



Report 00-101

train control incidents

hi-rail vehicles and trains occupying the same section of track and a collision

various localities

17 December 1999 – 5 September 2000

Abstract

On 17 December 1999, an incident occurred near Greymouth where a locomotive engineer was given permission by train control for his train to enter a section of track already occupied by a hi-rail vehicle. The driver of the hi-rail vehicle saw the train and was able to off-track in time to avert a collision.

On 17 January 2000, train control gave permission for a group of hi-rail vehicles to on-track near Paerata in front of a passenger express train. The train collided with one of the hi-rail vehicles and pushed it some 300 m along the track. The hi-rail vehicle, which was unoccupied at the time, was destroyed in the collision.

Another 2 incidents occurred where train control gave permission for trains to enter sections of track occupied by hi-rail vehicles: one on 14 February 2000 near St Andrews, and one on 5 September 2000 near Woodville. Neither of these 2 incidents resulted in collisions.

Given the similar issues arising from each incident, all 4 were combined into this one report.

Safety issues identified included:

- the repeated non-adherence to basic train control techniques taught during training and covered by procedures in the operating code
- inadequate auditing and assessment of train controller performance
- train controllers not using, nor being required to use, signal “blocking commands” as a defence against them issuing conflicting instructions to track users
- the potential for train controllers to report for duty when not fit to do so.

Four safety recommendations were made to the operator to address the safety issues.

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

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.

These reports may be reprinted in whole or in part without charge, providing acknowledgement is made to the Transport Accident Investigation Commission.

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List of Abbreviations

CTC	centralised traffic control
HRV	hi-rail vehicle
km	kilometre(s)
km/h	kilometres per hour
LE	locomotive engineer
m	metre(s)
MNL	Main North Line
NIMT	North Island Main Trunk
Signal 8L	8L down home signal at Paerata
SIMT	South Island Main Trunk
TC	train controller
TSM	track and structures manager

Data Summary

Incident details	Persons on board	Damage
On 17 December 1999, express freight train 847 entered the Greymouth to Stillwater section (Greymouth Branch) which was already occupied by hi-rail vehicle 63804.	Train 847 crew: 1	nil
	HRV: 2	nil
On 17 January 2000, express passenger train 201 collided with hi-rail vehicle 63145 between Papakura and Paerata (North Island Main Trunk).	Train 201 crew: 4 passengers: 112	nil
	HRV: nil	destroyed
On 14 February 2000, express freight train 933 entered the St Andrews to Studholme section (South Island Main Trunk) which was already occupied by hi-rail vehicle 64435.	Train 933 crew: 1	nil
	HRV: 1	nil
On 5 September 2000, shunting service P28 entered the Woodville to Ashhurst section (Palmerston North to Gisborne Line) which was already occupied by hi-rail vehicle 64457.	P28 crew: 2	nil
	HRV: 2	nil

Type of occurrences: three potential collisions and one collision

Injuries: nil

Operator: Tranz Rail Limited (Tranz Rail)

Investigator-in-Charge: Dennis Bevin

1. Factual Information

1.1 Summary of the incidents

- 1.1.1 On Friday, 17 December 1999, a train was permitted to enter the Greymouth to Stillwater section, which was already occupied by an authorised hi-rail vehicle¹ (HRV) movement.
- 1.1.2 On Monday, 17 January 2000, a collision occurred between an HRV and Train 201 at Crown Road level crossing between Papakura and Paerata.
- 1.1.3 On Monday, 14 February 2000, a train was permitted to enter the St Andrews to Studholme section on the South Island Main Trunk (SIMT), which was already occupied by an authorised HRV movement.
- 1.1.4 On Tuesday, 5 September 2000, a train was permitted to enter the Woodville to Ashhurst section on the Palmerston North to Gisborne Line (PNGL), which was already occupied by an authorised HRV movement.

1.2 Incident between Greymouth and Stillwater

Narrative

- 1.2.1 At about 1320 on Friday, 17 December 1999, a track ganger contacted the train controller (TC) by radio and requested time on track for an HRV to work from the 208.00 km to the 210.55 km, both metrages between Greymouth and Stillwater. The ganger advised he would be off-track and clear at 1420 for the passage of Train 802 *Tranz Alpine* passenger express, scheduled to depart Greymouth at 1425 on its return journey to Christchurch.
- 1.2.2 The TC instructed the ganger that Train 801 *Tranz Alpine* passenger express from Christchurch was approaching and authorised the HRV to go on-track after Train 801 had cleared. The ganger was instructed to be off-track and clear by 1420 for the passage of Train 802 *Tranz Alpine* passenger express returning from Greymouth.
- 1.2.3 The TC had endorsed the HRV movement on the train control diagram² in accordance with procedures for handling requests for time on-track, but in doing so he had drawn the on-track block in black over a blue pencil line which represented the planned running of Train 847, an additional service not included in the normal daily timetable but which was scheduled to depart from Greymouth at 1330. The TC had drawn the blue schedule line for Train 847 on the train control diagram earlier in his shift after he had been advised that it was running.

¹ A hi-rail vehicle is a road vehicle, used for maintenance or inspection duties, weighing up to an unladen weight of 10 tonne, fitted with rail trolleys so that it can be driven along the track and can also be driven on or off track at level crossings or other suitable places.

² The train control diagram covers a 24 hour period and contains station locations on one axis and time on the other. It also has green lines printed on it to indicate the path of each train scheduled to run during the 24 hour period. The purpose of the diagram is for the TC to plan and record train movements and the track occupancy requirements of HRVs, track gangs and other track users.

1.2.4 Tranz Rail Operating Code Section 6 Track Warrant Control Instruction 12.5, stated in part:

Blue only must be used to indicate track warrants. Other endorsements on the diagram such as the actual running line of a train, special trains and trolley movements will be shown in the following manner:

- Actual running line of trains – to be shown in red
- Special trains, timetable changes, block of line etc – to be shown in green
- Trolley movements or other track occupancy not under track warrant – to be shown in black

1.2.5 At 1332 the TC received a radio call from the LE of Train 847 in Greymouth requesting a track warrant for his train to proceed to Stillwater. The TC stated that he did not plot the projected path of Train 847 on the train control diagram again as the train was going to run on, or close to, the blue schedule line which he had drawn on earlier. He stated that after looking at the blue schedule line for Train 847 on the train control diagram he prepared and issued a conditional track warrant to the LE of Train 847, authorising his train to depart from Greymouth “after the arrival of Train 801” and proceed to Stillwater. In doing so the TC authorised Train 847 to enter the work and time on-track window, which he had already authorised for the HRV and endorsed on the train control diagram.

1.2.6 Tranz Rail Operating Code Section 6 Track Warrant Control Instruction 12.3 Summary of Procedures in effect at the time stated in part:

The sequence for issuing a track warrant is:

- Carry out the checks as prescribed herein to establish that it is safe to issue the track warrant
- Plot the movement on the Train Control diagram

1.2.7 Tranz Rail Operating Code Section 6 Track Warrant Control Instruction 12.5 stated in part:

All movements authorised by track warrant must be plotted in blue on the Train Control diagram.

1.2.8 After Train 801 had arrived in Greymouth Train 847 departed, the LE unaware of the HRV occupying the section about 3 km ahead.

1.2.9 When the gang had completed their work on-track at the 208.65 km they climbed into the HRV and prepared to move along to their next worksite. This was when they first noticed the locomotive headlight as Train 847 came into view from around a curve about 2 km away.

