Welcome to issue 7 of Rail Safety News

Readers will be aware that new rail safety legislation is in the South Australian Parliament. Once this legislation is passed it’s expected to be enacted by most jurisdictions in Australia, with a commencement date of December 2012. This is a challenging time frame for legislators and regulators, including Transport Safety Victoria (TSV). Inevitably, the governance of rail safety will change when State parliaments pass enacting legislation. TSV is working with the National Project Office to ensure that the regulatory processes will transition smoothly and, importantly, that there is no reduction in safety oversight.

If you are interested in reading more about the National Rail Safety Regulator project, please visit http://www.nrsrproject.sa.gov.au

This edition of Rail Safety News highlights TSV’s current activities regarding track side worker safety and management of risks to safety associated with hi-rail vehicles. The risks related to fatigue and our usual update on rail accident investigations from around the world are features in this newsletter. I hope you will find them useful.

Thank you and farewell

I would like to also take this opportunity to announce that this will be my last Rail Safety News column as TSV’s Director, Rail Safety. I have accepted a new position in the Office of the Chief Investigator as the Chief Investigator, Transport Safety and commence on 3 July. In this new role, I will continue to have a strong public transport safety focus – something that I am very passionate about.

As much as I am excited about the prospect of embarking on this new challenge, I am equally proud of my time at TSV, where I have had the pleasure of working with the industry and other stakeholders to deliver and uphold important and tangible rail safety initiatives.

By the time you receive this newsletter, Andrew Doery will be acting in the position of Director, Rail Safety. Andrew comes to the role with a wealth of experience in the area, having held the role of Deputy Director, Rail Safety Operations, for some time now. I am confident that he will continue the good work accomplished by TSV and the industry thus far.

It has been a pleasure working with you in our joint quest to improve safety in the rail industry.
Safeworking – track side worker safety

A focus of TSV’s Rail Safety Compliance Program in 2011/2012 includes track side worker safety. This has translated into a number of targeted safety audits focusing on safeworking rules for infrastructure work and rail operators’ occupational health and safety requirements.

This focus resulted from TSV’s analysis of reportable incidents, where an increasing trend of occurrences within the Occurrence Notification – Standard One (ON-S1) category ‘Safeworking Irregularity/Breach’ was identified. Closer examination of this trend revealed an increase in track side worker safety breaches.

The more significant occurrences relate to:
- near misses with track workers/equipment
- work commencing prior to correct protection in place
- conflicting train/track authorities
- protection removed prior to work completion.

Figure 1: ON-S1 category “Safeworking irregularity/breach”.
The increase in near misses with track workers/equipment is of particular concern. These incidents regularly involved work being undertaken where only lookout protection (administrative control to treat risks) was in place. In some of these cases equipment was operated immediately adjacent to the track with the potential to foul the mainline.

Data analysis has been a key input to TSV’s Rail Safety Compliance Program. Targeted safety audits are currently underway with heavy rail infrastructure managers in Victoria.

TSV reinforces the importance for all rail operators and contractor staff to comply at all times to safeworking standards, as documented in their safety management systems. While it may be tempting for staff to deviate from the systems and procedures on site, any deviation increases safety risks. It is also important for rail operators and contractor staff to ensure clarity for and appropriateness of risk treatment owners, including the roles and responsibilities of all workers to ensure safety.

For more information about TSV’s Rail Safety Compliance Program or reporting rail incidents visit www.transportsafety.vic.gov.au.

Figure 2: Safeworking occurrences related to track side worker safety.
Recent rail accidents have highlighted mobile phone use as a source of distraction in rail safety work.

On 12 September 2008, in Chatsworth, California, a passenger train collided head-on with a freight train. The passenger train locomotive and lead passenger car derailed and the freight train’s two locomotives and 10 of 17 cars also derailed. This resulted in 25 fatalities, including the driver of the passenger train. More than 100 passengers were hospitalised and other damage was estimated at greater than $US12 million.

After an extensive investigation, the National Transportation Safety Board (NTSB) determined that the probable cause of the collision was the failure of the driver of a passenger train to observe and appropriately respond to a red signal aspect. This was found to be because he was engaging in text messaging on his mobile phone at the time of the incident, which distracted him from his duties.

This is not the first occasion when mobile phone use has been found to have contributed to a train collision in the USA. A report on the impact of distraction caused by electronic devices in the US rail industry (Federal Rail Administration (FRA) 2008) identified possibly the first clearly documented accident.

On 28 May 2002, near Clarendon, Texas, two trains collided, resulting in two fatalities. The NTSB investigation report indicated the driver of one of the trains was conducting a personal call at the time the train exited the siding. The NTSB concluded that the driver may have been so distracted that he was unaware of the dispatcher’s instructions to stop the train at a designated point. Three other collisions involving mobile phones have been documented between 2000 and 2006.

...because he was engaging in text messaging on his mobile phone at the time of the incident which distracted him from his duties
While driving activities are typically cited, other activities on and around safety critical areas also require extensive vigilance from rail safety workers and their managers. The risk is not restricted to drivers of trains. For example, on 8 June 2008, a brakeman in the US was struck and killed by the train to which he was assigned (Federal Rail Administration, 2008). The preliminary findings indicated that he had instructed the driver via radio to back the train up and subsequently walked across the track, into the path of the moving train. It is most likely that he was talking on his mobile phone.

In another similar incident in September 2010, a railway maintenance worker in Minneapolis stepped from behind a stationary train on to tracks and was hit by another train. He was on his mobile phone at the time and may have been standing near a "loud maintenance vehicle" (Levy, 2010).

The dangers of distraction
Distraction can be dangerous because a person's attention is diverted away from a central activity to other competing activities. For instance, in train driving this could be distraction from any tasks critical to the safe operation of the train. In the rail environment, distraction can lead a person to miss a critical piece of information, such as a signal or warning, an approaching train or vehicle, or a passenger or pedestrian.

There is extensive literature about the impact on safety of distraction due to the use of electronic devices, mostly in the in-car driving environment. Typically, when considering the issue of distraction, people think of holding and using mobile phones while driving. However, there are other activities that may also lead to distraction to a greater or lesser extent. Activities that have been found to lead to distraction include, according to Young, Regan & Hammer, 2003:

- hands free mobile phone use has been found to be no safer than using a hand-held device
- mobile phone use has been found to be more distracting than holding an intelligent conversation with a passenger, but no more distracting than eating a cheese burger
- smoking while driving has been found to increase the risk of being involved in a crash
- for younger drivers, the presence of peers increases crash risk
- reaching for a moving object and applying make-up may expose the driver to up to three times the risk of crash involvement (Robertson, 2011).

For those tempted to dismiss mobile phone distraction as a part of the driving experience, it is sobering to understand the misconception that conversation on a mobile phone while driving is equivalent to talking with an adult, sober and traffic-experienced passenger. This has not been found to be true. Kircher, Patten and Ahlström (2011), reported that passengers with traffic knowledge adapt their conversation patterns to the traffic situation at hand, such as stopping talking when the driver needs to concentrate, and therefore can help in regulating the driver's workload. This is usually not the case for telephone calls.

Both experienced and novice drivers restricted their visual scanning while driving using a mobile phone.
Can we really multi-task?

In our modern world, people like to think that they can multi-task. Unfortunately, this is not the case. Research indicates that humans are “serial processors of information”. This means that even though we may feel as though we are multi-tasking we are really switching our attention rapidly back and forth between tasks. As a result, none of the tasks being performed is likely to receive optimal attention (Smiley, 2005 cited in Robertson 2011). Here our biology limits our ability to multi-task.

As the amount of information that requires attention increases, the brain must decide where to focus attention. Some of this can be consciously controlled, but much of it is not (Tromblay, 2010, cited in Robertson, 2011).

For example, Strayer, 2007 (cited in Robertson, 2011) estimated that mobile phone use by drivers leads them to fail to see up to 50 per cent of the available information. This is because the driver’s effective field of vision shrinks as the load of verbal information increases (Tromblay, 2010, cited in Robertson, 2011).

