# Report 99-106

# Train 8203

# fumes in passenger compartment

# Kaiwharawhara

# 27 April 1999

## Abstract

On Tuesday 27 April 1999, Train 8203, a southbound Porirua to Wellington electric multiple unit train, departed Takapu Road at about 0800 hours. Due to partially locked-on brakes on the fifth car of the six-car consist, acrid fumes given off from the composition brake blocks entered the three rear cars. The resulting strong smelling "haze" caused discomfort and anxiety to passengers as the train passed through two tunnels on the way to Kaiwharawhara.

Safety issues identified were the appropriateness of the training of passenger train staff in managing foreseeable operating irregularities and the lack of certification of part-time staff with respect to their role in such circumstances. Two safety recommendations were made to the operator.

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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.



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 Web site: www.taic.org.nz

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## List of Abbreviations

| | |
|---|---|
| EP | electro pneumatic |
| LE | locomotive engineer |
| NIMT | North Island Main Trunk |
| Tranz Rail | Tranz Rail Limited |

# Rail Incident Report 99-106

## Data Summary

| | |
|---|---|
| **Train type and number:** | suburban electric multiple unit, 8203 |
| **Date and time:** | 27 April 1999 at 0800 hours |
| **Location:** | Takapu Road,<br>12 km North Island Main Trunk (NIMT) |
| **Type of occurrence:** | fumes in passenger compartments |
| **Persons on board:** | crew: 3<br>passengers: approximately 390 |
| **Injuries:** | nil |
| **Damage:** | nil |
| **Operator:** | Tranz Rail Limited (Tranz Rail) |
| **Investigator-in-Charge:** | R E Howe |

# 1. Factual Information

## 1.1 Narrative

1.1.1 On Tuesday 27 April 1999 Train 8203 was a scheduled English Electric multiple unit commuter service travelling between Porirua and Wellington.

1.1.2 At approximately 0800 hours, after departing Takapu Road station (12km NIMT) and before arriving at the northern portal of Tunnel 2 (10 km NIMT), an unusual smell was noticed by the passengers in the last three cars of the 6 car consist. A haze developed, and the smell got progressively worse, as fumes built up as the train travelled through Tunnel 2.

1.1.3 The effect of the fumes was described variously by the passengers as:

- Initially thought it was the smell of the heaters coming on, but with the acrid burning smell intensifying, realised it was not.
- Smoke filtered through near the door and a haze was discernible at roof level.
- The smell got progressively worse while travelling through the tunnel and a window was opened to try and clear the air but the smell worsened and the window was closed.
- Passengers started coughing and gasping for air; eyes started to water.
- School children pulled their jumpers over their heads and adults had hands over their mouth to try and filter out the smell.
- It was a chemical smell which got to the back of the throat and could almost be tasted. I was concerned that it could have an asbestos content.
- The smell was so intense that it lingered on clothing for most of the day.

A few passengers were reported as looking distressed, particularly one lady who suffered from asthma and was “quite panicky”. The atmosphere was described as being “tense” and “uncertain”.

1.1.4 Just prior to the train entering Tunnel 2 the part-time ticket assistant had entered the fifth car as he worked his way forward from the rear of the train. He later stated that at that time he was not aware of a smell or haze problem. The smell and haze intensified as he worked his way through the car, so much so that a passenger near the front of the fifth carriage asked him “is the train on fire”. The passenger stated that he received a mumbled reply that he could not interpret. At no stage during the trip were passengers either advised of the cause of the fumes or given any information as to their implication, or what action was being taken.

1.1.5 The train made a scheduled stop at Kaiwharawhara (3 km NIMT). The guard and the locomotive engineer (LE) were unaware of the problem and the guard opened the doors in the normal manner. As he alighted the guard immediately noticed fumes billowing out from under the fifth car. The ticket assistant also drew the guard’s attention to the problem.

1.1.6 The guard was familiar with locked brakes and was satisfied that there was no fire risk. He went to the front cab to advise the LE of the problem. The LE took action from the cab to rectify what he assumed to be a brake problem, and after 5 minutes the train was ready to depart for Wellington, with the fumes and smell greatly reduced.

1.1.7 The guard rejoined the train at the third car and the train departed without any communication with the passengers in the rear 3 cars, or without any physical check that the brakes were released on the fifth car.

1.1.8 On arrival at Wellington about 20 agitated passengers sought out the guard to ascertain the problem and were advised that the brakes had locked on in a back car and that a decision had been made to carry on rather than make alternative arrangements. The passengers stated the guard gave them directions to lay a formal complaint if they wished to do so. Three passengers were so concerned that they delayed their intended actions and were eventually referred to the platform foreman.

**1.2 The ticket assistant**

1.2.1 The ticket assistant commenced work at Porirua at 0745 hours. It was his normal practice to check tickets from the rear of the six-car train, moving forward to meet up with the guard in the middle of the train.

1.2.2 He stated that he first noticed a smell when the train entered Tunnel 2 and that it got progressively worse. He noted passengers covering their nose and mouth and was asked what was happening to the train. He said that he told those who asked that there was something wrong and that he would be reporting to the guard.

1.2.3 The ticket assistant felt he was not in a position where he could do anything to improve the situation. He continued to clip tickets with the intent of reporting the situation at Kaiwharawhara. He acknowledged the intensity of the smell but was also aware of the danger of stopping the train in the middle of a tunnel.

