



Australian Government

Australian Transport Safety Bureau

Collision between track worker and passenger train

Guildford, Western Australia, 10 February, 2015

ATSB Transport Safety Report

Rail Occurrence Investigation

RO-2015-002

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The occurrence

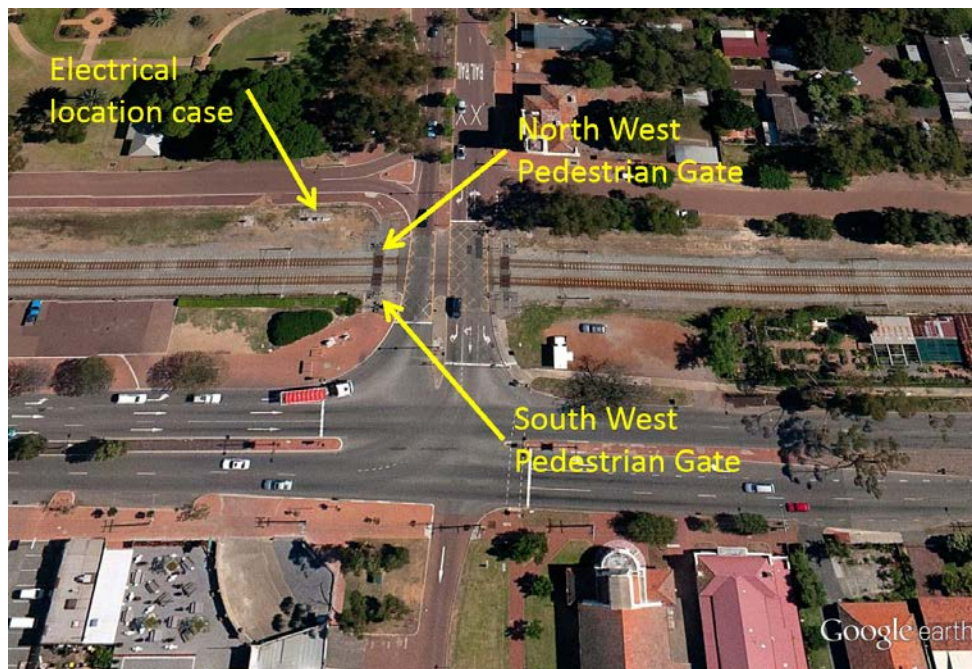
The information contained in this Preliminary report is released in accordance with section 25 of the Transport Safety Investigation Act 2003 and is derived from the ongoing investigation of the occurrence. Readers are cautioned that new evidence will become available as the investigation progresses that will enhance the ATSB's understanding of the accident as outlined in this Preliminary report.

On the morning of 10 February 2015, Public Transport Authority of Western Australia (PTA) signal maintenance crews commenced duty at Claisebrook depot. The crews were arranged into teams according to their qualification and skill sets. One of these teams consisted of a PTA employee and two contractors. The PTA employee was a maintainer, but on this day he was undertaking the role of the protection officer¹ to provide safe working protection to the contractors. One of the contractors, who had more experience on the PTA network, was given the role of signal technician while the other was allocated maintenance duties.

At about 0830 the team departed Claisebrook depot and drove to the Meadow Street level crossing in Guildford, WA. On arrival, the protection officer contacted train control and booked on-track². The team then commenced work, where the protection officer cleaned and maintained the pedestrian gates while the signal technician and maintainer carried out electrical testing.

At about 1019, down³ suburban passenger service 9571 approached the Meadow Street level crossing from the west (Figure 1). When the level crossing protection equipment (gates, lights and bells) activated, the maintainer noticed the north-west pedestrian gate was not closing completely. He advised the signal technician who, as train 9571 passed through the crossing, called the protection officer over to help assess whether the pedestrian gate needed to be adjusted.

