Australian Government
Australian Transport Safety Bureau

Overrun of authority involving train 6MP5

Blamey, Western Australia, 14 July 2013

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Addendum

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Safety summary

What happened

At about 2121 on 14 July 2013, Pacific National intermodal freight train 6MP5 overran the limit of its authority at Blamey, Western Australia. The train travelled 23 km into the Blamey to Curtin section before the crew realised the overrun had occurred and stopped the train.

The crew did not immediately report the overrun to the Network Control Officer as required. Instead, they provided misleading information about the train's location and that they were having problems with the on board communication systems. Unaware of the authority overrun, the Network Control Officer issued a Train Authority for train 6MP5 to proceed from Blamey to Parkeston.

The train crew signed off duty at Parkeston and after reflecting on their actions reported the occurrence to the Pacific National Kalgoorlie Depot Manager the following day.

What the ATSB found

The ATSB found that during the safety critical period approaching the limit of authority at Blamey, the train crew had focused their attention on planning for the upcoming refuelling at Parkeston. As a result, they were distracted from the primary task of driving the train and missed vital cues and information that identified the limit of the current train authority.

The investigation also found that there were inconsistencies in the instructions contained in the various Pacific National procedural documents relating to refuelling at Parkeston.

What's been done as a result

Pacific National has amended procedures related to the arrangements for refuelling trains at Parkeston to remove inconsistencies and ensure that ancillary tasks do not have the potential to distract train crews from undertaking safety critical work.

Safety message

Train crews must be cognisant of and apply the operational procedures intended to prevent or control the consequence that may arise from an overrun of authority.

Rail transport operators should ensure that any ancillary tasks undertaken by a train crew do not have the potential to divert attention away from the safe operation of a train.

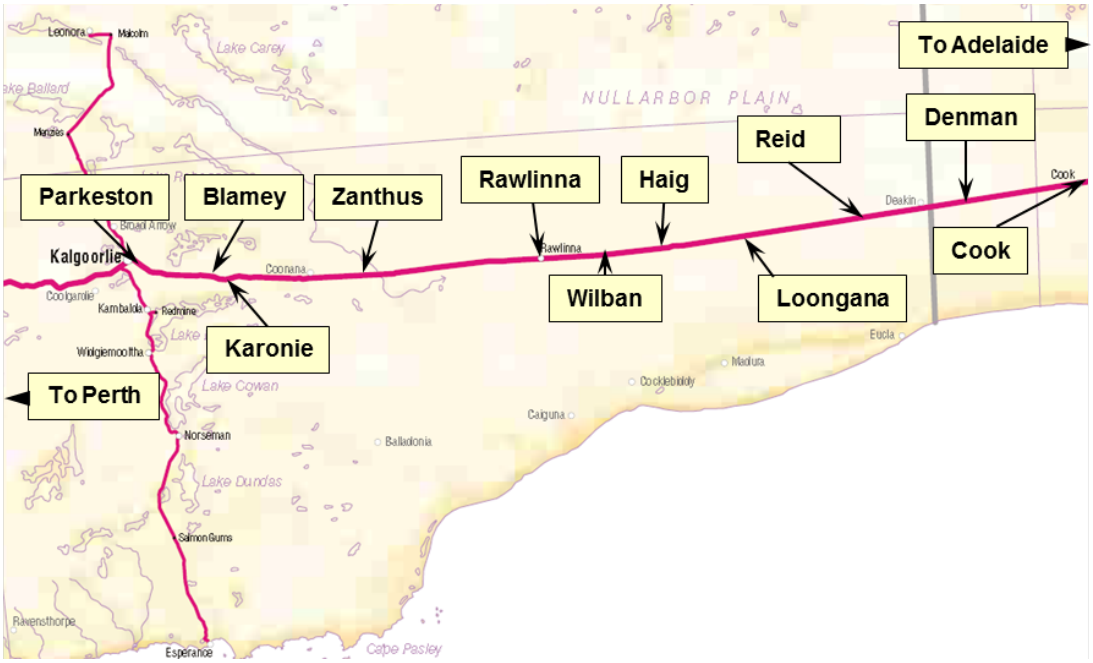
Contents

The occurrence

At about 1208[1] on 14 July 2013, the crew of Pacific National freight train 6MP5 received a train authority[2] from the Australian Rail Track Corporation (ARTC) Network Control Officer (NCO) that authorised them to depart Cook, South Australia, and commence their journey toward Parkeston, Western Australia (located on the eastern outskirts of Kalgoorlie) (Figure 1).

