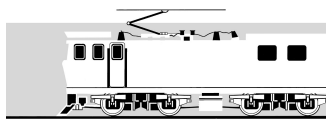
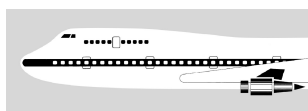


RAILWAY OCCURRENCE REPORT

02-113

Passenger express Train 700 *TranzCoastal* and petrol tanker, near collision, Vickerman Street level crossing, near Blenheim

25 April 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 02-113

passenger express Train 700 *TranzCoastal* and petrol tanker

near collision

Vickerman Street level crossing near Blenheim

25 April 2002

Abstract

On Thursday 25 April 2002 at about 1242 hours, a near collision occurred between passenger express Train 700 *TranzCoastal* and an empty petrol tanker, at Vickerman Street level crossing, near Blenheim. As the train approached the level crossing, the locomotive engineer saw the tanker obstructing the crossing and immediately sounded the horn and applied the emergency brakes. The train stopped about 5 m short of the crossing, by which time the tanker had reversed clear.

There were no injuries.

The safety issue identified was the lack of adequate stacking distance for long road vehicles waiting to turn on to State Highway 1 after negotiating the level crossing.

No safety deficiencies in the rail system were identified.

Safety recommendations were made to Land Transport Safety Authority, Transit New Zealand and Marlborough District Council.

Contents

Abbreviations..... ii

Data Summary iii

1 Factual Information 1

 1.1 History of the incident (train perspective) 1

 1.2 History of the incident (petrol tanker perspective)..... 1

 1.3 Site information..... 2

 1.4 Locomotive details and event recorder 4

 1.5 Road vehicle details and operation 4

 1.6 Personnel..... 5

 1.7 Incident simulation..... 5

 1.8 Previous occurrence involving stacking distance 6

2 Analysis 6

3 Findings 7

4 Safety Recommendations 8

Figures

Figure 1 Site Plan of Vickerman Street level crossing and junction with State Highway 1 (not to scale)..... 1

Figure 2 The Compulsory Stop sign on the Vickerman Street side of the level crossing 3

Figure 3 The State Highway 1 side of the level crossing showing the limit lines for traffic approaching the intersection and approaching the level crossing 4

Figure 4 The petrol tanker in the livery of its previous owner (photograph courtesy of Alexander Petroleum Services Ltd) 5

Figure 5 The simulation petrol tanker parked where the tanker driver had originally stopped when he became aware of the approach of Train 700 2

Abbreviations

km/h kilometres per hour

m metre(s)

Tranz Rail Tranz Rail Limited

Data Summary

Train type and number:	passenger express Train 700
Road vehicle:	petrol tanker
Date and time:	25 April 2002 at about 1242
Location:	Vickerman Street level crossing near Blenheim
Type of occurrence:	near collision
Persons on board:	crew: 4 passengers: about 54
Injuries:	crew: nil passengers: nil
Damage:	locomotive nil petrol tanker nil
Operators:	train Tranz Rail Limited petrol tanker Alexander Petroleum Transport Limited
Investigator-in-charge:	D L Bevin

1 Factual Information

1.1 History of the incident (train perspective)

- 1.1.1 On Thursday 25 April 2002, Train 700 was the Christchurch to Picton *TranzCoastal* passenger express and consisted of locomotive DCP 4611, 5 passenger cars, and a luggage van, giving an overall length of 117 m and gross weight of 180 tonnes. The train was crewed by a locomotive engineer, a train manager and 2 train attendants and carried about 54 passengers.
- 1.1.2 At about 1242, as Train 700 approached Vickerman Street level crossing near Blenheim, the locomotive engineer noticed a truck stopped at the level crossing about 330 m ahead. He recognised it immediately as a petrol tanker by its distinctive colours, and soon realised it was obstructing the level crossing. He immediately sounded the horn and made an emergency brake application.
- 1.1.3 The sounds of the locomotive horn and the brakes being applied, together with a warning call from a second person in the tanker cab, alerted the tanker driver to the approaching train and he cautiously reversed clear of the level crossing.
- 1.1.4 The train stopped about 5 m short of the level crossing. After the locomotive engineer had confirmed with the train manager that there were no injuries to passengers or staff, Train 700 continued its journey to Picton.

