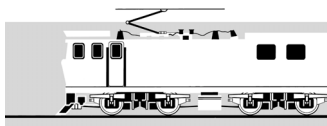
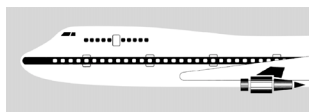


RAILWAY OCCURRENCE REPORT

04-127

express freight Train 952 and stock truck and trailer, collision,
Browns Road level crossing, Dunsandel

19 October 2004



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Report 04-127

express freight Train 952

and

stock truck and trailer

collision

Browns Road level crossing

Dunsandel

19 October 2004

Abstract

On Tuesday 19 October 2004 at about 0840, express freight Train 952 collided with a stock truck and trailer at Browns Road level crossing in Dunsandel, between Rolleston and Ashburton. Flashing lights and bells protecting the level crossing were working at the time of the collision.

The locomotive remained upright and on the rails but sustained major damage. The truck and trailer unit was extensively damaged.

The locomotive engineer was uninjured but the truck driver suffered extensive injuries.

The safety issues identified were:

- the adequacy of the warning devices at the level crossing
- the use of land alongside the railway line immediately south of the level crossing.

No safety deficiencies in the rail operating system were identified.

Safety recommendations were made to the Chief Executives of New Zealand Railways Corporation, Transit New Zealand and Selwyn District Council to address these issues.

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Abbreviations

B-train	articulated truck and trailer
Ellesmere Transport	Ellesmere Transport Company Limited
km/h	kilometres per hour
m	metre(s)
NZRC	New Zealand Railways Corporation
SH1	State Highway 1
t	tonne(s)
Toll Rail	Toll NZ Consolidated Limited
UTC	coordinated universal time

Data Summary

Train type and number:	express freight Train 952
Road vehicle:	stock truck and trailer unit
Date and time:	19 October 2004 at about 0840 ¹
Location:	Browns Road level crossing, Dunsandel
Persons on board:	train: 1 truck: 1
Injuries:	train: nil truck: serious
Damage:	major damage sustained by locomotive, stock truck and trailer
Operator:	train: Toll NZ Consolidated Limited (Toll Rail) truck: Ellesmere Transport Company Limited (Ellesmere Transport)
Investigator-in-charge:	D L Bevin

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

1 Factual Information

1.1 Narrative

- 1.1.1 On Tuesday 19 October 2004, Train 952 was a Timaru to Christchurch express freight train and consisted of a DC class locomotive and 20 wagons, giving a gross weight of 874 t and an overall length of 352 m. The train was crewed by a locomotive engineer.
- 1.1.2 At about 0840, as Train 952 approached Browns Road level crossing in Dunsandel, the locomotive engineer noticed a truck turn off State Highway 1 (SH1) towards the level crossing. He then lost sight of the truck as it passed behind an articulated truck and trailer (B-train), parked in a layby near the level crossing.
- 1.1.3 The locomotive engineer was sounding the locomotive horn when the truck reappeared from behind the B-train and continued towards the level crossing. He continued to sound the horn as he ducked behind the locomotive control console to protect himself from the impending collision.
- 1.1.4 After the collision the locomotive stopped about 577 m past the level crossing, from where the locomotive engineer advised train control.
- 1.1.5 Witnesses near the level crossing alerted the emergency services. Those same witnesses confirmed that the warning devices at the level crossing were operating at the time of the collision.

1.2 Site information

General

- 1.2.1 Browns Road level crossing was located at 49.97 km at Dunsandel, between Rolleston and Ashburton, on the Main South Line. Browns Road joined SH1 on the western side of the level crossing with Tramway Road on the eastern side (see Figure 1).

