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ISBN 978-1-74251-129-0

Publication Date: January 2011

ATSB-Jan11/ATSB02

Released in accordance with section 25 of the Transport Safety Investigation Act 2003

ATSB TRANSPORT SAFETY OCCURENCE REPORT
Rail Occurrence Investigation RO-2010-006
Final

Safeworking irregularity involving passenger train SN57 and train D231 at Moss Vale, New South Wales

17 June 2010

Figure 1: Main South 'A' Board - Phoenix Control System

Abstract

At about 1121[1] on 17 June 2010, a safeworking irregularity involving CityRail passenger service SN57 and train D231, a Pacific National light engine[2], occurred at Moss Vale in New South Wales. On the day of the occurrence, planned maintenance on the Argyle Street bridge, (southern end of Moss Vale) was being conducted in accordance with ARTC's SAFE Notice 2-1334/2010 (See Appendix A). By way of the SAFE Notice, the Australian Rail Track Corporation (ARTC) had promulgated that Down[3] CityRail services would be routed from the Down Main via 140[4] points set reverse[5] (an unsignalled movement) then terminate alongside the Moss

1 The 24-hour clock is used in this report. Australian Eastern Standard Time (EST), UTC + 10 hours. Unless shown otherwise, all times are EST.

2 A 'light engine' is common rail terminology for a locomotive travelling by itself; i.e. not hauling wagons or carriages. A light engine is still regarded as a train.

3 Trains travel towards Sydney in the Up direction and away from Sydney in the Down direction.

4 SAFE Notice 2-1334/2010 incorrectly refers to 140 points as 137 points.

5 Normal Position. Lie of points defined by design, usually set for the main line.
Reverse Position. Opposite to normal position.

Vale Up Platform before forming the return Up service to Campbelltown.

The investigation determined that the network controller, in error, gave the driver of CityRail passenger train SN57 verbal authority to pass signals MV15 and MV39 in the Stop position, over 140 points set reverse, to access the Up Platform at Moss Vale. A little earlier, the controller had authorised train D231 to travel into the Moss Vale Up Refuge Siding, also over 140 points, thereby placing the two trains into direct conflict.

Fortunately the network controller recognised the error and stopped train D231 about 200 m before 140 points, the potential point of conflict. There were no injuries or damage to rolling stock or infrastructure as a result of the incident.

The investigation established that an error by the network controller was the main factor contributing to the incident. However, the ATSB considers that the use of a checklist or similar systemic defence measure by network controllers for this type of working may enhance the integrity of ARTC's current safeworking arrangements.

FACTUAL INFORMATION

Location

Moss Vale is located on the Main South line between Sydney and Melbourne, 145.7 track km southwest of Sydney. Berrima Junction is about 5 km to the north of Moss Vale; both sites are on the Defined Interstate Rail Network (DIRN).

Figure 2: Moss Vale, New South Wales

Map – Geoscience Australia. Crown Copyright©

Berrima Junction and Moss Vale are two independent geographic locations linked by an Up Main and Down Main standard gauge unidirectional line, but for the purpose of the ARTC Rules the site is regarded as one integrated 'Yard', about 7 km long. The track and associated infrastructure through this area is managed and maintained by the ARTC. Operational control is from the ARTC Network Control Centre – South located at Junee, New South Wales. The passage of trains from Berrima Junction through to Moss Vale is managed by one network controller operating off the Main South 'A' Board of the Phoenix Control System.

Train information

The trains involved in the incident were train SN57, a two car Endeavour Class CityRail passenger service (2807 leading/2857 trailing) and train D231, a light engine numbered 8155.

There were no reported mechanical issues with either train that were considered contributory nor were the actions of the train's drivers.

