



Report 99-109

Southerner passenger express Train 902

track warrant overrun

Mosgiel

21 May 1999

Abstract

At approximately 1140 hours on Friday, 21 May 1999, northbound Train 902 operating as the *Southerner* passenger express overran its track warrant limit by approximately 2 km between Mosgiel and Wingatui on the main south line. The overrun occurred when the locomotive engineer was possibly distracted by other events after planning a track warrant renewal for a location which differed from the normal pattern. The safety issues addressed in this report include the resilience of the track warrant system to accommodate deviations from established patterns, and the relieving of staff involved in operating irregularities.

Two safety recommendations were made to the operator.

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The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

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Contents

List of Abbreviations ii

Data Summary iii

1. Factual Information1

 1.1 Narrative1

 1.2 Work at Gordon Road level crossing2

 1.3 Personnel3

 1.4 Display of Track Warrants.....3

2. Analysis 4

3. Findings6

4. Safety Recommendations7

Figures

Figure 1 Site plan of Mosgiel1

Figure 2 The position of the track warrant clip in a DBR class locomotive cab
(similar in profile and configuration to a DC class locomotive cab)8

List of Abbreviations

km/h	kilometres per hour
km	kilometre
LE	locomotive engineer
m	metre
TCO	train control officer
Tranz Rail	Tranz Rail Limited
TWC	track warrant control

Rail Incident Report 99-109

Data Summary

Train type and number:	express passenger 902
Date and time:	21 May 1999, at approximately 1140 hours
Location:	Mosgiel
Type of occurrence:	track warrant limit overrun
Persons on board:	crew: 2 other staff: 1 passengers: 21
Injuries:	nil
Damage:	nil
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator- in-Charge:	R E Howe

1. Factual Information

1.1 Narrative

- 1.1.1 On Friday, 21 May 1999, Train 902 was the *Southerner* passenger express operating from Invercargill to Christchurch. The train was crewed by a locomotive engineer (LE) and a train manager and conveyed 21 passengers. An appropriately authorised Tranz Rail staff member was also travelling in the cab. The LE was in possession of Track Warrant 64 authorising him to travel from Milton to Mosgiel.
- 1.1.2 Track Warrant 64 was issued to the LE at Milton and authorised him to travel to 7TIA points indicator at the north end of Mosgiel station limits, approximately 1.8 m north of the Mosgiel station platform (see Figure 1).
- 1.1.3 Track warrant 64 terminated at Mosgiel because, at the time it was issued, a shunting service was operating between Wingatui (approximately 3 km north of Mosgiel) and Dunedin.
- 1.1.4 Upgrading work was being undertaken at Gordon Road level crossing approximately 500 m north of the Mosgiel station platform. Because the LE was unsure of the progress of work going on at the level crossing, and whether the protection was operating automatically or manually, prior to arrival at Mosgiel he had instructed the train manager not to cancel the protection on arrival at the platform. The normal practice for stopping passenger trains was to cancel the protection.
- 1.1.5 The usual practice for a passenger train LE requiring a new track warrant before continuing beyond Mosgiel was to obtain it while carrying out passenger work at the station, with the level crossing alarms cancelled. Because of his instructions to the train manager, the LE was concerned about possible delays to road traffic while his train was stopped at the platform¹. He therefore planned to proceed to a point beyond Gordon Road level crossing once passenger work was completed at the station, stop the train short of 7TIA points indicator, and obtain a new track warrant for the continuation of his trip to Dunedin.

