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Australian Transport Safety Bureau

Locomotive runaway at the Sydney Operations Yard

Chullora, New South Wales | 23 September 2015



Investigation

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Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

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Addendum

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Safety summary

What happened

On 23 September 2015, two Pacific National terminal operators and the train crew were completing a shunt of train 4MW2 at the Sydney Freight Terminal. After detaching the remaining wagons, the train crew moved the five locomotives toward the end of the stabling road, where a shunt driver was waiting trackside to take over. After stopping, the train crew exited the cab and alighted from the lead locomotive. The train crew had left the locomotive independent brake handle fully applied but did not operate the park brake prior to leaving the cab.

The shunt plan required two of the five locomotives to be uncoupled and stabled. In readiness to uncouple, one of the terminal operators entered between the locomotives and isolated the air taps, disconnected the train hoses and lifted the coupling pin to the two trailing locomotives. Neither the train crew nor shunt driver realised that the rear two locomotives had been uncoupled. Shortly after, the shunt driver boarded the lead locomotive and in conjunction with the other terminal operator moved the front three locomotives to another area of the terminal. The two trailing locomotives remained at the end of the road, unattended by a qualified worker.

Shortly before 1751, sufficient air had bled from the brake cylinders to allow locomotives NR24 and NR12 to begin to roll away. The locomotives continued to roll uncontrolled through the Sydney Freight Terminal before exiting into the Australian Rail Track Corporation network. The locomotives travelled a short distance on the Down South Fork before coming to rest at Chullora West Junction. There were no injuries or damage due to the run away.

What the ATSB found

The ATSB found that a combination of individual action and ambiguous radio communications resulted in a breakdown of controls to prevent an uncontrolled movement of rolling stock. The interface coordination arrangements at the eastern interface between Pacific National and the Australian Rail Track Corporation were ineffective in capturing an uncontrolled movement before exiting the Sydney Freight Terminal.

What's been done as a result

The Australian Rail Track Corporation have issued instructions for the restoration of points at the interface following each movement and commenced investigation into the feasibility of automatic resetting of the points at that location.

Pacific National undertook toolbox briefings and issued Business Safety Notices restricting terminal operators from uncoupling locomotives and reinforcing the importance of applying communications and shunting procedures.

Safety message

Rail transport operators and rail safety workers must ensure the correct and consistent application of communication protocols and procedures when undertaking safety critical work, such as detaching and securing unattended locomotives.

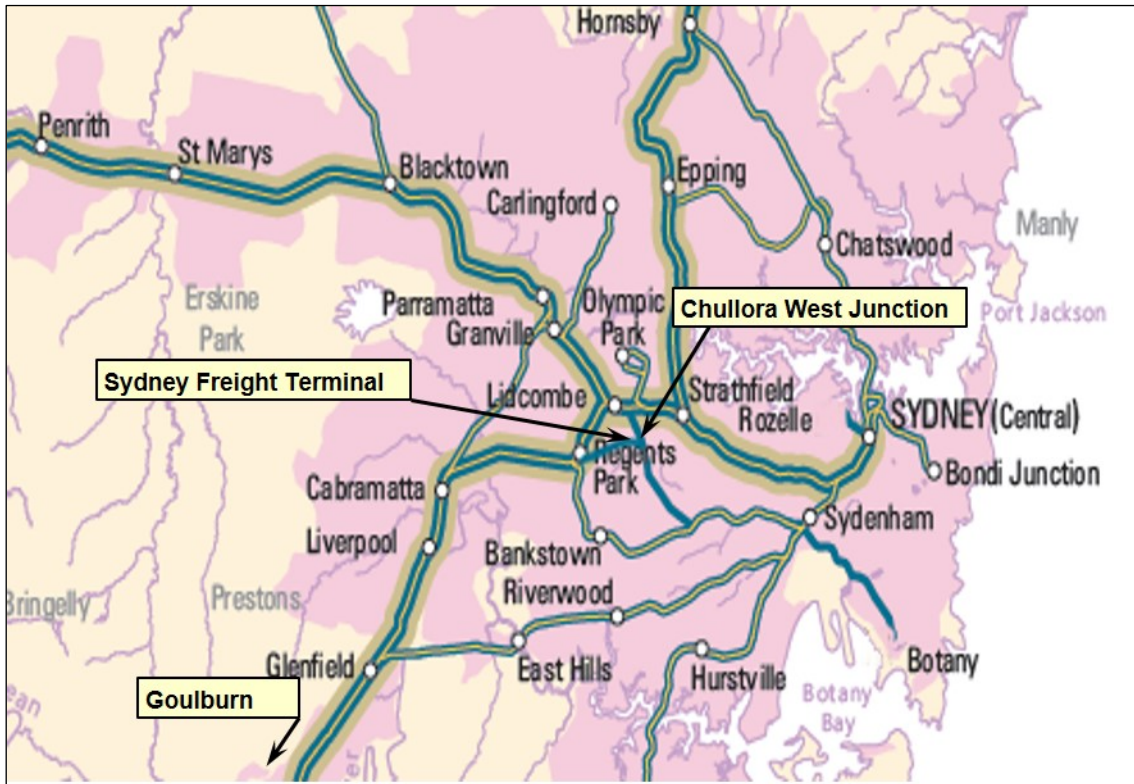
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The occurrence

On 23 September 2015, Pacific National (PN) freight train 4MW2 departed Melbourne and travelled along the Interstate Main Line via Junee and Goulburn toward Sydney. Within the Sydney area, 4MW2 traversed sections of the Australian Rail Track Corporation (ARTC) Southern Sydney Freight Line and the Metropolitan Freight Network en route to, the PN Sydney Freight Terminal (SFT) at Chullora (Figure 1). Train 4MW2 consisted of five locomotives hauling 76 wagons.

