



## **Report 99-119**

### **Train 281**

### **fall from cab**

### **Owhango (near Taumarunui)**

**15 August 1999**

### **Abstract**

On Sunday, 15 August 1999, Train 281, a southbound Te Rapa to Palmerston North freight, stalled as it ascended steep grade up the Owhango bank. After the stalling the locomotive engineer moved to and from the lead locomotive and brought into operation an unmanned trailing diesel-electric locomotive in an attempt to assist the train up the gradient. On finally returning to the moving lead locomotive he slipped while entering the cab and suffered serious injuries. The train was brought to a stop by another person riding in the cab of the lead locomotive. Safety issues identified were:

- the locomotive engineer's deliberate use of an unauthorised and unsafe manner of train operation
- the train control officer's failure to appreciate and prevent the unauthorised operation
- the ineffective procedure for matching locomotive power to load
- the timeliness of the emergency response.

Five safety recommendations were made to the operator to address these safety issues.



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## List of Abbreviations

km	kilometres
LE	locomotive engineer
NCO	network control officer
NIMT	North Island Main Trunk
Tranz Rail	Tranz Rail Limited
TCO	train control officer
VD	vigilance device

## Data Summary

<b>Train type and number:</b>	Freight 281
<b>Date and time:</b>	15 August 1999, approximately 2018 hours
<b>Location:</b>	375.6 kms North Island Main Trunk (NIMT)
<b>Type of occurrence:</b>	Fall from locomotive cab
<b>Persons on board:</b>	crew: 1 other: 1
<b>Injuries:</b>	crew: serious other: nil
<b>Damage:</b>	nil
<b>Operator:</b>	Tranz Rail Limited (Tranz Rail)
<b>Investigator-in-Charge:</b>	R E Howe





# 1. Factual Information

## 1.1 Narrative

- 1.1.1 On Sunday, 15 August 1999, Train 281 was a scheduled freight train travelling between Te Rapa and Palmerston North. The train consisted of two Class 30 electric locomotives, EF30094 and EF30203, powering the train, a non-operating diesel electric locomotive DX5045 and 59 wagons for a total weight of 1383 t and a length of 551 m. The DX locomotive had problems related to the number 4 traction motor and was being sent to Wellington for repairs.
- 1.1.2 The train was crewed by a locomotive engineer (LE), accompanied in the cab by a female companion. His companion had travelled with him on previous occasions with appropriate Tranz Rail written approval, but on this occasion no official approval had been sought.
- 1.1.3 The LE had experienced problems with lack of adhesion heading north from Te Rapa but this was not unusual with a full load and in the heavy rain falling at the time. He had not verified whether the sand boxes were full on the 2 electric locomotives prior to departure from Te Rapa but had assumed that they would have been serviced at the Te Rapa depot. (On examination at Owhangō following the accident the relevant sand boxes were found to be empty.)
- 1.1.4 At 1857 hours, when south of Kakahi and ascending the grade known as the Owhangō bank, the LE advised the train control officer (TCO) that the train had stalled<sup>1</sup> but that he had managed to restart and attain a speed of 5 km/h.
- 1.1.5 The LE, in answer to a question from the TCO, confirmed that both locomotives seemed to be functioning properly “otherwise we wouldn’t be moving at all” and the TCO replied that he would expect to hear from the LE at Owhangō (at 372 km NIMT).
- 1.1.6 At 1924 hours the LE advised the TCO that Train 281 had again stalled and raised the possibility of starting up the trailing DX class locomotive that was being hauled behind the 2 EF class locomotives to assist the train through to Owhangō. The TCO, who later stated that he was unaware of the repercussions of bringing the DX into operation in such a way, agreed to the plan. At this time the TCO was unaware of the presence of the cab rider and was also not aware that his agreement was related to movement between cabs while the train was moving. The LE thought that using the DX would be quicker than getting an assisting locomotive out from Taumarunui to help to propel Train 281 up the grade. He said later that he knew that using the DX “was probably against the regulations” but did not think that there would be any problem.
- 1.1.7 The TCO stated that while he was aware of Tranz Rail’s requirements for dealing with stalled trains (refer to section 1.10), the need to use these provisions had not arisen as he considered the LE would be able to overcome the stalling with the use of the DX locomotive.
- 1.1.8 With the train stationary and braked, the LE alighted from the leading EF locomotive and walked back about 35 m to the cab of the DX locomotive and attempted to start the engine; however, he had difficulty in achieving this and had to return to the lead locomotive to obtain information in the hand book he carried there. Eventually he managed to start the engine and at 1951 hours, and from the cab of the DX locomotive, advised the TCO that he had power on and “... everything looking all right, I’ll shoot back to the electric and hopefully the DX will push us up itself, - fingers crossed”. (It was possible to have the diesel electric locomotive in power and held stationary but if this was extended for any length of time damage to the transmission could result.)

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<sup>1</sup> The controls on EF locomotives automatically shut down power as soon as wheel slip was detected. On steep grades when a train is travelling at slow speed it was not unusual to come to a stop before the controls could be reset and power reapplied.