At about 1217, the train departed Cook and travelled in a westerly direction in accordance with a sequence of train authorities issued by the NCO that included train 6MP5 crossing two opposing (eastbound) trains en route at Denman and Reid. At Reid, the crew received a train authority to continue travel to Loongana where a cross with an opposing train was scheduled.

Figure 1: Location of Blamey crossing loop and other referenced locations



Source: Geoscience Australia, annotated by ATSB

At about 1542, as train 6MP5 approached Loongana, the crew received the next train authority that authorised travel through to Blamey. The crew completed the cross at Loongana and, at about 1606, departed toward Blamey, a distance of about 450 km. The crew understood from the information contained in the train working advice[3] documentation that there were no other train crosses between Loongana and Parkeston.

At about 1712, the crew of train 6MP5 overheard a radio transmission to the NCO in which the crew on the train ahead of 6MP5 reported their arrival at Kalgoorlie. The crew of train 6MP5 assumed that they would not need to stop before Parkeston and expected the NCO to issue the next train authority before they arrived at Blamey.

Due to a gang working on the track at the 1,338 km mark between Haig and Wilban, the NCO requested the crew to advise when train 6MP5 had cleared the gang's worksite and again when they had departed Wilban. At about 1719 and at 1731 respectively, the crew contacted the NCO to report the time that 6MP5 had cleared the worksite and departed Wilban.

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1 The 24-hour clock is used in this report and is referenced from Western Standard Time (WST), UTC +8 hours.

2 An instruction in the prescribed format issued by the NCO in connection with the movement of a train.

3 Operational information supplied by the NCO, which the train crew record on a form. The form records information relating to opposing, preceding and following trains as well as temporary speed restrictions that may be applicable.

At about 1948, near Zanthus, the train crew exchanged roles (driver and co-driver) and they checked the instructions on the current train authority to verify with each other their understanding of its content. They then continued toward the limit of the current authority.

At about 2105, as train 6MP5 approached Karonie, the last crossing location before Blamey, an officer from the Pacific National Intermodal Service Delivery Centre (ISDC) contacted the train crew via mobile telephone to update them on the upcoming crew change arrangements and to determine whether refuelling was required on arrival at Parkeston. After a discussion, the ISDC advised the crew to add fuel to ensure that there was sufficient to complete the trip.

Shortly afterwards, the co-driver attempted to contact the refuelling contractor by mobile telephone to confirm arrangements. This call was unsuccessful and the co-driver made three further unsuccessful attempts to contact the refuelling contractor, with the last occurring at about 2121, as train 6MP5 passed through Blamey. The train crew continued to evaluate the fuel reserve to determine whether it would be sufficient for train 6MP5 to reach Perth if refuelling was not possible.

At about 2130, the fuel contractor returned the telephone call to the co-driver and arranged the refuelling. Shortly after completing this call, the co-driver realised that they had not received authority to continue past the yard limit board situated at the eastern end of the Blamey crossing loop.

At about 2135, the driver stopped train 6MP5 at the 1,714 km point in the Blamey to Curtin section. The crew had exceeded the limit of their authority by about 23 km. The crew then contacted the NCO via ultra-high frequency (UHF) radio and reported that they were experiencing problems with the communication equipment on board train 6MP5 and that they had been on the main line at Blamey since 2110. The crew did not inform the NCO that they had exceeded their authority. The NCO was not aware of any communication issues with train 6MP5 or that the crew had exceeded the limit of their authority. The NCO requested the running times for train 6MP5 through each location between Rawlinna and Blamey and then issued the next train authority for train 6MP5 to proceed to Parkeston.

At about 2244, train 6MP5 arrived at Parkeston, where the crew handed the train over to a relief crew. The train crew who were involved in the authority exceedance (incident crew) then travelled by road to the Pacific National offices in Kalgoorlie. At 2300, they signed off duty.

It was not until a few hours later that the incident crew contacted the Pacific National Depot Manager to report the occurrence. That morning (15 July), Pacific National staff reported the occurrence to the relevant regulatory authorities and the ARTC. The company then commenced an internal investigation.

Context

Location

Blamey is a crossing loop located at the 1692.000 km[4] point on the Defined Interstate Rail Network (DIRN) in Western Australia. Train movements through this portion of the DIRN are managed by the ARTC from the network control centre located at Mile End, Adelaide, South Australia.