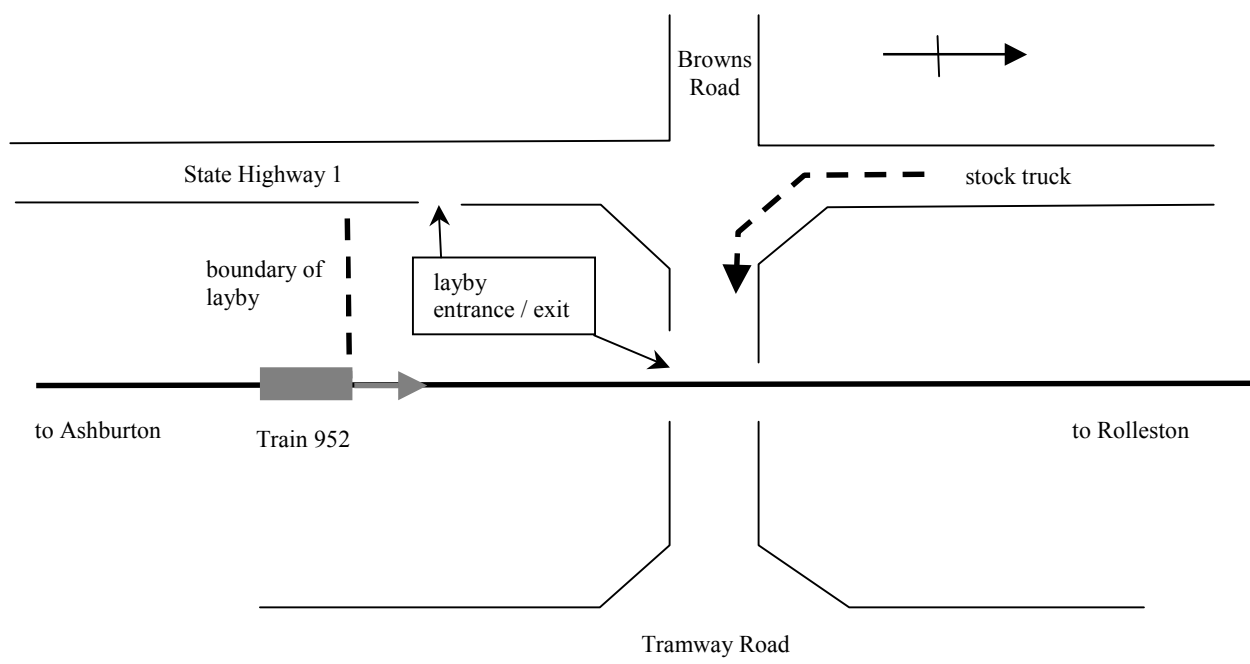


Figure 1
Site diagram of Browns Road level crossing (not to scale)

- 1.2.2 The level crossing offered good visibility for locomotive engineers and for road users approaching the crossing. The road approach from SH1 was straight for about 37 m. However, this straight approach was reduced to about 20 m for vehicles turning from SH1. The approach from Tramway Road was straight for about 21 m.
- 1.2.3 The railway line to the south of the level crossing, from where Train 952 approached, was straight for about 500 m (see Figure 2). This photograph was taken several days after the collision and an unattended road trailer can be seen parked in the layby.