1.2.10 The ganger stopped the HRV and tried to contact the LE of Train 847 by radio on channel 1 but was unsuccessful, so he reversed to the 208.00 km where the HRV could be off-tracked. He tried again unsuccessfully to contact the LE of Train 847 as he did so.

1.2.11 Meanwhile the LE of Train 847 had stopped his train at 209.5 km, about where the gang first saw the headlight, to shut down the second of the 2 train locomotives as the weight of the train was such that it did not require both to be in power. Once this was done the LE returned to the leading locomotive and continued his journey. He stated that he had not received any communication from the track gang by radio on Channel 1 and he had not seen the gang after he recommenced his journey.

- 1.2.12 When the train had passed, the ganger contacted the TC and advised him of the incident.
- 1.2.13 The TC was removed from duty pending an investigation by Tranz Rail.
- 1.2.14 The TC was certified for the duties he was undertaking. His most recent re-certification in accordance with Rail Operating Code Section 1, Instruction 5.3.2 had been completed on 30 January 1998 and was effective until 30 January 2000.
- 1.2.15 The TC had undergone a desk assessment on 30 January 1998 as part of his re-certification and another on 13 April 1999, the latter approximately 8 months before the incident. His desk assessments were 15 months apart.
- 1.2.16 Voice tape playback audits had been undertaken by his manager on 15 February 1999 and 6 October 1999, the latter about 2 months before the incident. His voice tape playback audits were 8 months apart.
- 1.2.17 The TC was 7.5 hours into an 8.5 hour rostered shift at the time of the incident. He had worked this shift for the 3 days before the incident and did not consider the shifts to have been either excessively long or busy. He stated that he had only had about 4.5 hours of disturbed sleep the night before his shift. He did not feel fatigued, so he considered himself fit to commence his shift at his rostered time.

1.3 Collision between Train 201 and Hi-rail vehicle between Papakura and Paerata

1.3.1 Narrative

- 1.3.1.1 At 0630 on Monday, 17 January 2000, the Auckland area TC commenced duty and took over the Waitakere to Te Rapa and Te Rapa to Bay of Plenty train control operations from the North Island Main Trunk (NIMT) train control position. At 0650 he handed the Te Rapa to Bay of Plenty control over to another TC who had begun duty at that time and concentrated on the Auckland area suburban passenger train operation during the morning peak period.
- 1.3.1.2 The track and structures manager (TSM) had planned an ultrasonic testing car run from Paerata to Te Rapa on the NIMT on this day and had called those members of his staff involved to a briefing in Pukekohe to discuss the day's work.
- 1.3.1.3 During this briefing, at about 0830, the TC contacted the TSM to discuss with him a separate work-related issue. During this discussion the TSM mentioned his requirement to on-track the ultrasonic testing car, classified as an HRV, and 2 attendant HRVs at Crown Road level crossing, immediately north of Paerata, and travel south to Te Rapa. The TSM advised that he would be ready to start the run at about 1000, so the TC gave him a rundown on expected train movements around that time.
- 1.3.1.4 The TC planned for the HRVs to follow Train 141 towards Pukekohe after it had cleared Paerata junction and he told this to the TSM. The TC expected to hear from the TSM or one of his staff at about 1000, seeking authority for the ultrasonic testing car and HRVs to on-track at Crown Road level crossing.

- 1.3.1.5 The ultrasonic testing car and attendant HRVs were insulated so they did not operate any line-side electrical equipment such as signals or level crossing alarms. When the vehicles operated on the main line they were not usually signalled so they could run on either main line in double line automatic signalling areas. The decision on which main line would be used was made between the ganger in charge of the work and the TC, dependent on the work to be done and track availability at the time. The TC advised that the best option for the ultrasonic testing car and attendant vehicles on this day was to use the down main line because of the density of trains expected on the up main line around 1000. The only train that was required to use the down main line was Train 141 returning about that time from Mission Bush to Huntly, which at the time of the discussion with the TSM was still discharging coal at Mission Bush.
- 1.3.1.6 After the staff briefing had finished the ultrasonic testing car and attendant HRVs proceeded by road to Paerata. The vehicles travelled close to the NIMT and the ganger, a member of the working party, saw Train 401 *Geyserland* railcar pass in the distance.
- 1.3.1.7 The majority of the working party were staff who regularly worked on this section of the NIMT and had some knowledge of the train timetables. They were aware that 2 passenger services, Train 401 *Geyserland* railcar service from Auckland to Rotorua and Train 201 *Overlander* Auckland to Wellington passenger express, were scheduled through the area on the down main line at about 0845 and 0925 respectively.
- 1.3.1.8 The HRVs arrived at Crown Road level crossing at about 0910 and the ganger established radio contact with the TC and requested permission for the 3 HRVs to on-track on the down main line and work their way south, initially to Pukekohe, with as much time on-track as possible. This request was made 50 minutes before the expected 1000 call. The ganger was aware that Train 401 had passed, having seen it from his vehicle as he drove to Paerata, and assumed that Train 201 had also passed. He later could not give a reason for this assumption but he was well aware that the services normally ran about 40 minutes apart.
- 1.3.1.9 After the passage of Train 401 through Paerata, the TC had taken manual control of signalling there to bring another movement, Train 395, from the Mission Bush Branch on to the down main line. Once Train 395 had moved through Paerata, the TC left the signalling in manual mode in preparation for bringing Train 141 through the same route at the expected time of 1000.
- 1.3.1.10 Taking manual control of signalling at Paerata required all signals controlling movements of trains on the up and down main lines through Paerata to be returned to the Stop position for the changeover from automatic to manual control. Paerata was normally set in automatic mode for trains operating on the NIMT, and the TC usually only took manual control to signal trains going to or coming from the Mission Bush Branch.
- 1.3.1.11 The TC wanted to get Train 141 on to the down main line ahead of the HRVs, so he authorised the HRVs to on-track and move south as far as 8L down home signal at Paerata (Signal 8L), from where he wanted the ganger to call at 0945 for an update. This was in line with his plan to hold the 3 HRVs at this signal until Train 141 had entered the down main line, at which point he would allow them to follow the train south. The distance from Signal 8L to the points at which Train 141 would enter the down main line was about 1300 m. The ganger repeated and acknowledged this instruction and the call was terminated.
- 1.3.1.12 While conversing with the ganger, the TC had drawn the movement of the HRVs on to the train control diagram in accordance with procedures for handling inquiries from track users. In doing so he had plotted the line across the pre-printed green schedule line for Train 201 on the train control diagram. Train 201 had not at that stage passed through Paerata and was not therefore endorsed by a red line on the train control diagram to show its actual passage.

