



Australian Government

Australian Transport Safety Bureau

Collision between freight trains 7MP5 and 2K66

Jumperkine WA, on 24 December 2019

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Addendum

Page	Change	Date

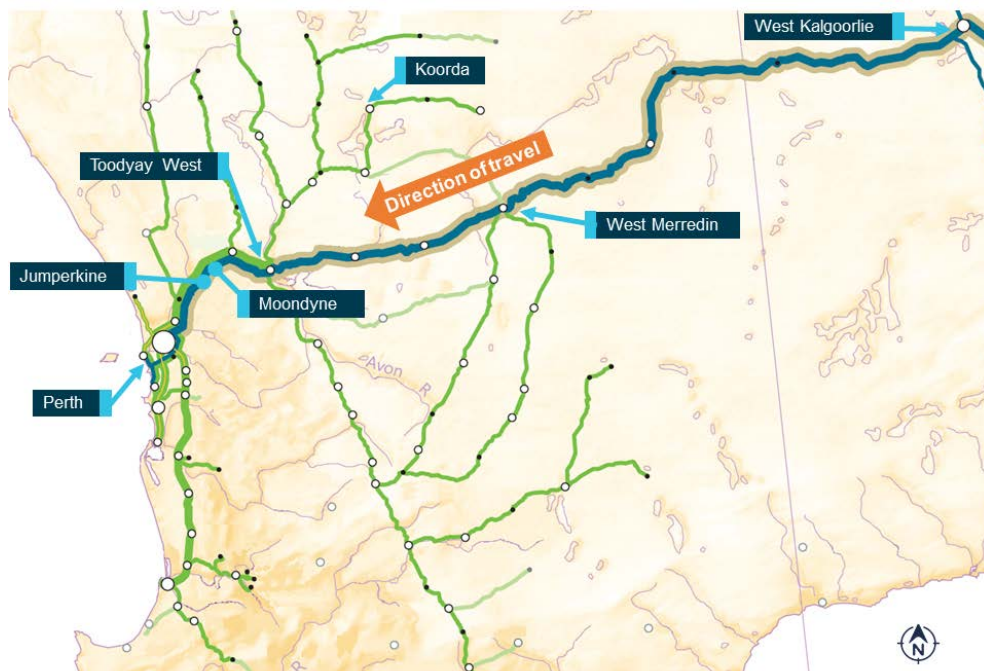
Preliminary Report

The occurrence

Overview

At about 0200¹ on 24 December 2019, freight train 7MP5 (operated by Pacific National) collided with the rear of a loaded grain train 2K66 (operated by Watco) at Jumperkine, Western Australia (WA) (Figure 1). The locomotive cabin of 7MP5 was damaged with a significant amount of grain entering the locomotive cabin. The driver of train 7MP5 sustained fatal injuries.

Figure 1: Kalgoorlie to Perth Arc Infrastructure network geography



The image shows the location and place names of locations relevant to this accident. Source: ARA Railways of Australia Map 2014, annotated by ATSB.

Sequence of events

At about 0340 on the 23 December 2019, the Pacific National driver involved in this accident booked off duty for his rostered rest at the Merredin drivers barracks. The driver's next rostered shift was scheduled to commence later on the 23 December 2019 at 2120. Whilst there had been a change to the assigned train, the driver's actual shift start time remained in line with his previously scheduled start time.

The driver commenced his rostered shift at 2120 and proceeded to West Merredin (Figure 1) to do a crew change with the driver on the incoming train 7MP5. Following the crew change, the new driver and train 7MP5 departed West Merredin and continued towards Perth at about 2207. Train 7MP5 travelled between West Merredin and Jumperkine, with the driver acknowledging the vigilance system² alerts as well as communicating with other train services.