Figure 1: Location map – Meadow Street level crossing, Guildford



Source: Google earth annotated by ATSB

¹ Nationally recognised term to describe a person who provides worksite protection (RISSB Glossary of Railway Terminology 2010). This qualification is similar to a WPW15 accreditation on the PTA Network.

² Industry term used to describe contacting train control and advising them of the works to be undertaken at that location

³ Trains on the Midland line travelling away from Perth are referred to as down trains, travelling towards Perth as up trains

At about 1032, train 9573 approached the Meadow Street level crossing from the west. The team, after again observing the operation of the pedestrian gate, decided to compare the control arm settings with the south-west pedestrian gate control arm. After train 9573 had passed through the crossing, the protection officer and the maintainer crossed the railway to the south-west pedestrian gate while the signal technician returned to the electrical location case. The level crossing protection equipment continued to operate because another train (9572) was approaching the crossing from the east, although it could not be seen at the time. The maintainer mentioned to the protection officer that there was another train coming, which the protection officer acknowledged.

The protection officer and maintainer examined the south-west pedestrian gate control arm and agreed its adjustment was different to the north-west pedestrian gate. Meanwhile, up suburban passenger service 9572 continued to approach from the east. The driver of 9572 sounded the horn on approach to Meadow Street and noticed two people working on the trackside of the pedestrian gates.

Moments later, the protection officer turned to his right, facing away from train 9572, and started to walk towards the track. The maintainer who saw the train approaching the level crossing, called out a warning and attempted to stop the protection officer. The driver of 9572 saw the protection officer step towards the track and immediately made an emergency brake application.

At approximately 1035, train 9572 struck and fatally injured the protection officer as it passed through the crossing – coming to a stop a short distance further along the track. The signal technician (at the location case) heard the collision and called out to the maintainer, who replied the protection officer had been hit by the train.

Post-occurrence

The signal technician and maintainer immediately returned to their vehicle and contacted their supervisor. At the same time the driver of 9572 contacted train control and advised he had struck a person at Meadow Street level crossing.

All train services between Bassendean and Midland were suspended and the level crossing was closed to traffic. The PTA, emergency services, WA Office of Rail Safety (ORS) and Worksafe WA attended the site.

At about 1200 the signal technician and maintainer were taken back to Claisebrook depot. Drug and alcohol testing was conducted – returning negative results.

At about 1300, train 9572 was moved to the Claisebrook depot for examination.

Context

Location

Meadow Street level crossing is located in Guildford, Western Australia, about 13 km from Perth Railway Station. The level crossing consists of dual-gauge double-track railway over a dual carriageway road with pedestrian walkways on both sides. The crossing is immediately adjacent to the road intersection between Meadow Street and James Street. The road intersection is controlled by traffic lights which work in conjunction with the level crossing equipment.

The level crossing and associated pedestrian gates were maintained by the PTA.

Track information

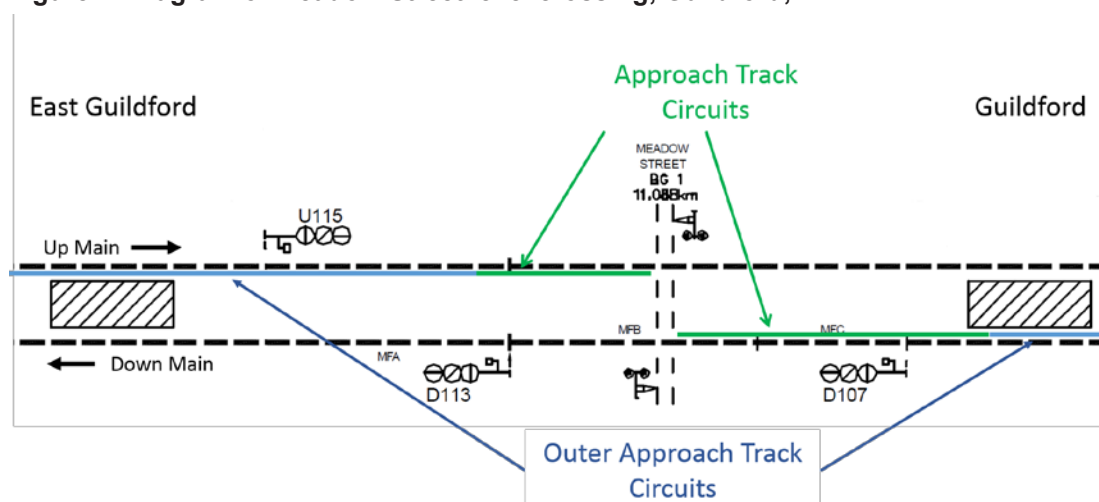
The track at Meadow Street was part of the dual-gauge line from Midland to East Perth; consisting of both narrow gauge (1067 mm) and standard gauge track (1435 mm) using a common rail.