- 1.3.1.13 The TC did not mention Train 201 so the ganger took this as confirmation that the train had passed and did not question the TC further. None of the other staff had thought of the possibility of Train 201 not having passed so they also took the authorising of the movement to Signal 8L as confirmation that there were no expected movements on the down main line. It was not until after the collision that they realised no one had actually seen Train 201 go past.
- 1.3.1.14 The radio communication between the ganger and TC was heard by other members of the work group who all understood from it that the TC's intention was to hold the HRVs at Signal 8L until Train 141 had joined the NIMT. This was primarily to avoid any delays to Train 141 which would have been caused by the HRVs had they gone ahead, but it also created an extended time envelope behind Train 141 for the ultrasonic testing car to undertake its work without interference from any train movements on the down main line.
- 1.3.1.15 The ultrasonic testing car on-tracked and proceeded on the down main line to Signal 8L. The TSM then on-tracked his HRV but, before he followed the ultrasonic testing car to Signal 8L, he and his passenger left the vehicle and returned to where the ganger was standing at the level crossing to give him some final instructions.
- 1.3.1.16 As they walked towards where the ganger stood, the crossing alarms at the level crossing started to operate, indicating the approach of a train. The TSM expected the train to be on the up main line but could not see any train coming from that direction. Turning around he saw Train 201 approaching the level crossing from round a curve on the down main line and immediately ran towards it, giving the LE an Emergency Stop hand signal as he did so. He realised that the train would not stop before it collided with the HRV so he leaped out of the way.
- 1.3.1.17 Train 201 was crewed by a locomotive engineer (LE), a train manager and 2 train assistants and conveyed 112 passengers. It had departed Papakura at 0913 after a scheduled passenger stop and proceeded south on the down main line towards Pukekohe. As the train approached Paerata the LE saw a Caution Proceed (yellow) indication on Signal 63471 warning him that the next signal in advance, Signal 8L, was at Stop (red). This surprised him as these signals were usually at Clear Proceed (green) for the passage of that train.
- 1.3.1.18 After he had passed Signal 63471 he saw some Tranz Rail vehicles parked in the vicinity of the Crown Road level crossing. He sounded the locomotive horn to warn of his approach and made a precautionary brake application to slow the train down in accordance with the Caution Proceed indication he had received on Signal 63471. The train then entered a left-hand curve, and he temporarily lost sight of the vehicles because of trees and other growth on the side of the track.
- 1.3.1.19 As the train exited the curve, the LE saw a Tranz Rail employee running towards him giving an Emergency Stop hand signal. He made a full service application of the brakes, followed by an emergency brake application when he saw the HRV on the down main line immediately in front of him. He then got out of his seat to shelter behind the control stand from the impending collision. The LE estimated that the impact propelled the HRV about 300 m towards Signal 8L where it collided with a light trailer coupled to the rear of the ultrasonic testing car.
- 1.3.1.20 Train 201 stopped approximately 60 m beyond the point of impact, and the LE immediately went to ascertain that no one was injured in the HRV. After confirming that no injuries were sustained, he contacted the train manager to ensure there were no injuries to passengers on the train before he contacted TC by radio and advised him of the collision.
- 1.3.1.21 At about 0922 the TC received a vigilance alarm call via the train control radio channel, which had been activated by the emergency brake application on Train 201. The TC immediately knew that a collision between Train 201 and at least one of the HRVs had almost certainly occurred. The collision was confirmed by radio communication from the ganger, who also advised that no injuries had been sustained.

1.3.1.22 The third HRV was not on-track at the time of the collision.

1.3.1.23 Although the actions taken by the LE of Train 201 were appropriate, he was relieved of duty before the train continued its journey. This was in line with Tranz Rail's procedures for the relieving of LEs involved in collisions.

1.3.2 Site details

1.3.2.1 The rail corridor between Papakura and Pukekohe consisted of a down main line for trains running to Pukekohe and an up main line for trains running to Papakura. This was defined as double line running.

1.3.2.2 The Mission Bush Branch was a single line railway and operated under centralised traffic control (CTC).

1.3.2.3 Paerata was a triangle junction located at 632.65 km between Papakura and Pukekohe where the Mission Bush Branch joined the NIMT (refer Figure 1). The station was under double line automatic signalling control and was usually only manually controlled by the TC to signal trains to and from the Mission Bush Branch. It was in manual mode with all signals at Stop at the time of the collision. Signal 8L at Stop was the reason for the Caution Proceed indication on Signal 63471 as Train 201 approached it.

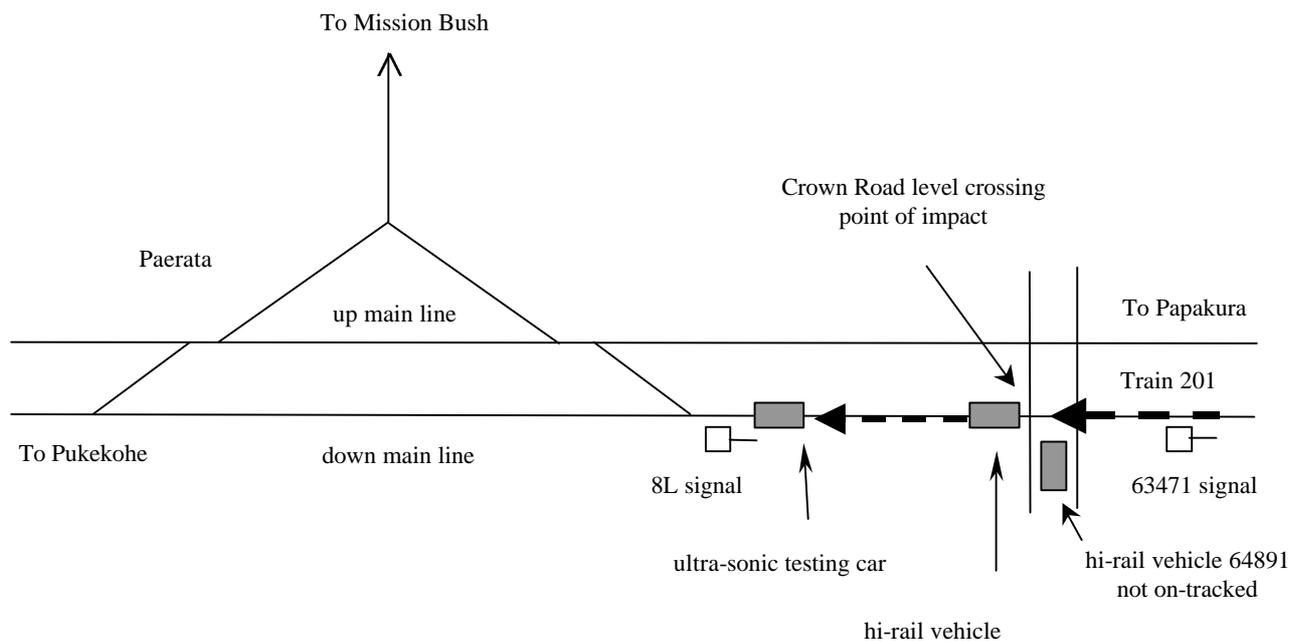


Figure 1
Site plan of Paerata
(not to scale)

- 1.3.2.4 The TC was able to monitor train movements and signals and points indications at Paerata from the CTC visual display unit on his desk.
- 1.3.2.5 Northbound trains travelling to Mission Bush joined the Mission Bush Branch via the south leg of the triangle from the up main line and trains travelling south from the Mission Bush Branch joined the down main line of the NIMT, also via the south leg of the triangle.

