



Australian Government

Australian Transport Safety Bureau

Safeworking Breach of Road-Rail Vehicles

Crystal Brook, South Australia, 10 June 2021



ATSB Transport Safety Report

Rail Occurrence Investigation (Short)

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Addendum

Page	Change	Date

Safety summary

What happened

On 10 June 2021, two SPENO Rail Maintenance Australia Road-Rail Vehicles (RRVs), FL18 and SP128, on-tracked at about the 196.012 km point, Binney Road level crossing, at Crystal Brook, South Australia, to undertake ultrasonic rail flaw detection. However, the track worker level 2 (TW) for the RRV travel inadvertently requested the protection limits for Train Running Information (TRI) travel from a location about 3 km in advance of where the RRVs were to on-track. The RRVs on-tracked outside of the protection limits and travelled for about 3 km before protection for the movement was applied by the network controller (NC).

What the ATSB found

The TW incorrectly requested the signal for the protection limits for RRV travel as signal 24 Crystal Brook (current location), instead of signal 24 Rocky River, when communicating with the Australian Rail Track Corporation (ARTC) NC. In addition, there was no confirmation between the TW and the NC of where the RRV's were to on-track while discussing the limits of protection required for the travel. Combined, these factors resulted in the NC applying Blocking Facilities from signal 24D at Crystal Brook to signal 3 at Coonamia and the RRV's operating outside of the limits defined in the Train Running Information.

What has been done as a result

SPENO have undertaken a review and made amendments to processes for on-tracking of RRV's. The proposed amendments include the provision to remove the single point of failure of the TW being responsible for identifying and communicating the location which RRVs would on-track in rail networks.

Safety message

This incident highlights the importance of identifying the location that travel or work on track will commence. Competent workers should provide all the information required for network controllers to identify and confirm that protection limits adequately cover the intended work site. Confirmation of location is especially important for providing Blocking Protection for RRV movements.

The investigation

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

The Occurrence

On 10 June 2021, SPENO Rail Maintenance Australia (SPENO) had planned to conduct ultrasonic rail flaw detection on the Australian Rail Track Corporation (ARTC) Port Augusta Line, South Australia. The testing was to be from the 196.030 km point at Crystal Brook to 94.960 km at Spencer Junction, (Figure 1). The maintenance was planned to be conducted with two Road Rail Vehicles¹ (RRVs), the testing vehicle FL18 (Figure 2) leading, and the hand testing vehicle SP128 (Figure 3) following.

Figure 1: Location of Crystal Brook, South Australia



Source: Google Earth Pro, annotated by the ATSB

¹ A road vehicle fitted with retractable rail guidance wheels. Also referred to as 'hi-rail vehicle'.

Figure 2: SPENO FL18 ultrasonic test vehicle (lead vehicle)



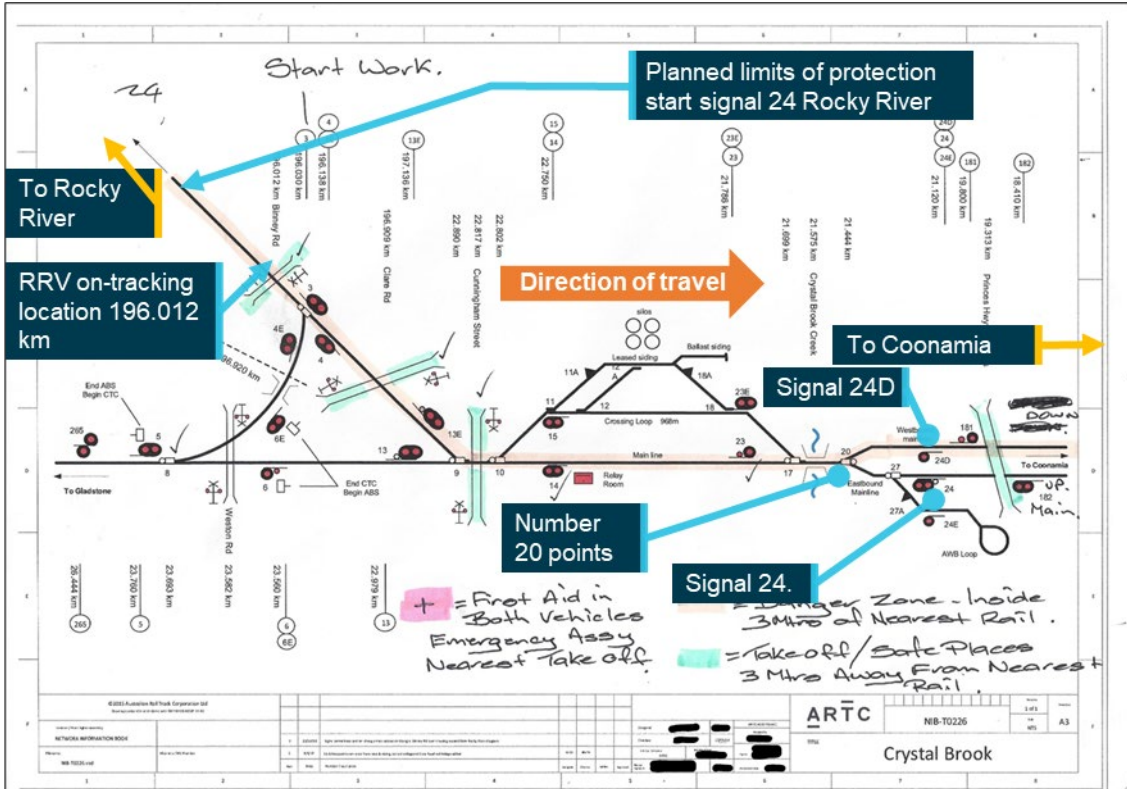
Source: SPENO Rail Maintenance Australia

