



Report 99-102

Train 523

track warrant overrun

Whangaehu

9 March 1999

Abstract

On Tuesday 9 March 1999, Train 523, a southbound New Plymouth to Palmerston North express freight, overran Whangaehu without a valid track warrant and continued approximately 18 km into the next section before the error was realised. There was no opposing traffic or obstruction and once the overrun was discovered a valid warrant was issued and a relief locomotive engineer completed the remainder of the journey. The overrun resulted from a lapse in concentration by the locomotive engineer.

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List of abbreviations

| | |
|-------|--|
| LE | locomotive engineer |
| MNPL | Martin New Plymouth Line |
| NAL | North Auckland Line |
| TCO | train control officer |
| TWACS | Track Warrant Assisted Computer System |
| TWC | Track Warrant Control |

Transport Accident Investigation Commission

Rail Incident Report 99-102

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|--------------------------------|--|
| Train type and number: | Express freight 523 |
| Date and time: | 9 March 1999, 0234 hours |
| Location: | Whangaehu, 21 km Marton New Plymouth Line (MNPL) |
| Type of occurrence: | Overrun of track warrant limits |
| Persons on board: | Crew: 1 |
| Injuries: | Nil |
| Damage: | Nil |
| Operator: | Tranz Rail Limited (Tranz Rail) |
| Investigator-in-Charge: | R E Howe |

1. Factual Information

1.1 Narrative

- 1.1.1 On Tuesday 9 March 1999 Train 523 was a scheduled southbound express freight travelling between New Plymouth and Palmerston North.
- 1.1.2 Train 523 arrived at Wanganui (43 km MNPL) at approximately 0130 hours to shunt.
- 1.1.3 At 0205 hours the locomotive engineer (LE) of Train 523 was issued with Track Warrant 5 authorising him to proceed from Wanganui to Whangaehu (21 km MNPL) under Track Warrant Control (TWC) to enter the main line and cross northbound Train 540.
- 1.1.4 The Wellington Train Control Officer (TCO) issued Track Warrant 5 from one he had pre-prepared before Train 540 had berthed in the Whangaehu loop which meant the warrant terminated at Whangaehu.
- 1.1.5 Between pre-preparing and activating Track Warrant 5 for Train 523, the TCO had cancelled the track warrant for Train 540 at 0201 hours following the arrival of that train into the Whangaehu loop. The LE of Train 523 heard the cancellation over the train radio. Because the TCO's shift was particularly busy at that time the TCO did not have the opportunity to "non issue"¹ the pre-prepared track warrant and prepare a new track warrant which would have allowed Train 523 a through passage from Wanganui to Marton.
- 1.1.6 In accordance with standard Tranz Rail Limited (Tranz Rail) procedures Track Warrant 5 was hand written by the LE on a purpose-designed form as he received the information from the TCO. The information recorded on Track Warrant 5 included:
- The physical limits of the track warrant (Wanganui to Whangaehu).
 - Authority to enter the main line at Whangaehu for crossing purposes.
 - The number of the train being crossed (540).
 - The time the main line at Whangaehu was reported clear (0201 hours).
 - That 540 may be on the loop at Whangaehu.
- 1.1.7 Having written out and checked Track Warrant 5 with the TCO, the LE stated that he placed it on a clipboard in the cab in full view from the cab light.
- 1.1.8 The LE stated that at approximately 0233 hours as Train 523 approached Whangaehu he clearly saw the station warning board. He noted that the Arrival signal at the loop entry displayed a red and slowed the train down as required until this signal turned green² and the Starting signal at the exit from Whangaehu turned yellow. He then dimmed the headlight so that it did not dazzle the LE of Train 540 in the loop, released the brake and "just carried on without thinking". The LE of Train 540 confirmed that the lights of Train 523 were dimmed on approaching Whangaehu.

¹ "non-issue" was the technical word used to describe the process of cancelling a pre-prepared track warrant in the associated computer system before a new warrant could be issued.

² Whangaehu was a Warrant station fitted with track circuiting which allowed the Arrival signal to be approach-lit by the train when it was some 1280 m from the main line points. The Arrival signal, as well as giving information on the setting of the points, gave additional information relating to the Starting signal ahead.

- 1.1.9 The LE of Train 523 stated that it was his normal practice to switch on his cab light to check the warrant and confirm what his limits were at all stations, but on this occasion he recalled registering Train 540 in the loop and that he did not check the warrant.
- 1.1.10 At 0238 hours the TCO, aware that Train 523 should have been near Whangaehu, inquired from the LE if he was trying to contact him and was told “no”. No attempt was made to exchange information on the location of the train which at that time was already approximately 5 km past Whangaehu.
- 1.1.11 At 0243 hours the TCO asked the LE if he was far from Whangaehu and received the reply that he was not far from Marton. The TCO then realised that an overrun had occurred and asked the LE to check his warrant, at which stage the LE became aware that he had overrun the limits of the warrant.
- 1.1.12 The LE stopped the train at approximately 3 km MNPL, just short of Marton. He was stood down and a relief driver was arranged to take the train to its destination.