1.3.3 Personnel

- 1.3.3.1 All staff were certified to perform the duties they were undertaking.
- 1.3.3.2 The TC's most recent re-certification in accordance with Rail Operating Code Section 1, Instruction 5.3.2 was completed on 10 February 1998 and was effective until 10 February 2000. He had undergone desk assessments on 10 February 1998 and 14 June 1999, the latter approximately 7 months before the incident. His desk assessments were 16 months apart.
- 1.3.3.3 Voice tape playback audits had been undertaken on 24 March 1999 and 27 October 1999, the latter approximately 3 months before the incident. His voice tape playback audits were 7 months apart.
- 1.3.3.4 He was approximately 2.5 hours into an 8-hour shift at the time of the incident. It was his second day back at work following a holiday break of approximately 4 weeks, which had included the Christmas and New Year holidays. The previous day was his first day back and he had worked a shift from 0700 to 1500.
- 1.3.3.5 The TC's family had left to continue its vacation before he had begun his shift on the day of the incident and the previous night he had stayed up later than usual to assist with getting things ready for their departure. He recalled only having about 5 hours sleep that night. He stated that he felt he was still in a state of transition between holidays and work, having had such a long break. Over the weekend he had also become aware of personal issues within his extended family. Neither the lack of sleep nor the personal issues prompted him to evaluate his condition before commencing his shift.
- 1.3.3.6 His health was good and he had no requirements for any medication that might have affected his performance.
- 1.3.3.7 The TC's workload had been particularly light during the shift, which he said was not unusual for a Monday morning.
- 1.3.3.8 The TC was relieved of duty immediately after the incident and following an internal inquiry conducted by Tranz Rail; he was reviewed medically and underwent a refresher course in track call handling procedures before being reinstated to operational duties.

1.4 Incident between St Andrews and Studholme

Narrative

- 1.4.1 At about 1450 on Monday, 14 February 2000, a track ganger contacted the TC by radio and requested time on track for an HRV to travel south from St Andrews to 10L down home signal at Studholme on the SIMT, being off-track and clear at 1600. The HRV had earlier worked its way south from north of St Andrews and was berthed on the crossing loop at the time of the call, waiting for the passage of Train 902 *Southerner* passenger express enroute from Invercargill to Christchurch.

- 1.4.2 The TC plotted the movement on to the train control diagram and advised the ganger that Train 933 Middleton to Dunedin express freight train was the next expected train movement through the area but that it was still shunting in Timaru and she was unsure of when it would be departing. She authorised the ganger to proceed after Train 902 had cleared and gave him time on-track until 1600 hours to complete the journey. After the passage of Train 902 through St Andrews, the TC reversed the loop to main line points for the HRV to re-enter the main line. The ganger advised her when he was clear of the points, and the TC returned them to the normal position.
- 1.4.3 The TC stated she had not used the signal blocking command facility (refer paragraph 1.9.1) to “tag” the signals controlling the entry of trains into the St Andrews to Studholme section. She was aware that the use of this feature was not mandatory, but she knew that it would have provided additional protection for the HRV movement. She stated that she usually used the signal blocking command but could offer no reason as to why she had not done so this time.
- 1.4.4 The TC was also responsible for train control duties covering the Main North Line (MNL) from Middleton to Picton. When she had finished talking to the ganger at St Andrews she had shifted her attention to the MNL and had not returned to the SIMT until the LE of Train 933 called her by radio and told her that his train was ready to depart from Timaru.
- 1.4.5 The TC stated that she plotted a line on the train control diagram for Train 933 to proceed to St Andrews only, as she had planned to hold the train on the main line there until she had either received advice that the ganger was off-track and clear or the agreed off-track time of 1600 had elapsed.
- 1.4.6 The TC then proceeded to clear the signals for Train 933 to depart Timaru and, she thought, enter the main line at St Andrews. In the process, however, she entered a command into the CTC computer that cleared the signal for Train 933 to also depart from St Andrews and enter the Studholme section which was already occupied by the HRV. The TC stated that she was sure she had only cleared the signal for Train 933 to enter the main line at St Andrews, but a printout of CTC commands issued confirmed that the signal to depart St Andrews had also been cleared at the same time.
- 1.4.7 Train 933 had departed from Timaru 40 minutes ahead of its scheduled departure time.
- 1.4.8 As he travelled south the ganger had stopped at Bridge 105 at 189.4 km for approximately 35 minutes to make an inspection. When he returned to the HRV he noticed the headlight of an approaching train in his rear vision mirror. He estimated the distance at between 1.5 km and 2 km so he started the HRV and moved quickly forward in an attempt to increase his distance from the train, at the same time trying to contact the LE by radio on channel 1. His attempts were unsuccessful so he changed to channel 2 and called the TC, who answered almost immediately.
- 1.4.9 The TC had noticed the passage of Train 933 through St Andrews from the CTC visual display unit in front of her and when she went to update her train control diagram realised that the section the train had just entered was already occupied by the HRV. At about the same time the LE of Train 933 had called her by radio and advised her that he could see an HRV ahead of his train. He asked if it was on-track or alongside the track. She responded that it was on-track and instructed him to stop his train.
- 1.4.10 The ganger had off-tracked at the first available level crossing. Once the TC had confirmed that the HRV was off track and clear she instructed the LE of Train 933 to continue.
- 1.4.11 The TC had just started her shift when she took the call from the ganger and was about 25 minutes into her shift when the LE of Train 933 called for a signal to depart Timaru.

- 1.4.12 The TC was removed from duty, pending an investigation by Tranz Rail.
- 1.4.13 The TC was certified in accordance with Tranz Rail Operating Code Section 1, Instruction 5.3.2 for the duties she was undertaking. Her certification in accordance with Rail Operating Code Section 1, Instruction 5.3.1 was completed on 20 November 1998 and was effective until 20 November 2000.
- 1.4.14 The TC had undergone a desk assessment at the time of her original certification on 20 November 1998 and up until the time of the incident, 15 months later, had not had another.
- 1.4.15 Voice tape playback audits had been undertaken on 22 January 1999 and October 1999, the latter approximately 4 months before the incident. The voice tape playback audits were 9 months apart.

1.5 Incident between Ashhurst and Woodville

Narrative

- 1.5.1 At about 1445 on Tuesday 5 September 2000, a track ganger contacted the TC by radio and requested time on track for an HRV to travel from 18.0 km to 22.5 km, both points between Ashhurst and Woodville on the Palmerston North to Gisborne Line. Train P28, a shunting service running to Pahiatua via Woodville and operating as a light locomotive, had passed the 18.0 km mark and the ganger planned to follow it to the 22.5 km, being off-track and clear at 1545.
- 1.5.2 The TC who received the call (TC 1) was operating the Manawatu Desk and had responsibility for train operations for the Manawatu, Wanganui and Taranaki areas as well as from Palmerston North to Woodville (although not including Woodville). After receiving confirmation from the ganger that Train P28 had passed, the TC plotted the movement of the HRV on to the train control diagram and advised him that the next train would be either P28 shunt returning from Woodville to Palmerston North or Train 601 *Bay Express* passenger service from Napier. He authorised the HRV movement and confirmed that the ganger would be off-track and clear at 1545.
- 1.5.3 TC 1 stated that he had not used the signal blocking command facility to “tag” the signals controlling the entry of trains into the Ashhurst to Woodville section because there was no requirement to do so under existing procedures and he considered the facility to be non-user friendly. He was satisfied that all relevant information relating to the HRV movement had been endorsed on the train control diagram but he had not drawn a plot line on the diagram to indicate the return of Train P28 from Woodville because he did not know at that time when it would be returning.
- 1.5.4 There was a rostered change of TCs at 1500 and 10 minutes before that TC 1 began his handover to the incoming TC (TC 2). As part of this process he went over the train control diagram and brought to the attention of TC 2 all train and track movements, including the movement of the HRV between Ashhurst and Woodville. TC 2 later confirmed that this had happened and that he was aware of the presence of the HRV when he took over the shift. Tranz Rail Operating Code Section 6 Instruction 14.1.7 re Inquiries from Maintenance Workers, Hi-Rail Vehicles and Trolley Users stated that:

At the completion of a shift, the outgoing TC must draw the attention of the member taking over the shift to the location of maintenance work, Hi-Rail vehicles or trolleys, trains running late and any other unusual circumstances.