Figure 1: Location of Pacific National Sydney Freight Terminal



Map of Sydney area showing various passenger and freight rail lines. Train 4MW2 travelled along the rail line from Goulburn through Cabramatta then toward the Pacific National Sydney Freight Terminal at Chullora. Source: Geoscience Australia, annotations by ATSB

At about 1657,¹ as train 4MW2 approached Chullora, the co-driver contacted staff at the SFT by radio seeking instruction on the final destination road² for the train within the terminal. A terminal operator waiting for the arrival of 4MW2 informed the train crew that it was to enter the EPA1³ road in preparation for shunting.

At about 1658, train 4MW2 arrived at the EPA1 road where the terminal operator further advised the train crew that there were no local relief train crew available, and that they would need to assist in the shunt of train 4MW2. The train crew, in conjunction with two terminal operators then commenced a series of shunt movements onto the various EPA roads. The terminal operators coordinated with each other to control the shunt and to uncouple and secure the required wagons in accordance with the shunt plan for that train.

After completing the shunt movements to the EPA roads, a terminal operator instructed the train crew to push the remainder of the train to the number 9 road. Number 9 road was located adjacent to the gantry crane roads in another section of the SFT.

¹ The 24-hour clock is used in this report and is referenced from Eastern Standard Time (EST).

² The term used to describe a designated rail track within the terminal area or shunting yard.

³ Term EPA relates to the Pacific National naming convention for an area of the Sydney Freight Terminal.

The train crew, with the assistance of the terminal operators, moved the five locomotives and remaining wagons to the gantry crane area and toward the dead end of the number 9 road. The terminal operators again coordinated with each other to position the shunt movement along the road.

Around this time, a SFT shunt driver was working on number 6 road testing the air brake system of a rake of wagons in the gantry crane area. On completing the testing, the SFT shunt driver moved the shunt locomotive to the entrance of the number 6 road, secured it and took a short rest break.

At about 1734, a terminal operator (TO1) uncoupled and secured the remaining wagons from the locomotives. The same terminal operator also contacted the train crew to ask where they wanted to leave the back two locomotives (NR24 and NR12), as the shunt plan had also listed them to be detached, but did not specify the final road. The locomotive driver replied that they wanted to leave all five locomotives and get off. Shortly after, the other terminal operator (TO2) who was at the opposite end of the wagons situated at the dead end of number 9 road interrupted, suggesting that the locomotives be moved to the entrance of number 9 road where the SFT shunt driver could take over from the train crew and finish the shunt of the locomotives.

The train crew subsequently moved locomotives (NR91, NR82, AN8, NR24, and NR12) forward toward the entrance to the number 9 road. The driver applied the independent brake⁴ fully, stopping the locomotives adjacent to the SFT shunt driver. The SFT shunt driver on returning from the rest break overheard a conversation between the terminal operators and train crew that he was to take over the locomotives on number 9 road. The SFT shunt driver then waited trackside adjacent to number 9 road.

As the terminal operator (TO1) continued to secure the detached wagons, the other terminal operator (TO2) moved from the dead end of number 9 road to meet the five locomotives that were now stationary at the entrance of number 9 road. The terminal operator (TO2) knew that the back two locomotives were to be detached but did not know the final road for stabling. The SFT shift manager and terminal operator briefly discussed arrangements for the two locomotives and decided to leave them on number 9 road where a local train crew would attend to them when available, about 30 minutes later.

Once adjacent the locomotives, the terminal operator (TO2) went between locomotives AN8 and NR24, disconnected the air hoses to the main reservoir and brakes, and lifted the pin in the coupler. Immediately after completing this task, the terminal operator departed the area to take a meal break. There was no direct communication between the terminal operator and train crew or SFT shunt driver, so the drivers were unaware that the terminal operator had entered between the locomotives and undertaken this task.

About the same time, the train crew were in the process of alighting from the lead locomotive and meeting with the SFT shunt driver, who was standing on the ground adjacent to the locomotives. After discussing the operational state of the five locomotives, the train crew departed and the SFT shunt driver boarded the lead locomotive.

Shortly after, the terminal operator (TO1), who had completed securing the wagons that were detached earlier, joined the SFT shunt driver. The terminal operator and SFT shunt driver then moved locomotives NR91, NR82, and AN8 from number 9 road. Neither the shunt driver nor terminal operator was aware the locomotives had been uncoupled. Locomotives NR24 and NR12 remained on the number 9 road and unattended by a qualified worker.

About 8 minutes later, sufficient air had leaked from the brake cylinders to allow locomotives NR24 and NR12 to commence rolling away. The locomotives continued an uncontrolled

⁴ Brake that acts on the locomotive independently from the rest of a train

movement through the SFT traversing a number of roads and trailable points⁵, reaching a maximum speed of about 21 km/h within the yard.

The locomotives continued toward the eastern interface point between the SFT and the ARTC network. While signal ED288 was set to stop, the points at the interface were set to direct rail traffic toward the ARTC Chullora West Junction.

