RAIL SAFETY INVESTIGATION REPORT

SAFEWORKING INCIDENT

MOSS VALE

21 DECEMBER 2013

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ACRONYMS AND ABBREVIATIONS

ARTC..........Australian Rail Track Corporation
ATSB..........Australian Transport Safety Bureau
DIRN..........Defined Interstate Rail Network
ITSR..........Independent Transport Safety Regulator
NCCS..........Network Control Centre South
ONRSR........Office of the National Rail Safety Regulator
OTSI..........Office of Transport Safety Investigations
RSSB..........Rail Safety and Standards Board (UK)
TTM..........Train Transit Manager
## GLOSSARY OF TERMS

<table>
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<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Blocking Facility</td>
<td>A facility or device used by a Qualified Worker to prevent either the unintended issue of a Proceed Authority, or signalling equipment.</td>
</tr>
<tr>
<td>Controlled Signal Blocking</td>
<td>A method used by Qualified Workers to carry out work on track using controlled signals set and kept at STOP.</td>
</tr>
<tr>
<td>Danger Zone</td>
<td>Everywhere within 3m horizontally from the nearest rail and any distance above or below this 3m, unless a safe place exists or has been created.</td>
</tr>
<tr>
<td>Defined Interstate Rail Network</td>
<td>Standard gauge interstate rail network.</td>
</tr>
<tr>
<td>Down and Up Lines</td>
<td>Trains that travel away from Sydney are Down trains. The lines that carry them are Down lines. Trains that travel towards Sydney are Up trains. The lines that carry them are Up lines.</td>
</tr>
<tr>
<td>Kilometrage</td>
<td>The track distance measured from the buffer stop at No. 1 Platform in Sydney Terminal (Central station).</td>
</tr>
<tr>
<td>Four Foot</td>
<td>The area between the rails of a railway track.</td>
</tr>
<tr>
<td>Hot Box Detector</td>
<td>A device capable of detecting abnormal heating in axle journal bearings on passing trains.</td>
</tr>
<tr>
<td>Network Control</td>
<td>The function responsible for managing train paths and issuing occupancy authorities.</td>
</tr>
<tr>
<td>Notifiable Occurrence</td>
<td>A notifiable occurrence means an accident or incident associated with railway operation that has, or could have, caused significant property damage, serious injury, death or that is, or is of a class that is, prescribed by the national regulations to be a notifiable occurrence or class of notifiable occurrence.</td>
</tr>
<tr>
<td>Phoenix System</td>
<td>An ARTC telemetry system forming the interface between the signal system and the network controller.</td>
</tr>
<tr>
<td>Six Foot</td>
<td>This is the area between the closest rails of adjacent tracks.</td>
</tr>
<tr>
<td>Train Transit Manager</td>
<td>The manager of an ARTC Network Control Centre.</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

At approximately 2214 on 21 December 2013 near Moss Vale station, passenger service ST21 travelling on the Down Main line passed stationary Pacific National freight service 6AB6 on the Up Main line. This alerted the crew of 6AB6 to the fact that worksite protection had not been in place for the co-driver while he was investigating the report of a warm axle on one of the train’s wagons.

The protection was sought by the driver of 6AB6 and was understood to have been implemented by the network controller located at the Australian Rail Track Corporation’s Network Control Centre South at Junee. However, when the network controller was about to implement protection arrangements, he was distracted by a personal phone call which resulted in him moving away from his control panel. During his absence, he was not relieved at the panel and, on return, took no further action to implement the worksite protection. Even though controlled signal blocking was not implemented, the network controller told the crew that it had.

In addition to the distraction, the investigation found that the network controller’s performance may have been fatigue-impaired. He had been working for 9 hours of a 10 hour shift without a scheduled break. It was normal practice in the control centre not to have scheduled breaks.

The investigation also identified inadequacies in the use of verbal communication protocols, post-incident drug and alcohol testing and the train driver’s adherence to procedures in the implementation of controlled signal blocking.

The main recommendations directed to the Australian Rail Track Corporation concern:

- review procedures for network controllers to minimise distraction
- improve rostering practices to have relief staff cover breaks
- regular auditing of verbal communications so as to promote adherence to network rules and improve compliance with communication protocols.

The same recommendation on the auditing of verbal communications is directed to Pacific National. In addition, it is recommended Pacific National have regular refresher training for train crew about the implementation of worksite protection.

The full details of the Findings and Recommendations of this rail safety investigation are contained in Parts 3 and 4 respectively.
PART 1 FACTUAL INFORMATION

Introduction

1.1 At 2136 on Saturday 21 December 2013, 6AB6, a Pacific National freight service travelling on the Up Main line activated a warm axle alert at Exeter. The train crew were requested by the network controller to inspect the axle. Arrangements were made for the inspection to be conducted at Moss Vale station.

1.2 A conversation between the network controller and the driver of 6AB6 established that protection arrangements would be put in place for a crew member to leave the crew compartment of the locomotive and conduct an inspection of the axle. The protection arrangements included blocking facilities being placed on the adjacent Down Main line. However, the network controller did not apply the blocking facilities to the Down Main line despite assuring the driver that he had done so.

1.3 The inspection of the axle did not detect any defects and the crew member returned to the front of the train. Shortly after he had re-entered the locomotive cab, the crew observed NSW Trains XPT passenger service ST21 pass on the adjacent Down Main line. This movement occurred despite an understanding that protection arrangements were still in place.

Environmental information

1.4 According to the crew of 6AB6, the night was cool with patches of drizzle. The overnight minimum temperature was 16.1°C as recorded by the Bureau of Meteorology at Moss Vale.

