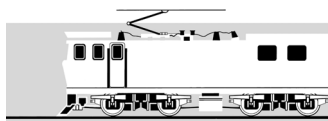
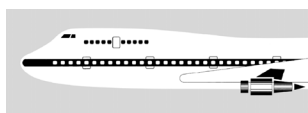


RAILWAY OCCURRENCE REPORT

02-127

Train 526, track warrant overrun, Waitotara

17 November 2002



TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

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.



Report 02-127
express freight Train 526
track warrant overrun
Waitotara
17 November 2002

Abstract

On Sunday, 17 November 2002, at about 2353, Train 526, a Palmerston North to New Plymouth express freight service overran its track warrant limit at Waitotara by about 1.5 km. The incident occurred when the locomotive engineer did not identify and stop at the limit of his track warrant authority but continued on into the next section. There was no opposing traffic.

The major contribution factor to the incident was the probability that the locomotive engineer lost concentration and situational awareness, which supported a misperception of the limits of the track warrant he held.

A previous incident involving medical impairment and 6 previous incidents of track warrant overruns were examined.

Safety issues identified included:

- the well-being of the locomotive engineer of Train 526 and his resulting capacity to recognise and respond to track warrant operating procedures
- the use of channel 1 radio calls by locomotive engineers when approaching track warrant stations to remind themselves of the limits of their track warrants.

One safety recommendation was made to the operator.

Contents

- Abbreviations ii
- Data Summary iii
- 1 Factual Information 1
 - 1.1 Narrative 1
 - 1.2 Site information 1
 - 1.3 Operating system 2
 - 1.4 Procedural changes arising from the Waipahi collision (Report 99-122) 2
 - 1.5 Locomotive event recorder 3
 - 1.6 The locomotive engineer 3
 - 1.7 Rostering 5
 - 1.8 Medical history 5
 - 1.9 Previous incident involving medical impairment 5
 - 1.10 Previous track warrant irregularities 6
- 2 Analysis 6
- 3 Findings 9
- 4 Safety Actions 10
- 5 Safety Recommendations 10

Abbreviations

hr	hour(s)
km	kilometre(s)
km/h	kilometres per hour
m	metre(s)
TWC	track warrant control
Tranz Rail	Tranz Rail Limited
UTC	coordinated universal time

Data Summary

Train type and number:	express freight Train 526
Date and time:	17 November 2002 at about 2353 ¹
Location:	Waitotara
Persons on board:	crew: 1
Injuries:	nil
Damage:	nil
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator-in-charge:	D L Bevin

¹ All times in this report are New Zealand Daylight Saving Time (UTC+13) and are expressed in the 24-hour mode.

1 Factual Information

1.1 Narrative

- 1.1.1 On Sunday 17 November 2002, Train 526 was a northbound express freight train travelling from Palmerston North to New Plymouth and consisted of a DX locomotive and 2 wagons for a total gross tonnage of 38 tonnes and a length of 51 metres. The train was crewed by a locomotive engineer.
- 1.1.2 After Train 526 departed Palmerston North it travelled to Wanganui and was berthed on the northbound siding in order to cross Train 547, an opposing Whareroa to Palmerston North express freight train.
- 1.1.3 After Train 547 had departed Wanganui the train controller issued the locomotive engineer of Train 526 a track warrant, which authorised him to travel from Wanganui to Waitotara where his train was to berth on the main line. After the locomotive engineer had correctly repeated back the track warrant details to the train controller, Train 526 departed from Wanganui.
- 1.1.4 While descending the gradient towards Waitotara the locomotive engineer selected dynamic braking² to maintain control of the train. As Train 526 approached Waitotara, Signal 4R displayed a “caution proceed at normal speed” indication³.
- 1.1.5 The locomotive engineer partially disengaged the dynamic braking as Train 526 travelled through Waitotara and he looked ahead for the indication on the trailing points indicator. The indicator was displaying a purple light⁴ so he completely disengaged the dynamic brake. The speed of the train had reduced to about 30 km/h, so he increased power in preparation for the uphill gradient ahead.
- 1.1.6 While passing through Waitotara the locomotive engineer suddenly thought that he was required to make a Clause 10 check call⁵, so he pressed the radio base call button, which sent a train identifier signal to train control. At the same time he turned on the locomotive cab light and referred to his track warrant and saw that Clause 10 was blank and that he was in fact not required to make a call.
- 1.1.7 By the time train control responded to the radio base call the train had cleared Waitotara and the locomotive engineer explained to the train controller that he thought he had a Clause 10 check call at Waitotara but had called in error. However, he confirmed that he had passed through Waitotara, at which point the train controller replied that the track warrant for Train 526 was issued to Waitotara only. The locomotive engineer then stopped his train and checked his track warrant and found that the train controller was correct. The locomotive engineer was relieved of duty following the incident.