- 1.1.9 The LE made no effort to isolate the vigilance device (VD)<sup>2</sup> on the DX locomotive because he was under the impression that when the locomotive was being towed the VD would have been automatically isolated and would remain so.
- 1.1.10 On returning to the leading EF locomotive, the LE applied power to the multiple coupled EF locomotives and released the train brakes. The train started to move off and the LE commented to the TCO "... we're on the move, it's looking good so far...". However some seconds later at about 1952 hours there was a sudden drop in brake pipe pressure and the LE realised that the VD had been activated on the DX locomotive, automatically applying the brakes and bringing the train to a halt. The VD activation was automatically relayed through to the TCO, who contacted the LE to ensure he was aware of the alarm.
- 1.1.11 The LE again went back to the DX locomotive, cancelled the VD, powered up the locomotive and returned to the lead locomotive and again managed to obtain forward movement. However at 2001 hours the VD on the DX locomotive again activated the brakes and the train came to a stop.
- 1.1.12 The LE then conferred with the TCO and discussed the possibilities of either trying to move off again without utilising the DX or isolating its VD unit by breaking the glass fronted box which gave access to the brake isolating cocks before powering up the DX locomotive again.
- 1.1.13 Following this conversation with the LE the TCO consulted by telephone with the network control officer (NCO) responsible for tonnage control, who was in an adjacent room. The following is the relevant transcript of those discussions:

TCO "281 go ahead."

LE "The VD on the DX going off eh? I can give it another go without the DX or we can isolate that VD on that DX, - that means breaking the glass just to get to our destination. Over."

TCO "Breaking the glass eh? Stand by."

(TCO contacts NCO)

NCO "Hello Control, ( )<sup>3</sup> speaking."

TCO "They are going to smash the VD glass on this DX on 281."

NCO "Oh, OK."

TCO "So he can get himself up the Owhango bank."

NCO "Why, has it gone off has it?"

TCO "Yeah, yeah."

NCO "OK. what's the loco number?"

TCO "5045... I'll just tell him to give him the go ahead to get him moving."

NCO "Whereabouts is he at the moment?"

TCO "Oh, - he's on the Owhango bank now."

NCO "Oh, - well that's your call. Where is the Owhango bank?"

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<sup>2</sup> All main line locomotives were fitted with a VD that safeguarded them in the event of an LE mishap. The VD caused an alarm to be sounded within the cab if any of the locomotive controls (including the VD cancel button) were not activated within a fixed period of time. For DX locomotives a warning light was activated after 50 seconds and then reinforced with an audible alarm. If this was not cancelled within ten seconds of it activating (by pushing the VD cancel button), power was cut off and the train brakes were automatically applied. As an additional safeguard the activation of a VD alarm was transmitted by radio through to Train Control when the audible alarm sounded.

<sup>3</sup> Denotes name removed to de-identify individuals.

TCO "It's between Kakahi and Owhango, just out of Taumarunui."  
NCO "OK, so he'll obviously only carry on to Palmy. We will be looking at a change of locos."  
TCO "Yeah."  
NCO "OK ( ), thanks a lot."

(TCO contacts the LE)

TCO "Yeah 281, yeah go ahead and do that ( ), 281."  
LE "Rodger control. Has that DX gone off again?"  
TCO "Yeah, just gone off again there ( )."

The vigilance alarm was recorded as being sounded at 2001 hours.

- 1.1.14 The NCO's understanding of the conversation with the TCO was that he was being informed of a defective locomotive hauling a train (a problem with the VD unit) requiring a change of locomotive at Palmerston North. The NCO stated that he did not know that the DX was being used in an unauthorised manner and assumed that the questions were being asked in relation to the legitimate use of the DX.
- 1.1.15 The LE in the meantime had attempted to restart the train using the 2 EF locomotives but had only managed to attain walking pace with a lot of "slipping and sliding" and had concluded that using the DX with the VD isolated was the best way of getting the train moving again. Now that he had the TCO's tacit approval, he set about attempting this.
- 1.1.16 With the train stationary and the train brakes applied the LE again went back to the DX locomotive. He broke the glass to the cabinet containing the brake cocks enabling him to isolate the brakes from the VD unit. He was not aware that this action alone was not sufficient to isolate the VD. The LE then went back to the leading EF locomotive and pumped off all the Westinghouse air brakes (train brakes) so that the train was held only by the brakes of the 2 leading EF locomotives. His reason for doing this was that he wanted to minimise the heat build up in the DX locomotive traction motors by minimising the time it took to get the train moving again.
- 1.1.17 The LE returned to the DX locomotive, applied power to notch 4 (the DX was attempting to drive but was restrained by the braked EF locomotives) and then proceeded to the head of the train where he applied power to the 2 EF locomotives and released the locomotive brakes allowing the train to move forward at approximately 2008 hours.
- 1.1.18 At approximately 2010 hours the DX locomotive VD was again activated. This coincided with the LE's conversation to the TCO that "we're looking good, sitting on 15 kph ... we'll just leave that DX to take that weight off our train ...". On being asked by the TCO how far he would make it, the LE indicated that he would have no trouble making it to National Park. The TCO did not tell the LE at that stage that the VD had once again been activated on the DX locomotive.
- 1.1.19 Shortly after this, the LE considered that the train was not reacting as it should do with the combined tractive effort of the 3 locomotives. He asked his companion to activate the VD cancel button in the leading EF locomotive cab and, whilst the train was still moving forward, jumped from the EF locomotive and climbed onto the DX locomotive to ascertain the reason for the poor response. He stated that the train was moving forward at a crawl by the time he mounted the DX locomotive. The event recorder indicated a speed of about 5 km/h.

- 1.1.20 The LE stated that once in the cab of the DX locomotive he noted that the VD light had been activated but there was no alarm sounding. The Westinghouse air brakes had not been applied but the diesel engine had returned to idle speed. He stated that he could not understand what he may have done wrong to cause this to happen but pushed the VD cancel button and at 2016 hours re-powered the DX locomotive by resetting it into notch 4.
- 1.1.21 The LE then exited the cab of the DX locomotive and made his way forward to the head of the train. As he did so he noted that the train seemed to be responding well and was picking up speed. On reaching the EF locomotive, at that time moving at about 15 km/h, he jumped onto the steps giving access to the cab, climbed to the top and turned around to view the rear of the train. In turning around he lost his footing on the door sill and fell off the train onto the track formation. Figure 1 gives an indication of the likely position of the LE when he slipped. The height from the door sill to the ballast formation was 1.5 m. The LE scrambled to grab the locomotive as it went past and in so doing was struck on the forehead by part of the under frame near the rear of the locomotive and was rolled away from the track. In the process he also injured his back.

