Report 00-113

Train 378

derailment

Te Maunga

22 July 2000

Abstract

On Saturday 22 July 2000, at about 1927, express freight Train 378 derailed when it entered a crossover at the north end of Te Maunga while travelling too fast. The locomotive was severely damaged when it overturned following the derailment. The locomotive engineer suffered minor injuries. The train controller had incorrectly set a medium speed route to Mount Maunganui instead of the intended high speed route to Tauranga. The locomotive engineer did not react to the unexpected signal aspects displayed.

Safety issues identified included:

- non-adherence to basic train control techniques
- the distracting train control environment
- an emerging pattern of serious operating irregularities involving train controllers
- the potential for locomotive engineers to misinterpret unexpected medium speed signals.

Safety actions taken and recommendations made to the Land Transport Safety Authority and the operator address these 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

CTC	Centralised Traffic Control
ECMT	East Coast Main Trunk
km	kilometre(s)
km/h	kilometres per hour
LE	locomotive engineer
LTSA	Land Transport Safety Authority
m	metre(s)
MMB	Mt Maunganui Branch
POD	point of derailment
SH	State Highway
TC	train controller
Tranz Rail	Tranz Rail Limited

Data Summary

Train type:	express freight, 378
Date and time:	22 July 2000, at 1927
Location:	Te Maunga
Type of occurrence:	derailment
Persons on board:	crew: 1
Injuries:	crew: 1 minor
Damage:	major damage to the locomotive and level crossing protection equipment
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator-in-charge:	R E Howe

1. Factual Information

1.1 Narrative

1.1.1 On Saturday 22 July 2000, express freight Train 378 was operating a scheduled service from Kawarau to Hamilton on the East Coast Main Trunk (ECMT) under the Centralised Traffic Control (CTC) train control system.

1.1.2 The train consist was DC 4749, and 7 wagons. The gross weight of the train was 232 t and the length was 115 m. The train was crewed by a locomotive engineer (LE).

1.1.3 The LE commenced his shift at 1615 on southbound Train 337 from Tauranga and was returning on Train 378 towards Tauranga. His shift was due to finish at 2330.

1.1.4 As Train 378 approached Te Maunga, the junction of the ECMT and the Mt Maunganui Branch (MMB), the LE was expecting a route to Tauranga and a planned crew changeover with Train 325 at Tauranga. However, the train controller (TC) had incorrectly set a route to the MMB. Figure 1 is a diagram of Te Maunga and the junction involved.

1.1.5 The signals indicating a medium speed route to Mt Maunganui were not correctly interpreted and acted on by the LE and his train was diverted from the ECMT through a 25 km/h crossover at a speed of approximately 76 km/h (see Figure 2).

1.1.6 At about 1927 the locomotive derailed some 70 m past the entry to the crossover and crossed State Highway (SH) 2 level crossing. It then overturned to the left, separated from the train and pivoted end to end before coming to rest on its right side in the direction of travel (driver's side), some 110 m past the point of derailment (POD) and on the left side of the track (see Figure 3). The remainder of the train came to a stop with the leading wagon about 190 m past the derailed locomotive, the 7 wagons still coupled, and only the leading bogie of the leading wagon derailed.

1.1.7 The flashing lights and bells on the north side of the crossing were destroyed during the derailment.

1.1.8 The LE was trapped in the severely damaged cab for about 30 minutes before he could be freed. He suffered minor injuries as a result of the incident.

1.2 Witness reports

1.2.1 The derailment was witnessed by 2 motorists and 3 pedestrians on the west (right) side of the line. Their reports established the level crossing alarms were activated and the train gave a warning whistle blast before crossing SH 2, derailed, at high speed.

1.3 Site evidence

1.3.1 The following derailment markings were recorded at the site:

- wheel marks on the railhead where a left wheel crossed and fell outside (the POD), about 70 m past the entry to No. 9 crossover
- derailed wheels marks outside the left rail, continuing to the level crossing, some 60 m past the POD
- multiple wheel markings for 25 m across SH 2 as the locomotive deviated up to 6 m to the left of track centre whilst still upright (see Figure 4).