1.5 There was ambient light around the station and track. This light was provided by the surrounding street lighting and the lighting positioned between the tracks on the Up side of Moss Vale station.

1.6 The investigation determined that the environmental conditions did not contribute to the incident.
Location

1.7 Moss Vale is on the Main South line approximately 145 km by rail south of Sydney (see Figure 1). The axle alert occurred on the Main South line at Exeter and the co-driver alighted from the train at Moss Vale station to conduct the axle inspection. The distance to Moss Vale station from Exeter is approximately 10 km.

1.8 The passenger service ST21, travelling on the Down Main line, passed the front of 6AB6 in the vicinity of Berrima Junction. The distance between Berrima Junction and Moss Vale station is about 2.5 km (see Figure 2).

Figure 1: Locality Map
1.9 The inspection of the axle occurred in a safe area at the Sydney end of Platform 1 at Moss Vale station. The rail corridor at the station contains a number of standard gauge lines including the Up and Down Main lines; the lines converge upon leaving the station (see Photograph 1). Both lines are part of the Defined Interstate Rail Network (DIRN).

1.10 On completion of the axle inspection, the co-driver walked back to the locomotive’s cab beside 6AB6 in the four-foot on the Down Main line and in the six-foot between the Down and Up Main lines. The path of the co-driver is depicted by the dotted line in Photograph 1.
1.11 The track and infrastructure in this area is managed by the Australian Rail Track Corporation (ARTC) and operational control is managed from the Network Control Centre South (NCCS) in Junee. Trains travelling through the Exeter - Moss Vale - Berrima Junction area are controlled by a network controller operating the Main South 'A' Panel.

Photograph 1: Up and Down Main looking towards Sydney

Train information

1.12 Intermodal freight service 6AB6 was owned and operated by Pacific National, a division of Asciano Limited. The train was travelling from Adelaide to Brisbane via Sydney. Two NR class locomotives (NR10 and NR47) were hauling 37 loaded wagons (see Photograph 2). The train measured 1357 metres in length and had a trailing weight of approximately 2540 tonnes. Apart from the warm axle alert, there were no other reported mechanical issues with the train.

1.13 Passenger service ST21 was owned and operated by NSW Trains, a NSW Government agency. This Sydney to Melbourne XPT service departed Central station at approximately 2032 and was due to depart Moss Vale station at
2218. The driver of ST21 was not contacted by the network controller about the warm axle alert inspection and was unaware of the safeworking incident.

Photograph 2: A Pacific National NR class locomotive

Employee information

1.14 **Train Crew.** The crew of 6AB6 consisted of a driver and co-driver, both Pacific National employees based at Sydney Freight Terminal Depot at Chullora. The driver was an experienced train driver with over 20 years driving experience. The co-driver, who conducted the axle inspection, was classified as a trainee driver at the time of the incident. He had 14 months driving experience. Both crew members were within their respective medical and competency assessment periods and were familiar with and qualified for the route.

1.15 **Network Controller.** The network controller operating the Main South ‘A’ Panel (see Photograph 3) at NCCS was an experienced network controller. He had commenced employment with ARTC as a network controller in 2006 but had been working in the rail industry since 1986. There was no record of his being involved in any similar incident. He was deemed fully competent to operate various signalling control panels within the control centre, including
the Main South ‘A’ Panel. He was within his medical and competency assessment periods.

1.16 In order to manage the movement of trains, the network controller uses the Phoenix control system. It provides a diagrammatic display which allows controllers to interact directly with the rail network by controlling signals, points and other signalling equipment through the click of a mouse. It is a non-vital\(^1\) centralised traffic control system which enables real time monitoring and control of the signals and points. The controller’s area of responsibility is displayed over multiple LCD monitors, of which the Main South ‘A’ Panel has five.

\[\text{Photograph 3: Control Panel at Network Control Centre South}\]

\(^1\) Non-vital: Signalling equipment and circuits are considered non-vital where failure to function correctly would not cause an unsafe outcome of the signalling system. Non-vital equipment and circuits do not affect the safe operation of the signalling system.
Trackside axle monitoring

1.17 Placed at strategic locations on the rail network are devices that measure the temperature of passing axle journal bearings (see Photograph 4). These devices are often referred to as hot box detectors. When an elevated temperature is detected, an alert is automatically relayed to the network control centre. The network controller is alerted by a flashing light on his panel and an audible alarm. An elevated temperature can be an indicator of a potential bearing failure. Extensive delays could result if a bearing failure occurs and the train is disabled, especially when it is in the Sydney metropolitan rail network. A more serious consequence is the potential for a derailment.

Photograph 4: A trackside axle monitoring device

1.18 When an alarm is received, the network controller contacts the driver of the train involved by telephone or, as occurred in this instance, the CountryNet radio system. When a crew member conducts an axle inspection, it is necessary to conduct the inspection from the track. This inspection includes: inspecting the axle bearing to see if the bearing is intact; checking the heat of the bearing; checking for any grease leakage; and checking if there are any other signs of damage such as a skidded wheel or scale on wheels. If the
bearing is damaged, it may be necessary for a rolling stock maintenance crew to attend the site where the inspection is conducted. In this case the inspection by the co-driver did not detect any problems.

1.19 The Exeter trackside detector is located at kilometrage 155.467 and is operated and maintained by ARTC. In this case the alert indicated that axle number 176 of the consist, located on vehicle RRYY 29P, the 28th vehicle on train 6AB6, recorded a temperature of 92°C on the down side bearing. The wagon was approximately one kilometre from the front of the train.