1.2 Site information

- 1.2.1 Waitotara was a track warrant station located at 57.47 km, between Kai Iwi and Waverley, on the Marton to New Plymouth Line. It was provided with a crossing loop for the purpose of crossing opposing trains.

² The dynamic brake was an electric retarding brake used to control the speed of a train.

³ Caution proceed at normal speed – the section ahead is not occupied, the track is clear up to the trailing points indicator in advance, but the points may not be correctly set.

⁴ Points indicators display a “purple” light when the points to which they apply are correctly set or a “red” light if the points are not in the correct position.

⁵ Clause 10 of a track warrant specified locations where it was necessary for the locomotive engineer to contact train control to confirm the whereabouts of the train. This information could also be used to determine if a train had cleared its limits sufficiently to allow a following movement to be authorised.

- 1.2.2 Northbound trains approached Waitotara from a downhill gradient of 1 in 35 and climbed a 1 in 60 gradient almost immediately after passing through Waitotara.
- 1.2.3 The maximum authorised line speed for express freight trains through the area was 70 km/h.

1.3 Operating system

- 1.3.1 Track Warrant Control (TWC) was introduced into New Zealand Railways in 1988 as an alternative to a signalling system for train operation on lower density lines. TWC was a method for ensuring that only one train had authority to occupy a section of the track at any time.
- 1.3.2 Before issuing a track warrant, train controllers dictated the necessary details by radio or telephone to locomotive engineers, who wrote the details onto a prepared form before repeating them back to the train controller as a check. When the train reached the limit of the track warrant, the locomotive engineer was required to advise the train controller and authorise cancellation of the track warrant.
- 1.3.3 The management of TWC was enhanced by the use of a Track Warrant Computer System in train control. This programme would not allow the issue of a track warrant if another warrant had already been issued for the same track section.
- 1.3.4 Between Marton and Hawera the line was mostly single track so, to enable opposing trains to cross, sections of double track (crossing loops) were provided at Ruatangata, Wanganui, Kai Iwi, Waitotara and Patea. To control such crossings, train controllers stipulated conditions on the track warrant.
- 1.3.5 Locomotive engineers of northbound trains departing from Wanganui would be in possession of a track warrant to proceed to any one of a number of points, depending on operational requirements and opposing trains. The terminating limit of the track warrant, together with the anticipated time to run, dictated the number, if any, of Clause 10 radio check calls enroute⁶.
- 1.3.6 Tranz Rail's Operating Rule 412, Calling Train Control Enroute, stated in part:
- When Clause 10 of a track warrant specifies that a call is to be made at a location, then that call must be made but the train need not stop for an acknowledgement from Train Control.
- When Train Control acknowledges, the addressee must advise their location and the terminating limit of the warrant held.
- 1.3.7 The signalling at Wanganui was remotely controlled from the train control office in Wellington.

1.4 Procedural changes arising from the Waipahi collision (Report 99-122)

- 1.4.1 As a result of a review of track warrant procedures following a fatal collision on 20 October 1999 at Waipahi (Occurrence Report 99-122), Track Warrant Control Regulations were amended on 30 March 2000. Tranz Rail introduced the following rule change:

**Implement Mandatory Calling of Limits Held
Operating in Track Warrant Control Area
(Additional new sub-clause)**

As a train approaches a station warning board or intermediate signal, the addressee must call on radio channel 1 advising the train number, location being approached and the terminating limit of the warrant held.