At about 1751, locomotives NR24 and NR12 passed signal ED288 at stop. This generated a Signal Passed at Danger (SPAD) alarm at the ARTC Network Control Centre South (NCCS) in Junee. About a minute later, the locomotives passed a further signal (ED278), generating another SPAD alarm.

The NCCS NCO contacted the SFT shift manager to identify the train movement that triggered the SPAD alarms. The SFT shift manager confirmed that there was no shunting operation occurring in that area, but would investigate the source of the SPAD alarms. At about 1759, the SFT shift manager confirmed to the NCO that two locomotives (NR24 and NR12) had run away and exited the SFT. The locomotives came to rest with the front of the lead locomotive (NR24) located at about the 17.407 km point⁶ on the Down South Fork of the Chullora West Junction.

The SFT shift manager dispatched Pacific National staff from the SFT to take control and secure the locomotives. The locomotives remained at that location until ARTC and Pacific National staff had inspected the track sections traversed by the locomotives. There was no damage identified to either the locomotives or track.

At about 2035, locomotives NR24 and NR12 cleared from the ARTC main line to the interface area and back towards the SFT.

⁵ Points designed to permit a trailing movement through points closed against the intended move. The wheel set opens the points which spring back to the normal position after the wheel set is through.

⁶ Point on the MFN referenced from the kilometre change location at Marrickville Junction

Context

The location

The SFT was located at Chullora in Sydney, NSW at about the 19.828 km point on the ARTC Sydney Metropolitan Freight Network (Figure 2). Rail access from the Sydney Metropolitan Freight Network (MFN) to the western and eastern extremity of the SFT was available via turnouts located at Enfield West and the Chullora West Junction respectively. The ARTC Network Control Centre South (NCCS) at Junee controlled rail operations along the MFN and at the interface with the private sidings at Chullora.

Figure 2: ARTC Sydney Rail Freight Corridors

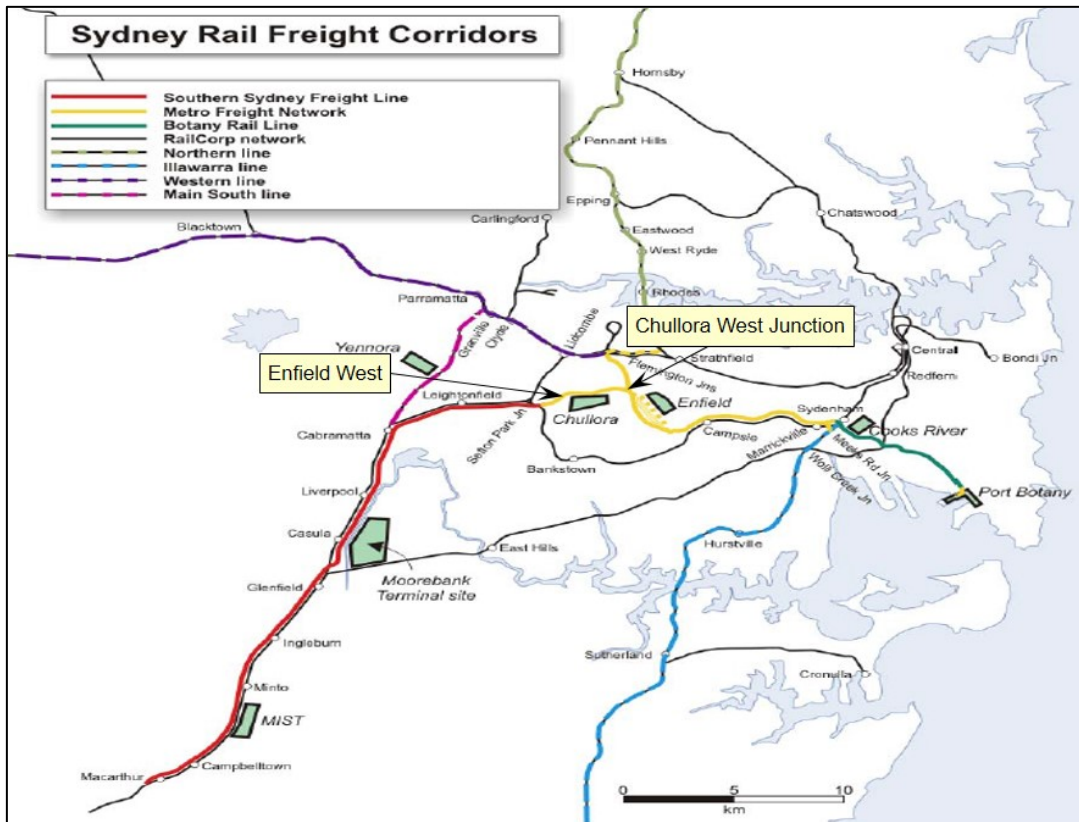


Figure illustrates the various main line track arrangements in the Sydney area and relative location of Chullora and the Chullora West Junction. Source: Australian Rail Track Corporation, annotations by ATSB

Train and train crew information

Train 4MW2 consisted of five locomotives (NR91 leading, NR82, AN8, NR24 and NR12) and 76 wagons. The train was 1501 m long and had a trailing mass of 3132 t. The trailing mass included the locomotives AN8 and NR24 because they were setup as ‘off line’. Train 4MW2 was crewed by a driver and co-driver.

