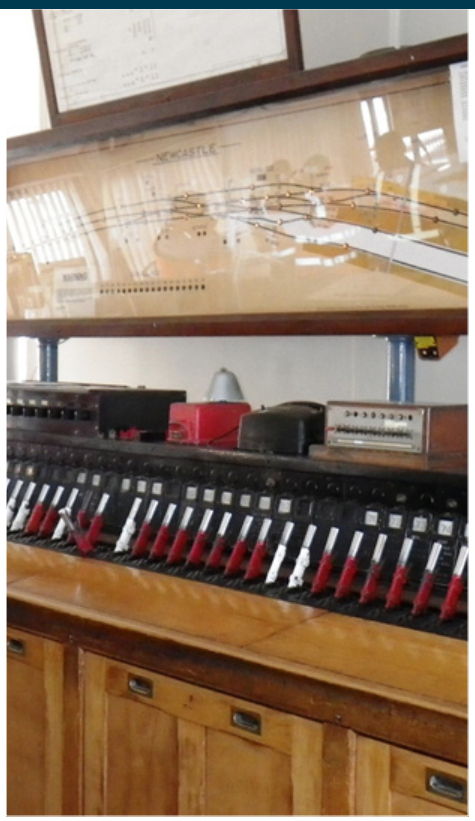
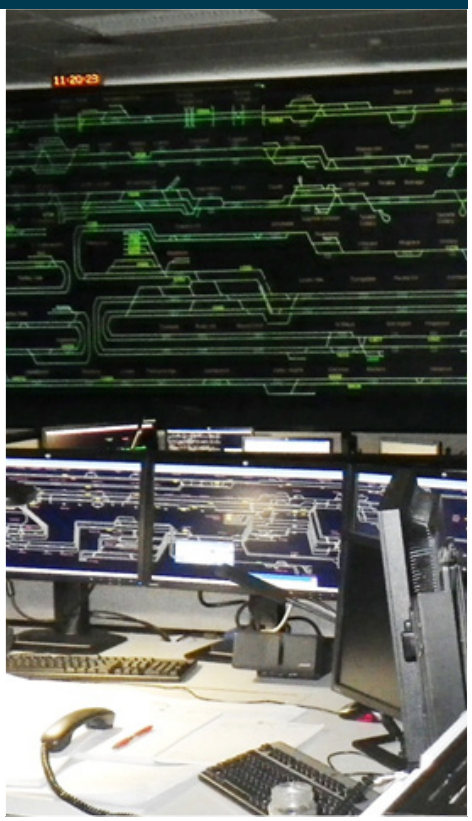
Australian Government
Australian Transport Safety Bureau

Safeworking breaches involving Absolute Signal Blocking

Blackheath, NSW, 13 June 2013
Newcastle, NSW, 13 July 2013
Wollstonecraft, NSW, 17 July 2013





Investigation

ATSB Transport Safety Report
Rail Occurrence Investigation
RO-2013-018
Final – 2 March 2015

Cover photo: OTSI

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Addendum

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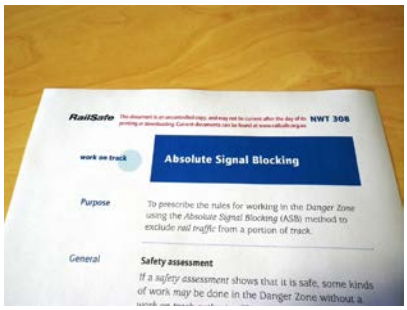
Safety summary

During June and July 2013, three separate safeworking breaches occurred on the Sydney Trains Network in NSW involving the application of Network Rule NWT 308 (Absolute Signal Blocking) and Network Procedure NPR 703 (Using Absolute Signal Blocking). The incidents occurred at Blackheath on 13 June 2013, Newcastle on 13 July 2013 and Wollstonecraft on 17 July 2013.

In each case, trains were being excluded from worksites, as part of worksite protection arrangements, using the Absolute Signal Blocking (ASB) rule and procedure. The rule and procedure were not adhered to during the authorisation of the ASB resulting in trains entering or passing through the worksites from which they should have been excluded.

NWT 308 Cover Page



Source: OTSI

What the ATSB found

The three incidents were the result of the requirements of the Network Rule and Procedure not being complied with; particularly full train-in-section checks were not being conducted or the location of worksites was not clearly identified. Also, the Sydney Trains' systems used to monitor the application of ASB were not consolidated. Instead, the systems made a very limited number of isolated and generally non-safety related findings without identification of how the findings or proposed corrective actions were to be recorded, analysed or implemented.

What's been done as a result

Immediately after the third incident, Sydney Trains suspended use of the ASB rule and procedure for some categories of track work. The suspension was conditionally lifted on 23 July 2014 with some additional procedural requirements and an emphasis on complying with existing requirements for clear communications.

In September 2014, Sydney Trains commenced a trial of a 'Coded Authorisation Process for Absolute Signal Blocking'. The trial seeks to address the common types of errors identified in ASB incidents by testing a 'job aid' which requires improved train-in-section checks, improved identification of work site locations and consistency in the implementation process between the Signaller and the PO for any ASB request. It also requires that a unique code number be issued to the Protection Officer by the Signaller upon any request for ASB. Work cannot commence on track without this code and the code is surrendered back to the Signaller when the ASB is fulfilled.

On the matter of the monitoring and assurance, the ATSB has recommended that Sydney Trains undertake further work to improve its focus on the potential issues involving ASB and its continued safety.

Safety message

ASB is one of five methods of worksite protection which are designed to provide workers with safe track access. It is paramount that track access using any of the methods is properly planned with adequate defence(s) against error, has the Network Rules and Procedures applied consistently and is constantly monitored for compliance.

Contents

The occurrences

Introduction

In each incident, trains were to be excluded from worksites, as part of worksite protection arrangements, using the Absolute Signal Blocking (ASB) in accordance with Network Rule NWT 308 (Absolute Signal Blocking) and Network Procedure NPR 703 (Using Absolute Signal Blocking). ASB requires protecting signals to be held at stop to prevent trains from entering the section and protect the workers on track. However, the rule and procedure requirements were not adhered to during the implementation of ASB resulting in trains entering or passing through the worksites while workers were on or about the track.

Blackheath 13 June 2013

At 0838[1], the PO of a six man workgroup working on the Down Main line at 123.456 km point,[2] between Blackheath and Mt Victoria (Figure 1), requested to use ASB for 10 minutes from the Signaller at Katoomba to record track gauge measurements previously marked on various sleepers on the adjacent Up Main line. However, with the Dubbo-bound CountryLink XPT passenger train service WT27 approaching Katoomba, the Signaller denied the request. Instead, the signaller offered the PO a five minutes window which he accepted.

Implementation of ASB requires the signaller to ascertain the precise location of the proposed worksite, confer with the Train Controller[3] regarding the request for ASB, give an assurance to the PO that there are no trains within the section approaching the worksite and apply blocking facilities[4] on the controlled signals and points providing entry into the section. The Signaller conferred with the Train Controller at Sydney West Control at 0841 before applying blocking facilities on controlled signals 68.3 and 68.5 at Katoomba. He additionally applied blocking facilities on No. 23 points at Katoomba after ensuring they were set in the normal position so that a route could not be set into the section from Katoomba to Mt Victoria.

At 0842, the Signaller contacted the PO and informed him that ASB had been granted and implemented from 0842 to 0847. The PO read back the details of the ASB to the Signaller and the workgroup commenced recording the measurements as marked.

The task was completed and the workers cleared the danger zone without incident before the PO fulfilled the ASB with the Signaller at 0846. Two minutes later, the workgroup observed a CityRail interurban passenger train pass their location on the Down Main line at line speed. As the section between Katoomba and the worksite is 13 kilometres long and 14 minutes in running time, they realised that, despite an assurance from the Signaller at the time, a train must have been in the section between Katoomba and their location when the ASB was granted.

At 0849, the PO rang the Signaller and informed him of the passing train. This confused the Signaller who replied that he had not observed any trains in the section on the display screens of the Train Visibility System (TVS), although WT27 was at the platform at Katoomba and the signals were at stop. The PO suggested the TVS should therefore be checked then added that he would be reporting the incident to a local manager.

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1 All times referred to in this report are Eastern Standard Time, Coordinated Universal Time (UTC) + 10 hours.

2 Distance in kilometres from a track reference point at No. 1 platform at Sydney Terminal.

3 A competent worker who authorises, and may issue, occupancy authorities, and who manages rail traffic paths to ensure safe and efficient transit of rail traffic in the Sydney Trains network.

