Report 00-116

hi-rail vehicle and express freight Train 225

occupying the same section of track

near Te Kauwhata

4 October 2000

Abstract

On Wednesday, 4 October 2000, Train 225, an Auckland to Wellington express freight service, was permitted to depart from Te Kauwhata on the North Island Main Trunk and enter the down main line that was already occupied by an authorised hi-rail vehicle movement.

No collision resulted, as the four occupants of the hi-rail vehicle became aware of Train 225's approach and were able to off-track before the train passed.

The safety issues identified included:

- a train controller not following procedures for handling track user inquiries
- a train controller not applying adequate safety measures to protect the hi-rail vehicle movement
- an unusually high number of incidents involving a train controller
- the inability of the operator to provide relief for the train controller for nearly 3 hours following the incident.

One safety recommendation was made to the operator to address these 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.

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List of Abbreviations

HRV	hi-rail vehicle
km	kilometre(s)
LE	locomotive engineer
m	metre(s)
TC	train controller
VDU	visual display unit

Data Summary

Train type and number:	hi-rail vehicle and express freight Train 225
Date and time:	4 October 2000 at about 1620
Location:	588.18 km near Te Kauwhata (North Island Main Trunk)
Type of occurrence:	train entering section already occupied by hi-rail vehicle (HRV)
Persons on board:	HRV crew: 4
	train crew: 1
Injuries:	nil
Damage:	nil
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator-in-charge:	D L Bevin

1. Factual Information

1.1 Narrative

1.1.1 On Wednesday, 4 October 2000, Train 139 was a Mission Bush to Te Rapa express freight service crewed by a locomotive engineer (LE). At about 1525 the LE called the train controller (TC) and advised that his train had run into a tree that had blown over across the down main line about 1 km south of Te Kauwhata. The train was disabled as a result of vegetation and debris caught up under the locomotive. The TC contacted the section ganger and requested assistance.

1.1.2 At about 1540 the ganger arrived at Te Kauwhata and contacted the TC to obtain permission to on-track his HRV on the up main line at Te Kauwhata and travel towards Train 139. The TC declined the request because there were trains due on the up main line. The TC told the ganger to call the LE of Train 139 on channel 1, the local radio channel, and find out the location of the disabled train. The TC said that he had later tried unsuccessfully to contact Train 139 to determine exactly where it was disabled, but he was aware of its approximate location because of occupied track circuits displayed on his visual display unit [1] (VDU).

1.1.3 At about 1545 the ganger called the TC and advised that he had spoken to the LE of Train 139 and was aware of the exact location of the train. The ganger requested permission to on-track on the down main line at Te Kauwhata and proceed towards the 590.00 km where Train 139 was stopped. After removing the debris from under the locomotive he planned to follow Train 139 to the 588.18 km where the HRV would off-track. There was a private level crossing at this point which was a convenient place to off-track the HRV.

1.1.4 The TCO asked the ganger if he could go by road instead because Train 225, an Auckland to Wellington express freight train, was expected "down there eventually". The ganger told the TC that he could not get to Train 139 by road, so the TC authorised the movement, but did not nominate a time for the ganger to be off track and clear; instead he instructed the ganger to call him when he was off track and clear "at the 588 km". The ganger acknowledged the instruction.

1.1.5 The TC said he had not used the signal blocking command facility (refer paragraph 1.7.1), to tag Signal 4L at Te Kauwhata (refer Figure 1) to protect the HRV movement. His reason for not doing so was that he had planned to hold Train 225 at Whangamarino, a crossing loop about 5.3 km north of Te Kauwhata, to cross Train 404 and when he took the track call from the ganger he knew that a Whangamarino crossing allowed an additional 25 minutes for the gang to complete its work and be clear for the passage of Train 225. The pencil lines plotting this crossing were visible on the train control diagram.

1.1.6 While the gang was travelling towards Train 139 they came across another tree which had blown down and was obstructing the opposite up main line. The ganger called the TC and advised him of this and asked him to stop any trains in the vicinity on the up main line while the gang cleared this obstruction. The TC knew from plot lines drawn on his train control diagram that Train 404 was close to the site so he contacted the LE by radio and instructed him to stop opposite Train 139, which was disabled immediately south of the up main line obstruction.