In conjunction with the train crew, two terminal operators and an SFT shunt driver also undertook various activities in the shunting of 4MW2 within the terminal. Post incident, the train crew of 4MW2, two terminal operators and the SFT shunt driver underwent preliminary testing for the presence of alcohol or a drug⁷. The result of this testing was negative.

The locomotive drivers and terminal operators held PN qualifications for shunting rolling stock and using communications systems. An examination of the health assessment records confirmed that

⁷ Within the meaning of the *Rail Safety National Law National Regulations 2012*

their health assessments were current and that each satisfied the standards prescribed by the *National Standard for Health Assessment of Rail Safety Workers*.

Chullora – Private Sidings

The Chullora area contained four private sidings⁸ that interfaced with the ARTC MFN at five locations (Figure 3).

The PN Sydney Operations Yard was a private siding with an eastern and western interface to the ARTC network. Motorised point machines on the turnout at each interface may be set to direct an uncontrolled movement (runaway) toward a dead end track section. The NCO controlled the points and signals at the interface locations remotely from the NCCS.

The NCO also controlled rail movements at the interface with the other private sidings by providing a release from the NCCS. The release enabled a qualified employee to set the points by operating the associated local ground frame⁹.

A motorised catch point¹⁰ was located at the eastern boundary of the Chullora interface area to protect the ARTC network from an uncontrolled rolling stock movement (runaway) from the private sidings entering the Down south fork and Down Main line. The ARTC controlled the signals, catch-point, and all other motorised point machines at the Chullora West Junction remotely from the NCCS.

Figure 3: Track arrangement at Chullora West Junction

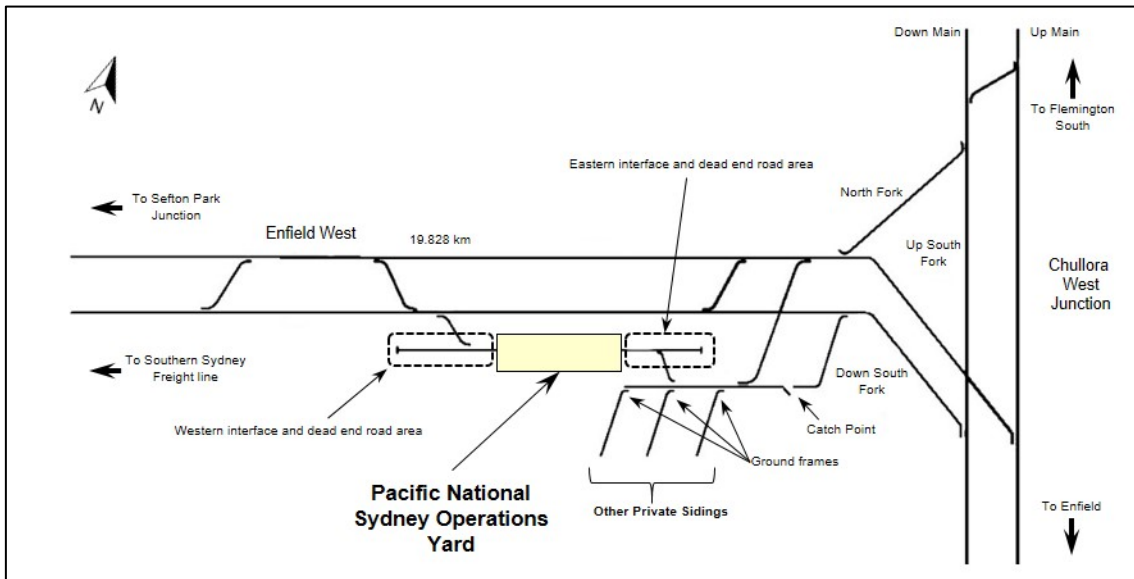


Figure illustrates the main line track arrangement at Chullora Junction including the interface connections to the Pacific National Sydney Operations Yard and other private sidings. Source: Australian Rail Track Corporation annotations by ATSB

ARTC/PN Interface coordination – Sydney Freight Terminal

An interface agreement¹¹ stipulated the arrangements for the joint management of the operational risk at the ARTC/PN boundary. The interface agreement was in draft, dated 23 April 2015. The risk assessment of operational hazards in the draft agreement identified no site-specific risk factors that raised the generic ARTC corridor risk rating above low.

⁸ Sidings owned and maintained by a person who does not own, control, or manage the running line with which the siding connects.

⁹ A small trackside-interlocking machine used for manual points operation at yards, sidings, crossovers, and loops.