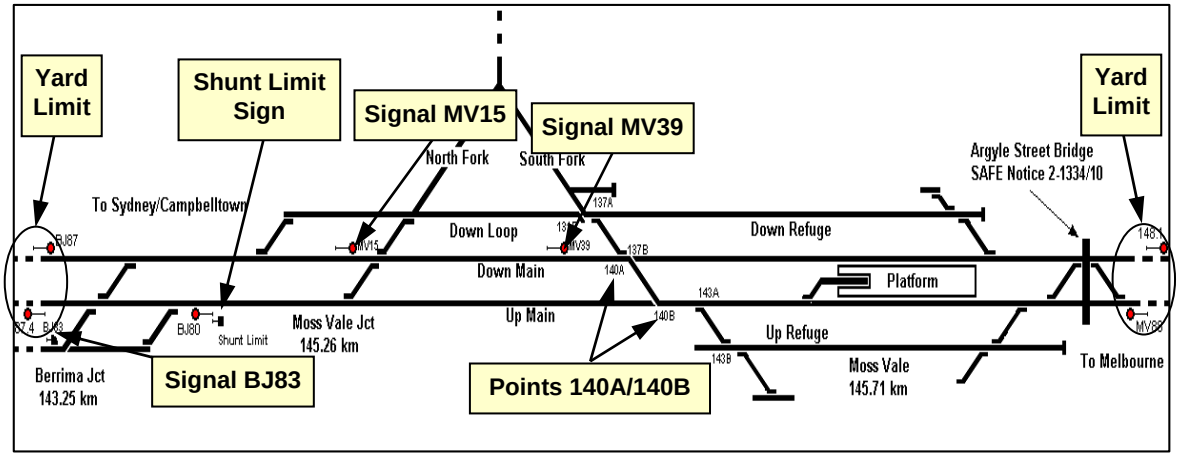
Occurrence

At about 1115 on 17 June 2010 the driver of train D231, while at Berrima Junction, requested authority from the ARTC network controller (Main South 'A' Board - Junee) to travel to Moss Vale and into the Up Refuge Siding for refuelling. Initially the network controller declined the request indicating that a CityRail passenger service (SN57) was soon to arrive at Moss Vale and would be given priority to enter the Up Platform road via 140 points set reverse. This was the unsignalled movement referred to in ARTC SAFE Notice 2-1334/2010.

About 4 minutes later the driver of train D231 again contacted the controller. This time the controller authorised the driver to proceed to Moss Vale via the Up Main. He then cleared signal BJ83 and train D231 duly departed Berrima Junction along the Up Main for Moss Vale. At this time passenger train SN57 was travelling at a speed of about 80 km/h on the adjacent Down Main line, slightly behind train D231.

On approaching signal MV15, the driver of train SN57 brought his train to a stand and contacted the network controller. He was given verbal authority, by the controller, to pass signals MV15 and MV39 both of which were displaying a Stop indication. The passenger train then slowly accelerated on its way to Moss Vale.

Figure 3: Schematic - Berrima Junction to Moss Vale



Almost immediately, the network controller realised that he had simultaneously authorised passenger train SN57 into the Up Platform Road and train D231 into the Up Refuge Siding. This meant that both trains were to traverse a common set of points (140) which would bring the two trains into direct conflict.

The controller straight away called the driver of train D231 on the radio and requested that he stop where he was. The driver acknowledged this transmission and stopped train D231 adjacent to signal MV39 on the Up Main, about 200 m short of 140 points.

The passenger train continued on its journey to Moss Vale without incident. Following this movement, the network controller authorised the driver of train D231 to proceed into the Up Refuge Siding. Just before departure from Moss Vale, the driver of passenger train SN57 spoke to the network controller indicating his concern regarding the incident and the need for it to be reported/investigated.

ANALYSIS

At about 1400 on 17 June 2010 the Australian Transport Safety Bureau (ATSB) received notification of a reported safeworking irregularity, involving involving CityRail service SN57 and train D231 near Moss Vale in New South Wales. Following an initial review of the incident, the ATSB decided to undertake a formal investigation, particularly to identify any systemic issues that should be addressed.

As part of the process the ATSB sourced all perishable evidence including; Phoenix control data files, voice logs and train data logs. This information was supplemented with data comprising; train graphs, train running information, timetables, site plans, safety policies and work procedures.

Based on available evidence, it was concluded that:

- There was no indication of any mechanical deficiencies with either train that required further investigation.
- There were no reported deficiencies in the track or signalling systems that required further investigation.
- The actions of the train drivers in the handling of their respective trains did not directly contribute to the incident.
- An error by the network controller was identified as the most likely factor giving rise to the safeworking irregularity.