The level crossing was equipped with boom gates, flashing warning lights and bells for road traffic. The pedestrian walkway included automatic gates and electronic alarms for pedestrian traffic, with a pedestrian escape route in the event that the gates closed while pedestrians were still crossing the track.

The Meadow Street level crossing used electronic approach and outer approach track circuits to detect the approach of trains from either direction on either line (Figure 2). When a train is detected on the approach, the control circuit causes the level crossing bells and lights to activate, and the boom gates to lower. In addition, the automatic pedestrian gates close and the pedestrian alarms sound. Due to the proximity to the James Street intersection, an indication is provided to the road traffic light control system to manage any traffic intending to turn into Meadow Street.

The purpose of the outer approach circuits is to prevent the level crossing boom gates from rising and descending in quick succession if a second train is approaching the crossing. If the level crossing equipment is already operating and a train detected on the outer approach, the boom gates remain lowered and the pedestrian gates remain closed until the second train has passed.

Figure 2: Diagram of Meadow Street level crossing, Guildford, WA



Source: PTA amended and annotated by ATSB

Train information

The PTA operate two types of electric multiple unit (EMU) railcars. The A-series EMUs (as involved in this incident) are comprised of two semi-permanently coupled railcars which are 48.42 m in length and have a gross weight of 114 t. The railcars' maximum operating speed was 110 km/h.

Train services 9572 and 9573 were suburban services, stopping at all stations and operating between Perth and Midland.

Train crew information

Train 9572 was operated by a single driver. At the time of the incident the driver was appropriately qualified and trained to operate A-series railcars over the Perth - Midland route.

Following the incident the driver was tested for the presence of alcohol and other drugs and the results were negative.

Maintenance team information

The signals maintenance team working at Meadow Street consisted of:

- PTA employee who was qualified in worksite protection and was working as the protection officer
- contractor qualified and working as a signal technician
- second contractor with qualifications of a signal technician but working as a maintainer.

All personnel had a safe working qualification allowing them to work within the rail reserve without supervision. The PTA employee (protection officer) had additional safe working qualifications allowing him to provide worksite protection associated with working on or about the railway reserve.

Environmental conditions

A weather report from Perth Airport (approximately 4km south of Meadow Street) showed the temperature at the time of the accident was about 27 degrees, with fine conditions and light winds.

As such, weather conditions were considered as unlikely to have contributed to the occurrence.

Maintenance Tasks

The track workers' task was to undertake maintenance of the level crossing and pedestrian gates at Meadow St. The signal technician and maintainer carried out electrical checks, while the protection officer conducted maintenance on the boom gates and pedestrian gates.