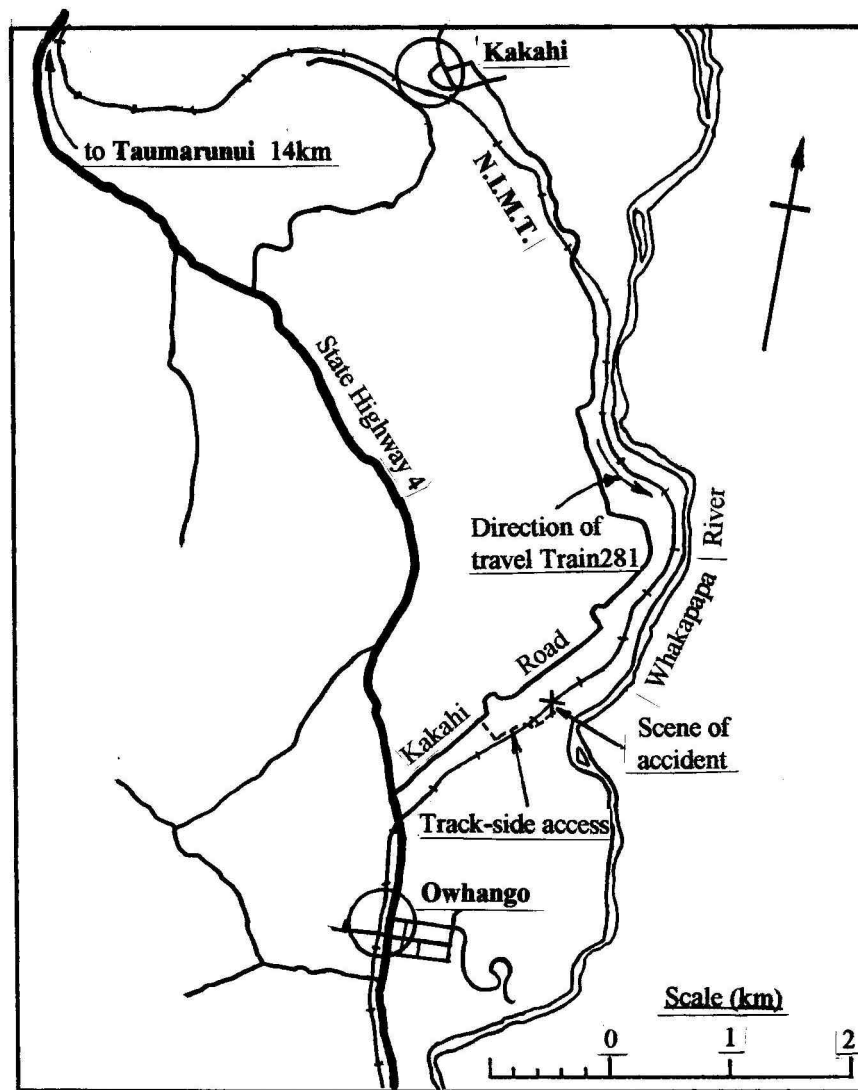


**Figure 1**  
**Likely position of LE in relation to the locomotive before falling**

- 1.1.22 The LE's travelling companion was seated on the centre swivel seat in the front cab reading a book at the time the LE reappeared at the left side cab door. She swivelled the seat to allow him to pass behind her into the driver's seat on the right side of the cab and was initially unaware of his fall. When she realised his absence she was sufficiently aware of the handling of a train, from her numerous trips with the LE, to quickly move across to the driver's position and apply the train brakes. The train came to a stop at approximately 2018 hours from a speed of about 17 km/h.
- 1.1.23 During this time the cab door was open but she was too shocked to move out of the cab to ascertain what had happened to the LE and could not recollect how long it took for him to appear. The LE had in the meantime managed to crawl forward to the locomotive cab and pull his way up the ladder and into the cab. His face was covered in blood from the head wound he had sustained and because of his back injury he could not sit without pain and had to slump forward onto the consol taking his body weight on his forearms. At 2023 hours the LE managed to contact the TCO to advise of the accident.
- 1.1.24 Between reporting the accident and the time that the ambulance arrived on site at 2120 hours, the TCO contacted the LE 10 times to monitor his condition and arrange the emergency response. During the latter contacts the LE was lapsing into unconsciousness.