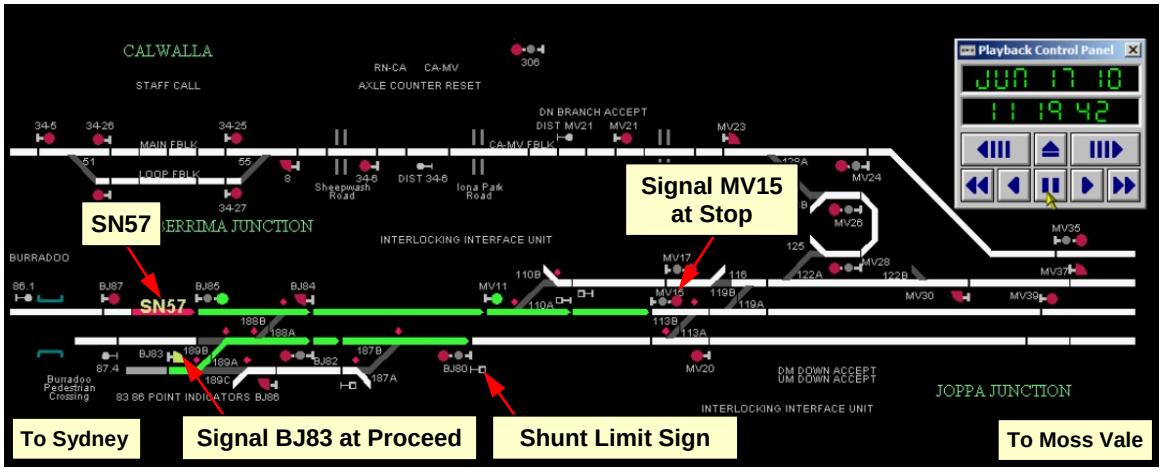
The balance of the report therefore focuses on establishing the nature of the error made by the network controller, followed by an examination of the systems and processes that allowed the error to occur.

Sequence of events analysis

The following reconstruction of events for the 17 June 2010 is based on a review of voice logs, CCTV footage, the Phoenix replay files and a statement from the network controller involved in the incident. The Phoenix control (Centralised Traffic Control) system is automatically synchronised to EST using a national time server and is used as the time base throughout this report.

On the day of the incident train D231 was initially working at Berrima Junction. At about 1110 train D231 arrived at signal BJ83; the intent being to obtain permission to travel to the Moss Vale Up

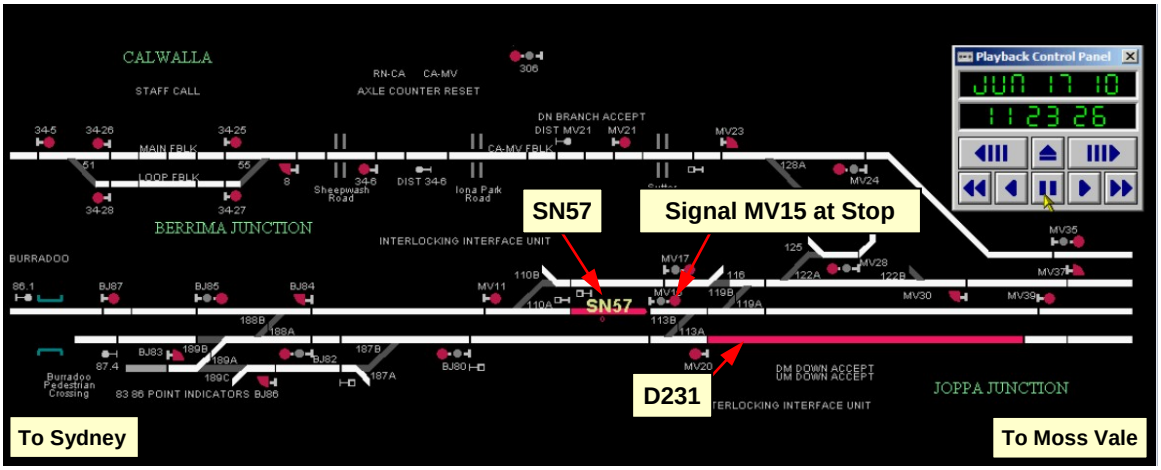
Figure 4: Berrima Junction, Phoenix replay 1119:42



Refuge Siding for refuelling. At 1115:19 the driver spoke to the network controller (Main South 'A' Board - Junee) and requested authority to travel to the Moss Vale Up Refuge Siding to refuel.

had cleared for his train. The driver then powered up and departed Berrima Junction along the Up Main for Moss Vale.