Pedestrian Gates

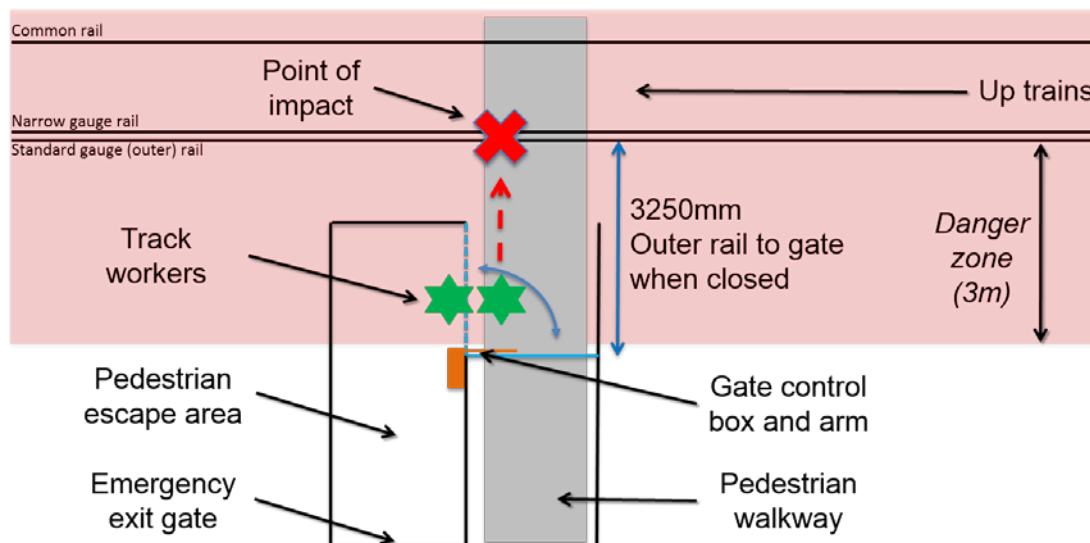
To facilitate maintenance of the level crossing equipment, certain tasks require the crossing to be operating while work is being carried out. This work includes tasks such as circuit testing and checks of the boom and pedestrian gate operation. In some cases, these tasks required the signal technician or maintainer to work close to or inside the danger zone⁴.

One such task was the inspection and, if required, adjustment of the pedestrian gate closing mechanism. The gate control box was located inside the pedestrian escape, with the control arm running from the box to the gate on the track side (Figure 3) - about 3 m from the railway line.

⁴ Industry term generally considered everywhere within 3m horizontally from the nearest rail and any distance above or below this 3 m, unless a safe place exists or has been created.

A level crossing test switch⁵ was provided at Meadow Street that can facilitate operation of the crossing equipment when trains were not present. Despite the availability of a test switch, it was common practice for maintenance personnel to rely on scheduled train services to facilitate operation of the crossing equipment for testing and maintenance of the pedestrian gates. At interview, signalling personnel reported a reluctance to use the switch, in light of the view that it would (unnecessarily) close the crossing to road traffic. In addition, there was a slight difference in the operation of the pedestrian gates when initiated by the test switch (when gates would close under spring tension only) compared with normal operation when activated by a rail vehicle (when gates would close under a combination of spring tension and motor control).

Figure 3: General arrangement of south-western pedestrian gate



Source: ATSB

Maintenance personnel advised that to assess or adjust the control arm required track workers to stand inside the three metre danger zone. Some maintainers would carry out the task with the gate open, working in the escape area with the gate acting as a barrier to the track. However, it was evident that some other maintainers carried out the task when the gate was closed, in which case there was no barrier protecting them against inadvertently stepping onto the track.

It was apparent that the process for conducting maintenance on level crossing pedestrian gates varied between maintenance personnel. In this case, the workers adopted a process whereby the presence of a train was used to operate the level crossing equipment and maintenance and/or adjustment of the gate control arm was undertaken while the gate was in the closed position. This process meant that workers would be positioned within the danger zone, and focused on the maintenance task, at a time when trains were present and without a barrier between themselves and the track.

Worker safety and worksite protection

The safety of personnel working on and around operating rail services is achieved through a number of complementary safety measures. These can be grouped into two general areas:

Worksite protection

These are the measures put in place to mitigate the risk of injury from railway operational hazards. That is, ensuring separation between track workers and train operations.

