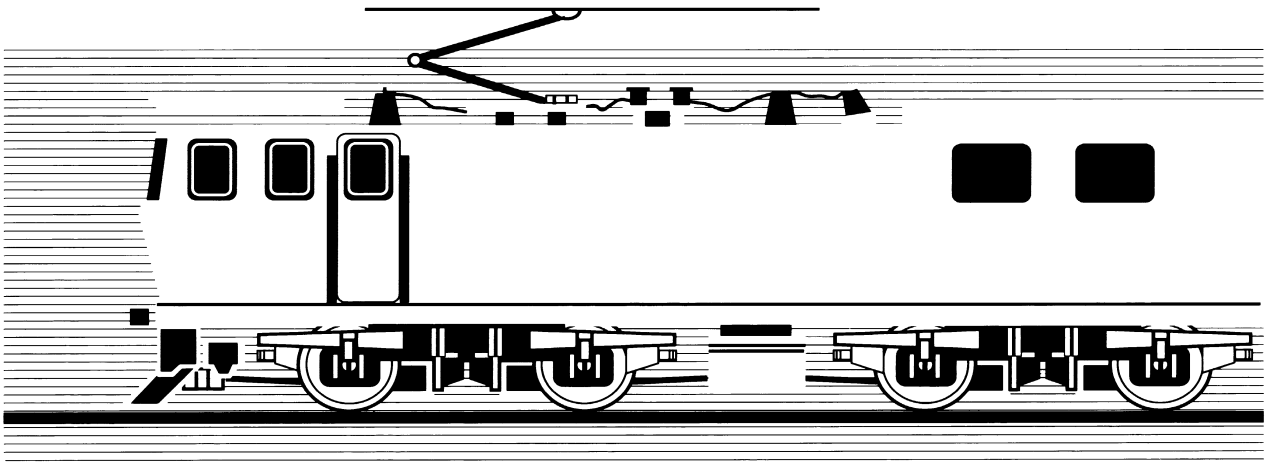
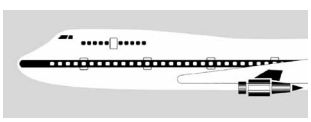
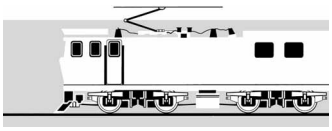


RAILWAY OCCURRENCE REPORT

04-113 **express freight Train 220 and empty truck and trailer, collision at farm access level crossing, 162.56 km between Maewa and Rangitawa** **27 April 2004**


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.

Report 04-113

express freight Train 220

and

empty truck and trailer

collision

farm access level crossing

162.56 km between Maewa and Rangitawa

27 April 2004

Abstract

On Tuesday 27 April 2004 at about 1605 hours, express freight Train 220 collided with the empty trailer of a fertiliser truck and trailer unit at a farm access level crossing between Maewa and Rangitawa on the North Island Main Trunk. The front bogie of the lead locomotive derailed and the truck and trailer unit was extensively damaged. One traction mast was knocked over and the overhead catenary brought down.

The locomotive engineer and the truck driver both suffered minor injuries.

The safety issues identified were:

- the legal status of the level crossing
- the view lines at the level crossing
- the available stacking distances for long road vehicles

Three safety recommendations were made to the Chief Executive of New Zealand Railways Corporation.

Truck and Trailer unit alongside Train 220 after collision

Contents

Figures

Abbreviations

Farmers Transport	Farmers Transport Limited, Feilding
km	kilometre(s)
km/h	kilometres per hour
m	metre(s)
NIMT	North Island Main Trunk
t	tonne(s)
Tranz Rail	Tranz Rail Limited
Toll Rail	Toll NZ Consolidated[1]
UTC	coordinated universal time

[1] New owners of Tranz Rail as from 5 May 2004.

Data Summary

Train type and number:	express freight Train 220
Date and time:	27 April 2004 at about 1605[2]
Location:	162.56 km NIMT, between Maewa and Rangitawa
Persons on board:	train: 1
	truck: 1
Injuries:	train crew: minor
	truck crew: minor
Damage:	minor to train, substantial to truck and trailer
Operator:	train: Tranz Rail Limited (Tranz Rail)
	truck: Farmers Transport Limited, Feilding
Investigator-in-charge:	D L Bevin

[2] All times in this report are New Zealand Standard Times (UTC+12) and are expressed in the 24-hour mode.