## **1.2 Recovery response**

- 1.2.1 After ascertaining the LE's condition and exact location, the TCO conferred with the network control manager and then contacted the Hamilton Police on an 0800 telephone number at 2028 hours, thinking that Owhango was inside their area of control. The TCO stated that he rang this number in preference to using emergency 111 as the 0800 number gave him direct access to an area of the Police who were familiar with Tranz Rail's operations. On being advised that Owhango was outside their area, the call was transferred to the Wellington Police Communications Centre who transferred the call to the Taumarunui Police.
- 1.2.2 At 2032 hours the TCO explained to the Taumarunui Police the details of the accident. The Police then made direct contact with the local St Johns Ambulance at 2034 hours to make arrangements to retrieve the driver. At that stage there was no clear understanding as to the best means of access to the stationary train, so the TCO arranged for the emergency services to proceed to the Owhango Railway yard where there would be some Tranz Rail staff to direct and assist in the recovery. At that stage, access by Hi-rail vehicle to convey the LE to an ambulance at Owhango was considered the quickest solution. The Taumarunui ambulance departed at 2044 hours.
- 1.2.3 At 2038 hours the TCO contacted the local Taumarunui track ganger and after explaining the details and location of the accident, arranged for him to go to Owhango to assist in transporting ambulance staff and a relief driver to the stationary train by Hi-rail vehicle.
- 1.2.4 Meanwhile at about 2054 hours, the TCO received information that direct road access to the site was possible. Realising it would be quicker for the ambulance to go direct to the accident site using the track-side access the TCO contacted the ganger at 2102 hours just prior to him arriving at Owhango. It was arranged that the emergency services would be redirected from Owhango to meet the ganger at Kakahi Road at the farm track that gave direct access to the track. Kakahi Road branches off State Highway 4 approximately 1 km north of Owhango and roughly parallels the railway line. (See attached locality plan at Figure 2.) The ganger had to wait for a few minutes at the farm track access before the emergency services arrived and he then piloted them direct to Train 281 via the track-side access.



**Figure 2**  
**Locality plan**

- 1.2.5 The ambulance, Police and the LE of northbound express Train 220 drove to the site. They arrived at the train at approximately 2120 hours.
- 1.2.6 On arrival at the site the ambulance officers placed the LE in a body splint before moving him from the locomotive cab. Difficulty was experienced in exiting the cab because of its restricted size and narrow door. He was finally placed in the ambulance at 2156 hours and conveyed to the Taumarunui Hospital by 2230 hours. The LE was later transferred to the Waikato Hospital for treatment of his back injury.
- 1.2.7 At 2202 hours the LE from Train 220 took over the control of Train 281. He took approximately 35 minutes to cover the remaining 4 kms to Owhango using only the 2 EF locomotives.

### **1.3 Train 220**

- 1.3.1 Train 220, a north bound express freight, was originally to have crossed with Train 281 at Horopito (at 327 km NIMT), and change crews.

1.3.2 The LE on Train 220 overheard the LE of Train 281 and the TCO discussing the use of the DX locomotive. He voiced concern to the TCO at the action being taken and stated that when he took over Train 281 he would not be using the DX. At about 2014 hours the train control tape included the following conversation:

LE (Train 220)	“.....It’s ( ) here mate.”
TCO	“( ), I was just wondering if it was you.”
LE(Train 220)	“ He’s not doing what I think he’s doing is he?”
TCO	“What’s that?”
LE(Train 220)	“With the DX - I won’t be running with the DX like that. It’ll be shut down when I get on it.”
TCO	“Yes, well he’s just getting himself up the (* <sup>4</sup> ) hill.”
LE(Train 220)	“The thing it’s pretty (*) dangerous. If you need to stop in a hurry and you’ve got power on a locomotive, you’ve got no control over, it’s not going to pull you up any quicker.”
TCO	“Sure.”
LE(Train 220)	“Plus the potential damage you could do to the (*) traction motors. It’s bad enough when you are stationary. I won’t be running with it going ( ). If I stall, you’ll have to get somebody out I think, - we’ll see how we go.”
TCO	“OK, so we’ll shut it down and see if she’ll make it up the Owhango bank.”
LE(Train 220)	“I just heard the tail end of the DX (being) in notch 3 and I just thought, oh no! (laughter) - blew my mind. Back in the old days with two men you could do it, - you could proceed down the Main Trunk, - yeah, she’s a bit risky, OK.”
TCO	“He said he’ll meet you at the Park.”
LE(Train 220)	“He’s going to get up there is he?”
TCO	“Yeah.”

## 1.4 Locomotive event recorders

1.4.1 The locomotive log was extracted from EF 30094 (the leading locomotive) and analysed with respect to train speeds in the Kakahi to Owhango section. The graphical presentation is shown in Figure 3 and shows the following:

- from a speed of 57 km/h just north of Kakahi (382 km NIMT), Train 281 progressively reduced speed and stopped over a 6 minute period.
- two attempts were made to move off, one at 1854 hours and one at 1859 hours, each attaining a maximum speed of approximately 5 km/h, but for only a minute’s duration.
- at 1904 hours another attempt was made to move Train 281 which lasted for 8 minutes and reached a maximum speed of 9 km/h before again stalling.
- at 1919 and 1922 hours 2 further attempts were made but they lasted for only one and a half minutes each, reaching a maximum speed of 7 km/h.
- at 1951 hours the train attained a speed of 9 km/h but was stopped suddenly after one minute.
- at 2008 hours Train 281 picked up speed over one minute to 12 km/h, decelerated over 6 minutes to 6 km/h and then picked up again to 17 km/h at 2018 hours before suddenly dropping to zero after a further minute.

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<sup>4</sup> Expletive deleted.