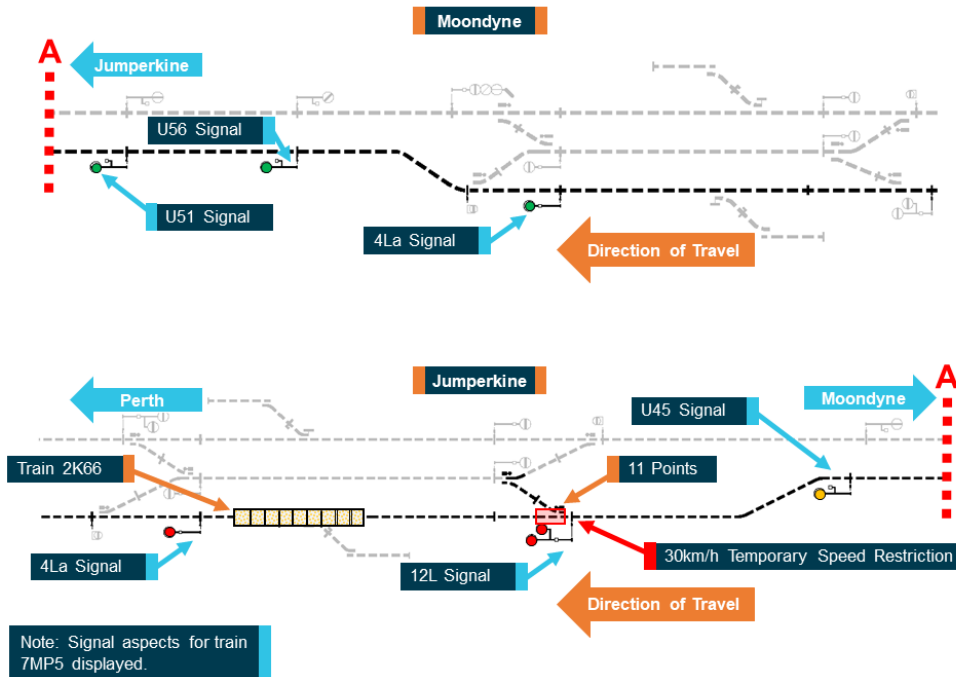
¹ WST, Western Standard Time (UTC +8.0).

² A system that will react by directly initiating an emergency brake application if an acknowledgment input is not received within a specified time increment. Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.

Note: In the NR class locomotive context with respect to driver only operation, the vigilance time up period was set to 50 seconds before an audible and visual alarm would be raised in the locomotive. The time up period count could be reset via the driver's vigilance acknowledgment push buttons, or via other driver actions relating to throttle, braking, or horn operations.

At about 0114 on the 24 December 2019, train 2K66 (also travelling towards Perth) was about 28 km ahead of train 7MP5 as it passed through Toodyay West (Figure 1). Both trains continued their journey towards Perth. About 34 minutes later, Train 2K66, came to a stop on the approach to signal 4La displaying a red, stop aspect at Jumperkine (Figure 2). At about this time, 7MP5 was about 14.5 km behind 2K66 and approaching Jumperkine.

Figure 2: Moodyne to Jumperkine Arc Infrastructure signal system layout



This image shows the signal identifications and track configuration between Moodyne and Jumperkine relevant to the accident. As well as location where train 2K66 was stopped, the signal aspects displayed for train 7MP5, and location of 30 km/h temporary speed restriction after signal 12L. Source: Arc Infrastructure, annotated by ATSB.

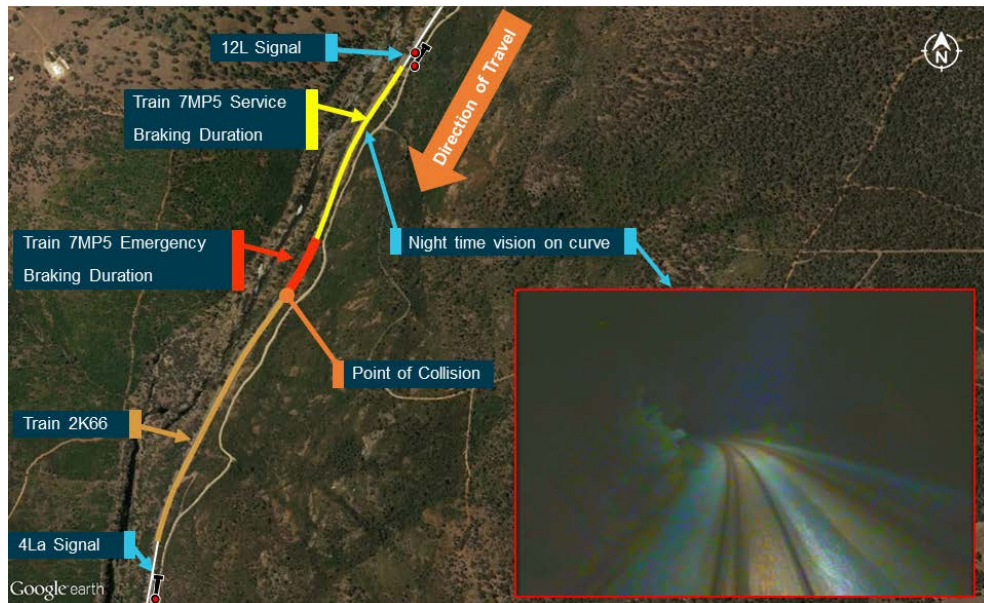
Train 7MP5 passed signal U45 at caution³ (yellow aspect) at about 0156 and proceeded towards the next signal 12L at Jumperkine (Figure 2). At this time, Jumperkine 12L signal was at danger⁴, displaying a red aspect as train 2K66 was stopped with its last wagon about 800 m after this signal (Figure 2).

