The Office of Transport Safety Investigations (OTSI) is an independent NSW agency whose purpose is to improve transport safety through the investigation of accidents and incidents in the rail, bus and ferry industries. OTSI investigations are independent of regulatory, operator or other external entities.

Established on 1 January 2004 by the Transport Administration Act 1988, and confirmed by amending legislation as an independent statutory office on 1 July 2005, OTSI is responsible for determining the causes and contributing factors of accidents and to make recommendations for the implementation of remedial safety action to prevent recurrence. Importantly, however, OTSI does not confine itself to the consideration of just those matters that caused or contributed to a particular accident; it also seeks to identify any transport safety matters which, if left unaddressed, might contribute to other accidents.

OTSI’s investigations are conducted under powers conferred by the Rail Safety Act 2008 and the Passenger Transport Act 1990. OTSI investigators normally seek to obtain information cooperatively when conducting an accident investigation. However, where it is necessary to do so, OTSI investigators may exercise statutory powers to interview persons, enter premises and examine and retain physical and documentary evidence.

It is not within OTSI’s jurisdiction, nor an object of its investigations, to apportion blame or determine liability. At all times, OTSI’s investigation reports strive to reflect a 'Just Culture' approach to the investigative process by balancing the presentation of potentially judgemental material in a manner that properly explains what happened, and why, in a fair and unbiased manner.

Once OTSI has completed an investigation, its report is provided to the NSW Minister for Transport for tabling in Parliament. The Minister is required to table the report in both Houses of the NSW Parliament within seven days of receiving it. Following tabling, the report is published on OTSI’s website at www.otsi.nsw.gov.au.

OTSI cannot compel any party to implement its recommendations and its investigative responsibilities do not extend to overseeing the implementation of recommendations it makes in its investigation reports. However, OTSI takes a close interest in the extent to which its recommendations have been accepted and acted upon. In addition, a mechanism exists through which OTSI is provided with formal advice by the Independent Transport Safety Regulator (ITSR) in relation to the status of actions taken by those parties to whom its recommendations are directed.
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ACRONYMS AND ABBREVIATIONS

AC .................... Area Controller
ARA .................. Australian Railway Association Inc
ARTC ................ Australian Rail Track Corporation
ATRICS ............... Advanced Train Running Information Control System
CoC .................. Certificate of Competency
CRN .................. Country Regional Network
CSA .................. Customer Service Attendant
CSB .................. Controlled Signal Blocking
DIP .................. Directly Involved Party
DIRN ................ Defined Interstate Rail Network
DTRS ................. Digital Train Radio System
EAP .................. Employee Assistance Program
FAID ................. Fatigue Audit Interdyne
ITSR ................ Independent Transport Safety Regulator
ITSRR ............... Independent Transport Safety and Reliability Regulator
MRA .................. Metropolitan Rail Area
MTR .................. MetroNet Train Radio
NAR .................. No Authority Required
NCO .................. Network Control Officer
NLA .................. Network Local Appendix
NOS .................. Network Operations Superintendent
OTSI ................ Office of Transport Safety Investigations
PO .................. Protection Officer
PWB .................. Pre-Work Briefing
RISI .................. Rail Industry Safety Induction Certificate
RISN .................. Rail Industry Safety Notice (issued by ITSRR)
RMC .................. (RailCorp’s) Rail Management Centre
RPA .................. Royal Prince Alfred Hospital
RTO .................. Registered Training Organisation
SECB ................ Signal Emergency Control Button
TC .................. Train Controller
TOA .................. Track Occupancy Authority
WPP .................. Worksite Protection Plan

1 With effect 1 July 2010, ITSRR’s name was changed to the Independent Transport Safety Regulator (ITSR) and its reliability responsibilities were transferred to Transport NSW as provided for by the Transport Administration Amendment Act 2010.
## GLOSSARY OF TERMS

<table>
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| **Absolute Signal** | Defined in the RailCorp Network Rules as: “A signal that must not be passed at STOP without the authority of a Signaller or Special Proceed Authority (SPA)”.
| **Advanced Train Running Information Control System (ATRICS)** | ATRICS is the electronic system used by Area Controllers at the Sydenham Signalling Complex to oversee and control points, signals and other signalling equipment, to authorise the movement of trains. |
| **Area Controller** | Within RailCorp, an Area Controller is a higher graded Signaller. The term Signaller covers all job titles which may be performing the duties for the area concerned. Area Controllers are qualified workers who remotely monitor and control train movements in the RailCorp Network from a large signal box or control centre. |
| **Blocking Facility** | A facility or device used by a Qualified Worker to prevent either the unintended issue of a Proceed Authority, or the operation of points or signalling equipment. |
| **Controlled Signal** | Defined in the RailCorp Network Rules as: “A signal that is, or may be, controlled or operated by a Signaller or a Qualified Worker”. |
| **Controlled Signal Blocking** | A method used by Qualified Workers to carry out work on track using controlled signals set and kept at STOP. |
| **Danger Zone** | 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. |
| **Emergency Switch Machine Lock (ESML)** | Electric points machines may be operated manually with a crank handle. An ESML cabinet for the points contains a crank handle welded to its own ‘Annett’ key which locks it in place in the ESML cabinet. |
| **FAID (Fatigue Audit Interdyne)** | A computerised model that calculates a fatigue score which is compared with the fatigue expected to be induced by working a particular pattern of work. The principal use of FAID is to better manage shiftwork, scheduling and fatigue risk. |
| **Four Foot** | This is the area between the two rails of a railway track. |
| **Kilometrage** | The distance to a point by rail as measured from Central Station in Sydney. |
| **Lookout** | A Qualified Worker responsible for keeping watch for approaching rail traffic, and for warning other workers to stand clear of the line before the arrival of rail traffic. |
| **Mechanical Controller** | Mechanical Control is a section within RailCorp’s Rail Management Centre (RMC) which:  
  - arranges for pre-positioning of sets for maintenance;  
  - receives and logs defects reported by train crew;  
  - provides advice to the train crews to resolve technical difficulties;  
  - calls out equipment examiners to attend to defective sets; and  
  - nominates a location for defective sets worked out of service. |
| **Metropolitan Rail Area** | The Metropolitan Rail Area network (MRA) is centred in Sydney and is under the management and control of RailCorp. It comprises 2,017km of track, sidings and yards and is bounded by Nowra, Macarthur, Lithgow (Bowenfels) and Newcastle. The MRA is used mainly by Countrylink and CityRail passenger trains but also services national and intrastate rail freight transport. |
| **National Standard for Health Assessment of Rail Safety Workers** | The National Standard for Health Assessment of Rail Safety Workers (Volumes 1 and 2) underpins a system for monitoring the health of rail safety workers and enables consistent application of health standards across the Australian rail industry. All health assessments for rail safety workers are conducted in line with this Standard which was approved by the Australian Transport Council (ATC) in April 2004. Volume 1 is intended for use by rail organisations and outlines responsibilities of rail organisations, workers and health professionals, and describes the management of... |
systems for health risk management. Volume 2 is for use by authorised health professionals and outlines the procedures for conducting health assessments, and provides the medical criteria for judging fitness for rail safety duty.

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<th>A Train Controller for an unattended location, a Signaller for an attended location, or a delegate carrying out some functions of a Train Controller or Signaller.</th>
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<td>Network Local Appendices</td>
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<td>Network Procedures</td>
<td>Procedures issued by RailCorp for the safe conduct of work on the RailCorp network. (To be read in conjunction with Network Rules).</td>
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<td>Network Rules</td>
<td>Rules issued by RailCorp to mandate the requirements for safe operation in the RailCorp network. (To be read in conjunction with Network Procedures).</td>
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<td>No Authority Required</td>
<td>A method used by Qualified Workers to carry out work on track without a formally issued work on track authority and which provides the lowest level of worksite protection. On 19 December 2010, the rule for No Authority Required working was changed to Lookout Working.</td>
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<td>Operations Controller</td>
<td>Refer to Train Controller.</td>
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<td>OSCAR</td>
<td>The H set or OSCAR (Outer Suburban Car) is a class of electric multiple unit train operated by CityRail.</td>
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<td>Permissive Signals</td>
<td>Defined in the RailCorp Network Rules as: “A signal that can be passed at STOP without the authority of a Signaller or Special Proceed Authority (SPA), if it is considered safe to do.” Permissive signals can be passed at STOP in accordance with Network Rule NSG 608 Passing Signals at STOP.</td>
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<td>Points</td>
<td>A crossing comprising of two matching half sets of points together with associated components. A set of points permits rail traffic to change from one track to another. Points are nominally referred to as left or right hand denoting the turnout direction as viewed from the toe end.</td>
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<tr>
<td>Protection</td>
<td>The means used to prevent rail traffic from entering a worksite or other portion of track.</td>
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<td>Protection Officer</td>
<td>The Qualified Worker responsible for protection.</td>
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<td>Rail Corridor</td>
<td>The territory from fence-line to fence-line, or if there are no fences, everywhere within 15m of the outermost rails.</td>
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<td>Rail Industry Safety Induction</td>
<td>Rail Industry Safety Induction (RISI) is an induction training package specifically designed for persons working in the rail industry. This training introduces participants to the key generic hazards of an operating environment and basic track terminology. All RailCorp employees, or any contractors, who enter the Rail Corridor whose activities will, or have the potential to, enter the Danger Zone, must have successfully completed the RISI training course and must hold a valid RailCorp-issued RISI card, unless they hold a Safeworking Certificate of Competency (CoC) (such as a PO). A RISI card does not entitle the holder to enter the Danger Zone unsupervised so, unless a person holds a Safeworking CoC, they must be supervised at all times.</td>
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<td>Rail Industry Safety Notice</td>
<td>Rail Industry Safety Notice (RISN) were issued as needed to inform accredited rail transport operators and the broader rail industry of current and emerging safety issues. Transport Safety Alerts (TSA) have been issued in place of the RISNs to reflect ITSR’s expanded role in safety regulation taking effect from 1 July 2010.</td>
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<td>Safe Place</td>
<td>A place where employees and equipment cannot be struck by rail traffic.</td>
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<td>Six Foot</td>
<td>The area between the closest rails of adjacent tracks.</td>
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<tr>
<td>Track Circuit</td>
<td>An electric circuit where current is carried through the rails and used to detect the presence of trains. Track circuits are used in the operation and control of points and signalling equipment.</td>
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<td>Train Controller</td>
<td>A Qualified Worker who authorises, and may issue, occupancies and Proceed Authorities, and who manages train paths to ensure safe and efficient transit of rail traffic in the RailCorp Network.</td>
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<td>Transponders</td>
<td>These are features of the MetroNet Train Radio system used by RailCorp in the metropolitan area. A transponder is a sealed unit attached to the sleeper on a running line or in a yard. As the train progresses through the rail network, transponders automatically change the mobile equipment to the correct area for the signaler and train controller responsible for that area. Each time that a train passes over a transponder, the train radio system is updated on the train’s new location.</td>
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| ‘Up and Down’ directions  | Trains travelling away from Sydney are referred to as Down trains. Movements in this direction are referred to as being in the Down direction.  
Trains travelling towards Sydney are referred to as Up trains. Movements in this direction are referred to as being in the Up direction. |
| Qualified Worker          | A worker certified as competent to carry out the relevant task.                                                                                   |
| Warning Light             | An illuminated white or orange warning light provided at locations where workers on track have a restricted view of approaching rail traffic. If rail traffic approaches, the light goes out giving time for workers to move to a safe place. |
EXECUTIVE SUMMARY

At approximately 1:08am on 13 April 2010, CityRail inter-urban passenger service C488, en route from Kiama to Central Station, struck and fatally injured a track worker at Kogarah Station as he attempted to get clear of the track by climbing up on to Platform 1. The worker was part of a team employed by Swetha International Pty Ltd which was contracted by RailCorp to remove rubbish from tracks. The other four members of the team scattered from the path of the train and avoided injury.

The Protection Officer for the team obtained approval to use Controlled Signal Blocking (CSB) as the method of work site protection at Kogarah. However, a number of safety critical requirements of Network Rules and Procedures were omitted in the process of implementing the CSB. In particular, checks and cross-checks between the Area Controller and the Protection Officer were not completed on the two key CSB safety measures, that is, ensuring the section was clear of all rail traffic and that the required blocking facilities had been applied on the protecting signal/s. The Area Controller had not applied blocking facilities when he told the Protection Officer that the blocks were on and the Protection Officer did not seek confirmation that CSB had been fully implemented before commencing work.

The investigation found that the track worker was struck because the Area Controller did not identify that the train was already in the section approaching Kogarah and past the protecting signals before he applied blocking facilities. When the Area Controller became aware of the situation, he asked the Station’s Customer Service Attendant to initiate a warning over the Station’s public address system, rather than using the more expedient means of the MetroNet Train Radio system to bring trains to an emergency stop.

The Area Controller had only just returned from a lengthy period of leave, most of which was sick leave. Although he returned to full duties without restrictions, there was sufficient evidence from the circumstances which had necessitated the sick leave, together with his previous medical history, to indicate that it would have been prudent to have required clearance through a 'triggered health assessment' before
allowing him to resume full duties, in accordance with the National Standard for Health Assessment of Rail Safety Workers.

In addition to the procedural omissions in implementing CSB, the investigation identified a lack of rigour in complying with the requirements of Network Rules and Procedures involving communication protocols and the planning, briefing and documenting of worksite protection.

It is also significant that on-site management and supervisory support was available to staff at the Sydenham Signalling Complex, the responsible Signal Box for train movements through Kogarah, for only part of its daily operation.