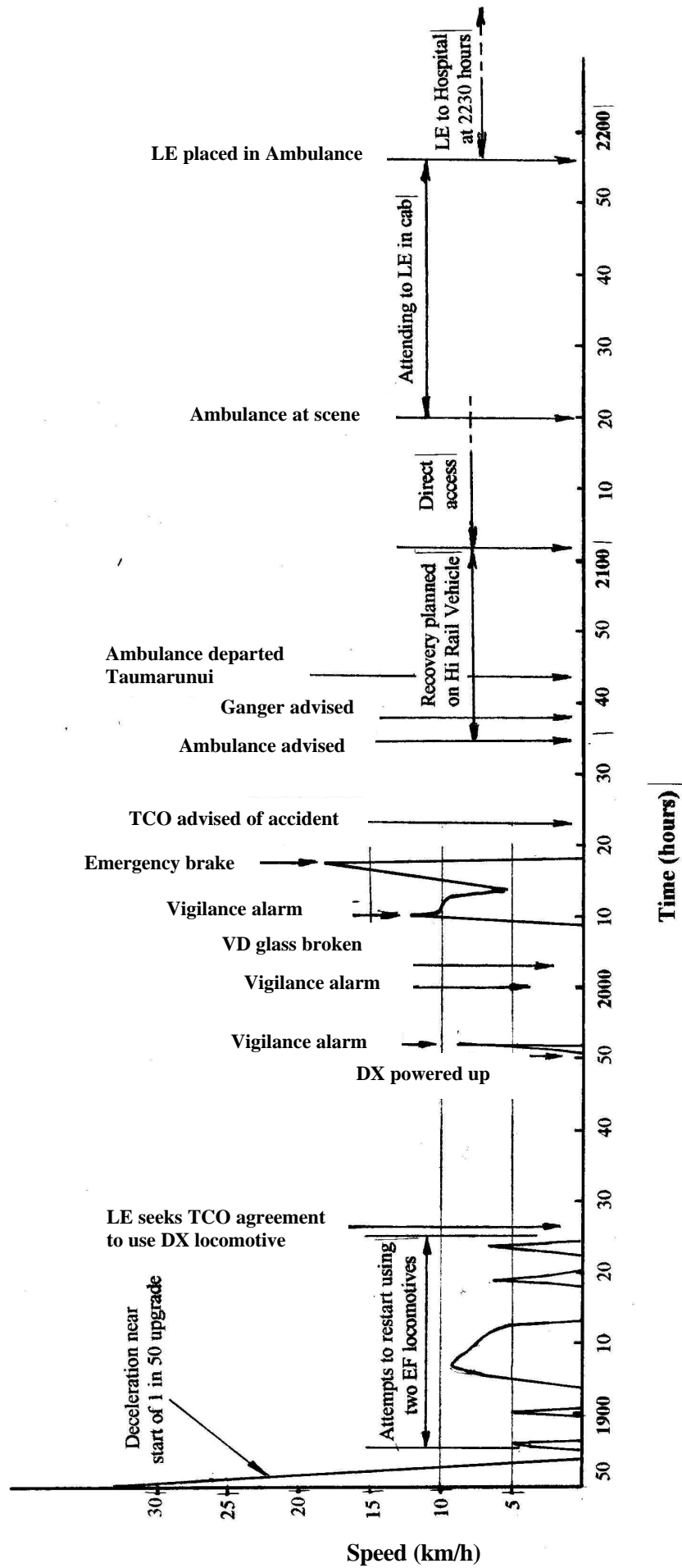


Figure 3  
Diagrammatic representation of events vs time



1.4.2 The locomotive event recorder on DX 5045 was activated when the locomotive was brought into operation at 1948 hours and provided information relating to speed, brake pressure and throttle opening. The following speeds were recorded:

- 1951 hours: a speed build up to 8 km/h before rapidly stopping
- 2008 hours: a speed build up to 12 km/h over one minute followed by a retardation over the next 7 minutes to 5 km/h, accelerating again to 16 km/h for one minute before stopping suddenly.

1.4.3 The points where the train stopped suddenly coincided with brake applications (i.e. build up of brake cylinder pressure) and except for the last application were activated by the VD in the DX locomotive.

1.4.4 The throttle opening positions indicated openings to notch 4 at 2008 and 2016 hours, each for approximately one minute's duration.

## **1.5 Track**

1.5.1 For south bound trains ascending from Taumarunui the track gradient progressively steepens south of Taumarunui (398 km NIMT) so that after passing through Kakahi (at 382 km) the gradient reaches a maximum of 1 in 50 at the Owango bank. This gradient continues until just south of Owango where it flattens off slightly before steepening again to 1 in 50 between Raurimu and National Park (the Raurimu Spiral).

1.5.2 The track materials were 50 kg rail fixed by "Pandrol" fastenings onto concrete sleepers bedded on a 300 mm depth of crushed ballast. The track was in good condition with no noticeable alignment irregularities.

1.5.3 The track alignment in the area of the accident followed the west bank of the Whakapapa river in sidling cuttings (i.e. the railway formation was cut into the western side slope of the Whakapapa River valley). During mid winter months the area of the track where Train 281 stopped at 375.6 km was continually in shade and was noted for its poor adhesion characteristics.

## **1.6 Weather conditions**

1.6.1 Heavy rain had been experienced for all of the trip from Te Rapa, during the accident and during the recovery operation.

## **1.7 EF locomotive condition**

1.7.1 Tranz Rail advised that one group of traction motors on locomotive EF30203 (the second locomotive hauling Train 281) was cut out on 5 August 1999, and the reduced status was noted in the locomotive faults book.

1.7.2 Rather than effect immediate repairs, Tranz Rail had developed a system whereby a downrated Class 30 locomotive could still be used in service, but subject to a reduced tonnage capacity. Any locomotive so downrated was appropriately "tagged" in the Locomotive Management System (an independent computer database giving the status of all locomotives). However the "tagged" information relating to locomotive EF30203 was not transferred from the Locomotive Management System into Tranz Rail's Amicus<sup>5</sup> system and the NCO responsible for allocating power to trains was unaware of the power reduction.

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<sup>5</sup> Amicus was a computer database system used for all operational purposes, including the movement and location of wagons, tonnage control and makeup of trains.