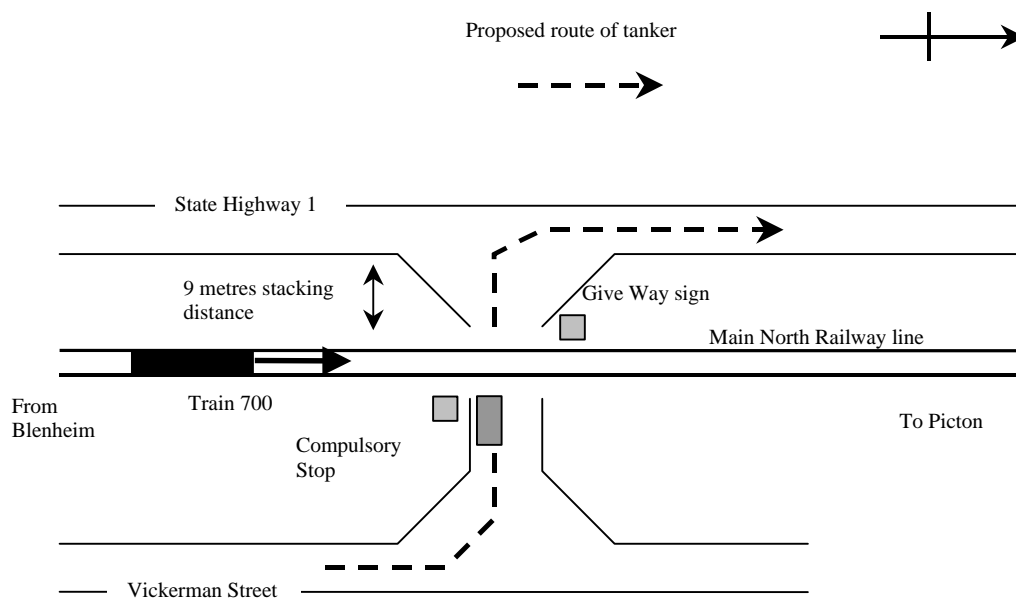


Figure 1

Site Plan of Vickerman Street level crossing and junction with State Highway 1 (not to scale)

1.2 History of the incident (petrol tanker perspective)

- 1.2.1 The tanker driver, accompanied by a trainee driver, had completed his delivery run for the day in the vicinity of the Vickerman Street level crossing and had decided to use it 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.

- 1.2.2 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.
- 1.2.3 He activated the vehicle's hazard lights and slowly moved his vehicle forward to a position from where he could watch the traffic, in preparation for making a right-hand turn onto State Highway 1, about 13 m away.
- 1.2.4 The tanker had moved forward about 3 m to the point where the cab was positioned over the nearest rail (see Figure 2) when the driver was alerted to the approach of Train 700 from his left side. He had turned to his left at the same time as the trainee driver had called "train". He cautiously reversed off the crossing, mindful of any other vehicles that may have parked behind him and were not visible in his rear vision mirrors. He reversed at a speed that would have allowed any such vehicles to get clear, but fast enough to clear the track before the train arrived.



Figure 2
The simulation petrol tanker parked where the tanker driver had originally stopped when he became aware of the approach of Train 700

- 1.2.5 From his cab, the driver could not see the yellow limit line road markings to advise him when his truck was safely clear of the crossing, so he continued reversing until the compulsory stop sign was adjacent to his cab, at which point he was about 3 m clear of the crossing and was clear of the limit lines. He stopped and waited as the train approached and stopped also. There was no contact between the tanker driver and the locomotive engineer and after the train had gone he contacted his office by cell phone to report the incident.