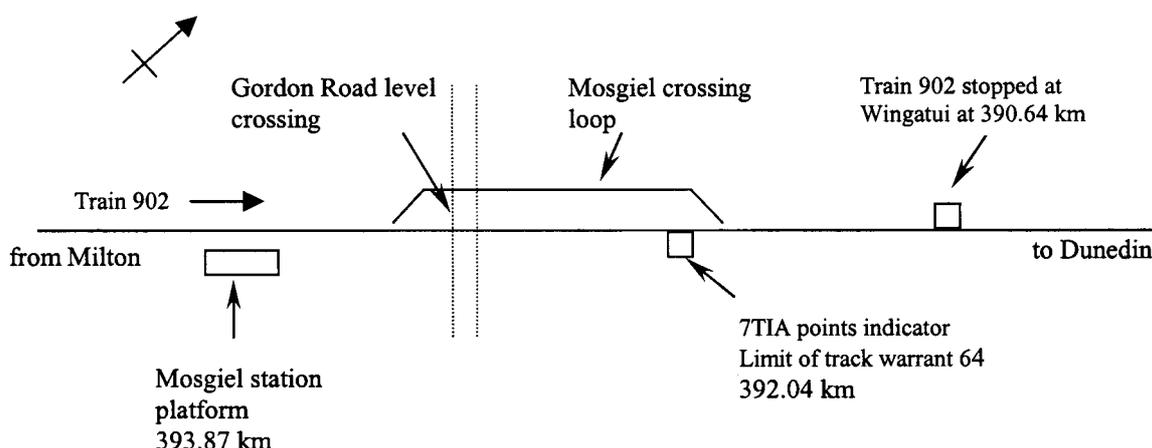


Figure 1
Site plan of Mosgiel (not to scale)

¹ When approaching Mosgiel platform from the south a train automatically activated the level crossing protection at Gordon Road before reaching the platform. Protection would continue during a passenger stop unless manually cancelled by the train crew at Mosgiel.

- 1.1.6 After leaving the platform, Train 902 proceeded slowly over Gordon Road level crossing with the flashing lights and bells and one half-arm barrier operating. As the locomotive went by the LE spoke briefly with a Tranz Rail employee beside the track who he assumed was the level crossing protector. When satisfied his train was clear, he increased power and continued his journey, failing to stop at 7TIA points indicator for a new track warrant. There was no conversation between the LE and the staff member in the cab during this period.
- 1.1.7 There were no other trains in the Mosgiel to Dunedin section at the time, the shunt which was operating earlier having by then arrived back in Dunedin.
- 1.1.8 The LE stated that as he approached the Wingatui indicator he got a feeling that things were not right but “couldn’t put his finger on the problem”. He picked up his warrant pad from the lunch tray where it was lying and then realised that he had proceeded past the limit of his track warrant. He immediately stopped the train and called the train control officer (TCO) by radio.
- 1.1.9 After confirming that the Mosgiel to Dunedin section was not occupied the TCO issued a track warrant for Train 902 to continue to Dunedin.
- 1.1.10 The LE was not relieved following notification of the incident and was allowed to continue on his train to Dunedin.

1.2 Work at Gordon Road level crossing

- 1.2.1 The Dunedin City Council had initiated a project which required the widening of Gordon Road level crossing by approximately 5 m, and the installation of traffic signals at the road intersections on either side of the level crossing. The work was planned to take place between Thursday, 13 May 1999, and Sunday, 16 May 1999. As this work required the repositioning of the automatic level crossing protection equipment, protection was deactivated during the work period and a 10 km/h speed restriction imposed for trains using the level crossing. Tranz Rail also took the opportunity to undertake some loop upgrade work on the crossing loop at Mosgiel.
- 1.2.2 The level crossing work was completed on time by both parties but, because the Dunedin City Council still had work to do on Gordon Road, Tranz Rail was not able to fully complete the repositioning of the half-arm barriers at that time. The protection was reactivated at 1530 hours on Tuesday, 18 May 1999, but because the half-arm barrier on the north side of the crossing could not be operated in its temporary position, the 10 km/h speed restriction remained in force. This restriction was included on the speed restriction advice notification to LEs together with a warning device fault endorsement, even though the alarms and one half-arm barrier continued to operate for the passage of trains. This was the status of the level crossing protection on 21 May 1999 when Train 902 passed through Mosgiel.
- 1.2.3 The crossing loop at Mosgiel that had been closed to rail traffic for upgrade work was still closed on 21 May 1999. This information was included in the relevant speed restriction advice.
- 1.2.4 A Tranz Rail employee was assigned to the site because roading equipment operated by contractors to Dunedin City Council was working in close proximity to the level crossing. It was his responsibility to protect this equipment from any train movements. He did not have any protection out to warn the LE of Train 902 as the excavator that had been working close to the level crossing had stopped work and was parked clear on the loop in Mosgiel to allow the passage of Train 902.
- 1.2.5 The protector stated that the level crossing protection was activated by Train 902 as it approached the Mosgiel station platform.

1.2.6 The LE had also operated Train 902 two days earlier and at that time had noticed the signal maintainer at Gordon Road level crossing when his train had passed over and had assumed he was operating the protection manually. On the day of the overrun when he saw the roading equipment protector at the level crossing he assumed similar manual operation was still being carried out.

1.3 Personnel

1.3.1 The LE had worked for Tranz Rail since 1975, most of that time being in Dunedin except for a 2-year transfer to Cromwell. During his time in Dunedin the LE also completed a 3-year period as a TCO before the train control office was relocated to Wellington. At that point he elected to return to LE duties rather than transfer to Wellington.