Figure 3: SPENO SP128 ultrasonic test vehicle (second vehicle)



To provide protection for the travel, a track worker level 2² (TW) assigned to the SPENO RRVs planned the protection required using a Worksite Protection Plan and Worksite Protection Plan Map that was marked with the limits of protection for Train Running Information³ (TRI) travel (signal 24 Rocky River through the Westbound Mainline), RRV on-tracking location (196.012 km) and intended travel path denoted in light brown on Map (Figure 4).

Figure 4: Competent worker map of Crystal Brook showing intended limits of protection for RRVs



Source: Track Worker Level 2 Worksite Protection Plan Map Markup, annotated by ATSB

At about 0715⁴ the TW briefed the SPENO work crew on protection arrangements. The SPENO work crew who attended the pre-work brief by the TW acknowledged the pre-work briefing by signing the Pre-Work Brief Form. At about 0721 the TW contacted the network controller⁵ (NC) to initiate receiving TRI. During the initial conversation the NC asked the TW for their location, to which the TW replied, 'Crystal Brook'. The TW and NC continued to exchange information, which included the limits for TRI travel. For the limits of protection, the TW requested signal 24 at Crystal Brook to signal 3 at Coonamia.

The NC noted Crystal Brook had a signal 24 and signal 24D and asked the TW if they required both the Eastbound Mainline and the Westbound Mainline for the intended work. The TW responded that they only required the Westbound Mainline for the travel, and the NC then stated that signal 24D was the protecting signal for that line.

² A Competent Worker responsible for managing the rail safety component of worksite protection.

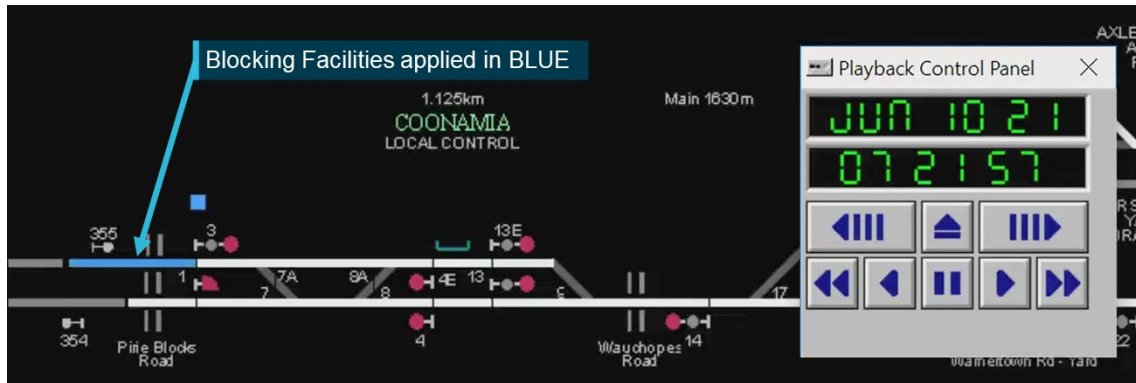
³ Information about rail traffic movement and frequency for a particular location.