Findings
In relations to those matters prescribed by the terms of reference as the principal lines of inquiry, OTSI finds as follows:

a. Cause
   i. The track worker was struck and fatally injured because the Area Controller did not identify that passenger service C488 had departed Hurstville and was in the section heading towards Kogarah. When he authorised Controlled Signal Blocking (CSB) for the protection of the rubbish removal worksite alongside Platform 1 at Kogarah Station, C488 had already passed protecting signal SM 914 and the driver had not been informed of the presence of workers on the track at Kogarah.

b. Contributory Factors
   i. Instead of using the MetroNet Train Radio system available to immediately alert trains that workers were on or about the track, the Area Controller telephoned the Customer Service Attendant at Kogarah Station and asked for an announcement to be made over the Station public address system to alert the track workers to the danger of the oncoming train. This process took up valuable seconds and resulted in insufficient time for the track workers to comprehend the situation and then react to the warning.
ii. Given the methods available to the work group, CSB was the appropriate method of worksite protection. However, a number of safety critical requirements of Network Rules and Procedures were omitted in the process of implementing the CSB. In particular, checks and cross-checks were not completed to ensure the section was clear of rail traffic and the required blocking facilities had been applied. The Area Controller had not applied blocking facilities when he told the Protection Officer blocks were on. The Protection Officer did not seek confirmation that CSB had been fully implemented as he assumed there would be no more rail traffic and that the Area Controller knew what to do as he had implemented CSB for him twice a little earlier that evening without incident.

iii. Initially, the four workers cleaning the track attempted to climb onto Platform 1 as there were no safe places for them along the Platform. Three of the workers abandoned that course of action and moved to the adjacent (live) track. Evidence indicated that during induction and worksite protection training, there was insufficient coverage of the emergency safety precautions to be taken by workers if they are caught on the track with a train approaching and no safe place readily accessible.

iv. Although the Area Controller was experienced and held the necessary current competencies, he had only recently returned from a lengthy period of mainly sick leave associated with health issues that had been ongoing intermittently for some years. Even though he had returned to work unrestricted, he had concerns about his fitness for duty which had been shared with his Manager while on leave. He considered calling in sick on the night of the incident but was concerned about the ramifications of taking more sick leave. There were sufficient ‘triggers’ in the Area Controller’s circumstances to indicate that a new health assessment should have been conducted to determine his ability to perform his job safely, prior to returning to full duties.

v. It is likely that the combined effects of a lengthy period of irregular shifts, reduced sleep, working during the circadian low and pre-existing health issues adversely affected the Area Controller’s work performance.
c. **Anticipation and Management of Risk**

i. Although the Protection Officer’s intentions and plan for the worksite protection were sound, his planning, briefing and documenting procedures lacked rigour in that they were not fully completed and were conducted off site, en route to the team’s initial work location at Beverly Hills.

ii. Staff working in the Sydenham Signal Complex were not provided with permanent full-time supervision, with management generally only in location from 5:00am to 1:00pm on weekdays, depending on operational imperatives, although network operations superintendents could be called in on an as required basis. There were conflicting reports as to whether immediate support or supervision was available to the Area Controller or other staff after the incident.

iii. Accounting for attendance was voluntary for staff and the taking of breaks during shifts occurred on an ad hoc basis. Despite clear and repeated promulgation of policy, it is apparent that personal electronic equipment was being used for non-work related purposes by staff while on duty.

iv. Although the MetroNet Train Radio provided the ability to broadcast an emergency ‘STOP’ message, as well as a direct call to the train, the Area Controller was not confident in using it or in its capabilities. Nonetheless, RailCorp considers that the training of Area Controllers in MetroNet functionality is adequate and frequent enough. However, a number of area controllers asserted they had never undertaken a ‘Stop ALL Stop’ drill. Training drills in such a seldom-required emergency procedure should be conducted regularly so as to maintain the highest level of competency.

v. The recorded voice communications were informal and conversational and not in accordance with Network Rules and Procedures, particularly in relation to the handling of safety critical information. This was despite RailCorp publishing information bulletins emphasising the importance to safety of effective communications and the ITSR targeting communication protocols in its audit and inspection programs.

vi. RailCorp had been conducting regular compliance audits of recorded communications but these were not random, there being a tendency for
them to be done on the same day in a particular time frame during a non-peak period and did not specifically target communications between area controllers and protection officers. Few non-compliances were identified and, as they were classified as minor, they were actioned informally and no record of the action kept.

vii. Immediately after the incident, RailCorp made a subtle change to the CSB Rule and Procedure using an emergency change provision in the Rail Safety (General) Regulation 2008. It was found that there was not a universal knowledge of the change within RailCorp and that understanding of the original rule varied among those charged with applying it.

viii. A warning light system, which relies on a lookout maintaining active observation, was in place at Kogarah due to restricted sighting on the track approach from the South. It was not utilised as the Protection Officer considered CSB had been successfully implemented and that any possible threat was assessed as coming from the opposite direction (albeit on the adjacent track). Additionally, there were no backup mechanisms to alert persons in the vicinity that the lights had in fact extinguished. However, while the purpose of warning lights is included in the Network Rules and Procedures, they do not reinforce the requirements for workers to act when warning lights extinguish. Warning lights are not shown on older diagrams and network maps.

ix. The procedures used to place signals back to stop in emergencies were not current or clearly understood by users. Further, recent system hardware and software modifications were not clearly delineated to or understood by users. For example, the Area Controller was unaware that the Signal Emergency Control Button on the adjacent panel had the ability to set automatic signals on his panel to Stop between Hurstville and Kogarah.

x. The Driver acted diligently in spotting the workers on track, making an emergency application of the brakes and warning of the train’s approach. However, despite his efforts, he could not avoid striking the track worker.
d. Incident Response

i. Although RailCorp’s drug and alcohol contracted testing arrangements and processes comply with regulatory requirements, the Area Controller was not drug tested after the incident. Additionally, the Driver and Guard of C488 were drug tested more than two weeks later; one track worker was not breath tested and the Customer Service Attendant from Kogarah was not tested at all.

ii. There was no effective structure in the command and control arrangements for some time after the incident. The network operations superintendent on-call list was incorrect and calls to the Sydenham Complex Manager (who was not on call) went unanswered. These difficulties, combined with the lack of a hierarchical structure on site, contributed to delays in action including protecting the incident site and attending to the Area Controller.

iii. There were minor discrepancies in the authorisation of the two train occupancy authorities issued to protect the incident site which were not detected during read back. Although not considered prejudicial to safety, this is symptomatic of an environment where procedural requirements were not being implemented rigorously.

e. Other Safety Matters

i. The signalling technology displayed over multiple screens in the ATRICS system did not provide information regarding kilometragess. Further, its drop down command menu boxes often obscured items in the display and the size of track circuits occupied by trains varied and was not easily identifiable. This made it difficult to readily determine the exact position of trains, signals and worksites which could be overcome with enhanced visual displays and alerts.

ii. On his return from leave, the Area Controller was not aware of any recent changes made to the operation of signal emergency control buttons or group replacement facilities. He was also unaware that the function of putting signals back to STOP in an emergency had been changed to activating icons on the ATRICS display screen.
iii. The Protection Officer had no effective system for storing train safety records and Swetha had not yet commenced monitoring or auditing documentation completed by their protection officers under this contract.

**Recommendations**

To prevent a reoccurrence of this type of railway accident, it is recommended that the following remedial safety actions be undertaken by the specified responsible entities:

a. **RailCorp**

i. Develop and implement regular training for area controllers using simulations and drills to demonstrate competence in the use of the emergency facilities in the MetroNet Radio system.

ii. Initiate a program of random audits on the implementation of worksite protection across the network to confirm conformance with the relevant policies, rules and procedures.

iii. Implement a periodic audit program to verify that the content of rail industry safety inductions and worksite protection training delivered by external training providers fully meets its requirements especially in relation to emergency safety precautions to be taken if a worker is caught on track without a readily accessible safe place.

iv. Develop and implement policies, procedures and education on triggered health assessments, consistent with the guidance provided in the *National Standard for Health Assessment of Rail Safety Workers*, that will assist supervisors and line managers in identifying the indicators which will alert them to staff in need of a health review.

v. Review the staffing of the Sydenham Signalling Complex so that it provides for management and/or supervisory support of staff on location 24 hours a day, seven days a week.

vi. Develop and implement policy guidelines and procedures for dealing with non-compliance with its network communication protocols and for maintaining the record of actions taken to deal with non-compliance.

vii. Investigate improvements to the Advanced Train Running Information Control System which would:
• provide additional detection and alerts for situations where rail traffic was within or entering an established worksite or one being established; and
• limit the extent to which drop down menu boxes obscure network displays.

viii. Review risk mitigation strategies by undertaking risk assessments at stations or network locations without a readily accessible safe place for persons caught on track bordered on both sides by platforms.

ix. Develop and revise all relevant ATRICS procedures so they contain all hardware and software modification used to place signals back to Stop in emergencies, and verify that all relevant staff are assessed as competent in the use of the equipment and procedures.

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

b. **Swetha International**

i. Demonstrate an ongoing, random program of monitoring the implementation of worksite protection arrangements by its track workers that confirms conformance with the relevant policies, rules and procedures especially in the early stages of new contract work.

ii. Develop and implement an ongoing, random program for monitoring adherence to network communications protocols by track workers. In conjunction with this, provide strengthened policy guidelines for dealing with non-compliance and procedures for maintaining the record of actions taken.

iii. Improve the storage of train safety records, particularly at the commencement of new contracts, to comply with current legislative requirements.
PART 1  CIRCUMSTANCES OF THE INCIDENT

Incident Synopsis

1.1 Shortly after 1:00am on 13 April 2010, a team of five employees of Swetha International Pty Ltd commenced rubbish removal work on the tracks at Kogarah Railway Station. The team was employing controlled signal blocking as its method of worksite protection in accordance with RailCorp’s Network Rule NWT 308 Controlled Signal Blocking (CSB).

1.2 At approximately 1:08am, C488, a Sydney-bound CityRail inter-urban service, approached Kogarah Station from the Country (Southern) end of Platform 1 while the workers were on the track directly ahead of it. The Protection Officer moved to a safe place at the Country end of the platform while the other four workers attempted to climb onto Platform 1. Three of the four workers abandoned their attempt to climb onto the platform and moved onto the adjacent live line, thereby avoiding being struck by the oncoming train. However, the fourth worker continued with his attempt to reach the safety of Platform 1, and being unable to do so, was struck by the train and fatally injured.

Cleaning Contract

1.3 On 15 March 2010, Swetha International Pty Ltd (Swetha) was awarded a contract by RailCorp to undertake station and corridor cleaning commencing on 6 April 2010. The contract covered 265 stations and 659 working platforms within the metropolitan rail network broadly divided into four districts: West, Illawarra, North and South.

1.4 The general scope of the contract consisted of collecting, removing and disposing of litter and rubbish at track level and surrounding station platforms at nominated frequencies for each specific location. The programmed clean up frequency at Kogarah Station was twice weekly.

1.5 The primary objective of the contract was to “contribute to the visual presentation of the network by reducing rubbish accumulation on the tracks and infrastructure with minimum disturbance to train operations.”  

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2 Contract document RFT No. WS8875, Station Corridor Cleaning, Part D, Scope of Works.
objectives included a reduction in the risks of fire, odours and vapours that may accumulate from rotting waste materials, vermin attraction and flooding of tracks due to drainage failure.

1.6 The contract required Swetha to provide all staffing including: “An appropriate level of work site protection and required protection officers and lookouts where applicable to complete the works”. Swetha was also responsible for organising access into the rail corridor and railway stations to perform the work.

1.7 The contract required RailCorp to conduct audits for quality and probity on a regular basis. As this contract had only commenced a week prior to the incident, no auditing had been undertaken.

Location and Track Information

Figure 1: Network map indicating route of C488 and incident location
(Diagram courtesy of RailCorp)

1.8 Kogarah is located approximately 11.600km by rail South of Sydney’s CBD on the Illawarra Line (see Figure 1). Kogarah Station is one of several suburban
stations located between Hurstville and Arncliffe on the RailCorp suburban network.

1.9 There are four lines and four platforms at Kogarah: the Up and Down Main Illawarra Lines and the Up and Down Illawarra Local Lines. The incident occurred on the track adjacent to Platform 1 on the Up Illawarra Local Line (see Figure 2).

![Figure 2: Track and signal configuration at Kogarah](Diagram courtesy of RailCorp)

1.10 As network owner, RailCorp is responsible for track maintenance, signalling and train control functions in this corridor. Train movements in this area are controlled by a mix of automatic and controlled signals under Network Rule NSY 500 *Rail Vehicle Detection System*. All signals and points are monitored remotely from the Sydenham Signalling Complex (the Signal Box). At the
Signal Box, area controllers (signallers) operate panels, each covering a defined portion of the total area controlled from Sydenham. The incident occurred in the area controlled from the Hurstville panel.

1.11 The track speed for passenger trains on the Up Illawarra Local Line on approach to Kogarah is 80km/h. The configuration of the tracks and signals at Kogarah, together with the route of C488, is shown in *Figure 2*.

**The Train**

1.12 CityRail service C488 consisted of a four-car Outer Suburban Electric Multiple Unit train (OSCAR – see *Photograph 1*). C488 weighed 197 tonnes and measured 82m in length. At the time of the incident, it was conveying four passengers.

1.13 C488 had departed Kiama at 10:51pm (12 April 2010) and was scheduled to arrive at Sydney Terminal at 1:27am. It was not scheduled to stop at Kogarah.

*Photo 1: Front of the OSCAR Electric Multiple Unit train on C488*
The Train Crew

1.14 C488 was operated by a two man crew (driver and guard) based out of the Sydney Depot. The Driver was positioned in the front crew compartment whilst the Guard was located in the crew compartment in the rear (4th position) car. The Driver had approximately 12 years experience as a train driver with RailCorp.

1.15 Both crew members were within their respective medical and competency assessment periods and both were familiar with and qualified for the routes and the OSCAR rolling stock.

The Swetha Track Workers

1.16 The member of the track worker team supervising the team and acting as the Protection Officer (PO) held a PO Level 2 certificate of competency (CoC). As such, he was qualified and authorised to establish worksites and implement worksite protection arrangements under RailCorp’s Network Rules NWT 308 Controlled Signal Blocking (CSB), NWT 310 No Authority Required (NAR) and NWT 304 Track Occupancy Authority (TOA). The four other workers had all undergone RailCorp’s mandatory Rail Industry Safety Induction (RISI). Two of these workers, including the deceased, were in the process of completing worksite protection officer qualifications.

1.17 The Protection Officer had been involved in railway operations for approximately four years and commenced employment with Swetha on 4 June 2007 as a PO Level 1. He gained his PO Level 2 qualification through the RailCorp training framework on 26 March 2008.

1.18 A review of the Protection Officer’s work history revealed he had been involved in a worksite protection incident at Enfield on 1 March 2010. An internal investigation by RailCorp found that there had been a breakdown in communication between the Protection Officer, a Pacific National yard master and a RailCorp signaler due to a misunderstanding over instructions given by the signaler. There were no injuries or damage as a consequence. As a result of the incident, the Protection Officer underwent re-assessment of his safeworking qualifications by RailCorp, was deemed competent and resumed full duties shortly after.
The Area Controller

1.19 Employment and training records established that the Area Controller had a total of 20 years experience in the rail industry. He commenced training as a signaller in October 1999 and had occupied a position as an Area Controller at the Sydenham Complex since 28 December 2001. He was fully qualified and was certified in all relevant systems of safe working. He was also deemed competent to operate various signalling control panels at the Signal Complex, including the Hurstville panel.