4 A facility or device used by a competent worker to prevent either the unintended issue of an occupancy authority, or the operation of points or signalling equipment.

At 0858, the PO alerted the Blue Mountains Network Operations Superintendent (NOS) of the incident. The NOS then contacted the Train Controller at Sydney West Control who informed the Shift Manager at the Rail Management Centre (RMC) in Sydney about the incident.

After discussion between the NOS, Train Controller and the Shift Manager, the Signaller was placed under the immediate supervision of the Katoomba Station Manager until a replacement signaller relieved him of his duties. During this time, he was not permitted to authorise or issue any forms of worksite protection or on-track authorities.

At 0935 the NOS informed the Blue Mountains Area Manager of the incident. Both he and the Area Manager deployed to Katoomba where the Signaller was relieved of safeworking duties before being drug and alcohol tested. Both tests returned negative results.

Newcastle 13 July 2013

At about 0800, the PO for a contractor workgroup comprising of six workers commenced a pre-work briefing for the planned litter reduction on track between the platforms at Newcastle Station (Figure 1).

At 0817, the PO rang the Signaller at Newcastle requesting access to the track to clean the track area between Platforms 3 and 4 but did not specifically ask for an ASB. The Signaller advised the PO that he would put 'a block on 3 and 4' platform tracks[5] and that he had ten minutes before the next train was due to arrive into Platform 4. He also recorded the PO's contact number. Although a requirement of ASB, the Signaller did not nominate to which signals or points the blocking facilities were being applied. This surprised the PO but went unchallenged by him. Furthermore, the signaller did not confer with the Train Controller about the request as required for an ASB.

Believing trains had been excluded, the PO and the workgroup entered the danger zone between the platforms and commenced their task. Lookouts were positioned on both Platforms 2/3 and 4 in accordance with the worksite protection plan and company directive. [6]

At about 0830, NSW TrainLink passenger service V712 from Telarah approached Newcastle Station to terminate in Platform 4. Approaching the platform, the driver observed workers on or about the track and sounded the train whistle in accordance with Network Rule NTR 408 (Using Train Whistles). In response to a warning from the lookouts of an approaching train, the workgroup immediately cleared to a safe place.

The Signaller heard the train whistle and realised that the workgroup was still on track and had not cleared after the agreed 10 minutes. He attempted to call the PO but the calls went unanswered going through to a message bank service.

The PO realised an incident had occurred but was unsure of reporting procedures. He rang the North Corridor Manager who advised him to report the incident to the Duty Manager at Newcastle. The Duty Manager advised the PO to report the incident to the North Train Controller in Sydney who, in response, called an Incident Response Commander to investigate.

The Signaller and PO were relieved of safeworking duties before being drug and alcohol tested with both returning negative results.

Wollstonecraft 17 July 2013

Two workgroups were working simultaneously on track on the North Shore line between Chatswood and Waverton. One workgroup was repairing a broken signal cable connection on the

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[5] This method of working was consistent with YARD WORKING in accordance with provisions in previous versions of the Safeworking Rules and Procedures.

[6] The directive for the use of lookouts was the result of recommendations made in the investigation of the track worker fatality at Kogarah in 2010 conducted by the NSW Office of Transport Safety Investigations.

Up Shore track at Waverton while the second workgroup, comprising of four workers, was conducting a scheduled walking inspection of the overhead wiring on the Down Shore line between Gordon and Waverton.

After arriving at St Leonards Station, at 1234 the PO for the second workgroup informed the Area Controller (Signaller) operating the North Sydney Panel at Homebush Signalling Complex that the workgroup was using Lookout Working in accordance with Network Rule NWT 310 but may also make a couple of requests for ASB as they proceeded down the track towards the next station Wollstonecraft (Figure 1).

Shortly after arriving at the Russell Street overbridge, at 1254 the PO contacted the Area Controller requesting ASB for the bridge crossing. He made the ASB request as there was no designated safe area[7] on the bridge. The PO nominated Signal SH3.87 (at Waverton) to be used as the protecting signal for the ASB and advised that a lookout would also be used. Signal SH3.87 was the nearest signal to their location that could be controlled with blocking facilities applied. However, he did not provide the name or exact kilometrage of the bridge the workgroup was about to cross; nor did he implement any protection arrangements for the live, adjacent Up Shore track.

The Area Controller advised the PO to wait as there was a train 'just clearing the section as we speak' and that he would call him back when he could.

At 1255, the Area Controller informed the Train Controller of the ASB request. In the phone call, the Area Controller indicated that the location of the workgroup was just at the country end of Waverton. This was several hundred metres away from the location where they were about to cross. The Train Controller sought an assurance from the Area Controller that blocking facilities had been applied and granted the request commencing at 1256.

At 1256, the Area Controller called the PO to advise that ASB had been granted. He assured the PO that the blocks were applied to Signal SH3.87 and the section was clear. The PO repeated back this information before advising that he would call the Area Controller once over the bridge.

Unbeknown to the PO, the Area Controller had mistakenly identified from the Advanced Train Running Information Control System (ATRICS)[8] that the workgroup was about to cross the Bridge End Street bridge 6.822 km point at Waverton instead of the Russell Street bridge. Despite four road overbridges being marked on the ATRICS, the Russell Street bridge, the only road underbridge in the section, was not. Also, the Area Controller had applied the blocks to Signal SH3.87 at 1255:50 aware that Run 117-H was still in the section about to depart Waverton station. The Area Controller was expecting that Run 117-H would have passed the Bridge End Street bridge before the ASB was authorised. Run 117-H had departed Waverton station towards Wollstonecraft at 1255:22.

Without realisation that the train mentioned by the Area Controller as 'just clearing the section as we speak' had not passed, the workgroup commenced to file across the Russell Street bridge using the Down Shore track.

At 1257:52, Run 117-H departed Wollstonecraft station with its wheels flanging audibly on the 240 metre right hand track curve leading towards the Russell Street bridge. The workgroup identified the noise as an approaching train. At the same time, they also observed a train approaching the bridge from the opposite direction on the Up Shore track. Backtracking hastily off the bridge, the workgroup climbed onto a safe place on top of the signal troughing adjacent to Signal SH4.65 and remained there until both trains had passed. Signal SH4.65 is located at the 7.451 km point, approximately 20 metres north of the Russell Street bridge.

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7 Anywhere outside of the danger zone.

8 ATRICS 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 centralised traffic control system which enables real time monitoring and control of the signals and points.

According to the PO, Run 117-H passed the workgroup without slowing or the driver sounding the whistle in acknowledgement of an all clear hand signal being given by the PO.

Immediately after the train had passed, the PO rang the Area Controller to report the incident. During the call, the Area Controller indicated that he had identified the wrong bridge when granting the ASB. He then granted permission for the workgroup to complete their crossing.

The Area Controller self-reported the incident to the Train Controller at 1259. He was immediately relieved of safeworking duties before being drug and alcohol tested. Both tests returned a negative result.

The ASB was fulfilled by the PO at 1301 after the workgroup had completed the crossing of the bridge. He was then directed to proceed (return) to Chatswood for drug and alcohol testing. Both tests returned a negative result.

Figure 1: Location of incidents

Source: Geoscience Australia annotated by the ATSB

In response to the Wollstonecraft incident, the Manager of Train Operations Sydney Trains suspended the use of ASB in worksite protection applications immediately at 1440 on 17 July 2013.

Context

All three incidents under investigation occurred on the NSW electrified network. The Blackheath incident occurred prior to a NSW Government restructure of RailCorp, the infrastructure manager of the Metropolitan Rail Area (MRA) network, on 1 July 2013. Under the restructure, Sydney Trains became the accredited rail operator of the electrified network under the Rail Safety National Law (NSW) and assumed responsibility for maintenance and network control on it. It is also a rolling stock operator along with CityRail, CountryLink and NSW TrainLink who are mentioned within this report.[9]

Location and track layout

Blackheath

The track at Blackheath (Figure 2) consists of dual electrified lines with a maximum posted track speed of 65 km/hr. It is located in the Blue Mountains on the Main West line in the section between Katoomba and Mt Victoria.

The worksite was located at the 123.456 km point on a 280 metre right hand curve with a gradient of 1:80.

Figure 2: Worksite at Blackheath

Source: OTSI

Newcastle

The city of Newcastle is located in the Hunter Region and is the terminus for the NSW Trains' electrified services in the north and local diesel multiple unit services from around the region. Newcastle station (Figure 3) consists of four platforms and a number of storage roads with a maximum track approach speed of 30 km/hr.