1.2 Track warrant control

- 1.2.1 The MNPL was controlled by the TWC system, which was designed to ensure that only one train could occupy a section of track at any time. Track warrants were issued by TCOs, who dictated the necessary details over radio or telephone to LEs. The LE wrote the details on a prepared standard form, and read them back to the TCO as a check. When a train cleared the limits of a track warrant, the LE was required to advise the TCO accordingly and authorise the cancellation of the warrant.
- 1.2.2 The management of TWC was enhanced by the use of a computer in Train Control using the Track Warrant Assisted Computer System (TWACS). The computer programme would not allow the issue of a track warrant if another warrant already existed for the same section of track. The TWACS computer programme monitored the reported position of trains, and would not allow warrants to be issued unless the information was consistent with the previous advice logged in.
- 1.2.3 Warrant stations equipped with motor points either had two-position colour-light Points Indicators which showed the setting of the motor points to which they applied, or (as at Whangaehu) three-position Arrival signals which not only showed the setting of the points to which they applied, but also gave some advance information about the signal ahead (the main line Starting signal at the opposite end of the station) and hence, the setting of the far end points. At Whangaehu the Arrival signal was a three-position signal, which could display a green, yellow or red indication, and the Starting signal was a three-position signal which used only the yellow or red indications.
- 1.2.4 Whangaehu and Kai Iwi crossing stations were commissioned on 27 August 1998 and their operation was covered by semi-permanent Train Advice 6245 which included the following summary of the key features of the signalling system used:
- Signals will detect main line tracks clear in addition to points being set and secure.
 - Arrival signals will display “Clear, Normal Speed” (green) when the appropriate mainline Starting signal is at “Proceed”.
 - Arrival signals will normally be automatically set to Proceed when a train is detected 800 metres away from the signal. Signals will also be approach lit at this point.

- Starting signals will display “Caution” (yellow) indications when not at “Stop”. (This is to remind Locomotive Engineers that a track warrant is also required to enter the section ahead.)
- When trains are to cross only the Locomotive Engineer of the first train to arrive will normally need to operate pushbuttons. Remaining movements will be signalled automatically.
- Motor points will automatically return to the main line position after a crossing has taken place.
- Pushbutton controls at the Arrival and Starting signals will operate in an identical manner.
- The time delay between cancelling a signal and being able to move the motor points will normally be 110 seconds but this time may be increased to 220 seconds for main line Starting signals when a train is approaching the previous Arrival signal.

These two warrant stations were the only warrant stations on the Tranz Rail system equipped in this manner.

1.3 Personnel

- 1.3.1 The LE had 35 years railway experience. After approximately 8 years he gained his second grade engine driver’s certificate and after a further 5 years his first grade driver’s certificate. In 1976 he transferred to Palmerston North as an LE until 1990 when he left road duties to take up an Operation Controller position, also at Palmerston North.
- 1.3.2 In December 1998 he was re-certified as an LE and returned to driving duties. The re-certification included all the elements of initial certification including:
- Medical examination.
 - Full locomotive simulator training.
 - Written examination on the rules and regulations.
 - Specific simulator and on-site training covering signalling at Whangaehu.
 - Familiarisation runs over each route and final approval by Manager Training, Operations Practices.
- 1.3.3 Prior to resuming his role as an LE his experience of operating on the MNPL was with tablet working and he had no practical experience of the TWC system. However he stated his union role at the time TWC was introduced had made him fully conversant with its operating principles.
- 1.3.4 Since re-certification on 27 December 1998 he had been rostered on shifts for 10 weeks. These shifts had included 17 runs where he operated trains over the section of track from Wanganui to Marton. Except for one run where a crew change was required with a train crossing at Whangaehu, 9 March was the first time that he had been issued with a track warrant limiting his run from Wanganui to Whangaehu (rather than Wanganui to Marton).
- 1.3.5 Of the 17 runs between Wanganui and Marton, 6 had been carried out in daylight hours while 11 had been at night.