1.3.2 The LE was certified for the duties he was undertaking, his last certification having taken place on 11 August 1998.

1.3.3 The LE had returned from 3 weeks leave 4 days prior to the incident. His daily work pattern since returning had been:

- a 4-hour shift
- a rostered day off
- an 8.2-hour shift
- a day rostered as standby but not called on.

The overrun occurred when the LE was 7.5 hours into a rostered 8.2-hour shift.

1.3.4 The LE stated that he was in good health and not under any stress. He had not slept well the night before the incident but did not consider he was fatigued.

1.4 Display of track warrants

1.4.1 A clip was provided in the locomotive cab in front of the LE. While there is no formal requirement to use the clip for track warrant purposes it is generally accepted that this is for the purpose of displaying track warrants or other operational documentation. On the day of the incident the track warrant was lying loose in the lunch tray. Figure 2 shows the relative positions of the clip and the tray.

1.4.2 Another clip is provided on the left side, at a lower level and out of the LE's direct vision, for other paperwork relevant to the train.

Clip generally used
for track warrants



Lunch tray

Figure 2
The position of the track warrant clip in a DBR class locomotive cab
(similar profile and configuration to a DC class locomotive cab)

2. Analysis

- 2.1 Train 902 normally travelled from Milton to Dunedin on a single track warrant, but because of the shunt service running between Dunedin and Wingatui on the day of the incident, a track warrant was issued to proceed to Mosgiel only. This was not a common practice, but did happen on occasions.
- 2.2 On the occasions when this did occur it was usual practice for an LE to obtain a new warrant while the train was stopped at the platform exchanging passengers. It was unusual for a passenger train not to stop for passenger work at Mosgiel.
- 2.3 Given the regularity of passenger stops at Mosgiel, and the usual practice of passenger trains running Milton to Dunedin on a single track warrant, a passenger train stopping at 7TIA points indicator for the issue of a track warrant was a rare event.

- 2.4 The most significant factor likely to have contributed to the LE overrunning his track warrant was that of mindset; “the usual track warrant for this train over this section is to Dunedin therefore I must have a track warrant to Dunedin”. This situation can arise when the same LE on the same train operates on the same track warrant limits frequently and consistently. When he gets a different track warrant under these conditions there is a potential for repeat “conditioning” to override the awareness necessary to react to the changed circumstances. By having his track warrant on his lunch tray instead of in the clip provided, the LE deprived himself of an important visual reminder of his track warrant limit.
- 2.5 Although the existence of the clip was common knowledge, the requirements for its use were not formalised. There was evidence of LEs not using the clip for this purpose, preferring instead to use the lunch tray immediately in front of them.
- 2.6 The mindset did not however take over until the train left Mosgiel. Prior to Mosgiel the LE was aware of his track warrant limit and intended to renew his track warrant after crossing Gordon Road. It probably wasn’t until his attention was diverted to the events taking place at Gordon Road level crossing, and his uncertainty over the status of the level crossing protection, that his mind was set to “leaving Mosgiel for Dunedin”.
- 2.7 Although the LE had not worked or been rostered for excessive hours in the 4 days between returning from leave and the incident, the fact that he had not slept well the on the night prior to the incident may have brought about an element of fatigue, particularly as the incident occurred near the end of his shift. Any element of fatigue could have made the LE more easily distracted and more susceptible to mindset.
- 2.8 The issuing of track warrant limits which differed from the normal pattern had been identified as a contributing factor in 3 previous track warrant overrun incidents the Commission has investigated. They were:
- Rail Occurrence Report 94-109, where Train 847 overran its track warrant limits by 23 km. In this report one of the findings was that the track warrant was not for the total distance from Stillwater to Westport, which was the more usual in the LE’s experience. The track warrant held by the LE in this instance was from Stillwater to Reefton.
 - Rail Occurrence Report 96-101, where Train 701 overran its track warrant limits by 24 km. In this report the LE stated that to his recollection, his previous track warrants on Train 701 to Christchurch over the Christmas period were from Kaikoura to Belfast. The track warrant held by the LE in this instance was from Kaikoura to Waipara.
 - Rail Occurrence Report 99-102, where Train 523 overran its track warrant limits by 18 km. In this report it was found that except for one occasion when he was required to change crews at Whangaehu, this was the first time that the LE did not have a track warrant from Wanganui to Marton. The track warrant held by the LE in this instance was from Wanganui to Whangaehu.