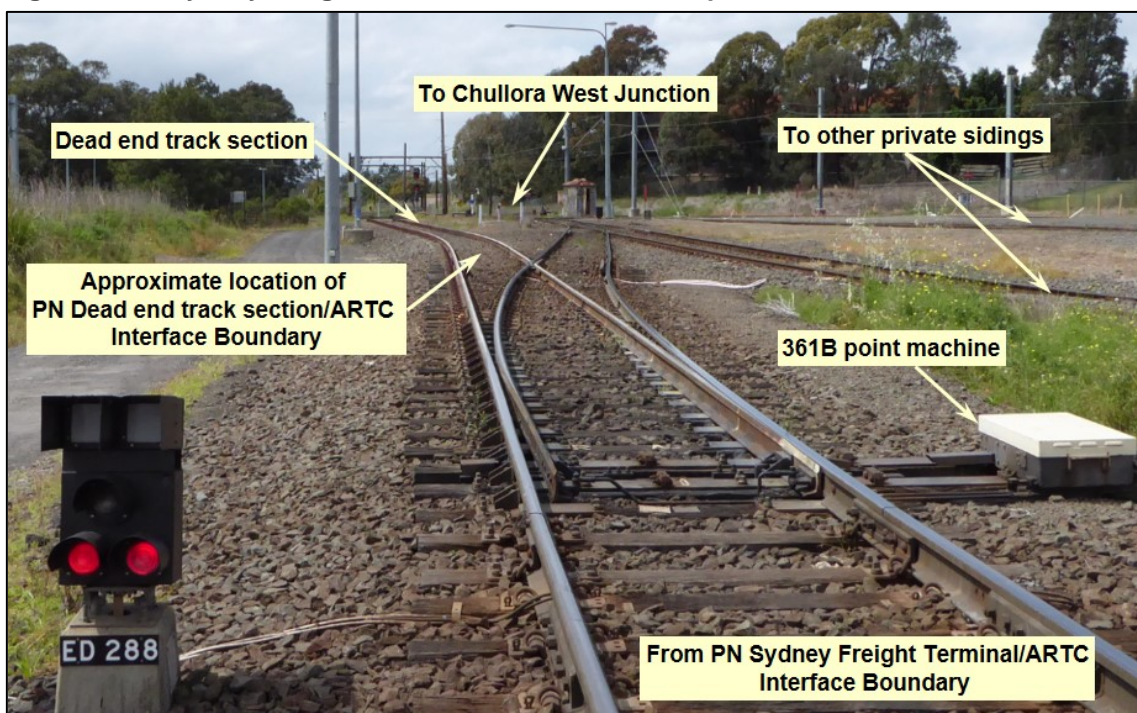
¹⁰ Set of points designed to prevent unauthorised access to a section of track by prior intentional derailment of the vehicle

¹¹ Interface Agreement IA1919, Version 8 - draft, Dated 23/04/2015

The PN risk assessment for the SFT¹² access and egress through the interface boundary identified the hazard of unauthorised entry or exit of a train to/from the SFT. An unauthorised movement may take the form of a train operated by a driver or rolling stock (locomotive or wagon) that is uncontrolled. The risk assessment identified various controls requiring the driver to comply with signal indications and approval protocols that permitted access/egress through the interface. For an uncontrolled rolling stock movement approaching the interface, the risk control relied on diverting the rolling stock away from the interface area.

At the eastern end of the SFT, motorised points adjacent signal ED288 provided the control mechanism to divert rolling stock toward a dead end track section (shunt neck) and away from the ARTC network (Figure 4). The signalled route selected determined the orientation of the motorised points. At the time of the uncontrolled movement, the route was set to allow access between the ARTC network and the SFT.

Figure 4: PN Sydney Freight Terminal eastern interface point and dead end road



Interface point at the eastern end of the PN Sydney Freight Terminal. Signal ED288 and the motorised point machine were controlled by the ARTC from the Junee control centre. The points should be positioned as shown to route any uncontrolled movement toward the dead end and away from the roads of the other private sidings and main lines at Chullora West Junction. Source: Australian Transport Safety Bureau

Pacific National Sydney Freight Terminal

The SFT encompassed the EPA, Gantry, Shed, and Transfer rail marshalling areas (Figure 5). The PN Shift Manager controlled the incoming and outgoing rail movements in conjunction with the other routine internal shunting operations. The standby train crew or a terminal shunt driver in coordination with terminal operator ground staff undertook the rolling stock shunting operations for the marshalling of trains within the various areas of the SFT.

Within the SFT areas, the terminal operator ground staff manually operated (hand throw) points to route the rolling stock between the various roads of each area. The design of a number of these manually operated points enabled a trailing movement¹³ through the point assembly by the rolling stock.

¹² Safety Standard Form risk assessment SFT SHT-01, Revision 4

¹³ A wheelset movement through a set of points from the heel end to the toe end.

The track grade from the entrance to of the Gantry road area toward Chullora West Junction started with a falling grade of about 0.70% before increasing to 1.166% through the Arrivals road area. The falling grade then reduced to around 0.060% through the Transfer road area before transitioning to a rising grade of around 0.26% through the interface area with the ARTC.

At the top of the grade in the Gantry area, four of the roads (#5, 6, 7 and 8) were equipped with a manually operated derail mechanism to prevent unauthorised access into or to capture an uncontrolled movement from the respective road. Road #9 was not equipped with a derail mechanism.

Figure 5: Pacific National Sydney Freight Terminal



View of the Pacific National Sydney Freight Terminal showing the relative location of the EPA and Gantry road areas. The uncontrolled movement of locomotives NR24 and NR12 commenced at the #9 road in the gantry area before travelling through the transfer road area and toward Chullora West Junction. Source: Google, annotated by ATSB

Pacific National shunting procedures

The Pacific National standard¹⁴ and procedure¹⁵ outlined the safe practices established for the movement of rolling stock. Both documents were applicable to operations undertaken on the main line, a terminal or a yard.

The standard identified PN's obligation relating to the assessment of shunting risks and defined the responsibilities for the PN staff involved. In a terminal or yard, the terminal operator in charge of a shunt was responsible for providing instructions to the locomotive driver to facilitate the placement of rolling stock. The terminal operator was also responsible for detaching or coupling wagons.