1.3 Site information

- 1.3.1 Vickerman Street level crossing offered good visibility for locomotive engineers and for motorists approaching the crossing. The road approach from Vickerman Street was straight for about 20 m, while that from State Highway 1 was on a slight rising gradient over a distance of about 10 m from the intersection.



Figure 3
The Compulsory Stop sign on the Vickerman Street side of the level crossing

- 1.3.2 The level crossing was not protected by warning lights, bells or barriers. Rather, it was protected by roadside signage, which included a Compulsory Stop sign immediately before the level crossing on the Vickerman Street side, and a Give Way sign on the State Highway 1 side. There were also appropriate road markings on both sides of the level crossing.
- 1.3.3 On the State Highway 1 side of the crossing there was a total distance of 12 metres from the nearest rail to the intersection. The “Manual of Traffic Signs and Markings”¹ stipulated a minimum distance of 3 m from the limit lines to the nearest rail for traffic approaching a Give Way sign at a level crossing. At this crossing there was 9 m of space remaining for vehicles to park awaiting a rail clearance (see Figure 4). There was no stipulated minimum distance clear of the railway for vehicles having crossed over a level crossing and stopped.
- 1.3.4 Tranz Rail had minimum standards in place for view lines for traffic at a Compulsory Stop at a level crossing. For crossings on a section of track with a maximum train speed of 70 km/h that minimum was 156 m. The standard was based on a minimum view along the track 5 m from track centre line and the time taken for a 12 m road vehicle to clear the railway from a standing start, 8.5 m from track centreline.
- 1.3.5 Appendix A4 of the “Manual of Traffic Signs and Markings” contained guidelines that allowed for a minimum distance of 142 m for a maximum train speed of 70 km/h. The view lines at Vickerman Street level crossing were in excess of both this and the Tranz Rail minimum standards.
- 1.3.6 Train 700 approached the level crossing from the south on a 400 m radius, 70 km/h right-hand curve. The crossing had first become visible to the locomotive engineer 330 m away, as measured after the incident. To the north of the crossing the railway continued in a straight line for about one kilometre.

¹ A manual jointly prepared and distributed by Transit New Zealand and the Land Transport Safety Authority that set out the policy and requirements for traffic signs and includes guidance for the location and positioning of signs.



Figure 4
The State Highway 1 side of the level crossing showing the limit lines for traffic approaching the intersection and approaching the level crossing

1.3.7 There was another level crossing at Fell Street, about 940 m south of Vickerman Street, which was protected by flashing lights and bells, but the stacking distance between it and State Highway 1 was also restricted.

1.4 Locomotive details and event recorder

1.4.1 DCP 4611 was a DC class locomotive which had been reclassified for passenger service. The locomotive horn had been sounded and the headlight was illuminated as Train 700 approached the level crossing.

1.4.2 The locomotive was fitted with an “old-style” event recorder in which the short-log data remained current for the previous 10 minutes, and long-log data was retained for the previous 7 days only. As this investigation was started 8 days after the incident, no relevant data was available from the event recorder.

1.5 Road vehicle details and operation

1.5.1 The petrol tanker was a 1995 Scania P113ML, with a tare weight of 10 300 kg. It was 7.6 m long and was equipped with a 15 000 litre tank. It was owned by Alexander Petroleum Services Ltd and used for petrol deliveries under contract to Shell New Zealand Ltd (Shell). It had a current certificate of fitness and registration.

1.5.2 Alexander Petroleum Services Ltd advised that there were 4 Shell customers in the Vickerman Street area and that their petrol tankers used the level crossing about once every 2 weeks, during deliveries.