1 Factual Information

1.1 Narrative

1.1.1 On Tuesday 27 April 2004, Train 220 was a northbound express freight service travelling from Wellington to Auckland. The train consisted of 2 EF locomotives in multiple hauling 28 wagons with a gross weight of 876 t and a total train length of 472 m. It was crewed by a locomotive engineer.

1.1.2 As the train approached a 75 km/h curve through a cutting, the locomotive engineer made a minimum brake application in preparation to descend the gradient towards Halcombe. As the train exited the curve and cutting, the locomotive engineer released the brakes, but then saw a stationary trailer obstructing the track.

1.1.3 The locomotive engineer made an emergency brake application, and got onto the floor to protect himself. The locomotive struck the trailer and pushed it through 90° to the left of the track where it overturned. The truck jack-knifed and slewed through 180° and came to rest with the driver's cab parallel with, but foul of the moving wagons. The train scraped along the front of the truck as it came to a stop. The front bogie of the leading locomotive derailed but the locomotive stayed upright.

1.1.4 The locomotive engineer contacted train control by radio to report the collision.

1.1.5 After the train had stopped, the truck driver climbed down from his cab and ran to the locomotive to check on the locomotive engineer's wellbeing. Once they had satisfied themselves that neither was seriously injured, the truck driver returned to his truck.

1.2 Site information

1.2.1 The level crossing was located at 162.56 km between Maewa and Rangitawa and gave access from Lethbridge Road to farm paddocks where a fertiliser storage bin was located.

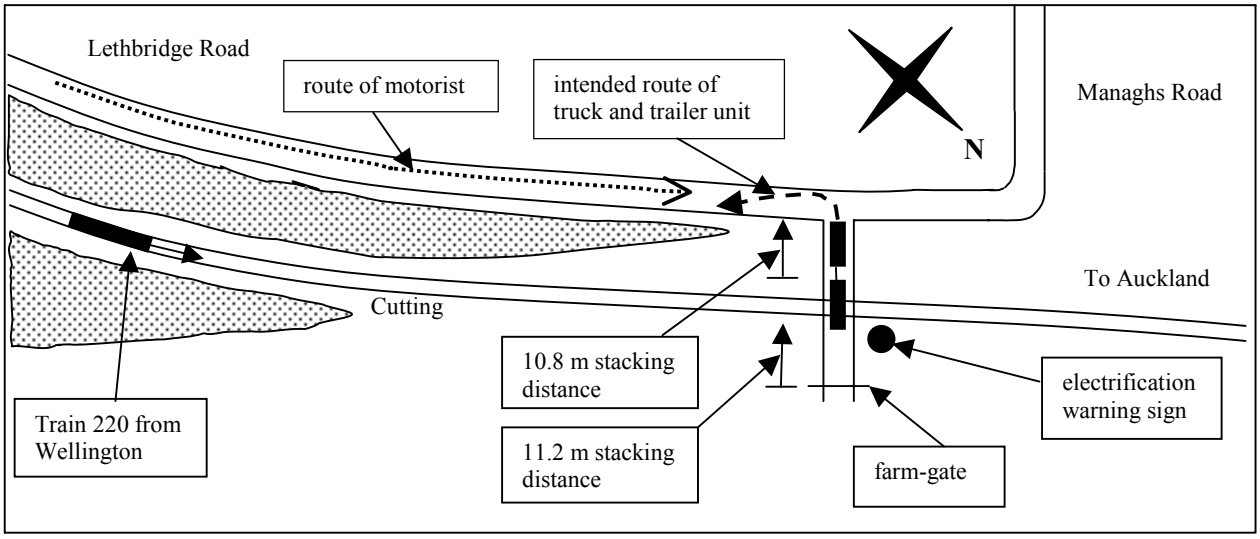


Figure 1
Site plan of the level crossing (not to scale)

1.2.2 The maximum line speed through this area for express freight trains was 80 km/h, but the curve speed was 75 km/h.

1.2.3 New Zealand Railways Corporation advised there was no record of the level crossing on the engineering alignment plans drawn up when the railway was built through this area. Therefore it was not classified as a statutory level crossing.