While experienced drivers perform better than novice drivers, studies have found that the abilities of both groups to maintain their vigilance are affected. For example, Smiley, 2008 (cited in Robertson, 2011) found that both experienced and novice drivers restricted their visual scanning while driving using a mobile phone.

Action by regulators and government

In response to these types of events, the United States Federal Railroad Administration (FRA) amended its railroad communications regulations, restricting the use of mobile telephones and other potentially distracting electronic devices by railroad operating employees. TSV has also recognised the risks associated with mobile phone use and in June 2011, issued a safety alert about the risk associated with the use of mobile telephones and other electronic devices. This was preceded by an earlier safety alert on driver distraction in 2008.

TSV considers that the use of mobile phones and other electronic devices may affect a rail safety worker’s ability to carry out safety critical work. It could lead to loss of situational awareness, failure to detect hazards and critical information, and increased mental workload and error.

TSV suggests that operators consider reviewing:

- risk registers with regard to the risks associated with distraction for drivers and other rail safety workers
- existing controls for these risks, for example, procedures controlling the use of electronic devices
- their approach to monitoring and enforcing these controls.

If you have further queries about distraction associated with rail safety work, please contact Elizabeth Grey, Manager Human Factors at TSV on (03) 9655 6892.

References


Protection arrangements on track are aimed at preventing workers being struck by approaching trains and to prevent entry of trains onto unsafe areas of track. Safeworking rules also apply to protect workers from injury through contact with electrical wiring or equipment. Apart from the devastating loss of life or serious physical injuries sustained by those involved in such events, incidents and near misses involving track workers can result in significant trauma to train crews and co-workers involved.

Many types of rail safety workers are involved in applying safeworking rules to manage risks working around the track. They include track protection coordinators/supervisors, hand signallers/flagmen, maintenance workers, network controllers, signallers and train drivers.

Incidents can occur when rules and procedures are not followed, or when other factors combine to result in a hazardous situation. A review of safeworking incident reports provided to TSV from accredited operators during 2011 identified a number of actions and circumstances.
The following examples of errors and violations occurred during work site protection tasks:

- a hand signaller observed placing protection on track while a train was approaching
- a flagman positioned too close to the worksite providing insufficient warning time for the train crew to respond
- a flagman positioned in a way that caused confusion as to which track the warning applied
- no Audible Track Warning (ATW) devices in place on approach to a worksite
- ATWs placed on wrong track
- failure to obtain appropriate authorisation for electrical works
- work group observed without a lookout in place
- heavy machinery operating close to a running line without protection in place
- workers placed where no position of safety was available (e.g. on a bridge)
- failure of track workers to move to a position of safety and give the ‘all clear’ hand signal to approaching train
- a flagman away from his post (e.g. observed to be in a car) and/or flags left unattended on or next to the track
- a flagman giving an inappropriate hand signal (e.g. showing the ‘all clear’ hand signal when workers were still on track)
- multiple work groups within an absolute occupation without individual permits to foul
- workers observed walking underneath overhead electrical wiring while it was being maintained
- workers observed standing on an adjacent, unprotected line
- ATWs left in place following work and removal of the flagman
- a supervisor failing to inform a flagman of works being completed and inner flagman protection having been removed.

"... the driver saw the four workers standing in the middle of the track with their backs to the train. He immediately applied the emergency brake and sounded the horn...the workers moved very quickly in a disorganised fashion to clear off the track. Expecting the train would strike one or more of the workers, the driver ducked underneath the dashboard and waited for the train to come to a stand..." 

While these actions involve some form of error or violation by individuals, it is also important to think systemically about what might have led to the occurrence. Such actions are influenced by the local workplace environment and factors in the organisational system. Rail operators and infrastructure managers experiencing such events need to consider what measures can be applied to minimise the likelihood of these behaviours and accidents arising as a consequence.

Rail operators are required to eliminate or reduce risks to safety so far as is reasonably practicable. This includes the risks and hazards associated with work on the track. Operators should review their risk registers regularly and ensure controls are appropriate and implemented correctly. This includes keeping abreast of new technologies and methods of work and adopting these where they are reasonably practicable.

Most operators rely heavily on administrative controls such as rules, procedures and training to reduce these risks. TSV promotes consideration of the hierarchy of control when reviewing and selecting control measures. As such, operators should first consider where there are opportunities to eliminate risks associated with track work through design and engineering controls such as the use of physical barriers.

The table below lists potential factors known to be involved in track worker protection incidents, as well as potential safety measures.

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<tr>
<th>Potential contributing factor</th>
<th>Example worker behaviour</th>
<th>Potential safety measures</th>
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| Knowledge and experience      | Worker responsible for positioning flagman lacks experience calculating the appropriate distance where there are differences in train operating speeds and track gradients. | - Improved training/on-going awareness sessions.  
- Implement non-technical skills training (e.g. rail resource management) as this encourages double checking and asking for assistance if in doubt. |
| Fatigue                       | Workers are slow to detect an approaching train or to move to a position of safety.     | - Alarms to alert track workers of approaching trains.  
- Sufficient resourcing is provided to complete the work within scheduled, rather than relying on over-time.  
- Improved rostering practices.  
- Fatigue self-reporting systems. |
| Time pressure                  | Workers choose lower form of protection to avoid significant train running delays.    | - Realistic timeframes used for planning of work including project works.  
- Legitimacy and importance of track work is promoted by senior management in the organisation.  
- Implement non-technical skills training. This can help to promote understanding between different work groups in terms of their roles and the operational pressures they face. |
| Distraction                   | Person with safeworking responsibilities becomes involved in, or distracted by, the work being undertaken on track. | - Sufficient resourcing is provided to complete the work.  
- Alarms to alert track workers of approaching trains. |
| Noise                         | Lookouts and workers unable to hear approaching trains due to being in a noisy environment. | - Alarms to alert track workers of approaching trains. |
| Poor visibility                | Lookup warning to workers delayed due to difficulties detecting the presence of the train. | - Improve visibility of trains.  
- Improve visibility of track workers.  
- Alarms to alert track workers of approaching trains. |
| Complacency/social norms      | Flagman working in hot conditions leaves his position to rest in his car nearby between timetabled trains. He is aware of other flagmen who do the same when working in adverse weather conditions. | - Safety culture improvement initiatives.  
- Implement non-technical skills training (e.g. rail resource management).  
- Increased supervision/monitoring of protection arrangements.  
- Ongoing awareness sessions about risks. |
| Lack of co-ordination between different groups | Train crew would have approached the area more cautiously and may have been more vigilant looking for track gangs, had they been informed that work was being undertaken in that area. | - Improving communications practices among different track worker groups, between network controllers and track workers and between network controllers and train crews (regarding the position of track workers).  
- Implement non-technical skills training (e.g. rail resource management). |
Rostering is typically a rail operator's primary control for eliminating or reducing the risks to safety associated with fatigue. Shift patterns have a direct impact on an individual's fatigue levels, which can increase the potential for human errors that can lead to accidents.

Rostering should be underpinned by good practice rostering principles which include roster design and management of work patterns. Rostering principles should be applied to minimise features of working patterns that could give rise to fatigue-related risks, or increase the risk of accidents arising from fatigue. Rostering principles should also be developed in consultation with rail safety workers (particularly those expected to be most susceptible to fatigue-related risks) and their representatives. The rostering principles developed should also be explicitly documented in the operator’s safety management system.

There is a range of factors that may constrain the rostering practices of a rail organisation. This may include operating schedules, resources, information management systems, and industrial agreements. Nonetheless, rostering must consider the impact of work schedules on the potential for fatigue. A common challenge is the impact of terms and conditions of employment contracts (which are often a result of enterprise bargaining agreements). Rostering cannot be solely based on limits from enterprise agreements unless these are consistent with good practice roster design to minimise fatigue. If work hours are not consistent with good practice, then additional controls may be required to manage increased fatigue related risk.