Figure 5
The petrol tanker in the livery of its previous owner
(photograph courtesy of Alexander Petroleum Services Ltd)

1.6 Personnel

- 1.6.1 The locomotive engineer and train crew were certified for the duties they were undertaking.
- 1.6.2 The petrol tanker driver held a current licence, with the relevant endorsements, for the duties he was undertaking. He had been employed in the fuel industry in Australia since 1989, prior to coming to New Zealand during 1998.
- 1.6.3 The driver had worked for the operator for less than a year and this was the first time he had used Vickerman Street level crossing, as he considered Fell Street crossing to be safer.

1.7 Incident simulation

- 1.7.1 On Thursday 23 May 2002, the incident was re-enacted in a simulation exercise to evaluate the potential risk for a conflict between an over-length vehicle and a train at Vickerman Street level crossing. This was attended by representatives from road authorities, local authorities, Shell, New Zealand Police, the locomotive engineer and tanker driver who were involved in the incident, and investigators from the Commission.
- 1.7.2 A DC class locomotive, similar to that on Train 700 on the day, was provided by Tranz Rail, and Alexander Petroleum Services Ltd provided a petrol tanker. Because of commercial and scheduling requirements it was not possible to use the tanker involved in the incident but the one provided met the requirements of the simulation.
- 1.7.3 The incident was re-enacted, which allowed lines of sight and closing distances between the train and the level crossing to be measured, based on information supplied by both the locomotive engineer and the tanker driver.
- 1.7.4 At a distance of 330 m from the level crossing, the petrol tanker was visible from the locomotive cab, but it was not possible to see if the petrol tanker was obstructing the crossing.
- 1.7.5 From a distance of 260 m, it became obvious that the petrol tanker, which had not moved, was obstructing the crossing.

1.7.6 From the cab of the petrol tanker, the train was visible at 260 m. It was at this stage that the driver took evasive action.

1.8 Previous occurrence involving stacking distance

1.8.1 The Commission has investigated a previous incident involving the stacking distance for long vehicles at level crossings. Rail Occurrence Report 96-106 covered a level crossing incident, where Train 903 collided with the rear of an articulated truck and trailer that had crossed Kirk Road level crossing at Templeton and was stopped, waiting to enter another road, while the rear of the trailer was still obstructing the level crossing.

1.8.2 Rail Occurrence Report 96-106 included the following Safety recommendation 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 vehicles is insufficient to ensure safe entry or exit from the crossing, and to ensure that appropriate action is taken, consistent with the frequency of use and the potential consequences of collision. (064/96)”

1.8.3 The Director, Land Transport Safety had responded in part:

The Land Transport Safety Authority (LTSA) acknowledges the TAIC recommendation regarding the safety of railway level crossings for long vehicles and will liaise with Transit New Zealand, Tranz Rail Ltd and other road controlling authorities to identify all level crossings within their districts where stacking distances for long road vehicles is insufficient to ensure safe entry or exit from the crossings, and develop and implement appropriate road or rail strategies to minimise the risk of collision.

2 Analysis

2.1 This incident was investigated from the perspective of potential risk to a rail vehicle and its occupants. The road signage and markings on approach to, and at, the level crossing were clearly visible and in good condition and met the guidelines in the “Manual of Traffic Signs and Markings”. Had the train been visible when the tanker first approached the level crossing, there was adequate clear sighting distance for the truck driver to have seen it and stopped. The road signage made it clear that any approaching train had right of way through the crossing.

2.2 The experience of the tanker driver was demonstrated by his actions. He was unsure if there was sufficient stacking distance for his truck to fit, clear of the railway, if he had to stop again before entering on to State Highway 1. Having first made sure that the track was clear, he moved on to the level crossing from where he could get a better view of the traffic on State Highway 1. He planned only to go on to the intersection, about 13 m away, once he was satisfied he could make the turn on to State Highway 1 without stopping.

2.3 The tanker driver was aware of the potential risk of his actions to other users of the level crossing, so he switched on the vehicle’s hazard lights prior to moving forward. He was also aware of the possibility that a train might approach while he was on the crossing, in which case he planned to reverse clear of the crossing, rather than test the stacking distance at the intersection ahead.