1.2.4 The level crossing was not held under a deed of grant as required in Section 1.1 (b) of Tranz Rail's Infrastructure Code Supplement G417.

1.2.5 Access over the level crossing was unsealed and slightly inclined up to Lethbridge Road, which was a lightly trafficked rural road. Near the intersection there was a 35 km/h advisory road sign for northbound traffic on Lethbridge Road turning into Managhs Road. The location of this sign meant that traffic joining Lethbridge Road from the level crossing had to drive in a wide arc to avoid the sign (see figure 2).

Figure 2
Overview of private level crossing and intersection with Lethbridge Road looking north

1.2.6 Users of the level crossing had good visibility of the track to the north with a view line of 450 m along an essentially straight track. Likewise locomotive engineers of trains approaching the level crossing from the north had good visibility of the crossing and any traffic using it (see Figure 3).

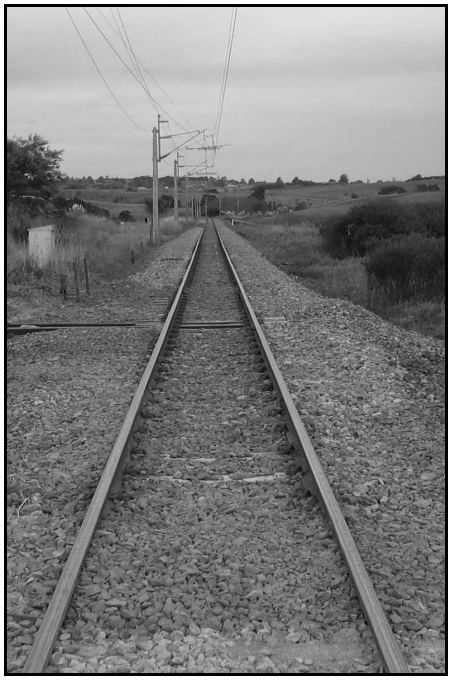


Figure 3
Looking north from the level crossing

1.2.7 The track to the south went through a 420 m radius curve in a shallow cutting. The view line for users of the level crossing and locomotive engineers was restricted to 140 m (see Figure 4).

Figure 4
A northbound train emerging from the cutting

1.2.8 The photograph in Figure 4 was taken from the farm gate, about 15m from the level crossing. From this position users would have the best possible line of sight for trains approaching from the south, because it was possible to see partway into the cutting and any approaching train when it was about 200 m away. Because of the cutting the line of sight reduced significantly as a truck moved nearer to the level crossing. In this instance, the truck driver did not see any approaching train from either the farm-gate or the level crossing.

1.2.9 The level crossing was not protected by warning devices or signage. However, there was a sign facing vehicles leaving the farm, warning of the presence and clearance height of the overhead catenary (see Figure 5).

Figure 5
Electrification warning sign visible from farm gate

1.2.10 The Manual of Traffic Signs and Markings[3] stipulated a minimum distance of 3 m from the nearest rail to the limit lines[4] for traffic approaching public level crossings that were controlled by "Give Way" or compulsory "Stop" signs. However, this manual made no mention of private level crossings.

1.2.11 At the time of the incident, Tranz Rail's standards for view lines for traffic at new level crossings were defined in Document Q517. Those standards stipulated that for crossings on a section of track with a maximum train speed of 75 km/h, the minimum allowable view line was 421 m along the track from a position 5 m from centre line of the track. The standard was based on the time taken for a 20 m long road vehicle to clear the railway from a standing start, 8.5 m from the track centre line.

