



Australian Government

Australian Transport Safety Bureau

Level crossing irregularity involving passenger train 3MA8

North Geelong, Victoria, on 8 January 2019

ATSB Transport Safety Report

Rail Occurrence Investigation

RO-2019-002

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Addendum

Page	Change	Date

Safety summary

What happened

On 8 January 2019, as The Overland passenger train, 3MA8, approached the Thompson Road level crossing at North Geelong, Victoria, the train crew noticed that the flashing lights had not activated and the boom gate had not lowered as expected. While the crew noticed the irregularity, it was too late to take substantive action and the train passed through the level crossing unprotected. The crew reported that several road vehicles were in the vicinity of the level crossing at that time, but none were in the danger zone.

What the ATSB found

The ATSB found that, in preparation for stage one track work, the Thompson Road level crossing was to be isolated for the broad and dual-gauge tracks only. The level crossing protections for the adjacent standard-gauge track, which was to continue operating as normal until stage two works at a later date, were to remain active. However, the signalling tester, following the isolation plans provided, mistakenly isolated the level crossing for the stage two work, in addition to stage one. While the stage one and stage two works were to be conducted separately, the signalling tester-in-charge provided the signalling tester with the isolation plans for both stages in one package.

VicTrack, through their contractor UGL Engineering Limited, did not provide the tester-in-charge or signalling testers with specific instructions detailing the scope of work to be conducted at each stage of the project, but rather, only provided packaged isolation plans for the entire project. The absence of these instructions increased the risk of the works being incorrectly implemented.

What has been done as a result

As a result of this occurrence, VicTrack has advised that improvements had been made at the task-based level by including specific work instructions for each task associated with each isolation plan.

Safety message

A work instruction is a step-by-step guide on how to perform a specific task or activity, in support of a process or procedure. They are an important defence within a safety system for ensuring the work is performed safely and as intended. This occurrence highlights the importance of providing clear, concise, and detailed work instructions to reduce the risk of errors during critical safety work.

Contents

Safety summary	i
The occurrence	1
Preparation for planned track work	1
Level crossing isolation	1
Train 3MA8 approaching Thompson Road	2
Context	4
Thompson Road level crossing	4
Planned work	4
Personnel involved	5
Isolation plans and package	5
Safety analysis	7
Introduction	7
Level crossing isolation	7
Packaged isolation plans	7
No specific instructions provided	7
Findings	9
Contributing factors	9
Safety issues and actions	10
General details	12
Sources and submissions	13
Australian Transport Safety Bureau	14

The occurrence

Preparation for planned track work

On the morning of 8 January 2019, planned track work was to commence at the North Geelong, Victoria 'C' signal box. The work, managed by VicTrack, involved the removal, modification, and installation of signalling equipment and was to be performed in several stages over January 2019. Stage one affected the two broad-gauge and single dual-gauge tracks (managed by V/Line) and would temporarily impact the operation of several level crossings including those at Thompson and Anakie Roads. Stage two involved works on the adjacent Australian Rail Track Corporation (ARTC) standard-gauge track, to be performed at a later date (see *Planned work*).

At about 0734 Eastern Daylight-saving Time,¹ a track warrant possession (TW2)² was issued to exclude rail traffic and allow the work to proceed safely. The exclusion applied to trains operating on the two broad-gauge and single dual-gauge tracks (stage one). The ARTC standard-gauge track would be protected between train services,³ but remain operational, as specified in the project planning documents and ARTC Train Notice 2668,⁴ until stage two.

Prior to commencing the work, several briefings were conducted involving the various project work teams. The signalling tester-in-charge (TIC) also conducted a separate pre-work briefing with the signal test teams (see *Personnel involved*). Specifically, the TIC reported mentioning that the standard-gauge track would remain open for normal traffic, but would be protected. The ARTC certified signalling tester (signalling tester) also attended the briefings, but could not recall any discussions regarding train movements.