2.4 The tanker had moved forward about 3 m when the driver became aware of the approaching train. He immediately stopped and reversed slowly off the crossing, because of his concerns for any vehicles that may have parked directly behind the tanker and out of his direct vision. From where he stopped, this was the quickest and most appropriate way to clear the crossing.

- 2.5 This was the first time the tanker driver had used Vickerman Street level crossing and this would have created further uncertainty about the available stacking distance. In view of his lack of knowledge of the level crossing and its approaches, his decision to reverse off the crossing, rather than continue forward and risk being held by traffic while he waited to join State Highway 1, with the rear of his truck possibly not clear of the railway line, was justified.
- 2.6 As Train 700 approached Vickerman Street at about 70 km/h, the locomotive engineer initially sighted the petrol tanker from about 330 m away, but it was not until about 4 seconds later and about 70 metres further into the curve, that he realised the tanker may have been obstructing the level crossing. The locomotive engineer went to a high level of awareness the moment he recognised the distinctive-coloured vehicle as a petrol tanker. The fact that he was able to identify the potential hazard from 260 m away, and take appropriate action to bring Train 700 to a stop before the level crossing, showed a high level of alertness, judgement and safe train operation. Although data was not available from the locomotive event recorder, the stopping distance achieved by the locomotive engineer indicated that he was not exceeding the 70km/h restricted curve speed at the time.
- 2.7 Had the locomotive engineer not been vigilant when the level crossing first came into view, or if he had been exceeding the maximum line speed of 70 km/h at the time, he would not have been able to stop the train before it reached the level crossing. In this instance, a collision would probably not have resulted, as the tanker driver had seen the approaching train and had cleared the railway. It was unlikely, however, that an express freight train operating under the same conditions would have been able to stop before the crossing, regardless of how vigilant the locomotive engineer may have been.
- 2.8 The simulation confirmed that the combined actions of the locomotive engineer and the petrol tanker driver removed the risk of a collision in this instance. However, had a vehicle in excess of 9 m crossed the level crossing and been waiting at the intersection to join State Highway 1 before a train became visible, the rear end of the vehicle might still have obstructed the crossing, and the driver might not have been aware of the train approaching as he concentrated on traffic flows on State Highway 1. In such a case, the only defensive actions possible would then be those taken by the locomotive engineer, and there could be no guarantee that the train could be stopped before it reached the obstructed crossing.

3 Findings

- 3.1 A potential major incident was avoided by the petrol tanker driver's justifiable concerns regarding the adequate stacking distance for his truck, had he proceeded across the level crossing and approached the intersection with State Highway 1.
- 3.2 The tanker driver complied with the Compulsory Stop requirement, and determined that the railway was clear before he proceeded on to the level crossing.
- 3.3 Given his uncertainty that his vehicle could be safely stopped on the State Highway 1 side of the crossing, his plan to stop on the crossing was appropriate, as long as he remained vigilant and prepared to reverse.
- 3.4 The presence of a second person in the cab of the petrol tanker would have raised the alertness level.
- 3.5 The tanker driver saw the approaching train in sufficient time to reverse clear of the track before the train arrived at the crossing.
- 3.6 The locomotive engineer, unaware of the tanker driver's plan, acted effectively and appropriately to stop his train, when confronted with an obstructed track.

- 3.7 The actions of the locomotive engineer and the tanker driver ensured that no collision occurred.
- 3.8 The maximum safe stacking distance for traffic waiting at the intersection to join State Highway 1 was 9 m.
- 3.9 The petrol tanker involved in the incident would have fitted safely within the available stacking distance between the track and State Highway 1.
- 3.10 The existing level crossing signage and road markings were in accordance with the guidelines published in the “Manual of Traffic Signs and Markings”, and they were clearly visible and in good condition.
- 3.11 The incident simulation confirmed that the view lines of the rail track, from the road approaching the level crossing from both sides, exceeded the minimum Trans Rail standard and that included in the “Manual of Traffic Signs and Markings, by about 200 m.
- 3.12 The incident simulation confirmed that it was highly unlikely that a collision would have occurred in this instance, but the potential for a collision existed if Vickerman Street level crossing was obstructed by a vehicle in excess of 9 m in length, waiting to enter State Highway 1, while a train was approaching.