⁴ All times are in Australian Central Standard Time (UTC + 10:30) and in 24-hour format.

⁵ A Competent Worker who authorises, and may issue, Occupancy Authorities, and who manages rail traffic paths to ensure safe and efficient transit of rail traffic in the Network.

After the signals for limits of protection were agreed, at about 0722 the NC placed Blocking Facilities⁶ from signal 24D at Crystal Brook to signal 3 at Coonamia (Figure 5).

Figure 5: Phoenix showing Blocking Facilities applied (blue section)



Source: Australian Rail Track Corporation, annotated by ATSB

After the TW received the TRI at about 0735, the SPENO crew prepared the RRVs and on-tracked at the 196.012 km point at the Binney Road Level crossing and proceeded towards Coonamia, conducting ultrasonic tests as they proceeded. On arrival at the number 20 points for the turnout⁷ to the Eastbound Mainline or Eastbound Mainline at Crystal Brook, located at 21.144 km⁸, the crew observed that the turnout was set for the Eastbound Mainline. The TW contacted the NC to request the number 20 points be set for their intended route to the Westbound Mainline.

The NC questioned the work crew's current location, and after confirmation, the NC informed the crew that they were outside of the limits of protection. The TW then explained to the NC that they had on-tracked the RRVs at the 196.012 km Binney Road Level Crossing, which was about 3 km prior to the start limits of the protection applied by the NC. Figure 6 depicts the travel of the RRVs outside of their protection limits in red. The RRV end location and green section of track indicate the location of where the original protection limits started. (Figure 6).

Figure 6: Path of RRV's outside of protection



Source: Google Earth Pro, annotated by the ATSB

⁶ A facility or device used by a competent worker to prevent either the unintended issue of an occupancy authority, or the operation of points or signalling equipment.

⁷ A combination of a set of points, V crossing and guard rails which permits traffic to turnout from one track to another.

⁸ Change of datum point between network kilometrage measurements.

Context

Track worker level 2

At the time of the occurrence, the TW had completed all the accredited and non-accredited course components and had been recertified, as of 21 May 2021, as current for Train Running Information and Code of Practice (CoP0 for the Defined Interstate Rail Network (DIRN), and the ARTC Addendum. The TW had undertaken Category 1 rail safety medical and had been deemed fit for duty subject to review on 10 December 2021. The review subject was not considered a factor in this occurrence. Alcohol and other drug tests were undertaken after the occurrence. The results were negative.

The work orders for SPENO for the planned scope of works had the times of 0600 – 1630 on two previous days and on the day of the occurrence. As the TW had adequate opportunities for rest prior to commencing work, fatigue was not considered to be a factor.

Network Rules and Procedures

When planning work or travel in a rail corridor, it is the TW's responsibility to ensure that the work is planned, and the protection requirements are carried out according to network rules and procedures. In the case of the RRV travel for the ultrasonic testing, the applicable rules were governed by the *CoP for the DIRN*, ARTC Version 3.0: 01 July 2018 and the *ARTC Addendum to the CoP for the DIRN* Version 5.1: 02 July 2020.

Sections 3.11.22 and 3.11.23 of the *CoP for the DIRN* defined the requirements for initiation and format of a TRI. When a TW requested a TRI, the TW shall tell the NC their name and company, the location from which communications is made, type of vehicle or work to be undertaken and the TRI limits expressed as being between two locations which may include the following:

- kilometre locations
- signal locations or numbers
- a main track or crossing loop at a specific location
- the track where there are multiple tracks, and
- section name.

The Rail Industry Safety and Standards Board (RISSB) had a procedure within its suite of *Australian Network Rules and Procedures* (ANRP) that address the identification and verification of location for worksite protection. The RISSB procedure states:

Where worksite protection is primarily applied by the network control officer, the correct and accurate location of the worksite is critical in ensuring the safety of workers and rail traffic.

Further, the RISSB procedure has additional information the TW may use to identify that location, which included:

- Contact the Network Control Officer
- Communicate the proposed worksite location using the identifiers below in the following order
 - track name, and
 - station name or stations at both ends of the worksite, and
 - One or more of the following:
 - the signal/Block Limit Board identification number/s giving entry to worksite, or
 - a points identification number located in the worksite, or
 - a kilometre location in the worksite, or

- a permanent structure in the worksite that is visible on the Network Control Officer workstation

The ARTC rules and procedures did not specifically have a procedure for identification and verification of location. The ARTC Addendum to the CoP for the DIRN s23.1 had the following mandate under s23 Track Force Working:

23.1 Defining a Location and Train ID

A worker shall identify their location in km and m in a section whilst trains are to be identified as being from one location to another location.