[9] Prior to 1 July 2013 CityRail and CountryLink were the rolling stock operating divisions of RailCorp.

Figure 3: Worksite at Newcastle

Source: OTSI

Wollstonecraft

Wollstonecraft is located on the North Shore line between Waverton and St Leonards stations. The track consists of dual electrified lines which reverse curve through various rock cuttings on a ruling gradient of 1:48 and a maximum track speed of 50 km/hr.

The Russell Street bridge (Figure 4) is a road underbridge located at 7.451 km point and is approximately 50 metres in length. Four road overbridges and a tunnel are also located in the section between St Leonards and Waverton including the Bridge End Street bridge located at 6.822 km point.

The workgroup cleared the track to signal NS4.65 which is located about 20 metres past the northern (St Leonards) end of the bridge at the 7.519 km point.

Figure 4: Worksite at Wollstonecraft

Source: OTSI

Environmental conditions

Blackheath

Weather conditions at the time of the incident were described by the PO as wet and misty. Bureau of Meteorology (BOM) records from Mt Boyce, located in the general incident area, indicated that, at 0900, the temperature was 6.6 °C with 22 km/hr winds. It was also recorded that 5.4 mm of rain had fallen over the 24 hour period.

Newcastle

Weather conditions on the morning of the incident were described by the PO as dry and clear. BOM records from Newcastle indicated that, at 0900, the temperature was 12.7 °C with 6 km/hr winds. It was also recorded that 0.2 mm of rain had fallen over the 24 hour period.

Wollstonecraft

Weather conditions on the morning of the incident were described by the PO as dry and clear. BOM records indicated that the maximum temperature had reached 24.3 °C with winds up to 22 km/hr. It was also recorded that 4.8 mm of rain had fallen over the 24 hour period.

It was determined that the environmental conditions at the locations did not contribute to any of these incidents.

System of safeworking

The system of safeworking used for train control at all three incident locations is prescribed under Network Rule NSY500 (Rail Vehicle Detection System). [10] Absolute (controlled) signals for entry

[10] A system that detects the presence of a train or any other on track vehicle intended to be detected on a section of track. Systems include track circuits, axle counters, treadles and global positioning.

into the sections are controlled and monitored from local signal boxes or centralised signalling complexes. Permissive (automatic) signals throughout the sections are positioned to maintain train separation but cannot be monitored from all signal boxes and control centres.

Signal boxes are located at Katoomba and Mt Victoria for the control and monitoring of signals through the section including Blackheath. A signal box also provides control and monitoring of the signals at Newcastle. At Wollstonecraft, the signals into the section and through the location are controlled and monitored from the North Shore Panel and the North Sydney Panel at Homebush Signalling Complex.

The signalling and points equipment at Katoomba are controlled by electro-mechanical large lever frame while Newcastle signalling and points are controlled by electro-mechanical miniature lever frame. Mechanical sleeves are used to provide blocking facilities and prevent any unintended movement of the levers. The control system at the Homebush Signalling Complex is computer-aided with the operation of all points, signals and blocking facilities facilitated by computer key strokes.

Train monitoring systems

Introduction

Various monitoring systems are provided for signallers and Train Control to monitor the passage of trains on the network and provide information about the locality of trains within sections. These include track diagrams, Train Visibility System (TVS) screens, Train Location Systems (TLS) screens and Advanced Train Running Information Control Systems (ATRICS).

TVS screens and a signalling diagram were provided at Katoomba, a track diagram at Newcastle and ATRICS with a TLS screen at Homebush.

Train Visibility System (TVS)

The TVS at Katoomba (Figure 5) is a non-vital indication system[11] designed to provide Signallers with visibility of trains in the long, permissive signalled sections on the Blue Mountains. The system was installed in response to a recommendation stemming from the judicial inquiry into the Glenbrook accident which occurred in December 1999. The accident happened when an interurban train collided with the rear of the *Indian Pacific* killing 7 passengers and injuring 51 others.

The TVS display is a straight line graphical representation of the permissive track sections between Katoomba and the neighbouring signal boxes at Springwood and Mt. Victoria. It is additional to the existing conventional track diagram at Katoomba. The line on the screen changes from a green aspect, when the route is clear, to a red aspect as trains occupy the track circuits while progressing through the section. Being a guide only and lacking in infrastructure details, it is not a recognised safety system and cannot be utilised for safe working purposes. As the signaller has no control over any equipment or its functions, other methods must be employed to ascertain the actual location of trains and the status of signals and points.

[11] 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.

Figure 5: Katoomba signal box

Source: OTSI

Train Location System (TLS)

The Train Location System (TLS) (Figure 7) is used extensively across the Sydney Trains and NSW Trains networks by both the RMC and the newer signal control centres. It is a large graphical representation of the entire Sydney Trains network providing staff monitoring the network with on time running information that assists in the planning and execution of the daily rail program during normal and degraded operations. It is also a non-vital indication system and, like the TVS, is not a recognised safety system so cannot be utilised for safe working purposes.

Track Diagram

Both Katoomba and Newcastle Signal Boxes (Figure 6) are equipped with track diagrams to provide signallers with information regarding the location of trains and the status of track circuits, absolute signals and points in their area of control. Although the diagrams are simplistic, they are permitted for use in safeworking as they indicate the actual location of trains and the state of the equipment controlled by the signal box.

Figure 6: Newcastle Signal Box

Source: OTSI

Advanced Train Running Information Control System (ATRICS)

The Wollstonecraft incident involved the use of the Advanced Train Running Information Control System (ATRICS) controlled from the Homebush Control Centre. The Homebush Control Centre controls the North Shore line, the Main North line between Rhodes and Normanhurst, the Epping to Chatswood Rail link and the Olympic Park line.

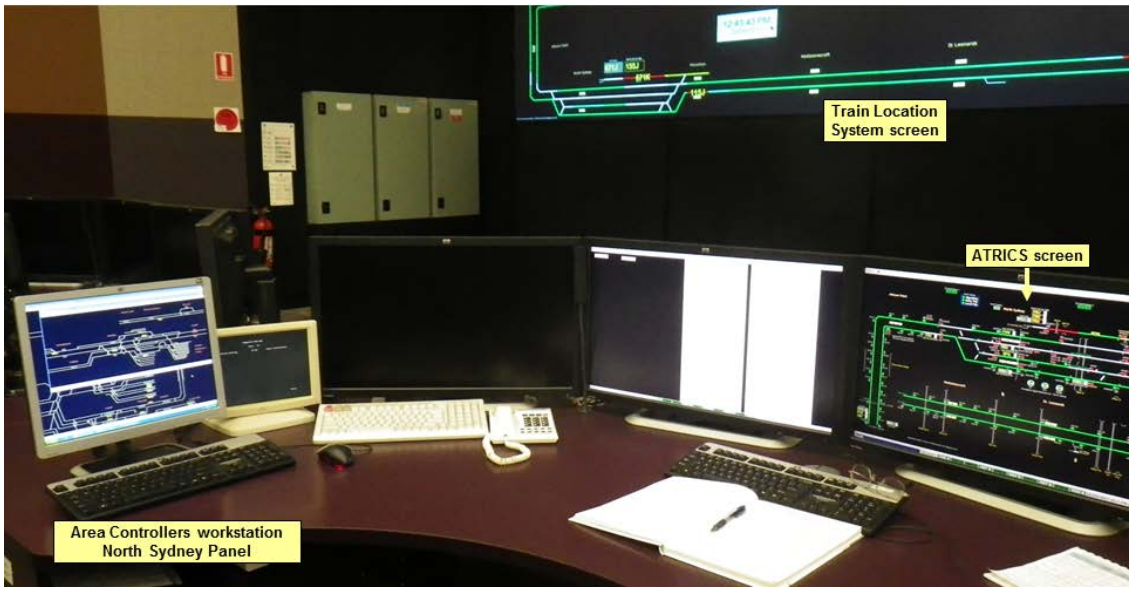
ATRICS is used throughout the Sydney Trains network to provide a graphical display that allows controllers to interact directly with the rail network by controlling signals, points and other signalling equipment through the click of a mouse. It is also a non-vital centralised traffic control system which enables real time monitoring and control of the signals and points. However, it is limited in its details of localities and track-borne infrastructure.

The area controller's area of responsibility is displayed over multiple computer monitors. The North Sydney control panel is shown in Figure 7.