Train and crew information

Train 6MP5 was an intermodal freight service operated by Pacific National between Melbourne and Perth via Adelaide. The train departed Melbourne on 12 July 2013 and arrived in Adelaide the following day.

On departure from Adelaide, the train consisted of locomotives NR 121 (leading) and NR 104 (trailing) hauling 40 wagons for a total length of 1,732 m and gross mass of 4670 t. The train continued its journey toward Port Augusta and following a crew change continued to Cook where another crew change occurred and the incident crew took control of the train.

Train crew

At the time of the occurrence, the driver of train 6MP5 had 6 years railway experience, with 3 years of that time spent working on the Defined Interstate Rail Network (DIRN) between Cook and Parkeston.

The co-driver had over 30 years of railway experience, 25 years of which was spent working on the DIRN in both South and Western Australia. The driver and co-driver were qualified in the operation of the locomotives, the ARTC Code of Practice (CoP) and in route knowledge for the portion of the DIRN between Cook and Parkeston.

Toxicology, medical and physiological factors

The crew did not immediately report the overrun of authority. Therefore, a screening test for the presence of alcohol did not occur until the crew reported to the Pacific National offices the following day. Each crew member tested negative to the presence of alcohol. The unavailability of Pacific National's contractor delayed the drug-screening test by a further day. Pacific National was unable to locate the contractor's report from the drug screening but confirmed to the ATSB that as no follow-up action was necessary, the results had been negative to the presence of a drug.

An examination of the driver's and co-driver's health assessment records confirmed that their health assessments were current and that the individuals had been assessed as meeting the required standard, prescribed by the National Standard for Health Assessment of Rail Safety Workers. There was no evidence to suggest that any medical or physiological factors affected their performance leading up to or during the incident.

Fatigue

Fatigue can have a range of influences on performance, such as decreased short-term memory, slowed reaction time, decreased work efficiency, reduced motivational drive, increased variability in work performance, and increased errors of omission.[5] Fatigue impairment has been identified as a contributing factor in accidents and limit of authority exceedance incidents such as a Signal Passed at Danger.

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[4] Distance in track kilometres from a reference point located at Coonamia near Port Pirie, South Australia.

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

Prior to this shift, the incident crew had been rostered off duty for 2 days before working train 6PM7 from Parkeston to Cook on 13 July 2013. The crewing on this train was undertaken using a team of four drivers working in relay shifts. The incident crew operated train 6PM7 during the first shift of their roster and then travelled in the crew van to rest during the second half. On arrival at Cook, the incident crew left the train and booked off duty at about 2115 on 13 July. The crew then retired to the accommodation facilities provided at Cook.

The incident crew were expecting to begin their next shift at 0955 on 14 July, to operate train 6MP5 from Cook to Parkeston. They contacted the ISDC officer earlier that morning to ascertain the expected arrival time of train 6MP5. The officer advised that the train was running late, and therefore they would be on a 1-hour call notification, which required the train crew to be on standby. The ISDC officer contacted the train crew at 1020 and asked that they be available to commence duty at 1120.

The duration of the off duty period meant that there was sufficient opportunity available for the incident crew to attain restorative sleep prior to commencing work. The drivers each advised that they had a good night's sleep and felt well rested when they commenced duty. Therefore, it is unlikely that fatigue adversely affected the crew's performance during this shift.

Safeworking system

The ARTC managed the safe movement of trains on the section of the DIRN between Cook and Parkeston via a verbal communications based train order working system (TOW). The system required the NCO to issue an authority to the train crew, who then recorded the authority on a paper based Train Authority (TA) form. The crew validated the content by reading the TA back to the NCO. The TA, once validated, authorised the crew to proceed between the specified locations and in accordance with any additional instructions. The train crew executing the TA were required to comply with instructions contained in the TA together with the applicable rules and procedures contained in the ARTC Code of Practice for the Interstate Rail Network (CoP).

Train Authority rules and procedures

The NCO could issue a TA that authorised the crew to travel over a series of consecutive track sections that included a number of crossing loops or other locations. To enable the coordination of other train movements, the NCO may also request that the train crew report the times of their arrival or departure from specified locations en route.