The National Transport Commission’s Guideline on the Management of Fatigue in Rail Safety Workers, is based on the advice of fatigue experts. It specifies that the following principles be considered in roster design:

- Minimise the occasions on which rail safety workers are required to undertake rail safety duties for long periods (i.e. from sign on to sign off).
- Ensure adequate rest and recovery periods after night shift work.
- Ensure that any rostered period of extended hours is compensated with a longer break before resuming a shift.
- Avoid rapid shift changes that do not provide opportunity for adequate sleep (especially from night shift to day shift).
- Ensure rail safety workers have a minimum number of hours free of work in a 14-day period to aid in fatigue recovery, including two nights sleep.
- Minimise consecutive night shifts in order to limit reductions in performance levels caused by circadian disruption, fatigue and reduced alertness, and
- Take into account the process of circadian rhythm adaptation when rail safety workers return to work after a period of extended leave.

In addition, those responsible for rostering should:

- Build in flexibility for rostering to optimise recovery from varying work conditions and unforeseeable events, which may include the consideration of:
  - the nature of work undertaken
  - variations in shifts and rest periods as a result of emergencies
  - degraded or abnormal conditions
  - different environments and routes, and
  - varying quality of rest environments
- Monitor actual hours against planned hours, as well as the impact of changes from planned rosters due to shift swapping, overtime or on-call working.
- Consider fatigue related risks immediately outside work (e.g. commuting demands, secondary employment, etc) which have foreseeable impacts on fatigue at work.

If bio-mathematical tools are utilised to assist with rostering it is important that those using the tool fully understand the model behind the software, including the limits to its validity and use the tool for its designed purposes only. Bio-mathematical tools do not amount to a fatigue management system and should not be used on their own. Rather they can be used in conjunction with good practice rostering principles and the other elements of a fatigue management system.

In the event of an audit, inspection or investigation, a rail organisation should be able to demonstrate how its rostering practices help manage the risk of a fatigue related incident or accident.

For further information, see:

Hi-rail vehicles (also known as road rail vehicles) are widely used in the inspection and maintenance of track infrastructure. Hi-rail vehicles exist in a number of forms, including vehicles that tow trailers or vehicles that have boom arms required to reach infrastructure or vegetation above the rail.

There are numerous hazards associated with the operation of hi-rail vehicles, and an extensive history of incidents associated with hi-rail vehicles in Australia and overseas exists.

On 30 December 2011 a hi-rail vehicle rolled over a track side worker at a rail construction site in Perth, Western Australia, resulting in a fatality. While this incident is still under investigation, preliminary advice suggests that there may have been a problem during the off tracking of the hi-rail vehicle, causing it to roll and hit the track side worker.

A number of investigation reports have been produced about incidents involving hi-rail vehicles. These include:

- Road-rail vehicle runaway incidents at Brentwood, Essex and at Birmingham Snow Hill that occurred on 4 November and 31 October 2007, produced by the Rail Accident Investigation Branch (RAIB) in the United Kingdom.  
  [link](http://www.raib.gov.uk/cms_resources.cfm?file=/090527_R112009_Brentwood.pdf)

- Derailment of a road rail vehicle at Terryhoogan, near Scarva, Northern Ireland that occurred on 9 March 2008, produced by the RAIB.  
  [link](http://www.raib.gov.uk/cms_resources.cfm?file=/090211_R032009_Terryhoogan.pdf)

- Runaway of a road-rail vehicle at Glen Garry that occurred on 5 December 2007, produced by the RAIB.  
Investigation into runaways of road-rail vehicles and their trailers on Network Rail, produced by the RAIB. [Link](http://www.raib.gov.uk/cms_resources.cfm?file=/091029_R272009_RRV.pdf)


Following an incident involving a heavy duty rail mounted mobile flash welder truck, the Western Australian rail safety regulator issued a safety alert (Notice No: RSN 2011 – 01) on 10 January 2011 regarding the braking systems of hi-rail vehicles. [Link](http://www.transport.wa.gov.au/rail_sa_rsn_2011_01.pdf)

The investigations into these incidents highlighted the following contributing factors:

- prevailing environmental conditions
- track contamination
- visibility on track
- design and configuration of the hi-rail vehicle (for example friction drive versus rubber tyre drive)
- maintenance of the hi-rail vehicle
- braking performance of the hi-rail vehicle (given prevailing environmental conditions and load)
- hi-rail vehicle speed
- training and experience of staff
- track gradient and curvature
- knowledge of operating rules and procedures on the network and at the work site
- failure to prepare emergency plans.

Network Rail in the United Kingdom has launched a national road rail vehicle safety improvement program and a campaign for road rail vehicle safety, to highlight the dangers posed by road rail vehicles.

Accredited rail operators and rail contractors are encouraged to consider the following information and take appropriate steps to manage the risks to safety associated with the operation of hi-rail vehicles.

[Links](http://www.safety.networkrail.co.uk/#s1)
[Links](http://www.safety.networkrail.co.uk/Information-Centre/Safety-365-Campaigns/RRV-2011)
Rail safety worker fatigue is widely accepted as a safety issue in the rail industry. To address this issue, Victorian rail safety legislation imposes obligations on rail operators to develop and implement strategies for controlling risks associated with the fatigue of rail safety workers.

Fatigue can have serious short term and long term effect on health as well as work performance. It is important to understand these effects and work towards minimising their impact.

The long-term effects on health associated with ongoing fatigue and lack of sleep may include heart disease, diabetes, high blood pressure, gastrointestinal disorders, depression, and anxiety.

In the short term, fatigue can lead to a reduced ability to:

- concentrate and avoid distraction
- think laterally and analyse problems and situations
- make decisions
- remember and recall events
- maintain vigilance
- control emotions
- appreciate complex situations
- recognise threats and risks
- coordinate hand-eye movements, and
- communicate effectively.

The nature of these effects means that people who are fatigued are more likely to make errors and be involved in accidents. Fatigue can also cause uncontrollable sleep onset which is particularly dangerous in the high risk rail environment.

It is important to understand that some people may not “feel tired” before their performance is impaired by fatigue. Once fatigued, people are less able to make this kind of assessment. Therefore, it is important to know what can cause fatigue and to plan ahead to minimise the chance of being impaired by fatigue when working.
## Contributing factors to fatigue

| Loss of sleep and cumulative fatigue | • Being awake for extended periods of time takes a toll on a person physically and mentally and reduces the opportunity for restorative sleep.  
• Demands and activities in a person’s work (eg. workload) extended hours/overtime, staff and resource shortages, commuting demands, plus demands in personal life (eg. family/social commitments and responsibilities, secondary employment, significant and stressful personal events) can result in loss of sleep. |
<table>
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<tr>
<td>Extended working hours</td>
<td>• Generally speaking, longer time spent working increases physiological and mental fatigue and reduces the opportunity for sleep.</td>
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| Time of day | • Everyone is biologically inclined to sleep between midnight and 6am, and (to a lesser extent) between 2pm and 4pm. These are the danger times for fatigue-related accidents.  
• Working and commuting at night is likely to expose a person to greater risk of fatigue. |
| Irregularity of sleep patterns | • Over time, a person’s body clock adjusts to the typical day-to-day schedule of being awake and asleep. Therefore, maintaining a regular and predictable sleep pattern is very important for achieving consistently good quality rest.  
• Any change to regular sleeping patterns such as those caused by unpredictable disruptions (eg. being on-call or on-duty, call-outs, changes between day to night shift, overtime, significant stress and other life events) is likely to increase the risk of fatigue.  
• Returning from extended leave can result in the body clock being inconsistent with regular working hours. |
| Task demands and work environment | • Tasks that are particularly difficult, demanding, or extended over long periods of time can result in overload of physiological and mental processes. This may cause a person to become fatigued more quickly.  
• Fatigue can also be brought about by tasks or environments that do not provide enough mental stimulation. This is often the case when tasks are prolonged and monotonous (eg. driving long distances).  
• The immediate work environment can also affect fatigue levels. For instance, uncomfortable conditions such as temperature, noise, vibration, glare, and lighting can place extra strain on a person. |
| Health and fitness | • Fatigue can be a symptom of an underlying medical or health problem.  
• Health conditions such as sleep apnoea and chronic fatigue syndrome may cause a person to be excessively sleepy or tired.  
• Increased fatigue and drowsiness can also be brought on by acute illness and poor health, as well as certain medications, drugs, and alcohol. |

### To reduce your risk of being involved in a fatigue related incident or accident at work, you should:

- comply with your organisation’s policies and procedures relating to fatigue  
- attend work in a fit state to undertake your duties  
- be aware of what might contribute to your being fatigued  
- understand your sleep/rest/recovery requirements and ensure you obtain appropriate rest and sleep away from work  
- assess your own fatigue levels and fitness for duty before commencing work  
- monitor your fatigue levels while you are at work  
- assess your fatigue levels after work and take appropriate commuting and accommodation options, such as avoiding driving if fatigued  
- advise your supervisor or manager if you foresee or experience being impaired by fatigue that may mean you are unfit to work  
- seek medical advice and assistance if you have or are concerned that you might have a health condition that affects your sleep and fatigue.
The following is a summary of the investigation reports into rail safety incidents that occurred in Victoria, NSW, New Zealand, Europe and Canada in recent months.