Figure 5: Berrima Junction, Phoenix replay 1123:26



After a brief discussion, the network controller declined the driver's request (1115:52) indicating that a CityRail passenger service (SN57) would soon arrive at Moss Vale and would be given priority to enter the Up Platform Road[6].

About 4 minutes later the driver of train D231 again contacted the network controller. On this occasion (1119:37) the controller cleared signal BJ83 for his train. Five seconds later (1119:42 Figure 4) the driver of train D231 communicated with the controller and advised that signal BJ83

Four seconds later (1119:46) the controller further briefed the driver of train D231 regarding the pathing of his train.

During this conversation he indicated that he would send him in the Down direction (towards Moss Vale) via the Up Main and that when the passenger train (SN57) had arrived alongside the Up Platform Road at Moss Vale he would give him the road into the Up Refuge Siding for the requested refuelling.

The limit of authority for shunt signal BJ83 only extends to the 'Shunt Limit Sign' adjacent to signal BJ80.

6 The network controller had set points 140 to the reverse position at 1102 in anticipation of the CityRail passenger service SN57.

However, the instructions given by the network controller gave the driver of train D231 the authority to proceed beyond the 'Shunt Limit Sign' and through to Moss Vale.

At the same time passenger train SN57, travelling at a speed of about 80 km/h, was on the adjacent Down Main line and trailing train D231 (Figure 4). Passenger service SN57 continued towards signal MV15. It then commenced slowing down and came to a stand in front of signal MV15, at about 1123 (Figure 5).

The driver of passenger train SN57 spoke to the controller and shortly thereafter (1123:26) received verbal authority to pass signal MV15 and MV39 displaying a Stop indication and to proceed down to 140 points where the road would be set for his movement into the Up Platform Road.

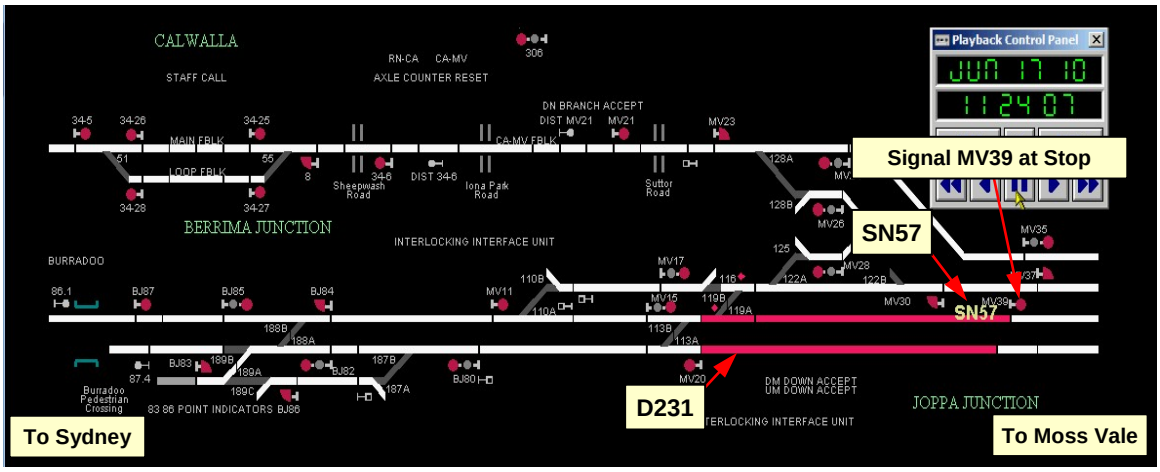
Following this the network controller authorised the driver of train D231 to continue on its journey into the Up Refuge Siding.