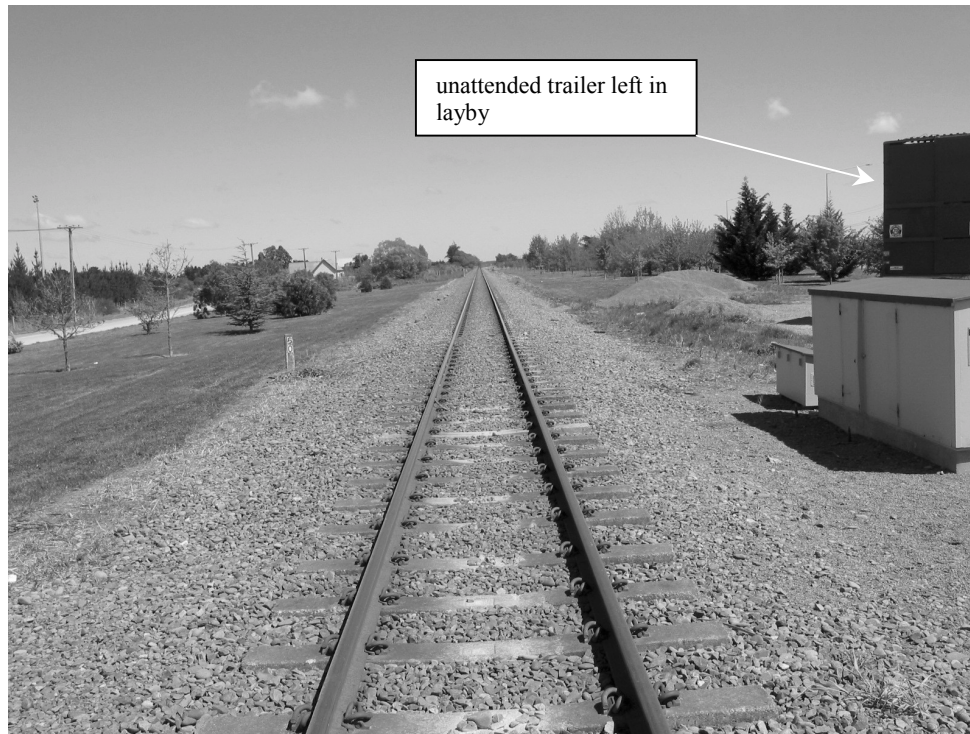


Figure 2
Looking south from the level crossing

- 1.2.4 The locomotive engineer's driving position was on the right-hand side of the cab. This was the off side to that from which the stock truck approached and entered the level crossing.
- 1.2.5 There were no tyre skid marks on the approach to the level crossing. The only rubber tyre marks on the road ran parallel to and between the tracks at the point of impact.
- 1.2.6 New Zealand Railways Corporation (NZRC)² advised that there were 12 scheduled freight train movements over Browns Road level crossing a day.
- 1.2.7 The maximum authorised line speed for express freight trains through this area was 80 km/h.

Level crossing protection

- 1.2.8 Flashing lights, bells, warning signage and road markings protected the level crossing. There was one RG-33 flashing light standard³ facing directly to SH1 (see Figure 3) and 2 RG-33 flashing light standards facing Tramway Road, angled towards traffic approaching from either direction (see Figure 4).

² The rail access provider from 1 September 2004.

³ An RG-33 flashing light standard consisted of a railway crossing flashing light signal head. Other signs such as the "crossbuck" may be attached to the standard or positioned independently.

- 1.2.9 The distance between the intersection with SH1 and the crossbuck sign on the western side was about 37 m and between Tramway Road and the crossbuck sign on the eastern side was 21 m. The crossbuck sign on the SH1 side of the level crossing was 4.5 m to the left of the edge of the sealed pavement (see Figure 3).