⁶ Tranz Rail's operating instructions stated that when a track warrant was issued to an addressee and had an anticipated 2 hours or more to run before the limits would be cleared, clause 10 check calls must be specified from track warrant stations at approximately hourly intervals.

- 1.4.2 Calls on channel 1 were not intended to be received. The intent was to provide a specific process to refresh locomotive engineers' knowledge of the track warrant limit. Channel 1 was a VHF point-to-point radio communication system that did not use repeaters. It was a local channel and could only be heard by train crews or other staff who happened to be in the near vicinity.
- 1.4.3 The channel 1 calls were additional to any Clause 10 calls and still had to be made, regardless of Clause 10 requirements and the limit of the track warrant.
- 1.4.4 Tranz Rail randomly monitored compliance of the rule with recording equipment and advised that the most recent audits for channel 1 radio calls at Waitotara had identified a compliance level by locomotive engineers of 85%.
- 1.4.5 Prior to this rule change in March 2000 the Commission had investigated 4 track warrant overrun incidents dating back to March 1994. Since the change the Commission has investigated a further 3 track warrant overrun incidents, including the subject of this report.

1.5 Locomotive event recorder

- 1.5.1 The data from the event recorder for DX5137, the train locomotive, was downloaded and supplied for analysis.

1.6 The locomotive engineer

- 1.6.1 The locomotive engineer held current certification for Grade 1 locomotive engineers' duties. He had 19 years experience in locomotive running duties, the last year of which he had been based in Palmerston North.
- 1.6.2 He said he was in good health and was not suffering from any home or work-related stress. He had attended a Tranz Rail alertness management course about 5 months before the incident.
- 1.6.3 The locomotive engineer said that he had arrived at work on time to commence his shift and, after booking on, had walked out to his train and prepared for departure. His train consisted of a locomotive and 2 wagons, and he had mentally questioned the need to run the train, especially as he knew that there were several other trains operating on the Marton to New Plymouth Line and he could expect delays en route. However, he was comfortable doing the job and thought nothing more about it.
- 1.6.4 After departing from Palmerston North, Train 526 travelled to Marton where it waited while a northbound loaded milk train cleared the section ahead to Ruatangata. When the section ahead was clear, train control issued the locomotive engineer of Train 526 a track warrant that authorised him to travel to Ruatangata and berth on the loop in order to cross Train E09, an opposing Wanganui to Palmerston North passenger express train.
- 1.6.5 However, before reaching Ruatangata, train control contacted the locomotive engineer and told him to stop short of Ruatangata, where a new track warrant would be issued to travel instead to Wanganui because the planned crossing with Train E09 at Ruatangata was now unlikely to happen.
- 1.6.6 A few minutes later train control called the locomotive engineer again and told him that the crossing with Train E09 would now go ahead at Ruatangata as originally planned. The locomotive engineer received this call as he emerged from the north portal of the Turakina Tunnel approaching Ruatangata and from where he would normally have made his channel 1 call. He decided to respond to the train control radio call instead of making the channel 1 call.
- 1.6.7 On arrival at Ruatangata Train 526 berthed on the loop. The locomotive engineer climbed out of the cab and went for a walk to check that everything was set for the passage of Train E09 through the station. He was back in his locomotive cab when Train E09 approached and he

spoke by radio to the other locomotive engineer as the train passed. After Train E09 had cleared, train control issued him with a track warrant to continue on to Wanganui to cross Train 547.