[1] Track circuits were illuminated in red on the VDU when the section to which they applied was occupied by a train.

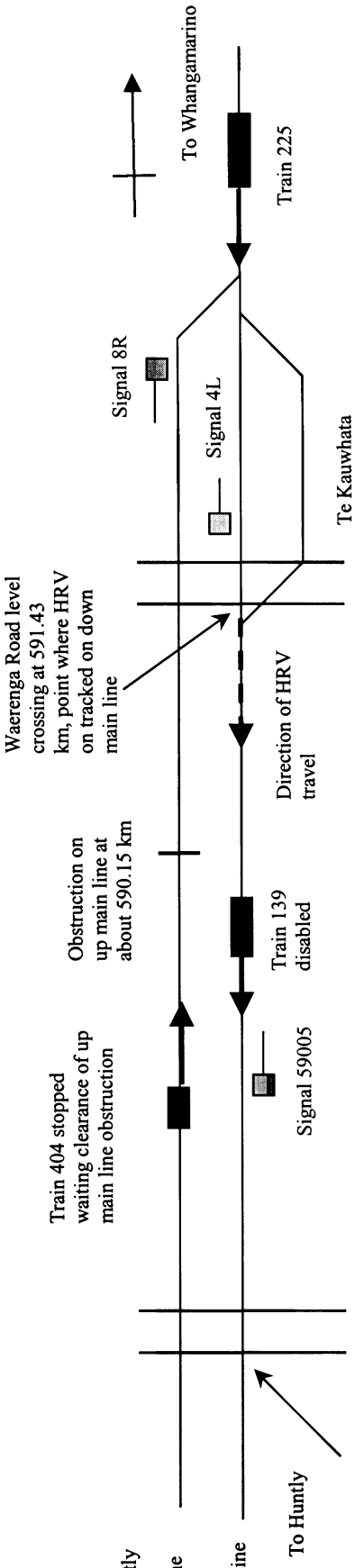

Figure 1
Track layout Te Kauwhata
(not to scale)

1.1.7 When the TC became aware of the impending delay to Train 404 he decided to advance Train 225 to Te Kauwhata to cross Train 404 there instead. He cleared the signals for Train 225 to proceed through Whangamarino but had not plotted the altered crossing on the train control diagram.

1.1.8 At about 1600 the ganger called the TC and advised him that the up main line was clear for the passage of Train 404 and that he was continuing on to assist Train 139. The LE of Train 404 also contacted the TC to confirm that he had heard the track clearance from the ganger and was continuing his journey.

1.1.9 The gang rejoined their HRV and continued on the down main line until they reached the rear of Train 139 at about 590.13 km, where they stopped and walked the length of the train to the locomotive at about 590.05 km to remove the debris.

1.1.10 At about 1605 the LE of Train 139 called the TC and advised him that the debris had been cleared from beneath his locomotive and that his train was continuing its journey. The gang returned to their HRV, followed Train 139 down to the 588.18 km and off-tracked. The TC noticed that Train 139 had disappeared from his VDU and he also saw that Train 404 was waiting at Signal 8R at the north end of Te Kauwhata (refer Figure 1) for Train 225 to clear the single line section from Whangamarino.

1.1.11 At this point the TC became involved with a level crossing alarm failure in a different area under his control. This diverted his attention from Te Kauwhata because he was required to contact other trains near the level crossing concerned and advise them of the placement of a temporary speed restriction and arrange for staff to attend the defective alarms.

1.1.12 While he was dealing with this incident the TC saw on his VDU that Train 225 was approaching Signal 4L at Te Kauwhata. At about 1610 he cleared the signal to allow the train to enter the down main line. He had not at that time received confirmation from the ganger that the HRV was off-track and clear of the section. The TC later said that when he heard from the ganger that the up main line was also blocked he thought that the HRV had vacated the down main line while the gang worked to clear that obstruction although he had not been told this by the ganger.

1.1.13 While Train 139 occupied the section between Signal 4L and Signal 59005 (refer Figure 1) the TC could not clear Signal 4L to allow another train to enter the section. Signal 59005 was about 200 m from where Train 139 had been disabled. The distance between Signals 4L and 59005 was 1375 m.