- 1.5.5 At about 1530, while TC 2 was involved in the issue and readback of a track warrant for a train in another area he noticed the “train waiting” light at Woodville was illuminated. He realised that Train P28 had arrived back in Woodville and was ready to depart for Palmerston North, so he cleared the signal for it to depart and enter the section already occupied by the HRV. He did not refer to his train control diagram to plot a line for Train P28 from Woodville to Ashhurst before clearing the signal.
- 1.5.6 Train P28 had been under the control of the Wellington TC from Woodville to Pahiatua and return, and it was this TC who had applied for the signal for the train to depart Woodville once its work there was completed. Although he had control of signalling within Woodville station limits he could not clear the signal to dispatch a train into the Woodville to Ashhurst section. The ‘train-waiting’ light was the advice to the Manawatu TC that a train was ready to depart.
- 1.5.7 As he continued with the track warrant read-back, TC 2 glanced at his train control diagram and immediately became aware of the potential conflict between Train P28 and the HRV. He completed the track warrant read back then attempted by radio base call and voice call to contact the LE of Train P28, but without success. He then contacted the ganger, who responded to the radio message and advised TC 2 that he was not yet clear of the track. TC 2 instructed him to arrange protection, as he had dispatched Train P28 into the section in error.
- 1.5.8 The LE of Train P28 responded to his base call and called TC 2. He was instructed to stop where he was until the ganger had confirmed he was off-track and clear. Train P28 was permitted to continue once the ganger reported he was off-track and clear. Train P28 had stopped about 3 km from the HRV.
- 1.5.9 TC 2 stated that when he took over the shift there was no pencil plot line drawn on the train control diagram for the return of Train P28 from Woodville. He did not draw one on at that stage nor did he activate the signal blocking command facility on the signals controlling entry to the Woodville to Ashhurst section because there was no requirement under existing procedures for him to do so. He also thought the facility was not user friendly.
- 1.5.10 Both of the TCs were removed from duty pending an investigation by Tranz Rail.
- 1.5.11 Both of the TCs were certified in accordance with Rail Operating Code Section 1 Instruction 5.3.2. for the duties they were undertaking.
- 1.5.12 TC 1 had undergone a desk assessment on 20 January 2000, which was 8 months before the incident. His most recent voice tape playback audit had been undertaken on 31 August 1999, more than 12 months before the incident.
- 1.5.13 TC 2 had undergone a desk assessment on 11 May 2000, which was 4 months before the incident. His most recent voice tape playback audit had been on 16 March 2000, just under 6 months before the incident
- 1.5.14 TC 2 was about 50 minutes into his rostered shift at the time of the incident and stated that the shift had been quite busy with the issuing of track warrants to trains in other areas under his control.

1.6 Train control procedures for handling track user inquiries

1.6.1 Tranz Rail Operating Code Section 6 Instruction 14.0 Inquiries from Maintenance Workers, Hi-Rail Vehicles and Trolley Users stated in part:

14.1 Accurate and Up-dated Information

The necessity for absolute accuracy when dealing with inquiries from trolley, Hi-Rail vehicle users and maintenance staff working on or near the track is vital. There is no margin for error, oversight or indifferent approach concerning the movement of trains, Hi-Rail vehicles, or trolleys when handling enquiries from these members. Their lives depend on the accuracy of information supplied by the TC and there should be no possibility of misunderstanding by the inquirer. Abbreviated speech or short cuts in procedure must not be adopted by a TC when handling these inquiries.

14.1.3 Pre Authorisation check and use of Train Control Diagram for Track Occupancy

Before an occupation is authorised the Train Controller must establish positively whether any conflict exists with either existing occupations, track maintenance machinery or trains within any part of the area requested. All movements must be plotted on the Train Control Diagram in black ink. This will establish if it is safe to authorise the occupation.

The Train Controller MUST establish by reference to these plot lines that:

- There is no conflict with a train or trains for any part of the area covered by the plot line which is about to be authorised
- There is no conflict with occupations already in effect for any part of the area covered by the plot line which is about to be authorised.

Should a conflict occur with an existing occupation or track maintenance machine exist the caller must be advised so that the arrangements can be made to pass through the area concerned.

14.1.4 Nominated Time – Safety Buffer (in part)

For occupations the nominated time MUST include a minimum safety buffer of fifteen minutes before the anticipated arrival time of the next train **EXCEPT where physical protection is established.** i.e. conditional stop boards, detonators, signals held at stop . . .

The Train Controller must provide the caller with the most up to date information in regard to the next train or trains (when it is unsure which will arrive first).

Trains must NOT be dispatched into an area inside the 15 minute buffer unless “off-track and clear” has been received from the Track User.

Rail Operating Code Section 6 Instruction 14.1 concluded by stating in part that:

As outlined above, the TC will be responsible for authorising a movement after taking into account the requested on-track time and train movements within the area concerned. After this the TC is then responsible for ensuring that no trains conflict with that movement . . .

1.6.2 Tranz Rail's Engineering Rule 198(d) stated that:

If, after authorising an on-track movement circumstances alter which would allow a train to conflict with the agreed on-track time, train control must arrange to hold back that train, until the employee in charge has advised he is clear of the line or the nominated time has elapsed.

1.7 Forward planning of train movements

1.7.1 Tranz Rail Operating Code Section 6 Instruction 3.3 Forward Planning stated in part:

All train movements and crossings must be anticipated for some hours ahead and be plotted in pencil on the diagram. This forward planning is vital to good train controlling.

It enables the TC to sum up the situation quickly and avoids the necessity for hasty decisions as problems can be foreseen earlier. Particular emphasis should be placed on the accuracy of plotting train movements as the operation of motor trolleys, Hi-Rail vehicles and track maintenance work can be vitally affected.

1.8 National train control centre

1.8.1 The national train control function was centralised to Wellington, where nationwide train control duties were carried out from 9 separate desks. The system comprised networked computers for signalling and a computer-based radio system which allowed TCs to communicate with LEs and other track users operating in their respective areas of control. Desks responsible for track warrant control working were also equipped with a computer for the preparation and issue of track warrants.

1.8.2 The computer-based systems were designed to allow train control areas to be transferred between desks within the train control centre to meet workload requirements. This system offered better flexibility and allowed staff to be reduced during periods of low activity, particularly at weekends and quieter periods, when several areas could be covered by one TC.

1.9 Protections available within CTC

1.9.1 Tranz Rail advised that the following protections against clearing signals governing the entry of trains in to sections were available within the CTC system:

Control Blocking - This feature enables the operator to prevent controls being sent to a specific control point. It can be used to prevent signals from clearing, points from being moved or switchlocks being released.

Manual Overwrite - this feature enables the operator to force a specified indication to a particular state. It can be used to show a section of track as occupied for insulated rail vehicles. A point that has been manually overwritten will show up in the colour cyan.

Note that manually overwriting tracks **DOES NOT** prevent a signal being cleared over those tracks.

1.9.2 Tranz Rail advised that they were currently reviewing the existing "Blocking of Signals" options available within the CTC system and were currently evaluating a software package and developing blocking options and software modifications which would make the system more effective and user-friendly.

1.10 Train controller re-certification and audit processes

- 1.10.1 Tranz Rail Operating Code Section 1 General Instruction 5.3.2 regarding the re-certification of TCs stated in part:

5.3.2 Re-certification

Re-certification will be required every two years. This re-certification will encompass both observation of practical competence and a written examination on the rules and codes applicable to the position . . .