The Area Controller’s Activities at the Time of the Incident

1.20 While attending to the team at Kogarah, the Area Controller was also attending to worksite requirements in the vicinity of 992 points at Penshurst (located on the Sydney side of Penshurst platform). At 12:48:43am, the local signal electrician had contacted the Area Controller and indicated that he needed to do maintenance work on 992 points. He then requested that the Area Controller operate the points a number of times in order to verify their operation and lubricate the mechanism. The work was arranged to be conducted between train movements. No protection methods were discussed during this and four subsequent conversations between the Area Controller and the signal electrician. A review of the voice logs indicated that the last of these four conversations commenced at 01:05:32am and ended 35 seconds prior to a conversation between the Area Controller and the Swetha Protection Officer in which CSB was granted to the team at Kogarah. A sequence of events including timings is shown at Appendix 1.

Environmental Conditions

1.21 It was dry, cool and dark around the Station at the time of the incident. The Bureau of Meteorology recorded a minimum overnight temperature of 13.1°C at Observatory Hill, located approximately 12km North of Kogarah.

1.22 The platforms and tracks at Kogarah were well lit by artificial light but visibility outside the station was aided only by light from a new moon. The contrasting

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3 All times recorded in this Investigation Report have been adjusted where necessary to take into account the lack of synchronisation between the various recording devices from which evidence was gathered. The only significant adjustment is that for the time recorded on the train event recorder which OTSI has calculated as being 24 seconds slower than the CCTV time stamps.
lighting conditions at the Southern end of Kogarah Platform 1 can be seen in Photographs 2, 3 and 4.

1.23 From the tracks between Platforms 1 and 2, there are a number of obstructions affecting visibility of the workers from an approaching train. These include a large car park on the Southern end, stanchions and platform curvature towards the Northern (Sydney) end. A combination of warning lights and signage are positioned in the area around the car park on the Southern end alerting workers to areas of restricted sighting and limited clearance from passing trains.

Photo 2: Contrasting lighting conditions at the Southern end of Platform 1 at Kogarah Station

1.24 Because of restricted sighting on the track approaches, two illuminated white warning lights are provided on the Up Illawarra Local Line on the approach to Platform 1 at Kogarah to assist lookouts (see Photographs 3 and 4). These lights are positioned in accordance with RailCorp Engineering Standard ESG 100.20 Signal Design Principles – Warning Lights and provide a warning to workers of approaching rail traffic in accordance with Network Rule NSG 604 Indicators and Signs. On detection of approaching rail traffic, the warning lights extinguish. This is intended to provide a fail-safe operation such that, if
the light fails, or is observed to be extinguished, it must be assumed that a train is approaching.

Photo 3: Warning lights for the Up Illawarra Local Line at Southern end of Kogarah Station

Photo 4: Visibility of warning lights from the position of the Protection Officer on track at the Southern end of Platform 1
1.25 ESG 100.20 stipulates that the warning time available to workers shall be “…an absolute minimum of 20 seconds, or sufficient time for any user to reach a safe place before the arrival of a train. Designs shall be based on 30s warning unless additional time is required to reach a safe place”. CCTV footage confirmed that the warning lights extinguished 30 seconds prior to the train passing the location of the lights.

1.26 There was evidence that the support structure on the Southern end of Platform 1 had recently been renewed resulting in two different types of construction (see Photograph 5). Typical of many other platforms around the RailCorp network, neither structure is intended to facilitate climbing from the track to the platform. While the small ledge in the older brick face would provide a foothold, it is at a height which, with no additional foot and/or hand holds, would make it difficult to climb from the track onto the platform. Again, because of the primary purpose of the platform, the design of the platform face does not incorporate recesses at track level to provide safe places.

Photo 5: Contrasting platform construction along Platform 1 Kogarah Station
Establishing the Worksite

1.27 The five Swetha employees had arranged to meet at the Protection Officer’s residence and travel in his work vehicle to their first station, Beverly Hills. En route the Protection Officer compiled the Worksite Protection Plan (WPP) covering individual work locations during the shift and a Pre-Work Brief (PWB). However, the workers only signed a PWB covering their first job. From his safety assessment, the Protection Officer determined that the team could access the danger zone using either NAR or CSB depending on the specific risks at each station location.

1.28 At both Beverly Hills and Kingsgrove, the worksites were protected using NAR. The group then travelled to Hurstville where the Protection Officer made arrangements with the Area Controller for work on all four tracks (Platforms 1 to 4) to be carried out under CSB.

1.29 On completion of the work at Hurstville, the group travelled to Kogarah where the Protection Officer undertook a more detailed safety assessment. From this assessment he confirmed that CSB was most appropriate for the work. He then contacted the Area Controller to implement CSB on Platform 3 (the Up Illawarra Line). This work commenced at approximately 1:00am and was completed by 1:07am. (see Appendix 1 for sequence of events).

1.30 While the work was underway at Kogarah, C488 arrived at Hurstville where one passenger embarked and three disembarked from the train. C488 then departed at 1:05:40am (20 seconds earlier than timetabled).

1.31 At 1:06:59am, the Protection Officer contacted the Area Controller and ‘fulfilled’ the CSB on Platform 3. He then requested CSB on Platform 1 (the Up Illawarra Local Line) which was granted by the Area Controller. The voice log from the Hurstville panel records the conversation between the Area Controller (AC) and Protection Officer (PO) as follows:

- PO: “Ar how are you ******, ah just wanted to fulfil a CSB on 3.”
- AC: “Yeah.”
- PO: “Any chance of gettin 1?”
- AC: “Yeah, no worries.”
• PO: “Yeah on 1, thanks mate.”
• AC: “Righto mate, blocks are on.”
• PO: “Thank you.”
• AC: “Tah.”

1.32 This conversation took 17 seconds and was completed at approximately 01:07:16am. Critically, the Area Controller advised the Protection Officer that “blocks are on”, which the Protection Officer assumed meant that the blocks had been applied to the appropriate signal/s preventing trains from approaching Platform 1. At interview, the Protection Officer stated that he assumed there would be no more regular passenger trains to run on that track at that time of night but that he thought the Area Controller would know what he was doing and would have verified that the section was clear of trains before applying the blocks on the appropriate signal/s. The Protection Officer also stated he did not clarify the message by repeating it back as the Area Controller appeared rushed. Significantly, there was no explicit confirmation about the section being clear of rail traffic or about what signals were to be blocked.

1.33 Confident that he now had the necessary authority and protection in place to commence the work, the Protection Officer advised his team members that:

• CSB had been granted along the track next to Platform 1;
• he would act as lookout for them (observing the adjacent track) as they worked in a Northerly direction along Platform 1; and
• they were now right to enter the danger zone and commence work.

He also warned them that the adjacent track (next to Platform 2 - the Down Illawarra Local Line) was still considered ‘live’, meaning trains were still operating on that track.

1.34 CCTV footage taken from Platform 2 shows that, at 01:07:42am, the workers reached the track alongside the Southern end of Platform 1 where, at 01:07:47am, the Protection Officer leaned on the edge of the Platform to write in his diary (see Photographs 6 and 7 and also Photograph 4 which shows the visibility of the warning lights from this position).
1.35 The Protection Officer believed CSB had been successfully implemented and that the principal threat was from rail traffic coming from the opposite direction to the work group movement (albeit on the adjacent track). Thus, his attention was focussed in the opposite direction to the warning light system positioned to overcome the restricted sighting on the track approach from the South, and so he did not see them extinguish on the approach of C488. Additionally, there were no backup mechanisms to alert persons in the vicinity when the lights extinguished. Warning lights are not shown on older diagrams and network maps, as was the case with Kogarah.
Warning of the Approaching Train

1.36 The Area Controller stated that he was aware that a train (C488) had pulled into the platform at Hurstville, but only realised it had departed Hurstville and was approaching the workers after he ended the conversation with the Protection Officer at 01:07:16am.

1.37 Voice logs record the Area Controller calling the Customer Service Attendant (CSA) at Kogarah Station at 01:07:41am. When the call was answered at 01:07:50am, the Area Controller requested the CSA make an announcement over the Station’s public address system (which is not recorded) to warn the
track workers of an approaching train. The conversation between the Area Controller (AC) and CSA proceeded as follows:

- CSA: “Kogarah.”
- AC: “Yeah mate, can you make an announcement for us on 1 and tell anyone near the track that wants to work to just wait for this Up Coastie coming.”
- CSA: “Yep, no worries.”
- AC: “Thanks mate.”
- CSA: “Tah.”

1.38 This conversation took 12 seconds and was completed at 01:08:02am. The CSA stated in interview that, although the request was unusual, he thought the call was conversational and there was little urgency conveyed by the caller about the workers being on track. The CSA then recalled that, after ending the conversation with the Area Controller, he took a few moments before changing the CCTV monitoring onto the workers moving along the track next to Platform No 1. He then made an announcement to the effect of: “Those blokes on the track, please get off track, please get off track”.

1.39 The Protection Officer recalled that he heard an announcement over the public address system warning to the effect of: “Get off track, train approaching”, which was repeated. Although momentarily confused as to whom the announcement was directed, he continued to assume that the Up Illawarra Local Line was still protected. He then heard the train horn, turned and saw the train approaching. The other three surviving track workers stated that they had heard the station announcement but were also confused as to whom it was directed. They then turned towards the Protection Officer looking for some indication from him.

The Incident

1.40 The sequence of events in the incident was captured on CCTV from Platform 1. At 01:08:17am, C488 approached Platform 1 from around the curve beyond

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The CSA indicated that he was not routinely made aware of the presence of rubbish removal workers and had not seen them arrive at the station. The CSA did not hold any worksite protection qualifications and so he was not required to engage with or monitor them while they were within the confines of station premises.
the Southern end of the Station. At 01:08:20am, the Protection Officer turned and moved quickly into the relative safety of an alcove beside a set of stairs at the Southern end of Platform 1. Significantly, signal logs confirm that at the same time the Protection Officer was taking evasive action, the AC had only just completed the command to place blocks on signal SM 914 at Hurstville (01:08:18).

1.41 Upon seeing the workers on the track, the Driver sounded the train horn. In reaction to the horn and to seeing an approaching train, the four remaining track workers panicked and initially attempted to clear the track by trying to climb onto the platform. Being unable to get up onto the platform, three of them then turned around and ran across onto the adjacent (live) track. In this position, these workers had no protection and were at risk of being struck if there had been any rail traffic on the Down Illawarra Local Line.

Photo 8: Position of track workers as C488 approaches

1.42 While these three workers were observed to scramble onto the Down Illawarra Local Line, the fourth continued to try to climb onto Platform 1 (see Photograph 8). The images then show that he struggled unsuccessfully to lift himself up onto the platform before being struck by C488 at what was later
identified as kilometrage 11.662kms\(^5\). The injuries sustained by the track worker proved to be fatal.

1.43 Signal logs show that at 01:08:32am, 14 seconds after the initial signalling command by the Area Controller and two seconds after the track worker was struck, the blocks were confirmed as being applied to Signal SM 914.

**Train Data Logger Information**

1.44 C488 was fitted with an event recorder (‘data logger’).\(^6\) Analysis of the data logger from the leading car of C488 (6904) recorded the following sequence of events:

a. C488 departed from Hurstville Station at 01:05:40am (corrected time), some 20 seconds earlier than its timetabled departure time.

b. C488 reached a maximum speed of 78km/h between Hurstville and Kogarah which was under the maximum allowable track speed of 80km/h.

c. An emergency brake application was initiated by the driver at 01:08:20am, at which time C488 was travelling at 73km/h.

d. In conjunction with the emergency brake application, both the Town and Country horns were sounded for a continuous period of eight seconds.

e. C488 came to a stand at 01:08:39am.

Based on RailCorp’s analysis of the event recorder download, it took 19 seconds and 201m for the train to stop after the application of the emergency brakes. This train brake performance is within normal limits.

**Emergency Response**

1.45 Although distressed by the incident, the Driver immediately called the Area Controller to report the incident. Voice logs confirm that he initiated the call at 01:09:21am.

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\(^5\) Records differ as to the exact location where the worker was struck. 11.662km is the location recorded by the NSW Police Forensic Unit and also used by RailCorp.

\(^6\) The data captured by the recorder included speed, power (throttle), brake pipe pressure, brake cylinder pressure, wheel slip and operation of the doors, deadman, headlights, horns (Town and Country) and spring park brake.
1.46 The Protection Officer called the emergency services at 01:09:45 and then the Area Controller at 01:12:16am to report the incident. The first emergency services arrived on site at 1:15am.

1.47 Voice logs also confirm that, at 01:10:53am, the Area Controller (AC) notified the Train Controller (TC) at RailCorp’s Rail Management Centre (RMC) instead of immediately calling the emergency services. The incident is reported as follows:

- AC: “Mate, there’s been a bit of a f**k up here. I think the train has hit somebody at Kogarah.”
- TC: “Which one bud?”
- AC: “The Up coast.”
- TC: “Yep.”
- AC: “He’s asked, I’ve had someone ring me ask me for a CSB to do some station cleanup.”
- TC: “Yep.”
- AC: “And um in the middle of that I was working on some points as well at Penshurst and um I told him that the block was on, but before I could tell him, before he hung up, the coastie was already in the section between Carlton and Allawah, I didn’t have time to tell him.”

1.48 Despite being a requirement of RailCorp’s incident management protocols, the Train Controller did not confirm that the accident site was adequately protected with blocking facilities, although he did verbally direct “…nothing on the Local there bud…ah yeah from both directions there bud”. Voice logs confirm that it was not until 2:23am, some 75 minutes after the incident, that the Train Controller arranged with the attending Network Operations Superintendent (NOS) to ensure formal protection of the incident site was applied. It was not until then that the Train Controller issued two Track Occupancy Authorities in accordance with Network Rule NWT 304 to ensure the incident site was formally protected.

1.49 The four Swetha team members were briefly interviewed by the NOS before undergoing drug and alcohol testing and were then taken to Kogarah Police Station for formal interviews by Police. In accordance with Section 7.3 of
RailCorp’s *Network Rules and Procedures Certification Standard*, the Protection Officer’s Certificate of Competency (CoC) was withdrawn by the NOS pending further investigation.

1.50 The Driver and Guard were tested for the presence of alcohol by Police. The Area Controller was transported by ambulance to Royal Prince Alfred Hospital (RPA) for treatment for shock and where his drug and alcohol testing was to take place.

1.51 The Train Controller was required to notify the on-call NOS of the incident in accordance with RailCorp incident management protocols but the on-call list was not correct and so the wrong NOS was called initially. The Train Controller then called the rostered on-call NOS but was unsuccessful in making contact despite a number of attempts. He resorted to calling back the NOS he had originally contacted who assisted by attending the site as incident commander.