When operating under the TOW system, the CoP Operations and Safeworking Rules specified the requirements for the train crew reporting the progress of the train and the requirement for the crew to verify the TA and other information as they approached each crossing location.[6] The verification procedure required the display of the TA in clear view of the driver and that each crew member check and verbally advise each other of the contents to ensure they complied with its meaning. The CoP also required the train crew to verify the train authority with the NCO prior to entry into a section where a train cross was to occur or where the limit of the train authority ended at the next location.[7]

Train authority issued to train 6MP5

The NCO issued TA W97 en route, as train 6MP5 approached Loongana. The TA authorised the crew to travel to Blamey, a total distance of about 450 km, through 12 locations and with a nominal run time of about 5 hours. The train authority did not contain any additional instructions or requirements for reporting to the NCO, but the CoP rules did require train crews to contact the

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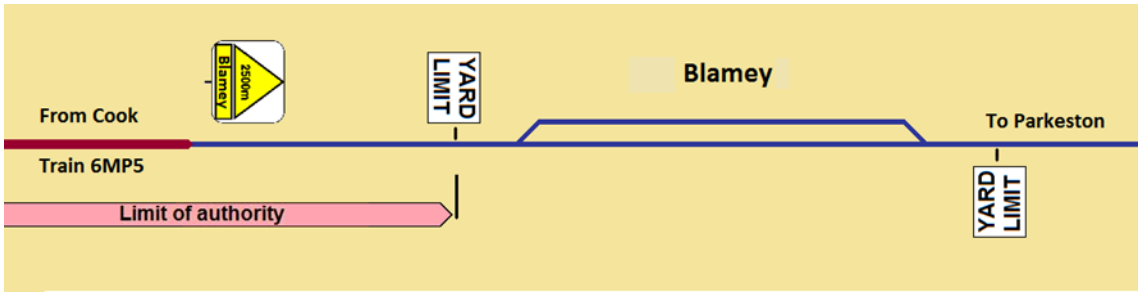
6 Section 5.7 (d) Code Of Practice for the Defined Interstate Rail Network, Volume 3, Operations And Safeworking, Part 1: Rules, ARTC annotated version, May 2002

7 Section 3.13 (f) (i) Code Of Practice for the Defined Interstate Rail Network, Volume 3, Operations And Safeworking, Part 1: Rules, ARTC annotated version, May 2002

NCO and verify their understanding of the current train authority at the location before the limit of their authority, in this case Karonie (about 20 km before Blamey).

Train authority TA W97 did not specify which line train 6MP5 was to occupy at Blamey. Therefore, the limit of authority for train 6MP5 was the Yard Limit sign at the eastern end of the yard as per the rules contained in the CoP.[8] Yard Limit signs are located 100 m prior to the facing points at each crossing loop. Location Ahead signs are placed 2,500 m before the Yard Limit to warn train crews or other rail safety workers that they are approaching a crossing loop (Figure 2).

Figure 2: Illustration of 6MP5 limit of authority at Blamey



Source: ATSB

Pacific National systems

In-cab activated points and GPS location alerter systems

The Pacific National NR Class locomotives were fitted with an ARTC in-cab activated points system (ICAPS), and the Pacific National AWARE[9] and GPS location alerter systems. The systems were interconnected to provide the required functionality.

The ICAPS enabled the remote operation of the self-restoring point machines[10] at crossing loops by the crew from the locomotive cab. This functionality allowed train crews to set the required route without having to stop the train. ICAPS activation occurred at a strike-in point (generally 5 to 8 km from the facing point at each crossing location) and remained active for a distance of about 2 km, providing a window within which the crew was able to select the points. The functionality to operate the points deactivated when the train was outside this window. If the points were required to be set manually, the train crew had to stop the train and operate the point machine using pushbutton controls located on a hut adjacent to the point machine.

When ICAPS activated, a screen in the locomotive cab displayed a message showing the location name and two touch-screen buttons. An audible tone accompanied the message to alert the driver that the system was active. The crew could then set the points for the crossing loop, dismiss the message and leave the points set for the main line or take no action. If the crew took no action, the points would remain in the current lie (usually set for the main line).

The GPS location alerter system was an enhancement to the AWARE system that provided track position information to the train crew when approaching a crossing loop or block point location.[11] The purpose of the system was to 'prompt the train crew to check their current limit of authority'.[12] If the crew had already selected, via the ICAPS, a route onto the crossing loop track, the alerter

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8 Section 3.9.4 (b) Code Of Practice for the Defined Interstate Rail Network, Volume 3, Operations And Safeworking, Part 1: Rules, ARTC annotated version, May 2002.