1.2.12 Neither the Manual nor Q517 stipulated a minimum distance clearance of the railway (stacking distance) to allow vehicles to stop on either side of a level crossing. However allowing a 3 m clearance to avoid conflict between the closest rail and the limit line, the following stacking distances were available at the level crossing:

- 11.2 m between the farm gate and an imaginary limit line on the farm side of the level crossing
- 10.8 m between Lethbridge Road and an imaginary limit line on the road side of the level crossing (see figure 6)

[3] A manual jointly prepared and distributed by Transit New Zealand and the Land Transport Safety Authority that sets out policy and requirements for traffic signs and includes guidance for the location and positioning of signs.
[4] Limit lines were marked on all sealed approaches to railway level crossings, to indicate the safe positions for vehicles to stop, if necessary, to avoid conflict with trains.

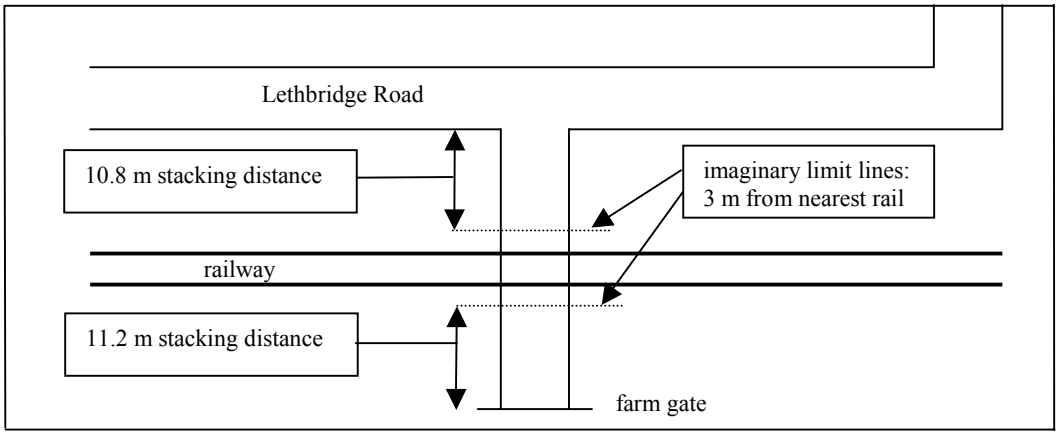


Figure 6
Detailed site plan of level crossing (not to scale)

1.3 Personnel

The locomotive engineer

1.3.1 The locomotive engineer began his railway career in the shunting yards at Palmerston North in February 2000. He was accepted as a trainee locomotive engineer in April 2002 and attained Grade 1 locomotive engineer certification in October 2003.

1.3.2 The locomotive engineer started work at Palmerston North at 1400 and departed on Train 220 at 1512.

1.3.3 The locomotive engineer made a short blast on the locomotive whistle when he saw the trailer obstructing the track but realised very quickly that a collision was imminent. He made an emergency brake application, sounded the locomotive whistle again and dived to the cab floor to protect himself from the impact.

1.3.4 Once the train had stopped after the collision, the locomotive engineer looked back along the train to see if the overhead catenary was down, but he could not see if it was. Witnesses to the collision arrived at the locomotive and confirmed that the overhead catenary had been brought down. He warned them, and the truck driver for safety reasons, "to stay back from the locomotive and make sure no one touches it".

1.3.5 The locomotive engineer remained in the locomotive cab until Tranz Rail personnel arrived at the scene.

The truck driver

1.3.6 The truck driver was an experienced owner-driver. He had been driving part time from Farmers Transport's Feilding depot for about a year. On the day of the incident, he had been delivering bulk fertiliser to a storage bin located in the paddocks over the level crossing. This was the first time he had used the level crossing and the fertiliser bin.

1.3.7 Before commencing the delivery, the truck driver and the dispatcher from Farmers Transport visited the site and carried out a safety assessment to ensure the truck and trailer could access the bin and discharge the fertiliser. The assessment considered the ground condition of the level crossing and the paddocks, and the physical condition of the bin.

1.3.8 The truck driver had also arranged a rendezvous with a shepherd to open the farm gate, and close the gate after his last trip.

1.3.9 On his first trip, he experienced difficulties driving his loaded truck and trailer from the farm gate to the fertiliser bin because an intervening shower of rain had affected the ground conditions. He decided to uncouple the trailer once it was unloaded and leave it behind while he completed the rest of the cartage, using his truck only. He intended to pick up the trailer after his last delivery to the fertiliser bin. This was more convenient as he would have had to detour to his depot to drop off the empty trailer.