Rolling stock - Wagons

The PN procedure detailed the specific processes and communication exchange protocols required when undertaking a shunt movement. A key component of the procedure was the implementation of a three-step protection process before a qualified worker (terminal operator or locomotive driver) entered between rolling stock to detach or couple wagons.

The intention of the three-step protection process was to ensure clear communications between the driver and qualified worker (in the case of 4MW2, the terminal operator) of the intention to enter in between rolling stock to undertake a task. The process was reliant on a sequential

¹⁴ PN-STD-SAF Shunting Standard ,Version 1, 1 June 2015

¹⁵ PN-PRO-SAF Shunting Procedure, Version 1, 1 June 2015

exchange of instruction and acknowledgement between the two parties to ensure the driver had undertaken actions to secure the rolling stock from moving.

To implement the three-step protection, the driver was required to:

- fully apply the locomotive's independent brake and if required the automatic brake¹⁶
- position the throttle to idle
- move the reverser lever to the centre position

Once the driver confirmed these protections, the qualified worker could then enter between the rolling stock. On completing the required task, further communication between the terminal operator and the driver was to occur before removal of the protections and the locomotives operated.

Where a wagon or number of wagons were uncoupled and left unattended for any period, the qualified worker was also responsible for ensuring the application of the park brake. A PN generic procedure¹⁷ for securing trains with park brakes specified the minimum number of park brakes required to hold the rolling stock. The number of park brakes required varied depending on the location where stabled and local track grade.

Rolling stock - Locomotives

The safe practices contained in the standard and procedure were similarly applicable to the shunting of locomotives. Where a locomotive or locomotives were to be left unattended¹⁸, the locomotive driver (whether operating as a two-man crew or as Driver Only Operation) was responsible for the uncoupling of locomotives and ensuring that the park brake was correctly applied. A PN generic procedure¹⁹ for securing locomotives with park brakes specified the required actions to ensure the correct application of the park brake.

The park brake on the NR locomotives was a spring-operated device held off by the application of air pressure sourced from the main reservoir. When selected, by the operation of a pushbutton in the locomotive cab, the device released the air pressure and the spring applied the brake to the wheels. The park brake selection relayed electrically to other similarly equipped locomotives coupled in the train via the Multiple Unit interconnector cable.

Previous occurrences

Several incidents have occurred of the uncontrolled movement of rolling stock (run away) in New South Wales. None was directly comparable to the runaway incident at the SFT on 23 September 2015. That is, they did not involve runaway locomotives.

The previous incidents principally related to the securing of wagons that were uncoupled from locomotives or stabled. The incidents prompted the Independent Transport Safety Regulator (ITSR) to issue a Transport safety alert on 13 April 2011²⁰ to address the effective securement with handbrakes and stop block functionality.

The Office of Transport Safety Investigations (OTSI) also investigated a runaway of rolling stock at Enfield Yard on 3 May 2011²¹. A rake of 28 wagons loaded with aggregate (total mass in excess of 2500t) ran away from North Road No. 1 in Enfield Yard and through the yard before colliding with a rake of 15 empty fuel tanker and three flatbed wagons stabled in South Road No. 1. The investigation identified the immediate cause of the incident was that, during maintenance

¹⁶ Control that applies/releases all brakes of the train

¹⁷ GPR_6_10 Securing Trains with Park Brakes – R02, Dated 1 July 2015

¹⁸ No-one in the cab controlling the locomotive

¹⁹ GPR_6_12 Securing Locomotives with Park Brakes R02, Dated April 2009

²⁰ Independent Transport Safety Regulator, Transport Safety Alert Number 36, 13 April 2011, Effective securement with handbrakes and stop block functionality

²¹ Office of Transport Safety Investigations, Rail Safety Investigation Report, Runaway of rolling stock Enfield Yard, 3 May 2011, Investigation reference 04514

activities, the air brakes were released on a wagon and the rake ran away due to the rake's remaining brakes being insufficient to hold it stationary on the prevailing grade.

Pacific National proposed a number of safety actions in response to the Transport safety alert and investigation into the runaway at the Enfield yard.

Safety analysis

Planning and coordination of a shunt

In planning a shunt, the PN standard required the communication of the shunt plan to the shunting team (terminal operators) and locomotive driver to ensure:

- the identification of the shunter in control and responsible for coordinating shunting movements
- the identification of the roles of each shunter involved in the shunt
- the planning to complete the shunt in the safest number of moves
- the informing of locomotive driver and the shunt team about the planned shunt moves
- confirming the shunt sequence and rolling stock to be moved

On 23 September 2015, the communication of the shunt plan commenced when a terminal operator advised the inbound train crew via radio that they would be operating the locomotives to shunt from the EPA1 road onto the EPA3 and EPA4 roads, before heading to the number 9 road.

The terminal operators then commenced uncoupling wagons in accordance with the shunt plan. The terminal operators communicated between each other to transfer the role of shunter in control. The shunter in control communicated instructions to the train crew for the movement of the train. The train crew did not have a copy of the shunt plan to facilitate clear understanding of shunt sequence and the rolling stock that would be uncoupled.

After detaching the remaining wagons on the number 9 road, the last entry in the shunt plan indicated 'to bed' against locomotives NR12 and NR24. There was a series of communications:

- between the shunter in control at that time and the train crew
- between the two terminal operators, and
- between one of the terminal operators and the SFT shift manager.

Each conversation contained information related to the intended actions to address the shunt plan for locomotives NR12 and NR24. However, the communications did not ensure that there was a clear understanding among all parties of what was to occur.