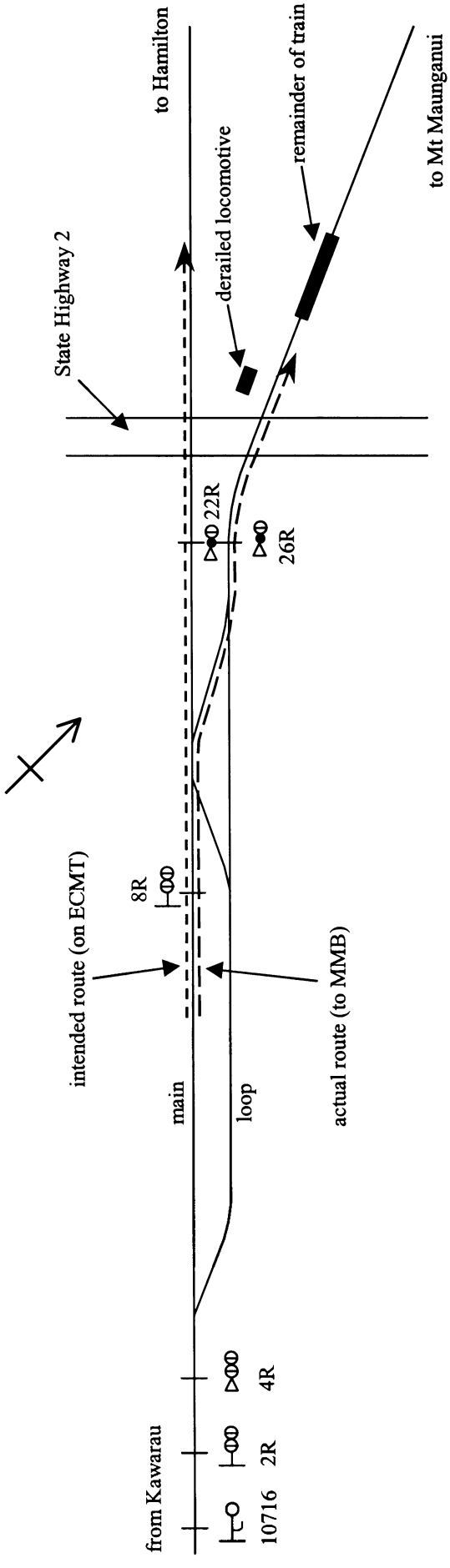

Figure 1
Te Maunga site diagram
(not to scale)

Figure 2
View looking north showing the intended route of Train 378 (to the left) and the actual route taken to the right, with SH 2 level crossing in the background

Figure 3
The leading (cab) end of DC 4749 looking in direction of travel (the locomotive had pivoted end to end before coming to rest)

Figure 4
Wheel marks of derailed DC 4749 crossing SH 2
(looking in direction of travel)

1.3.2 The locomotive came to a stop on the left side of the track and resting on the right (driver's) side some 4 m from the track as shown in Figure 3.

1.3.3 The track at the POD was heavyweight rail on treated pinus radiata sleepers. No significant track tolerance exceedances or maintenance deficiencies were present at the site.

1.4 Locomotive event recorder

1.4.1 The locomotive event recorder was extracted and 2 printed logs were supplied for analysis:

- the short log, which gave details of speed, air brake pressures and throttle position every second for 6 minutes prior to the end of recording
- the long log which gave days, time and speed every 10 seconds for 7 days prior to the end of recording.

1.5 Train 378 interaction with Train Control

1.5.1 The progress of Train 378 from Awakaponga, where the LE took over the train at about 1825, to Te Maunga spanned 2 train control shifts. The first train controller (TC1) was due to complete his shift at about 1900, at which time TC2 took over.

1.5.2 The only contact between Train Control and the LE of Train 378 after departure from Awakaponga was at 1830 when the LE radioed TC1 to notify a proposed comfort stop at Pikowai, which the TC acknowledged and drew on the train control diagram. This stop occurred about 1840. There was no contact between the LE and TC2 after the train controller changeover.

1.6 Train Control operations

1.6.1 For weekend operations Tranz Rail had 3 grouped desks (Northern, Central and Southern) accommodating 9 desks that were normally individually staffed Monday to Friday. The Northern desk had been rostered for 12-hour shifts in recognition of the low weekend workload.