1.1.14 At about 1616 the ganger called the TC and advised him that the HRV was off-track and clear at the 588.18 km. He also mentioned that Train 225 had passed on the down main line shortly after he had cleared the track. The ganger had been unaware of the presence of Train 225 on the down main line until he had stopped the HRV to off-track at the 588.18 km, at which point one of the gang members saw the train coming up behind them and warned the ganger.

1.1.15 The ganger was able to clear the HRV from the down main line before the arrival of Train 225 but he said he had not had time to advise the TC that he was off and clear, as he had been instructed to do, before Train 225 passed him.

1.1.16 The LE of Train 225 had been aware of the activity of the gang by listening on the train control radio channel and because of this, and the fact that his train was travelling on Caution Proceed (yellow) signals from Te Kauwhata, he was travelling at about 25 km/h as he approached the level crossing. He had not seen the HRV while it was on track but did see it on the road as he passed over the level crossing. He had not reported anything to the TC but had heard the ganger discussing the situation with the TC as his train moved away.

1.1.17 The TC was not immediately relieved following the incident but remained on duty for a further 3 hours under the supervision of the train control manager. Tranz Rail were unable to provide a relief TC or to amalgamate the desk workload with that of another desk because of concerns about overloading the second desk workload.

1.1.18 Once relief became available the TC was suspended from train control duties pending an internal inquiry by Tranz Rail.

1.2 Site and signalling information

1.2.1 The track to the north of Te Kauwhata was single line to Amokura with a crossing loop at Whangamarino, about halfway between Te Kauwhata and Amokura, and was controlled by centralised traffic control signalling operated remotely from the train control centre in Wellington.

1.2.2 The track to the south was double line and was controlled by double line automatic signalling, although Signal 4L controlling the entry of trains from Te Kauwhata on to the down main line could also be manually operated by the TC from the train control centre in Wellington. Signal 4L was a controlled signal that could be control tagged by a signal blocking command.

1.2.3 The signals between Amokura and Te Kauwhata were operated from a computerised centralised traffic control system situated in the train control centre in Wellington, and on his VDU the TC could see points and signals indications and the progress of trains as they passed through the section.

1.2.4 When a southbound train entered the down main line at Te Kauwhata the track circuit remained illuminated on the VDU until the train had travelled a distance of about 1 km at which point it extinguished. Similarly, a northbound train on the up main line "spotted" on the VDU about 1 km south of Te Kauwhata to signal its approach. The remainder of the double line track was not monitored on the VDU.

1.2.5 The off-tracking site at the 588.18 km was a private level crossing.

1.3 Personnel

1.3.1 The TC said that when he commenced his shift at 1500 he had walked into a busy period. At the time he commenced duty Train 139 had been doing a ballast discharge for track maintenance purposes between Whangamarino and Te Kauwhata and this had delayed a northbound passenger service at Te Kauwhata. The TC felt that he "was on the back foot from the word go."

1.3.2 When the ganger contacted the TC for permission to go and assist Train 139, the TC asked the ganger where he wanted to on-track. The ganger replied, "at the level crossing at Te Kauwhata." The TC confirmed with the ganger that the on-tracking location was Waerenga Road level crossing at 591.43 km, Te Kauwhata and plotted the HRV movement on to the train control diagram from its on-tracking point to where Train 139 was disabled.

1.3.3 The TC said that he had not extended the plot line for the HRV to follow Train 139 to the requested off-tracking point at the 588.18 km because he did not know how long it would take for the gang to clear the tree. He did not endorse on the train control diagram the HRV's call sign, the fact that it was running on the down main line nor the metrage point at which the HRV was to off-track when he plotted the HRV movement.

1.3.4 There were two horizontal lines drawn very close together on the train control diagram at the point where Train 139 was disabled: a red one which identified that Train 139 was stopped at the obstruction, and a black one with a corresponding endorsement, which showed the location of the obstruction.

1.3.5 The TC said that when he was approached by Tranz Rail management after the incident and asked to continue his shift he replied that he did not really want to. He had been shaken up by the incident and did not feel overly confident about carrying on. The TC said that when he was told that there was no relief available he had no option and felt obligated to continue until relief could be organised.