- 1.7.3 Tagged EF locomotives did not show on the T15 load schedule (issued to LEs) and neither the LE on Train 281 or the changeover LE from Train 220 were aware that the second locomotive (EF30203) was at half power.
- 1.7.4 The Te Rapa Locomotive Service Manager reported that both EF locomotives had full and operational sanding systems before the train's departure on 15 August.

## 1.8 Tonnage control

- 1.8.1 Tranz Rail's "Master Locomotive Load Schedule" listed the following allowable loads that could be carried in the Taumarunui to National Park section for Electric Freight as under:

location		freight		
from	to	maximum load	class 30	class 30
Te Rapa	Taumarunui	1700	1200	#570
Taumarunui	National Park	@1400	900	#400

# this is the load schedule in the event of a Class 30 defect where only one traction motor group is available

@ 1550 tonnes for 2 class 30 locomotives provided that the train is assisted in the rear from Kakahi to National Park by either a DX or Class 30 locomotive. Only DX or class 30 locomotives may be used when Class 30 locomotives are in the lead. When a DX locomotive is used in the rear it may be accompanied by a DBR or DC locomotive. BOTH OF THESE LOCOMOTIVES MUST BE IN POWER

- 1.8.2 A Tranz Rail network control officer had the responsibility of allocating and prioritising the tonnage make up for each train and allocating sufficient locomotive power to haul the train.
- 1.8.3 In assembling a train, details were compiled within a database which took into account the matching of tonnage with locomotive tractive power rostered and the route, and an alert was generated if a mis-match was created. The network control officer stated that unless a tagged EF locomotive was made known to the tonnage control office such a mis-match could occur as they would not know to manually alter the maximum tonnage accordingly.

## 1.9 Train consist details

- 1.9.1 The train consist documentation held by the LE included identification of the locomotives on Train 281 with the following letter classifications:

EF 30094	T	(meaning train locomotive i.e. leading)
EF 30203	A	(in this case a locomotive in multiple with the train locomotive)
DX 5045	D	(meaning a dead locomotive being hauled and not under power)

- 1.9.2 The train consist held by the LE did not include information regarding the downgraded status of EF 30203, or the "consigned for repair" status of DX 5045.

## **1.10 Locomotives in multiple and assisting locomotives**

### **1.10.1 Tranz Rail Operating Instructions for Locomotive Running Staff, Page 9.1 stipulated the following:**

#### **9.1.5 Locomotives in Multiple**

When locomotives are connected in multiple the correct air hoses must be coupled and the brake on the trailing unit or units set up and tested in accordance with the instructions for that particular brake.

When locomotives are disconnected, the trailing units must be set up for "Lead" immediately. "Multiple" means hoses and jumper cables coupled and controlled from the "Lead" unit.

#### **9.1.6 Assisting locomotives**

An assisting locomotive is one which is anywhere in the train, except the lead, and is controlled by a crew in the cab. The brake pipes must be coupled between the locomotives. The Locomotive Engineer in the leading locomotive must take full control of the braking of the train. The correct pressure must be maintained in the main reservoir. The Locomotive Engineer in the assisting locomotive is not to take any action in the ordinary braking of the train, but must be prepared at all times to apply the brakes in the case of emergency. He may make a light application of the independent brake to assist in holding the train during recharge, while descending a long gradient.

After an assisting locomotive is either disconnected from or connected to a train, the Locomotive Engineer of the leading locomotive must satisfy himself, with the correct brake test carried out from the leading locomotive, that the brake valve and cocks on the locomotive or locomotives are in the correct position.

During each portion of the test the brake valve must be allowed to complete one operation before being moved to start another. It must not be moved to 'Release' while air is exhausting from the brake pipe."

Tranz Rail advised that Class 30 jumper cables were not compatible with those of DX locomotives. The 2 classes of locomotive could therefore not be connected in multiple.

## **1.11 Stalled trains**

### **1.11.1 Tranz Rail's Centralised Traffic Control Regulation 17(d) dealt with stalled trains and how they must be removed from a section as follows:**

#### **"17 (d) Trains Stalled**

(i) When a train is stalled in the section and the Locomotive Engineer has advised Train Control that the locomotive or part of the train can be taken forward to the station in advance without assistance the following procedure will be adopted:

The Locomotive Engineer must ensure that the rear portion of the train is secure.

Once Uncoupled the Locomotive Engineer is to move the front portion forward approximately 200 metres.

Two detonators must be placed 10 metres apart, on each rail at a distance of about 200 metres from the front vehicle of the rear portion to warn the Locomotive Engineer, when returning, of the position of the remainder of the train.

The Locomotive Engineer must note the class and number of the rear vehicles on the front portion.

The Locomotive Engineer on arrival at the station must remove the half pilot key from the half pilot key box. The Locomotive Engineer, after satisfying himself

that the front portion is complete and being advised by Train Control or Signalman that the points are in the correct position for the intended movement may then return to remove the remainder of the train from the section. If before reaching the remainder of the train the locomotive is required to pass a Stop and Stay Intermediate signal at stop then Train Control must retain possession of the half pilot key until the whole of the train has been removed from the section.”

## **1.12 Personnel**

- 1.12.1 The LE of Train 281 had 24 years railway experience, starting as a locomotive trainee in Hamilton. After one year he obtained his locomotive assistant ticket, followed by his B grade driver’s certificate in 1980 and his A grade driver’s certificate in 1981. He held a current operating certificate. His previous 4 rostered shifts had been on Tuesday 10 August to Friday 13 August with an average shift length of less than 8 hours. He was not suffering any health problems at the time of the accident.
- 1.12.2 The TCO started with Railways in 1971 in the traffic branch and transferred to Palmerston North Train Control office in 1977 after qualifying as a TCO. When Train Running was centralised in 1997 he moved to Wellington as a TCO. He held a current certification as a Train Control Officer.
- 1.12.3 The Network Control Officer controlling tonnage started as an apprentice fitter in the Hillside workshops in Dunedin and graduated through to Locomotive Maintainer. In 1990 he transferred to the Hutt Workshops and in 1997 shifted to the Network Control Centre.