- 1.6.8 The locomotive engineer said that as Train 526 approached Wanganui, he had the train under good control and was travelling at reduced speed in accordance with the signal indications. He saw Signal 4R was displaying a low speed⁷ indication. This signal applied to 2 turnouts from the main line; the first led to the southbound siding while the second led to the northbound siding. There was about 100 m between the 2 sets of points.
- 1.6.9 After passing Signal 4R the locomotive engineer said that he saw the first set of points was set for the main line, so he anticipated that his train was to be berthed there and he increased power slightly. However, when the second set of points came into view he saw that they were set to reverse and that his train was being routed to the northbound siding. His reflex action was to apply the brakes, even though his speed was not excessive, because he said he got a fright and hadn't felt in control of the situation or of what he was doing.
- 1.6.10 The locomotive engineer later said that from his previous experience whenever the route was set for the northbound siding he had only ever received low speed indications on Signal 4R. Although this occasion was no different, he felt vulnerable and not in control of what he was doing and didn't feel good when he realised his train was to divert from the main line as, for some inexplicable reason, he had thought that if the first set of points was set at normal he must be berthing on the main line.
- 1.6.11 After Train 547 arrived, train control issued the locomotive engineer of Train 526 with a track warrant authorising him to proceed to Waitotara where he was to berth on the main line. He was comfortable with this as he knew his train was still following the milk train, which was now occupying the section north of Waitotara, and that when he arrived at Waitotara he could expect to get another track warrant to continue.
- 1.6.12 After departing from Wanganui the trip to the top of the Waitotara Bank was uneventful and the locomotive engineer had felt in control and focussed on the operation of his train. However, as he descended the gradient towards Waitotara the train increased speed, despite his having selected dynamic braking and making an air brake application. He made a further brake application to bring the train under control but in doing so the speed reduced below his initial target speed of 40 km/h. As he passed through Waitotara he increased power to reach an optimum speed of 50 km/h in preparation for climbing the gradient at the north end.
- 1.6.13 The locomotive engineer said he had not checked his track warrant prior to making the Clause 10 check call to train control but immediately after making the call he referred to the track warrant and saw that the Clause 10 space on the track warrant was blank. He did not check the limits of the track warrant at this time.
- 1.6.14 He had not made a channel 1 radio call as he approached Waitotara. He could offer no explanation for this, especially as he had made such a call at Kai Iwi, the previous track warrant station he had passed through, about 30 minutes earlier. He was sure that had he made the required channel 1 call at Waitotara he would have been alerted to the limits of his track warrant.
- 1.6.15 The locomotive engineer was a member of the working party that had been responsible for the development and implementation of the rule amendment following the Waipahi collision, and he was well aware of the additional safety defence provided by the new procedure.

⁷ Indicates that the points are in the proper position but not necessarily that the track is unoccupied. Locomotive engineer must proceed at such a speed (not exceeding 25 km/h) as will enable him to stop clear of any obstruction.

- 1.6.16 The locomotive engineer had been involved in 2 previous track warrant overrun incidents:
- On Train 544 on 8 November 2001 he passed Signal 4R at Wanganui at “Stop”
 - On Train 542 on 1 March 2002 he passed Signal 4R at Waitotara at “Stop” and entered the main line. The track warrant issued to him had authorised him to take the loop at Waitotara to cross an opposing train.

These incidents were not investigated by the Commission.

1.7 Rostering

- 1.7.1 In the fortnight ending Saturday 16 November, the locomotive engineer had been rostered on duty for 71 hours 20 minutes, and had actually worked for 74 hours and 40 minutes. He was on his sixth consecutive shift after having been rostered off duty for one day.
- 1.7.2 The incident happened about 4 hours 18 minutes into his shift, which had commenced at 1935 on Sunday 17 November.
- 1.7.3 The locomotive engineer’s preceding rostered shifts had been within the accepted rostering guidelines.

1.8 Medical history

- 1.8.1 After the incident, the locomotive engineer recalled that over the previous 2 years he had experienced a number of incidents of neurological symptoms. These had included feelings of detachment, being unable to execute planned actions, slowed motor reactions and loss of control but without experiencing overt loss of consciousness.
- 1.8.2 How many of these episodes had occurred with the locomotive engineer being unaware of them was not clear. The medical condition underlying these occurrences has been under investigation since this incident.
- 1.8.3 Tranz Rail’s rules stated that operational employees who suffered any illness or sudden incapacitation were to advise their supervisor or manager. Such employees were deemed to be unfit for operating duties until their condition had been examined and they were certified as fit to recommence duty. The locomotive engineer had not advised Tranz Rail of his neurological symptoms.
- 1.8.4 The locomotive engineer’s last medical prior to the incident was on 23 March 2000, at which time no medical issues were identified that would have precluded him from driving. His next medical was scheduled for 23 March 2003.