1.52 The NOS also attempted to seek assistance from the Signalling Complex Manager to ensure the area controllers on duty at the time were adequately supervised following the incident. Several calls were made to the Manager but they went unanswered. At the time of the incident, the Manager’s position did not have an on-call role and the incident management framework did not require his attendance. However, he indicated he expected to be called in the event of a significant incident and would attend as he had on a number of occasions in the past.

**Drug and Alcohol Testing**

1.53 The *Rail Safety (Drug and Alcohol Testing) Regulation 2008* (NSW) requires rail safety workers involved in a prescribed incident to undergo a breath test and provide a sample of blood or urine for testing within three hours of an incident. Contrary to the *Regulation*, two track workers were breath tested outside the three hour timeframe and one was permitted to return home without being tested. NSW Police undertook the testing and the three track workers who were tested and the crew of C488 all returned negative results.

1.54 Drug testing of the Driver and Guard of C488 was not undertaken until 30 April 2010 and 1 May 2010 respectively, albeit returning negative results. The
four surviving track workers also returned negative results for the presence of drugs.

1.55 Shortly after the incident, the Area Controller was relieved in place by another area controller. The Train Controller also prompted an additional area controller to maintain a watch on the Area Controller's wellbeing. Despite this, the Area Controller was left unsupervised and left the Signal Box. He later stated that he drove away from the premises to buy cigarettes at a nearby store then returned, eventually being located by some of his colleagues. He recalled being away from the premises somewhere between 10 and 21 minutes.

1.56 Under the explicit directions of the Train Controller, the Area Controller was then placed under the direct supervision of other area controllers and an ambulance was called. The Area Controller was treated on site for shock then transported to the RPA. Another NOS, also not on call, was contacted and directed to proceed to the Hospital to supervise the drug and alcohol testing arrangements. On arrival at the RPA, the NOS carried out a breath analysis of the Area Controller which returned a negative result.

1.57 Despite RailCorp having a contract with Laverty (Symion Pathology) for the provision of drug testing services, drug testing of the Area Controller was not conducted. When advised that the Area Controller was at the RPA, the Laverty contractor refused to enter the Hospital precincts to undertake the necessary collection of samples as he believed it was outside the scope of the contract. This impasse was not resolved so the Area Controller remained untested.

1.58 Although a party to the incident, the Kogarah Station CSA was not subject to any post-incident drug or alcohol testing.
PART 2 FACTORS CONTRIBUTING TO THE INCIDENT

Introduction

2.1 To establish the causal and contributing factors of the incident, OTSI examined the following:

a. voice logs for the Area Controller’s workstation at the Sydenham Signalling Complex and the Train Controller’s workstation at the RMC;

b. event recorder information from the lead car (6904) of train C488;

c. CCTV recordings from Kogarah Station;

d. network rules and procedures;

e. track diagrams, signalling and track circuit plans;

f. replays from the signalling system used by the Area Controller;

g. Bureau of Meteorology records;

h. the Area Controller’s medical records; and

i. Pre-work Briefing and Worksite Protection Plan forms for the site.

In addition, interviews were conducted with the Area Controller and three other area controllers on duty at Sydenham on the night, the Signal Box Manager, the NOS who attended the RPA, the CSA at Kogarah and the four surviving Swetha track workers.

2.2 The signalling system generates a signalling log which records the status of the signalling equipment and a time for each change in status. This was cross referenced against information from the train’s event recorder, voice logs from the Area Controller’s workstation and times shown in CCTV footage of the station clocks at Hurstville and Kogarah.

Selection of the Worksite Protection Method

2.3 The contract between RailCorp and Swetha required that “... the appropriate worksite protection for the designated worksite will be designed and implemented in strict compliance with RailCorp Network Rules and Regulations”. RailCorp’s Network Rule NWT 300 Planning Work in the Rail Corridor requires work in the danger zone to be planned and to be carried out
using one of five methods of worksite protection. The methods require varying levels of authority and competencies to implement and, despite their technical differences, all are underpinned by the following fundamental safety requirements:

a. work cannot occur unless the workers have access to a safe place within the rail corridor that can be easily reached in a timely manner;

b. the level of safety must not be reduced to allow train and track vehicle movements, or because of a lack of trained workers;

c. effective communication must be maintained with network control officers;

d. worksites must have a protection officer whose other duties must not interfere with protection duties; and

e. the protection officer must;
   • make a safety assessment before work commences,
   • ensure work is conducted safely, and
   • keep a record of the protection arrangements.

2.4 Any person required to enter the RailCorp rail corridor to establish a worksite must be trained and assessed as competent as a protection officer. Network Rule NWT 300 states: “A Protection Officer’s primary duty is to keep the worksite and workers safe.” Of the allowable worksite protection methods available to him as a PO Level 2, the Protection Officer assessed CSB as suitable for protecting the work at Kogarah.

2.5 CSB may be authorised by an area controller and involves excluding rail traffic from a worksite thereby creating a safe place, by setting and keeping controlled signals on the approach to the work area at ‘Stop’. Significantly, before setting signals to ‘Stop’, an area controller must speak to the train controller about the request to exclude rail traffic, mainly to check if the requested CSB is in conflict with the train controller’s pathing requirements. Before work on track is commenced, the protection officer must confirm with the area controller that the related signals have been placed at ‘Stop’, blocking facilities have been applied and there is no rail traffic approaching the
worksite. The area controller must not clear the related signals until he is advised by the protection officer that the work area is clear.

2.6 In acting as the lookout for the team, the Protection Officer assessed the most likely risk as a train coming from the opposite direction to C488 on the adjacent track. This may be considered reasonable in light of the fact he was confident CSB had been properly implemented. However, it meant he could not see the warning lights extinguish as he had his back to them looking in the opposite direction.

2.7 The option of a TOA was available to the Protection Officer though he stated that it would have taken longer to implement as this would have required the placement of protection. A TOA requires the use of detonators and red flags/lights as warnings to trains in addition to the similar signalling arrangements required under CSB. A TOA authorises the occupation of track within specified limits for a specified period and may only be issued by a train controller, or a signaller on the authority of a train controller. Again, the area controller must apply blocking facilities to prevent the movement of rail traffic into the worksite. The blocking facilities can only be lifted when the protection officer has advised that the work area has been cleared; that all forms of protection that may have been placed at their direction have been recovered (e.g., detonators, flags); and the portion of track included in the authority is certified as available for use.

2.8 Even if a TOA had been employed as the worksite protection method in this situation, in the worst case the outcome may have been the same but, given the fact that only a train controller may authorise a TOA, a check that the section was clear of trains might have been prompted as a result of the communication between the train controller and area controller during the authorisation process.

2.9 It was noted that the team worked under the NAR method at two stations earlier in the night. NAR affords the lowest level of protection of the methods available and the Protection Officer had assessed the risk at Kogarah as needing a higher level of protection.
Pre-work Briefing

2.10 When worksite protection plans (WPP) have been formulated, pre-work briefings (PWB) are used to formally brief employees, contractors and visitors about safety matters before they start work. The aim is to ensure they understand the OHS procedures, risks, hazards and controls specific to a particular worksite and tasks, and how the activities of different persons can impact on one another.

2.11 The protection arrangements for the rubbish removal work are recorded on a Swetha Pre-work Briefing form (HR07F-003) and Worksite Protection Plan form (HR07F-010). These forms come in a pad with each pair of forms consecutively numbered, i.e., the PWB on the first page, immediately followed by the associated WPP with an identical serial number, followed by the next pairing of PWB and WPP with the next serial number in the sequence, etc.

2.12 WPPs were completed for the work at Beverly Hills, Kingsgrove, Hurstville and Kogarah by the Protection Officer prior to his meeting up with his team members. Likewise, PWBs were then partially completed, mainly with information common to all sites. The practice was to complete the details at some later stage as was the case for Kogarah where the PWB was completed after the incident. The actual briefing of the team was undertaken in the Protection Officer’s work vehicle at a petrol station en route to Beverly Hills and only the first PWB form was sighted and signed by the team members. The Protection Officer explained that he liked to do things in advance when he could so as to save time.

2.13 The team had conducted two clean-ups at Kogarah since the contract commenced the week before, on both occasions using CSB as the method of worksite protection. The content of the forms differed on each occasion as follows:

a. the identified hazards differed;

b. the control measures differed in type, timing, or detail;

c. the access points and emergency assembly areas differed depending on where the team entered a station and/or rail corridor; and

d. the number of team members differed.
2.14 While there may be scope for some pre-preparation of forms, the need to complete documentation and conduct a PWB on site separately at each location should have been evident from the fact there were differences in detail, in addition to it being mandatory in accordance with Network Rule NWT 300.

**Implementation of the CSB**

2.15 The roles and responsibilities of protection officers and area controllers in implementing CSB are contained in RailCorp’s Network Rule NWT 308 *Controlled Signal Blocking* and Network Procedure NPR 703 *Working using Controlled Signal Blocking*. However, the following specified initial key procedural obligations were not fulfilled at Kogarah:

a. The signaller must make sure, and the protection officer must confirm, that “*the protecting signals have been set at STOP with blocking facilities applied*”.

b. The signaller must make sure, and the protection officer must confirm, that “*the line is clear between the protecting signals being used and the worksite*”.

c. The signaller must “*speak to the Train Controller about the request to exclude rail traffic*”.

d. The signaller must “*make sure that the controlled signals being used for protection are absolute signals*” and that “*there is no rail traffic approaching the worksite*”.

e. The protection officer must “*make sure that the agreed safety measures are in place*”.

2.16 The Protection Officer explained his deviation from the procedures on the following bases:

a. He assumed that the last timetabled passenger service had passed through on the Up Illawarra Local Line.

b. He felt that the Area Controller knew what he was doing as he had sought CSB for earlier work at Hurstville and at Kogarah.
c. He did not challenge the Area Controller because he sounded busy and because he did not want to take the risk that the Area Controller would become agitated at any questioning of the implementation of the CSB rule. (The Protection Officer explained that, on other similar occasions when he had had cause to question the implementation of the CSB rule, methods of protection or operational matters with the signallers, some had hung up on him, effectively preventing him from doing the work.)

2.17 The Area Controller explained his deviation from the procedures on the bases that:

a. In between phone conversations with the Protection Officer in relation to protection beside Platform 3 and then Platform 1, he had a series of phone conversations from the electrician seeking assistance with the maintenance work on 992 points at Penshurst. During the calls from the electrician, his mind was still on the conversations he had had with the Protection Officer. Similarly, when he returned to the Protection Officer, his concentration was still narrowly focussed on the points rather than across the wider area under his control. Given these conflicting distractions, advising that “the block was on and he was right to go” appears to have been a non-cognitive response. He then hung up before realising that C488 had departed Hurstville, later describing that the train had “kind of snuck up on me”.

b. He had woken up in the early afternoon and “felt crappy”. He had considered going off sick for that shift but he feared some sort of retribution as he had already been off for three months earlier in the year (two months sick leave immediately followed by one months annual leave), and had been counselled on three prior occasions (in 2002, 2004 and 2008) about poor attendance. During the recent period of sick leave, he raised his ongoing issues with anxiety and depression and other concerns with management but was unable to get a satisfactory resolution and felt compelled to come to work that night.

c. He had ongoing personal conflicts with two train controllers though he did not have dealings with either on the night of the incident. In March 2007, one conflict escalated to the point where a management directive was issued reminding both parties that their type of behaviour conflicted
with the RailCorp ‘Code of Conduct’ and suggested that “further mediation and counselling involving both parties may be required to extinguish the problems that exists between them”. Further, it recorded the Area Controller “has been given the phone numbers for counselling and support through EAP and has advised myself that he will be contacting them in the near future”.

d. The conflict with train controllers affected the Area Controller to the extent that he was apprehensive about contacting anyone in the train control section of the RMC unless he felt that it was absolutely necessary. This apprehension extended to his not wanting to seek guidance on any safety critical matters, such as talking to train controllers about the application of CSB (as required by the Network Rules), for fear of retribution from the train controller, or to raise suspicion from others that he was not able to perform his role.

2.18 As part of their planning in accordance with Network Rule NWT 300, protection officers must consider if controlled signals are available to protect worksites. There are three methods of providing CSB protection depending on site specific circumstances and risks. Two methods rely on signals: placing two consecutive controlled signals at STOP with blocks; or placing one controlled signal at STOP with blocks, combined with a set of points secured to prevent access or a lookout and safe places as mandatory additional control measures.7

2.19 The WPP for the work at Kogarah indicated that the site allowed for CSB, but did not have a set of points in close proximity and had no safe places along the platform. Therefore, as evidenced by the WPP, the Protection Officer’s intention was to use two controlled signals for protection at Hurstville, being signals SM 914 and SM 924 on the Up Illawarra Local Line. An additional signal, SM 922 on the Down Illawarra Local Line, was to be used as trains could be diverted from the Down Illawarra Local Line onto the Up Illawarra Local Line by this signal at Hurstville. However, the Protection Officer did not seek confirmation that the line was clear or if blocks had been placed on any signals and had not taken the opportunity to clarify the number of protecting

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7 The third method, involving the removal of an Emergency Switch Machine Lock (ESML) handle to exclude rail traffic, was not available at Kogarah.
signals with the Area Controller. The process and conversations between the Protection Officer and the Area Controller were similar to those used in establishing CSB for work alongside Platform 3. However, it was confirmed from the Advanced Train Running Information Control System (ATRICS) that in that instance a block was immediately placed on one protecting signal at Hurstville.

**Interpersonal Relations**

2.20 Throughout the investigation, the Protection Officer and area controllers indicated there was some ingrained animosity between protection officers and area controllers, as well as between area controllers and train controllers, which may have discouraged protection officers from speaking up about safety issues. Statements made during interviews gave the impression there existed an organisational culture that discouraged communication from protection officers to area controllers that might be interpreted as calling into question the area controller’s actions and/or authority.

2.21 Similarly, the Area Controller expressed reservations about questioning the Train Controller on safeworking or train running issues, even if they were matters that affected the efficiency of railway operations, or more importantly, even if the Area Controller was uncertain about a particular safety critical issue. He stated that he was embarrassed to ask for help from his peers, the NOS or the Train Controller for fear of drawing attention to himself as someone not confident in his own abilities to do his job.

2.22 Contributing to the relationship issues between groups of like workers may be the fact that their work locations are physically quite separate. Protection officers are on the track while area controllers are located in signalling facilities. Similarly, area controllers and train controllers conduct their work without any face-to-face contact and sometimes may not know who is at the other end of the phone, particularly if there is an area controller change mid-shift. Indeed, there is no requirement for any type of ‘introductory’ contact if personnel change during a shift.