Common themes in these reports include:

- the importance of controls to prevent train runaways (Poland, NSW)
- risks associated with the failure of cuttings (UK, Canada)
- risks associated with bearing failures (South Australia, Victoria, Canada)
- inappropriate operations of plant equipment on the railway (NSW, Netherlands)
- risks and effectiveness of controls associated with overruns (Victoria, UK).
Platform overruns Siemens Nexus EMU Connex/Metro Trains Melbourne

**Occurrence date**  Feb-Mar 2009  
**Investigation release date**  14 Sep 2011

The report noted that the Siemens-manufactured Nexus has been involved in a relatively high number of reported overrun events when compared to other types of trains operating on the network. The six platform overruns between 8 February and 3 March 2009 suggested that systemic issues remained unresolved and triggered this investigation. Another event at Ormond Railway Station on 25 February 2009 involved a train overrunning the platform by about 250 metres and entering the North Road level crossing before the boom barriers had fully lowered.

It was concluded that the predominant condition associated with the overrun events was the presence of low levels of adhesion between wheel and rail. In considering this condition and other factors potentially contributing to platform overruns, the investigation explored the following five themes:

**Theme 1** the environment - the investigation concluded that moisture combined in a particular proportion with rail head contaminants produces a liquid suspension sufficient to result in low coefficient of friction conditions.

**Theme 2** the track - while unlikely to have been highly contributory to the frequency of overrun events, the investigation concluded that maintaining track in ideal condition would contribute to maintaining a good wheel-rail contact interface with the potential to optimise braking performance.

**Theme 3** the train - the investigation concluded that there was no identified defect on Nexus trains involved in the overrun events but that as an integrated system, was more prone to overrun than other types of train running on the network.

**Theme 4** train handling - the investigation concluded that driving techniques could in some instances have contributed to the onset of wheelslide and an overrun event.

**Theme 5** network risk management - the investigation concluded that at the time of the Ormond incident there remained the potential for severe consequences and that the network risk management systems that were in place were inadequate. The investigation also found deficiencies in procurement and acceptance testing processes.

Recommendations were made to the operator and infrastructure manager in the areas of train performance monitoring, track condition monitoring and driver training. Recommendations were made to the Department of Transport and operator in terms of procurement and acceptance testing.

End-of-track overrun Metro Trains Melbourne, Macleod

**Occurrence date**  24 Mar 2011  
**Investigation release date**  21 Oct 2011

An X'Trapolis train collided with the end-of-track baulks at Macleod Railway Station and subsequently the station wire boundary fence. The train was fully loaded but there was no injury to any occupant or other person. The leading car of the train sustained minor damage with the baulks being destroyed and the fencing damaged.

The investigation determined that low-adhesion conditions were present at the wheel-rail interface, contributed to by vegetation matter from surrounding foliage and moss from the platform that had been washed onto the track during the platform cleaning process. The end-of-track baulks were poorly maintained and not fit for purpose.

Recommendations were made to the rail operator concerning the maintenance of infrastructure as it relates to vegetation and end-of-track baulks, and for the operator to conduct a review of the adequacy of end-of-track protection.

Derailment Pacific National Train, points 127D, South Dynon

**Occurrence date**  15 Oct 2010  
**Investigation release date**  9 Jan 2012

The locomotives and the leading wagon of a Pacific National Mildura to Appleton Dock freight train derailed at points at South Dynon Junction. The set of points connected the recently constructed North Dock Line to the existing Australian Rail Track Corporation network and the derailment occurred during commissioning works. The train was the first revenue train to operate through the commissioning area and was doing so under the local signaller’s authorisation. As a consequence of the derailment, rail traffic was disrupted and Dock Link Road was closed to road traffic for several hours.

The investigation found that the broad-gauge blade of the points was not connected to the dual-control point machine and that it was secured against movement for the broad-gauge route towards the North Dock Line. The derailment was caused by the left-hand point blade of the points being in the reverse position while the right-hand broad-gauge point blade was secured against the standard-gauge rail in the normal position. This resulted in the locomotives and lead wagon attempting to traverse two routes. The derailment was a consequence of the failure of the commissioning planning, operations and safe working processes to identify the condition of the points and the signallers not ensuring the integrity of the route set for the train.

The investigation made recommendations in the areas of the processes for identifying the position of field equipment prior to train movements and the practices applied by signallers.

The investigation also recommended that Victorian Network Managers review the rules in relation to the operation and working of dual-control point machines when in the hand mode.

End-of-track overrun MTM Train, Carrum Siding (PDF, 496 KB, 25 pp.)

**Occurrence date**  3 Mar 2011  
**Investigation release date**  13 Feb 2012

A Comeng train being driven into Carrum 3 siding could not be stopped before reaching the end of the line, causing it to overrun the end-of-line baulks, derail and collide with a steel stanchion supporting the overhead contact wire. As a consequence, the stanchion was uprooted and the overhead contact wire parted. The stanchion fouled the adjoining main line causing rail services between Carrum and Frankston to be suspended. There was also considerable damage to the leading car of the train.

The investigation found that the two drivers involved did not follow standard operating procedures when changing driving ends, resulting in the train being driven into the siding without the braking system correctly set up. Since the incident the operator has issued a bulletin advising drivers to “fully and correctly” comply with documented procedures at all times and outlining the likely consequences of not complying.

The investigation found that Comeng trains can be operated without normal braking being available and recommended that the operator consider the provision of a suitable intervention system to prevent such occurrence.
Runaway of rolling stock, Enfield Yard

Occurrence date
1 April 2011

Investigation release date
12

A Pacific National Terminal operator was changing brake blocks on a rake of 28 loaded aggregate wagons. When he released the air pressure from the braking system on a wagon in the centre of the rake, the remaining brakes applied to the rake did not hold it on the prevailing grade. It ran away through the yard and collided with another stabled rake consisting of 15 empty fuel tanker wagons and three flat bed wagons. The force of the collision caused the tanker bogie closest to the point of collision to derail. The combined rakes continued, and two of the tankers derailed and slewed across the track, carrying away two shunting signals and an overhead wiring portal stanchion. The two rakes came to rest approximately 460 metres from the point of collision with the derailed tankers foul of the up and down main lines. The rake of aggregate wagons ran away for a total of 1085 metres.

The investigation established that too few handbrakes had been applied to the rake in order to hold it on the prevailing grade, and that Pacific National’s maintenance regime and training of terminal operators was not adequate for the effective maintenance of brakes on rolling stock that did not have slack adjusters. The investigation also found that Pacific National did not comply with:

- the Safety Interface Plan and Management Agreement with RailCorp in regard to controlling the risk of runaways
- its own procedures for risk assessments to test the efficacy of its minimum requirement for handbrake application at Enfield Yard.

The investigation identified a number of safety issues for improvement including Pacific National’s non-conformance with its own procedures for undertaking risk assessments, and gaps in training and procedures in relation to brake maintenance.

