
- Tasmania - ONRSR RegIS database
- Northern Territory - ONRSR RegIS database
- Victoria – TSV TSAARS database until 18 May 2014, ONRSR RegIS database
- The Australian Capital Territory - ONRSR RegIS database from 20 November 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 clause 56 of the RSNL National Regulations 2012 (SA). The source of activity data for each of the jurisdictions was the ONRSR RegIS database.

Definitions

Most of the statistics in this report are based on the top event occurrence category definitions of the national occurrence classification guideline, OC-G1 2013. Data collected by previous state and territory regulators were classified under similar but different classification standards

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; and
- minor injury – requiring medical attention but not hospital admission.

The quality of injury coding varies markedly within and between sources for reasons including:

- absence of injury-related data items, for example, severity, description, person type;
- reduction of non-fatal injury to presence /absence;
- little or no information on the nature of the injury and/or the medical attention received[15];
- use of alternative severity criteria such as occupational-type injury scales ('lost time injury');
- confusion over concepts such as health-related condition versus energy-related damage / injury; and
- different conventions applied for a given injury in the absence of admission information.

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[16].

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 have different definitions to ONRSR and hence the scope of ONRSR incidents used in these comparisons have been aligned to the benchmarking definitions.

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 ONRSR develops and refines its systems for data capture, validation and reporting.

Tram on Jetty Road, Glenelg, South Australia

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

[15] For example, whether or not the person was admitted to hospital which is the basis for defining serious injury

[16] Australian Transport Safety Bureau, Australian Rail Safety Occurrence Data, 1 July 2002 to 30 June 2012, ATSB Transport Safety Report, RR-2012-00, ATSB, Canberra, 2012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