The TIC, that morning, provided the signalling tester a package of isolation plans (wiring drawings) for the work (see *Isolation plans and package*), which included the plans for both the stage one and stage two works. Following this, a test team (test team 1), consisting of the signalling tester and an assistant, made their way to the equipment relay room⁵ near the Thompson Road level crossing at North Geelong.

For the work, some of the signalling infrastructure at the Thompson and Anakie Road active level crossings needed to be electrically isolated for the broad-gauge and dual-gauge tracks. In preparation for this, the signalling tester assembled the electrical jumpers needed to isolate each circuit identified on the isolation plans.

Level crossing isolation

At 0954, the TIC contacted the network control officer (NCO) to arrange an infrastructure booking advice⁶ for Thompson Road. Shortly after, the TIC notified the signalling tester at the equipment relay room to commence work. The tester began applying the jumper cables⁷ to the relay contacts of all four tracks to isolate the Thompson Road level crossing, as detailed within the packaged isolation plans provided (see *Isolation plans and package*).

¹ Eastern Daylight-saving Time (EDT): Coordinated Universal Time (UTC) + 11 hours.

² Authority for exclusive occupancy of track by track workers and equipment within specified limits.

³ Authority for non-exclusive occupancy of track by track workers and equipment within specified limits.

⁴ The train notice was issued on 27 December 2018 and detailed the works to be performed at North Geelong between 8–22 January 2019.

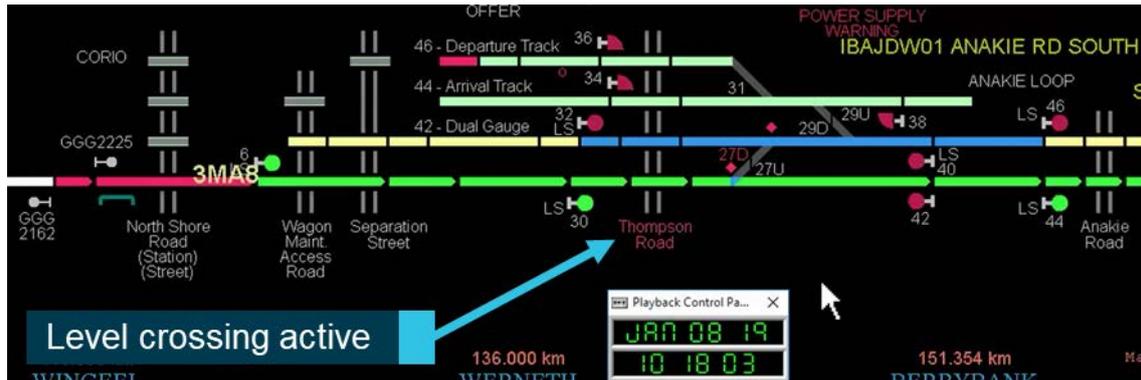
⁵ An enclosure encompassing racks and their mounted equipment (signalling and control equipment, power supplies and communications equipment).

⁶ Infrastructure booking advices (IBAs) are used to tell network control officers that infrastructure is: temporarily or permanently removed from service ('booked out-of-use'), or installed or returned to service ('booked into-use').

⁷ The jumper cables are used to isolate (bridge) the electrical contacts on relays or any device to remove the functionality normally provided by the relay or device within the associated electrical circuit.

At about 1048, after applying the jumper cables, the tester verified that the level crossing was functioning by activating the local push-button.⁸ Upon verification, the team left and made their way to the next crossing at Anakie Road. The test triggered an alarm on the Phoenix control system⁹ display in the ARTC train control centre in Adelaide, South Australia. The NCO received a level crossing fault alarm, and the 'Thompson Road' text changed colour to red to indicate it had been activated (Figure 1). The NCO immediately contacted the operations coordinator¹⁰ and asked if the crossing was okay, and not affected, and would operate as normal. The operations coordinator advised the NCO that the crossing should operate as normal.