1.6.2 The outgoing TC1 had a particularly busy last hour before completing his shift due to a number of unforeseen events. As a result he had not updated the train performance computer screen with time of arrival of trains at selected stations. He advised TC2 of this during the changeover. The changeover occurred between 1838 and 1844 and the train control tape showed a detailed handover had occurred, covering the unforeseen events, their effects, and in particular the planned crossing of Train 378 with 325 at Tauranga. The crossing had been drawn in pencil on the train control diagram by the outgoing TC1.

1.6.3 TC2 took control of the Northern desk at 1844. He stated he was quite busy at the shift commencement, including entering train performance times into the computer. At about 1920, as he was doing this work, he saw on the CTC screen that a train was approaching Te Maunga from Te Puke. He stated he had just been entering performance times for Train 338 (a previous train from Kawarau to Mount Maunganui) and as "a reflex thing" set Train 378 to Mt Maunganui, which was the routing of about 90% of northbound trains on the ECMT. At about 1927 he lost indication on 27 points at Te Maunga (as a result of the derailment) and received an emergency call advising him of the derailment at about 1929.

1.6.4 The train control tape showed a relatively low level of operational activity from 1844 until 1929. Noticeable on the tape was a background Channel 1 television sound track which first became audible at 1850, and remained audible thereafter.

1.6.5 There were 3 portable television sets in Train Control, one at each grouped desk. They were generally only switched on during weekend shifts. These sets had been supplied by the TCs and had been in Train Control for some years. Although not authorised they had been tolerated by Tranz Rail. They were removed immediately following the incident.

1.6.6 The CTC log showed the route setting that directed Train 378 to the MMB occurred about 1922. When the route was set No. 9 points were not moved. The previous operation of these points was at 1353 hours when they were set at reverse for a movement from the MMB. Tranz Rail advised that they were left in this position because the majority of trains use this route. The train control tape around this time showed the following activities:

Times	Activity
1910	operational call
1912	operational call
1916	4 short operational calls covering one minute
1919	operational call
1929	emergency call to train control reporting the derailment

1.6.7 TC2 could not recall whether he had been watching the television at the time he set the route to Mt Maunganui, but stated it was possible he may have been. He could not recall referring to his train control diagram at the time.

1.7 Train 378

1.7.1 Train 378 left Awakaponga heading north at about 1830 following a crew change. The LE was on a roster which usually required the next crew change with Train 325 in the Tauranga/Te Puna area and this was his thought as he approached Te Maunga. When interviewed he recalled "I was coming up the straight towards Te Maunga and I saw that I had clear proceed signals, but it didn't register to me that they were not the ones I was expecting." The first knowledge he had of the routing to Mt Maunganui was about 70 m before the points when he saw they were not set as he expected. He had time to apply the brakes before Train 378 took the turnout road.

1.7.2 Tranz Rail Rules and Regulations regarding identifying proceed signals were covered in Rule 109 (a) which stated:

> **109. (a) Locomotive Engineer to Identify Signal** – When a signal is placed at "Proceed" the Locomotive Engineer must satisfy himself that it refers to his train and the line it is on, and must understand the movement thereby authorised.

1.8 Signal aspects

1.8.1 The aspects displayed on the day compared to those expected by the LE were:

	MMB as set up by the TC		Intended ECMT route
Signal	**Aspect on the day**	**Name**	**Aspect expected by the LE**
2R	Green Red	Clear Normal speed	Green Red
4R	Yellow Green	Caution Normal speed Prepare to reduce to medium speed	Green Red
8R	Red Green	Clear Medium speed	Green Red
26R) Branch) Signals) 28R)	Green Red Green Red	Clear Normal speed Clear Normal speed	Red (Applying to the Mt Red Maunganui route)
22R) ECMT) Signals) 24R *)	Red Red Red Red	Stop))) Stop)	Green Red Green Red

* Not visible to the LE before reaching No. 9 crossover.

1.9 Signal sighting

1.9.1 A test run following the incident showed signal sighting approaching Te Maunga junction was influenced by 2 factors:

- the merging of some signals at specific points on early approach (in particular 8R merging with 22R)
- the effect of yellow street lighting in the junction vicinity when viewing signal 4R.

1.10 Personnel

1.10.1 TC2 joined Tranz Rail in 1997 as a trainee train controller and had been progressively certified in the Northern group desks. He was currently certified for the four desks in the group.