Collision between hi-rail and rail motor, Zig Zag Railway

Occurrence date
3 May 2011

Investigation release date
2012

A Zig Zag Railway maintenance vehicle (the hi-rail), collided with a two-car rail motor on a viaduct. The hi-rail, with a driver and passenger on board, was freewheeling down the hill in reverse. The rail motor, operated by a driver, was travelling empty in the opposite direction. The rail motor driver saw the approaching vehicle and applied the brakes. However, the two persons onboard the hi-rail, facing the opposite direction, did not see the rail motor before the collision. The force of the collision compacted the body of the hi-rail such that neither cab door would open. The two occupants of the hi-rail were injured in the collision and were assisted out of the hi-rail and onto the rail motor by the rail motor driver who was uninjured. The force of the collision caused a minor misalignment of the track.

The investigation found the collision resulted from the driver of the rail motor and the driver of the hi-rail not being aware that they were travelling towards each other on the same track as a result of procedural errors. The rail motor driver departed without communicating his intention to his guard or the hi-rail crew, and the rail motor guard exceeded his authority by authorising the hi-rail driver to leave a worksite. A number of other factors were found to have contributed to the collision, particularly a lack of radio communications and operational safe working errors. Other safety issues identified included delayed notification of the accident; poor maintenance of train register books; passengers travelling in the rail motor driver’s cab; rail motor driver’s fatigue and excess speed of the hi-rail.

As a result of its investigation, OTSI recommended that Zig Zag Railway review current operational procedures for the implementation of safeworking systems, improve monitoring and auditing of safeworking procedures, ensure that the train register books are maintained, review the structure and staffing of safety operational positions and reinforce reporting requirements following an incident.

Parting of train 9827 near Gunning, NSW

Occurrence date
30 Mar 2011

Investigation release date
22 Nov 2011

A southbound Port Kembla to Parkes empty bulk grain train experienced a train parting event near Gunning (Oolong), NSW, on the down main Sydney to Melbourne rail line. There were no injuries or damage as a result of the incident. The driver felt a series of mud holes in the track, followed shortly thereafter by a loss of brake pipe pressure. The train was travelling at a speed of about 75 km/h at the time. Once the train came to a stop, the driver notified the network controller at Junee while he placed track circuit shorting clips onto the up main line adjacent to the train. He then walked towards and placed audible warning devices on the up main track near the first approaching signal.

During this time the second person walked back to the rear of train 9827 looking for an air leak and found an open air cock on what he thought was the end of the train. He contacted the driver and advised him that the air pipe was blowing, the tap was open and that he had closed it. The driver then noted that the brake pipe pressure had returned to normal. The driver recalled asking the second person if he was at the back of the train, ‘the wagon with the light’. After the event, the second person did not recall this particular communication.

The driver then contacted the network controller and advised them of the findings. When the second person returned to the cab, the driver recalled confirming with him that there was an end of train marker in place, following which he surmised that the hose must have flicked up, as a result of the series of mud holes, and hit the air cock. In his statement, the second person recalled a conversation about closing the tap but not the exact words. Based on the information from the second person, the driver contacted the network controller, removed the track circuit clips and audible warning devices and departed.

After train 9827 cleared the section, the track circuit remained occupied. The network controller noticed the anomaly and immediately contacted train 8114, on the up main line, to be very cautious and check the condition of the track ‘just in case he has left wagons behind’. The driver observed four wagons sitting stationary on the down main line. As a result of the operators own investigation, the operator expects to make changes to training packages and in cab resources for use in emergencies. The investigation identified two safety issues in relation to:

- the in-service condition monitoring of the wheel bearing which was ineffective in detecting the failing bearing before it led to the derailment, and,
- bulk hopper wagons loaded with limestone which have been regularly operated at speeds up to 15 km/h higher than the mandated limit for some classes of track.

Derailed of freight train 4DA2 near Cadney Park, South Australia

Occurrence date
25 Nov 2010

Investigation release date
20 Dec 2011

Freight train 4DA2 derailed on the Central Australia Railway line, about 5 km south of Cadney Park in South Australia. There were no injuries as a result of the derailment but there was significant damage to rolling stock and about 300 m of track required replacement.

The investigation determined that a severe weather event involving very strong winds associated with thunderstorm activity, was of sufficient magnitude to initiate the rollover and subsequent derailment of a group of lightly loaded double-stacked container wagons. The train had parted at the 18th wagon and the 19th wagon through to the 32nd wagon were rolled over and located to the eastern side of the track. The last three wagons were upright although the leading bogie of the 5-unit wagon FQAY 0009R (Unit 1) was derailed. An ISO container of methanol on this wagon had become separated from the wagon and was lying on its side. Wind induced lateral forces, especially those acting on the side of wagons, can contribute significantly to body roll and may cause wagons to rollover as identified by the ATSB in two of its previous reports (Mt Christie in South Australia on 1 September 2008 (RO-2008-010) and Loongana in Western Australia on 11 November 2008 (RO-2008-013)).
The investigation found that double stacked container wagons are at higher risk of wind induced rollover. As a result the operator has adopted a loading protocol which is designed to minimise the risk by requiring that the heaviest container in any double stacked configuration is loaded on the bottom.

The investigation also found that train drivers receive no formal training with respect to understanding severe weather events, the associated derailment risk and mitigation strategies. As a result the operator advised it will engage a specialist service provider to monitor and issue warnings of the formation of severe weather events which have the potential to impact on the railway network and operations.

**Derailment of freight train 5MP5 near Keith, South Australia**

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<td>08 Oct 2010</td>
<td>28 Sep 2011</td>
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Freight train 5MP5 travelling from Melbourne to Perth derailed on the Defined Interstate Rail Network (DIRN) between Wirrega and Keith in South Australia. Four hundred metres of track required repairs before services could resume and 2900 concrete sleepers were subsequently replaced to restore track integrity. It was established that the derailment was the result of a screwed journal on the twelfth wagon in the consist behind the locomotives.

Inspection of data showed that there was a growing problem with the 2L axle-box that was identified by a trackside bearing acoustic monitor. Wheel impact data also identified a growing wheel impact trend. Under the operators existing maintenance guidelines there was no requirement to take wagon RQ1W 22034D out of service. The investigation advised that the operator should consider the implications of these safety issues and take action where considered appropriate.

**Collision between freight train 3SP7 and road-rail vehicle near Menindee, NSW**

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<td>13 Jul 2011</td>
<td>22 Nov 2011</td>
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Freight train 3SP7 collided with a road-rail vehicle in the Kaleenatha to Menindee section of track. The road-rail vehicle, a Toyota Landcruiser station wagon, was extensively damaged. There were no injuries and no damage to fixed infrastructure.

The investigation concluded that the available evidence indicated that in this instance the road-rail vehicle had accessed the track without the knowledge of, or authority from, the network controller, even after the operator was advised of the need to get a separate authority. After accessing the track the vehicle travelled on towards a worksite without authority and was struck by the freight train.

**Collison of grain train 3234 with grain train 8922 at Yass Junction, NSW**

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<td>9 Dec 2010</td>
<td>30 Jan 2012</td>
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Up (northbound) loaded grain train 3234N collided at low speed with the rear of another up (northbound) loaded grain train 8922N at Yass Junction NSW. The intended operation had been for both trains to wait, one behind the other, on the down main line at Yass Junction to enable a third northbound goods train, 4MB2, to pass them both on the adjacent up main line.

Train 3234N proceeded as intended past a signal which indicated that the route was not clear and that the train should proceed with caution. Train 3234N braked as soon as train 8922N was sighted but a collision nevertheless ensued. The investigation highlighted that the definition of restricted speed application in these cases requires considerable judgement on the part of train drivers.

The calling on indication given to 3234 N required the driver to assume that the line ahead was occupied and to operate the train accordingly, at restricted speed. The ARTC glossary defines restricted speed as ‘A speed that allows rail traffic to stop short of an obstruction within the distance of a clear line that is visible ahead’. The Rail Industry Safety and Standards Board (RISB) of Australia is currently developing standards for the rail industry in Australia to adopt. The current draft document ANRP glossary defines restricted speed as “a speed that allows rail traffic to stop short of an obstruction within half the distance of clear line that is visible ahead. Restricted speed must not exceed 25 km/h.” This is consistent with rules currently in force in Victoria.