Figure 1: Phoenix replay of the Thompson Road level crossing alarm



Note: The level crossing fault alarm is a pop-up dialog box, not shown in this image. Time is Central Daylight-saving Time (CDT), Coordinated Universal Time (UTC) +10.5 hours.
Source: ARTC, annotated by the ATSB

Once at Anakie Road, the tester began applying the isolations, similar to the process followed at Thompson Road.

Train 3MA8 approaching Thompson Road

Soon after, The Overland passenger train 3MA8 was nearing the Thompson Road level crossing, operating on the ARTC standard-gauge track. The train crew had been previously made aware by the NCO that track workers were operating at the North Geelong 'C' signal box. As the train approached, the crew noticed that the level crossing lights had not activated and the boom gates had not lowered. In response, they commenced braking, reduced the throttle, and sounded the horn to alert approaching road traffic. At about 1054, the train passed through Thompson Road at a reported speed of about 50 km/h, with the level crossing protections inactive. Although there was road traffic in the vicinity of the crossing, no vehicles were in the danger zone¹¹ at the time the train passed through. The Phoenix replay (Figure 2) showed the 'Thompson Road' text white, indicating the crossing was not active as 3MA8 passed (represented by the red line).

The crew contacted the NCO and advised of the occurrence. The train continued its journey as normal. The Anakie Road level crossing, about 650 m further along from the Thompson Road level crossing, operated normally for train 3MA8.

⁸ Following the implementation of both isolation stages, the tester verified the correct function of the crossing via the local push-button.
⁹ The Phoenix control system is a non-vital centralised traffic control system that provides real-time monitoring of train movements, and the controls of signals and points. Signalling equipment and circuits are considered non-vital where failure to function correctly would not cause an unsafe outcome of the signalling system.
¹⁰ The operations coordinator is the interface between the project, and the ARTC and V/Line operations.
¹¹ Everywhere within 3 m horizontally from the nearest rail and any distance above or below this 3m, unless a safe place exists or has been created.

Figure 2: Phoenix replay of the occurrence



Note: Time is Central Daylight-saving Time (CDT), Coordinated Universal Time (UTC) +10.5 hours.
 Source: ARTC, annotated by the ATSB

The NCO immediately called a project representative in the site office near Separation Street who spoke with the TIC about the occurrence. The TIC then contacted the tester, now located at Anakie Road. The tester, who was in the process of applying the jumper cables (but had not yet isolated the level crossing), stopped work and returned to Thompson Road. The TIC also proceeded to Thompson Road.

From about 1120, the TIC reinstated and tested the affected level crossings. During this process, it was determined that the tester had applied jumper cables to all tracks, consistent with stage two implementation. All further work was suspended until further notice. Later that day, an ARTC representative validated the reinstatement actions and normal working resumed through the Thompson Road level crossing.