Soon after passing signal U45, train 7MP5 passed a Temporary Speed Restriction Ahead sign⁵ warning of a 30 km/h speed restriction 2,500 m ahead. The driver of 7MP5 continued towards Jumperkine, without undertaking any driver control changes that would have reset vigilance time count. The driver was acknowledging the vigilance system alerts and resetting the vigilance time count via the driver's push button when necessary. Shortly before signal 12L was likely visible, the driver acknowledged the last vigilance system alert via the driver's push button. About 21 seconds later, train 7MP5 passed Jumperkine signal 12L at danger (Figure 2), travelling at about 72 km/h. This resulted in a 'Signal Passed at Danger' (SPAD) alarm being generated in the ARC Infrastructure network control centre.

³ An aspect which advises the driver that the next signal may be at danger, requiring the train to stop. It is indicated by a single yellow (aspect). Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.
⁴ An indication given by a signal to stop. Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.
⁵ Temporary Speed Restriction Ahead signs are diamond shaped with a yellow background and a horizontal black stripe. This sign is placed 2,500 metres before a Temporary Speed Restriction start sign. Placed below the Temporary Speed Restriction ahead sign is a maximum speed sign displaying the maximum speed permitted for the restricted area. Source: Arc Infrastructure Network Safeworking Rules and Procedures, Rule Number 3025, Version 2.0.

Train 7MP5 continued at a speed of about 72 km/h for about 3 seconds where it passed the Temporary Speed Restriction Start Sign⁶ and entered the start of 30 km/h speed restricted location. About 3 seconds after entering the speed restricted location, a service brake⁷ application was made. The train's speed gradually reduced as it travelled around a sweeping left hand curve and onto a straight section of track (Figure 3). It is likely that the rear of train 2K66 came into view at about this point, and about 28 seconds after the service brake application, an emergency brake⁸ application was made. At this point 7MP5 was travelling at about 59 km/h and was about 175 m from the rear of train 2K66.

Figure 3: Overview of Jumperkine accident site landmarks and braking information.



The image shows the track curvature and geography of the Jumperkine accident site. This includes graphics showing about where service and emergency brake applications were made as well as location of 12L signal and train 2K66. An inset photo shows the night time vision through the curve. Source: Google Earth and Pacific National, Annotated by the ATSB.

Shortly before the collision, the Arc Infrastructure network controller⁹ had commenced calling the driver of 7MP5 on the radio. However, the driver of 7MP5 never replied to the radio calls from the network control officer.

At about 0200, about 13 seconds after the emergency brake application, train 7MP5 collided with the rear of train 2K66. While train speed had further reduced following the emergency brake application, the collision speed was still above 40 km/h (Figure 4). The lead locomotive cabin (NR80) was damaged with a significant amount of grain entering the locomotive cabin. The driver sustained fatal injuries.

Additionally, wagon CBHN 1221 on 2K66, the trailing locomotive of 7MP5 (NR59) and the empty crew van of 7MP5 all sustained substantial damage as a result of the collision.

⁶ Temporary Speed Restriction start signs are circular shaped with a yellow background with a horizontal black stripe. This sign is placed 50 metres before the area covered by a Temporary Speed Restriction. Placed below the Temporary Speed Restriction start sign is a maximum speed sign displaying the maximum speed permitted for the restricted area. Source: Arc Infrastructure Network Safeworking Rules and Procedures, Rule Number 3025, Version 2.0.

⁷ A brake application in the normal operating mode, without using the emergency position. Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.

⁸ Maximum brake application made when a train must be stopped in the minimum distance possible, initiated by the driver or other crew member, or by a fault in the brake system such as rupture to the brake pipe, air hoses becoming disconnected, etc. Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.

⁹ A Competent Worker who authorises and issues Occupancy Authorities, and works points, signals and other signalling equipment to manage routes for safe and efficient transit of rail traffic in the Network. Source: Arc Infrastructure Network Safeworking Rules and Procedures, Glossary, Version 2.0.

Figure 4: Accident site, lead locomotive of 7MP5 and last wagon of 2K66 post collision.



The image shows damage to lead locomotive of 7MP5 (NR80) and last wagon on 2K66 (CBHN 1221) post collision. Source: WA Police and ATSB, Annotated by the ATSB.