**Metro passenger train derailment, Sylvia Park, 14 April 2008 and diesel motor fires on board Metro Passenger Trains, 3 June 2008 and 25 July 2008**

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<th>Occurrence date</th>
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<td>14 Apr 2008</td>
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A brake pad caliper fell from a wheel set on the fourth car of a DMU passenger train and derailed one wheel set on the train. The train was stopped, but not before the wheel set, plus another that subsequently derailed, had re-railed. The brake caliper fell because the securing key had either failed or worked loose. Damage to the train was minimal and no one was injured.

On Tuesday 3 June 2008 and again on Friday 25 July 2008, fires broke out in the area of the diesel auxiliary motors fitted on DMU passenger trains while running scheduled services. On each occasion the train was stopped and the fire extinguished. Both fires were seated on the top of the under-slung auxiliary motors.

The cause of all three incidents in this report stemmed from inadequate service and maintenance practices at the maintenance depot. The maintenance depot was not delivering a maintenance regime that was in line with sound railway engineering practices. Although the maintenance depot had to cope with more and longer trains than those for which it had originally been designed, it might have delivered a better level of maintenance if better systems had been in place.

Under the Railways Act 2005 (NZ) and according to the rail participant’s safety cases, KiwiRail was responsible for maintaining the Auckland metro trains and the operator Veolia was responsible for monitoring KiwiRail’s performance to ensure that the trains were being maintained in accordance with sound railway engineering practices. The investigation found contractual arrangements between ARTA (the owner of the trains), Veolia (the operator of the trains) and KiwiRail (the maintainer of the trains) were consistent with the Railways Act 2005 and the National Rail Industry Standard (NRSS). A blurring of responsibilities around the contract and a breakdown of relationships at that time at a senior management level in all three entities was found to

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be hampering the effective execution of those contracts.
Insufficient investment had been put into expanding and improving the efficiency of the then current maintenance facility to cope with the planned increase in passenger rolling stock.
The report states that KiwiRail has taken safety actions to address the specific maintenance issues contributing to the incidents, and has also made significant modifications to the maintenance depot to improve its efficiency and level of safety.

### Derailment of a passenger train near Dryclough Junction, Halifax

**Occurrence date** 5 Feb 2011  
**Investigation release date** 20 Oct 2011

A two-car passenger train derailed when the train ran into stone rubble on the track. The rubble had fallen from a retaining wall beside the line which had collapsed during the night. The collapse of the wall followed a period of heavy rain.
The local authority highways department had reported cracks in the pavement behind the wall to the railway infrastructure manager on several occasions, most recently in October 2010, and had closed the footpath as a precaution.
The investigation found deficiencies in the examination of the wall by the railway infrastructure manager’s examination contractor and in the way in which Network Rail handled reports from the local authority concerning problems with the wall. The limited extent of repairs made to the wall in 2006 also contributed to its failure.
The investigation made five recommendations to the railway infrastructure manager, relating to the structures examination process, the control of minor civil engineering construction works and the system for dealing with reports from third parties.

### Passenger accident at Brentwood station

**Occurrence date** 28 Jan 2011  
**Investigation release date** 28 Nov 2011

A passenger alighting from the last coach of a train fell between the side of the train and the platform. The driver of the train did not see this happen and the train departed from the station with the passenger still in the gap between the train and the platform. The passenger sustained injuries to her leg and head in the accident.
The investigation made three recommendations to the operator concerning improvements in maintenance processes, restrictions on the use of trains that need servicing, driver awareness of low sand conditions and the responsiveness of the sand replenishment regime.

### Station overrun at Stonegate, East Sussex

**Occurrence date** 8 Nov 2010  
**Investigation release date** 17 Nov 2011

A passenger train failed to stop at Stonegate station in East Sussex. The train ran for a further 3.94 km with the emergency brake applied, passing a level crossing before coming to a stop 5.18 km after first applying the brakes. No one was hurt and there was no damage to the train or to the track.
Rail adhesion conditions were poor on that day due to high winds causing fresh leaf fall, and the onset of rain. The line had been treated to improve adhesion the previous evening. The investigation found that it is likely that the train failed to stop because there was almost certainly no sand in the sand hoppers at the leading end. If sand had been present, the train braking system would have deposited sand onto the rail head, improving the available adhesion and allowing the train to stop in a much shorter distance.
The investigation made three recommendations to the operator covering improvements in maintenance processes, restrictions on the use of trains that need servicing, driver awareness of low sand conditions and the responsiveness of the sand replenishment regime.

### Train passed over Lydney level crossing with crossing barriers raised

**Occurrence date** 23 Mar 2011  
**Investigation release date** 15 Dec 2011

A train passed over a manually controlled barrier level crossing while the barriers were in the raised position. The railway signal protecting the level crossing was showing green, and the train was travelling at 94km/h. The red flashing lights intended to instruct road users to stop were operating and there were no road vehicles on the crossing. No injuries or damage resulted from the incident.
The crossing keeper had raised the up side barrier manually during the 90 minutes before the incident, due to a defect in the equipment controlling the barrier motors. Shortly before the incident, the crossing keeper lowered the barriers for a train approaching from the east. He then raised both barriers manually just before the westbound train arrived at the crossing. An annunciator (buzzer) intended to warn the crossing keeper about approaching trains did not give the usual warning.
The railway signals protecting the crossing should have been placed at danger before the barriers could be raised safely. The crossing keeper had no facility to control these signals, and did not inform the neighbouring signallers who could have kept the signals at danger while the barriers were raised. Several possible reasons for not informing the signaller have been identified.
The investigation made recommendations to the infrastructure manager relating to the adequacy of instructions and training given to crossing keepers and signallers and the process used for on-going assessment of staff competencies. The investigation also recommended the modification of standards for new and upgraded crossings so that protecting signals always display a stop aspect when the crossing barriers are raised.
Collision between trains at Hordorf crossover

Occurrence date 15 March 2010
Investigation release date 14 Sep 2011

A collision between freight train DGS 69192 and passenger train DPN 80876 occurred at the Hordorf crossover (double to single line junction), resulting in the passenger train becoming completely derailed. Both trains were occupied by a single driver. Ten people were fatally injured. Twenty-three people were injured, some seriously, including the driver of the freight train.

The investigation revealed that of the signals passed by freight train DGS 69192, the signal in advance showed an ‘expect stop’ aspect, and the block signal showed a ‘stop’ aspect. The Hordorf crossover had been run through. The freight train entered an occupied section and as a consequence collided with the passenger train approaching from the opposite direction on the single line.

The investigation found the passing of the repeater signal showing ‘expect stop’ and the stop signal B showing ‘stop’ was due to human error (though the type of error was not identified).

The investigation concluded that the event would not have occurred had there been a track- and train-based automatic train control system. The investigation recommended updating all lines with automatic train control by means of which a train which passes a signal at danger without authorisation can be automatically brought to a halt.

The investigation also recommended that until sections of line are updated with automatic train control in accordance with the first recommendation, additional measures should be taken to reduce the probability of occurrence and/or extent of the consequences of passing a signal at danger without authorisation.

Collision involving a rail grinding train in Stavoren, Netherlands

Occurrence date 25 Jul 2010
Investigation release date 29 Sep 2011

A rail grinding train travelling at high speed ploughed through a buffer stop located at the end of the railway track at Stavoren Station. The train then crashed into a parked tanker and drove straight through a shop. The accident occurred while the rail grinding train was being transferred to Stavoren Station. The intention was to take the track section out of service after the train had arrived and to subsequently commence the rail grinding activities.

The crew on board the train consisted of four people, two of whom were slightly injured. As there was no one near the station at the time of the accident, there were no other casualties. However, the rail grinding train was severely damaged and the tanker and the shop premises were completely destroyed. The material damage incurred as a result of the accident is estimated to be over EUR 20 million.

The accident occurred because the rail grinding train braked too late when approaching the end of the line, the train driver failed to obey a signal (in the form of an approach marker) and the automatic train protection system (ATB) was inoperative.