Network controller actions

The network controller involved in the incident was appropriately qualified and fit-for-duty. Immediately following the incident, he was tested for alcohol impairment. Results returned zero readings. Hours of work were examined and fatigue was considered unlikely to be a factor.

An examination of events leading up to the incident showed that the network controller initially failed to recognise that he had authorised train SN57 into the Up Moss Vale Platform and train D231 into the Moss Vale Up Refuge Siding requiring that both trains traverse a common set of points (140), thereby bringing them into potential conflict.

Figure 6: Berrima Junction, Phoenix replay 1124:07



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Train D231 had now just caught up to passenger service SN57 as it began to accelerate slowly and proceed past signal MV15 on its way to Moss Vale. Having now authorised both train D231 and passenger train SN57 through the Moss Vale Yard over 140 points the two trains would come into direct conflict if the conflicting movement was unchecked or undetected.

Fortunately, the network controller recognised that he had made a mistake and immediately called the driver of train D231 (1124:07 Figure 6 and Figure 7) to request that the driver bring the train to a stop.

The driver of train D231 stopped near signal MV39 on the Up Main about 200 m short of 140 points. The passenger train continued on its journey to Moss Vale without incident.

However, on recognising the error he immediately called the driver of train D231 over the radio system and requested that he stop before a collision could occur.

Train D231 was subsequently stopped adjacent signal MV39, about 200 m in advance of 140 points.

Of note, is that the two trains were travelling at low speed, less than 25 km/h, as required by the ARTC Rules and that the two drivers were probably aware of the other train movement as they should have been quite visible to one another. They were probably also aware of communications from network control to the driver that were occuring on the local train radio network. It is therefore unlikely that a collision would have occured, even

if the network controller had not detected the error.

Figure 7: Moss Vale, CCTV Image 1124:07

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Responsibility of Network Controllers

In accordance with the ARTC's New South Wales Network Rules, in particular ANGE 236:

> The primary responsibility of Train Controllers is to manage *train* paths for the safe and efficient transit of *rail traffic* through the ARTC Network.

To meet this requirement network controllers apply appropriate rules and procedures with which they are required to be familiar/proficient. However, the application of the rules and procedures can be subject to human error and the incorrect application can result in unintended errors that affect the safe operation of train movements.

Rules and procedures applicable on this occasion included:

- ANGE 204 Network Communication
- ANPR 721 Spoken and Written Communication
- ANPR 746 Authorising rail traffic to pass an absolute signal at stop
- ANSG 608 Passing Signals at Stop
- ANTR 418 Yard Limits

Communications

Rule ANGE 204 relates to communication protocol. A review of conversations (voice logs) between the network controller and the driver of train D231 shows that the intent of this rule was not strictly observed. Had the network controller's instructions been:

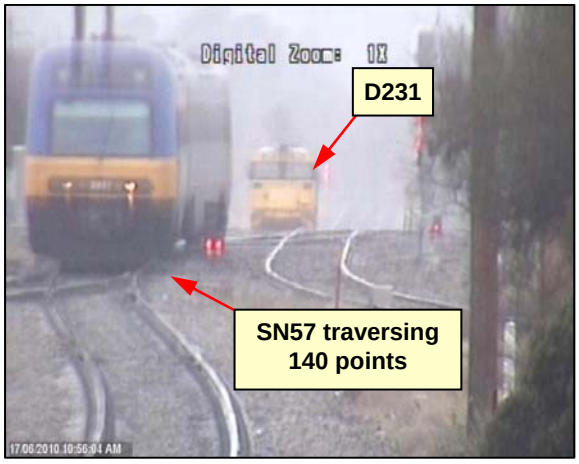
- clear, brief and unambiguous,
- relevant to the task at hand, and
- agreed as to its meaning before being acted upon,

the driver of train D231 would probably have had a better understanding of the geographical relationship between his train and passenger train SN57. Had this occured the driver of train D231 could have forewarned the network controller regarding the proximity of train SN57 and that his planned movement would probably conflict with it.