1.9 Previous incident involving medical impairment

Occurrence report 02-120, collision between Electric Multiple Unit (EMU) Trains 9351 and 3647, Wellington, 31 August 2002

- 1.9.1 On Saturday, 31 August 2002, Train 9351, a Johnsonville to Wellington EMU passenger service collided with Train 3647, an Upper Hutt to Wellington EMU passenger service. Both trains were approaching the Wellington station platforms on converging tracks. There were no injuries to passengers or crew.
- 1.9.2 One finding of this investigation was:

The driver’s ability to carry out his duties safely was suddenly impaired by acute distress on a background of ongoing stress and depression, causing him to suddenly decompensate. His impaired driving

performance and poor concentration as a result contributed to the collision.

1.9.3 The investigation resulted in a Safety Recommendation to the Managing Director of Tranz Rail on 7 August 2003 that he:

reinforce with operating staff the company's procedures for reporting instances of sudden incapacitation through illness or other condition while on duty (35/03).

The focus of this recommendation is equally applicable to this occurrence, so no new safety recommendation regarding this issue has been made.

1.10 Previous track warrant irregularities

1.10.1 Since 1994 the Commission has investigated 6 previous track warrant overruns:

- Report 94-109, Reefton, 30 March 1994
Train 847, a Lyttelton to Westport freight service overran Reefton without a valid track warrant and continued about 23 kms into the next section. The safety issues included the observance of track warrants.
- Report 96-101, Waipara, 8 January 1996
Train 701, a southbound "Coastal Pacific" passenger service, overran Waipara without a valid track warrant and continued approximately 24 kms into the next section. The causal factor was the locomotive engineer's failure to recognise the limits of his authority to proceed.
- Report 99-102, Whangaehu, 9 March 1999
Train 523, a southbound New Plymouth to Palmerston North express freight service, overran Whangaehu without a valid track warrant and continued approximately 18 kms into the next section. The overrun resulted from a lapse in concentration by the locomotive engineer.
- Report 99-109, Mosgiel, 21 May 1999
Train 902, the northbound "Southerner" passenger express overran its track warrant limit by approximately 2 kms between Mosgiel and Wingatui. The overrun occurred when the locomotive engineer was possibly distracted by other events after planning a track warrant renewal for a location that differed from the normal pattern.
- Report 00-106, Matura, 4 May 2000
Y35 shunt overran its track warrant limit at Matura by 15 kms.
- Report 00-111, Tapuata, 14 June 2000
Train 630, a northbound Wellington to Napier express freight service, overran its track warrant limit by about 1100 m. A possible contributing factor to the overrun was that the locomotive crew lost situational awareness as a result of succumbing to a microsleep.

2 Analysis

2.1 The track warrant for Train 526 to proceed from Wanganui to Waitotara was issued and confirmed in accordance with documented procedures that were meant to ensure those receiving the warrant clearly understood all conditions, particularly the warrant limit. When the warrant was issued there was no confusion as to the limit and there was no doubt that the locomotive engineer was aware of it.

