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ATSB TRANSPORT SAFETY REPORT
Rail Investigation RO-2010-009
Final

Safe working irregularity involving freight train 2CM3 at Bomen, New South Wales

6 September 2010

Figure 1: Signal BN27 (right of track) looking in the direction of travel for train 2CM3

Abstract

At about 2307[1] on 6 September 2010 a safeworking irregularity involving freight train 2CM3 occurred at Bomen in New South Wales.

The network controller attempted to set the route for freight train 2CM3 to depart Bomen Yard and proceed onto the mainline towards Melbourne. The network controller was unable to change absolute signal BN27 from a stop (red) aspect to a proceed aspect (green), so he gave verbal authorisation to the driver of train 2CM3 to depart Bomen and pass signal BN27 while it was displaying a stop indication. However, issuing a verbal authorisation was not in compliance with the safeworking rules in this case. The network controller should have issued a written Special Proceed Authority (SPA) to authorise train 2CM3 to pass signal BN27 at stop.

The investigation found that a procedural error by the network controller was the main factor that contributed to the incident. There were no injuries or damage to rolling stock or other property as a result of the incident.

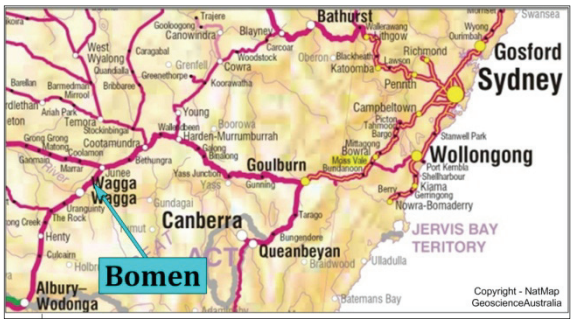
FACTUAL INFORMATION

Location

Bomen is located on the Sydney to Melbourne rail corridor, 514 track km from Sydney and 440 track km from Melbourne (Figure 2). Rail tracks adjacent to the interstate mainline at Bomen consist of a 950 m passing loop and a multi user goods loop from which three industrial private sidings radiate.

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.

Figure 2: Location of Bomen, NSW



Train and crew information

Train service 2CM3 was operated by Pacific National Intermodal (PNI). The train originated at Griffith, New South Wales and was transporting containers to Melbourne, Victoria.

On arrival at Junee, a crew change was made. The relief crew had travelled from Melbourne the previous night, before resting in Junee, NSW. The crew booked on for duty at 1900, took charge of train 2CM3 and departed Junee station at 2051.

The train travelled about 45 km south to the Bomen Rail Terminal arriving at about 2115 where locomotive G531 and additional wagons were added to the train. The revised train consist weighed a total of 2886 t, was 804 m long and was hauled by four locomotives, G536 leading with DL48, DL43, and G531 trailing. No dangerous goods were being transported on train 2CM3.

Train 2CM3 was rostered with two drivers, of which one driver would carry out the on-ground shunting and testing duties at Bomen and the other, train driving duties. The driver performing the on-ground duties commenced his railway service in 1978 and graduated to locomotive driver in 1983. The driver performing the train driving duties commenced locomotive driver duties in 2001 and has operated trains on the Melbourne-Albury-Griffith rail corridor for the past two and a half years. Both drivers had previously spent many years operating trains on Victoria's rail network and were regular drivers of the CM3 service between Junee and Melbourne. The competencies and levels of training for both drivers were current and they had been assessed medically fit to carry out their duties within the requirements of the National Standard for Health Assessment of Rail Safety Workers.

Network control

Operational control of train movements through Bomen are managed by the Australian Rail Track Corporation (ARTC) Network Control Centre at Junee, New South Wales. The passage of trains through Bomen is managed by a network controller operating the Main South Board 'C' of the Phoenix Control System. The Phoenix Control System is a non-vital[2] Centralised Traffic Control (CTC) system that provides real time monitoring of train movements and the control of signals and points.