The investigation noted that the Honourable Peter McInerney, in his report into the Glenbrook Rail Accident dated April 2001, also identified similar concerns with the communication protocol used by train operating staff. In his report Justice McInerney stated:

> The failure to use a formal protocol to relay and receive information increased the risk that important information would not be communicated and that the person providing the information would not correct the recipient if the latter omitted or misstated relevant information.

Figure 8: Moss Vale, CCTV 1126:04



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Further, in the same report, Justice McInerny stated:

> The conversations of the SRA employees demonstrated a lack of clarity, a lack of precision and a failure to comply with the communication protocols in which these men should have been trained and should have been required to use.

Procedure ANPR 721 relates to the use of spoken and written communications. Further examination of the conversation between the network controller and the driver of train D231 established

that the general tone of conversation was inexpert for what was safety critical dialogue.

By using poor radio protocol, the network controller and driver of train D231 were unintentionally lowering their appreciation of a safety critical operational task and increased the risk of making unintended errors.

Yard Limits

Rule ANTR 418 and procedure ANRF 012[7] relate to the Rules/Procedures for the safe movement of rail traffic within yards, including 'Consolidated Yards'[8]. Berrima Junction to Moss Vale is regarded as one integrated yard (Refer to ARTC SAFE Notice 2007 Number: 2-564) set by the yard limits, from signal BJ87 (140.900 km - Down Main) and signal 87.4 (141.000 km Up Main) at the Down end of Berrima Junction through to signal 148.1 (147.995 km - Down Main) and signal MV88 (147.995 km Up Main) at the Up end of Moss Vale. During the investigation it was noted that at least two 'Shunt Limit Signs' existed within the defined limit of this yard area, one of which is located adjacent to signal BJ80 (143.799 km - Up Main) at Berrima Junction.

Rule ANTR 418 specifically prescribes:

> **Yard Working**
> **Running lines**
> Rail traffic movements on running lines within yard limits must be authorised by
> - Signallers at attended locations and for remotely controlled locations, or
> - Train Controllers for unattended locations.
>
> Network Control Officers must make sure that they do not authorise conflicting movements.
>
> If available, fixed signals must be used to authorise movements.
>
> Signals at STOP must be passed only in accordance with Rule ANSG 608 Passing signals at STOP.
>
> Unsignalled movements within yard limits must not exceed 25km/h.

The rule prescribes that network controllers shall not authorise conflicting movements. On this occasion when the network controller authorised passenger train SN57 to pass signal MV15 and MV39 displaying a Stop indication he initially failed to appreciate that he had already authorised train D231 passage into the Moss Vale Up Refuge Siding over 140 points. The pathing of the two trains could have resulted in a collision if it had gone unchecked. It is noted that ANRF 012 is a form (check list) used by network controllers for authorising train movements through a Consolidated Yard. Had a similar form or check list been available to the network controller it is likely that he would have recognised his error before authorising the conflicting movement.

Passing signals at stop

Rule ANSG 608 and procedure ANPR 746 relate to 'Passing Signals at Stop' and 'Authorising rail traffic to pass an absolute signal at stop' respectively. In particular ANSG 608 requires that:

> Before authorising a Driver or track vehicle operator to pass an absolute signal at STOP
> ...
> The Signaller must tell the Driver or track vehicle operator:
> - whatever is known or not known about the condition of the block ahead.

At the time of authorising passenger train SN57 to pass signals MV15 and MV39 at Stop, the network controller did not alert the driver of passenger train SN57 that train D231 had been authorised to travel on the Up Main to Moss Vale. Had this occured the driver of the passenger train could have forewarned the network controller regarding the proximity of train D231 and that his movement would come into direct conflict with it.

Safety action taken

Following the incident, the ARTC undertook a formal investigation and has since counselled and re-certified the the network controller in the application of rules that were required on this occasion for the safe movement of passenger train SN57 and train D231:

- ANGE 204 Network Communications
- ANPR 721 Spoken and Written Communication
- ANPR 746 Authorising rail traffic to pass an absolute signal at stop
- ANSG 608 Passing Signals at Stop
- ANTR 418 Yard Limits

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7 ARTC - Checklist for an Unsignalled Movement within Yard Limits.