9 Australia Wide Augmented Radio Environment System, a touch screen communications system. An AWARE screen is provided for both the driver and observer (co-driver) positions in the locomotive cab.

10 A qualified employee sets the self-restoring point machine to the required lie prior to the passage of a rail vehicle. The self-restoring point machine automatically returns to the default position following the passage of the rail vehicle.

11 A place where trains are not able to cross or pass but is available for the purpose of reporting or obtaining an authority.

12 Pacific National Information Bulletin No. 54A, AWARE Train Radio System, GPS Location Alerter – Driver Information System.

would not activate. This feature avoided unnecessary alerts when the train crew had already undertaken a safeworking operation and therefore should have already checked the train authority.

The GPS location alerter system also provided a message on the AWARE screen when the locomotive was about 5 km from the next crossing location. The message prompted the train crew to check the current limit of authority. A single audible beep sounded, but there was no requirement to acknowledge the message.

When a locomotive was within 3 km of the crossing location, the system generated three audible beeps and a message on the AWARE screen. For this alert, the system required the train crew to acknowledge within 10 seconds using the AWARE system touchscreen located adjacent the co-drivers position. If this alert was not acknowledged, the audible beeps continued with increasing volume until actioned or the system detected that the train had travelled a distance of 3 km past that particular crossing location.

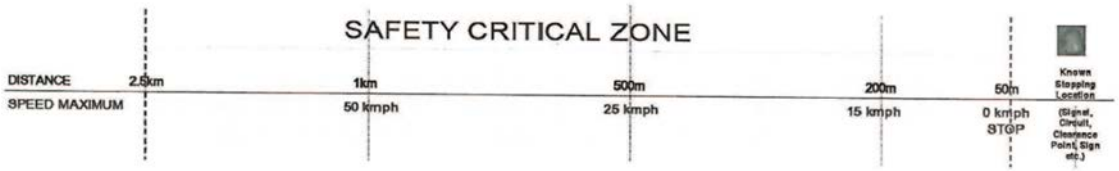
When the locomotive was about 3 km past the crossing location, the AWARE screen displayed a further message identifying the name and track kilometre point of the next crossing loop. This was not accompanied by an audible tone and there was no requirement to acknowledge it.

Together, this combination of systems provided a sequence of messages and audible alerts to the train crew at each location that the train traversed. The systems did not have (nor were they required to have) the functionality of providing real time train location information to network control.

Safety critical zones

The Pacific National document Defensive Train Handling Techniques and Strategies provided general advice for the safe working and operation of Pacific National intermodal services throughout Australia. The document defined a safety critical zone (Figure 3) and specified the need for the train crew to restrict all their actions and attention to safety critical communication and appropriate defensive driving and train handling techniques within this zone, to ensure that they stop the train prior to the designated stopping point.

Figure 3: Pacific National Safety Critical Zone



Source: Pacific National

There were two locations critical to ensuring that train drivers were aware of their authority limits and that they took appropriate action to ensure they did not exceed those limits. The first was at the location before the limit of their authority, where the crew were required to contact the NCO and verify their train authority as per the CoP, in this case at Karonie (about 20 km before Blamey). The second was the safety critical zone where attention should be directed at safety critical tasks and communication, in this case the 2.5 km between the Location Ahead sign leading up to the limit of authority at the Yard Limit board at Blamey.

Previous occurrences

In 2011, the ATSB investigated a Signal Passed at Danger (SPAD) that occurred at Dry Creek, South Australia, on 11 October 2011.[13] In this occurrence, Specialised Bulk Rail (SBR) train 1901S passed signal 13 at Dry Creek, which was displaying a stop (red) indication. The train subsequently collided with an opposing GWA train (5132S).

This investigation identified a number of factors that may have distracted the train crew from their primary task of train driving. Furthermore, safety issues were also identified relating to the operators procedures and training process.

[13] ATSB investigation number RO-2011-016 – Collision between train 1901S and train 5132S at Dry Creek, South Australia, on 11 October 2011.

Safety analysis

Factors affecting the train crew's actions

The primary task of the driver was to control the movement of train 6MP5 to safely negotiate the track section ahead. Similarly, the primary task of the co-driver was to provide support to the driver and to check that the actions of the driver were appropriate in controlling the train for the conditions ahead. Both drivers were required to observe and crosscheck the correct interpretation of the respective train authorities and to respond appropriately to potential hazards.