The investigation concluded that the signal was not obeyed on account of the following:

- the train driver had inaccurate expectations of the signals/signs along the line and his attention had been diverted
- the signal (approach marker) was an unusual signal, unfamiliar to the train driver, which during darkness moreover is visible for a shorter period of time and was less noticeable than a light signal
- it was more difficult for the train driver to determine the position of the train because some location markers along the track were missing or illegible.

The investigation also found that the train driver’s poor route knowledge played a role in respect of his inaccurate expectations of the signals/signs along the route.

The ATB system was inoperative because the trainborne ATB equipment was incompatible with the trackside ATB equipment. As a result the train driver did not receive an alert upon passing the approach marker, no warning signal was subsequently sounded when the braking system was not manually operated and no automatic braking intervention occurred when the driver failed to brake manually. Because the rail grinding train’s trainborne ATB equipment was switched off, the train was able to travel faster than 40km/h despite the incompatibility of the ATB systems.

Train to train collision Amsterdam

Occurrence date 25 April 2012
Investigation release date 18 Oct 2012

On 21 April 2012, two trains collided in Amsterdam resulting in one fatality and more than 100 injured passengers.

The 24 hour reporting of Prorail (managers of the rail network) and Inspectie Leefomgeving en Transport (The Human Environment and Transport Inspectorate) indicated that the driver of the ‘Sprinter’ train passed a signal at stop. The Sprinter travelled for another 350 metres along the track and drove through and opened up a set of points. The train ended up on a track where the intercity double-decker train was travelling in the opposite direction.

The signal was fitted with a train protection system known as the ATB first generation, and not with the ATB improved version. The ATB first generation does not intervene with trains passing a red signal at speeds below 40 km/h. These findings are reported in the 24 hour reports which are considered to be preliminary. In-depth investigation by multiple parties is still ongoing.
Main-track derailment, Canadian Pacific Railway freight train 220-24, Mile 105.1, MacTier Subdivision, Buckskin, Ontario

Occurrence date 26 Jan 2011
Investigation release date 18 Jan 2012

Canadian Pacific Railway freight train 220 was travelling southward at about 45mph when one of its cars derailed. The train continued 1.4 miles where an additional 20 cars, including a dangerous goods tank car, loaded with non-odorized liquefied petroleum gas (UN 1075), derailed. Some of the derailed cars side-swiped northbound Canadian Pacific Railway (CP) freight train, which was stationary in a siding, derailing its lead locomotive and damaging the second locomotive and the first nine cars.

Inspection of the track revealed that a roller bearing from a wagon on train 220 had overheated, seized and failed causing the axle journal stub to burn off and sever from the axle. The car remained on the rails until it derailed at a snowmobile crossing. The car continued southward with one wheel set derailed until the wheel set contacted siding points at Mile 103.7 and became dislodged, thus causing the following 20 cars to derail.

The roller bearing on the wagon initiated a low level alert on a hot axle box detector. CN low level alerts did not require any action. Four of the previous five hot axle box detectors that train 220 encountered recorded temperature readings that initiated a low level alert for the roller bearing that subsequently failed. Since each of the readings was below an alarm threshold the alerts were not communicated to CP or to train 220’s crew, nor were they required to be.

The investigation also found that two derailments had taken place at the same approximate location since 2006 and that both derailments resulted from progressive equipment failure which wayside inspection systems (WIS) are designed to detect. Principal main line WIS spacing is generally less than 25 miles, but in the vicinity of the derailment WIS spacing is 54 miles.

The investigation also found that reconditioned roller bearings which contain repaired raceway spalls have an increased risk of premature failure when returned to service. Incorrect roller bearing locking plate stamping presents a risk that potentially defective wheel sets may not be correctly identified in the field and removed before component failure.

Main-track derailment, Canadian National freight train M36831-18, Mile 58.20, Kingston Subdivision, Lancaster, Ontario

Occurrence date 18 Oct 2010
Investigation release date 21 Oct 2011

An eastward Canadian National freight train M36831-18 derailed 18 cars, including 6 cars containing dangerous goods.

The damage to sleepers at Mile 58.33 was consistent with impact marks caused by the coupler of wagon car CNIS 623151 (the 68th car) hitting the ground after being pulled away from the yoke and separating the train. The coupler was ejected and fell in the ditch outside the path of the trailing cars.

The coupler and the yoke of the trailing end of car CNIS 623151 did not exhibit any fracture surfaces. Instead, the train separation was found to be caused by the failure of the connection joining the two components together. The retaining bolt of the connection had been identified as being prone to fatigue failure and subject to an interchange requirement. Nevertheless, the retaining bolt was not changed.

In this occurrence, the retaining bolt was not found. However, it is likely that the bolt fractured causing the retaining block to fall to the ground. With no redundancy built into the coupler design, the connecting pin had worked its way out of the assembly, no longer securing the coupler to the yoke. As the coupler was pulled away from the yoke, the train separated between the 68th and 69th cars.

Train M36831-18 was marshalled with a block of loaded cars on the tail end trailing mainly empty cars. This marshalling configuration is susceptible to a derailment through the generation of high in-train forces. When the train experienced an emergency application of the brakes after the separation between the 68th and 69th cars, both portions of the train began to slow. Because the trailing portion of the train was composed of mainly loaded cars and was situated on a steeper descending grade, the brakes were not as effective as on the leading portion composed of mainly empty cars. Consequently, the trailing portion of the train decelerated at a slower rate and collided with the leading portion of the train.

Findings were made in regards to the replacement of components subject to interchange rules and the marshalling of trains.

Main-track derailment, Canadian Pacific Railway freight train 159-23 Mile 22.2, Winchester subdivision, Saint-Lazare, Quebec

Occurrence date 23 Sep 2010
Investigation release date 23 Nov 2011

Canadian Pacific Railway freight train 159-23 derailed 2 locomotives and 11 loaded cars. While the train was travelling at 50mph, it passed the 221 signal (Mile 22.1), which was showing a clear indication, and the crew noticed that the track ahead was obstructed by debris. The engineer reduced the throttle and initiated an emergency brake application. The train was unable to stop before hitting the debris derailing approximately 200 feet wide in the wooded section north of the track, sliding onto the track and covering it with a layer of clay and plant material approximately six feet deep.

The investigation found that an asphalt storage scrap pile rendered the ground unstable, causing a thick layer of sensitive clay to slide onto the tracks. Since municipal regulations did not require a geotechnical analysis of the load-bearing capacity of the ground, the landslide risk caused by the overload imposed by the storage scrap pile was not anticipated.
Industry show case: ARTC – rail safety worker competency management system

The Rail Safety Act 2006 and Rail Safety Regulations 2006 in Victoria require rail transport operators to ensure, so far as is reasonably practicable, their rail safety workers do not undertake rail safety work unless they are competent to do so. This extends to having in place a system of identifying and managing the competency levels of all rail safety workers, including a profile of rail safety work requirements and a system for recording the qualifications that each worker holds.

In response to these requirements, Australian Rail Track Corporation (ARTC) designated a team in 2010 to commence the development of an appropriate rail safety worker competency management system.

In accordance with their accreditation, ARTC has defined rail safety work into nine functional categories. Minimum competency matrices linked to the Australian Qualifications Framework have been created, detailing the units of competence required to perform each specific rail safety worker role.

The implementation of these matrices has been completed in NSW. Rail safety workers who conduct work in track and civil, plant and equipment, safe working, structures, and network control are compliant and had their associated Rail Safety Worker card issued by 2 March 2012. The suite of minimum competencies required to perform rail safety work is available on the ARTC website at www.artc.com.au.

ARTC has further determined communications, engineering, project management and signals procedures as categories of rail safety work. Minimum competency matrices for these categories are currently being finalised with a compliance date to be determined.

The maintenance of competency data, associated competency management system, and the issuing of Rail Safety Worker cards have been externally sourced to Pegasus Safety Ltd.

A new website has also been established for all external contractors to enable them to access information about the competency management system and upload their information to the portal. Please visit www.railsafetyworker.com.au for more information.

The ARTC competency management system not only links rail safety workers to competency information, it is associated with a stringent 100 point identification check. A partnership with Australia Post has been established to facilitate an independent identification check to be carried out on all rail safety workers.