1.3.6 The TC had been employed by Tranz Rail for about 15 years and had been operating as a certified TC for nearly 5 years. He had been originally certified for the Auckland train control desk in July 1998 and his certification was current. All formal safety observations, tape playbacks and desk assessments were in accordance with Tranz Rail Operating Code instructions.

1.3.7 About 6 weeks before the incident the TC had been advised of his appointment to a different position within Tranz Rail. This was in response to his request of 12 months earlier for a transfer out of the train control environment because of what he considered the anti-social nature of the rosters in the train control positions in which he worked. While waiting for his transfer he had achieved his certification for the Auckland train control desk because he considered the rosters on that desk to be more socially acceptable. Although the TC was looking forward to transferring out of the train control environment, he felt that this had not impacted on his performance. He had not then been released to his new position because of a staff shortage in train control.

1.3.8 The TC said that rostering requirements had caused disruptions to his family life but his move to the Auckland train control desk and the fact that he was to be transferred out of train control had for the present resolved that issue. Nevertheless, a planned family outing for the upcoming weekend had been disrupted by "yet another roster change", which had caused some degree of stress at home.

1.3.9 During his time in train control the TC had been involved in 2 near-collisions between HRVs and trains, in December 1997 and January 2000, and 3 incidents in which he allowed trains to enter sections while other track users had authority to occupy them, in April 1996, March 1997 and February 1999. In March 2000 he was involved in an incident where he did not provide 15 minutes buffer for track users before dispatching a train into the section in which they had been working, and during his training in December 1995 he permitted a track maintenance machine to enter a section which was already occupied by an authorised light inspection vehicle movement.

1.3.10 Tranz Rail advised that during the same period there had been a further 20 occurrences involving TCs who had allowed trains to enter sections already occupied by authorised track users as follows:

1996	2
1997	4
1998	6
1999	2
2000	6

1.3.11 These incidents were spread among 15 TCs as follows:

11 TCs with one incident each
3 TCs with 2 incidents each
1 TC with 3 incidents

1.3.12 Both the ganger and the LE were certified for the duties they were undertaking.

1.4 Relief of train control staff involved in serious operating incidents

1.4.1 Tranz Rail's policy regarding the relieving of TCs involved in serious operating incidents required the following:

- the Network Control Manager to immediately notify the Train Control Manager
- the Train Control Manager to determine if the TC is implicated
- the Train Control Manager to direct if the TC is to be relieved from duty.

It was not mandatory for a TC involved in a serious operating irregularity to be immediately relieved of duty.

1.4.2 With regard to the not relieving the TC following the incident, Tranz Rail advised:

> Due to the Train Control Manager being unable to provide additional coverage for the Train Control desk involved, he made a decision to allow the Train Controller to continue under his personal supervision until relief could be provided. When making this decision, the Manager weighed up the merits of using this option versus opting to transfer the workload onto another Train Control position.
>
> Given that there was not a means to provide immediate relief for the specific train control desk and the alternative transfer of work to another desk had potential to "overload" another Train Controller, it is considered the Train Control Manager had a very difficult decision to make. The option he chose may not have been ideal, however he did provide additional support/protection by remaining with the Train Controller until relieved.
>
> The Train Control Manager did not hold a current certification to physically operate the train control desk, nevertheless has had considerable previous experience as a Train Controller and as Network Control Manager. The latter position involved working very closely with Train Controllers in a supervisory role. Collectively his experience in both positions provide the knowledge and experience for him to manage this function and, more specifically in this case, supervise a Train Controller.
>
> The matter was discussed with the Train Controller. They discussed the only immediate option of merging with another desk, however were concerned about the workload. The Train Controller did feel some degree of apprehension given the situation and was concerned that he may make a similar mistake. This nervousness is understandable and was the basis of the Train Control Manager's decision to provide his support.
>
> Situations will arise where the Train Control Manager has to weigh up options when dealing with matters such as this. One consideration must be the impact of merging another desk if the workload may render this move unsafe.
>
> Tranz Rail is working towards having Train Control qualified staff in other roles to reduce this exposure, however our ability to react immediately will still be

> governed by availability, time of day etc. Equally, situations will arise where other options are available, such as merging the desks and supervising the "merged" desk.