Communication protocols

The PN voice radio protocols promoted effective spoken radio communications to be:

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

The communication protocols and shunting procedures required the locomotive driver and terminal shunter to reply to each communication to indicate that they have complied with the request or to acknowledge the previous communication. The protocols contain a warning that qualified workers must not assume that a receiver has understood a message before the receiver confirms that the message has been understood.

The sequencing of radio exchanges between the parties that occurred during the preparation for the final shunt of the locomotives resulted in essential information being misunderstood or lost. This was particularly pertinent to the application of the three-step protection process.

The application of these processes to ensure protections were in place before the terminal operator entered between rolling stock may have alerted the train crew of the intention to uncouple the locomotives.

Procedures for uncoupling locomotives

Following the request from a terminal operator, the driver moved the locomotives forward to the entrance of number 9 road and applied braking using the independent brake lever.

The independent brake valve was self-lapping, meaning the degree of braking effort was proportional to the positioning of the lever by the driver. The valve regulated the air pressure applied to the brake cylinders of the lead locomotive, and through the train pipe and interconnecting hoses to the brake cylinders of the four trailing locomotives to stop the train.

Once stationary, the driver left the independent brake handle in the full application position, which maintained the air pressure to the brake cylinders holding the locomotives with maximum braking effort. The train crew then gathered their gear and vacated the cab in preparation to leave the locomotive.

The train crew did not apply the locomotive park brake prior to vacating the cab. The implementation of the park brake requirements in the procedure for securing locomotives would almost certainly have prevented the runaway from occurring.

When on the ground, a short conversation occurred between the crew and the SFT shunt driver, which included a briefing on the set up of the locomotives in the train on arrival at the SFT. During this time, the terminal operator entered between locomotives AN8 and NR24 and uncoupled the locomotives. The terminal operator on completing this task assumed that the locomotive drivers were aware of the intention to undertake a task, and had made the rolling stock safe in accordance with the three-step process. The terminal operator did not subsequently contact the drivers to arrange the removal of protections to enable the operation of locomotives.

Terminal operators were only authorised by PN to undertake the task of uncoupling wagons. The task of uncoupling and securing locomotives was the responsibility of the locomotive crew or SFT shunt driver. It was apparent however that some terminal operators, who during their employment with other rail operators, had received training in undertaking this task and would on occasion assist a locomotive driver to uncouple locomotives.

Although PN undertook compliance and safety audit monitoring programs, these had not identified the practice of terminal operators assisting locomotive drivers existed, or that variances in the application of the radio communication protocols, such as the three-step process, were occurring at the SFT.

Interface risk assessment

The ARTC Engineering (Signalling) Standard²² includes the option of providing self-normalisation²³ of catch points on sidings to protect the main line. Where self-normalisation is provided in the signalling arrangement, the catch point sets to normal (open position) when the signalling interlocking system indicates that the catch point has been continuously free to move for a period not less than 45 seconds. The self-normalisation principle could also apply for power-operated points on a turnout (as installed at each end of the SFT).

The design of the ARTC interlocking at Chullora did not include the functionality to self-normalise either the catch point or points at the interface between PN and ARTC.

The PN assessment of risk from an unauthorised movement exiting the SFT relied on the effectiveness of a series of engineering and administrative controls. The assessment identified the automatic operation of the points at either end of the SFT toward a dead end track section, when

²² ESD-05-01 Common Signal Design Principles S1 – Signalling Locking and Train Dynamics, Version 3.0 Dated 13 October 2015

²³ Power operated points that are automatically returned by the interlocking to the normal position to provided protection after a movement via the points reverse.

the associated signals were at red as an engineering control. The assessment assigned responsibility for this control to the ARTC.

As the interlocking design at Chullora did not include automatic operation of the points, PN's reliance on automatic operation as an engineering risk control was therefore incorrect at this location.

The signalling at Chullora operated as an 'Entrance – Exit' system. To set a route the NCO operated controls to select the required entrance and exit signals along the desired route. The interlocking set the points (if free to move) to the required orientation before clearing the required signals along the route. If required, the system also enabled the NCO to operate the point machines individually to set the desired orientation.

The interface coordination required liaison between the SFT Shift Manager and NCO to progress movements through the interface area. Signalled routes were set to enable train services to enter or exit the SFT. If required, signalled routes could also be set to enable PN to shunt long trains from the SFT through the interface area and onto the main line. The point machines within the selected route would lie in the orientation set for the previous movement until the operation of another set of entrance and exit signals to request a new route.

The draft interface agreement identified the Chullora operational boundaries at ED 288 signal and the clearance point at the back of 361B turnout. The agreement identified the ARTC and PN as responsible for operations within their respective territory, and jointly responsible for the management of risk at the interface. The correct orientation of the ARTC controlled point machine 361B situated between the interface boundary of the PN Sydney freight terminal and PN dead end track section, was essential to ensure the preferred routing of an uncontrolled movement toward the dead end (that is, away from the main line).

The administrative process associated with the interface coordination between the PN Shift Manager and the NCO did not ensure that, on the completion of PN rail movements, the motorised point machine adjacent signal ED288 diverted any uncontrolled rolling stock movement toward a dead end track section and away from the ARTC network.