## **2. Analysis**

### **2.1 The stalling**

- 2.1.1 Stalling can and does occur for a number of reasons and Tranz Rail’s rules and procedures allow for this. The significance of this accident is not that the train stalled, but that having stalled the standard operating procedure to respond to such an event was not used. However, factors related to the stalling are included in the report since without the stalling the accident would not have occurred.

### **2.2 Tonnage control**

- 2.2.1 The maximum load for 2 EF locomotives up the Owango bank was limited by Tranz Rail to 1400 t. For an EF locomotive coupled to another EF locomotive with only one traction motor group available the maximum allowable load was only 1300 t. At 1383 t Train 281 was overloaded. The mis-match came about because the reduced capacity of the downgraded EF locomotive was not allowed for in the Amicus system.
- 2.2.2 The fact that no sanding was possible because of heavy demands emptying the sand boxes on both EF locomotives would have adversely affected the performance of the train. The wet rail heads and overloaded train would have required more sand than usual to maintain traction. With the constant heavy use of sand on the grades between Hamilton and Taumarunui it was not surprising that Train 281 ran out of sand.
- 2.2.3 EF 30203 was not identified as downrated on the train consist for Train 281, and at no stage during the operation were either of the LEs (the scheduled LE or his changeover) aware of the reduced ability to haul the known tonnage they had on the train. As there was no necessity for the LE to inspect the second locomotive to check its status, and as there was no reference on the train consist, there was no way that the LE could know that the motive power rostered did not match the train load.

- 2.2.4 Similarly the fact that DX 5045 was defective and consigned for repair was not on the train consist. This knowledge may have avoided the sequence of events which unfolded if it had been known by those involved in communications prior to the event.

### **2.3 The actions of the LE of Train 281 and the TCO**

- 2.3.1 From the EF locomotive log it was estimated that Train 281 first stalled on the Owhango bank approximately 4.3 km south of Kakahi. The LE was attempting his second restart when he advised the TCO of the problem. He made 3 further attempts (one of 8 minutes duration and 2 more of about 2 minutes each) before he suggested to the TCO that he bring the DX into operation. At this stage Train 281 had progressed up the grade a further 1.2 km in a time span of 31 minutes.
- 2.3.2 The LE's proposal to restart the train with the aid of the DX locomotive was motivated by a desire to save an assisting locomotive having to come out from Taumarunui to assist. He knew it was against operating rules but nevertheless considered that he could save time by bringing the DX locomotive into use. The LE openly discussed the problem with the TCO who tacitly approved the proposed solution.
- 2.3.3 The TCO admitted that he was not aware of the significance or the repercussions of the LE's suggestion to use an unmanned DX locomotive to assist. The use of the DX locomotive in such circumstances was outside the TCO's specific area of expertise although he should have had sufficient background knowledge to appreciate that what was being proposed was against operating procedures.
- 2.3.4 The aspect of utilising the procedures as laid down in Tranz Rail's regulations for recovering stalled trains (Centralised Traffic Control Regulations clause 17d) was not considered by either the TCO or the LE. Both the LE and the TCO were aware that the locomotive or part of the train could have been taken forward to the station in advance without assistance, and this should have been an automatic response to the situation. The LE's alternative proposal was contrary to regulations governing this event and should not have been suggested by the LE or given tacit approval by the TCO.
- 2.3.5 When the TCO discussed with the NCO the possibility of breaking the glass to isolate the VD on the DX locomotive, he did not make the full circumstances clear. An ambiguity was created whereby the NCO assumed that the VD isolation was required as the result of a normal service fault in a DX locomotive on a diesel-hauled train and had concluded that it would require replacing when it got to Palmerston North. Had the NCO brought up the Train 281 consist on his computer database he would have realised that it was being hauled by 2 Class 30 locomotives, and with his background would probably have known that using a DX locomotive in the manner intended was unauthorised and unsafe.
- 2.3.6 The LE was aware that the coupling of the 2 classes of locomotives to run in multiple was not possible. He made deliberate moves to minimise the overheating in the DX traction motors which would have resulted from them being in power while the train was stationary.
- 2.3.7 The breaking of the VD glass in an attempt to use the DX locomotive to assist added to the poor judgement already shown and indicated a certain degree of mindset on the LE's part. Once embarked on his course of action to fix the problem he seemed determined to make it work. Once put into power with the VD isolated the locomotive was unable to be controlled without an LE in the cab. The locomotive would have remained in the preset power notch until it was cut out by a relay, or was shut down by the LE coming back on board.
- 2.3.8 Tranz Rail Operating Instructions allowed for an assisting locomotive to join a train, "anywhere in the train, except the lead" and it had to be "controlled by a crew in the cab". Without that control the train would not respond effectively to braking. The DX locomotive would still be under power and damage could result to the traction motors of the DX locomotive.