1.3.10 After discharging his last truckload at the fertiliser bin, he coupled the empty trailer to his truck in readiness for the trip back to his Fielding depot. He approached the level crossing, stopped, and after satisfying himself that no trains were approaching, he proceeded over the crossing towards the shoulder of Lethbridge Road.

1.3.11 The narrowness of Lethbridge Road, the position of the 35 km road sign and the length of the truck and trailer unit was such that the whole width of Lethbridge Road was required to make his left hand turn into Lethbridge Road. However, he stopped at the intersection to give way to a motor vehicle approaching from his left and in doing so the trailer unit was straddling the track.

1.3.12 The truck driver then heard the locomotive whistles of the approaching train so, once the motor vehicle had passed, he immediately attempted to move forward but could not clear the level crossing before the train collided with his trailer.

1.3.13 After checking on the wellbeing of the locomotive engineer, he returned to his damaged truck and contacted the dispatcher at Farmers Transport to report the collision.

1.4 The fertiliser bin

1.4.1 The fertiliser bin was built in about 1980 and was used for several years. An alternative community fertiliser bin was built on a nearby farm resulting in the original bin falling into disuse.

1.4.2 Some weeks earlier the grass airstrip that serviced the newer bin was ploughed for cropping thus stopping access to the bin. As a consequence, fertiliser storage reverted to the original bin. The day of the incident was the first time the bin had been used for a number of years and it was not possible to establish exactly when it was last used.

1.5 Truck and trailer details

1.5.1 Both the truck and trailer were flat deck units that had been adapted to convey the fertiliser by the installation of portable sides.

1.5.2 The truck was 8.2 m long and the trailer 9.8 m long, making a combined unit length of 18.0 m.

1.5.3 The contract was for the delivery of 50 t of fertiliser. To convey this load meant either 2 trips with the truck and trailer, or 5 trips with the truck only.

1.6 Locomotive event recorder

1.6.1 The event recorder on the lead locomotive, EF30007 was downloaded and supplied for analysis.

1.7 Previous occurrences involving stacking distances

1.7.1 The Commission has investigated several previous incidents involving the stacking distance for long vehicles at level crossings, including:

- Rail Occurrence Report 93-112 covered a collision between the "*Southerner*" passenger Train 901 and a concrete mixer truck at George Holmes Road level crossing at Rolleston in August 1993
- Rail Occurrence Report 96-106 covered a collision between the "*Southerner*" passenger Train 903 and a truck and semi trailer unit at Kirk Road level crossing at Templeton in May 1996
- Rail Occurrence Report 02-113 covered a near collision between "*Tranz Coastal"* passenger Train 700 and a petrol tanker at Vickerman Street level crossing near Blenheim in April 2002.

1.7.2 Of the above occurrences, the one at Vickerman Street (02-113) was the most recent and most closely resembles the circumstances of this incident. On that occasion a tanker driver had completed his delivery run and had decided to use Vickerman Street level crossing to access State Highway 1 for his return to his depot in Nelson. He stopped at the Compulsory Stop at the approach to the level crossing and looked along the railway in both directions.

1.7.3 The tanker driver was satisfied that the railway was clear, but was unsure of the adequacy of the stacking distance between the crossing and State Highway 1 to allow a train to pass behind him safely. He planned to move into the intersection only when he was able to complete his turn on to State Highway 1 without stopping. He moved forward about 3 m when he became aware of the approach of Train 700 from his left hand side and cautiously reversed off the crossing.

1.7.4 Rail Occurrence Report 02-113 included the following safety recommendations:

On 10 June 2002 the Commission recommended to the General Manager, Marlborough District Council that he:

> Liaise with Transit New Zealand to urgently review the use of Vickerman Street level crossing and take such steps as are necessary to prohibit the use of level crossings by vehicles exceeding 9 m in length. (034/02)

1.7.5 On 19 June 2002 the General Manager, Marlborough District Council responded in part:

> Your safety recommendation (034/02) was approved and will be implemented by imposing a length restriction of 9 m at the site under Section 70AA of the land Transport Act 1962.