Network Communication

The CoP for the DIRN had provisions for communications between rail safety workers. This included the requirement for a TW to establish communication with the relevant NC and provide sufficient detail to ensure adequate identification of location. The ATSB reviewed the voice recordings between the TW and NC during the establishment of the Train Running Information and noted that the communication of important safety information was informal, conversational and did not include the location that the RRVs would on-track. The TW included the location of Crystal Brook within the context of references to signal 24 and did not make any reference to signal 24 at Rocky River as the location required for the start of the protection limits.

The ARTC Train Notice (TN) 1928 - 2017 Track Worker Communication Protocol contains details for a competent rail safe worker (CRSW), to which a TW is aligned, is required to undertake to access the ARTC Rail Corridor.

The CRSW must on initial contact with Network Control, specify their physical location by stating:

- Location name and KM, or
- KM and Signal Number.

The RISSB has a CoP for safety critical communications, which states it is important that safety critical communication is transmitted accurately and effectively to all rail safety workers.

When arranging worksite protection, it is important that safety critical communications are transmitted accurately and effectively between the NCO [network control officer]⁹ and the PO [protection officer]¹⁰, and with other parties where applicable.

Road Rail Vehicles

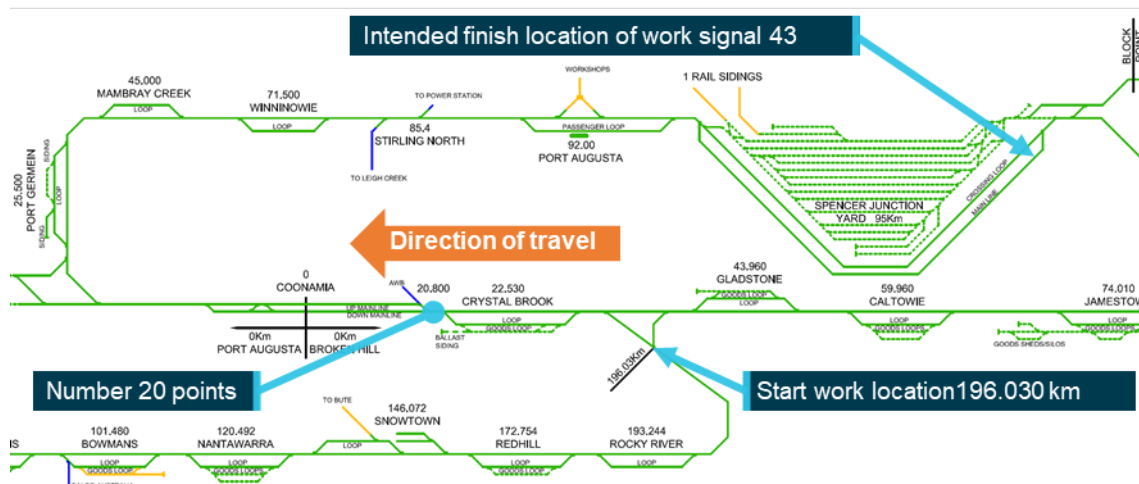
The SPENO work order information had kilometrage from 196.030 km at Crystal Brook to signal 43 at Spencer Junction (Figure 7). The SPENO crew attended the TW pre work briefing at about 0715. The SPENO Supervisor stated that the TW had mentioned the limits of protection would be signal 24 Rocky River to signal 3 Coonamia.

After the TW had received the TRI from the NC, the SPENO crew prepared the RRVs for work by lowering the rail wheels onto the rails, which guide the RRVs, at the 196.012 km and proceeded towards Coonamia.

⁹ A network control officer, in the context of this occurrence, is aligned to a network controller (NC) as defined in the RISSB Glossary of Terms.

¹⁰ A track worker level 2, in the context of this occurrence, is aligned to a protection officer (PO) as defined in the RISSB Glossary of Terms.

Figure 7: SPENO Work Order from Crystal Brook to Spencer Junction



Source: Australian Rail Track Corporation, annotated by ATSB

Safety analysis

On the morning of 10 June 2021, while preparing for scheduled maintenance work on a section of track between Crystal Brook and Spencer Junction, South Australia, the protection officer for the work crew contacted the network control officer to obtain train running information and establish protection limits. During the discussion between the track worker level 2 and network controller, the exact location that the work crew would on-track was not clearly communicated and confirmed. Inclusion of the on-track location would have also provided an opportunity for the network control officer to recognise that the requested protection was inappropriate for the area of work. Consequently, the RRV on-tracked outside the limits of protection.