**Development of the occurrence**

1.20 The train crew signed on for duty at Junee station at 1540 on Saturday 21 December 2013, having driven a train to Junee from Sydney the previous day. They took charge of intermodal freight service 6AB6, a service running from Adelaide to Brisbane, from another crew. The destination of 6AB6 was Sydney Freight Terminal at Chullora where the expected arrival time was approximately midnight.

1.21 The co-driver drove the train from Junee to just past Exeter when, at 2139, a call was received from network control about a warm axle alert detected by a trackside detector at Exeter. The co-driver answered the call but the more senior driver took control of managing the incident.

1.22 The network controller advised the train crew about the details of the warm axle alert. He requested that they stop 6AB6 towards Berrima Junction in order for an axle inspection to take place. The driver agreed to stop the train at signal BJ82, but indicated that he would first stop at Moss Vale station to let his co-driver off and then pull the train forward to make it safer for him to carry out the inspection. There is an area at the Sydney end of Moss Vale station platform 1 which the driver knew would be a safe well-lit location for the inspection to be performed (see Photograph 5).

1.23 The driver then requested that the network controller place a Controlled Signal Block on the Down Main line. This meant that the network controller would place signals at stop to prevent any trains passing the stationary 6AB6 on the adjacent track. This would enable the co-driver to complete the inspection and
then return to the front of the train and enter the locomotive cab without any train passing while he was on or near that track.

Photograph 5: Inspection area at end of Platform 1 at Moss Vale

1.24 Communications between the network controller and the driver established that protection arrangements would be put in place for a crew member to leave the crew compartment of the locomotive and conduct an inspection of the axle. The protection arrangements included blocking facilities being placed on the adjacent Down Main line to provide a safe area for the co-driver to walk back to the locomotive after conducting the inspection.

1.25 After the inspection of the axle, which did not detect any defects, the co-driver walked beside his train along the Down Main line. He climbed up the steps and re-entered the locomotive cab.

1.26 The co-driver said he was in the locomotive cab for about two minutes when XPT passenger service ST21 passed on the adjacent Down Main line. The time was approximately 2214. The crew estimated the speed of the train at about 90 km/h. (The posted track speed at the location is 110 km/h for passenger services.) Shortly after this, another passenger train, SN54,
passed on the Down Main line, this time running in the Up direction. Both ST21 and SN54 passed 6AB6 when there was a possibility that the co-driver could still have been on the track.

1.27 After these trains passed him, the driver of 6AB6 contacted the network controller to ask for an explanation. The network controller incorrectly informed the driver that the blocks had not been lifted and that the other trains were told: ‘to keep an eye out’ (for 6AB6). The driver then called the train transit manager and a Pacific National operations manager located in Adelaide to complain about what had happened. Shortly afterwards, 6AB6, with permission from the network controller, continued its journey to Sydney where the crew signed off. They were not subjected to drug and alcohol testing.

1.28 The train transit manager started investigating the incident and quickly determined that no blocks had been applied by the network controller. He determined that the network controller should be breath tested. The network controller stayed in the control centre until the end of his shift and was subjected to a breath alcohol test by a police officer who attended the control centre. The result was negative. He was not drug tested following the incident. The network controller left the control centre about 2310 and returned to work the next morning where he was recertified as competent by the same train transit manager who was on duty the night before. He commenced a shift as network controller at 0700. It should be noted that the train transit manager was working his scheduled shift and the fact that it was the same train transit manager who was on duty at the time of the incident is coincidental.

Other safeworking occurrences

1.29 The incident at Moss Vale is one of a number of safeworking incidents that have occurred in recent years. Both the Australian Transport Safety Bureau (ATSB) and OTSI have investigated and published reports into many of these incidents, some of which are highlighted below.

1.30 On 28 October 2009, at Glenlee, Pacific National freight train 3BM4 almost struck the co-driver of another freight train, 2XW4, who was returning to his locomotive after conducting an axle bearing inspection. The subsequent OTSI investigation found that no blocking facility was requested to be placed on the
Down Main line to prevent a train from entering that section. The communication between the network controller and the co-driver of 2XW4 was poor. It was brief and lacking detail, and in particular, there was no feedback or clarification about the protection arrangements which needed to be applied to the Down Main line if the axle bearing inspection was to take place. A number of recommendations were made to ARTC and Pacific National which have direct relevance to this incident at Moss Vale. These are discussed in the analysis section of this report.

1.31 On 13 April 2010, at Kogarah station, a track worker was struck and killed by a passenger train while removing litter on the tracks. The other four members of the work group moved from the path of the train and avoided injury. The investigation found that the track worker was struck because the RailCorp area controller did not identify that the train was already in the section approaching Kogarah and had passed the protecting signals before he applied blocking facilities. These workers were working under the controlled signal blocking method of worksite protection. It should be noted that neither ARTC nor Pacific National were involved with this incident.

1.32 On 17 June 2010, also at Moss Vale, a safeworking irregularity occurred between a CityRail passenger service, SN57, and a Pacific National light engine, train D231. An ATSB investigation determined that the network controller had made an error in allowing SN57 authority to pass signals placed at stop, which placed this train in conflict with D231. The network controller realised the error and stopped train D231 before the potential point of conflict. While significant, the incident did not involve controlled signal blocking.