The crew were cognisant of the Pacific National procedures related to defensive train handling techniques and strategies, the ICAP and GPS alerter systems and local safety notices that reinforced the CoP rules relating to the verification of train authorities. However, in this case, the crew's attention was on the ancillary task of arranging for the refuelling the locomotives as they approached the limit of their authority. This probably reduced their capacity to correctly perceive or comprehend the cues that could alert them to the approaching limit of authority.

The crew were also aware of the requirement in the CoP to report any incident en route, such as a limit of authority overrun, so that the NCO could implement measures to protect the train against immediate danger. In this case, the crew did not immediately report the incident because they assumed from the information available to them at the time that there was no other movement ahead and therefore no risk of collision with another train.

The crew stated that they initially panicked and chose not report the authority exceedance as they were in fear of the potential for punitive action by Pacific National, such as dismissal. However, the crew's decision not to report the authority exceedance and to provide misleading information to the NCO compromised the effectiveness of the TOW safeworking system.

After booking off duty, the crew reflected on their decision and reported the incident the following morning to Pacific National management at Kalgoorlie. Pacific National immediately suspended the crew from duty pending the outcome of an internal investigation into the incident.

Workload, attention and distraction

Human information processing is limited in that each person has finite mental resources available to attend to information or perform tasks at any particular time. In general, if a person is focussing on one particular task, then their performance on other tasks will be degraded.[14]

In this case, the crew of train 6MP5 overran the limit of their train authority while their attention was on an ancillary task. The investigation examined the factors which potentially influenced their performance and the systems that may have increased the risk of human error.

To share workload, Pacific National required the driver and co-driver to exchange the driving task at regular intervals en route between Cook and Parkeston. On the 6MP5 service, the crew exchanged the driving task at Forrest, Rawlinna and Zanthus. The crew recalled verifying with each other their understanding of the respective train authorities at the locations where a driver change occurred.

The Pacific National GPS location alerter system is a tool designed to assist train crews by drawing their attention to safety critical tasks through the provision of prompts at defined locations where safeworking functions may occur. There was no evidence that the GPS location alerter system did not function correctly, or that the train crew did not acknowledge the alerts as required. Therefore, between Cook and Loongana, the GPS location alerter system prompted the crew on

[14] Kahneman, D. (2011). Thinking Fast and Slow. Farrar, Straus & Giroux: New York.

seven[15] occasions to verify the content of the current train authority. Of these prompts, three[16] coincided with a requirement for the crew to undertake a safeworking function in crossing an opposing train.

The crew stated that they verified the train authority when they changed over the driving tasks but could not recall verifying the content of the respective train authorities prior to crossing each of the opposing trains or when acknowledging the alerter prompts triggered at each of the 18 locations after departing Cook. A review of the voice recordings from the ARTC network control centre found that the crew had contacted the NCO around Deakin, which was the location before the end of the current authority to Reid (TA W77). During this contact, the crew reported their arrival and departure time from the various locations en route and verified the content of their train authority, as was required under the rule contained in the CoP. After departing Reid, and prior to the crew reaching the limit of their next authority at Loongana (TA W91), the NCO contacted the train crew to issue a further authority TA W97.

Train authority W97, required no additional action from the crew until train 6MP5 arrived at Blamey. After receipt of TA W97, the train crew undertook two driver changes and acknowledged the GPS location alerter prompt as train 6MP5 approached each crossing loop location. After the last driver change at Zanthus, about 120 km before Blamey, train 6MP5 travelled through two more crossing locations before approaching Karonie, which was the last location prior to the limit of the current authority. There was no record of the train crew contacting the NCO at Karonie to verify the understanding of the current train authority.

Distraction

Distraction can be understood as a type of inattention, where a person's attention is diverted by a particular event or object. Driver distraction has been more specifically defined as 'the diversion of attention away from activities critical for safe driving toward a competing activity (occurring) voluntarily or involuntarily.'[17]

The CoP required that the train crew remain vigilant and not engage in any activity on the locomotive that distracts from attention to safety[18] and that the train crew verify their train authority with the NCO prior to entry into a section where the limit of the train authority ends at the next location. In this case, the crew was to undertake this requirement at Karonie. This did not occur, as around the time that train 6MP5 approached and passed through Karonie, the crew became preoccupied with fuel calculations and making various telephone calls to the ISDC and the refuelling contractor in preparation for the train's arrival at Parkeston.