Context

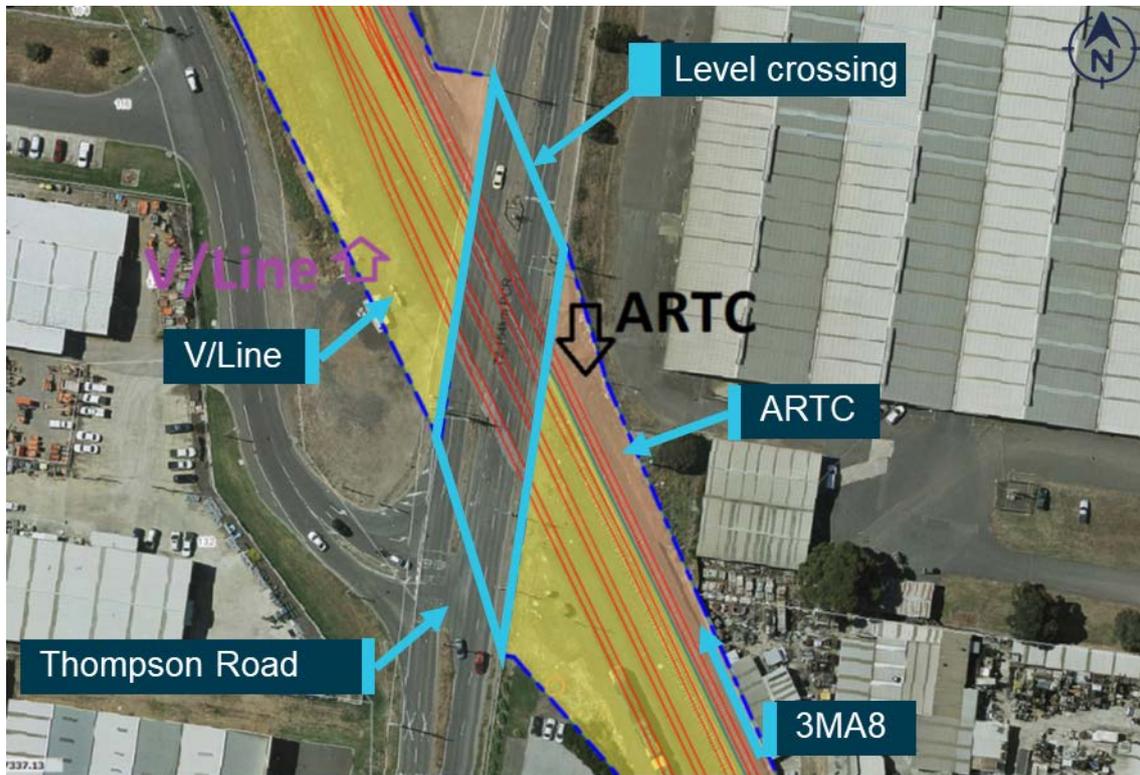
Thompson Road level crossing

The Thompson Road level crossing at North Geelong is located about 72 track kilometres south-west from Melbourne, on the main line between Melbourne and Adelaide. The level crossing had active protections, which included physical barriers, warning signs, line markings, lights, and audible devices to alert vehicular or pedestrian traffic that a train was approaching or crossing.

The level crossing consisted of four railway tracks and a dual carriageway road, including a pedestrian pathway. All tracks ran adjacent to each other within the rail corridor.

V/Line managed both the broad-gauge and single dual-gauge tracks (yellow shading in Figure 3), and Australian Rail Track Corporation (ARTC) managed the single standard-gauge track (red shading in Figure 3). ARTC had primary maintenance responsibility for the level crossing infrastructure.

Figure 3: Aerial view of ARTC and V/Line responsibility boundaries



Source: VicTrack, annotated by the ATSB

Planned work

The North Geelong ‘C’ signal box allowed the management of rail traffic at Thompson Road, Separation Street, the Geelong grain loop, and the Corio independent goods line. The Victorian Government engaged VicTrack to undertake works to replace the current mechanical interlocking and signal control systems to allow the remote operation of the signal box from V/Line’s Centralised Train Control (Centrol). VicTrack engaged UGL Engineering Limited (UGL) as the principal contractor for the works, who in turn sourced suitably qualified staff from other third party providers as required. VicTrack retained oversight and responsibility for the project.

The scope of works undertaken were the disarrangement of track circuits and infrastructure to enable signal upgrades in the V/Line leased area only (Figure 3). The work was to be undertaken during the month of January 2019 in several stages as part of Train Notice 2668:

- Stage one (yellow shading in Figure 3): 8-22 January 2019, isolation of the dual-gauge, broad-gauge, arrival, and departure tracks at Thompson Road; and south line at Anakie Road.
- Stage two (yellow and red shading in Figure 3): 13 January 2019, isolation of all tracks at Thompson and Anakie Roads.
- Stage three: 21 January 2019, testing.
- Stage four: 22 January 2019, commissioning.

Regular planning meetings were held detailing the scope of work required, including the staged track possession of the ARTC standard-gauge track.

Personnel involved

As part of the broader project, an electrical work group was tasked with the electrical isolations of the signalling system. The group consisted of a signalling tester-in-charge (TIC) supervising two test teams, test team 1 and test team 2. Each team consisted of a signalling tester and assistant, who were appropriately qualified.