Voice communication between train drivers and the network controller is achieved using the CountryNet communication system[3].

The network controller involved in the safeworking incident had about 12 months network control experience (including 3 months training) and had been assessed as appropriately qualified. On the day of the incident, he signed on fit-for-duty at about 2240 for a rostered start at 2300.

Occurrence

At 2051 on 6 September 2010 the train crew of train 2CM3 departed Junee and proceeded to Bomen where they were to add locomotive G531 and 14 extra wagons to the front of the train.

Train 2CM3 arrived at Bomen at about 2115 and placed the train on the loop road. They then cut-off the locomotives and proceeded towards signal BN27 until they were past the goods siding points. The on-ground driver operated the points, allowing the locomotives to push back onto the goods siding and attach to locomotive G531 and the 14 additional wagons.

While this work was occurring on the loop and siding roads, the network controller had cleared the mainline signals to allow a Brisbane bound freight train (2MB2) to travel through Bomen. The controller also entered a 'stored command' to clear signal BN27, meaning that signal BN27

2 Equipment is considered 'non-vital' when its failure to function correctly would not affect the safe operation of the signalling system.

3 The CountryNet communication system uses terrestrial radio and satellite communication systems to provide secure voice and data communications between train drivers and network controllers.

would clear once the track conditions were suitable to do so. In this case, once train 2MB2 had passed fully into the yard on the mainline and the mainline points had moved to the reverse position, signal BN27 cleared to a proceed aspect (green light).

The four locomotives and 14 wagons of train 2CM3 were then moved out past signal BN27 until the last wagon was clear of the siding road points. The on-ground driver then operated the siding road points, allowing the wagons collected from the siding to move back onto the loop road and attach to the stationary consist of train 2CM3.

A shift change was rostered for the network controllers at 2300. The in-coming controller had signed on at 2240 and the two controllers completed their hand-over of the Main South 'C' Board just before 2300.

At about 2303, all loading and brake checks were completed, so the train driver contacted the network controller (new controller on Main South 'C' Board - Junee) and confirmed the revised details of train 2CM3's locomotives, quantity of wagons and its total weight and length. After providing these details, the driver advised that train 2CM3 was now ready to depart Bomen and continue its journey towards Melbourne. The network controller advised the train driver that he would set the route to allow 2CM3 to travel at least as far as Uranquinty, where they would probably cross train 2MV9. However, when the network controller attempted to clear signal BN27, the signal would not clear. The controller tried a number of commands in an attempt to clear signal BN27, but all were unsuccessful. Consequently, the network controller provided verbal authorisation for the driver of train 2CM3 to proceed past signal BN27 while it was displaying a stop indication.

Before moving train 2CM3, the driver queried with the co-driver the decision of the network controller to issue a verbal authority, stating that in his view a Special Proceed Authority (SPA) was the appropriate method for authorising them to pass signal BN27. Both drivers agreed that they believed a SPA was the correct authorisation in this case. However, they did not question the decision of the network controller because they assumed the controller had a superior level of understanding of the network rules. At about 2307 train 2CM3 passed signal BN27 displaying a stop indication and began travelling south on the mainline towards Uranquinty.

Soon after the train had departed Bomen, the network controller realised that he had allowed train 2CM3 to depart Bomen without following established safeworking rules to allow trains to pass signals at stop. The network controller immediately notified the ARTC Train Transit Manager and informed him of the error. The network controller was subsequently relieved of his duties and was tested for the presence of alcohol and drugs with a negative result. A relief network controller took over management of the Main South 'C' desk.

Train 2CM3 arrived at Uranquinty at about 2330 and was signalled into the loop road. The relief network controller contacted the crew and advised them that there had been a breach of safeworking rules when they departed Bomen. They were advised that their train would be held at Uranquinty pending an investigation and the subsequent relief of them from duty.

At the time train 2CM3 passed signal BN27 at stop there were no other trains in the section. The nearest train heading towards 2CM3 was 2MV9 located near Culcairn, about 85 km to the south.