2.23 In the absence of any assistance, guidance, or directions, the Area Controller went about his duties in a manner which sought to minimise any possible adverse attention, such as a delay to a passenger train, or initiating
emergency radio broadcasts. Both these types of occurrences are recorded and have the potential to be examined and judgements made about the performance of the Area Controller, which he was keen to avoid.

2.24 The instructions in the Network Rules and Procedures are not expressed in terms of rank, or seniority, rather they state the role and responsibilities for suitably qualified persons performing rail safety work. However, both the Protection Officer and the Area Controller expressed reservations about challenging those they perceived to be of a higher authority in a situation where they believed a rule or procedure was not being followed correctly.

2.25 Although the Protection Officer had the opportunity, he did not seek or receive any assurances that the section was clear or that the appropriate signals were at stop with blocks applied prior to commencing the work. However, this does not seem to be attributable to a perceived authority gradient as he stated that he felt he had the necessary confidence in the Area Controller’s ability to obviate the need to seek such reassurance.

2.26 Furthermore, the Protection Officer did not feel any undue pressure from his employer to complete all the work, as his understanding was that it could be completed as an overtime shift on Saturdays.

Review of CSB Incidents

2.27 The average number of worksite protection irregularities (incidents) in NSW involving CSB has remained fairly constant over the last four years (see Figure 3). In comparison with other methods, irregularities with CSB are not prevalent, contributing on average less than 5% to the total of worksite protection irregularities.

2.28 For analysis purposes the Independent Transport Safety Regulator (ITSR) classifies CSB irregularities into one or more of 11 categories (see Figure 4). The Kogarah incident has been classified as both “NCO does not identify train between blocking signals and worksite, PO does not check” and “Fail to establish block”. Despite the apparent predominance of “Fail to establish block”, ITSR advises that it is not statistically significant as “the apparent
differences between failure types are unreliable due to the small number of failures across a large number of categories”.

Figure 3: CSB Irregularities during period July 2006 to June 2010
(Data courtesy of ITSR)

Figure 4: Failures in CSB during period July 2006 to June 2010
(Data courtesy of ITSR)

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8 ITSRR, Rail Industry Safety Report 2009-10, January 2011. ITSR advises that the category “NCO does not identify train between blocking signals and worksite, PO does not check” is a risk that is not considered in RailCorp’s Safety Risk Register.
2.29 CSB is used primarily in the Hunter and the Metropolitan Rail Area (MRA) because of the greater number of controlled signals available which readily facilitates the expedient implementation of this method of worksite protection. Hence, it is to be expected that the number of incidents would be greater than in country areas where there are long distances between controlled signals.

**Rail Industry Safety Induction**

2.30 It is RailCorp’s policy that anyone who has to enter the rail corridor as part of a work requirement must complete a Rail Industry Safety Induction (RISI) and must be under the supervision of a protection officer. RISI is a training course that introduces participants to the key generic hazards of an operating rail environment. It is considered a pre-requisite to any higher safeworking certification. RISI certification expires after five years.

2.31 RISI training is provided by several Registered Training Organisations (RTO) on behalf of rail network owners/managers. As an RTO itself, RailCorp has developed its own training material and delivers training internally, but also recognises RISI completed through some of the other RTOs.

2.32 Although the track workers had all undergone RISI training, CCTV footage showed that, when confronted with an approaching train, they did not take appropriate emergency safety action. According to the RailCorp RISI Facilitator Guide, if they are not able to move to a safe place, workers should avoid an approaching train by lying down in the six foot. In this case, the first reaction of the track workers was to turn and attempt to climb onto the platform. When they did not succeed, three then placed themselves in further danger by running onto the adjacent, but still ‘live’, track. These actions were later explained by the Protection Officer and surviving track workers as a ‘panicked reaction’ and a ‘basic survival instinct’ when suddenly confronted with the approaching train.

2.33 A sample of course materials from four RTOs, including RailCorp, was examined. The trainee notes take a preventative approach and advise trainees to be vigilant, know the hand signals used to stop approaching rail traffic, and cover the assessment, location and suitability of safe places. RailCorp’s RISI Facilitator Guides included instructions and a diagram showing what emergency safety precautions to take but this information did
not appear in the course materials provided by non-RailCorp RTOs. Course participants recalled that lying down in the six foot was discussed, albeit very briefly, as being a ‘last resort’.

2.34 In addition, the RailCorp RISI course notes did not show how to assess if that option is inherently unsafe, such as where there may be ‘Narrow Track Clearance’ boards which act as an alert to restricted clearances between tracks and other infrastructure or buildings, thereby excluding any safe place in those locations. It is a matter for concern that the delivery of content on emergency safety precautions by RTOs may not be reflecting RailCorp’s expectations.

2.35 An internal ITSR investigation aimed at identifying the specific issues contributing to increased worksite protection incidents found that there were significant anomalies associated with the training of worksite protection officers. The investigation report states: “The training of worksite protection officers is a critical element for ensuring the safety of worksites. RailCorp have established detailed standards for training worksite protection officers but do not ensure that training providers are implementing these standards. ARTC have developed training material but do not ensure that the training providers deliver in accordance with the material provided. Neither organisation audit training providers to ensure that courses are delivered in accordance with their respective training material”. The same organisations also provide training in RISI. RailCorp assesses the competence of persons who undertake worksite protection training with external RTOs but issues RISI certificates based only on advice from the RTOs of successful completion of the induction.

2.36 A national training program has been developed recently under the auspices of the Australian Railway Association Inc (ARA) that covers the “core, common competency requirements for access to the rail corridor across Australia”. The intention is to replace the current induction programs, like RISI, with this nationally accepted program.


10  Australian Railway Association Inc (ARA) Communiqué, “One Track” now available to all members, 16 February 2011 - available on the ARA website at www.ara.net.au
Sydenham Signalling Complex

Supervision

2.37 RailCorp employs 54 staff at the Sydenham Signalling Complex, between 12 and 15 of whom can be on shift at any one time. The Complex operates 24 hours a day, seven days a week. The Manager of the Complex generally works weekdays from 5:00am until 1:00pm, although the hours may vary according to operational imperatives. Sydenham, like other signalling complexes, does not have designated shift supervisors. However, network operations superintendents (NOS) are required to undertake supervision of a signal box/complex as part of their duties if the need arises. A NOS may also be called to attend a signalling complex after an incident.

2.38 One area controller, usually the most experienced and qualified, is designated as a ‘Tableman’ on shift. Tablemen can be called upon to provide relief or advice to staff during their shift or during times of high workload, service disruption and safety critical events, but they are not deemed to be supervisors. On the night of the incident, two Tablemen were rostered as there was additional work associated with a commissioning on the Sutherland to Cronulla line.

2.39 Like all panels, the Hurstville Panel experiences peaks and troughs of operational activity during a shift. Activity may be high during peak travel times and when there are problems on the network, e.g., train delays, breakdowns and signal faults. Activity may be low when the frequency of trains drops outside peak travel times. However, trackwork activities and freight train movements may increase during off-peak times. The incident at Kogarah occurred during a time of low train frequencies and no delays.

2.40 Area controllers do not have rostered rest breaks. Typically rest breaks are taken during periods of low activity or when a Tableman or an area controller working an adjoining panel can take over for a short period of time. Meal breaks are generally taken while sitting at the panel, even though a dedicated, well equipped meal room is provided. Staff routinely leave the premises to collect food or beverages for themselves and others on shift.

2.41 RailCorp provide an attendance book at the Complex but signing this book is not mandatory. An examination of the attendance book found that a number...
of staff had not signed the book, including the Area Controller on the Hurstville Panel. RailCorp had to verify his attendance using eyewitness accounts and electronic building access card activity.

2.42 During interview, several area controllers, including the Area Controller on the Hurstville Panel, said they were shocked and distressed when they learnt what had happened. However, there were no formal arrangements made for the staff on shift to be medically/psychologically assessed. It was only after an explicit direction by the Train Controller that the Area Controller was placed under the supervision of one of the other area controllers after he returned from his absence from the premises.

2.43 Some area controllers indicated they were not offered any form of counselling, supervision or mentoring until the completion of their shift, or not at all. RailCorp has advised that one NOS reported that he had offered the Area Controller counselling but this was declined. Further, another attending NOS reported that, at 3:00am, he had offered counselling to everyone on shift but all declined.

2.44 Voice logs highlight continuing stress and the consequences of a lack of effective supervision in the Complex after the incident. As an example, during the time the Area Controller was missing, the Train Controller gave instructions to the relieving Area Controller for a non-stopping passenger service, 16 Run, to make an unscheduled stop at Kogarah to pick up passengers from C488. However, this information was not passed on to station staff at Kogarah or the crew of C488, which resulted in 16 Run stopping at Kogarah, being unable to locate the passengers and eventually departing Kogarah without them. Arrangements were then made for taxis to convey the passengers to their destinations.

**Advanced Train Running Information Control System**

2.45 The Advanced Train Running Information Control System (ATRICS) is used throughout the RailCorp network and has been in use at the Sydenham Complex since 2002. 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. The controller’s area of responsibility is displayed over multiple LCD monitors, of which the
Hurstville Panel has three. The workstation for the area controller working the Hurstville Panel is depicted in *Photograph 9*.

![Photo 9: Area Controller's workstation, Hurstville Panel](image)

2.46 Area controllers have two main means available for manipulating signals and points for some other commands (such as placing blocks) on the network.\(^{11}\) These are:

a. **by clicking directly on the symbols representing the signalling equipment** controller’s select from a number of commands located in a series of cascading menus (see *Photographs 10 and 11*). They are driven by the computer’s operating system rather than the ATRICS software, so the area occupied by the menu boxes may sometimes temporarily obscure an area a controller is concentrating on or otherwise distract the controller, until the boxes disappear once a selection is made or cancelled. Comparing *Photographs 10 and 11* with *Photograph 13* shows that these menu boxes can obscure signal SM 914 at Hurstville although the track circuits and trains on the Up Illawarra Local Line are still visible. (Anecdotal evidence indicates that this is the method preferred by area controllers).

\(^{11}\) Most routine ATRICS signal operations do not generate menus or dialog boxes whereas these do.
b. by selecting from a drop down menu controllers make a selection from the menu bar at the top of the screen, similar to the menus on Microsoft® packages.
2.47 The ATRICS displays a variety of colour changes to indicate the status of tracks, signals and the presence of trains. *Photograph 12* shows some of the colours used to indicate varying track conditions.

![Photo 12: Screen shot of ATRICS system showing status of track conditions](image)

2.48 The ATRICS system has a replay capability which was used to review the operation of the system and trains on the night of the incident. *Photograph 13* shows the position of C488 when a block was finally placed by the Area Controller on protecting signal SM914.

![Photo 13: ATRICS replay – location of C488 when block placed on signal SM914](image)

2.49 Examination of the ATRICS replay revealed that, when the Area Controller utilised a command in ATRICS to block signal SM914, the track beyond that signal, in the usual direction of travel, changed from white to blue, indicating a block on the section. The colour changes demonstrate there is recognition of physical changes to the track conditions at the software level.
2.50 If the System had also had the ability to recognise there was a train occupying track circuits beyond that signal and alerted the operator accordingly, earlier intervention may have been possible. (The system already provides an alert via a menu selection before a block is about to be removed.) Such an enhancement need not take control away from an area controller. Rather, it could assist in identifying unintentional errors through the use of, for example in this case, a warning dialogue box prompt to the effect of “You have blocked a signal before an occupied circuit, do you wish to continue?”

2.51 The ATRICS does have the capability to display the number of the next train approaching an area controller’s area, but only if the train number has already been entered into the system by an area controller managing an adjacent area. However, it does not show the exact mileage/location of trains in relation to signals or worksites. This situation is exacerbated if the work location, train or block is displayed over separate screens.

2.52 Another feature highlighted in the replay is that the detection of trains is limited to the static display of the train number above a red block showing the train occupying a track circuit. The size of the red blocks showing the train occupying track circuits can vary in size along the same track according to the length of each circuit and dependent on whether the train spans more than one track circuit at a time. Photograph 11 shows that the train occupying the bottom track (C488) is a much less prominent red line in comparison to the red lines on other tracks. In the absence of more enhanced visual display, or audible alert, some trains are not as easily identifiable as others.

Facilities Available to Place Signals to Stop in an Emergency

2.53 Some signals allow the signaller, in an emergency or degraded situation, to override the proceed indication on a signal and place it to STOP. Three such emergency signalling arrangements were in operation at the Sydenham Complex.

2.54 **Signal Emergency Control Button (SECB).** Activating a SECB removes power to the interlocking and returns all signals operated by that interlocking to STOP, regardless of whether they are automatic (permissive) signals or controlled (absolute) signals. The signaller also loses situational awareness as the signaller’s indicator diagram is no longer updated during the shutdown
of the interlocking. This facility was decommissioned on the Hurstville workstation, but was active on the adjacent Wolli Creek workstation which did cover the automatic signals within the Hurstville panel signalling territory. The availability of this facility (albeit to another area controller) was not known by the Area Controller on the Hurstville panel and so was not requested. RailCorp is gradually phasing out this facility in favour of the others below.

2.55 Group Replacement. Use of group replacement facilities is currently the preferred method for emergency replacement of controlled signals within a computer-based interlocking area. This is because the indicator diagram continues to update so the signaller does not lose situational awareness. Group Replacement is activated using an icon on the ATRICS screen labelled “Emergency Signal Replacement” and can only be used by the signallers/area controllers working in the signal box controlling the area in which the signals are located. Group sets are normally arranged in ‘All’ signals, ‘Up’ signals and ‘Down’ signals. This facility was active on both the Hurstville and Wolli Creek ATRICS screens.

2.56 Emergency Replacement Button. The Emergency Replacement Button function can be found on some automatic signals in areas of special risks such as underground lines. These are controlled signals and are physically arranged as such with an extinguishable “A” light fitted on the signal post. When the “A” light is illuminated, the signal is in automatic operation and when extinguished, the signal is a controlled signal. The ‘button’ is also an icon on the screen and can only be used by the signallers/area controllers working in the signal box controlling the area in which the signals are located. While none existed on the Up Illawarra Local Line between Hurstville and Kogarah, the function is used on the Airport Line, some of which is within the territory controlled from the Sydenham Complex.

2.57 RailCorp states in its Network Local Appendices (NLAs) that, in areas where automatic signals in areas of special risks exist, SECBs can be used to set signals at STOP to protect worksites. This point was broadly raised by some area controllers during interview who indicated that the arrangement could be used to enhance some methods of worksite protection, including CSB. However, although described as SECBs in the NLAs, RailCorp later confirmed that this description: “more accurately describes the Emergency Replacement
button function on automatic signals in areas of special risks such as underground systems…”, in reference to the City Underground (City Circle), Eastern Suburbs Railway (ESR), Epping to Chatswood Rail Link (ECRL) and Airport Line.