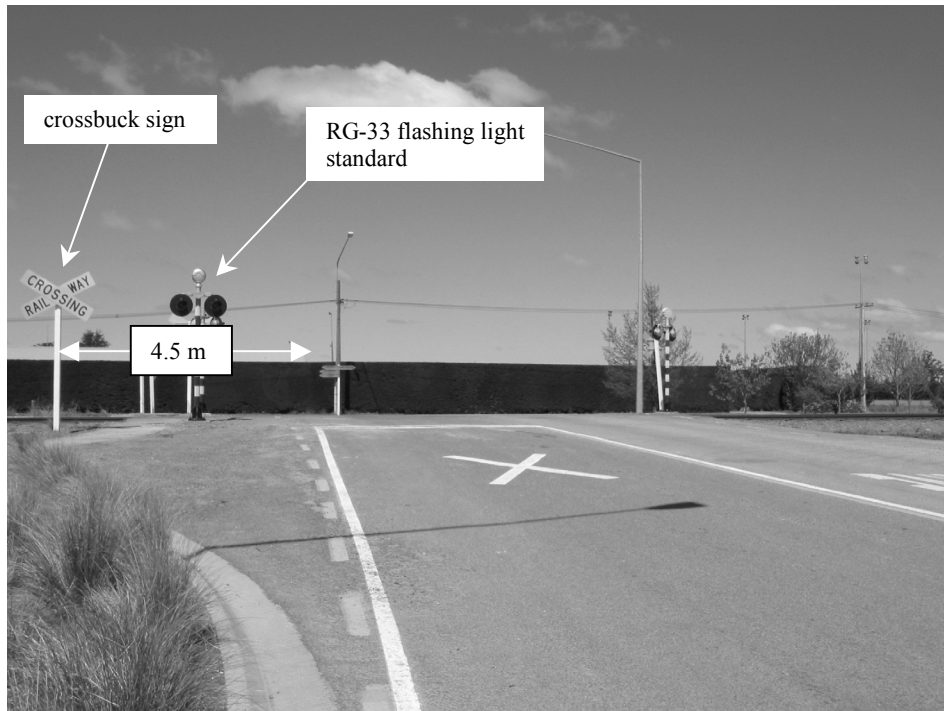


Figure 3
The level crossing approach from SH1

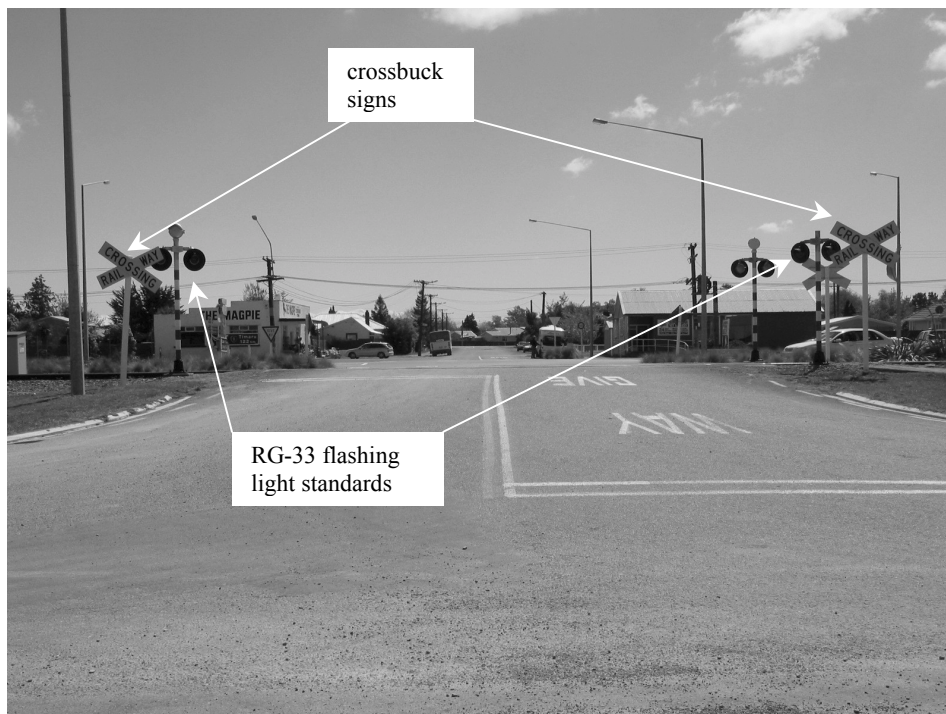


Figure 4
The level crossing approach from Tramway Road

- 1.2.10 The number of RG-33 warning device standards required on each side of the level crossing was defined in Section 4 of the “Manual of Traffic Signs and Markings” Part 2 (the manual)⁴ which stated that where the distance between the intersection and the RG-33 was less than 30 m the RG-33 standard was to be duplicated on the right-hand side of the road.
- 1.2.11 A PW-57 Railway Level Crossing Warning Sign was positioned on the left-hand side of the road about 25 m from the limit lines for the level crossing. A second sign was positioned directly opposite on the right-hand side of the road. The signs were angled to face northbound or southbound traffic turning into Browns Road from SH1 (see Figure 5).



Figure 5
The PW-57 signs facing SH1

- 1.2.12 The manual required that a PW-13 Railway Crossing on Side Road sign be erected on the main road approach to a controlled side road where a railway level crossing was located on the side road immediately adjacent to the main road intersection. Such a sign was positioned on the left-hand side of SH1, 101 m from the centre of the intersection with Browns Road (see Figure 6). A similar sign was positioned about 54 m south of the intersection on the left-hand side of SH1 for northbound traffic.
- 1.2.13 The maximum road speed through the area was 70 km/h and the manual required that a PW-13 sign be placed facing oncoming traffic between 100 and 160 m from the centre of the level crossing. While this was achieved for southbound traffic it was not for northbound traffic because of the presence of several access ways to shops adjacent to the highway.

⁴ A manual jointly prepared and distributed by Transit New Zealand and Land Transport New Zealand which set out the policy and requirements for traffic signs and included guidance for the location and positioning of signs.



Figure 6
The PW-13 sign facing southbound traffic approaching Browns Road

The layby

- 1.2.14 A layby, on land owned by NZRC, extended between the highway and the railway line for about 360 m south from the intersection of Browns Road with SH1. Access to and from the layby was possible from Browns Road or SH1. Drivers of southbound vehicles stopping for meals at the surrounding facilities regularly used the layby for parking.
- 1.2.15 At some time before the collision, a southbound B-train had pulled off SH1 and entered the layby via Browns Road. The unit had parked at the south end of the layby at such an angle as to allow easy access back on to SH1 (see Figure 7). The B-train was 3.6 m high.