The ARTC Train Transit Manager recorded on a Train Control Report that there was a fault for signal BN27 failing to change to a proceed aspect and that maintenance staff would later be called to investigate the cause.

ANALYSIS

At about 0900 on 7 September 2010 the Australian Transport Safety Bureau (ATSB) was advised of a safeworking irregularity, involving the Australian Rail Track Corporation Network Control Centre at Junee and Pacific National freight train service 2CM3 at Bomen New South Wales. The ATSB commenced a formal investigation to identify any systemic issues that should be addressed.

As part of the process the ATSB sourced all perishable evidence including; Phoenix Control System data files, network control voice logs and locomotive data logs. This information was supplemented with data comprising; a train control diagram, train running information,

timetables, work rosters, site plans, safe working rules, procedures and forms.

Based on available evidence, it was concluded that:

- There was no indication of any mechanical deficiencies with the train that required investigation.
- Fatigue was considered unlikely to have been a contributing factor to the event.

Based on the sequence of events, it was evident that the inability to clear signal BN27 prompted decisions and actions that resulted in the safeworking incident. The balance of the report focuses on establishing why signal BN27 could not be cleared and the nature of the decisions made by the network controller and the train crew.

The following reconstruction of events for the occurrence of 6 September 2010 is based on a review of voice logs, the Phoenix Control System replay files, examination of signalling circuits and interviews and statements from the network controller and train drivers involved in the incident.

Signal BN27

Signal BN27 was an absolute colour light signal that could display either a red (stop) or green (proceed) indication. The signal was designated as a home/starting signal since it combined both the functions of a home signal[4] and a starting signal[5].

Based on recorded data, it was evident that the system operated correctly at 2142 when it stored a command to clear signal BN27 and at 2203 when the system cleared signal BN27 after train 2MB2 had passed through on the mainline. The data then recorded the track occupancies as the train crew completed their shunt movement and prepared train 2CM3 for departure.

At 2304, the replay system indicated that the network controller attempted unsuccessfully to clear signal BN27. It was evident that, after signal BN27 was cleared at 2203 and the shunt movement was completed, a condition remained that prevented the signal from clearing when selected at 2304.

Normally when a signal is cleared, a train will proceed past that signal and continue travelling over the entire route locked by that signal. In this case, based on recorded data and driver statements, it is evident that train 2CM3 only shunted far enough to clear the goods siding points before pushing back onto the loop road, In effect, train 2CM3 did not complete the signalled movement.

An examination of the interlocking control tables implied that the system should have allowed clearing of signal BN27, even though the previous movement past the signal may have been incomplete. However, it is evident that the Phoenix Control System retained a train identification number (2CM3) over the unoccupied switch track immediately after signal BN27 (Figure 3) when normally the identification number would show over the track occupied by the head of the train, in this case the loop track before signal BN27. It is apparent this condition is a limitation of the Phoenix Control System, however it is recognised that this is a 'non-vital' system and the condition that existed did not affect the safe operation of the signalling system.