1.33 The Independent Transport Safety Regulator (ITSR) Rail Industry Safety Report 2011-2012 contains a number of statistics relating to safeworking incidents in NSW. More than 200 notified occurrences in 2011–12 involved significant failures in the systems governing the safe operations of trains and protection of workers on track. Also, the number of notified breaches for most forms of procedural systems has not changed significantly over time. However, the number of incidents involving workers on track with no protection in place appears to have fallen.
1.34 The dominant type of failure was work conducted without controlled signal blocking protection actually being in place (23% of incidents). The next most common types of failure were work conducted outside the area actually protected by controlled signal blocking, and trains not identified between the blocking signal and worksite. The table below lists the proportion of controlled signal blocking failures (see Figure 3). The incident at Moss Vale would be categorised as ‘Fail to establish block’ and would come under the DIRN & Hunter section.

<table>
<thead>
<tr>
<th>Failure Description</th>
<th>Metropolitan Rail Area</th>
<th>DIRN &amp; HUNTER</th>
<th>Country Rail Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work conducted despite CSB not requested, not available or not granted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work conducted outside protected area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train not identified between blocking signal and worksite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or more means of access to designated work area not protected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fail to establish block</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrong signal set to stop or selected signal does not protect designated work area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection officer sets up on wrong track (unprotected)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CSB used when a higher form of protection required</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Protection officer releases CSB with track still obstructed or work continues / resumes after CSB fulfilled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train SPADs signal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fail to maintain block</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>False authority to enter designated work area</td>
<td></td>
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Figure 3: Controlled signal blocking failure on the NSW rail network 2007-08 to 2011-12
(Source: ITSR Rail Industry Safety Report 2011-2012)
PART 2 ANALYSIS

Introduction

2.1 The Office of the National Rail Safety Regulator (ONRSR) received notification of a reported safeworking breach involving Pacific National freight service 6AB6 near Moss Vale. An initial review of this notification was undertaken by the Office of Transport Safety Investigations (OTSI) which decided to conduct an investigation into the incident. As part of the process OTSI examined electronically recorded voice conversations, Phoenix control system replays, train graphs, crew rosters, timetables and company policies. Interviews were also conducted with the train crew and network control staff.

2.2 The investigation examined the sequence of events that led to the train crew being directed to conduct an axle inspection; the communication between the network controller and the train crew; the work environment of the control centre, and the events following the incident including the process of recertifying the network controller.

2.3 Based on analysis of the evidence, it was concluded that:

- Apart from the warm axle alert, there was no indication of any mechanical problem with the train.
- There was no reported problem with the signalling or control system.
- A significant oversight by the network controller was identified as the causal factor that gave rise to the incident.

2.4 This safeworking incident where control signal blocking was not applied by the network controller, despite his assurance to the train crew that it had been applied, was a serious incident. The co-driver was in danger of being struck by a train as he made his way back to the locomotive cab.

Conversation between network control and train crew

2.5 The initial call from the network controller was at 2139.
Network Controller: ‘6AB6 driver (you) just had a warm alert coming through there at Exeter Hot Box, it is showing axle number 43 on RRYY two zero’.

Co-driver: ‘just had the brakes on coming down there.’

The network controller then asked the co-driver to stop towards Berrima to conduct the inspection and then discussed letting a passenger train run around 6AB6. The network controller was concerned about trains backing up and was working to keep trains running while the axle inspection occurred.

Network Controller: ‘Okay there driver so I might get you to pull up right down there towards Berrima there and check it out there.’

Co-driver: ‘Okay, I'll pull up down there (at) BJ82, Okay?’

Network Controller: ‘Yeah, if it is alright driver I'll get you down there so I can get this pass (passenger train), he is behind you, he is only just coming through Wingello, but if need be we will run him around you there, over.’

2.6 Later in the conversation the driver of 6AB6 requested that the adjacent line be protected while his co-driver conducted the inspection. The network controller suggested that the co-driver does not need this line protected because of the platform configuration. The driver reminded him that once the inspection is complete and the co-driver walks along the line, then he will need protection.

Driver: ‘Alright, can I get a block please on the Down (line) over.’

Network controller: ‘Well if he is on the platform, it is an island platform, it shouldn’t worry him on the down (line) there driver.’

Driver: ‘If he walks up there he will have to, that’s all.’

Network controller: ‘OK, yeah, I have got SN59 so I will let you know when I have got the block on once he gets on the platform, blocks will be applied over.’
Driver: ‘Righto mate, I’ll let him off on the platform, pull forward, and get him to check that out and wait for you to give us that call that block is put on the Down.’

2.7 The network controller called a few minutes later at 2156 to confirm that he had placed a block on the line:

Network controller: ‘I won’t lift that block until I’ve got it guaranteed that your offsider is out of the way.’

Driver: ‘Yeah, got that …’

Despite this request and a later confirmation that the block would not be removed until the co-driver had completed the inspection, a block was never placed on any signal protecting the Down Main line. It was later confirmed by a replay of the Phoenix control system that no blocks had been placed on signals to prevent rail traffic on the Down Main line. The network controller also admitted that he did not place any blocks on despite reassuring the train crew that they were protected. He said that he realised at the time that this was not correct but that he was trying to cover himself.

Implementation of controlled signal blocking

2.8 ARTC’s Network Rule ANWT 308 Controlled Signal Blocking and Network Procedure ANPR 703 Working using controlled signal blocking set out the requirements for this method of protection. The purpose of the rule is to exclude rail traffic from a portion of track and allow work to be undertaken safely in the danger zone. ANPR 703 requires that: ‘Before work starts, the protection officer must confirm from the signaller that there is no rail traffic approaching the worksite.’ In this case, the key procedural obligation was not fulfilled by the protection officer (the driver).