The system permits the area controller to operate or block the signals and points in their area of control by either clicking directly on the onscreen symbols representing the signalling/points equipment or using a drop down menu from the menu bar at the top of the screen. The permissive signals are controlled by the presence of a train on the track circuits and in most cases cannot be controlled or blocked by the area controller.

ATRICS has a replay function which can be used to review the status of its operation should there be a failure of the system or an incident on track.

Figure 7: Homebush signal complex – North Sydney control panel



Source: OTSI

Applicable ASB Rules and Procedure

Safeworking rules and procedures are implemented to ensure the safe operation of multiple train movements and/or track occupancies on a rail network. A key principle for any railway safeworking system is to maintain adequate separation between rail traffic and any other rail vehicles or track workers occupying or working on the running lines. The safeworking rules relating to 'working on track' for the Sydney Trains' Network in New South Wales are distributed over a number of documents.

Network Rule NWT 300 - Planning Work in the Rail Corridor

NWT 300 prescribes the rules for planning work in the rail corridor and assessing the work for safety. Before any workgroup enters the rail corridor, the PO must plan and document the worksite in accordance with NWT 300. The rule prescribes that work planned in the corridor must be assessed for safety and it's potential to intrude on the Danger Zone. Work cannot be carried out unless a safe place can be easily reached and safety measures are in place.

A worksite must have a PO whose primary duty is to keep the worksite and workers safe. POs must be satisfied that other work will not interfere with their primary duty. The PO is responsible for conducting the safety assessment of the worksite, briefing the workers of the protection arrangements, ensuring the works are conducted in a safe manner, keeping records of the protection arrangements and communicating with Network Control about the protection.

When conducting the safety assessment, the PO must consider, amongst other factors, the method of protecting the worksite, the resources required for its protection and the communication requirements. The PO must also ensure that the planning of the worksite is documented and all workers are adequately briefed on the safety requirements.

Network Rule NWT 308 – Absolute Signal Blocking

ASB is a method of worksite protection used to exclude rail traffic from a worksite. It is intended for use where any required tools can be easily removed from the tracks by a single person. ASB can also be used to allow vehicles to cross the track at network access level crossings.

When requesting an ASB, the PO must tell the signaller the location of the worksite and the intended start and finish times. All points of entry must be protected and the PO must arrange for:

- at least two consecutive controlled absolute signals at STOP with blocking facilities applied, or

- manual points control mechanisms to be used to set controlled absolute signals at STOP, or
- at least one controlled absolute signal at STOP with blocking facilities applied, and
  - points secured to prevent access to the tracks, or
  - there must be an easily reached safe place available and a lookout provided.

A signaller may grant the ASB method only for signals in their respective area of control. Before setting controlled signals at Stop, the Signaller must tell the Train Controller about the request to exclude rail traffic. The Signaller must ensure that;

- the protecting controlled absolute signals are at STOP, and
- blocking facilities have been applied, and
- there is no approaching rail traffic between the protecting signals and the proposed worksite, and
- that any rail traffic that has passed complete beyond the worksite will not return.

The PO must confirm these actions with the Signaller as well as the agreed start and finish times.

At the end of the working the PO must tell the Signaller that the work is completed, the workers and equipment are clear of the danger zone, all manual points control mechanisms have been returned to normal and any points that were secured are available for use. After being assured the track is clear by the PO, the signaller may remove the blocking facilities that were applied.

Although there is a requirement that a permanent record of the ASB details be made by the Signaller and the PO, no forms or checklists accompany the rule.

Network Procedure NPR 703 – Using Absolute Signal Blocking

Network Procedures describe how particular actions are to be done to apply the Network Rules. NPR 703 prescribes the requirements when using ASB, in accordance with NWT 308.

As with NWT 308, NPR 703 requires the Signaller to ensure that all absolute signals allowing entry to the worksite are at stop with blocking facilities applied, there is no rail traffic approaching the worksite and all rail traffic that has passed complete beyond the proposed work location will not return. However, neither the network rule nor the procedure gives any guidance to the signaller on the methods used for determining the location of rail traffic in the section or confirming the clearance of rail traffic past the proposed work location.

Employee information

Blackheath

The Signaller, the PO and the Train Controller all held appropriate current qualifications for their respective positions.

The Signaller was an employee of Sydney Trains and RailCorp since August 2011. He was deemed competent after completing the Signallers Safeworking Levels 2 to 6 in September 2011 before he was posted to Penrith Signalling Complex. In June 2012 he was appointed as a Signaller Grade 3 at Katoomba Signal Box.

The PO was an employee of Sydney Trains and RailCorp since 2001 in the track and infrastructure maintenance function. He qualified as a Worksite Protection Officer Level 3 in 2006.

The Train Controller was an employee of Sydney Trains and RailCorp having commenced within the signalling discipline in June 2005. Progressing through a three month Train Control Training Program, the Train Controller was then appointed to a position at the Rail Management Centre (RMC) in Sydney in September 2012.

Newcastle

The Signaller and the PO both held appropriate qualifications for their respective positions.

The Signaller was an employee of Sydney Trains and its predecessors since September 1981. He was employed in various Station Assistant positions before undergoing training as a Signaller. He was appointed as a Signaller Grade 2 in 2000 and Area Controller 2 at Hornsby Signal Centre in 2009.

After the functions at Hornsby Signal Centre were consolidated and transferred to Homebush Signal Centre in 2011, the Area Controller became a relief at various smaller signal boxes located along the Central Coast and Hunter line.

The PO was an employee of Swetha International, a labour hire organisation contracted by Sydney Trains to remove litter from the tracks at various stations throughout its network. He was a qualified Protection Officer Class 4 with in excess of 30 years rail experience. He had been employed by Swetha International since 2000 and had undergone recertification as a PO Class 4 in July 2012.

Wollstonecraft

The Area Controller was an employee of Sydney Trains and its predecessors since July 2000. He was qualified as an Area Controller Class 3 and was deemed competent to operate the ATRICS workstations at Homebush Signalling Complex.

The PO was an employee of Sydney Trains and its predecessors since 1998. He had been employed in various roles as an authorised electrical traction worker and Protection Officer Class 3 and was qualified and assessed competent as a Protection Officer Class 4 in April 2013.

Rosters and fatigue

Factors that may have affected the performance of key personnel were considered for each of the three incidents. Fatigue is one area which is focussed on in investigations as fatigue can have a range of influences on performance, such as decreased short-term memory, slowed reaction time, decreased work efficiency, reduced motivational drive, increased variability in work performance, and increased errors of omission.[12]

The work rosters for the signallers and POs were examined for the fortnight prior to the incident and they were interviewed about their sleep patterns and general well-being. The time of day and the length of time on task were also considered. This analysis suggested that, based on the above information, the key personnel were unlikely to have been impaired by fatigue.

Number of ASBs granted daily

At interview, two of the Signallers stated that they considered that ASB was one of the most requested forms of worksite protection made for work on track. They also stated that it was common to issue some form of track access throughout most shifts.

Records for each of the three signalling centres involved in the incidents indicated that the number of ASBs granted daily generally ranged from none up to two although on some days, numbers spiked to 14. The high number probably indicated that an out of course repair or defect had been located on track on that day. On the day of the incidents, the Signallers at Blackheath and Newcastle had only granted single ASBs during their shift while the Area Controller operating the North Sydney Panel had granted four.

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[12] Battelle Memorial Institute (1998). *An Overview of the scientific literature concerning fatigue, sleep, and the circadian cycle*. Report prepared for the Office of the Chief Scientific and Technical Advisor for Human Factors, United States Federal Aviation Administration.

Safety analysis

Absolute Signal Blocking (ASB)

ASB rules and procedures

ASB is used in territories where train movements are controlled under the Rail Vehicle Detection (RVD) system. Trains are detected on the tracks and electronic visibility of their location is provided in various forms to the signaller. Although train locations are visible, RVD cannot detect the presence of workers on track. Consequently, it is essential for the signaller and the PO to verbally communicate all information that is critical to the ASB process so as to ensure safe separation between rail traffic and track workers. For example, the signaller cannot 'see' the workers, so relies on information from the PO regarding the exact location of the worksite. Conversely, the PO does not know the whereabouts of trains, so relies on information being communicated by the Network Control Officer (NCO). [13] Both sets of information are critical to safe work on track.

The process for applying ASB requires the Signaller to ensure that all absolute signals allowing entry to the worksite are at stop with blocking facilities applied to prevent inadvertent clearing of the signals or train entry into the section. The signaller must also ensure there is no rail traffic approaching the worksite and any rail traffic in the section has passed complete beyond the proposed work location will not return.