2.58 Attendance records for the Area Controller confirmed that he was on his first shift at the Hurstville Panel in over three months when the incident occurred. He recalled that there were two manually operated SECBs located on the desk beside the display screens. However, it was only after commencing the shift that he became aware that these were now booked out of use. He stated that he had not received any information about this in any briefing, alert or shift handover.

2.59 The Area Controller recalled thinking at the time of the incident that his first option would be to look at his own ATRICS panel for ways of stopping the train by “throwing the signals back to stop” but, as the manual (SECB) button had been booked out, “that part of the infrastructure had been compromised”. When shown images taken of the Hurstville Panel display, he was unable to correctly identify the newly commissioned Emergency Signal Replacement icons on the ATRICS screen, but assumed they may have been
commissioned at the same time as the manually operated SECB buttons were booked out of use. The relative positions of one of the SECB manual buttons and the Emergency Signal Replacement screen icons are depicted in Photograph 14.

**MetroNet Train Radio**

2.60 MetroNet Train Radio (MTR) is one of three modes of communication currently used in the NSW rail network. The system was specially designed to meet the communications needs of the MRA with its high volume of radio traffic. It provides discrete voice communications between drivers and signallers/area controllers or train controllers, with provision for drivers to speak to ‘Mechanical Control’ and ‘Operations Control’.

2.61 The MTR is a single integrated system using 194 terrestrial base stations in the 408 and 418 MHz bands for all communications. One frequency from each band is used in each call to permit two-way conversation (duplex operation) much like an ordinary telephone. A signaller or controller places calls to a train by keyboard entry with information from the “train list” on the console. This list shows all trains in the signalling or control area as a single line entry. The MTR system in RailCorp trains is accessed via a handset on a fixed radio unit. Communications are sent/received via a fixed base station or track transponder system (including a GPS capability) depending on the location of the user. All calls and data messages are logged and recorded.

2.62 A key feature of the MTR is the ability to broadcast an emergency ‘Stop STOP Stop’ message to an individual train registered on the MTR system, or a ‘Stop ALL Stop’ message to all trains (registered, or non-registered) in a specified area. When activated, an emergency ‘Stop ALL Stop’ broadcast call is sent as an audible warning ‘beep’ along with a text message to all trains within that defined area.

2.63 A working MTR was available to the Area Controller and, during interview, he acknowledged that this would have been an efficient way to have alerted the Driver of C488 to stop the train. However, he recalled that he was apprehensive about using the equipment and quickly discounted using it. He did not trust the system, had never sent an emergency ‘Stop ALL Stop’ broadcast in training or during operations, and did not consider himself
competent to use it in this situation. He also considered time was “very precious” and tried to think of another way to get the message across. It was then that he decided that the best way was to call Kogarah Station and ask the CSA to make the announcement over the Station’s public address system. This process took up valuable seconds, only succeeded in confusing the track workers and ultimately proved unsuccessful. Had it been successful, the outcome of the incident is likely to have been different.

2.64 When asked to explain further why he was apprehensive about using the MTR, the Area Controller stated that he could not readily recall how to send an emergency ‘Stop ALL Stop’ message but, after prompting, was able to vaguely recall that it was a menu based operation. This was despite attending signaller refresher training on 29 July 2009 with MTR as a topic, workstation training between 1 and 5 December 2009 (covering worksite protection, communications and fatality scenarios) and attending Voice Communication System (VCS) training days on 10 October 2009 and 31 March 2010.12

2.65 He explained that he “was scared to use it” because, even though there were few other trains on his diagram at that time, “in the back of your mind, you try every other way before you press that button because it throws everything back to stop for like a time, you have to wait for it to reset”. He added that, from his limited experience, it sometimes cut out between sections and he thought the changeover between the radio system’s signaller transponder boundaries was near Allawah and Wolli Creek. It was the Area Controller’s understanding that the MTR would switch from Allawah (Hurstville Panel) to Wolli Creek (Wolli Creek Panel) so he “didn’t want to risk trying to call the driver”. He said he did not want to create the situation where he had to wait for the system to be patched through, then for it eventually to show that it had changed over to the Wolli Creek Panel anyway13. Instead of waiting for that possibility, he ‘didn’t trust it’, discounted it, and tried to stop the train another way.

2.66 Familiarity with the ‘Stop ALL Stop” procedure was checked during interviews with five area controllers and three accompanying union representatives.

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12 VCS is designed to permit interoperability between the CountryNet and MTR systems in the metropolitan area.

13 The actual MTR transponder boundaries for the Hurstville panel are Como (20km) and Kogarah (11km) and on the Wolli Creek panel (referred to in the MTR documents as ‘Sydenham South’) are Kogarah (11km) and Sydenham (6km).
None had ever undertaken a ‘Stop ALL Stop’ drill and there was anecdotal evidence from several other area controllers to the effect that very few area controllers had ever used it in a live situation. Records of ‘Stop ALL Stop’ messages sent by area controllers in the MRA show that one was initiated from the Sydenham Signal Box in both 2006 and 2007, three were initiated in both 2008 and 2009 and one was initiated in 2010 up to the time of the incident.

2.67 In response to the question as to what training exercises, rehearsals or live testing of an ‘Stop ALL Stop’ broadcast had been undertaken at the Sydenham Complex, RailCorp advised that: “Training provided to Signallers and Area Controllers on the MetroNet Train Radio System is the same regardless of their workplace. RailCorp’s training affords the trainee ample opportunity to simulate emergency situations including the use of the ‘All Stop’ emergency function”. While it is acknowledged that an ‘opportunity’ may have been available, this is not the same as a mandatory training requirement where the competency of an area controller to perform the ‘Stop ALL Stop’ function is sufficiently assessed.

2.68 The MTR system has some peculiarities:

a. When a ‘Stop ALL Stop’ message is transmitted by the signaller, rather than providing an immediate warning, the text message ‘Restricted Speed’ is displayed on the second line of the driver’s screen.

b. RailCorp provided information that: “Unless a system confirmation is received over the air within 15 seconds the “Restricted Speed Cleared” message is shown on the driver’s screen along with an audible beep, this is a mechanism to prevent unnecessary delays due to by (sic) possible data corruption on a single train. A message is sent to the system by the train mobile to indicate an incomplete “All Stop”. If a system confirmation is generated, the driver receives an audible beep and the screen display shows a flashing “Stop All Stop” message”.

c. When asked how a signaller can ensure that a train has received a message, RailCorp responded: “The system does not produce transaction records for the successful receipt of “All Stop’ by trains, however, a record is made when an “All Stop” has been received without a confirmation indicating data corruption on a mobile”.

Track Worker Fatality, Kogarah, 13 April 2010
2.69 Part of the Area Controller’s hesitation in using the system appears to be confirmed by the design parameters which seek to “prevent unnecessary delays” by adding in additional alerts, confirmation and prompts for the initiating signaller. These add to the timeframe it takes for a genuine ‘Stop ALL Stop’ message to be effective. However, the Area Controller did not consider the delay that could have been incurred if the CSA at Kogarah had not been available to answer his phone call.

2.70 An OTSI investigation into an opposing movement at North Strathfield in 2006 noted that the MTR was not utilised for emergency broadcast.\footnote{OTSI Rail Safety Investigation, Signal Passed at Danger by CityRail Service 67-R Resulting in an Opposing Movement, North Strathfield, 2 September 2006, available at www.otsi.nsw.gov.au} In that incident, direct contact with the train by radio was unsuccessful because the driver of the train had entered the wrong run number when he logged into the radio network. Given the ineffective use of the MTR in that instance and the reluctance to use it in the case of the Kogarah incident, even to make a direct call to C488, there would seem to be justification for the refresher training for those operating the MTR to be strengthened to include more regular ‘drills’ during training, or rehearsal during ‘live’ operations in periods which can be scheduled to coincide with minimal disruption to train services.

2.71 Information on RailCorp’s website indicates that the Digital Train Radio System (DTRS) will replace the analogue MTR system with a state-of-the-art digital product.\footnote{This information can be found at http://www.railcorp.info/about_railcorp/major_projects/dtrs} In December 2009, RailCorp entered into a $225 million contract with United Group Limited for the design, supply, installation, testing and commissioning of the DTRS throughout their electrified network. The fixed network component of the project is due to be completed in 2012, with the final rolling stock upgrades completed thereafter.

**Network Communications**

2.72 Network Rule NGE 204 *Network Communication* prescribes the rules for spoken communication in the RailCorp network. In particular, it is mandatory that the receiver of a message in relation to certain specified subjects, including “a work on track method” and “train running information”, repeats the message back to the sender. In the mobile phone communications recorded in the Sydenham Complex between the Area Controller and Protection...
Officer, no repeat back of safety critical information on these two subjects was offered or requested.

2.73 NGE 204 also contains the “WARNING” that:

“Qualified Workers must not assume that a receiver has understood a message before the receiver confirms that the message has been understood.”

In the crucial part of the communication the Area Controller stated: “…Righto mate, blocks are on”. The Protection Officer did not repeat back the message or confirm his understanding of the actions that had been undertaken. Despite receiving a cursory acknowledgement of his advice that a block was on, the Area Controller did not confirm his advice had been fully comprehended. Further, there was no discussion as to whether the section was clear or if one or two signal protection was appropriate for the safe implementation of CSB on this occasion. Instead, the Protection Officer assumed the Area Controller knew what signals to protect and had placed a block on them.

2.74 RailCorp’s Network Procedure NPR 721 Spoken and Written Communication prescribes a range of standard terms and protocols to be used in operational communications. As evidenced by the voice tapes, particularly in relation to work at Hurstville and Platforms 1 and 3 at Kogarah immediately preceding this incident, the communications between the Area Controller and Protection Officer were conversational and informal, lacking the rigour required by NPR 721. This had been the case consistently since the commencement of the rubbish removal work earlier in the evening and applied regardless of how safety critical the subject matter was.

**Monitoring and Auditing of Network Communications**

2.75 Deficiencies in communication protocols and procedures were highlighted during the Glenbrook and Waterfall rail accident inquiries.\(^{16}\) Since then, legislative changes initiated by ITSR have increased rail operator responsibilities in relation to their safety management systems (SMS)

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including placing greater emphasis on implementing controls, such as audits, and procedures for monitoring, reviewing and revising the adequacy of those controls.

2.76 To ensure compliance with Network Rules, ITSR targets communication protocols in its audit and inspection programs. A number of inspections have been conducted since 2005. These inspections have involved either reviewing audio tapes to ensure compliance with communications protocols or reviewing an operator's internal processes for monitoring compliance with communications protocols including procedures for actioning non-conformances. Some of the earlier inspections found that compliance with communications protocols was poor.

2.77 RailCorp has reinforced the importance of effective communication in maintaining safety within its network in two SafeTracks information bulletins. The bulletin issued in November 2009 reiterated the mandatory requirement for the receiver to confirm the content of a message by repeating the message back to the sender if the communication involves situations such as a work on track authority. Complementing that was the bulletin issued in February 2010 stating its purpose was “to inform RailCorp employees, contractors and operators of policies and protocols for the recording and monitoring of safety-critical communications within the RailCorp network”. In particular, this bulletin alerted that RailCorp intended to conduct: “weekly audits of recorded conversations to check for compliance with the Network Rules, Procedures and Standards for communications”.

2.78 RailCorp provided the results of its audits covering the period 30 April 2009 to 12 May 2010. These records showed that 10 audits had been undertaken in the 14 weeks between the issue of the February 2010 SafeTracks bulletin and 12 May 2010. The calls monitored were those made during the day, in non-peak periods and on weekdays, specifically Wednesdays between 10:00am and 3:00pm. Communications between area controllers and protection officers were not specifically targeted. A total of 175 calls were reported as having been monitored in the South/Illawarra region which includes the Sydenham Complex. A total of 13 ‘non-compliant’ calls were detected and

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reported to the Regional Manager. At interview, the Sydenham Complex Manager stated that he was made aware of those non-compliant calls relevant to his Complex, but considered them to be minor and so had spoken informally to the area controller/s concerned. No formal record of this action was documented.

2.79 There are close similarities in the identified miscommunications between the Area Controller and the Protection Officer in the Kogarah incident and those identified in relation to the Glenbrook accident. Similar lapses in communication protocols and procedures have been identified in OTSI investigations into two recent serious rail incidents. In response to the incident under investigation and with a background of several others, ITSR issued a Safety Notice reinforcing the importance of communication between parties when Controlled Signal Blocking is implemented.18

Area Controller’s Fitness for Duty

Experience and Competency

2.80 When asked about the Area Controller, the Signal Complex Manager stated that he had been his direct manager for 16 months but had known him through work for several years. He considered the Area Controller to be a conscientious employee and one who brought safety issues to the attention of management. There had been no cause for the need for counselling or disciplinary action during the time he had been the Area Controller’s manager.

2.81 The Area Controller did not share his Manager’s confidence and stated that he had expressed concern about his health when he spoke with the Manager during the three months he was on leave.

2.82 The Area Controller’s Certificate of Competency had no conditions attached.19

Performance Records

2.83 The Area Controller’s employment history recorded a number of incidents which called into question both his judgement and competence as a controller, and resulted in formal action and counselling.

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18 ITSR, Rail Industry Safety Notice No. 30, Controlled Signal Blocking, issued 6 May 2010
19 The certificate shows an issue date of 19/08/2009 although RailCorp records show an issue date of 19/04/2010 which is six days after the incident and while he was still off duty as a result of the incident.
2.84 His sick leave records indicated that he had received counselling that what was assessed to be unsatisfactory attendance needed to improve and that his absences would be monitored. In 2009, his records show that he had 11 absences. However, in 2010, he had taken seven weeks sick leave at the beginning of the year mostly in relation to a condition for which he attended a treatment program at Canterbury Hospital. He then cleared four weeks annual leave before returning to work on 21 March 2010 whereupon he undertook refresher training before taking responsibility for the Hurstville Panel.

Health Assessment

2.85 As a Category 2 rail safety worker, the Area Controller was required to undergo a periodical health assessment every five years (up to the age of 50) as a condition of employment. Records indicated that the Area Controller last underwent a routine health assessment in October 2005. This assessment identified that he presented with poor coping skills and regular bouts of chest pains, as well as symptoms of mild anxiety and depression which focused on an inability to recall events. As a result, he was subjected to further testing and treatment, but eventually no cause could be confirmed.