4 Safety Recommendations

- 4.1 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 the level crossing by vehicles exceeding 9m in length. (034/02).

- 4.2 On 19 July 2002 the General Manager, Marlborough District Council responded in part:

...we confirm your report was considered by Council's Assets and Services Committee on 18 July.

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

This recommendation requires ratification by full council on 8 August before the Section 70AA process can be commenced.

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

Liaise with 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 the level crossing by vehicles exceeding 9m in length. (035/02).

- 4.4 On 3 September 2002 the Acting Chief Executive, Transit New Zealand responded:

I am happy to confirm that, in consultation 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.

Transit New Zealand is fully supportive of any measures that will enhance level crossing safety and participated in the first meeting of the Rail-Road Level Crossing Safety Forum earlier this month.

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

Liaise with Transit New Zealand, Tranz Rail Ltd 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 safe entry to or exit from the crossing, and to ensure that appropriate action is taken, consistent with the frequency of use and the potential consequences of collision. (036/02).

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

Since the recommendation was first made in 1996 there has been some progress on this aspect of rail safety. During the intervening years period the LTSA, Transit New Zealand (Transit), and Tranz Rail Ltd and appropriate local authorities have concentrated on improving the general standard of sign posting required at all level crossings believing this to be the most appropriate area for attention. The programme has now been substantially completed.

There are currently a range of signs used to warn drivers of limited stacking length between the 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 entitled 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 or 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...

4.7 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 now can 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.

Approved for publication 02 October 2002

Hon. W P Jeffries
Chief Commissioner



**Recent Railway Occurrence Reports published by
the Transport Accident Investigation Commission**

- 00-114** shunting service P28, signal passed at danger, Woodville, 19 September 2000
- 00-113** Train 378, derailment, Te Maunga, 22 July 2000
- 00-116** hi-rail vehicle and express freight Train 225, occupying the same section of track, near Te Kauwhata, 4 October 2000
- 00-115** freight train 521, derailment, Westmere, near Wanganui, 22 September 2000
- 00-117** express freight Train 540, derailment, Kai Iwi, 26 November 2000
- 00-121** express freight Train 828 and express freight Train 951, collision, Middleton, 8 December 2000
- 00-118** express freight and express passenger trains, derailments or near derailments due to heat buckles, various localities, 5 December 2000 to 2 March 2001
- 01-101** passenger express Train 901 Southerner and stock truck and trailer unit, collision, Makikihi Beach Road level crossing between Timaru and Oamaru, 8 January 2001
- 00-123** Train 3130 and Train 3134, collision, Eilerslie, 28 December 2000
- 01-102** express freight Trains 237 and 144, derailment and collision on double-line track, Paerata-Pukekohe, 23 February 2001
- 01-104** express freight Train 547 and express freight Train 531, collision, Mokoia, 7 March 2001
- 01-106** express passenger Train 600 Bay Express and maintenance plant, collision, Muri, 6 May 2001
- 01-108** express freight Train 842, derailment, Otira Tunnel, 7 July 2001
- 01-109** passenger EMU Train 8203, doors open on EMU, Tawa, 16 July 2001
- 01-113** DC4185 light locomotive and private car, collision, Egmont Tanneries private level crossing 164.14 km Stratford, 19 September 2001
- 01-112** Shunt 84, runaway wagon, Stillwater, 13 September 2001
- 01-107** Passenger baggage car Train 201, broken wheel, Otaihanga, 6 June 2001
- 01-111** Report 01-111, Passenger EMU Train 2621, door incident, Ava, 15 August 2001

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 \$20.00

ISSN 0112-6962