Figure 7
The B-train parked in the layby

- 1.2.16 Measurements taken from about where the stock truck would have commenced its turn off SH1 into Browns Road showed that the truck driver's opportunity to see the approaching train would have been severely restricted by the parked B-train. Line of sight measurements established that when the train appeared from behind the B-train it would have been about 51 m from the centre line of the level crossing.
- 1.2.17 As the truck moved nearer to the level crossing, the driver's line of sight around the rear of the B-train would have been further impeded by a row of trees stretching south between the railway line and SH1 (see Figure 7).

1.3 Collision information

- 1.3.1 The locomotive hit the loaded 3-axle stock truck on the rear axle. The impact separated the stock crate, which was secured to the flat deck of the truck, and threw it to the right-hand side of the track in the direction of travel of Train 952. The stock crate came to rest in front of the truck (see Figure 8).



Figure 8
The truck after impact

- 1.3.2 The stock truck was turned through 90° by the force of the impact and came to rest on the Tramway Road side of the level crossing.
- 1.3.3 The trailer was separated from the truck during the impact and remained on the SH1 side of the level crossing and also turned through 90°.



Figure 9
The trailer after impact

1.4 Personnel

The locomotive engineer

- 1.4.1 The locomotive engineer had been driving for about 17 years. He had held his grade 1 certification for 4 years of that time.
- 1.4.2 He had been rostered on standby shift with no assigned work, but had been called to work to take over the running of Train 930 from Timaru. When he arrived at Timaru, Train 930 had already departed so he relieved the locomotive engineer of Train 952 because that locomotive engineer was close to having worked his maximum shift hours.
- 1.4.3 As Train 952 approached Browns Road level crossing, the locomotive engineer noticed a large white truck (the B-train) parked in the layby. He said he then saw the stock truck turn towards the level crossing but he lost sight of it behind the B-train.
- 1.4.4 The locomotive engineer became concerned and sounded the horn. The stock truck reappeared from behind the B-train and he could see that it was not going to stop. He continued to sound the horn but everything happened so quickly he said he didn't think he had any time to make an emergency brake application before the impact, although he remembered grabbing the handle as he ducked.
- 1.4.5 He recalled that he had attempted to apply the emergency brake during the impact. He wasn't sure if it had activated at that stage because the brake cocks and hoses had been torn from the front of the locomotive by the impact, and the emergency brakes had applied automatically with the resulting release of air.



Figure 10
The front of the locomotive after the collision

- 1.4.6 Once the train stopped, the locomotive engineer called the train controller and advised him of the situation. He then climbed out of the locomotive cab and inspected the locomotive. He found the side doors were open, water was pouring from the locomotive and diesel was leaking from the torn fuel tank.
- 1.4.7 The locomotive engineer said that although the track was lined with trees near the level crossing, visibility was not impaired. He had not noticed trucks parked in the layby before and thought it was unusual, which increased his alertness as he approached the level crossing.

The stock truck driver

- 1.4.8 The stock truck driver had about 30 years' experience driving trucks. He had been driving stock trucks for Ellesmere Transport for about 18 months.
- 1.4.9 Ellesmere Transport had a depot on Tramway Road on the eastern side of the level crossing so the truck driver used the level crossing regularly, often several times a day. He said that it was never a problem to see trains approaching the level crossing and he occasionally had to stop for them.
- 1.4.10 The stock truck driver confirmed he had turned left from SH1 into Browns Road but could not remember seeing either the parked B-train or the approaching train. From his experience it was not unusual for trucks to park in the layby or leave unattended trailer units there while drivers undertook other work. He had seen cars parked there and a school bus regularly parked there, although in such a position as to not inhibit view lines along the track.
- 1.4.11 The stock truck driver felt that the trees alongside the track to the south of the level crossing restricted visibility, both for vehicles using the level crossing and for trains approaching from that direction.

1.5 The locomotive event recorder

- 1.5.1 The locomotive event recorder data was downloaded and provided for analysis.