1.7.6 On 10 June 2002 the Commission recommended to the General Manager Transit New Zealand that he:

> Liaise with the Marlborough District Council to urgently review the use of Vickerman Street level crossing and take such steps as are necessary to prohibit the use of level crossings by vehicles exceeding 9 m in length. (035/02)

1.7.7 On 3 September 2002 the Acting Chief Executive, Transit New Zealand responded in part:

> I am happy to confirm that, in conjunction with Marlborough District Council we propose to place a 9 m length restriction over the section of Vickerman Street from Watsons Road to State Highway 1. The signs are on order and will be installed when they arrive.

1.7.8 On 10 June 2002 the Commission recommended to the Director, Land Transport Safety that he:

> Liaise with Transit New Zealand, Tranz Rail and the appropriate local authorities to initiate a review to define all public level crossings where the stacking distance for long road vehicles is insufficient to ensure that appropriate action is taken, consistent with the frequency of use and the potential consequences of collision. (036/02)

1.7.9 On 27 June 2002 the Director, Land Transport Safety responded, in part:

> There are currently a range of signs used to warn drivers of limited stacking length between rail and a nearby intersection. However, these provide only general warning and do not specify actual stacking lengths. Transit and LTSA has been considering methods of effectively providing such specific information but have yet to arrive at a satisfactory solution. It is recognised that warning signs are only one avenue for addressing concerns in this area but most others involve disruption to access or major costs.
>
> The LTSA is to convene a special working group, to be identified the Rail-Road Level Crossing Safety Forum, and its first meeting is planned before the end of August 2002. The Forum is to be made up of representatives of rail service operators, Transit and other interested parties including the Road Transport Forum.
>
> The Forum will be tasked with investigating, recommending or proposing projects practices to improve safety at rail-road level crossings. It will assist the LTSA and the constituent members in defining, prioritising and implementing projects and programmes.

1.7.10 On 2 September 2002 the Manager, Rail Safety, Land Transport Safety Authority, wrote in part:

> With references to your recommendation 36/2 to the land Transport Safety Authority (LTSA) regarding a review of road stacking distances at level crossing and our subsequent response: I can now advise that the inaugural meeting of the LTSA Level Crossing Forum was held on 22 August. All those attending the Forum considered it very useful, with a variety of issues, including stacking distances being discussed.
>
> At this stage the Forum considers there is a need to quantify the scale of the issue of road stacking distances, so that site-specific options for solutions or mitigation can be identified.

2 Analysis

2.1 The condition of the level crossing, its lack of warning signage and the absence of any formal record of its existence suggested that it was not a legal level crossing. However, in the early 1980s when the NIMT was electrified between Palmerston North and Hamilton its existence had been acknowledged by the placing of a sign on one side of the crossing, warning of the presence and clearance of the overhead catenary.

2.2 The view lines to the south did not meet Tranz Rail's minimum standards for traffic at private level crossings so any application to register it would probably have been declined.

2.3 The available stacking distance between the track and Lethbridge Road was adequate for trucks up to 10 m long, but not for truck and trailer units. At the time the level crossing was formed, traffic was probably restricted to trucks only, so the issue of inadequate stacking distances did not arise. However, developments within the road transport industry have seen the introduction of truck and trailer units impacting on the available stacking distances at all level crossings.

2.4 The opening of the new communal fertiliser bin reduced the need to use the level crossing to almost nil. With the decline in traffic, the potential for a collision was correspondingly reduced. However with the subsequent redundancy of the new bin, the need to again use the original bin arose, and with it came the probability of increased traffic using the level crossing. As a result the risk of a collision increased.

2.5 This was the first time the trucking company had serviced the fertiliser bin for several years, and it was also the truck driver's first visit. He was therefore unfamiliar with the farm, the level crossing and the intersection with Lethbridge Road. Although the level crossing had been included in the safety assessment prior to the commencement of deliveries, the risk of a collision had apparently not been considered. Lethbridge Road was a lightly used rural road so the possible need to stop at the intersection had probably also not been considered. The NIMT was not heavily trafficked so the passage of a train at the times the vehicle was using the level crossing was also probably not considered. The earlier visit to the fertiliser bin appears to have been more a site familiarisation visit, than a safety assessment.