- 2.2 The TWC process relied totally on the diligence of the locomotive engineer, who must correctly perceive the requirements of the warrant, retain that perception, maintain situational awareness and act in accordance with regulations and the warrant. If these conditions are met with 100% accuracy, then there is no reason why TWC should not be as safe as any other traffic control system.
- 2.3 The reality, however, is that humans rarely operate at 100% accuracy. Boredom, distraction, fatigue, illness, anxiety, misunderstanding and sensory problems can degrade performance. Nevertheless, operating inconsistencies can be tolerated if there are appropriate defences in place to detect and correct any errors, slips or lapses.
- 2.4 With TWC, a foreseeable error is the misperception of warrant limits. One possible form of misperception is the formation of an incorrect perceptual set. Perceptual set is the process by which a person becomes predisposed to perceptions, which may be consistent with prior experience. Once formed, a perceptual set is unlikely to be challenged by the holder.
- 2.5 One of the prime defences against this risk was the requirement for a locomotive engineer to repeat the details of the warrant back to train control. While this process did not absolutely ensure that the locomotive engineer would remember the limits or retain situational awareness, it did reduce the possibility of the formation of an incorrect perceptual set. In this case, the fact that the locomotive engineer did not make a channel 1 radio call at Waitotara probably resulted from his mistaken belief that he was required to make a Clause 10 check call to train control, as he had probably done in similar circumstances many times before.
- 2.6 A second defence was the retention of the track warrant within the locomotive cab. This was a passive defence and less effective than the active read-back process. Once a perceptual set had been formed, the locomotive engineer was unlikely to check the limits of the warrant but may have checked to see if he had to make any calls under Clause 10. In this case, the locomotive engineer did not refer to his track warrant until after he had made the radio base call to train control, by which time he had also overrun his track warrant limits.
- 2.7 A third defence was the requirement for the locomotive engineer to check his track warrant at station warning boards and make a mandatory channel 1 radio call. If the locomotive engineer had made such a check at Waitotara it is probable that the overrun would not have occurred.
- 2.8 The mandatory calling of track warrant limits, which was implemented following the fatal accident at Waipahi, recognised the reliance of the track warrant system on human input and was introduced to provide an additional safeguard against the chance of human error causing an overrun. The locomotive engineer was aware of this provision, having been a member of the working party responsible for its development.
- 2.9 While the locations for Clause 10 check calls can and do vary depending on the anticipated duration of the track warrant, channel 1 calls were mandatory when approaching all track warrant stations. During the time the locomotive engineer had been driving the route, he had received several variants of track warrant limits when proceeding north from Wanganui. Waitotara, being about 37 kms and 55 minutes running time from Wanganui, was probably a common Clause 10 check call point for trains running in either direction.
- 2.10 The locomotive engineer's earlier radio communications with the train controller had not released him from the requirement for a channel 1 call as he approached Ruatangata but he made a conscious decision to respond to train control instead of, and not as well as, the channel 1 call. As a result, he did not make the required check of his track warrant, although his radio communication with train control would have reminded him that he would be crossing an opposing train at Ruatangata. The chance of a track warrant overrun in this instance, even though the correct procedures were not followed, was reduced.
- 2.11 The berthing of his train in the northbound siding at Wanganui unsettled the locomotive engineer. After he had passed Signal 4R at Wanganui and saw the first set of points in the

normal position, he appeared to have completely forgotten about the existence of the second set of points and assumed his train was being berthed on the main line. As a result, when he saw the second set of points, and that they were set for a diverging route, he became confused. His response in making an initial brake application, even though his train was not travelling very fast, was probably a reaction to this temporary loss of situational awareness. The signal indication, and the route set for his train, was not unusual and he had experienced them many times before. However, this time he felt that he was not in control of the situation, even though he was acting in accordance with operating rules.