2.9 Following the safeworking incident at Glenlee in 2009, Pacific National issued a Safety Notice, 09/04, titled Walking in the Danger Zone to all intermodal drivers reminding them of the procedures for walking in the danger zone, including requesting controlled signal blocking. This notice was issued on 29 October 2009 (see Appendix 2) and signed for by the driver on 5 November...
2011. The co-driver, who was working as a terminal operator at the time of issue, had not signed for, or received, this document.

2.10 Also, after the Kogarah fatality in 2010, Pacific National issued another Safety Notice, 1005, titled *Controlled Signal Blocking* to all intermodal drivers reminding them of the required action for implementing controlled signal blocking. This notice was issued on 31 May 2010 (see *Appendix 3*) and signed for by the driver on 25 August 2010. The co-driver, who was working as a terminal operator at the time of issue, had not signed for, or received, this document.

2.11 The driver said that he did not confirm that there was no train already in the section or the signal numbers as he thought there was no need as he was within yard limits. The requirement of ANPR 703 for the protection officer to confirm the above was a serious omission when requesting controlled signal blocking.

2.12 The voice recordings reveal that the co-driver was conducting the axle inspection before there was confirmation that the blocks had been placed on the Down Main line. Although the initial axle inspection was taking place in a safe place, work should not have commenced until this confirmation was received.

**Communication**

2.13 ARTC’s Network Procedure ANPR 721, *Spoken and Written Communication*, prescribes a range of standard terms and protocols to be used in operational communications. A number of conversations were analysed during the course of the investigation and many were generally conversational and informal, lacking the use of standard terms required by ANPR 721.

2.14 In one of the recorded conversations after the controlled signal block was requested, the network controller can be heard contacting the wrong train crew. The network controller was attempting to contact 6AB6 but instead contacted a train crew on train 8213 in the Kemira Valley in the Illawarra. The network controller stated that this was not his error but a radio problem.
**Distraction**

2.15 The explanation given by the network controller for not placing the blocks on the adjacent Down Main line was that he was distracted by a personal event that took place in the control centre around this time. The network controller said he received a personal phone call on the landline phone in the control centre and then left his panel for a short time to have a discussion at the door of the control centre with a family member. The network controller admitted that he was distracted by this intrusion and said this was the reason why he failed to apply controlled signal blocking to the Down Main line as requested and agreed upon.

2.16 This is similar to what occurred in the 2009 Glenlee incident where the investigation reported that:

> ‘At the time of the communication between the Network Controller and the Co-driver about the hot box detector alert, the supervising Network Controller was receiving a personal phone call which distracted him from what the Network Controller was doing. This was a key factor in the supervising Network Controller not being aware that the Network Controller had not contacted Campbelltown Signal Box to ensure that blocking facilities were put on the ‘Down Main’ line.’ (Source: OTSI Glenlee report 28 Oct 2009, p.20)

2.17 One of the recommendations of the OTSI investigation (Recommendation 3.4) was that ARTC:

> ‘Institute policies that ensure network controllers are not distracted by non-work related influences while on duty including, in particular, prohibiting the use of personal mobile phones in the work area.’ (Source: OTSI Glenlee report 28 Oct 2009 p.27)

2.18 ARTC was asked by ITSR to state what actions had been implemented in response to the recommendations made in the OTSI Glenlee report. In a letter to ITSR dated 6 May 2011 ARTC stated that:

> ‘A dedicated land line is available away from work stations to facilitate personal calls. Network Controllers are informed of this facility during on site inductions… Recommendation rejected.’
2.19 Further correspondence between ITSR and ARTC led to this response from ARTC to ITSR dated 26 September 2011:

‘As per ARTC’s previous response, Network Controllers are informed during site inductions of a dedicated land line that is available away from workstations to facilitate personal calls. The attached Induction Checklist highlights where this is covered during inductions.

A copy of Procedure OPP-01-01 Network Control Centre Operations is attached which includes a clause that says private calls are not to be made from workstation phones and private mobiles are not to be used at workstations under heading ‘Network Controllers private phone calls’. This procedure was approved at the August 2011 Safety & Environment Committee and will be published on the ARTC intranet by 30 September 2011. Ongoing compliance by Network Controllers with this part of the procedure will be managed through the monitoring of monthly voice recordings and daily by the TTM whilst on shift. The site inductions also remind and inform employees of their obligation to adhere to this requirement.

If a Network Controller is absent for a private call, the board is monitored by an adjacent Network Controller and call lengths are kept to a minimum.

Recommendation Rejected’

2.20 The network controller in this instance has acted in accordance with the stated procedure in that he has not used his workstation or private mobile phone but another phone in the control centre, the dedicated land line. When he left his workstation to take this call no arrangement was made for it to be monitored by an adjacent network controller. If an arrangement was to be made for it to be monitored, it would require a handover explaining that he was about to implement controlled signal blocking. This was not done and when he returned to the workstation he did not implement controlled signal blocking.

2.21 Network controllers often work under high workload conditions with little opportunity for a break. The Main South ‘A’ Panel is a busy operational panel and according to the train transit manager is only quiet between midnight and 0200. There are approximately 100 trains per day controlled through this panel. A previous OTSI investigation (Glenlee) found that this panel can
receive over 500 calls in a 24-hour period. The shift worked by the network controller that evening was a typical active shift.