The TIC had the responsibility to ensure that the new and altered works were planned, installed, inspected and tested to design, standard and schedule. The signalling testers carried out testing activities as directed by the TIC and in accordance with relevant V/Line and ARTC procedures. Assistant signalling testers assisted with testing activities as directed by the TIC or a signalling tester.

Isolation plans and package

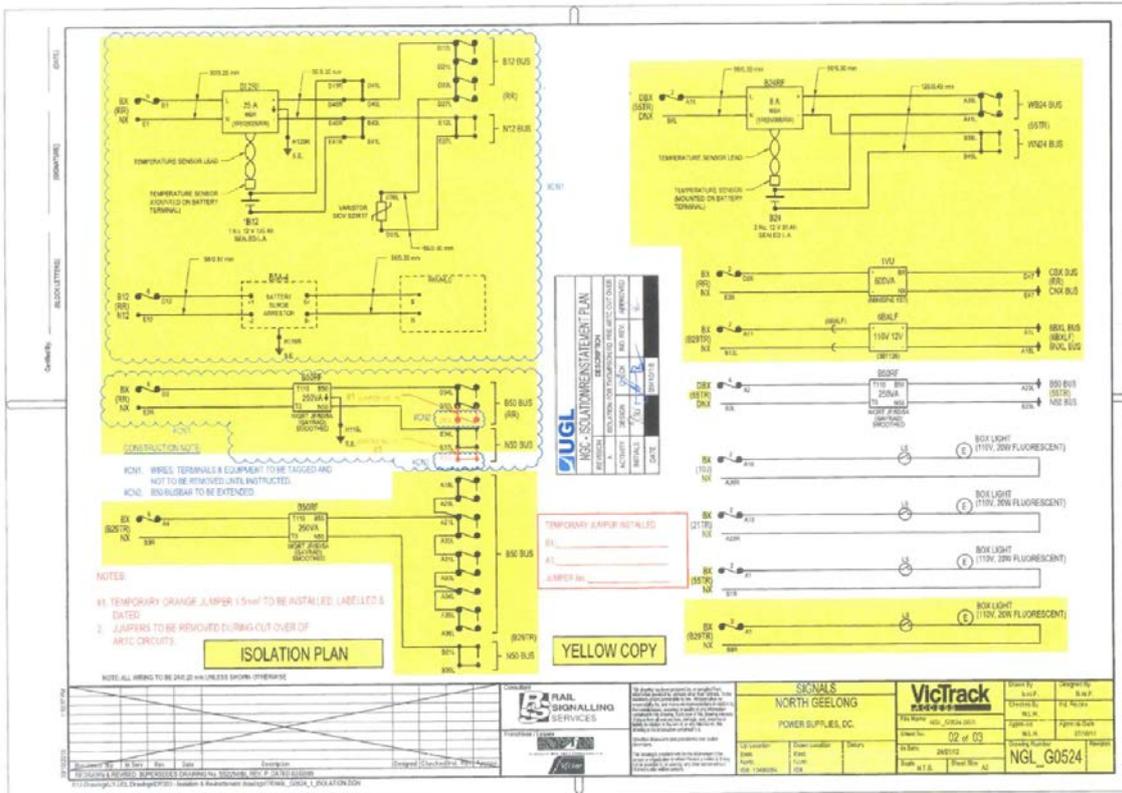
A work instruction is a step-by-step guide on how to perform a specific task or activity, in support of a process or procedure. They are an important defence within a safety system for ensuring the work is performed safely and as intended.

The isolation plan for each location was designed by UGL, then reviewed, and approved by all stakeholders¹² before the work commenced. The plans (Figure 4) contained critical information on what circuits were to be isolated, and identified each isolation jumper cable for each circuit. While each plan was associated with a certain stage of the project (see *Planned work* above), there was no supporting instructions provided in the package specifically detailing the scope of work to be conducted at each stage, nor were the plans marked to clearly identify at which stage that plan applied to.