1.4.3 The issue of relief for TCs involved in serious operating incidents was addressed by the Commission in Safety Recommendation 009/01 in Rail Occurrence Report 00-113, which was made on 30 March 2000 and related to a full investigation of train control operations and recommended to the director of the LTSA that he:

> Carry out an LTSA investigation, or initiate a specific audit, of Train Control operations, such investigation or audit to include:
>
> - the resources available to meet the workload demand
> - the suitability of the roster system
> - the maximum shift desirable
> - the adequacy of arrangements for meals and other breaks during shifts
> - the adequacy of the current training system
> - the suitability of staff trained under any other system
> - the effectiveness of the safety observation and compliance monitoring system
> - the suitability and control of the work environment
> - the ability to immediately relieve any train controller involved in a serious operating incident
> - and initiate action necessary to address any deficiencies found.

On 6 June 2001 the director of the Land Transport Safety Authority replied:

> We have considered your recommendation for the Land Transport Safety Authority (LTSA) to conduct a Review of Tranz Rail Ltd (TRL) Train Control Operations. Although we consider that our proposed course of action will allow for appropriate monitoring of TRL actions on the issues regarding train control we acknowledge that there may be some benefit in commissioning the recommended independent review. On this basis we will accept your recommendation.
>
> As we consider that the proposed review will divert technical expertise within TRL we will discuss with them the most effective means of meeting the terms of the review. I am meeting with the TRL CEO on Friday 8 June and I will raise the matter of this review at that time.
>
> We have drafted a Terms of Reference for this Review and we are actively considering appropriate reviewers noting the potential for conflict of interest where any of the main rail consultancies are also involved in bidding for aspects of TRL business.
>
> We look forward to receiving the final draft of the above TAIC Report.

1.5 Train control procedures for handling track user inquiries

1.5.1 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.
>
> **14.1.4 Nominated Time – Safety Buffer** (in part)
>
> 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).
>
> **14.1.5 Plotting Conventions** (in part)
>
> Where Train Control agrees to hold all movements until the Track User gives clearance the designator "H" drawn at the right extremity of the plot line is to be used to indicate the line is obstructed until the Track User has called and given clearance. The occupation once completed is to be marked using a tick through the "H".
>
> **14.1.6 Working between metrages** (in part)
>
> When a track user is working from or to a metrage reference MUST be made to the metrage scale on either side of the train control graph to ensure the start / finish locations are correctly plotted. A small error in plotting the exact location may greatly expose the Track User to encroaching trains therefore extreme care needs to be taken in this regard.

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 . . .

1.5.2 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.

1.6 Forward planning of train movements

1.6.1 Tranz Rail Operating Code Section 6 Instruction 3.3 Forward Planning states 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.

1.7 Protections available within centralised traffic control

1.7.1 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.

The use of these protections was not mandatory.

1.7.2 In response to a similar issue raised in Rail Occurrence Report 00-101 Tranz Rail advised that they were 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.

2. Analysis

2.1 Because the LE of Train 225 was travelling cautiously through the section and had adequate visibility of the level crossing at the 588.18 km as he approached it the likelihood of his train colliding with the HRV was low. The fact that the LE was unaware of any potential conflict is reflected in the fact that he made no contact with the TC at the time he approached or travelled over the level crossing.

2.2 The ganger had initially requested time on-track on the up main line so that the HRV could run parallel to the down main line to where the locomotive of Train 139 was disabled. The TC declined this request because of expected traffic movements on the up main line and asked the ganger to contact the LE of Train 139 and find out exactly where he was stopped, then call him back.

2.3 Although the TC had been unable later to contact the LE of Train 139, he was aware of the approximate location of the disabled train from indications on his VDU. This information was available at the time of the ganger's first call and it could not be established why the TC instructed him to contact Train 139 to establish exactly where it was disabled. At the time the TC declined the request for the HRV movement on the up main line he was in a position to have offered the ganger time on-track on the down main line instead.

2.4 When the ganger called again and requested authority for the HRV to on-track on the down main line the TC asked the ganger if he could travel by road to the disabled train because he had Train 225 proceeding towards Amokura and he required the down main line for the passage of that train.

2.5 The TC's request for the ganger to travel by road to the disabled train to keep the down main line clear for Train 225 was difficult to understand. While Train 139 was disabled and occupying the next section past Signal 4L there was no possibility of advancing Train 225 beyond Te Kauwhata. It would have seemed reasonable to expect that the TC's priority would have been to get Train 139 moving again as quickly as possible and that he would therefore have provided every assistance to the ganger to achieve this.