2.22 Often meals are eaten while sitting at the panel. There is no scheduled breaks rostered, nor are there any relief controllers rostered. According to a UK Rail Safety and Standards Board survey, signallers and drivers ranked workload as the highest precursor to an error. A high workload is recognised as a major contributing factor to safety-critical communication errors.\(^2\) In this instance it was found that a distraction, rather than a high workload, was a contributing factor. A distraction that occurs during any safety-critical communication can have serious consequences.

**Axle bearing inspection**

2.23 The requested axle bearing inspection was a non-routine task for the train crew. When the train crew were interviewed, the co-driver stated that he had not conducted an axle inspection before. The more experienced driver said that in the last 10 years he had probably experienced an alert once per year. The relative infrequency of train crew conducting axle bearing inspections during normal operations means that refresher training may need to be conducted regularly.

2.24 Axle monitoring equipment is located on key points on the NSW rail network. ARTC maintain and operate a network of trackside detection devices, consisting of 9 hot bearing detectors, 5 wheel impact detectors, 3 bearing acoustic monitors and 1 wheel profile detector. Some of these devices (hot box detectors) are reactive while the other types are predictive. Once an alert is notified to the control centre, contact is made with the affected train and a request is made for it to stop and an axle bearing inspection undertaken by a member of the train crew. As the location of the detectors is known and the usual stopping area known, then a safe stopping inspection site could be predicted. Consideration should be given to specifying locations where it is safe for train crew to conduct axle bearing inspections in the vicinity of

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detectors. Such locations would need good access for the inspection and good visibility for the person on the track.

**Selection of the worksite protection method**

2.25 There are a number of methods to protect workers while they perform authorised work on or around tracks. The method of excluding rail traffic from a worksite using signals set at stop is termed controlled signal blocking. ARTC’s Network Rule ANWT 308 *Controlled Signal Blocking* and Network Procedure ANPR 703 *Working using controlled signal blocking* set out the requirements for using this method of protection. This was the appropriate method of worksite protection to be implemented.

2.26 In general, train crew apply controlled signal blocking less frequently than protection officers who routinely organise infrastructure worksite protection. It seems that applying controlled signal blocking correctly presents a challenge for train crew. Protection officers generally utilise a checklist when applying controlled signal blocking and the signals to be blocked are usually specified and confirmed by the protection officer.

2.27 One reason why there may be a difference in the application of controlled signal blocking between train crew and protection officers is that when an axle alert occurs, it is the network controller who initiates the process by first contacting the train crew to request them to stop. This initial communication by the network controller means that the train crew may need to rely more on the knowledge of the network controller in relation to what signals need to be blocked. Without regular training and good route knowledge, this non-routine task can be difficult for the train crew to complete without assistance.

**Work scheduling and fatigue management**

2.28 An examination of the train crew’s roster, interviews with the train crew and analysis of their actions give no indication that their performance was fatigue-impaired. They indicated that they were well rested before the journey and there were no problems or distractions during the trip before they were contacted by the network controller after Exeter. By this time they had been on
duty for about six hours and were about two and a half hours away from their destination.

2.29 An examination of the network controller’s roster, interviews with him, observation of his work environment and analysis of his actions indicate a likelihood that his performance was fatigue-impaired. The network controller had commenced his shift at 1300 and did not have any scheduled break in the 10 hours up to the occurrence of the incident. He said he may have left the panel for short periods for toilet or coffee breaks but there was no organised relief staff during his shift. The network controller had a rostered day off the day before and he said he felt well at the start of his shift and at the time of the incident.

2.30 It was about 10 hours since he arrived to start his shift and he had been awake for about 14 hours. ‘Time on task involves both physical and mental exertion. Research indicates that physical fatigue accumulates in a linear manner with respect to time.’\(^3\) It is likely that the network controller’s performance was impaired by the time on task and the lack of any scheduled break during his shift. A long duty period and lack of any rest breaks within shifts are both identified as primary factors in fatigue-related performance degradation.\(^4\) It should be noted that this 10 hour shift was the longest shift that the network controller had worked for the previous 14 days. The duration of a normal shift is eight hours.

**Incident management**

2.31 The train transit manager was aware of the warm axle alert being activated by 6AB6 and also heard the network controller discussing both controlled signal blocking and the placing of blocks on the Down Main line. Later, he also heard the network controller arguing with someone on the phone. When he checked the panel, he observed that there were no blocks placed on the Down Main line and that ST21 was at the platform.

2.32 The driver then phoned the train transit manager and made him aware that he was upset that there were no blocks on the Down Main line and that ST21 was

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\(^3\) National Guideline for Management of Fatigue in Rail Safety Workers, National Transport Commission June 2008 p.6.

\(^4\) Ibid. p.5.
allowed to pass while his co-driver may have been on the tracks. The train transit manager questioned the network controller who said that he had lifted the blocks and allowed ST21 to pass through. He subsequently checked the Phoenix control system using the replay facility which confirmed that no blocks had been placed.

2.33 The train transit manager informed Pacific National's operations manager what had occurred and discussed the occurrence with ARTC's operations manager at 2240. A decision was made in conjunction with the ARTC operations manager to breath test the network controller but the train transit manager found that the unit in NCCS was out of calibration. He contacted the police to request them to conduct a breath test which was conducted by a police officer at approximately 2300.

2.34 The network controller was not relieved from his duties immediately as the train transit manager decided that, as his relief was arriving shortly, he would be able to continue his duties under his supervision.

2.35 It is a mandatory requirement under the Rail Safety (Adoption of National Law) Act 2012 that notifiable occurrences are reported to the ONRSR. The incident was reported by ARTC as a rolling stock warm axle alert on 21 December 2013. In this original report there was no mention of any safeworking irregularity.