8 An area where interlockings controlled by one signalling location have intervening automatic signals. The area is defined exclusively by a YARD LIMIT sign and an END OF YARD LIMIT sign. (ARTC Operations, Network Rules, Glossary – Applicable 2008-11-23)

The ARTC has also advised that they are reviewing the current yard limits at Moss Vale to ensure they comply with ARTC Network Rule ANTR 418. The ARTC has also advised they are reviewing opportunities to extend the use of signalled moves between Berrima Junction to Moss Vale with the intent of reducing the need for verbal authorities.

FINDINGS

Context

At about 1121 on 17 June 2010, a safeworking irregularity involving CityRail passenger service SN57 and train D231 occurred at Moss Vale in New South Wales. Passenger train SN57 had been authorised to access the Up Platform at Moss Vale, passing signals MV15 and MV39 in the Stop position over 140 points set reverse. Train D231 had also been authorised to travel into the Moss Vale Up Refuge Siding over the same set of points, thereby placing the two trains into direct conflict.

From the evidence available, the following findings are made with respect to the safeworking irregularity between trains SN57 and D231 at Moss Vale on 17 June 2010 and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The network controller did not fully implement the requirements of Rules ANTR 418 and ANSG 608 as they applied to the movements of trains SN57 and D231 at Moss Vale.

Other safety factors

- Radio communication protocol between the network controller and the driver of D231 was inexpert for what was safety critical dialogue.
- The ARTC does not have a check list available for network controllers to assist in identifying risks associated with the verbal authorisation of train movements for an integrated yard. *[Minor safety issue]*

Other key findings

- When the network controller realised that he had authorised a conflicting movement he radioed the driver of train D231 and instructed him to stop.
- A key mitigator against either a collision or the consequences of a collision was that both trains were travelling at less then 25 km/h as required by rule ANTR 418.
- The network controller involved in the incident was appropriately qualified and fit-for-duty.
- The actions of the train drivers were not considered factors that contributed to the incident.

SAFETY ACTION

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

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

Australian Rail Track Corporation

Check List

Minor safety issue

The ARTC does not have a check list available for network controllers to assist in identifying risks associated with the verbal authorisation of train movements for an integrated yard.

ATSB safety advisory notice RO-2010-006-SAN-002

The Australian Transport Safety Bureau advises that the ARTC should consider the implications of this safety issue and take action where considered appropriate.

SOURCES AND SUBMISSIONS

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

A draft of this report was provided to:

- Asciano Ltd (Pacific National)
- Independent Transport Safety Regulator for New South Wales
- Network Controller
- RailCorp
- The Australian Rail Track Corporation
- Train Drivers

Submissions were received from the Independent Transport Safety Regulator for New South Wales, RailCorp and the Australian Rail Track Corporation. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Sources of Information

Information for this report was obtained from:

- RailCorp
- The Australian Rail Track Corporation

References

ANGE 204	Network Communications
ANPR 721	Spoken and Written Communication
ANPR 746	Authorising rail traffic to pass an absolute signal at stop
ANSG 608	Passing Signals at Stop
ANTR 418	Yard Limits

Appendix A:

ARTC SAFE Notice 2-1334/2010 (extract)

Moss Vale

Argyle Street Bridge Repairs

Terminating down direction CityRail services

From Monday 14th June 2010 until Monday Friday 18th June 2010 daily between 0900hrs and 1700hrs the following working will apply to allow down direction CityRail services to terminate and form up services on the up platform at Moss Vale.

In exception to ANWT 306 Track Work Authority the minimum distance of 500m and the Inner Handsignaller the below working must be adopted for the termination of CityRail services at Moss Vale to allow the worksite at Argyle Street Bridge to be protected.

The Network Controller at NCCS must obtain the following assurances from the Protection Officer prior to allowing an unsignalled movement via 137 points to the Up platform at Moss Vale:

- A stop sign has been erected in the four foot of the Up main at the country end of Moss Vale Platform and detonator protection has been applied.
- The stop sign is attended by a qualified worker.