2.6 The TC had not arranged with the ganger to hold all train movements until the ganger had advised that he was off-track and clear but by instructing the ganger to call when he was "clear at the 588" he intimated that he was going to do so and the ganger therefore had good reason to believe that adequate protection had been provided to ensure no following trains entered the section while he was occupying it. The assumption was that the TC required track clearance before he dispatched any trains in to the obstructed section.

2.7 The TC was unsure of the time it would take to clear the debris from under the locomotive of Train 139 but his plot line for the movement of the HRV should have continued to the off-tracking point, with additional time being built in to accommodate the work enroute. While such a plot line may not have been absolutely accurate time wise, it would have served as a reminder to the TC that the HRV was behind Train 139 and was going to follow it to the off-tracking point at the 588.18 km.

2.8 While Train 139 occupied the section, the HRV behind it was automatically protected by Signal 4L at Te Kauwhata. However, once the train moved out of the section that defence was lost as the signal could then be cleared for the next movement on the down main line. Had the signal blocking command been activated at the time the HRV movement was plotted this would not have been possible.

2.9 If the TC had used the signal blocking command option on Signal 4L any subsequent efforts by him to clear the signal for Train 225 would have brought the presence of the HRV in the section ahead to his attention through a message on the VDU. Although not mandatory, the use of this facility offered an effective defence by prohibiting the clearing of signals to allow trains to enter a section which was already occupied. A safety recommendation covering the mandatory use of signal blocking command "control tags" was made in Rail Occurrence Report 00-101 and accepted by Tranz Rail so no further safety recommendation covering this issue is included in this report.

2.10 When the TC was advised that the gang was going to be clearing an obstruction on the up main line he assumed that the HRV was therefore clear of the down main line. While the gang was working on the up main line, the HRV would obviously have remained on the down main line, as they cannot off and on-track at will, and the ganger would have been required to have reported off and clear of the down main line and asked for permission to occupy the up main line.

2.11 Once the obstruction was cleared from the up main line the ganger advised the TC that they were continuing on to Train 139 and, as the TC was under the impression that the HRV was clear of the down main line, he should have questioned the ganger and sought clarification of the situation. He could also have used this opportunity to update the ganger on the movements of Train 225 seeing as that train was now expected to arrive earlier at Te Kauwhata because of the altered crossing with Train 404.

2.12 When the TC plotted the HRV movement on the train control diagram he had not endorsed sufficient information to allow him to provide adequate protection and this, together with his not using the signal blocking command facility, meant that he had either forgotten about the presence of the HRV on the down main line, or continued with his assumption that it was off-track and clear following the work on the up main line. The TC dispatched Train 225 from Te Kauwhata before receiving confirmation that the ganger was off-track and clear of the down main line at the at the 588.18 km.

2.13 As Train 225 approached Signal 4L the TC was involved in other activities and cleared the signal to avoid any unnecessary delay to the train. It is probable that he did not refer to the train control diagram before doing so. Even though there was no evidence of the existence of a plot line for the continuation of Train 225 beyond Te Kauwhata, and details relating to the movement of the HRV were minimal, such a check before clearing Signal 4L was the last remaining defence against Train 225 entering the section still occupied by the HRV.

2.14 Three deficiencies relating to the use of the train control diagram by the TC were identified:

- Not correctly endorsing the complete details of the movement of the HRV, including: the letter "H" to indicate that all traffic was to be held until clearance had been received from the track user, the main line being used, time for enroute work, and the off-tracking point and approximate time.
- Not forward planning by plotting the altered crossing of Trains 404 and 225 from Whangamarino to Te Kauwhata in pencil and a plot line for Train 225 to wait at Te Kauwhata until track clearance was received.
- Not referring to the train control diagram before clearing Signal 4L at Te Kauwhata.

2.15 These deficiencies raised once again 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. This issue was originally raised in Rail Occurrence Report 00-101 when, after an incident between a HRV and a train between Woodville and Ashhurst, Tranz Rail issued a Train Control Safety Briefing No 5 on 15 September 2000, 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.