The package was provided to the TIC by UGL prior to the commencement of the work. The package included the train notices, project planning documents, and isolation plans for the project.

¹² V/Line, VicTrack, UGL, ARTC.

Figure 4: One of the isolation plans for the North Geelong works stage 1



Source: VicTrack

Safety analysis

Introduction

In preparation for planned track work for the upgrade of the North Geelong, Victoria, 'C' signal box, the Thompson Road level crossing was to be isolated for the broad and dual-gauge tracks only (V/Line tracks). The level crossing protections for the adjacent standard-gauge track (Australian Rail Track Corporation (ARTC) track), which was to continue operating as normal, were to remain active as trains would continue to use this track during stage one of the works. However, as The Overland passenger train (3MA8) approached the crossing on the ARTC track, the train crew noticed that the level crossing protections had not activated as expected. While the crew noticed the irregularity, it was too late to take substantive action and the train passed through the level crossing unprotected. The crew reported that several road vehicles were in the vicinity of the level crossing at that time, but none were in the danger zone. The ARTC Phoenix train control system replay confirmed the non-operation of the Thompson Road level crossing.

This analysis will examine why the level crossing protections did not activate as expected and review the documentation provided to signalling testers for isolating the Thompson Road level crossing.

Level crossing isolation

Following the packaged isolation plans provided by the tester-in-charge (TIC), the signalling tester applied the jumper cables to the V/Line track in preparation for the stage one works. Additionally, the tester also mistakenly applied the cables to the ARTC track, which should have been performed at a later time as part of the stage two works. The implementation of both stages isolated the V/Line tracks as well as the ARTC track, which was still operational for scheduled train movements. This resulted in the Thompson Road level crossing not operating for the approach and passage of train 3MA8.

While a pre-work brief had been conducted, the tester could not recall the specific details of that briefing. This was a missed opportunity for knowing that the level crossing for the ARTC track was to remain active.

The tester was notified about the occurrence before there was an opportunity to isolate the next level crossing at Anakie Road. However, it was possible that, had the tester applied the jumper cables for the Anakie Road level crossing, it too would have been incorrectly implemented, resulting in the isolation of the crossing protections for all tracks.

Packaged isolation plans

The TIC was provided the isolation package for the entire project by the principal contractor for the works, UGL Engineering Limited (UGL). This package contained the isolation plans for each location, including those for the stage one and stage two works, which were to be conducted separately. The TIC subsequently conducted a verbal pre-work brief with the signalling testers and assistants. During this brief, the TIC reiterated that the ARTC track would remain operational (stage one) and the level crossings active, distinguishing between the two stages. Despite this, the TIC provided the signalling tester with the entire isolation package, without modification, prior to the work commencing. Consequently, the tester had the plans for both stages, although the plans for stage one were only to be applied on the day of the occurrence.

No specific instructions provided

The principal contractor employed by VicTrack for the works, UGL, led the project planning, including the development and approval of the isolation plans. During this process, specific instructions detailing the scope of work to be conducted at each stage of the project had not been

developed to support the isolation plans. Consequently, the absence of these instructions increased the risk of the works being incorrectly implemented.

In this case, UGL provided the TIC with a package containing the isolation plans for the entire project including the work to be conducted at Thompson Road, which in turn was provided to the signalling tester. However, without specific written instructions for each plan (at each stage), the tester mistakenly applied the isolation plans both stage one and two at the same time.

Findings

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.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (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.

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

From the evidence available, the following findings are made with respect to the Thompson Road level crossing failed to operate for the passage of passenger train 3MA8 on 8 January 2019.