2.86 Separately, he was referred to RailCorp’s Employee Assistance Program (EAP) for counselling, but later stated that he did not get time off work to attend. Due to client confidentiality, the Area Controller signed a release authorising the sharing of information between the health assessment provider and specialist medical practitioners, but did not sign the form which authorised the release of this information to his employer. As such, key clinical documentation held by the health provider was marked “Not to be sent to employer”. Further, the Medical Examination request of 20 April 2006 noted 10 days sick leave taken in the last 12 months and attached previous relevant health assessment reports. This provided a limited insight into the employee’s absenteeism as it did not cover all absences since the previous medical (five years earlier), during which time he had been the subject of two formal counselling sessions on excessive absences (in 2002 and 2004).

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20 Safety Critical Worker (Category 2) - One whose action or inaction due to ill-health may lead to a serious incident affecting the public or rail network. Attentiveness and vigilance is critical to their job. A Safety Critical Worker is classified as Category 2 if a sudden incapacity would not impact on the safety of the network, but all Safety Critical Workers undergo a comprehensive physical and psychological assessment to detect conditions that may affect safe working ability, e.g., heart disease, sleep disorders, alcohol and drug dependence, psychiatric disorders.
2.87 On 12 May 2006, the Area Controller was declared “Fit for Duty, unconditional” in the health report provided to RailCorp by the examining health professional.

2.88 While being interviewed, the Area Controller disclosed that the state of his mental health had been concerning him over several years and had given rise to the 11 weeks absence at the beginning of 2010. He also disclosed that he had concerns with his fitness for duty and that he had raised these concerns with the Sydenham Complex Manager during the time he was on sick leave.

2.89 In an exchange of emails between the Signal Complex Manager and a Case Manager in RailCorp’s human resource area (dated between 13 and 15 January 2010, i.e., during the three months leave), the Signal Complex Manager relayed to the Case Manager that the Area Controller had sought assistance, external to RailCorp’s EAP, for counselling at Canterbury Hospital. The email also stated that the Area Controller wanted to return to work, but at that time was “just to (sic) fragile”, and “his concern for his job is adding to his already significant stress”. The Manager indicated that the Area Controller also doubted his ability to safely perform the signalling role.

2.90 In response, the Case Manager advised that: “I would not do anything at this stage, just wait and see how he goes. If he is away after some time, eg. 3 – 4 months we will send his (sic) for assessment with the RailCorp doctor. Make sure he provides medical certificates for his absences. This is the same as any other illness, eg. Operation when the employee needs time to recover. We do not really need to do anything as it is not a liability the employee is responsible to take care of their health…..If he would still be at work we would consider medically assessing him for his fitness”.

2.91 Between 1 January and 22 February 2010 the Area Controller was on sick leave being treated mainly for psychological conditions and drug rehabilitation. The medical certificates described his condition in non-specific terms such as “unwell” and “medical condition” and there were no restrictions attached to his return to work. He stated that he had reluctantly returned to work and only did so because he was running out of sick leave and the reduced income was affecting his finances. He further stated that he considered calling in sick for the shift on 12 April 2010, but was fearful that he would be counselled again
for this extended absence for medical reasons and the potential ramifications as a result.

2.92 Given the disclosures by the Area Controller, his performance history and recurrent absences on sick leave, a new assessment should have been required to determine his ability to perform his job safely, prior to returning to full duties. Section 9.3 (Volume 1) of the National Standard for Health Assessment of Rail Safety Workers identifies circumstances such as his as ‘triggers’ that “may lead to triggered referral for health or neuropsychology assessment, retraining in competencies or referral to an Employee Assistance Program”.21

**Fatigue**

2.93 RailCorp uses the Fatigue Audit InterDyne (FAID) software as a component of its fatigue monitoring program. While FAID scores should not be used as the sole basis for risk management, they can assist in identifying the propensity for fatigue to become a factor in human work performance and so inform risk management processes. Recent research on FAID in the USA, based on train driver work hours, found risk of an accident due to human error or violation increased above a FAID threshold score of 60.22

2.94 The Area Controller was on his third consecutive night shift and the FAID score for his roster was 87. He commented that he had felt “crappy” on the night of the incident and was suffering from headaches; a situation he had experienced before. His usual routine of sleeping for six hours immediately on returning home after night work and waking early afternoon could have resulted in some sleep deprivation, but he described his sleep environment as comfortable, quiet and dark.

2.95 At the time of the incident he was working during the circadian low of night when alertness is naturally reduced, and had worked for three hours and eight minutes without a scheduled break. However, he had consumed a few cups of coffee which he indicated was normal for him.

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The Area Controller had worked 108 hours in the two weeks leading up to the incident on a very irregular shift pattern with large variation in start time as well as extended hours. He worked 14 out of 15 consecutive days which consisted of seven consecutive shifts, followed by a break of 40 hours then six consecutive shifts leading up to the incident. The 40 hours break did not allow an opportunity for two full night recovery sleeps due to an early shift start time of 6:00am. The first sequence of seven shifts included two consecutive ‘double back’ short returns of less than 12 hours between shifts followed by an extended 12 hour night shift (1am to 1pm). The shifts were mostly 6:00am starts or nights, with some single afternoon shifts. Rostering of this kind with extended hours, a combination of early starts and night shifts without a full two day recovery break is not good practice.

It is likely that the combined effects of a lengthy period of irregular shifts, reduced sleep, working during the circadian low and pre-existing health issues adversely affected the Area Controller’s work performance. Overlooking tasks, taking shortcuts, delayed responses and inability to think quickly, accurately assess and respond to a non-routine situation are symptomatic of a fatigued condition.

Voice logs and CCTV footage were examined as part of investigating the possibility of the Protection Officer being affected by fatigue but no evidence of fatigue-related issues was found. Recorded conversations showed that he was alert and responsive during his conversations with the Area Controller prior to the incident. His rostering and the monitoring undertaken by Swetha met regulatory requirements as was the case for the other members of his team.
PART 3 OTHER ISSUES

Changes to the CSB Rule and Procedure

3.1 The day after the incident, RailCorp cancelled Network Rule NWT 308 and Network Procedure NPR 703 and replaced them with amended (temporary) instructions. On 2 May 2010, RailCorp replaced these temporary instructions with permanent instructions. ITSR permitted the changes under Rail Safety (General) Regulation 2008, Clause 38 – Emergency amendments to network rules. The changes were relatively minor, basically changing “speak to the Train Controller” to read “tell the Train Controller” (see Figure 5).

<table>
<thead>
<tr>
<th>Rule</th>
<th>Wording prior to 14 April 2010</th>
<th>Wording in force from 14 April 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>NWT 308</td>
<td>Before setting controlled signals at STOP, the signaller must speak to the Train Controller about the request to exclude rail traffic.</td>
<td>Prior to authorising the CSB, the signaller must tell the Train Controller about the request to exclude rail traffic.</td>
</tr>
<tr>
<td>NPR 703</td>
<td>Speak to the Train Controller about the request to exclude rail traffic.</td>
<td>Prior to authorising the controlled signal block tell the Train Controller of the request.</td>
</tr>
</tbody>
</table>

Figure 5: Comparison of changes to the CSB Rule and Procedure

3.2 Though permitting the changes, ITSR expressed concern to RailCorp as to why the changes were so important as to invoke the emergency change provisions, particularly as “those affected by the change may not even be aware of it and may not understand its significance even if they are aware of it”. ITSR then required RailCorp to provide reasoning behind the change and any risk assessment conducted which reinforced the need to change or to strengthen the risk controls.

3.3 In the interim, to facilitate the spread of awareness amongst its workforce, RailCorp also advertised the changes internally via a safety alert on their publicly accessible RailSafe website. Similarly, ITSR sent out Rail Industry Safety Notice (RISN) No 30, outlining the background to the incident, the new rule requirements and what action should be taken by accredited operators and rail infrastructure managers to understand and apply these requirements.

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23 NWT 308 was replaced by Safe Notice Telegram 1022 – 2010 and NPR 703 was replaced by Safe Notice Telegram 1023 – 2010.

24 Safe Notice Telegram 1022 – 2010 was replaced by Permanent Safe Notice 025 – 2010 and Safe Notice Telegram 1023 – 2010 was replaced by Permanent Safe Notice 026 – 2010.
3.4 Significantly, ITSR’s RISN stated in part:

a. The Rules and Procedures make it clear that while the Signaller has the initial responsibility for these actions, the Protection Officer has a separate responsibility to “confirm” with the Signaller that the actions have in fact been taken.

b. This responsibility requires specific and explicit action by the Protection Officer. The Protection Officer must ask for and receive explicit confirmation of the required actions having been taken……

c. In particular, Signallers should be informed that they must take initial responsibility (emphasis added) for placing the required signal(s) at stop with blocking facilities applied and for checking that there is no rail traffic between the signal(s) and the worksite, but the process under the Rules and Procedures is not complete until the Protection Officer has obtained specific confirmation of both these aspects (emphasis added). Similarly, Protection Officers must understand that they must obtain specific confirmation of both these aspects, and must not allow work to take place until confirmation has been received.

3.5 A NOS and several area controllers were interviewed in relation to aspects of the incident after the changes had been promulgated. Their understanding of the application of the original rule was found to vary and only one area controller was aware of the subsequent rule changes made by RailCorp. Some even expressed concern that the rule was prone to human error, over-reliant on the area controller and did not have the additional safety measures encompassed in other (higher) forms of worksite protection methods.

3.6 On 20 September 2010, RailCorp responded to ITSR’s concerns by publishing a SafeTracks issue\(^\text{25}\) and advising the ITSR that:

A SafeTracks advisory was issued in early September to provide clarification in relation to issues that had been raised relating to the implementation of CSB.

\(^{25}\) RailCorp, SafeTracks, NWT 308 and NPR 703: Information required for controlled signal blocking, Issue 10, September 2010.
The SafeTracks was produced in consultation with our operating personnel and was designed to provide specific guidance in relation to the information exchange between the parties relating to the application of this method.

Network Rules Division has given a commitment to review the performance of NWT 308 following the issue of the SafeTracks with a view to determine whether there is a need to revise NPR 703 to formalize these requirements.

The response did not explain the reasoning behind the changes or proffer a risk assessment as had been requested by ITSR.

3.7 SafeTracks No 10 emphasises the safety critical information required to be exchanged between protection officer, signaller and train controller whereas RISN No 30 highlights the initial responsibilities of the signaller. SafeTracks No 10 appears to provide additional emphasis on the train controller’s role in the authorisation process, especially confirming whether the section is clear, the protecting signals are at ‘STOP’ and blocking facilities have been applied, which are the responsibility of the signaller.

3.8 Swetha are of the view that, at the time of the incident, both the Rule and Procedure “did not clearly define the requirement for the PO to identify the ‘specific’ controlled signals”. They state that the Rule and Procedure did not “make clear the need to communicate the system of control e.g. signal and lookout, or 2 (or more) signal(s)" and that: “Regardless of this ambiguity, one signal is designed to stop a train, the use of 2 signals or more is an additional safety precaution”. Further, they consider the subsequent actions on the part of RailCorp and ITSR have not removed the perceived ambiguity.

3.9 Swetha report that following a request from them to RailCorp:

“RailCorp have since made the use of CSB on the two tracks a requirement, empowering the POs to ask for same. The expectation is that, unless there is a train in the block, the PO’s request will not normally be refused. Swetha has also instructed the teams performing work on this contract that NAR (‘No Authority Required’) shall not be used as a form of protection.”
Use of Personal Electronic Equipment

3.10 Voice logs revealed that area controllers realised a need to pack up and put away their personal laptop computers when they became aware of the incident. The Area Controller stated that he had his laptop on his desk but was not using it at the time.

3.11 RailCorp had identified reasons for concern about the risks associated with distraction due to staff using personal electronic equipment such as laptops, DVD players, iPods and MP3 players while on duty. In an attempt to control these risks, RailCorp has issued a number of instructions limiting the use of this equipment, including:

a. A local Memorandum\textsuperscript{26} issued on 11 June 2009 by the Manager of the Sydenham Complex stating that RailCorp policy prohibited the use of personal computers in the control room and their use was to stop immediately. NOSs were advised to collect any equipment they found being used.

b. A General Order\textsuperscript{27} issued on 15 February 2010 to the Rail Management Centre (RMC) staff stating that, apart from mobile phones (which could be “utilised for private communications of a reasonable duration so as not to cause distraction from safety-critical working”), privately owned audio/visual electronic devices were not permitted within the RMC.

c. Three days after the incident, the Manager (Metropolitan) Network Control replicated the RMC instruction in a General Order\textsuperscript{28} issued to regional operational managers stating that privately owned audio/visual electronic devices were not permitted within any control area in any signal box “so as to ensure that any safety critical/essential administrative responsibilities are not deviated from by the use of unauthorised devices”.

3.12 Several area controllers admitted they had used, or were aware of personal electronic equipment being used, particularly in the absence of the Manager.

\textsuperscript{26} Sydenham Signal Box Memorandum, The use of personal computers in the workplace, dated 11th June 2009.

\textsuperscript{27} Rail Management Centre General Order 24/10, Use Of Privately-Owned Audio-Visual Electronic Devices Not Permitted Within Sydney Rail Management Centre, 15/02/10.

\textsuperscript{28} Metropolitan Network Control General Order 11/10, Use of Privately Owned Audio Visual Electronic Devices: Not Permitted Within Control Areas in any Signal Box, dated 16 April 2010.
from the Complex. Each acknowledged that they were aware of RailCorp’s policy regarding the use of personal electronic equipment but had not considered the inherent risks in doing so.

3.13 RailCorp’s policy permits the use of mobile phones in the workplace “for private communications of a reasonable duration”. By comparison, use of mobile phones in the NSW Traffic Management Centre (TMC) is not permitted except in exceptional circumstances. In the air traffic control centre environment, mobile phones are prohibited outright and the policy is rigidly enforced.

Record Keeping

3.14 WPP and PWB forms are defined as train safety records in accordance with Section 75 of the Rail Safety Act 2008 and are required to be kept for a period of 90 days. On the night of the incident, some of the WPP/PWB books held by the PO went missing when he went to the Police station and left his vehicle unattended. WPP and PWB forms compiled by the Protection Officer during the four weeks prior to the incident were provided for examination. However, it was subsequently advised that those for the period 15 to 30 March 2010 had been reproduced from memory after the originals had also been reported lost, or stolen, from the Protection Officer’s possession.

3.15 Although they had conducted a review of the document layout and content and had a review system in place for previous contracts, Swetha indicated that no auditing or monitoring of the documentation completed by their protection officers under this contract had commenced.