ARTC is well advanced in the development of its competency management system. The roll out has commenced in Victoria with Metro Trains Melbourne, a major partner to ARTC. It is expected compliance with a competency and identification management system will be achieved by December 2012.

→ For queries or information about ARTC's rail safety worker competency management system, please email competencies@artc.com.au

*This article has been provided by ARTC. The views and opinions expressed herein are those of the author and do not necessarily reflect the views of TSV.
Tourist and heritage (T&H) rail operators face the challenge of preserving the heritage of the railway, as well as ensuring the safety of rail operations. This is particularly so when T&H railways are located in arduous terrain.

It is important that track and structures, including bridges and retaining walls, and the surrounding environment, are routinely monitored to ensure that early signs of defects or potential failures are identified.

Asset inspection regimes should take into consideration the risk profile of the railway and have different levels of inspection types and detail depending on the risks associated. The type, condition and age of the assets and prevailing environmental conditions, together with details of the asset inspection regime, should be documented in the operator’s safety management system (SMS).

Inspections should be undertaken by personnel who have the relevant competency and capacity. Some T&H railway staff lack the competencies to undertake detailed inspections of their infrastructure. A reliance on suitably qualified external parties may therefore be necessary in these circumstances.

It is the responsibility of the operator to ensure that such external parties have the necessary competencies and capacity to undertake this work.

It is also important that appropriate records of all inspections are retained.

A periodical review of the inspection regime should be undertaken to ensure the effectiveness of the inspection schedule. This should include reviewing any incidents that have occurred and adjusting the inspection regime to respond to incident investigation findings or asset condition.

It is also the responsibility of the operator to ensure any infrastructure defects or failures are assessed by a suitably qualified person and appropriate rectification works are carried out to the prescribed specification.

TSV periodically conducts safety audits on an operator’s management of infrastructure assets. These safety audits may include a review of the following aspects of the operator’s SMS:

- risk register
- relevant procedures
- compliance with procedures
- records of compliance with procedures and condition of assets
- management of identified issues, and
- ongoing internal review of the inspection regime.
Institute of Rail Signal Engineers – International Technical Convention Singapore and Malaysia

TSV’s signal engineer, Stephen Backway, was awarded the Frank Hewlett/Alan Fisher Travelling Bursary to attend the Institute of Rail Signal Engineers (IRSE) International Technical Convention (ITC) in Singapore and Malaysia in October 2011. The Frank Hewlett/Alan Fisher Travelling Bursary is provided by the IRSE to support its younger members (under 35 years old). Stephen was one of 10 recipients of the bursary for 2011, which was valued at £1,000. This allowed him to attend the ITC from 9-14 October with support from TSV.

As part of the convention, members participated in various technical site visits, technical presentations and social events. The technical presentations provided details on past and current developments in the respective countries, lessons learnt from recent projects and future technologies and trends in rail signals. As part of the site visits, members were given the opportunity to observe rail control centres, train maintenance facilities, signalling equipment rooms and systems onboard the train. Social events enabled members to develop contacts from different countries and to exchange lessons learnt, while experiencing the local culture.

This opportunity has benefited Stephen and TSV by showing how rail safety risks are managed in other countries. This included the application of new technologies and practices to improve the efficiency and safety of railways and the influence of cultural factors on how railways operate. This assists TSV to understand the risks to safety associated with technologies and practices, which may be introduced into Victoria.

The 2012 IRSE ITC (ASPECT 2012) will be held in London in September. For information about this and previous international events see www.irse.org. The local chapter of the IRSE conducts free monthly meetings with technical presentations. More information about these local meetings can be found at www.irse.org.au
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Rail accreditation – rail operators intending to operate in Victoria

Accreditation is the formal process undertaken by Transport Safety Victoria (TSV) to allow an operator to carry out rail operations in Victoria under the Rail Safety Act 2006 (Vic) (RSA). The purpose of accreditation is to attest that the rail operator has demonstrated the competency and capacity to manage the risk to safety associated with the proposed rail operations for which accreditation is sought.

Under the RSA, a rail operator may be accredited as a rail infrastructure manager (RIM) and/or rolling stock operator (RSO).

Under section 36 RSA, a RIM must not operate or be allowed to operate rolling stock on the rail infrastructure under its control, unless the RIM is accredited or is exempted from accreditation either as a private siding operator or is exempted pursuant to the regulations (if operating an emergency response vehicle).

Similarly, under section 37 RSA, an RSO must not operate rolling stock on rail infrastructure unless the RSO is accredited or is exempted from accreditation either as a private siding operator or is exempted pursuant to the regulations (if operating an emergency response vehicle).

Recently, TSV has become aware of rail operators who may be carrying out rail operations either outside their accreditation or without being accredited by TSV.

Operating rolling stock on rail infrastructure without or outside accreditation or without holding an exemption attracts substantial penalties in Victoria. In addition, TSV’s transport safety officers have enforcement powers which include prohibition notices to prohibit any rail operations that involve an immediate risk to safety.

Exemption from accreditation:

Rail operators can apply for exemption from accreditation in Victoria if the operator is:

- a RIM who carries out rail infrastructure operations using or in relation to a private siding
- an RSO who carries out rolling stock operations in a private siding.

Exempt rail operators (EROs), however, still have obligations under the RSA to have systems and arrangements that comply with Schedule 3 of the Rail Safety Regulations 2006 (Vic) (RSR).

The accreditation process

TSV conducts a rigorous process when granting an operator accreditation as an RSO or RIM, or exemption from accreditation.

In order to grant accreditations, TSV conducts reviews of at least the following:

- ABN and other company information
- the nature, character and scope of the rail infrastructure manager’s proposed rail infrastructure operations
the risk management steps taken by the operator
- safety management system (SMS) provided by RIM or RSO applicants (as required by schedule 2 of the RSR, including risk registers)
- evidence of consultation on the SMS
- financial and insurance documentation.

In order to grant exemptions from accreditation, TSV conducts reviews of at least the following:
- ABN and other company information
- documents evidencing the scale/complexity of private siding and the extent of track and other infrastructure layout
- evidence of systems and arrangements provided by ERO applicants (as required by Schedule 3 of the RSR, including risk registers)
- the safety interface agreements provided.

TSV may issue points of clarification to applicants requesting further information to clarify any issue or address any omission associated with the application.

After the required information has been provided, TSV undertakes a number of reviews against legislative requirements that result in a response being given to the applicant.

Applicants are encouraged to meet with TSV before submitting their application for accreditation or exemption, and if required, seek additional guidance from suitably qualified persons in order to meet the requirements of the RSA and RSR.
Track safety awareness training

Track Safety Awareness is a competency-based training course developed for the rail industry. It ensures people who work on or about the railway track environment have the skills and knowledge to conduct their activities safely.

Rail operators are responsible for arranging track safety awareness training where appropriate. This is one way to demonstrate to TSV that operators are ensuring that a person is competent to carry out rail safety work, so far as is reasonably practicable.

Each rail operator has their own processes and systems for maintaining track safety awareness. If a person is employed by, or providing services for, a rail operator through a contractor, he or she should speak with the relevant operator about track safety awareness training. A worker can also seek further information by contacting the relevant track manager.

Below are the contact details for each of the major track managers:

**METRO TRAINS**

Metro Academy conducts train track safety awareness courses and is Metro’s preferred trainer. Metro Academy can be contacted by email on infrastructuretraining@metrotrains.com.au

**ARTC**

The training organisations which ARTC endorses are:


Other useful links:

**V/LINE**

For all V/Line track safety awareness training requirements contact:
Rupert Capper
Manager Systems & Safeworking
T 03 8414 8643
E Rupert.Capper@vline.com.au
Comments, ideas, feedback? Need this publication in a more accessible format (such as large print or audio)? Please telephone TSV on 1800 223 022, or email information@transportsafety.vic.gov.au

Report a rail safety incident (accredited rail operators only): 1800 931 937

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View previous editions of this newsletter: Go to the TSV website homepage, then click on ‘publications and forms’ (top right-hand corner).

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