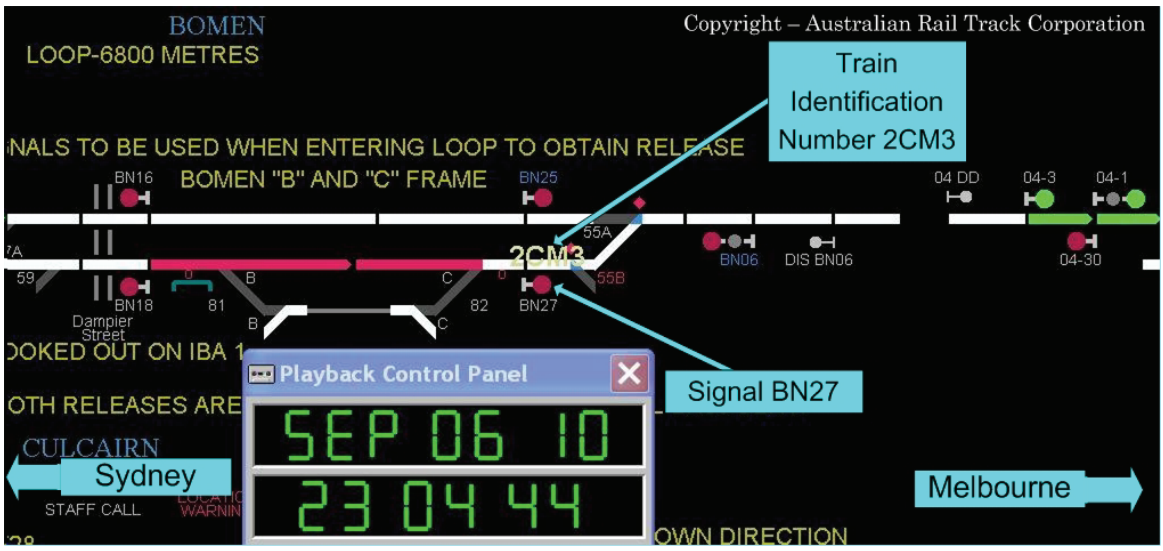
On the morning of 7 September 2010, the ARTC signal technicians examined the field equipment at Bomen and verified that no control system faults were associated with signal BN27. The technicians also examined the Phoenix history log and noted the issue associated with the train identification, but did not offer any explanation for this condition.

Based on the information available, it is likely that the Phoenix Control System prevented a command being issued to the field based interlocking, even though the interlocking would normally have accepted the command and cleared signal BN27. It is possible that an alternative method of conducting the shunt at Bomen may have avoided the condition that prevented signal BN27 from clearing. For example, the train drivers said that on previous occasions, they had received a verbal order to conduct a similar shunt movement past signal BN27 (within yard limits).

4 'Home' signals protect points and other identified risks.

5 'Starting' signals authorise departure from a controlled area.

Figure 3: Phoenix replay of Bomen passing loop showing the 2CM3 train identification number that was retained and positioned over unoccupied track beyond signal BN27



Safeworking rules and procedures

The network controller who issued the verbal order to pass signal BN27 at stop signed on for duty at 2300 and was not the same controller involved with the actions that created the conditions that prevented signal BN27 from clearing. It is likely the network controller who issued the order in error did so as a result of his incomplete understanding of the operation of the Phoenix Control System and the system condition that existed at the time.

The safeworking rules and procedures were examined with respect to the method used to authorise train 2CM3 to pass signal BN27 while it was displaying a stop indication.

Trains passing signals at stop

In accordance with the ARTC Network Rules, rail traffic must respond to signals displaying a stop indication. When a signal cannot be cleared for an intended train movement, it may be passed only in accordance with *Rule ANSG 608 - Passing Signals at Stop*. This document prescribes the rules for passing signals at stop in the ARTC's New South Wales rail network.

Since various operational conditions may exist whereby a train may be required to pass a signal at stop, Rule ANSG 608 includes a table specifying the required type of authorisation for each operational condition. In this case, the condition relevant to signal BN27 was a 'movement beyond yard limits on *Rail Vehicle Detection territory* on bidirectional portions of line'.

The rule provides four authority options for this type of operational condition:

- *Rule ANWT 302, Local Possession Authority (LPA)*, or
- *Rule ANWT 304, Track Occupancy Authority (TOA),* or
- *Rule ANSY 514, Special Proceed Authority (SPA),* or
- *Rule ANSY 516, Pilot Staff Working.*

LPA's and TOA's are normally implemented in relation to working on track, not normal train operations. Pilot staff working is a method of on-going special working implemented for movements that are not permitted under the system of safeworking. Consequently, in this case the relevant authority for train 2CM3 to pass signal BN27 at stop, was a Special Proceed Authority (SPA).

The network controller stated that he had a brief lapse in concentration and this led him to issue a verbal authority to pass signal BN27 while it was displaying a stop indication. However, the ARTC network rules are clear that a verbal or 'spoken' authority could only be used, in this case, if the

movement had been carried out within the yard limits.