1.10.2 He described his training as “on the job” as compared with the present train control school, which gave initial 4-week courses before on-the-job training.

1.10.3 He had both a desk check and a tape audit check shortly before the incident, both within the Tranz Rail time requirements. The desk check had been carried out on a single desk during Monday to Friday. He could not recall being checked on weekend multi-desk work at any time.

1.10.4 Following a rostered day off on the Wednesday before the incident, TC2 had worked the Thursday and Friday night shift, 2250 to 0700, before commencing his 12-hour rostered shift at 1844 on Saturday, 22 July.

1.10.5 TC2 stated he enjoyed weekend shifts, which although in a quiet period were challenging due to the flexibility required to switch his mind between individual desk areas. However, he commented on the undesirability of the 12-hour shift, which had no allowance for meal break or other break from desk duties.

1.10.6 TC2 said he had no health or stress problems, and reported no problem sleeping between his shifts immediately prior to the incident.

1.10.7 The LE of Train 378 had 23 years service, of which 18 were as LE. He had been based at Mt Maunganui for 2 years. He held a current operating certificate for his duties.

1.10.8 In the fortnight before the incident the LE was rostered for 98 hours 33 minutes (including the day of the incident) with a work pattern of:

- 2 days off duty
- 6 days, 9-hour early shift (0001 – 0900 nominal)
- 2 days, 8-hour early shift (0500 – 1300 nominal)
- 1 day rostered day off *
- 1 day, 8-hour afternoon shift (1435 – 2240)
- 1 day, 8-hour late shift (1850 – 0220)
- 2 days, 7¼-hour afternoon shift (1600 – 2330 nominal). The incident occurred on the second of these shifts.

* The LE was requested to work on this day following a level crossing accident affecting another locomotive engineer, but declined. In the event he would have worked 104 hours if he had completed his shift on 22 July, and about 110 hours if he had accepted work on his rostered day off.

1.10.9 This roster included working on 2 rostered days off due to a shortage of LEs available at Mt Maunganui. The roster had 27 links. There were 26 LEs employed at Mt Maunganui at the time, one of whom was off on long term sickness. Due to additional work, absence on leave and short-term sicknesses, there were 23 LEs available at the time. Tranz Rail operating staff described this as "stretching the upper limits" of roster flexibility.

1.10.10 The LE stated he did not feel fatigued when he commenced his shift, and considered he had adequate sleep (0045 – 0900) on that morning. He commented on personal pressures relating to 3 separate family issues current at the time but did not feel these were unduly affecting him on the day. He also commented on his need for extra hours to assist in meeting his family needs. Despite such external influences he stated his thoughts as he approached Te Maunga were centred on where his crossing would take place.

1.11 Rostering

1.11.1 A check of rostered and actual hours for the Mt Maunganui-based LEs for the fortnight ending 22 July 2000 showed:

- maximum rostered hours 110 hours 20 minutes
- maximum actual hours 113 hours 25 minutes.

1.11.2 Tranz Rail "Rail Operating Manual" Section 3, "Rostering Locomotive Running" included Section 4.3 covering shift rotation, which stated:

4.3 Shift Rotation

4.3.1 Shift rotation is an ingredient in roster construction.

Research has demonstrated that it is preferable that 'forward rotation' be applied to rosters – this is the practice where the shift pattern has starting times that progressively move forward, thus creating an enhanced rest period between shifts.

4.3.2 Because of the nature of our operation it will often not be possible for rosters to consist of 'absolute' forward rotation. To cater for this the following "preferred" shift rotation parameters have been developed which should be applied when absolute forward rotation cannot be achieved.

4.3.3 The following boundaries in terms of shift commencement times have been identified:

0001 – 0600 EARLY	0600 – 1200 MORNING
1200 – 1800 AFTERNOON	1800 – 2359 LATE

- the ideal criteria is no backward rotation into the preceding timeframe.
- reasonable to step back 1 hour into the preceding timeframe.
- stepping back 2 hours is still considered acceptable.
- backward rotation within each timeframe is reasonable but preferably no more than 2 hours particularly in the Late and Early periods.
- progressive backward rotation in excess of a total of 4 hours over a period of 5 days or less should be avoided.

4.3.4 It is recognised that 2300 hours to 0700 hours is the normal key sleep period. Consideration should be taken of the extent that shifts encroach into this timeframe.