- 1.10.2 On 11 August 2000, Tranz Rail confirmed by letter that the re-certification and audit of TCs as at 28 February 2000 consisted of:

Six monthly random procedure audits by voice log playback

This process is designed to enable Controllers to evaluate their own operating practices and develop action plans to strengthen these procedures with the Manager providing feedback and critique.

Additionally, this enables track users to receive consistency from all Controllers as “best” practise is embedded into daily operations.

The purpose is solely to address these issues and not to apportion blame, nor is it used for disciplinary reasons. By encouraging Controllers to listen to and assess their performance handling track calls and dealing with radio procedures, an ideal situation is created enabling individuals to address any areas below the required standard.

Specific elements for each type of call have been identified. New Controllers learn these disciplines during the Train Control School.

Desk Assessment

An annual desk assessment will be conducted for each Controller.

This process will assess the individual’s technical competence and operating practices seen on the day. For Controllers who are certified to operate a number of desks this will involve a shift split over these desks as appropriate. This will only be necessary where the desks use different operating systems, i.e. a Controller certified for two desks that operate the exact same systems will not generally be observed in each desk unless the workload is substantially different.

Train Control Graph Audits

The Train Control Manager also has responsibility for auditing Train Control Graphs. This process requires an inspection to be completed and includes an overall view of occupancy authorities granted for infrastructure work for compliance with code and rules requirements.

- 1.10.3 On 21 August 2000, Tranz Rail advised that the following changes had been successfully trialled and were proposed to be incorporated into the existing train control re-certification procedures:

Train Control Re-certification

Prior to February 2000 a review of the Train Control certification and re-certification process was undertaken. This review recommended the process be improved by increased frequency of desk assessment and voice tape playback. To enable both the company and employees to evaluate the effectiveness of this process it was introduced on a trial basis.

Feedback from Train Controllers in regard to review of safety related procedures by tape playback assessment has been positive, and as a result the process is now being further refined to bring it into line with the Safety Observation Procedures in place for other staff in operating positions within Tranz Rail.

In a twenty four month (two year) period this will see each Train Controller having:

- Three desk assessments (safety observations).
- Four tape playbacks,
- Computer aided theory assessment for each of the operating classifications held.

The main changes included in the proposal were that the desk assessments would be carried out 8-monthly instead of annually as at present, and that computer-aided theory assessments would replace the written rules and regulations examinations.

- 1.10.4 Tranz Rail advised that the proposed changes to the TC re-certification and audit processes were implemented on 31 August 2000.

1.11 Train controller survey

- 1.11.1 Six TCs not involved in any of these 4 incidents were spoken to in an effort to establish staffs perceptions of some issues raised during these investigations.
- 1.11.2 In response to a question relating to self-evaluation of health and fitness, 4 of the TC's stated that they were aware of the term and had carried out a self-evaluation of themselves in the past before commencing a shift.
- 1.11.3 When asked how they felt about ringing in if they were going to be unable to start a shift because of sickness or fatigue, 4 stated that they were quite comfortable with it, although they acknowledged they were aware of the pressure this could put on their colleagues. They supported this by saying that health and fitness were paramount to achieving effective performance while on shift. The remaining 2 TCs stated that they felt uneasy about ringing in because of a loyalty to their colleagues and a perceived expectation that they had to come to work regardless of their fitness. This was also tempered by their feelings for the additional workload on colleagues if they did not report for work.
- 1.11.4 The results of the survey showed staff were generally supportive of the existing TC training process although 4 of those surveyed felt that improvements could be made in the re-certification and auditing processes. Two of those spoken to felt that, because many of the audit processes had not been done within required timescales, management did not place a high importance on this aspect of their duties.

2. Analysis

2.1 Incident between Greymouth and Stillwater

2.1.1 Factors contributing to the TC authorising Train 847 to enter the section already occupied by an HRV included:

- the TC drawing the schedule line for Train 847 on the train control diagram in blue instead of green
- the TC not referring to his train control diagram to check for potential conflicting moves when the LE of Train 847 initially advised he was ready for a track warrant for the Greymouth to Stillwater section
- the TC not plotting the path of train 847 in pencil, then in blue before preparing and issuing a track warrant authorising the train to proceed from Greymouth to Stillwater.

2.1.2 The TC had earlier drawn the schedule line for additional Train 847 in blue pencil, instead of green, and did not see the need to redraw it again in blue for track warrant issuing, as he knew the train was going to run on the original schedule blue line anyway. He had not plotted the projected path of Train 847 in pencil for the same reason. Had the TC followed the correct procedures regarding the respective colours and plotting practices, he would have been drawing lines across those representing the HRV occupying the section, which probably would have alerted him to the presence of the HRV, and avoided the incident.

2.1.3 Because the ganger had been advised that Train 802 *Tranz Alpine* passenger express was his next movement the TC should not have issued a track warrant for Train 847 until either the nominated off-track time had elapsed or he had been advised that the HRV was off-track and clear.

2.1.4 Desk assessment and voice tape playback audits carried out on the TC did not comply with Tranz Rail's own requirements. Desk assessments were 15 months apart instead of the documented 12-monthly requirement for such assessments, and his voice tape playback audits were 8 months apart instead of the documented 6-monthly requirement for such audits.

2.2 Collision between Train 201 and Hi-rail vehicle between Papakura and Paerata

2.2.1 The Train Controller

2.2.1.1 When the ganger contacted the TC from Crown Road level crossing about 50 minutes earlier than expected, the TC appears to have established a mindset based around the time of 1000 and gave the ganger the same train movement information that he had given to the TSM about 30 minutes earlier in Pukekohe, which related to expected train movements at 1000. While drawing the plot line for the movement of the HRVs on the train control diagram he had drawn it over the green schedule line of Train 201, which was already printed on the train control diagram. This preprinted schedule line should have reminded him of the presence of Train 201, which he appeared to have totally forgotten.

2.2.1.2 This 1000 mindset was probably entrenched further when the TC took manual control of Paerata for signalling Train 395 from the Mission Bush Branch on to the down main line after Train 401 had cleared and then left the signalling in manual mode in preparation for signalling Train 141 off the Mission Bush Branch some 55 minutes later but before Train 201 *Overlander* passenger express had cleared Paerata. The TC expected Train 141 to be near Paerata at about 1000 and obviously expected that to be the next train in the area. It was usual for automatic control to be used at Paerata for NIMT movements. His action in taking manual control accounted for the Caution Proceed indication on Signal 63471 and the Stop indication on Signal 8L.