2.36 On 30 December 2013, an OTSI investigator was reviewing occurrence reports supplied to OTSI by ONRSR and became aware of the safeworking irregularity through a Pacific National report. Pacific National had provided the correct details about the incident. The OTSI investigator contacted an ARTC safety officer responsible for the south region for further information but this officer was unaware of the incident and investigated further. Following this request for further information, ARTC amended the Train Control Report on 2 January 2014 to include the information about the safeworking incident. There was an oversight in not reporting this incident correctly and then not modifying the Train Control Report until it was picked up by OTSI nine days later.
Drug and alcohol testing

2.37 In accordance with the *Rail Safety (Adoption of National Law) Regulation 2012 (NSW)*, an operator must require its rail safety workers involved in, or reasonably suspected of having been involved in, certain incidents to undergo drug and alcohol testing. Such testing must be undertaken within three hours of the incident. The incidents to which the requirement applies are prescribed in the *Rail Safety National Law National Regulations 2012*.

2.38 As described previously, the network controller was breath tested within the time prescribed by legislation, however no drug test was requested to be conducted by ARTC. When questioned after the incident, the train transit manager was unsure if he was qualified to conduct drug testing and said in any case there was no equipment in the control centre to carry it out. Another option not acted upon was to contact the independent testing company contracted by ARTC to conduct drug and alcohol testing. A decision was made instead to call the police.

2.39 Following the incident, the train crew were not tested at all for the presence of drugs and alcohol. Pacific National responded that testing in this instance was not considered to be necessary.

Recertification

2.40 The network controller left the control centre about 2310 and returned to work the next morning at 0640 where he was recertified as competent by the train transit manager and commenced another shift as network controller at 0700. Although the network controller did not have a long commute between work and home (about five minutes) it was a short turnaround between shifts. The network controller admitted that he did not sleep well that night. It is likely that he was not in an optimal mind-set to commence work that morning, especially considering the short time since he had completed his last shift and that he would again be working on full duties at a busy operational panel.

2.41 The recertification was conducted by the same train transit manager that had been on-duty since the previous evening. The time taken for counselling and recertification was short and took place in the 20 minutes after he arrived at
work. The network controller said the process took about 10 minutes to complete. The paperwork that accompanied this process mentioned that the network controller received counselling and recertification in the following Network Rules and Procedures: ANGE 204 *Network Communications*, ANGE 234 *Responsibilities of signallers*, ANGE 236 *Responsibilities of train controllers*. Significantly, rules and procedures concerning controlled signal blocking were not included in the counselling and recertification.
PART 3 FINDINGS

Immediate cause

3.1 The network controller working the Main South ‘A’ Panel in the Network Control Centre South at Junee did not apply controlled signal blocking to the Down Main line as requested by the driver of 6AB6. This left the co-driver without protection against passing trains while walking back to the locomotive’s cab.

Contributing factors

3.2 The network controller was distracted by a personal phone call and then a visit by a family member at the Network Control Centre South at a critical time during the application of controlled signal blocking. There was no relief staff provided to cover his absence from the panel.

3.3 It is likely that the performance of the network controller may have been degraded due to fatigue-impairment. This likelihood was due to the length of time on task and the lack of any scheduled rest breaks.

3.4 The driver of 6AB6 did not confirm that there were no trains already in the section; he did not confirm the signal numbers and there was no read back when he requested controlled signal blocking as required by the Network Rules and Procedures.

Other safety factors

3.5 Communication between the Control Centre and the train crew lacked the use of standard terms required by the network procedures. In general, transmissions were informal and conversational rather than operationally formal according to prevailing communications protocols.

3.6 The requirements for Drug and Alcohol testing were not followed in that the network controller was not drug tested following the incident and the train crew were not tested for the presence of drugs and alcohol.
3.7 The initial incident report by ARTC did not include critical information about the safeworking incident; it only included information about a warm axle alert. It was only amended after an OTSI investigator pointed out the discrepancy.

3.8 The recertification process of the network controller did not include any reference to controlled signal blocking.

3.9 The network controller started his shift at 0700 on 22 December 2013 after a short turnaround time since he finished his last shift the previous evening at 2300.

3.10 There are no designated locations where train crew are able to conduct axle bearing inspections after an axle alert is triggered by a trackside detector.
PART 4 RECOMMENDATIONS

The following recommendations are made in relation to matters identified in the course of this investigation:

Australian Rail Track Corporation

4.1 Revise procedures to ensure that organised relief is made available to network controllers if they need to leave their panel.

4.2 Conduct regular auditing of communication procedures between network controllers and train crew to promote adherence to network rules and improve compliance with communication protocols at network control centres.

4.3 Revise working arrangements for network controllers to ensure that adequate meal and convenience breaks are scheduled to occur and there is adequate rest time between shifts.

4.4 Review the recertification process to confirm its effectiveness in ensuring staff are fit to recommence full duties.

4.5 Review the drug and alcohol testing arrangements and processes to verify they comply with regulatory requirements.

4.6 Emphasise accurate reporting of incidents to comply with regulatory requirements.

4.7 Investigate the feasibility of specifying locations where train crew have a designated area to conduct axle bearing inspections following trackside detector alerts.

Pacific National Pty Ltd

4.8 Conduct regular auditing of voice communication procedures between train crew and network controllers so as to promote adherence to network rules and improve compliance with communication protocols.