The calculation of fuel requirements and continuing attempts to contact the refuelling contractor diverted the attention of both members of the crew from safety critical driving tasks associated with the approach to the limit of authority. In this case, the alerts provided by the ICAPS and GPS alerter systems as train 6MP5 entered the safety critical zone and approached the limit of authority at Blamey were not sufficient to draw the crew's focus of attention back to their primary tasks.

The train crew stated that they could not recall acknowledging the alerts but had probably done so while attending to the refuelling arrangements for the train. The crew probably acknowledged the alerts at Blamey in much the same way they had acknowledged the alerts 18 times since departing Cook, only three of which were associated with a limit of authority. The other 15 alerts

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15 An audible prompt did not occur at Reid as the train crew had selected the crossing loop via the ICAPS, which cancelled the GPS location alerter function.

16 Locations of Denman, Reid and Loongana.

17 Regan, M.A., Hallett, C. & Gordon, C.P. (2011). Driver distraction and driver inattention: Definition, relationship and taxonomy. *Accident Analysis and Prevention, 43,* 1771-1781.

18 Section 5.4 (b) Code Of Practice for the Defined Interstate Rail Network, Volume 3, Operations And Safeworking, Part 1: Rules, ARTC annotated version, May 2002

acknowledged by the crew could be likened to false alarms, as they were unrelated to a limit of authority and required no action other than to recheck the current train authority.

Research into human compliance with automation has found that operator compliance with automation decreases as the false alarm rate increases, eventually reaching a cry-wolf effect where the operator (either consciously or unconsciously) ignores the automation[19] [20], thus reducing or even negating its effectiveness.

Pacific National refuelling procedures

The Pacific National intermodal procedures manual[21] contained instructions relating to the refuelling of trains at Parkeston. The instruction 'Direct in line refuelling/isolation procedures at Parkeston' required the crew of a train approaching Parkeston to contact the ISDC when they were 1.5 hours out of Parkeston and advise of the anticipated fuel level on arrival. The ISDC was then required to determine the amount of fuel required, the train's arrival time and notify the refuelling contractor about 1 hour prior to the trains anticipated arrival to finalise arrangements.

In addition, the train management plan[22] carried on board the train also included instructions related to refuelling. However, this plan required the train crew to 'Call the fuel tanker, advise approx. arrival time & requirements'. The timing when the crew were required to undertake this instruction coincided with the train passing through the Karonie crossing loop location situated about 1.5 hours running time out of Parkeston.

The instructions contained in the train management plan and the intermodal procedures manual were inconsistent in defining the responsibility between the ISDC and train crew for undertaking this task.

In this case, the limit of authority was at Blamey which, due to the rules documented in the CoP, also placed a safeworking task at Karonie for verifying the train authority. However, the ISDC contacted the crew of train 6MP5 as they approached Karonie to discuss the relief crewing and other arrangements for the arrival of the train at Parkeston, including its refuelling. The train crew then, as per the instruction in the train management plan, undertook the task of calculating the amount of fuel required and contacting the refuelling contractor to make the final arrangements.

An important consideration in assigning a task to a train crew is the potential for this additional workload to divert the attention of the crew away from another safety related task. As previously discussed, in this instance these tasks occupied the train crew's attention at both locations that were critical to ensuring they were aware of their authority limits and would take appropriate action to ensure they did not exceed those limits.

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19 Dixon, S.R. & Wickens, C.D. (2006). Automation reliability in unmanned aerial vehicle control: A reliance-compliance model of automation dependence in high workload. *Human Factors, 48 (3)* 474-486.

20 Rice, S. (2009). Examining single and multiple-process theories of trust in automation. *The Journal of General Psychology, 136 (3)* 303-319.

21 Intermodal Procedures Manual, Part C, Kalgoorlie Drivers Depot, Direct In Line Refuelling/Isolation Procedures at Parkeston 12 July 2012.

22 A record of a Pacific National train consist details, train-running information and crew tasking associated with the operations of the train service.