- 2.12 The locomotive engineer regained his composure after bringing his train to a stop in the northbound siding and correctly followed the process of cancelling his track warrant for the section he had just vacated. He was also comfortable with the next track warrant he was then issued with, authorising him to travel to Waitotara. He was alert at this stage and knew that he could get a track warrant only that far because he was still following the northbound milk train, which was occupying the section in advance of Waitotara. He knew that another track warrant would probably be issued for him to continue once he reached Waitotara because by then the next section would be clear.
- 2.13 After departing from Wanganui, the locomotive engineer appeared to have been relaxed and comfortable as he concentrated on his train driving responsibilities. His response to the increasing speed as the train descended the gradient to Waitotara showed that he was alert to the situation and his surroundings. His overcompensating his braking when bringing the train back under control was a simple error of judgement that had no significant impact on the passage or operation of the train.
- 2.14 Even if a Clause 10 check call had been required at Waitotara, this did not override the requirement for a channel 1 call as Train 526 approached Waitotara. The locomotive engineer believed he was required to make a Clause 10 check call at Waitotara and did so, without first checking his track warrant. He was, therefore, not in a position to accurately fulfil one of the requirements of a clause 10 check call, specifically to advise train control of the terminating limit of his track warrant. His action reflected a perceptual set, probably consistent with his previous experiences, where he regularly made Clause 10 check calls from Waitotara, but in this instance his mistaken perception of his track warrant limits had not been challenged by a check of the track warrant.
- 2.15 The safety defence provided by the track warrant check, coupled with the channel 1 radio call, was overridden when this call was not made as the train approached Waitotara. Had the call and the associated track warrant check procedure been carried out it is probable that the locomotive engineer would have been reminded that his track warrant limits terminated at Waitotara and the ensuing overrun would not have occurred.
- 2.16 Although he had a mistaken belief that a Clause 10 check call was required at Waitotara, by not checking his track warrant before making the call, the locomotive engineer overrode a further defence against the overrun because a check at this time would reminded him of his limits, even though the channel 1 call procedures had not been followed.
- 2.17 The locomotive engineer was experienced in track warrant control and was apparently well and not fatigued when he reported for duty. However, his overall performance enroute showed evidence, not only of a perceptual set and a lack of execution of planned tasks, but also loss in concentration, memory lapse and disorientation in that he:
- did not make a channel 1 radio call as he approached Ruatangata
 - became confused when berthing his train at Wanganui
 - did not make a channel 1 radio call as he approached Waitotara
 - did not first check his track warrant to confirm the requirement for a Clause 10 check call at Waitotara before making the call.

- 2.18 According to medical evidence obtained by the Commission these lapses were inconsistent with “normal” human errors and suggested global cognitive dysfunctioning and impaired attention or awareness during certain phases of duty. This type of intermittent but serious functional impairment is consistent with the neurological episodes he reported over the previous 2 years. These would have caused significant but partial incapacitation during each episode and resulted in significant impairment of driving performance, both in motor vehicles and locomotives. It is, therefore, probable that this track warrant irregularity was caused at least in part by transient medical impairment of the locomotive engineer.
- 2.19 Although a precise diagnosis was not currently available, the effects on the locomotive engineer’s driving performance during such an episode were significant. It was possible that further episodes of neurological impairment of this nature had occurred as he had arrived at Ruatangata and at Wanganui. It could not be established if similar episodes had occurred at the time of his 2 other track warrant incidents.
- 2.20 Having recognised that he was not focussing on his work, the driver should have stopped at the nearest location where it was safe to do so, and reported that he was no longer fit for duty. Procedures existed for this situation and staff should be reminded of their responsibilities to immediately stand themselves down as soon as it is safe and prudent to do so if they become unwell for any reason while on duty. A safety recommendation to this effect has been accepted by Tranz Rail as a result of Occurrence Report 02-120.
- 2.21 Despite instructions to operating staff requiring them to report changes in health and fitness, symptoms that had caused significant episodic impairment over the past 2 years had not been acted on, despite having possibly contributed to other incidents. Compliance with the Tranz Rail procedures for “fitness for duty” may well have resulted in the locomotive engineer being deemed unfit to drive prior to this incident. However, it should be noted that unawareness of symptoms or of their seriousness is a common feature of neurological disorders.
- 2.22 This occurrence was the third overrun incident in which the locomotive engineer had been involved in just over 12 months and the second involving a track warrant irregularity. A lapse in concentration was probably a contributing factor in both of these previous incidents.
- 2.23 Analysis of the locomotive event recorder output showed that Train 526 was being operated correctly as it approached and passed through Waitotara.
- 2.24 The timing of the locomotive engineers’ shifts in the days before the incident suggested that he would have been able to obtain adequate sleep leading up to the incident. His roster was not considered arduous and, therefore, fatigue as a result of rostered or actual hours worked was not considered a contributing factor to the incident.
- 2.25 While 85% compliance with the channel 1 radio call procedure could be considered relatively high, such a compliance level does not reflect the importance placed on the procedure as the primary defence against track warrant limit overruns and a recommendation relating to achieving and maintaining a higher level of compliance is made to the Managing Director of Tranz Rail.