ASB implementation at Blackheath, Newcastle and Wollstonecraft

Radio and telephone communications between signallers and POs are recorded. The recordings associated with these three incidents were provided by Sydney Trains. Analysis of the recordings identified a number of deficiencies when implementing ASB, including:

- No kilometrages or exact locations were provided by the POs in the Newcastle and Wollstonecraft incidents resulting in the Signaller, in the Wollstonecraft incident, believing that the work group was at another location within the section. In the Newcastle incident, the Signaller had full view of the proposed worksite.
- Despite planning to use ASB in one incident, the alternate arrangements proposed by the signaller were not challenged by the PO. Although listing the signal numbers or points numbers to be used for the ASB on the Worksite Protection Plan (WPP), they and the application of blocking facilities were not identified or confirmed with the signaller.
- Despite a request for ASB at Newcastle, no advice was given to the train controller as required.
- At Newcastle, despite the Signaller giving permission to go on track, no warning was provided to the workgroup that a route had been set for trains to enter the station and worksite location. The clearing of the route also indicated that blocking facilities had not been applied as required despite a statement to the contrary.

Similarly, the standard of communications used in the incidents did not comply with Network Rule NGE 204 (Network Communication) and Network Procedure NPR 721 (Spoken and Written Communication). Instead they were conversational and informal with parties being identified on first name basis or read back being given in one continuous block without being itemised or

[13] A competent worker who authorises, and may issue, occupancy authorities, and who manages rail traffic paths to ensure safe and efficient transit of rail traffic in the Sydney Trains network.

verified correct.[14] Despite clear and concise communications being a fundamental requirement in the exchange of safety critical information, no reference is made to NGE 204 or NPR 721 in NWT 308, NPR 703 or any of the other worksite protection rules and procedures.

It was evident that information critical to the application of ASB was not communicated between the signaller and the PO. While the required information is documented in the ASB rules and procedures, neither give any guidance on acceptable methods for determining the location of rail traffic in the section nor confirming the clearance of rail traffic past a proposed work location.

Similarly, ASB requires that a permanent record be made of its details by the Signaller and the PO. However, no forms or checklists accompany the rule. Where records are to be kept, it is relatively common for a form to be provided. A form not only provides an auditable record of the process, it can also provide practical guidance for completing the steps required by a process.

Time taken in granting ASB

When a request for ASB is made by a PO, the signaller must undertake a number of tasks before granting the request. The tasks include phone calls, identification of the worksite location, identification of train locations, identification of signals, the nature of the work being undertaken, the operation of signal levers, the application of blocking facilities and record keeping. Despite the number of tasks, they are generally done from recall by the signaller as there is no specific checklist or forms used for ASB.

Voice tape evidence in each incident indicated that ASB was granted by the signaller within two minutes of the completion of the initial request made by the PO. However, it was identified that a number of steps were omitted in the process of granting ASB. They included:

- the exact location of nearby trains not being verified by or communicated to the PO
- the exact location of worksites not being adequately verified by the signaller
- non-reference to track maps by the signallers
- the confirmation of signal numbers, points numbers and the application of blocking facilities not being requested or given (in the Newcastle incident).
- blocking facilities not being applied (in the Newcastle incident)

Additional time was also taken up in negotiating the change in duration of the ASB at Blackheath.

In all cases, there was only a short window of opportunity in which to complete the work between the request for ASB and the arrival of the next train. However, in all three cases, longer windows of opportunity existed after the next approaching trains had passed the sections.

ASB analysis for Blackheath, Newcastle, Wollstonecraft

Blackheath

The Signaller at Katoomba monitored train movements in his area of control using the signal diagram and a TVS screen mounted each side of the diagram (Figure 5). However, as the TVS screens are non-vital equipment, Sydney Trains directives do not permit their use to ascertain the location of trains for safeworking purposes e.g., the granting of ASB.

At 0838 when the PO at Blackheath requested ASB for his worksite, the Signaller monitored the left hand TVS screen for trains approaching Katoomba from Sydney. The ASB request came approximately three minutes after W521 had departed Katoomba Station for Mt Victoria.

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[14] Recent ATSB reports where worksite protection communication issues feature include RO-2010-004, RO-2011-006, RO-2011-013, RO-2011-018 and RO-2013-003. They may be accessed at the ATSB website **Error! Hyperlink reference not valid.**

Observing that WT27 XPT service to Dubbo was approaching Katoomba the Signaller advised the PO that he could only have the ASB for five minutes instead of the 10 requested. No details of previous trains were provided by the Signaller or requested by the PO.

Having departed Katoomba, W521, at best, would have only been displayed on the last two indication lights of the track diagram and/or the first couple of track circuits depicted on the top left corner of the right hand TVS screen for the Katoomba to Mt Victoria section (Figure 5). As such, it was at this stage that the Signaller had the least visibility of W521 and he did not establish its precise location directly from either the driver or the Signaller at Mt Victoria. It was also at this stage that the Signaller commenced the most active period of the ASB; when he was required to set signals and points, apply blocking facilities, telephone various parties and record information in the Train Register Book (TRB). Although a guide only, it should be noted that the TVS screen for the Katoomba to Mt Victoria section also faced slightly away from the view of the Signaller and was not positioned for clear visibility from near the TRB and the telephone in the box.

Differing train identification methods being used by signallers and POs at Blackheath

Voice tape evidence from the Blackheath incident indicated that neither the PO nor the signaller could properly identify the train which had passed the worksite. There was only one train, WT27, indicated on the displays, and it was standing at the Katoomba platform. Train W521, by this time, had disappeared off the displays at Katoomba and into territory controlled by the next signal box.

The PO identified the passing train as V20 by the target plate at its rear and communicated this number to the signaller. V20 was the train set-number that was operating the scheduled timetable service identified as run-number W521. Neither the signaller nor the PO had any information that cross-referenced train set-numbers with train run-numbers. As a result, neither party could immediately identify the train to each other. It was not until later during initial investigation of the incident that V20 was eventually identified as operating on run W521.

Although not an issue in the other two incidents, it was noted that a similar potential still existed for confusion between the PO and the signaller when trying to identify trains passing worksites.

Newcastle

At Newcastle, train movements are monitored on the track diagram encompassing the section to Civic, the next station. There is no indication of a train on the diagram until it occupies the track circuits that extinguish lights on the diagram. Generally, there is only two to three minutes indication on the diagram of a train approaching Newcastle station.

Without blocking facilities applied, the Signaller cleared the route earlier for V712 to enter Newcastle station. This was done prior to any indication of V712 on the diagram. Subsequently, he did not monitor the diagram and it was not until the driver of the train sounded the whistle in warning to the workgroup that the Signaller remembered their presence on track.

Wollstonecraft

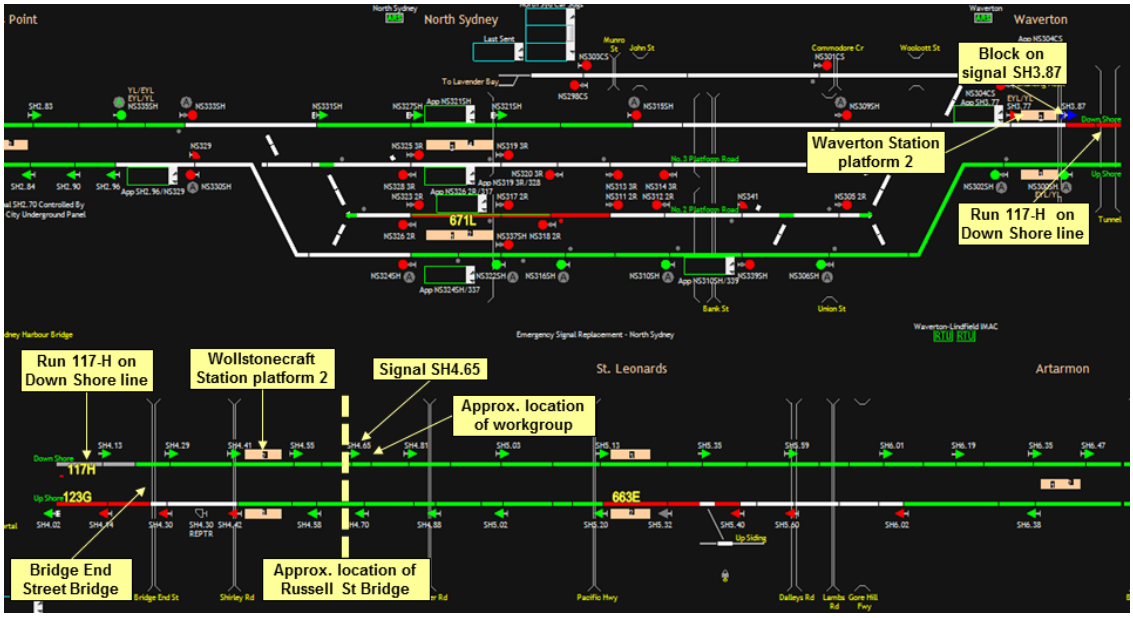
Similarly with Blackheath, ASB was granted by the Area Controller while a train was still in the section.