⁵ Also known as a flagman switch or manual switch. Used to manually activate the level crossing.

Worker safety

These are the measures put in place to mitigate the risk of injury from site specific hazards and task specific hazards.

Worksite protection

Rail systems within Australia use various methods to ensure track workers carrying out maintenance tasks are kept separate from rail traffic. The higher levels of protection involve exclusion of rail traffic from a worksite and can include the complete closure of the railway (or part thereof). The lower levels of protection permit work to be undertaken between train services and can use other employees to warn track workers of approaching rail vehicles.

Access to maintain suburban railway networks is often more restrictive than for freight networks due to the volume and frequency of rail traffic. Works that require the railway to be closed, even for a short period of time, are generally only permitted at night when the frequency of rail vehicles has reduced. Works carried out during the day are usually associated with general maintenance or inspection tasks that can be achieved without closing the railway.

The rules for providing worksite protection are documented in the PTA *Network Rules*. Where track workers are working in the danger zone with hand tools only and have the ability to move to a place of safety prior to the arrival of any oncoming rail vehicle, *Lookout Protection* is routinely adopted for worksite protection. Rule 191 documents the requirements for lookout protection.

The purpose of lookout protection is to task a person or persons to maintain a watch for approaching trains - allowing track workers to be suitably warned to stop work, move to a *place of safety* and allow the train to pass before returning to work. A place of safety is defined in the PTA Network rules as either:

- Where there is at least 3 m clearance between the person and the nearest running line (rail)
- Properly constructed for use as a refuge
- Where a structure or physical barrier has been erected to provide protection
- Behind the safety line on a platform.

Under lookout protection, the lookout's sole duty must be to maintain a constant watch for trains and no other work⁶ may be undertaken. A lookout is only required when track workers are within, or likely to go within, the danger zone. Should the work be outside the danger zone, the lookout may perform other duties, however should track workers resume works within, or likely to go within the danger zone, the lookout must resume the exclusive lookout role.

In this occurrence, the ATSB found that prior to commencing work, the protection officer had not discussed the worksite protection method with the train controller or the contractors. It was evident that the role of a lookout had not been allocated, as all three track workers continued to be engaged in maintenance tasks. At the time of the collision, the protection officer was involved with maintenance tasks rather than the assigned role of protection officer.

Worker safety

The PTA had implemented two levels of hazard assessment to ensure worker safety.

Job Safety Analysis (JSA) forms

Job Safety Analysis (JSA) forms were used to document and assess the risks inherent to conducting the particular job at hand. The JSA for Maintenance of Automatic Pedestrian Crossing Equipment provided information such as the number of people required to carry

⁶ Work is generally defined as any activity within the danger zone other than walking directly from one side of the rail reserve to the other.

out the job, equipment and training required, and a risk matrix containing a selection of high level generic risks that should be considered prior to commencing the job.

In the context of this incident, the JSA identified 'Being hit by a train' as a potential hazard, with the associated controls identified as 'Adherence to safety procedures - assign competent lookout, obtain prior train information (booking on track)'.

Pre-start checklist

Pre-start checklists were used as a record that workers had considered all issues that ensure a task could be undertaken safely. The checklist is a generic form that can be used for any site or task and records information such as date, location, task and names of workers. The checklist records acknowledgment that workers have considered and understand the scope of work and the measures required to undertake the work safely, such as the information contained in the JSA.

The ATSB found that the site team, in this case, had not completed the pre-start checklist prior to commencing work at Meadow Street. While it is likely that the workers were aware of the JSA for pedestrian gate maintenance, there was no record that they had considered the risk controls contained therein to ensure worker safety.

Safety analysis

The Western Australia *Rail Safety Regulations 2011* prescribe the requirements that all railway operators in Western Australia must include in their safety management systems. Schedule 1, Clause 17 (4) requires a railway operator to have 'systems, procedures and standards' for monitoring and maintenance of rail infrastructure.