In addition, the track worker level 2 requested the protection limits start at signal 24 Crystal Brook, instead of signal 24 Rocky River. Signal 24 Rocky River encompassed their planned start location of Binney Road at the 196.012 km, which was the location they briefed the work crew and had annotated on their work plan. This resulted in the network controller applying Blocking Facilities on the incorrect section of track.

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include ‘contributing factors’ and ‘other factors that increased risk’ (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition ‘other findings’ may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following finding is made with respect to the RRV’s on-tracking outside of the limits of protection on the 10 June 2021.

Contributing factors

- The track worker level 2 incorrectly requested the protecting signal for the protection area required as signal 24 Crystal Brook (current location), instead of signal 24 Rocky River, when communicating with the network controller. Further, there was no confirmation of where the road-rail vehicles were to on-track while discussing the limits of protection required for the work.

Safety actions

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. All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out to reduce the risk associated with this type of occurrences in the future. The ATSB has so far been advised of the following proactive safety action in response to this occurrence.

Safety action by SPENO Rail Maintenance Australia

SPENO have undertaken a review and made amendments to processes for on-tracking of RRVs. The proposed amendments include the provision to remove the single point of failure of the TW being responsible for identifying and communicating the location which RRV's would on-track in rail networks.

Glossary

ARTC	Australian Rail Track Corporation
CoP	Code of Practice
CRSW	Competent rail safe worker
DIRN	Defined Interstate Rail Network
NC	Network controller
TW	Track worker
RRV	Road-rail vehicle
TRI	Train running information

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Protection Officer of the occurrence
- SPENO Rail Maintenance Australia
- Australian Rail Track Corporation
- Rail Industry Safety and Standards Board
- Office of the National Rail Safety Regulator

References

Department of Transport and Regional Services 2002, *Code of Practice for the Defined Interstate Network*, Volume 3, ARTC Version 3.0: 01 July 2018, pp.70-71.

ARTC *Addendum* to the Code of Practice for the Defined Interstate Rail Network 2020, Volume 5.1, s23.1, p.88.

ARTC Network Information Book, *West CTC, Dry Creek North Junction (exc) to Spencer Junction (inc)*, OGW-30-09 2020, Version 1.3.

ARTC Train Notice 1928 - 2017, *Track Worker Communication Protocols*.

ARTC *Network Communications Standard* 2020, OPE-PR-043, Version 1.0.

Rail Industry Safety and Standards Board 2017, *Identification and Verification of Location*, Version 1.0.

Rail Industry Safety and Standards Board 2017, Code of Practice, *Safety Critical Communications*, Version 1.0, p.5.

Office of the National Rail Safety Regulator 2019, Guideline, *Road Rail Vehicle Management & Operations*, Version 1.0.

Submissions

Under 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. That section 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 following directly involved parties:

- Railsafe SA Pty Ltd, Protection Officer of the occurrence
- SPENO Rail Maintenance Australia Pty Ltd, Ultrasonic Testing Supervisor
- SPENO Rail Maintenance Australia Pty Ltd, Operator of FL18
- SPENO Rail Maintenance Australia Pty Ltd, Operator of SP128
- Australian Rail Track Corporation, General Manager, Safety and Environment
- Australian Rail Track Corporation, Safety Assurance Manager
- Office of the National Rail Safety Regulator

A submission was received from the Australian Rail Track Corporation, Safety Assurance Manager, and, where considered appropriate, the text of the report was amended accordingly.

General details

Occurrence details

Date and time:	10 June 2021 – 0721 CST	
Occurrence class:	Incident	
Occurrence categories:	Safeworking Breach	
Location:	Crystal Brook, South Australia	
	Latitude: 33° 21.724' S	Longitude: 138° 12.126' E

Train details

Track operator:	Australian Rail Track Corporation	
Train operator:	SPENO Rail Maintenance Australia	
Train number:	RRV's FL18 and SP128	
Type of operation:	Ultrasonic Testing	
Departure:	196.012 km	
Destination:	Signal SJC -43 Spencer Junction	
Persons on board:	Crew – 4	Passengers – None
Injuries:	Crew – None	Passengers – None
Damage:	None	