- 1.3.6 His average rostered shift length over the fortnight previous to the incident was 9.15 hours. The shift involving this incident was the first one after a rostered weekend off and the LE had been on duty for 7 hours when the incident occurred. The LE stated that he was under no stress, had no medical problems (he had passed a medical check within the previous 2 weeks) or anxieties and that he had a good sleep prior to going on duty. He was unable to explain the reason for the lapse in concentration that allowed him to overrun the track warrant limits. His account of the events leading up to his arrival at Whangaehu included “. . . doing all the normal things . . . but nothing registered that I should be stopping”.
- 1.3.7 The TCO had 2.5 years railway experience starting initially as a signaller. He had been certified as a TCO for approximately 9 months at the time of the incident.
- 1.3.8 It was the TCO’s first time unaccompanied on the “provincial desk” at the time of the incident. The “provincial” area took in the control of all lines Otaki to Wanganui, Palmerston North to Woodville and the North Auckland Line (NAL) north of Waitakere.
- 1.3.9 The TCO acknowledged that following the cancellation of Train 540’s warrant when the train arrived at Whangaehu, the optimum warrant for Train 523 would have been for travel from Wanganui straight through to Marton. However, because the NAL was particularly busy at the time, he did not have the time to “non-issue” the pre-prepared Wanganui to Whangaehu warrant for Train 523 and re-issue a new warrant from Wanganui to Marton (a process which takes approximately 2 minutes).

1.4 Train event recorder

- 1.4.1 An analysis of the event recorder for Train 523 showed that it had been travelling at a speed of 70 km/h approximately 1.25 km north of Whangaehu and had slowed to a speed of 25 km/h at Whangaehu. The train then picked up speed gradually as it travelled further south.
- 1.4.2 The train was recorded as coming to a stop some 15 minutes after it passed through Whangaehu.

2. Analysis

- 2.1 When issuing Track Warrant 5 for Train 523 at 0205 hours the TCO had already obtained clearance from Train 540 in the loop at Whangaehu. He would normally have issued a warrant for Train 523 to travel between Wanganui and Marton, either by entering the required details into TWACS or by “non-issuing” any pre-prepared warrant for Wanganui to Whangaehu and preparing a new warrant to authorise the longer journey. His heavy workload at the time was such that he felt justified in issuing the pre-prepared short warrant to Whangaehu. Although possibly inefficient from a train running perspective, Track Warrant 5 as issued was a valid warrant containing standard clauses that an LE could expect to receive at any time.
- 2.2 Track Warrant 5 to the LE of Train 523 included the statement under clause 12: Other Instructions “540 may be on loop Whangaehu”. This was a standard, all embracing format statement generated by the TWACS and did not necessarily imply uncertainty as to the location of Train 540. The clause was worded that way to cover such situations as a crossing train carrying out shunting duties at the station. This was a wording that was well understood by all operating staff.

- 2.3 The LE's overrun of Whangaehu may have been influenced by the following operating factors on the day:
- He was aware that Train 540 was in and clear at Whangaehu before his warrant was issued and this could have influenced him into believing that he had a clear run to Marton irrespective of the track warrant that he subsequently obtained.
 - Except for the one occasion that he was required to change crews at Whangaehu, this was the first time that the LE did not have a straight run through from Wanganui to Marton on a single track warrant.
- 2.4 There was nothing to suggest that the LE's situational awareness was lacking as he approached Whangaehu, slowed his train to 25 km/hour and dimmed the headlights in response to seeing Train 540 in the loop.
- 2.5 An opportunity existed for the TCO to establish the location of Train 523 at 0238 hours when he made contact with the LE of Train 523 shortly after the train had exceeded its limit. TWC relies strongly on human input and it is desirable that every opportunity is taken to increase the resilience of the system to lapses or deviations in operation. The use of crew resource management principles could have prevented the delay which occurred before the overrun was appreciated. A similar problem was recognised and addressed in Railway Occurrence Report 98-107, and resulted in a safety recommendation to Tranz Rail to introduce formalised crew resource management training. Tranz Rail are currently assessing the suitability of such training available in New Zealand to meet their operational requirements.
- 2.6 The varying signals and points indicators applicable within TWC territory were all covered by the appropriate Tranz Rail Rules and Regulations or Train Advice. All such signals and points indicators gave information on the setting of the points and not authority to proceed. Irrespective of the signal displayed at a station the movement of the train was governed by the limits conveyed in the track warrant. The recently commissioned signalling system at Whangaehu used well established signalling principles and there was nothing to suggest that this system contributed to the overrun which occurred.

3. Findings

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

- 3.1 Train 523 was being operated normally prior to the incident.
- 3.2 The LE was appropriately trained and certified for the duties being carried out.
- 3.3 Train 523 was operating under a correctly issued track warrant prior to the incident.
- 3.4 The overrun of the track warrant limit by approximately 18 km did not conflict with other train movements.
- 3.5 Factors which may have contributed to the LE's lapse were:
- his recent return to operating duties
 - his knowledge that the train he was to cross was already in and clear at Whangaehu before the track warrant was issued
 - the low number of track warrants terminating at Whangaehu that he had experienced.

3.6 The use of crew resource management principles could have prevented the delay which occurred before staff realised an overrun had occurred.

4. Safety Actions

4.1 Following the incident the LE was stood down until he could be examined by his Operations Manager and Training Manager. His knowledge of the area and the operating system involved were confirmed before he returned to LE's duties.

Approved for publication 11 August 1999

Hon. W P Jeffries
Chief Commissioner