2 Analysis

- 2.1 The road signage and markings that were in place, both approaching and at the level crossing, were clearly visible and in good condition and met the guidelines included in the manual, with the exception of the southern PW-13 sign. However, the main defences, namely the warning devices at the level crossing, met the guidelines and the out-of-position southern PW-13 sign did not contribute to the collision.
- 2.2 The presence of two RG-33 flashing light standards on the eastern side of the level crossing and only one on the western (SH1) side of the crossing met the guidelines laid down in the manual. The distance from the intersection with SH1 to the RG-33 flashing light standard was in excess of 30 m and therefore did not require to be duplicated. However, when traffic turned off SH1 into Browns Road, the turn was not completed until the vehicle had straightened up about 24 m from track centre, from where a direct view of the straight-facing warning devices could be gained. This, together with the fact that the level crossing was approached by vehicles entering Browns Road at an angle from either north or south, suggested that the installation of an additional RG-33 flashing light standard on the south side of Browns Road, and angled towards traffic approaching from the north, may have been appropriate. A safety recommendation covering the design, layout, signage and warning devices at the level crossing has been made jointly to the Chief Executives of New Zealand Railways Corporation, Transit New Zealand and Selwyn District Council.
- 2.3 The layby was well established, with clearly defined and easily seen entry and exit points. This suggested its use as a parking area was accepted, and probably encouraged, in preference to vehicles parking on the shoulder of SH1. However, the use of the layby for this purpose by large vehicles such as B-trains restricted the line of sight to the south for vehicles approaching the level crossing from SH1. This use of the layby was a contributing factor to the collision and a safety recommendation covering this issue has been made to the Chief Executive of New Zealand Railways Corporation.
- 2.4 The full force of the collision was borne by the locomotive. The truck and trailer did not come in contact with the train again after the initial contact. The fact that the locomotive remained upright and did not derail probably reduced the risk of serious injury to the locomotive engineer. In the circumstances of this collision, the crashworthiness of the locomotive met expectations.
- 2.5 Analysis of the locomotive event recorder showed that Train 952 was travelling at 76 km/h at the time of impact and there had been no changes to control settings up to that point. At the time of impact a significant reduction in air pressure in the brake pipe was evident, probably caused by the tearing off of the air brake cocks and hoses from the front of the locomotive as a result of the impact, rather than an emergency brake application by the locomotive engineer.
- 2.6 The locomotive was about 51 m away when the stock truck entered the level crossing. Travelling at 76 km/h the train would have taken about 2.5 seconds to reach the level crossing and the locomotive engineer had time only to sound the locomotive horn and take action to protect himself. Under the circumstances there was nothing else he could have done to avoid or lessen the impact.
- 2.7 The line of sight south along the railway line for the stock truck driver as he turned off SH1 into Browns Road was severely restricted by the presence of the B-train and as a result he would not have seen the train approaching. However, he had passed a sign while on SH1 which warned him of the level crossing on the side road and, as he turned into Browns Road there was another sign, a PW-57, on the right-hand side of the road and angled towards him as he turned, which warned of the presence of the level crossing. Once his vehicle had straightened up the activated warning devices were in front of him and were the principal line of defence against a collision. Why he did not stop at the warning devices could not be determined.

- 2.8 The truck driver was familiar with the level crossing and often crossed it several times a day. He was aware of the lines of sight available in both directions, including the row of trees, which he considered a possible restriction, and had occasionally stopped for the passage of a train. The track was infrequently used by rail traffic during daylight hours and the number of times the stock truck driver had to stop for trains, although he remembered doing it, would have been few. As a result there was probably an expectation that there was not going to be a train coming. If there had been no large vehicles parked in the layby, the driver of a truck turning from SH1 into Browns Road could probably have seen south along the railway as he made the turn. If no train could be seen approaching from that direction the driver might then approach the level crossing and concentrate on looking for trains approaching from the north, having satisfied himself that nothing was approaching from the south.
- 2.9 The driver of the stock truck possibly used this procedure on this day but did not register that the reason he thought there was no train coming was because his line of sight when turning from SH1 was blocked by the B-train. The stock truck driver was possibly distracted with other things on his mind but, for whatever reason, he did not notice the train approaching, nor the warning lights and bells, before he entered the level crossing. The absence of tyre skid marks on the pavement at the level crossing confirmed that he had not made a brake application at that time.
- 2.10 In the unlikely event that he did see the train once he was on the level crossing and had time to react, that reaction could only have been to accelerate in an attempt to get the truck and trailer across ahead of the train. However, the short time between when the locomotive engineer saw the truck enter the level crossing and impact suggested there was no time for the truck driver to take such action.
- 2.11 The truck driver probably escaped more serious or even fatal injuries because the train struck the rear of the truck rather than the cab.