When the workgroup conducting the inspection of the overhead wiring arrived at the Russell Street bridge the PO correctly requested ASB to continue the inspection as there was no safe place on the bridge. Also correct was the nomination of Signal SH3.87 at Waverton by the PO for application of blocks as this was the nearest controlled signal to the workgroup. However, neither the PO nor the Area Controller came to a clear understanding about the location for the bridge crossing as no location, kilometrage or even bridge name was mentioned by the PO or requested by the Area Controller.

As ATRICS indicated Run 117-H was between North Sydney and Waverton, travelling towards the workgroup, the Area Controller initially declined the ASB request. However, after Run 117-H departed Waverton and passed Signal SH3.87, the block was applied to the signal and the ASB

granted to the PO (Figure 8). He granted the ASB on the assumption that the workgroup was intending to cross the bridge at Bridge End Street (6.822 km point) near Waverton. Observing that this was the first bridge marked on the ATRICS screen after Signal SH3.87 he assumed that the train would have completely passed the workgroup and the bridge by the time the ASB was granted.

Figure 8: ATRICS replay at 1256 depicting status of trains and signals at Wollstonecraft



Source: Sydney Trains

While four road overbridges and the Waverton Tunnel are marked on the ATRICS screen, the Russell Street road underbridge is not. At interview the Area Controller stated that he was unaware of the existence of the Russell Street bridge or the workgroup's intention to cross it. He also stated that he was unaware of any other infrastructure in the section other than that marked on the screen as he had not undergone any familiarisation in the field.

In this case, there was an inconsistency in the information provided to the signaller by the ATRICS screen.

Limitations in monitoring trains

In each incident, there were limitations or inconsistencies associated with the train monitoring systems available to the signallers. Display screens were either not positioned appropriately, information was missing or information was not clearly visible to the signaller. The track diagrams had a limited view of the field necessitating constant monitoring for the presence of trains and not all relevant infrastructure was marked on the ATRICS screens. This, along with the absence of documented guidance in the network rules and procedures for signallers to determine the position of trains, increased the risk of error with respect to the management of ASB protection.

Planning issues for work on track

Unlike the requirements for worksites using higher forms of worksite protection, there was no planning or coordination requirements between the infrastructure engineering group and the operations group for access to the track. Instead, the only coordination occurred when the workgroup arrived at the worksite and requested ASB from the signaller.

Before the commencement of any work on track, the PO must conduct an assessment in accordance with Network Rule NGE 300 and Procedure NPR 721 to identify all hazards and risks at the worksite location. The purpose of the assessment is to identify the method of worksite protection to be used and the control measures required to maintain the safety of workers on or

about the track. Details of the protection arrangements i.e., hand signallers, lookouts, tracks, signal numbers, points, infrastructure or kilometre posts are then documented on the WPP form. The PO also documents the results of the safety assessment on a Pre-Work Briefing (PWB) form to inform all work group members of the protection arrangements, the hazards identified and control measures to be implemented at the site. Copies of the WPP and PWB forms were provided for the three worksites by Sydney Trains.

Each of the worksites had been assessed, planned and documented by the POs in accordance with the network rule and procedure. Each PWB had listed the generic hazard of 'struck by train' for which 'worksite protection plan', 'as per protection plan and Network Rules' or 'use correct protection procedures (ASB as required)' had been nominated as the sole control measure. No other hazards or controls relating to the use of ASB were listed on the forms.

The nomination of those control measures indicated that the POs were either doing a generic assessment of the hazards or anticipating an error or violation by a Signaller or train crew. This was despite ASB being meant to exclude trains during its use. The control measures, as well as the lack of details for any other hazards related to the use of ASB, indicated that the planning of the worksites was deficient and solely focussed on the protection arrangements. Instead, the WPP should have also included assessment of the following:

- *Suitability of the work window*. No prior consultation was made with the Signallers or the Working Timetable regarding the best times to access the tracks. Instead, the requests for ASB were made during peak or higher volume traffic periods with one during the weekday morning peak, one pending a train arrival and the last with trains delayed on an adjacent line. In the Blackheath incident, a 30 minute window of opportunity existed immediately after the XPT service passed. It should also be noted that, in each incident, the Signaller could have delayed or refused the request for ASB had it impacted on train services.
- *Time Constraints*. The granting of each ASB was for a period of 10 minutes or less. While this time period was sufficient for the bridge crossing at Wollstonecraft, at Blackheath and Newcastle, any overrun in time was likely to cause delay to approaching train services.
- *Urgency of work*. All three workgroups were conducting minor, scheduled maintenance tasks which did not require immediate rectification or emergency access to the track.
- *Error by the Signaller*. Although the POs listed the network rule and procedure as the control measure for 'struck by train' on the PWB, no formal verification was made before entering the danger zone regarding the clearance time for last train into the section or the precise locations of the next approaching trains. Had this verification been made, particularly at Blackheath and Wollstonecraft, it should have alerted the POs and the Signallers that a train was still in the section.
- *Long section lengths*. In the Blackheath and Wollstonecraft incidents, no assessment was made regarding the long section lengths where the worksites were being established or the running times of trains through the section. Further, no additional assessment was made regarding the distance between the worksites and the controlling signals or whether ASB was the most appropriate method of worksite protection for the location.
- *Surrounding environment*. The Blackheath and Wollstonecraft worksites were established in proximity to live adjacent tracks and sharp curvatures. At Blackheath, the task required the workgroup to encroach onto the live Up Main to read measurements. At Wollstonecraft, the ATRICS replay showed Run 117-H and another train passing on the Russell Street bridge at the same time the workgroup was attempting to clear the track; a situation confirmed by the PO. Despite the hazards associated with the live tracks, neither workgroup planned or implemented any adjacent line protection to ensure workgroup members did not stray onto those lines.

From these deficiencies, it was evident that, had a rigorous assessment been made when formulating the WPP, it should have been evident that the short window for track access was unsafe and that the workgroup needed to either wait until a suitable window became available or implement a higher level of worksite protection. Further, had the POs established the exact positions of the last trains into the section, they would have identified that trains were approaching the worksites. Instead, the worksites were planned to accommodate the available time constraints and without rigorous assessment of the risks associated with ASB.

Suspension of ASB working

Immediately after the Wollstonecraft incident, the Manager of the Sydney Trains' Rail Management Centre issued instructions to all area controllers that 'engineering staff (track workers) must not be issued with Absolute Signal Blocking Authority under any circumstances'. The instructions, issued in accordance with Network Rule NSY 518 (Suspending a System of Safeworking), directed that 'any engineering works must instead be conducted under Track Work Authority conditions or a higher level of Worksite Protection'.

The instructions remained in force until 23 July 2014 when Sydney Trains reached agreement with the Office of the National Rail Safety Regulator (ONRSR) and the unions about the conditional reintroduction of the ASB method of protection. The agreement included the following interim measures;

- the provision of Lookouts at worksites
- the requirement for clear communications between the Signaller/Area Controller and PO about the exact location of the proposed worksite
- the requirement for a clear understanding between the Signaller/Area Controller and PO regarding worksite protection arrangements
- the introduction of a mandatory checklist for Absolute Signal Blocking authorities for all Sydney RMC Train Controllers, Supervisors and Shift Managers.

The conditional interim measures were not subjected to any risk assessment or change management review by Sydney Trains to determine if there were consequential changes in safety risk. Sydney Trains considered that the interim measures were only reinforcements to the existing rule and procedure rather than a change. The interim measures were introduced via a safety alert; they have not been formalised in the normal manner by way of a Safe Notice or amendments to NWT 308 or NPR 703.

ASB is used to exclude rail traffic from a section of track. The interim measures do not improve signallers' visibility of trains. Rather, reliance may be placed on lookouts detecting rail traffic already in, or subsequently entering, the section. This implies that confidence should not be placed in ASB succeeding in its primary purpose.