Contributing factors

- The Thompson Road active level crossing at North Geelong failed to operate as train 3MA8 approached and passed through the level crossing.
- In preparation for stage one track work (broad and dual gauge-tracks) the signalling tester, following the isolation plans provided, isolated the level crossing for the stage two work (standard-gauge track), which was still operating trains.
- The signalling tester-in-charge provided the signalling tester with the packaged isolation plans for both stage one and stage two works, which were intended to be conducted separately.
- **VicTrack's contractor, UGL Engineering Limited, did not provide signalling testers with specific instructions detailing the scope of work to be conducted at each stage of a project, but rather, only provided packaged isolation plans for the entire project. The absence of these instructions increased the risk of the works being incorrectly implemented.** (Safety issue)

Safety issues and actions

Central to the ATSB’s investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the rail industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

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.

The initial public version of these safety issues and actions are provided separately on the ATSB website, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website as further information about safety action comes to hand.

No specific instructions provided

Safety issue description

VicTrack’s contractor, UGL Engineering Limited, did not provide signalling testers with specific instructions detailing the scope of work to be conducted at each stage of a project, but rather, only provided packaged isolation plans for the entire project. The absence of these instructions increased the risk of the works being incorrectly implemented.

Issue number:	RO-2019-002-SI-01
Issue owner:	VicTrack
Transport function:	Rail: Infrastructure
Current issue status:	Closed - Adequately addressed
Issue status justification:	The ATSB is satisfied that the action taken by VicTrack will reduce the risk of works being incorrectly implemented in relation to isolation plans.

Proactive safety action taken by VicTrack

Action number:	RO-2019-002-NSA-03
Action organisation:	VicTrack
Action status:	Closed

VicTrack has advised that improvements have been made at the task-based level by including specific work instructions for each task associated with each isolation plan.

The original level crossing isolation plans were prepared by VicTrack’s contractor, UGL Engineering Pty Ltd (UGL), who was engaged due to the competence and expertise in signalling on the rail network.

UGL’s plans were subsequently reviewed and approved by ARTC and V/Line as the accredited Rail Infrastructure Manager, of the location where the incident occurred.

UGL provided its plans and instructions to its signalling testers who were to have the requisite ARTC accreditation, competence and expertise in signalling to perform the works on the rail network.

UGL was required to manage its signalling testers and provide the packaged isolation plans and specific instructions detailing the scope of work to be conducted at each stage of the project.

Post incident, VicTrack instructed UGL to revise the level crossing isolation plans to ensure that those plans, were identifiable to the requirements of the works for each stage of isolation, rather than a collective package for the whole project, in relation to the level crossing signal isolation works.

Revised plans were received by VicTrack, and forwarded to ARTC and V/Line for review and approval, which were considered to provide the requisite clarity and certainty as to the relevant works.

VicTrack appropriately and adequately addressed these concerns, on the day of the incident, and these actions also cleared the Prohibition Notice issued by ONRSR at the time.

Following this incident, VicTrack instructed UGL to revise the level crossing isolation plans to ensure that those plans, were identifiable to the requirements of the works for each stage of isolation, rather than a collective package for the whole project, in relation to the level crossing signal isolation works.

Revised plans were received by VicTrack, and forwarded to ARTC and V/Line for review and approval, which were considered to provide the requisite clarity and certainty as to the relevant works.

General details

Occurrence details

Date and time:	8 January 2019 – 1053 EST	
Occurrence category:	Incident	
Primary occurrence type:	Level crossing irregularity	
Location:	North Geelong, Victoria	
	Latitude: 38° 06.239' S	Longitude: 144° 20.681' E

Train details

Track operator:	VicTrack	
Train operator:	Journey Beyond/Pacific National	
Train number:	3MA8	
Type of operation:	Passenger	
Departure:	Melbourne, Victoria	
Destination:	Adelaide, South Australia	
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- The Office of the National Rail Safety Regulator
- VicTrack
- Australian Rail Track Corporation
- Pacific National.

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:

- Australian Rail Track Corporation
- Office of the Rail Safety Regulator
- Pacific National
- UGL Engineering Limited
- VicTrack
- V/Line

Submissions were received from:

- Australian Rail Track Corporation
- Office of the Rail Safety Regulator
- Pacific National
- UGL Engineering Limited
- VicTrack

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

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- 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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.