Findings

From the evidence available, the following findings are made with respect to the overrun of the limit of authority at Blamey by train 6MP5 on 14 July 2013. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

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

Contributing factors

- The train crew did not contact the Network Control Centre at the location prior to the limit of the current train authority (Karonie) to verify their understanding of that train authority with the Network Control Officer.
- The train crew did not verify the content of the train authority with each other when approaching the limit of the train authority at Blamey.
- Both members of the train crew focused their attention on the arrangements for the refuelling on arrival at Parkeston. This resulted in them missing vital cues and information which identified the limit of the current train authority.
- **The instructions relating to the arranging of refuelling at Parkeston contained in the Pacific National train management plan and the intermodal procedures manual were inconsistent. [Safety issue]**

Other factors that increased risk

- The train crew did not immediately report the limit of authority overrun to the Network Control Officer.

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and 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.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Inconsistency in defining responsibilities for the refuelling of locomotives

Number:	RO-2013-019-SI-01
Issue owner:	Pacific National
Operation affected:	Rail: Freight
Who it affects:	All rail safety workers and rolling stock operators

Safety issue description:

The instructions relating to the arranging of refuelling at Parkeston contained in the Pacific National train management plan and the intermodal procedures manual were inconsistent.

Response to safety issue by: Pacific National

Action number: RO-2013-019-NSA-052

Pacific National has amended the train management plan and the intermodal procedures manual to remove inconsistencies between the instructions and to ensure that any ancillary tasks undertaken by train crew do not have the potential to divert attention away from the safe operation of the train.

The intermodal procedures manual now requires train crews to contact the ISDC prior to arriving at Parkeston with advice of the locomotive/s requiring fuel and the locomotive anticipated fuel level on arrival at Parkeston. This contact is not to interfere with train safe working or to be conducted in a safety critical area.

Current status of the safety issue

Issue status: Adequately addressed

Justification: Pacific National has reviewed the relevant procedures for arranging the refuelling of locomotives at Parkeston and removed inconsistencies in instructions contained in the documents.

General details

Occurrence details

Date and time:	14 July 2013 – 2121 WST	
Occurrence category:	Incident	
Primary occurrence type:	Safeworking breach	
Location:	Blamey, Western Australia	
	Latitude: 30° 57.946’ S	Longitude : 122° 19.154’ E

Train details

Train operator:	Pacific National Pty Ltd	
Registration:	6MP5	
Type of operation:	Freight	
Persons on board:	Crew – 2	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 (ARTC)
- Pacific National Pty Ltd
- Train crew

References

ARTC Addendum to the Code of Practice for the Defined Interstate Rail Network

ATSB investigation number RO-2011-016 – Collision between train 1901S and train 5132S at Dry Creek, South Australia, on 11 October 2011

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

Code of Practice for the Defined Interstate Rail Network, Volume 3, Operations And Safeworking, Part 1: Rules, ARTC annotated version, May 2002

Dixon, S.R. & Wickens, C.D. (2006). Automation reliability in unmanned aerial vehicle control: A reliance-compliance model of automation dependence in high workload. *Human Factors, 48 (3)* 474-486.

Kahneman, D. (2011). Thinking Fast and Slow. Farrar, Straus & Giroux: New York.

National Transport Commission (2008). National Rail Safety Guideline. Management of Fatigue in Rail Safety Workers. Available from: http://www.ntc.gov.au/filemedia/Reports/NRSG_FatigueManagement_June2008.pdf

Pacific National Intermodal Procedures Manual, Direct In Line Refuelling/Isolation Procedures at Parkeston

Pacific National Information Bulletin No. 64, AWARE Train Radio System, ICAPS – In Cab Activated Points System

Pacific National Information Bulletin No. 54A, AWARE Train Radio System, GPS Location Alerter – Driver Information System

Regan, M.A., Hallett, C. & Gordon, C.P. (2011). Driver distraction and driver inattention: Definition, relationship and taxonomy. Accident Analysis and Prevention, 43, 1771-1781.

Rice, S. (2009). Examining single and multiple-process theories of trust in automation. *The Journal of General Psychology, 136 (3)* 303-319.

RISSB Glossary of Railway Terminology 2010

Submissions

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

A draft of this report was provided to the Australian Rail Track Corporation, Pacific National, the Office of Rail Safety WA, the Office of the National Rail Safety Regulator and the crew of train 6MP5.

Submissions were received from the Australian Rail Track Corporation, Pacific National, the Office of Rail Safety WA and 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 fare-paying passenger operations.

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

Purpose of safety investigations

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

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

Developing safety action

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

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

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

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