The addition of a checklist in the process formalises a recording requirement at the RMC. The checklist does not contain additional specific questions to those the train controllers asked the signallers in accordance with the rule and procedure in both the Blackheath and Wollstonecraft incidents.

Specific requirements for track clearance times and for minimum sighting times and distances are contained in the rule and procedure for Lookout Working (Network Rule NWT 310 and Network Procedure NPR 721). However, the Safety Alert issued by the Director Maintenance permitted the use of lookouts at worksites protected by ASB where such criteria could not be achieved.

Auditing and monitoring

Auditing is designed to test elements of a management system for compliance with standards or processes. It is also used to ensure consistent application of processes.

The Network Rules and Procedures are an integral part of the Sydney Trains' Safety Management System (SMS). The SMS is a requirement for the accreditation of operations in NSW under the Rail Safety National Law (NSW). Auditing is another element within the SMS.

Sydney Trains indicated it used a number of different types of audits to monitor the application of the Network Rules and Procedures. Audits used included the following:

- Signal Box Compliance Inspection Checklists
- Audio Safety Recording Assessments
- RMC Monitoring Compliance of Communication Protocols
- Corridor Safety System Audit Logs
- Team Management Audits
- Worksite Protection Program ASB.

Some of these audits are conducted by immediate supervisors e.g., Signal Box Compliance Inspection Checklist, RMC Monitoring Compliance of Communication Protocols, Team Management Audit. Others are part of centralised programs that remotely assess collected documents or recordings against a template or standard criteria. However, none of the audits are integrated and each type is conducted in total isolation to the others.

Various audit reports were supplied by Sydney Trains as evidence of the above audit processes. However, assessment of these audits observed that some types did not monitor or ensure compliance with the safety critical aspects being targeted. Of particular relevance were the following:

- Signal box compliance inspection checklists which did not verify the availability and currency of information publications i.e., track diagrams, in accordance with Network Rule NGE 212 (Network Information Publications) and Safe Notice 364-2013
- Signal box compliance inspection checklists which did not verify the critical steps i.e., the application of blocking facilities, the methods used to ensure trains are clear or excluded from the section or the location of the workgroup, when implementing ASB
- Audio recording assessments which did not propose any corrective actions or escalation of matters despite nine occasions being identified where a signaller did not confirm the location of trains before granting ASB
- The RMC Monitoring Compliance of Communication Protocols forms which were only being used to monitor non-safety related communications i.e., the supply of train time details from the signaller to the train controller, instead of any safety related communications
- A team audit conducted at the time of the incident at Blackheath which, although rightly recognising that the ASB had been granted while a train was still in the section, did not identify the omission of adjacent line protection despite potential encroachment of the worksite onto the Up Main line or the use of the un-authorised drivers diagrams by the PO
- The scoring of a WPP and a PWB utilising ASB with a mark of 80% despite the lack of safety critical details, i.e., track details, emergency assembly points, access/egress points, protecting signals/points or first aid points, not being recorded on the forms or marked on unauthorised driver diagrams.

Although six different types of audits were being used, they were not consolidated. Singularly, none were being used to the full potential to identify any safety critical issues or procedural non-conformances when granting ASB. Instead, the audit system made a very limited number of isolated and generally non-safety related findings without identification of how the findings or proposed corrective actions were to be recorded, analysed or implemented within the organisation.

Findings

In all three incidents, the POs assessed that the work could be conducted by excluding rail traffic using ASB in accordance with Network Rule NWT308 and Network Procedure NPR 703. However, the granting of ASB was made by the signallers while trains were either approaching the worksites or still in the section.

Although the immediate circumstances of the three incidents were dissimilar, a number of recurring themes were identified and, from the evidence available, the following findings are made with respect to the incidents. 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

- The POs and Signallers did not effectively communicate all information that was critical to the implementation of Absolute Signal Blocking (ASB).
- **Rule NWT 308 *Absolute Signal Blocking* and procedure NPR703 *Using Absolute Signal Blocking* did not provide any guidance on acceptable methods for determining the location of rail traffic in the section or confirming the clearance of rail traffic past a proposed work location. [Safety issue]**
- **There were no forms or checklists to provide practical guidance for completing the steps required to implement Absolute Signal Blocking (ASB) or to provide an auditable record of the process. [Safety issue]**
- The worksites were established to accommodate the available time constraints and without rigorous assessment of the likely hazards or risks associated with using Absolute Signal Blocking (ASB) as a form of safeworking.

Other factors that increase risk

- **Differences exist in the way Signallers and Protection Officers (POs) identify trains to each other. [Safety issue]**
- **Not all major infrastructure was marked on the ATRICS screens for the North Shore panel. [Safety issue]**
- POs are implementing generic hazard control measures for the ‘struck by train’ risk, without understanding that Absolute Signal Blocking (ASB) relies on the total exclusion of trains from the section where the worksite is located.
- **The Sydney Trains regime for auditing worksite protection arrangements was not effective in identifying emerging trends or safety critical issues when using Absolute Signal Blocking (ASB). [Safety issue]**

Other findings

- Although conditional, the re-introduction of Absolute Signal Blocking (ASB) following a period of suspension, was not subjected to any risk assessment or change management review for potential changes in risk.

Safety issues and actions

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to the [aviation, marine, rail - as applicable] industry, the ATSB may issue safety recommendations or safety advisory notices as part of the final report.

Insufficient guidance in Absolute Signal Blocking

Number:	RO-2013-018-SI-01
Issue owner:	Sydney Trains
Operation affected:	Rail: Passenger – Metropolitan
Who it affects:	All rail operators

Safety issue description:

Rule NWT 308 *Absolute Signal Blocking* and procedure NPR703 *Using Absolute Signal Blocking* did not provide any guidance on acceptable methods for determining the location of rail traffic in the section or confirming the clearance of rail traffic past a proposed work location.

Proactive safety action taken by: Sydney Trains

The coded ASB process currently being trialled requires signallers to establish and record the location of the last train/vehicle to pass the protecting signal on a job aid.

Action number: RO-2013-018-NSA-086

ATSB comment/action in response:

The Australian Transport Safety Bureau is satisfied that the 'coded Absolute Signal Blocking (ASB) process', if completed and implemented, will provide improved guidance on acceptable methods for determining the location of rail traffic in the section or confirming the clearance of rail traffic past a proposed work location when granting ASB.

Current status of the safety issue:

Issue status: Safety action pending

Justification: At the time this report was issued, the coded ASB process was still being trialled, with the decision to broadly implement the new requirements pending the full assessment of the trial outcomes.

No forms or checklists

Number:	RO-2013-018-SI-02
Issue owner:	Sydney Trains
Operation affected:	Rail: Passenger – Metropolitan
Who it affects:	All rail operators

Safety issue description:

There were no forms or checklists to provide practical guidance for completing the steps required to implement Absolute Signal Blocking (ASB) or to provide an auditable record of the process.

Proactive safety action taken by: Sydney Trains

An ASB job aid has been developed through an iterative design process involving protection officer and signaller end-user representatives. The primary intent of this tool is to provide a guiding structure that fits well with the task and helps to address the error mechanisms identified through the Sydney Trains human error assessment process.

Action number: RO-2013-018-NSA-089

ATSB comment/action in response:

The Australian Transport Safety Bureau is satisfied that the 'coded Absolute Signal Blocking (ASB) process', if completed and implemented, provides the necessary forms/checklists and improves the practical guidance of the steps required when granting ASB. The addition of the forms/checklists also provides an auditable record of the ASB process.

Current status of the safety issue:

Issue status: Safety action pending

Justification: At the time this report was issued, the coded ASB process was still being trialled, with the decision to broadly implement the new requirements pending the full assessment of the trial outcomes.

Differences in identifying trains

Number:	RO-2013-018-SI-03
Issue owner:	Sydney Trains
Operation affected:	Rail: Passenger – Metropolitan
Who it affects:	All rail operators

Safety issue description:

Differences exist in the way signallers and Protection Officers (POs) identify trains to each other.

Proactive safety action taken by: Sydney Trains

Sydney Trains assumes that this relates to a protection officer visually identifying a train passing a worksite. Identifying an existing train within a section using this method can be problematic for a variety of reasons, including; identifying small target numbers on suburban rolling stock, reconciling stock numbers with train numbers etc.

The current rules do not specify a particular method to be used to identify trains, but instead allows the signaller some autonomy in how they would do this. It is believed that the coded ASB process requirement to establish and record the location of the last train to pass the protecting signal will address this action.