3 Findings

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

- 3.1 Train 952 was being operated correctly at the time of the collision.
- 3.2 The locomotive engineer of Train 952 had about 2.5 seconds' warning of the impending collision and could not have taken any other action to avoid or lessen the impact.
- 3.3 The crashworthiness of the locomotive was appropriate.
- 3.4 With the exception of the positioning of the southern PW-13 sign, the existing level crossing signage and road markings were in accordance with guidelines published in the "Manual of Traffic Signs and Markings", Part 1. All signage and road markings were clearly visible and in good condition.
- 3.5 An additional RG-33 flashing light standard on the south side of Browns Road, and angled towards traffic approaching from the north, may have alerted the truck driver to the approaching train.
- 3.6 View lines of the rail track when approaching and at the level crossing were adequate for road users when the layby was unoccupied. However, the view lines were impeded when large vehicles parked in the layby.
- 3.7 The main factor contributing to the collision was the stock truck driver not responding to the level crossing warning devices activated by the approach of Train 952.
- 3.8 A further contributing factor was the reduced view lines on the approach to the level crossing because of the position of the B-train in the layby to the south of Browns Road.

4. Safety Recommendations

Safety recommendations are listed in order of development and not in order of priority.

- 4.1 On 1 February 2005, the Commission recommended to the Chief Executive of New Zealand Railways Corporation that he:

participate with Transit New Zealand and Selwyn District Council in a review of Browns Road level crossing at Dunsandel to ensure that the design, layout, signage and warning devices, together with the alignment of the road approaches are appropriate and take steps to rectify any shortcomings identified (002/05)

and

close the entry and exit points to the land alongside the South Island Main Trunk Railway immediately south of Browns Road level crossing and State Highway 1 intersection to prevent unsafe use (003/05).

- 4.2 On 15 February 2005, the Chief Executive of New Zealand Railways Corporation replied in part:

New Zealand Railways Corporation (NZRC) intends to implement these recommendations.

Consultation will need to take place with various other parties involved in these recommendations, and NZRC do not envisage them being fully implemented prior to the end of 2005.

- 4.3 On 2 March 2005, the Commission recommended to the Chief Executive of Transit New Zealand that he:

participate with Selwyn District Council and New Zealand Railways Corporation in a review of Browns Road level crossing at Dunsandel to ensure that the design, layout, signage and warning devices, together with the alignment of the road approaches are appropriate and take steps to rectify any shortcomings identified (006/05).

- 4.4 On 24 March 2005, the Chief Executive of Transit New Zealand replied in part:

While Transit New Zealand (Transit) accepts the recommendation in principle the crossing in question is not on a state highway; it is therefore not appropriate for Transit to take the lead role.

My Christchurch Regional Office has made initial contact with both ONTRACK⁵ [New Zealand Railways Corporation] and the Selwyn District Council who will no doubt advise you of the anticipated timetable for the review of the level crossing.

The timing of any work that Transit may be required to do would be dependent on availability of funding and the priority of work at that time.

⁵ ONTRACK was the trading name of New Zealand Railways Corporation.

4.5 On 2 March 2005, the Commission recommended to the Chief Executive of Selwyn District Council that he:

participate with Transit New Zealand and New Zealand Railways Corporation in a review of Browns Road level crossing at Dunsandel to ensure that the design, layout, signage and warning devices, together with the alignment of the road approaches are appropriate and take steps to rectify any shortcomings identified (007/05).

4.6 On 24 March 2005, the Chief Executive of Selwyn District Council replied:

On behalf of the Council we are comfortable in participating with Transit New Zealand and the New Zealand Railways Corporation to review the Browns Road rail crossing at Dunsandel. This review is to ensure that the design, layout, signage and warning devices, together with the alignment of the road approaches are appropriate.

We are happy to give consideration to steps to rectify any shortcomings identified.

One assumes that it will either be the Commission or the Railways Corporation who will convene the review and until the timing of that is determined I am unable to advise of an expected completion date.

Approved on 18 August 2005 for publication

Hon W P Jeffries
Chief Commissioner



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