4.3.5 The higher risk is movement from Morning to Early and Early to Late. The lesser risk is movement from Afternoon to Morning and Late to Afternoon.

4.3.6 A 48 hour "buffer" should be the minimum between two series of shifts when the change from one series to the other falls within the higher risk period.

4.3.7 Other considerations when determining appropriate shift patterns are:

- variation eg shunt .v. mainline, different routes.
- continuity of Late/Early or Early shifts.
- preferable to intersperse long and shorter shifts.

4.3.8 The above are guidelines that it is considered will provide the best possible shift/rest periods for employees. There will be situations where the Company has no option but to depart from these but such instances must be clearly identified and kept to an absolute minimum.

1.12 Recent Train Control incidents

1.12.1 The Commission has recently investigated 4 train control incidents (Railway Occurrence Report 00-101), which identified the following safety issues:

- 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.

In addition, in another incident under investigation (Railway Occurrence Report 00-116, Te Kauwhata, 4 October 2000) relating to a near miss between Train 225 and a hi-rail vehicle, the hi-rail vehicle and Train 225 were not entered correctly on to the Train Control diagram, resulting in the train being signalled into an occupied section before the hi-rail vehicle reported clear.

1.12.2 The number of incidents investigated by the Commission over the last 5 years which involved serious train control operating irregularities, and a recently advised Tranz Rail 5-year record of occurrences involving TCs who had allowed trains to enter occupied sections are shown below:

	Incidents investigated by the Commission	**Entry into occupied track occurrences**
1996	2	3
1997	0	6
1998	2	6
1999	2	3
2000	6	8

1.13 Previous locomotive derailments due to similar causes

1.13.1 The Commission has investigated two similar derailments, which occurred at Te Kauwhata in 1993 (Railway Occurrence Report 93-124) and 1997 (Railway Occurrence Report 97-109). In both cases signals indicating an unusual, but in these cases intended, routing were misinterpreted resulting in high-speed rollovers.

2. Analysis

2.1 The derailment

2.1.1 Analysis of the short log showed the speed of Train 378 was 76 km/h approaching No. 9 crossover. A brake application was made about 100 m before the POD and the train speed dropped to 62 km/h before derailment occurred.

2.1.2 The high speed of Train 378 through the curved road of No. 9 crossover created lateral forces which resulted in weight relief on the left side. This allowed the leading left wheel to climb the rail and derail, followed by the remainder of the locomotive axles and the leading axle of the leading wagon.

2.1.3 The impact of the derailed locomotive with concrete curbing on SH 2 resulted in the locomotive separating from the rest of the train and turning end to end before coming to rest on the driver's side.

2.2 Train Control operations

2.2.1 The plotting of Train 378 by TC1 and the handover from TC1 to TC2 were carried out in accordance with required procedures and resulted in TC2 being specifically briefed on the crossing and crew change for Train 378, and the correct pencil plot on the train control diagram.

2.2.2 There was no indication that the 12 hour shift worked by TC1 had any affect on the quality of the handover to TC2. TC2 was only about 45 minutes into his shift at the time of the incident and shift length was not considered to have been a factor affecting his actions.

2.2.3 Although TC2 referred to his shift as "busy", due particularly to the unforeseen events which had occurred before the changeover, this was not reflected in the train control tape. Only 7 short operational calls required attention in the last 12 minutes before the wrong route setting and none were of a complex or demanding nature. In particular there was only 1 in the last 7 minutes before the route setting.

2.2.4 The unactioned train performance times at the changeover were not uncommon. Such work was commercially important but not safety-related. Catching up on this work during the relatively quiet start to TC2's shift was desirable as long as it did not conflict with key train control duties involving operational safety.

2.2.5 The television sets had been in Train Control for some time, and their presence was known and tolerated by network control management. The noise level and the nature of the programme running at the time TC2 set the route for Train 378 was such that it is highly likely that TC2 was watching or distracted by the programme.

2.2.6 TC2 was relatively inexperienced as a controller. Although he felt his training in 1997 was not to the current practice standard, he felt confident in his work and prepared for the task that was expected of him.