4.9 Through regularly scheduled refresher training, continue to reinforce the requirement that drivers check and confirm effective protection is in place and that there are no trains already in the section before conducting on-track train inspections.
PART 5 APPENDICES

Appendix 1: Sources and submissions

Sources of information

- Australian Rail Track Corporation
- Office of the National Rail Safety Regulator
- Pacific National Pty Ltd

Submissions

The Chief investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- Australian Rail Track Corporation
- Office of the National Rail Safety Regulator
- Pacific National

Submissions were received from all three DIPs. The Chief Investigator considered the representations made by the DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the Final Report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.
Appendix 2: Safety Notice 09/04

Linehaul Safety Notice 09/04

<table>
<thead>
<tr>
<th>Title</th>
<th>Walking in the Danger Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Dates</td>
<td>From 29th October 09</td>
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<tr>
<td>Approved By</td>
<td>Matthew Tamplin, GM Linehaul</td>
</tr>
<tr>
<td>Issued By</td>
<td>Louise Williams</td>
</tr>
<tr>
<td>Date of Issue</td>
<td>29th October 2009</td>
</tr>
<tr>
<td>Distribution</td>
<td>All Intermodal Driver Depots</td>
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</table>

SAFETY CRITICAL CATEGORY B

Walking in the Danger Zone

Issue:

A serious near miss occurred on the 29th October 2009, involving a Pacific National driver walking in the Danger Zone at Glenlee (NSW). The driver of an Up Steel service was walking back along the Down Main line, to check a suspected hot axle on the train. Whilst the driver was walking back along the Down Main line, a Down Intermodal service was allowed to approach the location at high speed. The driver walking on the line only had a very short period of time to move clear of the approaching train. The Down service had not been detained prior to the incident location for reasons that are currently under investigation.

Actions Required:

All drivers that may be required to place themselves in the Danger Zone, on adjacent lines, are to ensure appropriate signal block protection is placed on the adjacent lines PRIOR to leaving the locomotive. Following the request, a confirmation must be obtained from the Train Controller / Signaller that the signal block protection has actually been applied, and that it will remain in place until the Train Controller / Signaller is advised by the train crew that it can be removed. The crew should also confirm with the Train Controller / Signaller that there is no rail traffic between the controlled signals being used for protection, and their train.

Additionally, if drivers are required to enter the Danger Zone near areas that are the boundary between ARTC and any other network provider, they should ensure the signal block protection is applied through the correct Train Controller / Signaller that controls the approach to their location.

Note: Under the NSW rules, the reference to signal block protection is Controlled Signal Block.

Matthew Tamplin
GM Linehaul

Document Control Safety Critical Document Category B (Signature required)

Instruction Expiry Date: C10nging until revised or cancelled
Appendix 3: Safety Notice 1005

This safety notice has been sent out arising from a communication issued by ITSRR

**Issue:**
At approximately 1:08 am on the 13th April 2013, a rail maintenance worker was fatally injured when struck by a passenger train at Kogarah in Sydney's southern suburbs. The method of protection being applied was Controlled Signal Blocking (CSB). The incident is under investigation.

This notice has been issued on behalf of ITSRR to remind all railway operators that the Train Controller or Signaller and the Driver, must share communications to confirm that the correct signal(s) have been placed to stop with blocking facilities applied and that there is no rail traffic between the protecting signal(s) and the worksite.

**Action Required:**
The Rules and Procedures make it clear that while the Train Controller or Signaller has the initial responsibility for these actions, the Driver has a separate responsibility to “confirm” with the Train Controller or Signaller that the appropriate actions have in fact been taken.

This responsibility requires specific and explicit action by the Driver. The Driver must ask for and receive explicit confirmation of the required actions having been taken by the Train Controller or Signaller.

**Using controlled signal blocking**

**Driver**
1. Make sure that your safety assessment shows that a work on track authority is not necessary for the work.
2. Tell the Train Controller or Signaller:
   - your name, and
   - the location of the work, and
   - the intended start and finish times.
3. Ask the Train Controller or Signaller to exclude all traffic from the portion of track by:
   - setting and keeping controlled signals at STOP with blocking facilities applied to the signal controls, or
   - authorising the removal of the ESML (Emergency Switch Machine Lock) handle to set signals at STOP.
   - Notifying adjacent track owner/controller of the situation and ensuring their rail movements do not enter parallel lines.
Linehaul Safety Notice 1005

Train Controller or Signaller

4. Make sure that the line is clear between the controlled signals being used for protection and the worksite.
5. Make sure that the controlled signals being used for protection are absolute signals.
6. Where required, speak to the Train Controller about the request to exclude rail traffic.
7. Set the protecting signals at STOP and apply blocking facilities.
8. If authorising the removal of an ESML handle, make sure that there is no rail traffic closely approaching a signal that will be placed at STOP by the removal of the ESML handle.

Driver

9. If the removal of an ESML handle has been authorised, remove and safeguard the handle.
10. Before work begins,
   - confirm with the Train Controller or Signaller that signals have been set at STOP and blocking facilities applied, and
   - confirm there is no rail traffic in the area between the controlled signals being used for protection and the worksite.
   - confirm the limit of protection, the signal numbers that have blocking applied, and the precise location of these signals
   - Where adjacent lines are under the authority of another track owner or train controller, confirm that the train controllers for both lines are aware of what is occurring and that any approaching movements on the parallel line are warned and stopped before entering.
   - Record this information on the TRACO under the relevant section comments

11. Tell the Train Controller or Signaller when the work area is clear of workers and equipment.
12. If the ESML handle was removed, tell the Signaller when it has been returned.

Document Control Safety Critical Document Category A (Signature required)