The Office of Rail Safety (Western Australia) makes reference to a publication titled *National Rail Safety Guideline - Preparation of a Rail Safety Management System*⁷ for guidance on the development of these procedures and standards; specifically that railway operators should provide safe work procedures that include:

- A description of the activity.
- Identification of the person or position that has a supervisory responsibility for the activity or process.
- A clear explanation in sequential order, of the steps or stages comprising the procedure or process.
- Identification of potential hazards in the process.
- Identification of safety controls to minimize potential risk from any identified hazards.

The PTA *Signalling Equipment Maintenance Manual* provided a checklist which detailed all necessary tasks required to maintain automatic pedestrian crossings. The JSA identified the potential hazards and relevant safety controls, while the pre-start checklist recorded workers' acknowledgment of these measures. While individually, these documents addressed the stated requirements of the regulations and guidelines, the incident on 10 February 2015 illustrated that the intent of the system was not met (that is, to ensure work is carried out to a consistent level of quality and safety). Explicitly, there were no instructions requiring that the work on the pedestrian crossing system be carried out in a manner that did not create an increased risk of being struck by operating train services and was consistent between all maintenance teams.

It was evident that the process for maintaining pedestrian gates varied between work groups. While not specified, the requirement in the JSA to assign a lookout implied that Rule 191 (lookout protection) should be adopted when maintaining pedestrian gates. Rule 191 requires workers to '...move from the track and stand clear in a position of safety at least 10 seconds before rail traffic arrives and remain clear until the rail traffic has passed by'. However, for some workers, it was common practice to carry out maintenance and adjustment of pedestrian gates (within the danger zone) while rail traffic was passing. It was evident that this process had been adopted by the maintenance team at Meadow Street level crossing on 10 February 2015.

An alternative practice adopted by some workers more closely aligned with the requirements documented in Rule 191. This involved maintaining the gates from within the pedestrian escape area while trains were not present. When a train was approaching, the workers would stop the maintenance task and only observe the gate operation. The workers would note any operational issues and, upon passing of the train, would make the necessary adjustments.

In any case, the absence of specific documented instructions meant that maintenance personnel adopted a variety of inspection, adjustment and maintenance practices – some of which may be inherently less safe than alternatives.

⁷ Published by the National Transport Commission (2008). The document was republished (2014) by the Office of the National Rail Safety Regulator and titled *Preparation of a Safety Management System Guideline*.

Ongoing investigations

The investigation is continuing and will include an examination of the following:

- Policies and procedures for safe working practices adopted by the PTA.
- The training programs for safe working practices and undertaking work on track.
- The human performance and behavioural factors that may have contributed to the incident.

Preliminary findings

From the evidence available, the following preliminary findings are made with respect to the fatality at Guildford, Western Australia on 10 February 2015. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

Contributing factors

- Worksite protection had not been adequately implemented to ensure workers were protected against inadvertently stepping into the path of a train while undertaking maintenance work.
- It was common practice for maintenance personnel to adopt a process that was inherently less safe than an alternative when maintaining automatic pedestrian crossing equipment.
- **The Public Transport Authority of Western Australia did not have documented instructions to ensure a consistent and safe approach to maintaining automatic pedestrian crossing equipment. [Safety issue]**

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Where relevant, safety issues and actions will be updated on the ATSB website as information comes to hand. The initial public version of these safety issues and actions are in PDF on the ATSB website.

Documented instructions

Number:	RO-2015-002-SI-01
Issue owner:	Public Transport Authority of Western Australia
Operation affected:	Rail: Infrastructure
Who it affects:	All owners, operators and maintainers of railway infrastructure.

Safety issue description:

The Public Transport Authority of Western Australia did not have documented instructions to ensure a consistent and safe approach to maintaining automatic pedestrian crossing equipment.