2.2.7 There was nothing in TC2's work or recreational pattern to indicate fatigue was a factor in the events that occurred. TC2's incorrect route setting for Train 378 can be attributed to:

- his involvement with non-essential train information
- not referring to the train control diagram when his CTC screen showed a train approaching Te Maunga
- a mindset that the train was destined for Mt Maunganui, based on his knowledge that about 90% of northbound trains were so directed, reinforced by the train information input he was making at the time, and supported by the points setting
- the distraction of the television.

2.2.8 The Commission is concerned at the number and severity of train control irregularities recently identified. Some action has been taken to address specific safety issues, including Tranz Rail actioning the 4 recommendations made in Railway Occurrence Report 00-101 and Tranz Rail's current "hi-rail protection project" aimed at increasing safety for track occupancies. The Land Transport Safety Authority (LTSA) had been actively involved in aspects of such action. However, the pattern of train control incidents raises a doubt as to the effectiveness of the total train control management system to maintain an acceptable safe level of rail vehicle operation. Safety Recommendation 009/01 (5.1.1) has been made to the LTSA to address this issue.

2.3 Control of Train 378

2.3.1 TC2's incorrect route setting for Train 378 was not a first for Tranz Rail. Such incorrect settings can and do occur. Rule 109 (a) provided a defence against such occurrences by requiring LEs to satisfy themselves that "proceed" indications were intended for their train and the line it was on, and to understand the movement authorised.

2.3.2 The first indication the LE had of the MMB setting was signal 4R, some 850 m before the crossover, showing a yellow over green aspect. Yellow over green meant "prepare to reduce to medium speed" (25 km/h). The LE incorrectly interpreted this as a clear, normal speed probably because he could see a green on both 4R and 8R in the distance. Although signal 4R was clearly distinguishable close up, the yellow light on the top could be lost in the yellow street lighting in the background at certain points on the approach and this may have influenced the LE's interpretation of the signal.

2.3.3 Signal 8R at the crossover was showing red over green for a 25 km/h medium speed. The LE continued to interpret this as a clear normal speed based on the greens he had seen on signals 4R and 8R as he approached and his expectation of where he was going, reinforced by his thoughts on where his crossing would occur. Although signal 8R was clearly distinguishable close up there were times on approach where it merged with other signals due to the junction and signal layout, and this may have influenced the LE's interpretation of it. Once clearly distinguishable there was time for emergency braking to have been applied to achieve a lesser speed through No. 9 turnout had the aspect been seen and understood by the LE.

2.3.4 Although street lighting and signal merging made it more difficult than usual for the LE to interpret the signals facing him, his interpretation of a clear route was based mainly on his expectation rather than the indications ahead. He expected greens on 4R and 8R and when he saw them the significance of the colour and position of the second light was missed.

2.3.5 Misunderstandings of this nature, occurring where LEs are presented with unexpected routings, have occurred before and highlight the weakness of Rule 109 (a) as the only defence against such unexpected routings. Action proposed by Tranz Rail to change the signalling at Te Maunga will provide an additional defence (see Section 4).

2.3.6 A number of human factors had the potential to adversely affect the LE's performance. They included:

- his long rostered hours
- the undesirable backward rotation of 3 hours 10 minutes associated with his shifts on the 2 days before the incident
- family and economic pressures.

2.3.7 Although signal sighting and human factors may have contributed to the events on the day, their overall contribution is not seen as significant. Of more significance is the previously demonstrated human behaviour of operating staff misinterpreting signals and acting on what they expect based on pattern rather than on an unexpected, albeit correctly indicated, alternative. Redesigning the signal layout at Te Maunga will provide LEs with an advance warning of the medium speed routing and lessen the likelihood of LEs misinterpreting signals at this station. The Commission considers the action proposed should be implemented for Te Maunga and evaluated for other localities and a recommendation has been made accordingly.

2.4 Crashworthiness

2.4.1 Despite the speed of the derailment and related damage to the cab of DC 4749 the cab did not separate from its mount and provided protection to the LE such that he suffered only minor injuries.

3. Findings

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

3.1 Train 378 derailed due to excessive speed through an incorrect route setting.

3.2 The incorrect route setting was caused primarily by non-adherence to basic train control techniques, encouraged by a distracting train control environment.

3.3 The lack of weekend auditing of Train Control meant that management probably did not realise the level of distraction created by the tolerated television sets.