Train drivers summation of the occurrence

On previous occasions the train crew stated that network controllers have issued a verbal authority to pass home/starting signals at stop, but these have been for train services working within the yard limits of Bomen Yard. On this occasion, train 2CM3 was departing the south end of Bomen yard and entering bi-directional mainline track where a signal that could not be cleared to a proceed aspect could be passed after the completion of a SPA in consultation with the network controller. Although the train drivers discussed the verbal authority between them stating that a SPA would normally be required before passing signal BN27 at stop, they did not challenge the network controller's decision.

The absence of a challenge from the train crew may have been as a result of a phenomenon called diffusion of responsibility. This tends to occur in large groups or organisations when individuals from within a group may be aware of something that is wrong or risky, but don't take action because they believe it is not their responsibility or that as they had noticed whatever was wrong, that others must surely have noticed it too and taken the appropriate action.

Diffusion of responsibility can more easily occur in hierarchical situations where individuals with less authority may feel, and subsequently claim, that orders coming from someone with more authority must be correct and followed without challenge.

In this instance, the train crew stated that they believed the network controller clearly understood his role by authorising their train to pass signal BN27 at stop. Both drivers acknowledged that, in the future, if a safeworking instruction issued by a network controller is counter to their training and experience, they would question the validity of the instruction to avoid a breach of safeworking rules.

FINDINGS

Context

At about 2307 on 6 September 2010 a safeworking irregularity involving freight train 2CM3 occurred at Bomen in New South Wales.

The network controller gave verbal authorisation for train 2CM3 to pass absolute signal BN27 that was displaying a stop indication where a Special Proceed Authority was the appropriate network rule to have been followed.

From the evidence available, the following findings are made with respect to the safeworking irregularity where freight train 2CM3 proceeded past absolute signal BN27 that was displaying a stop indication at Bomen NSW and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The network controller gave verbal authorisation to the driver of train 2CM3 to proceed past signal BN27 at stop to leave Bomen yard when this train movement actually required a Special Proceed Authority.
- Although the train drivers felt that the network controller was incorrect in issuing a verbal authority to pass signal BN27 at stop, they did not challenge his decision or otherwise confirm if a Special Proceed Authority should have been issued prior to their train departing Bomen yard.

Other key findings

- When the network controller realised that he had authorised the movement of train 2CM3 past signal BN27 at stop without the correct authorisation, he immediately reported the safe working breach to the ARTC Train Transit Manager.
- The network controller involved in the incident was appropriately qualified and medically fit for duty.
- The train drivers involved in the incident were appropriately qualified and medically fit for duty.

SAFETY ACTION

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of rail operations.

The Australian Rail Track Corporation has advised that remedial action has been taken to minimise the likelihood of a recurrence involving individual

safety actions. Evidence was provided to investigators that shows scheduled competency assessments and safeworking refresher training is ongoing for all network controllers working on the ARTC New South Wales south network. This action is in addition to the network controller taking it upon himself to refresh his knowledge of the relevant network rules immediately after being relieved from duty on the day of the incident.

SOURCES AND SUBMISSIONS

Sources of Information

Australian Rail Track Corporation

Pacific National

References

ARTC Network Rules - Sept. 2004 Issue 1, Rev1 ANSY 514 Special Proceed Authority.

ARTC Network Rules –June 2010 Issue 2, Rev2 ANSG 608 Passing Signals at Stop.

ARTC Network Rules - June 2010 Issue 3, Rev0 ANTR 418 Yard Limits.

ARTC NSW Glossary - December 2010 Issue 2, Rev 0

National Standard for Health Assessment of Rail Safety Workers - Volume 1 - June 2004.

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
- The Australian Rail Track Corporation
- The network controller - Junee
- The drivers of train 2CM3.

Submissions were received from:

- Asciano Ltd (Pacific National)
- New South Wales Independent Transport Safety Regulator
- The Australian Rail Track Corporation.

The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.