Action number: RO-2013-018-NSA-087

ATSB comment/action in response:

The Australian Transport Safety Bureau is satisfied that the 'coded Absolute Signal Blocking process', if completed and implemented, will improve the way signallers and Protection Officers (POs) identify trains to each other.

Current status of the safety issue:

Issue status: Safety action pending

Justification: At the time this report was issued, the coded ASB process was still being trialled, with the decision to broadly implement the new requirements pending the full assessment of the trial outcomes.

Infrastructure not marked on ATRICS screen

Number:	RO-2013-018-SI-04
Issue owner:	Sydney Trains
Operation affected:	Rail: Passenger – Metropolitan
Who it affects:	All rail operators

Safety issue description:

Not all major infrastructure was marked on the ATRICS screens for the North Shore panel.

Proactive safety action taken by: Sydney Trains

ATRICS screens, TVS screens and indicator diagrams have a limited capacity to display infrastructure information, especially non-signalling assets. Additionally, Sydney Trains does not believe that incorporating more information on these screens is a solution, but rather it has potential to introduce new risks.

As part of the coded ASB process, protection officers are required to provide their physical location by reference to two signalling assets; Signal number, Points Number or a platform. These were determined to be the three most reliable identifiers as they are clearly identifiable to a signaller in reference to ATRICS screens, TVS screens and indicator diagrams.

The requirement for two reference points to be used also greatly reduces the potential for confusion when a single point of reference is used i.e. on the Sydney side of signal X, or 2 Kilometres beyond signal Y. Sydney Trains believes this requirement will address this action.

Action number: RO-2013-018-NSA-088

ATSB comment/action in response:

The Australian Transport Safety Bureau is satisfied that the 'coded Absolute Signal Blocking (ASB) process', if completed and implemented, will improve the identification of infrastructure reference points required when granting ASB.

Current status of the safety issue:

Issue status: Safety action pending

Justification: At the time this report was issued, the coded ASB process was still being trialled, with the decision to broadly implement the new requirements pending the full assessment of the trial outcomes.

Auditing not effective

Number:	RO-2013-018-SI-05
Issue owner:	Sydney Trains
Operation affected:	Rail: Passenger – Metropolitan
Who it affects:	All rail operators

Safety issue description:

The Sydney Trains regime for auditing worksite protection arrangements was not effective in identifying emerging trends or safety critical issues when using Absolute Signal Blocking (ASB).

Proactive safety action taken by: Sydney Trains

The different types of inspections or audits being carried out are not consolidated as they are carried out for different purposes. If Sydney Trains viewed all of the potential issues purely from the perspective of ASB compliance a criticism could equally be applied that more general or systemic issues of non-compliance were being ignored.

That being said Sydney Trains does review and refine its assurance activities on an ongoing basis. Since the gathering of information for this investigation by the ATSB, enhancements have been applied to a number of the relevant areas.

ATSB comment/action in response:

The Australian Transport Safety Bureau considers that Sydney Trains has not yet provided sufficient detail on any enhancements to its assurance activities for identify emerging trends or safety critical issues when using Absolute Signal Blocking.

ATSB safety recommendation to: Sydney Trains

Action number: RO-2013-018-SR-085

Action status: Released

The Australian Transport Safety Bureau recommends that Sydney Trains undertake further work to ensure that future auditing of worksite protection arrangements is effective in identifying issues with the implementation and use of Absolute Signal Blocking as a method of safeworking.

Current status of the safety issue:

Issue status: Safety action pending

Justification: At the time this report was issued, enhancements had been applied to assurance activities in a number of relevant areas, however the ATSB considers that further work could be undertaken to ensure that worksite audits consider the specific issues associated with the implementation and use of ASB.

General details

Occurrence 1 details

Date and time:	13 June 2013 – 0848	
Occurrence category:	Incident	
Primary occurrence type:	Safeworking breach	
Location:	Blackheath, New South Wales	
	Latitude: 33° 37.202' S	Longitude: 150° 16.65' E

Train 1 details

Train operator:	NSW Trainlink	
Registration:	W521	
Operation affected:	Rail: Passenger – Regional	
Persons on board:	Crew – 2	Passengers – N/A
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Occurrence 2 details

Date and time:	13 July 2013 – 0828 EST	
Occurrence category:	Incident	
Primary occurrence type:	Safeworking breach	
Location:	Newcastle, New South Wales	
	Latitude: 32° 55.601' S	Longitude: 151° 46.735' E

Train 2 details

Train operator:	NSW Trainlink	
Registration:	V712	
Operation affected:	Rail: Passenger - Regional	
Persons on board:	Crew – 2	Passengers – N/A
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Occurrence 3 details

Date and time:	17 July 2013 – 1256 EST	
Occurrence category:	Incident	
Primary occurrence type:	Safeworking breach	
Location:	Wollstonecraft, New South Wales	
	Latitude: 33° 49.788' S	Longitude: 151° 11.613' E

Train 3 details

Train operator:	Sydney Trains	
Registration:	117-H	
Operation affected:	Rail: Passenger - Metropolitan	
Persons on board:	Crew – 2	Passengers – N/A
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Sources and submissions

Sources of information

The Bureau of Meteorology

The Office of the National Rail Safety Regulator

Rail Industry Safety and Standards Board (RISSB)

Sydney Trains

Swetha International

The Swetha protection officer

The Sydney Trains area controller

The Sydney Trains protection officers

The Sydney Trains signallers

The Sydney Trains train controller

Transport for NSW

References

Battelle Memorial Institute (1998), *An Overview of the scientific literature concerning fatigue, sleep, and the circadian cycle*, Report prepared for the Office of the Chief Scientific and Technical Advisor for Human Factors, US Federal Aviation Administration.

Independent Transport Safety Regulator (2013). *ITSR Rail Industry Safety Report 2011−2012.*

Independent Transport Safety Regulator (2010), *Transport Safety Alert 34 - Use of bio-mathematical models in managing risks of human fatigue in the workplace.*

Independent Transport Safety Regulator (2011), *Transport Safety Alert 35 - Use of bio-mathematical models of human fatigue.*

Rail Industry Safety and Standards Board (RISSB, Dec 2010). *National Guideline Glossary of Rail Terminology.*

RailCorp Engineering Standard − *NSW Signalling SGS 01 Infrastructure Engineering Manual – Glossary of Signalling Terms.*

RailCorp General Rule NGE 200 − August 2005.

RailCorp General Rule NGE 204 − November 2008.

RailCorp General Rule NGE 212 − November 2008.

RailCorp General Rule NGE 234 − August 2005.

RailCorp General Rule NGE 236 − August 2005.

RailCorp Network Rule NSY 500 − August 2005.

RailCorp Network Rule NSY518 – August 2005

RailCorp Network Rule NSG 614 − August 2005.

RailCorp Network Procedure NPR 703 − July 2012.

RailCorp Network Procedure NPR 712 − July 2012.

RailCorp Network Procedure NPR 721 – December 2010.

RailCorp Operator Specific Procedures OSP 21 – May 2012

RailCorp Sydney Trains 'Interim Arrangement for Application of Absolute Signal Blocking' (Version 2 dated 6 August 2013)

RailCorp Safety First No: 2013/18 Working under an ASB − June 2013.

RailCorp Train Working NTR 408 − June 2010.

RailCorp Work on Track Rule NWT 300 − July 2012.

RailCorp Work on Track Rule NWT 308 − July 2012.

RailCorp Work on Track Rule NWT 310 − July 2012.

Rail Safety National Law National Regulations (2012) − Made under the *Rail Safety National Law (NSW).*

Train Operating Conditions (TOC) Manual – April 2013

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the 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 Office of the National Rail Safety Regulator

Sydney Trains

Swetha International

The Swetha protection officer

The Sydney Trains area controller

The Sydney Trains protection officers

The Sydney Trains signallers

The Sydney Trains train controller

Transport for NSW

Submissions were received from all parties, with the exception of the Sydney Trains protection officers, the Sydney Trains signallers and the Sydney Trains train controller. The submissions were reviewed and where considered appropriate, the text of the draft 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.

Australian Transport Safety Bureau

Enquiries 1800 020 616
Notifications 1800 011 034
REPCON 1800 011 034
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Email atsbinfo@atsb.gov.au

Investigation

ATSB Transport Safety Report
Rail Occurrence Investigation

Safeworking breaches involving Absolute Signal Blocking Blackheath, NSW, 13 June 2013 Newcastle, NSW, 13 July 2013 and Wollstonecraft, NSW, 17 July 2013

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