The Interface Agreement IA1919 was in draft since mid-2014. Neither ARTC nor PN had endorsed the interface coordination arrangements for the joint management of risk at the ARTC/PN boundary. The absence of a self-normalising turnout or a finalised agreement on responsibilities for the coordination at the interface, likely increased risk to the ARTC corridor.

On 23 September 2015, the points at the eastern interface toward Chullora West Junction remained set from a previous PN rail movement through the interface area. This allowed locomotives NR24 and NR12 to exit the PN controlled SFT and onto the ARTC network.

Findings

From the evidence available, the following findings are made with respect to the uncontrolled movement (runaway) of locomotives NR24 and NR12 from the Pacific National Sydney Operations yard onto the ARTC main line at Chullora, NSW on 23 September 2015. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

Contributing factors

- A terminal operator entered between locomotives AN8 and NR24 disconnecting the air hoses to the main reservoir and brakes, and lifted the pin in the coupler.
- The train crew did not apply the locomotive park brake prior to vacating the cab.
- Power operated point machines at Sydney Freight Terminal eastern interface were not set to direct rolling stock toward the dead end track section.
- The implementation of communication protocols and procedures for the planning and coordination of the shunt was ineffective in ensuring that the shunt plan was clear and unambiguous and that adequate protections against the unintended movement of rolling stock were in place.

Other factors that increased risk

- The engineering control listed in the Pacific National risk assessment SFT SHT-01 incorrectly identified the availability of an automatically operated point machine at the interfaces to the Australian Rail Track Corporation network to mitigate risk from an uncontrolled rolling stock movement.

Safety actions

Additional safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Additional safety action taken by Australian Rail Track Corporation

On 28 October 2015, the Australian Rail Track Corporation issued an instruction to all Network Control Officers at the Network Control Centre South (NCCS), Junee requiring:

- The restoration of the points at the eastern end interface of the Sydney Freight Terminal to the normal position (toward the dead end track section) following each rail movement. There was no exception to this requirement, even when following train movements were to occur.

The Australian Rail Track Corporation also advised the commencement of an investigation into the feasibility of modifications to the signalling control systems to restore the points at the interface automatically and the provision of a catch point alarm on the NCO's control panel at Junee.

Additional safety action taken by Pacific National

Pacific National post incident actions included:

- Toolbox meetings involving all train crew and terminal operators at the Sydney Freight Terminal briefing on the incident and reinforcing the importance of correct communications and the need to follow procedures.
- Issue a Business Safety Notice, BSN 15-29 to outline the restrictions on terminal operators uncoupling locomotives, reiterate the application of the three-step protection, and the shunting procedures.
- The provision of a manually operated derail situated at the entrance to the Number 9 road in the Gantry road area.
- The review and update of the shunting procedures used at the Pacific National Sydney Freight Terminal. The revised procedure includes instruction prohibiting Terminal Operators from uncoupling locomotives from other locomotives.
- The locomotive crew undertook re-training in the relevant procedures for securing locomotives and in radio protocols.
- Pacific National monitors, on a random basis, the orientation of turnouts at the interface. Where found to be incorrectly set, the ARTC control centre at Junee is requested to set the points for the correct orientation.

General details

Occurrence details

Date and time:	23 September 2015– 1751 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runaway	
Location:	Chullora NSW	
	Latitude: 33° 52.990' S	Longitude: 151° 4.006' E

Train details

Train operator:	Pacific National	
Registration:	Light locomotives ex train 4MW2	
Type of operation:	Freight	
Persons on board:	Crew – 0	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Damage:	None	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Australian Rail Track Corporation
- Pacific National
- Pacific National Sydney Freight Terminal staff
- Office of the National Rail Safety Regulator
- Office of Transport Safety Investigations
- RISSB Glossary of Railway Terminology – Guideline Version 1, December 2010

References

Australian Rail Track Corporation ESD-05-01 Common Signal Design Principles S1 – Signalling Locking and Train Dynamics, Version 3.0 Dated 13 October 2015

Australian Rail Track Corporation, Interface Agreement IA1919, Version 8 - draft, dated 23/04/2015

Independent Transport Safety Regulator, Transport Safety Alert, TSA no. 36, Dated 13 April 2011, Effective securement with handbrakes and stop block functionality

Office of Transport Safety Investigations, Rail Safety Investigation Report, Runaway of Rolling Stock, Enfield Yard, 3 May 2011, Investigation reference 04514

Pacific National, Safety Standard Form risk assessment, SFT SHT-01, Revision 4

Pacific National, PN-STD-SAF Shunting Standard, Version 1, 1 June 2015

Pacific National, PN-PRO-SAF Shunting Procedure, Version 1, 1 June 2015

Pacific National, GPR_6_10 Securing Trains with Park Brakes – R02, Dated 1 July 2015

Pacific National, GPR_6_12 Securing Locomotives with Park Brakes R02, Dated April 2009

Rail Safety National Law National Regulations 2012

Submissions

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

A draft of this report was provided to the Australian Rail Track Corporation, Pacific National, the Office of the National Rail Safety Regulator and the relevant Sydney Freight Terminal staff involved in the shunt of 4MW2.

Submissions were received from the Australian Rail Track Corporation, Pacific National, the Office of the National Rail Safety Regulator. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Australian Transport Safety Bureau

Enquiries 1800 020 616

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Investigation

ATSB Transport Safety Report Rail Occurrence Investigation

Locomotive runaway at the Sydney Operations Yard
Chullora, New South Wales, 23 September 2015

RO-2015-017

Final – 11 October 2016