- 2.2.1.3 There were 2 major differences in train movements on the down main line through Paerata between 0910 and 1000. At 0910, Train 201 *Overlander* passenger express was the first scheduled movement but did not feature at 1000; secondly, at 1000, Train 141 returning from Mission Bush was the first scheduled movement but did not feature at 0910. Train 141 had not departed Mission Bush at the time of the collision.
- 2.2.1.4 The TC had endorsed the passage of the previous trains on the down main line on to the train control diagram in red ink as they had passed through Paerata: Train 401 *Geyserland* railcar at 0855 and Train 395, an express freight service from Mission Bush Branch, at 0905. These were recorded from information available to the TC from the CTC visual display unit on his desk. The TC was entitled to leave the signalling system at Paerata in manual mode and to manually clear signals for Train 201 to pass through on the down main line. Forgetting the presence of Train 201 could happen to any TC, but to then draw a plot line for the HRV across the green schedule line for Train 201 suggests that other factors may have been affecting the ability of this experienced TC to function normally.
- 2.2.1.5 The TC may have experienced some distractions while on duty due to the earlier departure of his family on the continuation of their holiday and the additional worry of other family issues, both of which may have contributed to some degree of preoccupation.
- 2.2.1.6 As the result of an enforced late night and early start packing the family car for the holiday he would have been mildly fatigued when reporting for duty. Both the short-term sleep loss and the early morning start may have contributed to this.
- 2.2.1.7 Mild fatigue and preoccupation may limit conscious attention and the sharing and prioritising of attention between different tasks. This may explain the apparent coning of attention by the TC to specific activities under his control and his apparent lapse of attention to the presence of Train 201, together with an apparent loss in situational awareness with the movement of various trains and vehicles over this time. This apparent temporal disorientation may have been due to a mindset linked to the expected entry of the HRVs to the area.
- 2.2.1.8 The potential for mistakes, lapses and slips due to a failure to maintain comprehensive situational awareness should be matched by appropriate defences. The train control diagram is used as a checking device as well as for planning. The failure of the TC to recognise the potential conflict created when he plotted the movement of the HRV across the schedule line of Train 201 cannot be explained by fatigue or preoccupation. It is more likely that the TC did not perceive the importance of the train control diagram as a check for potential conflicts and did not check the planned movement once it was plotted on the train control diagram.
- 2.2.1.9 Desk assessment and voice tape playback audits carried out on the TC did not comply with Tranz Rail's own requirements. Desk assessments were 16 months apart instead of the documented requirement of 12-monthly assessments and the voice tape playback audits were 7 months apart instead of the documented requirement of 6-monthly audits.

2.2.2 The ganger

- 2.2.2.1 The schedules of Trains 401 *Geyserland* railcar and 201 *Overlander* express were common knowledge among the local track workers, as the trains ran close enough together that track gangs generally considered there was insufficient time to get work time on-track between them.
- 2.2.2.2 Train 401 *Geyserland* railcar was scheduled 40 minutes ahead of Train 201 *Overlander* express. The ganger had seen Train 401 pass while he was enroute from Pukekohe to Paerata, a journey of approximately 10 minutes, and assumed that Train 201 had also passed by the time he arrived at Crown Road level crossing, although he had not seen it. As the rail tracks were not always clearly visible from the road it was possible that a train could pass without anyone travelling on the road seeing it. When the ganger had contacted the TC at 0910 hours from Crown Road level crossing, approximately 2 km north of Paerata, there had been insufficient time for Train 201 to have also cleared.
- 2.2.2.3 A track worker's local knowledge of the train timetable could be a useful informal defence against conflicting moves when seeking time on-track but it was not an expectation and was not part of the documented process for TCs when dealing with track inquiries.

2.3 Incident between St Andrews and Studholme

- 2.3.1 A factor contributing to this incident was the TC's action in advancing Train 933 through St Andrews and into the section ahead without checking her train control diagram for any potential conflicting movements. Had she done this before clearing the signals for Train 933 the plot line of the HRV movement should have reminded her of its presence.
- 2.3.2 Train 933 was a Middleton to Dunedin express freight service and was shunting at Timaru at the time the TC took the track call from the ganger. She stated that when the LE of Train 933 contacted her by radio for a light to depart Timaru she plotted the passage of the train only to St Andrews where she planned to hold it until the agreed off-track and clear time had elapsed. The TC expected Train 933 to arrive at St Andrews at about 1530 and should have plotted the train for a stop at St Andrews for about 30 minutes to indicate it was being held there until the HRV was off-track and clear at 1600. Train 933 was running ahead of schedule and a delay for this purpose would not have impacted on the schedule of the service. However, as the TC cleared the signal for Train 933 to depart St Andrews without referring to her train control diagram it is doubtful that this action would have prevented the incident.
- 2.3.3 In between taking the track call from the ganger and receiving the call from the LE of Train 933, the TC had been doing work on the Main North Line between Christchurch and Picton. This probably distracted her from her previous activities so that when she took the call from the LE of Train 933 it appears she had forgotten about the presence of the HRV and consequently cleared the relevant signals in error for Train 933 to proceed into the St Andrews to Studholme section.
- 2.3.4 Had the TC used the pseudo blocking command option on this signal her efforts to clear it would have been unsuccessful and would have brought to her attention the presence of the HRV in the section ahead. The TC stated that she had always used this function in CTC operations and could offer no explanation as to why she had not done so this time. Although not mandatory, the use of the signal blocking command "tag" in CTC signalling areas offered an effective defence against potential conflicting movements because of the additional protection it provided for track users by prohibiting the clearing of signals to allow trains to enter sections which were already occupied. A safety recommendation has been made in section 5 of this report to address this issue.

- 2.3.5 Desk assessment and voice tape playback audits carried out on the TC did not comply with Tranz Rail's own requirements. No further desk assessment had been carried out since the TC's first and only certification 15 months earlier, and the voice tape playback audits were 9 months apart instead of the documented requirement of 6-monthly audits.

2.4 Incident between Ashhurst and Woodville

- 2.4.1 The manner in which TC 1 handled the HRV request and plotted the movement on the train control diagram was in accordance with procedures for the handling of track inquiries. However, in doing so, TC 1 had not plotted the anticipated return of Train P28 from Woodville in pencil on to the train control diagram. Anticipated train movements for some hours ahead were supposed to be plotted on the train control diagram as a reminder to the TC when planning the movements of other trains and track users.
- 2.4.2 TC 1 correctly followed procedures when handing the shift over to TC 2. During the handover TC 2 became aware that the return journey of Train P28 from Woodville had not been plotted on the train control diagram and he should have done this immediately. Had he done so, this may have prevented him from responding to the "train-waiting" light when it appeared for Train P28 at Woodville, although as TC 2 did not refer to the train control diagram anyway, it is doubtful that this action would have prevented him from clearing the signal. When responding to the "train waiting" indication TC 2 should have first plotted the projected path of Train P28 in pencil on to the train control diagram, which would have ensured that he checked for potential conflicting movements before he cleared the signal for the train to depart from Woodville.
- 2.4.3 A further factor contributing to this incident was that TC 2 had tried to do 2 jobs at once when he cleared a signal for Train P28 to depart Woodville while he was involved in track warrant readouts and readbacks with trains in another area of his control. The demands of the track warrant readout and readback meant that TC 2 was not in a position to give his full attention to Train P28, which should have been held at Woodville until he was in a position to respond to the "train waiting" indicator.
- 2.4.4 The actions of TC 2 once he realised that he had created a potential conflict were questionable in that he continued with the track warrant readback before he responded to the situation he had created by allowing Train P28 to depart into the occupied section. Once the potential conflict was recognised by the TC he should have treated the situation with more urgency.
- 2.4.5 Neither of the TCs had used the signal blocking command "tag" nor the manual override systems available within the CTC system. The use of either of these systems was not mandatory and both TCs thought the process was not user-friendly. A safety recommendation has been made in section 5 of this report to address this issue.
- 2.4.6 Desk assessments carried out on TC 1 met with Tranz Rail's requirements but voice tape playback audits did not, his previous such audit having taken place more than 12 months before the incident.
- 2.4.7 Desk assessment and voice tape playback audits carried out on TC 2 complied with Tranz Rail's requirements.