2.16 There was nothing to suggest a drop-off in the performance of the TC as a result of his anticipated transfer out of train control. Indeed, since applying for a transfer nearly 12 months earlier he had taken the positive step of attaining his certification for the Auckland train control position. Personal matters in which he was involved prior to commencing his shift may have contributed to his general demeanour and the lapses in handling the track call.

2.17 The TC's involvement in 5 previous incidents involving trains entering sections already occupied by other authorised track users in spite of having undergone the requisite performance monitoring raised doubts as to the effectiveness of Tranz Rail's selection, training and monitoring of TCs. Figures provided by Tranz Rail show 20 similar incidents in 5 years spread amongst 15 TCs, which averages out at about 1 every 5 years compared to the 1 per year for this TC.

2.18 Tranz Rail's policy for the relief of TCs who had been involved in serious operating incidents did not allow for situations where relief was not immediately available. The inability of Tranz Rail to provide relief for the TC for nearly 3 hours is viewed with concern. The TC had been involved in an operating incident with potentially serious outcomes and should reasonably have expected to be removed from the train control environment at the earliest opportunity to compose himself and thus remove the potential for another incident as a result of stress.

2.19 The TC said he was shaken following the incident but in spite of this he was told that there was no one else to relieve him and was asked to carry on. This left him with little choice. It is questionable whether the presence of his immediate manager, while perhaps beneficial from an operating perspective, would have contributed in any way to the confidence and wellbeing of the TC. Had the TC's immediate manager been certified for the Auckland train control desk it would have provided an opportunity for the TC to have been relieved immediately following the incident.

2.20 While desirable, it may not be practicable for Tranz Rail to have TCs available at all times to provide relief for all train control positions in the event of all serious operating irregularities and incidents, but the times when a relief TC is not available should be rare.

2.21 However, there is a need for Tranz Rail to fully review its procedures for removing TCs from operating duties following multiple operating incidents, and a safety recommendation addressing this issue has been made in section 4 of this report.

3. Findings

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

3.1 Train 225 was wrongly authorised to enter a section that was occupied by a HRV, which had the potential to cause a collision. The vigilance of the locomotive engineer in proceeding with caution reduced the possibility of a collision with the HRV.

3.2 The train controller was probably distracted by other workload and possibly events outside his work environment, when he authorised Train 225 to occupy the section.

3.3 The train control diagram had little effect in preventing this occurrence for the following reasons:

- it was incomplete
- it had not been used as a forward planning tool
- the train controller probably did not refer to it before authorising the Train 225 movement.

3.4 The train control diagram is the primary tool train controllers are required to use for controlling Tranz Rail train movements. The possibility exists that train controllers are instead using other tools at their disposal such as VDUs that do not have the equivalent level of safety as the train control diagram.

3.5 The use of a signal blocking command tag was a valuable defence that could have prevented this incident, but its use was not mandatory and the train controller did not use it on this occasion.

3.6 The train controller should have been relieved of duty following this incident to avoid the possibility of his dwelling on the incident at the expense of safe operation of train movements under his control, but Tranz Rail did not have the resources to do so on this occasion.

4. Safety Recommendations

4.1 On 30 May 2001 the Commission recommended to the managing director of Tranz Rail that he:

4.1.1 introduce a procedure to ensure train controllers who establish an abnormal history of serious operating incidents are removed from train control until the reasons for this are understood and addressed. (016/01)

4.2 On 25 June 2001 the managing director of Tranz Rail replied:

4.2.1 Tranz Rail accept this recommendation, noting the comments contained in our letter dated 12 June 2001.

Tranz Rail will review its present procedures to ascertain if there are further enhancements that can be introduced.

A process already exists to ensure operating staff, including Train Controllers, who establish an abnormal history of serious operating incidents, are removed from operating work until the reasons are understood and addressed.

> A further safeguard is the recent initiative introducing increased safety observations for staff considered "at risk" because they are new to the role, have contributed to significant operating incident(s) or are experiencing personal difficulties.

4.3 The following safety recommendation to the managing director of Tranz Rail, relating to the mandatory use of signal blocking command "control tags", was included in Rail Occurrence Report 00-101 regarding similar occurrences and is equally applicable to this incident.

> 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)

Approved for publication 11 July 2001

Hon. W P Jeffries
Chief Commissioner