3.4 The 12-hour shifts worked by the TCs did not contribute to the unintended route setting.

3.5 TC2's type of training and limited experience may have been factors contributing to the incorrect route setting.

3.6 Six serious train control irregularities investigated by the Commission over the last 10 months raise concern as to the effectiveness of the total train control management system to maintain an acceptable safe level of rail vehicle operation.

3.7 The defence in place (Rule 109 (a)) to avoid undesirable consequences from an unintended route setting was not effective.

3.8 The effectiveness of the defence was reduced by some merging of signals and background lighting, which affected signal sighting and interpretation.

3.9 The LE's rostered pattern prior to the incident, although not meeting Tranz Rail guidelines, was not a significant factor contributing to his misinterpreting the signals.

3.10 Although the LE was under some personal stress at the time of the incident, it was not a significant factor contributing to the signal misinterpretation.

3.11 The prime reason for the LE misinterpreting signals 4R and 8R was his mindset that his train was proceeding to Tauranga, and not Mt Maunganui as the signals indicated.

3.12 Mindsets based on previous patterns causing an incorrect response to an unexpected departure from such patterns has been identified in previous investigations by the Commission.

3.13 Reliance on Rule 109 (a) as the sole defence against signal misinterpretation from an unexpected routing has resulted in 3 high-speed rollover derailments in 8 years.

4. Safety Actions

4.1 Previous train control incidents (refer 1.12) have prompted safety actions relating to the operation of Train Control. In particular, Tranz Rail accepted the 4 recommendations arising out of Railway Occurrence Report 00-101. These were:

- 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)
- 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 obliged to commence duty if they do not consider they meet the required fitness standards (126/00)
- do not allow train controllers to be recertified unless they have undergone the required audits and assessments defined in Tranz Rail's procedures within the prescribed timeframes (127/00)
- 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 recertification after that period before moving into the biannual recertification process. (128/00)

On 23 February 2001 Tranz Rail advised that the recommendations, which in many respects they stated had been covered by safety actions arising from the incidents, had been actioned except for final acceptance of a user friendly blocking system to enable 125/00 to be implemented.

4.2 Tranz Rail has developed a proposal to install a revised signal aspect system for northbound trains approaching Te Maunga which will give an additional advance warning to trains routed to the MMB. This has been submitted to staff and union for comment.

4.3 Three additional LEs have been added to the Mt Maunganui roster since July 2000. Tranz Rail Manager Train Operations is now monitoring rostered hours to ensure earlier proactive response to roster shortages.

5. Safety Recommendations

5.1 On 30 March 2001 the Commission recommended to the director of the LTSA that he:

5.1.1 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. (009/01)

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

5.2.1 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.

5.3 On 11 July 2001 the Commission recommended to the managing director of Tranz Rail that he:

5.3.1 implement a revised signalling system controlling northbound trains approaching Te Maunga to provide enhanced advance warning to the LE of a train routed to the Mount Maunganui Branch, and develop and action a priority list of any similar locations where an enhanced advance warning would reduce an unacceptable risk of high speed entry to a medium speed route. (013/01)

5.4 On 25 July 2001 the managing director of Tranz Rail replied:

5.4.1 Tranz Rail accept this recommendation.

Tranz Rail's internal investigation identified further differentiating the sequence of signals approaching Te Maunga would enhance the advanced warning available to a Locomotive Engineer should the route be inadvertently set for the lesser speed turnout to the Mt Maunganui line.

A proposal has been discussed with local Locomotive Engineer representatives and has been accepted. However, before proceeding with installation, Tranz Rail is considering further an additional enhancement that could alleviate any further opportunity for confusion when approaching the preceding signal governing entry to the crossing loop. This review and further local consultation is expected to be complete by the end of August 2001.

Subsequent design and installation is expected to be complete by the end of November 2001. The design work involves providing a flashing aspect on a search light type signal that is more complicated than similar flashing aspect designs already in place on Tranz Rail's network.

The Company Rules Committee had also identified the need to consider other sites where altering the sequence of signals could provide an additional defence against incorrect route settings. This review has commenced and is expected to be complete by the end of September 2001, with a view of programming changes on a priority basis.

Although the full extent of this work is yet unclear, it is anticipated the project should be complete by end of June 2002.

Approved for publication 11 July 2001

Hon. W P Jeffries
Chief Commissioner