2.5 Train Controller re-certification and audit procedures

- 2.5.1 There was no correlation between the bi-annual re-certification of TCs and the desk assessment/tape playback audit procedures. While the TCs involved were current regarding their re-certifications, the majority of them did not meet the specified desk assessment and voice tape playback audit requirements between those re-certifications. The value of the audits and assessments was questionable, given that they were not undertaken in compliance with prescribed timescales. A safety recommendation covering this issue has been made in section 5 of this report.
- 2.5.2 The least experienced TC had been certified 15 months prior to the incident and during that time had only had 2 tape playback voice audits 9 months apart. No desk assessment had been done since her initial certification. A more intensive audit program should have been in place for new TCs to monitor their progress more closely. A safety recommendation covering this issue has been made in section 5 of this report.
- 2.5.3 The changes to the TC re-certification and audit processes introduced on 31 August 2000 will increase the frequency of desk assessments in particular but will mean an increase in the workload of those responsible for the compliance monitoring of TCs. As the previous requirements for desk assessments and voice tape playback audits were often not met in terms of compliance requirements it is difficult to see how the increased audit and assessment requirements resulting from the new procedures will be achieved without an increase in resources.

2.6 Summary

- 2.6.1 The following deficiencies relating to the use of train control diagrams by TCs were identified:
- failure to forward plan by plotting the projected paths of trains in pencil on to the train control diagram
 - failure to refer to the train control diagram before clearing signals controlling the entry of trains into sections
 - failure to correctly interpret information endorsed on the train control diagram relating to scheduled train movements and authorised HRV movements.
- 2.6.2 In each of these 4 cases sufficient information was available on the train control diagram to have averted the respective incidents. Although this information was incomplete in three cases where the TC had failed to plot in pencil the projected path of the train movement into the occupied section, the authorised movement of the HRV was in each case entered on the train control diagram. The other incident involved the authorising of a HRV to on-track in a section already occupied by a train, the presence of which was identified on the train control diagram by a printed green schedule line.
- 2.6.3 Fatigue not related to work appeared to have been a factor in two of the incidents and raised the issue of effective self-evaluation by staff regarding their fitness to go on duty. A safety recommendation covering this issue has been made in section 5 of this report.

- 2.6.4 The words of Tranz Rail’s Operating Code Section 6, Instruction 14 (see section 1.6.1) are worth repeating “There is no margin for error, oversight or indifferent approach concerning the movement of trains, hi-rail vehicles or trolleys when handling enquires from these members. Their lives depend on the accuracy of information supplied by the TC...” In almost all cases with the TCs involved in these incidents Tranz Rail did not meet the desk assessment and voice tape playback compliance requirements between their re-certifications as defined within its documented procedures. This reinforced the finding from the survey of TCs that Tranz Rail management did not place a high level of importance on this requirement, despite it being a quality check on a highly safety critical task.
- 2.6.5 The workload in 3 of the incidents was not heavy and was not considered a factor. In the fourth incident the TC considered he was busy and had tried to do 2 jobs at once to avoid a delay to Train P28 by clearing a signal for it to depart from Woodville while he was still involved in track warrant readouts and readbacks.
- 2.6.6 These incidents raised the issue of the primacy of the train control diagram in dealing with track user inquiries, and whether the new technology being introduced into the train control environment was seen by TCs as a replacement or an alternative to the use of the train control diagram. Following the incident between Woodville and Ashhurst, Tranz Rail issued a Train Control Safety Briefing No 5 which stated in part:

The diagram, the primary tool of the Train Controller, is where movements are plotted and recorded. Before signalling a train past a signal, you must ensure the section the train is entering is clear and safe, and that can only be guaranteed by referring to the diagram. When you have plotted the intending movement, and there is no conflict, then signals can be cleared accordingly.

This left no doubt as to the importance of the train control diagram in all aspects of a TC’s duties.

3. Findings

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

- 3.1 All staff were certified for the duties being carried out.
- 3.2 The 4 incidents occurred across all 3 traffic control systems within Tranz Rail.
- 3.3 The manner in which each individual track user communicated with their respective TC regarding the movements of their HRVs was in accordance with documented procedures.
- 3.4 In all cases the TCs failed to identify potential conflicting movements because of incorrect plotting, lack of forward planning or incorrect interpretation of information contained on the train control diagram.
- 3.5 Two of the TCs gave incorrect train movement information in response to track inquiries.
- 3.6 Three of the TCs failed to plot the projected path of the train movement in pencil on to the train control diagram before either issuing a track warrant or clearing signals to authorise the train to enter the occupied section.

- 3.7 In 2 of the incidents, St Andrews and Woodville, the train controllers did not refer to their train control diagrams before clearing signals to allow trains to enter the occupied sections. Because of this, the presence of pencil plot lines would probably not have prevented these incidents.
- 3.8 Fatigue although not as a result of work requirements was probably a factor in the Paerata incident.
- 3.9 The use of either the signal blocking command tags or the manual overwrite system, although not mandatory, could have prevented the St Andrews and Woodville incidents.
- 3.10 The workload on the train control desks at the time of the respective incidents was not a contributing factor.
- 3.11 The hours of duty of each train controller were such that they had no bearing on the respective incidents and their preceding shifts were not excessively long.
- 3.12 These incidents show that TCs were not placing the appropriate importance on the train control diagram when planning, plotting and authorising train movements and HRV track occupations.
- 3.13 The desk assessments and tape playback audits on the majority of the TCs involved did not meet Tranz Rail's compliance requirements at the time of the incidents.

4. Safety Actions

- 4.1 On 21 January 2000 Tranz Rail advised that:

At the time of the occurrence both the track warrant and schedule line for train 847 were drawn in blue. A change has been made to the procedure for drawing extra trains on the Train control diagram. This now requires these to be drawn on in green to differentiate from "track warrants" which are drawn in blue.

In view of the action taken by Tranz Rail no safety recommendation covering this issue has been made in this report.

- 4.2 Tranz Rail advised on 6 September 2000 that as at that date all TCs complied with the desk assessment and the tape playback audit compliance requirements. This had been achieved since the implementation of the new train control re-certification and audit and assessment procedures on 31 August 2000.

5. Safety Recommendations

- 5.1 On 17 January 2001 the Commission recommended to the managing director of Tranz Rail that he:
- 5.1.1 as a matter of urgency make the use of signal blocking command "control tags" mandatory on signals controlling the entry of trains into sections occupied by HRVs, track maintenance gangs or other track users (125/00)

- 5.1.2 introduce self-appraisal techniques to assist train controllers in establishing their fitness to commence duty and provide adequate relief measures to ensure that train controllers do not feel obligated to commence duty if they do not consider they meet the required fitness standards (126/00)
- 5.1.3 do not allow train controllers to be re-certified unless they have undergone the required audits and assessments defined in Tranz Rail's procedures within the prescribed timeframes (127/00)
- 5.1.4 develop and introduce a more intensive audit and assessment procedure for new train controllers for their first 12 months in the position, culminating in a re-certification after that period before moving into the bi-annual re-certification process. (128/00)

5.2 On 2 February 2001 the managing director of Tranz Rail advised that:

5.2.1 Safety Recommendations 125/00, 126/00, 127/00 and 128/00

125/00: Tranz Rail accept this recommendation.

126/00: Tranz Rail accept this recommendation.

127/00: Tranz Rail accept this recommendation.

128/00: Tranz Rail accept this recommendation.

Approved for publication 24 January 2001

Hon. W P Jeffries
Chief Commissioner