3 Findings

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

- 3.1 Train 526 was operating under a valid track warrant, correctly issued in accordance with Tranz Rail’s procedures.
- 3.2 The overrun of Train 526’s track warrant limits by about 1.5 km did not conflict with other train movements or track obstructions.

- 3.3 The locomotive engineer's control of Train 526 as he approached Waitotara showed he was alert and responsive immediately prior to the overrun.
- 3.4 The inability of the locomotive engineer to complete expected safety actions, together with confusion and disorientation during certain parts of his duty were probably caused by an as yet unidentified neurological disorder that resulted in episodic impairment.
- 3.5 By not referring to his track warrant as Train 526 approached Waitotara the locomotive engineer deprived himself of an important visual cue for maintaining situational awareness.
- 3.6 Neither rostered hours, nor the hours actually worked by the locomotive engineer would have caused excessive sleep debt or contributed to the incident.
- 3.7 The level of compliance by locomotive engineers with the channel 1 radio procedures did not reflect the high importance of this safety defence against track warrant overruns.

4 Safety Actions

- 4.1 Following the incident the locomotive engineer was rostered on alternative duties pending an internal investigation by Tranz Rail. He had not returned to operating duties at the time of publication of this report.

5 Safety Recommendation

- 5.1 On 13 November 2003 the Commission recommended to the Managing Director of Tranz Rail that he:

take steps to ensure that the level of compliance by locomotive engineers with channel 1 radio call requirements in track warrant control areas reaches 100% by 30 June 2004 and is maintained at that level through ongoing auditing (052/03).

- 5.2 On 1 December the Managing Director of Tranz Rail replied in part:

We agree with the merit of this recommendation, however, because variable of human factors we cannot support committing to an absolute a 100% compliance target. Our regime of remote call monitoring and safety observations will be initiated to achieve optimum compliance.

Approved for publication 19 November 2003

Hon W P Jeffries
Chief Commissioner



**Recent railway occurrence reports published by
the Transport Accident Investigation Commission
(most recent at top of list)**

- 02-127** Train 526, track warrant overrun, Waitotara, 17 November 2002
- 02-120** electric multiple units, Trains 9351 and 3647, collision, Wellington, 31 August 2002
- 02-118** express freight Train 484, near collision with hi-rail vehicle, Tauranga, 7 August 2002
- 02-117** express freight Train 328 signal passed at stop, Te Rapa 31 July 2002
- 02-116** express freight Train 533, derailment, near Te Wera, 26 July 2002
- 02-112** passenger fell from the Rail Forest Express, Tunnel 29, Nihotupu Tramline, Waitakere, Saturday 4 May 2002
- 02-104** express freight and passenger trains, derailments or near derailments due to heat buckles, various localities, 21 December 2001 to 28 January 2002
- 02-113** passenger express Train 700 TranzCoastal and petrol tanker, near collision Vickerman Street level crossing, near Blenheim, 25 April 2002
- 02-107** express freight Train 530, collision with stationary shunt locomotive, New Plymouth, 29 January 2002
- 01-111** passenger EMU Train 2621, door incident, Ava, 15 August 2001
- 01-107** passenger baggage car Train 201, broken wheel, Otaihangā, 6 June 2001
- 01-112** shunt 84, runaway wagon, Stillwater, 13 September 2001
- 01-113** DC4185 light locomotive and private car, collision, Egmont Tanneries private level crossing 164.14 km Stratford, 19 September 2001
- 01-109** passenger EMU Train 8203, doors open on EMU, Tawa, 16 July 2001
- 01-108** express freight Train 842, derailment, Otira Tunnel, 7 July 2001
- 01-107** freight train 688 and rail mounted excavator, collision, between Waipunga and Waikoau, 9 May 2000

Transport Accident Investigation Commission
P O Box 10-323, Wellington, New Zealand
Phone +64 4 473 3112 Fax +64 4 499 1510
E-mail: reports@taic.org.nz Website: www.taic.org.nz

Price \$ 18.00

ISSN 0112-6962