## **2.4 The cab rider**

- 2.4.1 The presence of the cab rider appears to have played no part in the LE's original decision to utilise the DX locomotive. After powering up the DX locomotive, and while the train was stationary, both of the VDs (on the EF and DX locomotives) were passive. After the LE had returned to the lead locomotive and started moving the train the VD on the DX locomotive became activated. The LE's mistaken assumption that the VD on the DX locomotive would not be activated led him into believing that he could carry out the operation single handed.
- 2.4.2 However, when the LE elected to attend to the DX locomotive for the last time, while the train was on the move, there was a need for someone to cancel the VD alarm in the EF locomotive while he was absent. The LE requested the cab rider to do this and because of her frequent trips with the LE she was familiar enough with the locomotive controls to accomplish the task. Her general familiarity with the controls was also sufficient for her to stop the train when the LE slipped from the top step. Without the assistance of the cab rider to cancel the VD, the LE was not likely to have been tempted to go back to attend to the DX and the accident may have been avoided. At this stage the presence of the cab rider and the LE's intentions were still unknown to the TCO.
- 2.4.3 The practice of permitting repeated cab trips for individuals, and thus allowing them to become familiar with the locomotive controls, is a temptation for LEs to use unauthorised procedures such as those that occurred on this occasion.

## **2.5 Emergency response**

- 2.5.1 It took more than 57 minutes from the time that the TCO first became aware of the accident (2023 hours) until the ambulance arrived at the accident scene (2120 hours) and during this time it became known that the LE was seriously injured (passing in and out of consciousness). Eleven minutes were lost in making contact with the appropriate ambulance authorities in Taumarunui (2023 hours to 2034 hours). This was partly due to the TCO's decision to use an 0800 Police number for the Northern Area Police as the initial contact.
- 2.5.2 The person with local knowledge of the area who could have given the best advice on access, the ganger, was not contacted until 2038 hours, 15 minutes after the accident, and even then was not pressed for this information. Access to the accident site by Hi-rail vehicle from Owhango was the plan until 2054 hours, some 36 minutes from the time of the accident.
- 2.5.3 It took 36 minutes from the time the ambulance left Taumarunui (2044 hours) until it arrived at the accident scene (2120 hours); a journey of approximately 22 km that could have been achieved in about 20 minutes had they been advised earlier of the best point of access. Had the Taumarunui ambulance been alerted earlier and directed straight to the site, a total saving of some 30 minutes could have been achieved. This loss of time getting the emergency services to the LE did not adversely affect his condition or recovery in this instance, but could well do so in any future situations requiring emergency service response.

### **3. Findings**

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

- 3.1 The prime cause of overloading of Train 281 was a downrated EF locomotive not being entered into the computerised tonnage control system, and being assigned to Train 281 as a fully operational locomotive.
- 3.2 The use of an unmanned DX locomotive to assist the train was not in compliance with Tranz Rail instructions.
- 3.3 If the DX locomotive had been identified as defective on the train consist this may have influenced the preceding events and avoided the accident.
- 3.4 The judgement of the LE was seriously flawed in utilising an assisting locomotive without an LE in attendance in the cab.
- 3.5 The LE acted incorrectly in leaving a moving train, particularly in circumstances where a cab rider was required to make unauthorised use of the locomotive controls (VD).
- 3.6 The TCO should have activated the required response to stalling (Centralised Traffic Control Regulations 17d).
- 3.7 The TCO acted incorrectly in tacitly approving a proposal relating to an unauthorised locomotive operation.
- 3.8 If the TCO had fully explained the problem and the proposed solution regarding the use of the DX locomotive, the NCO may have appreciated the hazard involved and stopped the unauthorised operation.
- 3.9 The unauthorised procedure relied on the presence of a second person in the cab to cancel the EF locomotive VD.
- 3.10 The fact that the cab rider did not hold a cab pass was not a factor in this accident.
- 3.11 The accident response time was unnecessarily delayed but did not adversely affect treatment of the injured LE in this case.

### **4. Safety Actions**

- 4.1 Tranz Rail advised that the identified gap in procedures had been closed by issuing instructions to tonnage control regarding the managing of the tonnage allocations to trains with reduced locomotive capacity.

## 5. Safety Recommendations

5.1 On 30 May 2000 it was recommended to the Managing Director of Tranz Rail that he:

- 5.1.1 Ensure that procedures for dealing with stalled trains are understood and adhered to by all operating staff. (021/00)
- 5.1.2 Revise the procedures for tagging downrated locomotives to include a formal process to have them entered into the computerised tonnage control system, and include such information in the train consist documentation supplied to LEs, together with the status of any non-powered locomotives in the consist. (022/00)
- 5.1.3 Review the effectiveness of the Tranz Rail emergency plan to respond to such accidents to ensure it includes guidelines to TCOs and network control managers to minimise the initial delay in notifying emergency services and ensure timely information regarding access to accident and incident sites. (023/00)
- 5.1.4 Include this accident, and the safety messages highlighted by this report, as a case study to be included in the ongoing training of the operating groups concerned. (024/00)
- 5.1.5 Control the conditions for cab riders to avoid familiarity resulting in a delegated control function. (029/00)

5.2 On 4 July 2000 the Managing Director of Tranz Rail responded as follows:

- 5.2.1 021/00: Procedures for dealing with stalled trains are covered in the Rail Operating Code.
- 5.2.2 022/00: We will review what details are supplied directly to LE's regarding non-operational or downrated locomotives in train consists. Lead, Trail and Dead locomotives are already identified on Train Work Orders. Further information is available through the Transit office if requested by the LE.
- 5.2.3 023/00: Appropriate information for emergency responses is available and procedures are already in place. These will be reviewed and reinforced.
- 5.2.4 024/00: Tranz Rail already uses appropriate case studies to highlight important issues during formal training. Consideration will be given to incorporating this incident into the current LE training course.
- 5.2.5 029/00: Tranz Rail already has a formal process in place to authorise people other than the LE responsible for the train to ride in the cab. The LE is responsible for the safe operation of the train and may, using existing rules, utilise any employee to assist in an emergency.

Approved for publication 13 June 2000

Hon. W P Jeffries  
**Chief Commissioner**