Track Occupancy Authorities

3.16 Examination of the two TOAs, numbers 15 and 40, issued by the Train Controller to protect the incident site revealed a number of anomalies in their compilation which were not detected during the read-back between the Train Controller and the area controller/s. Though not considered to be safety critical, they included:

a. the Train Controller not confirming the commencement time until after he had hung up, when he then remembered and rang the two area controllers back shortly after;
b. the Train Controller not specifying an agreed period (time TOAs limited to), then stating that those details could be filled in when the TOAs were fulfilled;

c. the Train Controller not ensuring that the section was unoccupied when reading back TOA 15 to the area controller;

d. differences in some information which should be common to both TOAs such as the identification of the tracks and location of the issuing signaller/s and authorising train controller; and

e. TOA 40 not specifying if the defined clearance points were signals or points.
PART 4 FINDINGS

Immediate Cause

4.1 The track worker was struck and fatally injured because the Area Controller did not identify that passenger service C488 had departed Hurstville and was heading towards Kogarah. When he authorised Controlled Signal Blocking (CSB) for the protection of the rubbish removal worksite alongside Platform 1 at Kogarah Station, C488 had already passed protecting signal SM 914 and the driver had not been informed of the presence of workers on the track at Kogarah.

Contributory Factors

4.2 Instead of using the MetroNet Train Radio system available to immediately alert trains that workers were on or about the track, the Area Controller telephoned the Customer Service Attendant at Kogarah Station and asked for an announcement to be made over the Station public address system to alert the track workers to the danger of the oncoming train. This process took up valuable seconds and resulted in insufficient time for the track workers to comprehend the situation and then react to the warning. [Recommendation 5.1]

4.3 Given the methods available to the work group, CSB was chosen as the appropriate method of worksite protection. However, a number of safety critical requirements of Network Rules and Procedures were omitted in the process of implementing the CSB. In particular, checks and cross-checks were not completed to ensure the section was clear of rail traffic and the required blocking facilities had been applied. The Area Controller had not applied blocking facilities when he told the Protection Officer blocks were on. The Protection Officer did not seek confirmation that CSB had been fully implemented as he assumed there would be no more rail traffic and that the Area Controller knew what to do as he had implemented CSB for him twice a little earlier that evening without incident. [Recommendations 5.2 & 5.11]

4.4 Initially, the four workers cleaning the track attempted to climb onto Platform 1 as there were no safe places for them along the Platform. Three of the workers abandoned that course of action and moved to the adjacent (live)
track. Evidence indicated that during induction and worksite protection training there was insufficient coverage of the emergency safety precautions to be taken by workers if they are caught on the track with a train approaching and no safe place readily accessible. [Recommendations 5.3 & 5.8]

4.5 Although the Area Controller was experienced and held the necessary current competencies, he had only recently returned from a lengthy period of mainly sick leave associated with health issues that had been ongoing intermittently for some years. Even though he had returned to work unrestricted, he had concerns about his fitness for duty which had been shared with his Manager while on leave. He considered calling in sick on the night of the incident but was concerned about the ramifications of taking more sick leave. There were sufficient ‘triggers’ in the Area Controller’s circumstances to indicate a new health assessment should have been required to determine his ability to perform his job safely, prior to returning to full duties. [Recommendation 5.4]

4.6 It is likely that the combined effects of a lengthy period of irregular shifts, reduced sleep, working during the circadian low and pre-existing health issues adversely affected the Area Controller’s work performance.

**Anticipation and Management of Risk**

4.7 Although the Protection Officer’s intentions and plan for the worksite protection were sound, his planning, briefing and documenting procedures lacked rigour in that they were not fully completed and were conducted off site en route to their initial work location at Beverly Hills. [Recommendation 5.11]

4.8 Staff working in the Sydenham Signal Complex were not provided with permanent full-time supervision, with management generally only in location from 5:00am to 1:00pm on weekdays, depending on operational imperatives, although network operations superintendents could be called in on an as required basis. There were conflicting reports as to whether immediate support or supervision was available to the Area Controller or other staff after the incident. [Recommendation 5.5]

4.9 Accounting for attendance was voluntary for staff and the taking of breaks during shifts occurred on an ad hoc basis. Despite clear and repeated promulgation of policy, it is apparent that personal electronic equipment was being used for non-work related purposes by staff while on duty. [Recommendation 5.5]
4.10 Although the MetroNet Train Radio provided the ability to broadcast an emergency ‘STOP’ message, as well as a direct call to the train, the Area Controller was not confident in using it or in its capabilities. Nonetheless, RailCorp considers the training of Area Controllers in MetroNet functionality is adequate and frequent enough. However, a number of area controllers asserted they had never undertaken a ‘Stop ALL Stop’ drill. Training drills in such a seldom-required emergency procedure should be conducted regularly so as to maintain the highest level of competency. [Recommendation 5.1]

4.11 The recorded voice communications were informal and conversational and not in accordance with Network Rules and Procedures, particularly in relation to the handling of safety critical information. This was despite RailCorp publishing information bulletins emphasising the importance to safety of effective communications and the ITSR targeting communication protocols in its audit and inspection programs. [Recommendations 5.6 & 5.12]

4.12 RailCorp had been conducting regular compliance audits of recorded communications but these were not random, there being a tendency for them to be done on the same day in a particular time frame during a non-peak period and did not specifically target communications between area controllers and protection officers. Few non-compliances were identified and, as they were classified as minor, they were actioned informally with no record of the action being kept. [Recommendation 5.6]

4.13 Immediately after the incident, RailCorp made a subtle change to the CSB Rule and Procedure using an emergency change provision in the Rail Safety (General) Regulation 2008. It was found that there was not a universal knowledge of the change within RailCorp and that understanding of the original rule varied among those charged with applying it.

4.14 A warning light system, which relies on a lookout maintaining active observation, was in place at Kogarah due to restricted sighting on the track approach from the South. It was not utilised as the Protection Officer considered CSB had been successfully implemented and that any possible threat was assessed as coming from the opposite direction (albeit on the adjacent track). Additionally, there were no backup mechanisms to alert persons in the vicinity that the lights had in fact extinguished. However, while the purpose of warning lights is included in the Network Rules and
Procedures, they do not reinforce the requirements for workers to act when warning lights extinguish. Warning lights are not shown on older diagrams and network maps.

4.15 The procedures used to place signals back to stop in emergencies were not current or clearly understood by users. Further, recent system hardware and software modifications were not clearly delineated to or understood by users. For example, the Area Controller was unaware that the Signal Emergency Control Button on the adjacent panel had the ability to set automatic signals on his panel to stop between Hurstville and Kogarah. [Recommendation 5.9]

4.16 The Driver acted diligently in spotting the workers on track, making an emergency application of the brakes and warning of the train’s approach. However, despite his efforts, he could not avoid striking the track worker.

**Incident Response**

4.17 Although RailCorp’s drug and alcohol contracted testing arrangements and processes comply with regulatory requirements, the Area Controller was not drug tested after the incident. Additionally, the Driver and Guard of C488 were drug tested more than two weeks later, one track worker was not breath tested and the Customer Service Attendant from Kogarah was not tested at all. [Recommendation 5.10]

4.18 There was no effective structure in the command and control arrangements for some time after the incident. The network operations superintendent on-call list was incorrect and calls to the Sydenham Complex Manager (who was not on call) went unanswered. These difficulties combined with the lack of a hierarchical structure on site, contributed to delays in action including protecting the incident site and attending to the Area Controller. [Recommendation 5.5]

4.19 There were minor discrepancies in the authorisation of the two train occupancy authorities issued to protect the incident site which were not detected during read back. Although not considered prejudicial to safety, this is symptomatic of an environment where procedural requirements were not being implemented rigorously.
Other Safety Matters

4.20 The signalling technology displayed over multiple screens in the ATRICS system did not provide information regarding kilometrages. Further, its drop down command menu boxes often obscured items in the display and the size of track circuits occupied by trains varied and was not easily identifiable. This made it difficult to readily determine the exact position of trains, signals and worksites which could be overcome with enhanced visual displays and alerts. [Recommendation 5.7]

4.21 On his return from leave, the Area Controller was not aware of any recent changes made to the operation of signal emergency control buttons or group replacement facilities. He was also unaware that the function of putting signals back to STOP in an emergency had been changed to activating icons on the ATRICS display screen. [Recommendation 5.9]

4.22 The Protection Officer had no effective system for storing train safety records and Swetha had not yet commenced monitoring or auditing documentation completed by their protection officers under this contract. [Recommendations 5.11 & 5.13]
PART 5 RECOMMENDATIONS

To prevent a reoccurrence of this type of railway accident, it is recommended that the following remedial safety actions be undertaken by the specified responsible entities.

RailCorp
5.1 Develop and implement regular training for area controllers using simulations and drills to demonstrate competence in the use of the emergency facilities in the MetroNet Radio system.
5.2 Initiate a program of random audits on the implementation of worksite protection across the network to confirm conformance with the relevant policies, rules and procedures.
5.3 Implement a periodic audit program to verify that the content of rail industry safety inductions and worksite protection training delivered by external training providers fully meets its requirements especially in relation to emergency safety precautions to be taken if a worker is caught on track without a readily accessible safe place.
5.4 Develop and implement policies, procedures and education on triggered health assessments, consistent with the guidance provided in the National Standard for Health Assessment of Rail Safety Workers that will assist supervisors and line managers in identifying the indicators which will alert them to staff in need of a health review.
5.5 Review the staffing of the Sydenham Signalling Complex so that it provides for management and/or supervisory support of staff on location 24 hours a day, seven days a week.
5.6 Develop and implement policy guidelines and procedures for dealing with non-compliance with its network communication protocols and for maintaining the record of actions taken to deal with non-compliance.
5.7 Investigate improvements to the Advanced Train Running Information Control System which would:
   • provide additional detection and alerts for situations where rail traffic is within or entering an established worksite or one being established; and
   • limit the extent to which drop down menu boxes obscure network displays.
5.8 Review risk mitigation strategies by undertaking risk assessments at stations or network locations without a readily accessible safe place for persons caught on track bordered on both sides by platforms.

5.9 Develop and revise all relevant ATRICS procedures so they contain all hardware and software modification used to place signals back to stop in emergencies, and verify that all relevant staff are assessed as competent in the use of the equipment and procedures.

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

Swetha International

5.11 Demonstrate an ongoing, random program of monitoring the implementation of worksite protection arrangements by its track workers that confirms conformance with the relevant policies, rules and procedures especially in the early stages of new contract work.

5.12 Develop and implement an ongoing, random program for monitoring adherence to network communications protocols by track workers. In conjunction with this, provide strengthened policy guidelines for dealing with non-compliance and procedures for maintaining the record of actions taken.

5.13 Improve the storage of train safety records, particularly at the commencement of new contracts, to comply with current legislative requirements.
### Appendix 1: Sequence of Events

<table>
<thead>
<tr>
<th>TIME</th>
<th>EVENT</th>
<th>RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:51pm</td>
<td>C488 scheduled to depart Kiama</td>
<td>Actual not verified</td>
</tr>
<tr>
<td>0:48:43</td>
<td>Electrician's 1st contact with AC - working at 992 points</td>
<td>Voice Log</td>
</tr>
<tr>
<td>0:59:38</td>
<td>Work commences alongside Platform 3 at Kogarah</td>
<td>Voice Log &amp; CCTV</td>
</tr>
<tr>
<td>1:05:32</td>
<td>Start of the last of four calls from Electrician</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:05:40</td>
<td>C488 departs Hurstville</td>
<td>Station clock</td>
</tr>
<tr>
<td>1:06:24</td>
<td>End of call with Electrician</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:06:59</td>
<td>PO contacts AC - work complete Platform 3, requests CSB alongside Platform 1</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:07:16</td>
<td>PO call to AC ends. CSB approved. AC states: &quot;blocks are on&quot;</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:07:16+</td>
<td>AC realises C488 has departed Hurstville</td>
<td>AC Statement</td>
</tr>
<tr>
<td>1:07:41</td>
<td>AC calls Kogarah CSA to give warning</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:07:42</td>
<td>Workers reach Platform 1 to commence work</td>
<td>CCTV</td>
</tr>
<tr>
<td>1:07:47</td>
<td>PO makes diary entry at Southern (Country) end of Platform 1</td>
<td>CCTV</td>
</tr>
<tr>
<td>1:07:50</td>
<td>CSA answers AC’s phone call</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:08:02</td>
<td>AC’s call to CSA ends</td>
<td>Voice Log</td>
</tr>
<tr>
<td>1:08:02+</td>
<td>CSA adjusts CCTV and broadcasts warning</td>
<td>Statements</td>
</tr>
<tr>
<td>1:08:17</td>
<td>C488 rounds curve on approach to Kogarah</td>
<td>CCTV</td>
</tr>
<tr>
<td>1:08:18</td>
<td>AC applies block to signal SM 914 at Hurstville</td>
<td>Signal Log</td>
</tr>
<tr>
<td>1:08:20</td>
<td>PO sees train and takes cover in alcove</td>
<td>CCTV</td>
</tr>
<tr>
<td>1:08:20</td>
<td>C488 emergency brake application</td>
<td>Data Logger</td>
</tr>
<tr>
<td>1:08:30</td>
<td>Worker struck by C488</td>
<td>CCTV</td>
</tr>
<tr>
<td>1:08:32</td>
<td>Confirmation that signal SM 914 at STOP and block on</td>
<td>Signal Log</td>
</tr>
<tr>
<td>1:08:39</td>
<td>C488 comes to a stand</td>
<td>CCTV</td>
</tr>
</tbody>
</table>

**Note:** + indicates stated as immediately or a few moments thereafter the time quoted.
Appendix 2: Sources, Submissions and Acknowledgements

Sources of Information

- Bureau of Meteorology
- Independent Transport Safety Regulator
- NSW Police
- RailCorp
- Swetha International Pty Ltd

References

- Glossary for the National Codes of Practice and Dictionary of Railway Terminology
- Passenger Transport Act 1990 (NSW)
- RailCorp Contract Number CW 6477 Station Corridor Cleaning
- RailCorp Engineering Standards – Signalling
- RailCorp Network Rules and Procedures
- Rail Safety Act 2008 (NSW)
- Rail Safety (Drug and Alcohol Testing) Regulation 2008 (NSW)
- Rail Safety (General) Regulation 2008 (NSW)

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:

- RailCorp
- The Area Controller
- The Protection Officer
- The family of the deceased track worker
- Swetha International
- Independent Transport Safety Regulator
- NSW Police
Submissions were received from:

- RailCorp
- The Area Controller
- The family of the deceased track worker
- Swetha International
- Independent Transport Safety Regulator

The Chief Investigator considered all representations made by 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.

**Acknowledgements**

*Figures 1 and 2* were provided by RailCorp.

The data in *Figures 3 and 4* are reproduced with the permission of the ITSR.