Context

Train information

Train 7MP5

Train 7MP5 was a Pacific National intermodal freight service between Melbourne, Victoria and Perth, WA. The train was 1,070 m in length consisting of two NR class locomotives with 25 single and multi-platform wagons and a train weight of 1,958 tonne. A driver only operation¹⁰ was in use for train 7MP5 between West Kalgoorlie, and Perth, WA (Figure 1).

Train 2K66

Train 2K66 was a Watco bulk grain service between Koorda and Perth, WA (Figure 1). The train was 793 m long consisting of two CBH class locomotives and 52 CBHN class grain wagons for a train weight of 3,900 tonne. Train 2K66 was operated by two train crew.

Track information

Arc Infrastructure operated and managed the rail infrastructure from West Kalgoorlie towards Perth, including the Jumperkine accident site. The safeworking system in place between West Kalgoorlie and the Jumperkine accident site was centralised traffic control.¹¹

Safety action

Since this accident, as rolling stock operator Pacific National have taken the following proactive safety actions:

- Risk assessment undertaken to address new identified hazards and permit restart of operations.

¹⁰ Driver only operation is operations in which a single rail safety worker has the responsibility for the operations and procedures of a train.

¹¹ A system of remotely controlling the points and signals at a number of interlocked stations, junctions and crossing loops in automatic signalling areas, from a centralised control room or signal box. Source: RISSB Glossary of Railway Terminology – Guideline, Version 1.0, 3 December 2010.

- Risk assessment undertaken regarding operations between 0001 and 0600, identifying additional controls such as implementation of second person in cab, check in process every 30-45 minutes if services extend after 0001 due to out of course running, and requirement to maintain radio volume at audible levels.

Arc Infrastructure as rail infrastructure manager, have also instigated the following proactive safety actions:

- The fleeting or automatic signal calling function within the Arc Infrastructure network control system is not to be used in the Avon Valley. Train routes must be called as required manually by the network controller.
- Introduction of a process for network controllers requiring that where a train has, or must be, stopped, any following trains must, where possible, be held at the station in the rear and not be advanced until the stationary train has recommenced its journey.
- Commencement of a process requiring communications with train crews in the event a train has stopped ahead of a following train. Where it is necessary to hold trains in the Avon Valley, or a train has come to a stand due to unforeseen circumstances, the first following train must be advised over open channel radio of the circumstances and what their limit of authority is. Acknowledgment of this communication must be confirmed by the train crew.

Further investigation

To date, the ATSB has

- Gathered and undertaken preliminary analysis on:
 - all locomotive event recordings
 - all forward facing locomotive video recordings
 - network control voice recordings
 - Jumperkine and Moondyne signal interlocking event recordings
 - West Kalgoorlie to Jumperkine train control system replays.
- Gathered information about the train, locomotives, rail infrastructure, operational records, employment records, health assessment records, and operational procedures.

The investigation is continuing and will include:

- Review and examination of the functionality of locomotive braking control and vigilance systems.
- Further analysis of the event recordings and video recordings.
- Review of driver only operation risk controls related to collision and authority exceedance (SPAD) hazards.
- Review of controls associated with the management of human performance.
- Review of factors that can affect human performance, such as fatigue, rostering, health and fitness, as well as other factors, including the post-mortem and toxicology analysis of the driver.

A final report will be released at the conclusion of the investigation. Should a critical safety issue be identified during the course of the investigation, the ATSB will immediately notify relevant parties so appropriate safety action can be taken.

The information contained in this preliminary report is released in accordance with section 25 of the *Transport Safety Investigation Act 2003* and is derived from the initial investigation of the occurrence. Readers are cautioned that new evidence will become available as the investigation progresses that will enhance the ATSB's understanding of the accident as outlined in this preliminary report. As such, no analysis or findings are included.

General details

Occurrence details

Date and time:	24 December 2019 – 0200 AWST	
Occurrence category:	Accident	
Primary occurrence type:	Collision	
Location:	Jumperkine, Western Australia	
	Latitude: 31° 42.477' S	Longitude: 116° 5.15' E

Train details

Train operator:	Pacific National Pty Ltd	
Registration:	7MP5	
Type of operation:	Intermodal containerised freight	
Departure:	Melbourne (Vic)	
Destination:	Perth (WA)	
Injuries:	1 Driver fatally injured	Passengers – Nil
Damage:	Substantial	

Train operator:	Watco WA Rail Pty Ltd	
Registration:	2K66	
Type of operation:	Bulk grain freight	
Departure:	Koorda (WA)	
Destination:	Perth (WA)	
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	