2.6 With the trailer coupled to the truck, the combined length was such that the truck had to travel almost 8 m onto the road before the trailer was clear of the track.

2.7 When the truck arrived at the intersection the driver had to stop to give way to an approaching vehicle. This meant that about 9 m of the trailer was still foul of the level crossing. When the truck driver became aware of the approaching train he attempted to move and clear the level crossing but having to start on an incline, and make a tight turn to enter Lethbridge Road, the truck's response was understandably slow and he was unable to clear the crossing in time.

2.8 The use of longer truck and trailer units in the existing stacking distances, and sub-standard view lines meant that the level crossing was not suitable for the purpose for which it was being used. A preliminary safety recommendation relating to the immediate closure of the level crossing has been made to the Chief Executive of New Zealand Railways Corporation.

2.9 Had the truck driver taken the trailer back on the first trip the collision would not have happened. However his rationale for leaving it at the farm after his first trip was valid.

2.10 Data downloaded from the locomotive event recorder confirmed that Train 220 was travelling at 75 km/h, the posted curve speed, when the locomotive engineer saw the trailer foul of the track and made an emergency brake application. The collision happened about 7 seconds later. Neither speed nor train handling contributed to the collision. From the instant he saw the trailer, he did not have time to avoid the collision.

2.11 Following the incident at Vickerman Street level crossing near Blenheim in April 2002, the Director of Land Transport Safety advised that he had convened a Rail-Road Level Crossing Safety Forum, made up of representatives of rail operators, the Road Transport Forum and other interested parties. The purpose of the forum was to investigate, recommend or propose project or practices to improve safety at level crossings.

2.12 The limit lines defined in the Manual of Traffic Signs and Markings applied to public level crossings but did not apply to private level crossings. However, the minimum distance of 3 m from the nearest rail to the limit lines was as much appropriate for private level crossings and should be defined accordingly. Most private level crossings are unsealed so painting marks on the road surface would not be practical. However, signage or a marker post could be installed to indicate the equivalent limit line at private level crossings. A safety recommendation covering the installation of such posts has been made to the Chief Executive of New Zealand Railways Corporation.

3 Findings

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

3.1 The collision occurred because there was an inadequate stacking distance between the track and Lethbridge Road to safely accommodate the truck and trailer unit.

3.2 Train 220 was operated correctly and the actions of the locomotive engineer did not contribute to the accident.

3.3 Although the existence of the level crossing was not officially recorded, its presence was acknowledged by the installation of a warning sign during the electrification project of the early 1980s.

3.4 The level crossing was not statutory or granted. It was therefore not legal.

3.5 The view lines at the level crossing did not meet the minimum standards specified by Tranz Rail.

3.6 The safety assessment carried out by the truck driver and dispatcher did not identify the potential risk of collision at the level crossing.

4 Safety Recommendations

4.1 On 28 September 2004 the Commission recommended to the Chief Executive of New Zealand Railways Corporation that he:

4.1.1 close the level crossing located at 162.56 km NIMT between Maewa and Rangitawa. (073/04)

4.1.2 identify all other private level crossings that are neither statutory nor granted, and either execute a deed of grant for each crossing that meets technical standards and there is a need to retain the crossing, or close the crossing. (074/04)

and

4.1.3 to reflect the standards applied to public level crossings, arrange for the installation at all private level crossings appropriate marking or signage 3 m from the nearest rail to define the position of limit lines for approaching vehicular traffic. (080/04)

4.2 On 30 November 2004 the Chief Executive of New Zealand Railways Corporation replied in part:

> In response to your safety recommendations New Zealand Railways Corporation advise that:
>
> - We accept the safety recommendations
> - Given the extent of the recommendations, these may take some time to resolve.

Approved on 22 November 2004 for publication

Hon W P Jeffries
Chief Commissioner

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03-112	diesel multiple unit Train 2153, collision with truck, St Georges Road level crossing, Avondale, 28 October 2003
03-110	express freight Train 337, derailment, Kaimai Tunnel west portal, 9 August 2003
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