In view of the developing pattern in track warrant overruns there is a need for Tranz Rail to not only improve defences which may avoid overruns occurring, but also consider ways of identifying any overruns which do occur at an early stage and thus minimise the possible consequences.

- 2.9 The failure to relieve the LE immediately the irregularity was reported conflicts with a policy confirmed during an investigation of a track warrant irregularity involving Train 701 which occurred between Claverley and Oaro on 31 October 1994 (Rail Occurrence Report 94-125). The following safety action was recorded in Report 94-125:

During the course of the investigation NZRL [now Tranz Rail] advised that the appropriateness of the relief arrangements following the incident had been reviewed and operating staff had been made aware of the need to critically assess all immediately available sources of information and to immediately relieve all staff in cases where their possible involvement in serious operating irregularities was indicated.

- 2.10 This incident at Mosgiel involved a passenger train track warrant overrun. There was no doubt that the LE was involved in a serious operating irregularity. Although in this case there was no opposing traffic the potential for a serious accident existed.
- 2.11 Tranz Rail's Rail Operating Code, Section 6, Operating Instructions for Train Control, Section 24.1 Operating Irregularities, states in part that:

It is the decision of the Locomotive Engineers Manager in conjunction with the NCM [Network Control Manager] to direct if he should be relieved immediately or be allowed to continue.

There appear to be some differences in the interpretation of instructions regarding the requirement to relieve operating staff in these circumstances.

- 2.12 Decisions on relief should be related to the seriousness of the incident, and the potential consequences of not relieving staff involved. In this regard it would be expected that the LE of a passenger train would be more likely to be relieved following an incident than the LE of a freight train. However, in 4 track warrant overrun incidents which have been investigated by the Commission the LE was not relieved in 2 cases, both involving passenger services, but was relieved in the other 2 incidents involving freight services. It is normal human behaviour for a person who has been involved in an incident to feel downcast at the thought of having contributed to an accident or incident, often to the detriment of their ability to function normally for the remainder of their shift. To not relieve a staff member in such a situation is not in the best interests of rail safety.

3. Findings

Findings and safety recommendations are listed in order of development and not in order of priority.

- 3.1 Train 902 was being operated normally prior to the incident.
- 3.2 The LE was appropriately certified for the duties being carried out.
- 3.3 Train 902's overrun of its track warrant limits by approximately 2 km did not conflict with other train movements or track obstructions.
- 3.4 The LE's uncertainty as to the status of the level crossing protection resulted in him planning an unusual stop to obtain a new track warrant.
- 3.5 By leaving the track warrant lying on the lunch tray in front of him, instead of the on the clip provided in the locomotive cab, the LE may have deprived himself of an important visual cue for maintaining situational awareness.

- 3.6 The LE may have been distracted by his brief discussion with the roading equipment protector as the train passed over Gordon Road level crossing.
- 3.7 The LE may have been distracted by his concern regarding Gordon Road level crossing protection and the possible delays to road traffic his train would cause.
- 3.8 The LE's normal pattern of either having a single track warrant direct to Dunedin, or renewing his track warrant at Mosgiel station for Dunedin, set him up with the mindset of departing Mosgiel platform with a valid track warrant to Dunedin.
- 3.9 Having set himself an unusual location to obtain a new track warrant, and then becoming distracted by other unusual events and concerns, the LE appears to have reverted to his natural mindset and assumed he held a track warrant to Dunedin.
- 3.10 The track warrant system appears to have a low resilience to human responses to deviations from standard patterns. The system may need additional defences put in place to firstly minimise track warrant overruns and to detect any overruns that do occur.
- 3.11 The LE should have been relieved following the incident as required by Tranz Rail operating procedures.
- 3.12 A desire to minimise inconvenience to the travelling public appears to be an overriding factor influencing decisions to relieve staff involved in operating incidents, to the possible detriment of rail safety.

4. Safety Recommendations

- 4.1 On 3 April 2000, it was recommended to the managing director of Tranz Rail that he:
- 4.1.1 improve the resilience of the track warrant system to accommodate deviations from standard patterns, taking particular account of the need for:
- an improved method of providing an LE with a continuous and conspicuous visual display of his track warrant limit
 - introducing a system to identify the position of trains in track warrant territory which would increase the situational awareness of LEs as they approached the limit of their track warrant, and limit the possible consequence of any overrun which may occur (001/00); and
- 4.1.2 standardise and enforce relief arrangements for LEs involved in serious operating irregularities (002/00).

Approved for publication 12 April 2000

Hon. W P Jeffries
Chief Commissioner

² Rail and Maritime Transport Union