Response to safety issue and proactive safety action taken by the Public Transport Authority of Western Australia

The PTA advised that maintenance workers are trained and competent to determine the appropriate level of worksite protection. Furthermore, the PTA stated that 'by not mandating particular rules to particular tasks, the PTA empowers workers to best determine which level of worksite protection best meets the needs of the task/s being performed'.

Notwithstanding this, the PTA advised of the following safety action:

Action number: RO-2015-002-NSA-01

Following the incident at Guildford the PTA issued Safety Alert PTA01/15 stating that all employees required to work within, or likely to enter, the danger zone must be protected from rail traffic. The Safety Alert also reinforced the requirements of lookout protection.

The PTA also advised that they intend to withdraw the existing Network Rule 191 and replace it with Rule 3013 on the 1st August 2015; this is the initial phase in aligning PTA with the Australian Network Rules and Procedures (ANRP). This will provide qualified employees with the following addition protection:

- People performing the role of Lookout have a higher level of training and can only perform that duty.
- Sighting distance must be measured and confirmed.
- Restricts the type of work being done as only hand tools can be used.
- Lookouts must have a break every 60 minutes.

- Only two Lookouts are allowed.
- Provides instruction for worksites using noisy machinery.
- Implements the role of the Protection Officer (Level 1).
- Provides detailed placement and actions of the Lookout and the workers.
- The Process must be documented.

The PTA would provide additional training to all track workers in the use of the new Rule 3013 Lookout Working.

In addition to this, the PTA advised that the General Manager Network Infrastructure had instructed maintenance personnel to adhere to PTA rules and procedures, and that activation of the level and pedestrian crossing was not considered to be a method of worksite protection.

ATSB comment in response

The ATSB acknowledges that the PTA have taken steps to implement an improved version of lookout working (Rule 3013), but notes that the rule in place at the time of the incident (Rule 191) was largely consistent with the requirements of the new rule. That is, workers are warned of approaching trains, required to stop work, move to a place of safety and allow the train to pass before returning to work.

While trained workers should be competent at determining the required level of worksite protection, the ATSB found that, when conducting maintenance on automatic pedestrian crossing equipment, some workers implemented the requirements of lookout working while others did not. That is, some workers would carry out the maintenance task (within the danger zone) while rail traffic was passing; an approach adopted by the maintenance team at Meadow Street level crossing on 10 February 2015.

The PTA's safety alert states that workers must be protected from rail traffic and implies that lookout working is considered the minimum level of worksite protection applicable to the task of maintaining automatic pedestrian crossing equipment.

The ATSB is satisfied that the actions taken to date significantly reduces the safety risk and when combined with completion of the additional training should fully address this safety issue.

The ATSB will examine the PTA training program as part of the ongoing investigation.

General details

Occurrence details

Date and time:	10 February 2015 – 1035 WST	
Occurrence category:	Serious incident	
Primary occurrence type:	Fatality	
Location:	Guildford, Western Australia	
	Latitude: 31° 53.933' S	Longitude: 115° 58.287' E

Train details

Train operator:	Transperth	
Registration:	AEA239 / AEB339	
Type of operation:	Passenger	
Persons on board:	Crew – 1	Passengers – Unknown
Injuries:	Crew – 0	Passengers – 0
Damage:	Minor	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Bureau of Meteorology.
- Public Transport Authority of WA.
- Brookfield Rail.
- National Guideline Glossary of Railway Terminology Version 1.0, 3 December 2010 Railway Industry Safety and Standards Board of Australia (RISSB).

References

- Public Transport Authority Network Rules 2000.
- Public Transport Authority Appendix to the Network Rules 2000.
- Public Transport Authority, Signalling Equipment Maintenance Manual – Schedule of Maintenance Tasks 8100-600-046.
- Western Australia Rail Safety Regulations 2011.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the Public Transport Authority of Western Australia, WA Office of Rail Safety and individuals directly involved in the occurrence.

Submissions were received from Public Transport Authority of WA. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.