1.2.4 When the train reached Kaiwharawhara the ticket assistant signalled to the guard that there was something wrong and received an acknowledgment that the guard was aware of it. It was not until after departing Kaiwharawhara that he was able to talk to the guard and became aware that the smell was caused by locked brakes.

1.2.5 He had only been on one other train that had experienced brake problems, and on that occasion the guard was able to rectify the situation fairly quickly. He stated that he did not have any specific training to cover such occasions.

**1.3 The guard**

1.3.1 The guard started his final ticket check at Takapu Road, starting from the leading carriage and working backwards towards the third carriage. He was in the third carriage when the train stopped at Kaiwharawhara, and on opening the exterior passenger doors noticed fumes billowing out from under the fifth carriage. He said that he was not aware of any fume problem until then.

1.3.2 The guard suspected that the fumes were caused by locked brakes and, satisfied that there was no fire risk from the brakes, he went to the head of the train to discuss options for further movement with the LE. The LE freed the brakes from the cab. Because they were only 3 to 4 minutes train travel from Wellington it was considered that it was more convenient to continue on the journey than make alternative arrangements.

1.3.3 The guard stated that by the time he had walked back to the third car the fumes had mainly dissipated and there was no sign of agitation amongst the passengers. He did not physically check the brakes on the fifth car, but he assumed they had come free and gave right of way to proceed.

1.3.4 After the train departed from Kaiwharawhara the guard met up with the ticket assistant after they had each completed their final checks. The ticket assistant told him how the fumes had been sucked into the carriages while they were travelling through the tunnels. By this time the train had pulled up at Wellington. Once on the platform, some of the passengers voiced their concern to him about the fumes in the rear carriages and he gave them an explanation.

1.3.5 The guard stated that dealing with locked brakes had not been specifically covered in his training but, because he had experienced it a number of times, he could recognise it when it occurred. He had never previously experienced locked brakes in a tunnel.

## 1.4 The LE

1.4.1 The LE noticed nothing to indicate any abnormality in the handling of the train up to Takapu Road. It was not until the train was in coasting mode just prior to stopping at Kaiwharawhara that the LE felt that the train was "pulling". Once the train had stopped he was advised by the guard of the fumes billowing out from under the fifth car.

1.4.2 The LE then fully applied and released the brakes. When he pulled out of Kaiwharawhara the lack of any drag and the absence of fumes confirmed to him that the brakes had freed.

1.4.3 The LE did not detect any drag in his train as he left Takapu Road. (From the north end of Takapu Road station there was a 1 in 100 ascending grade to Tunnel 2 portal and then a 1 in 120 descending grade towards Wellington.)

## 1.5 Personnel

1.5.1 The part-time[1] ticket assistant started with Tranz Rail in 1995, working between Porirua and Wellington. His initial training involved administrative aspects of dealing with and accounting for passengers and he stated he had no training in relation to unusual operating situations or how to deal with them. Tranz Rail did not require such part-time staff to hold any form of operating certificate or certification for the duties concerned.

1.5.2 The guard had 13 years railway experience. He started in 1986 and he was appointed as a guard in 1996. He held a current operating certificate for the duties concerned.

1.5.3 The LE had 26 years railway experience, the last 21years in Wellington as an LE. He held a current operating certificate for the duties concerned.

## 1.6 Training

1.6.1 Tranz Rail advised that part-time ticket assistants were given a 2 hour training session covering:

- uniforms, dress and appearance
- attendance, advise of sickness etc
- rostered shifts, shift alteration and train numbers
- conduct and assistance to passengers during ticketing duties
- the need to remain in assigned carriages; only leave to seek guard assistance
- ticket wallets, ticketing and fare tables and fare evasion
- right of way procedure
- electrical awareness.

and that:

[1] The ticket assistant carried out ticket duties each morning and evening while commuting to his full-time employment outside Tranz Rail.

> The Assistant was trained in relation to unusual operating situations wherein his responsibilities were to promptly bring to the attention of the Guard, any problems affecting passengers in their respective portion of the train.

1.6.2 Training sessions were followed by an assessment after 5 days "on-the-job" experience before a ticket assistant was deemed qualified. No follow-up training was given.

**1.7 The braking system**

1.7.1 The brake blocks on the English Electric units (commonly referred to as red units) were cast iron. However, due to rapid wear, alternative composition brake block materials were being trialed by Tranz Rail to obtain a higher service life[2].

1.7.2 The braking system was a Westinghouse automatic brake with a superimposed electro-pneumatic (EP) arrangement. An LE could choose which method was used, and for other than emergency application this was usually the EP option. When using the EP option air was applied to and released from the brake cylinders by electro-magnetic valves.

1.7.3 The partially locked-on brakes on the rear bogie of DM556 (the fifth car) were attributed by Tranz Rail to a piece of loose mill scale sticking under the electro-magnetic application valve in the EP circuit and not allowing it to close off. This had the effect of not allowing the brakes on the rear bogie to fully release.

# 2. Analysis

2.1 As the smell was not noticed until the train neared Tunnel 2 it is likely that the brakes locked following braking for Takapu Road. In the coasting mode prior to braking for Takapu Road any locking brakes would have been detectable. When pulling away from Takapu Road up a 1 in 100 ascending grade the significance of any locking brakes in relation to the total tractive effort of the train may not have been noticeable.

2.2 The intensity of the smell given off from the brakes was accentuated when travelling through the tunnel as the fumes could not be dissipated as freely as in the open air. For this reason the fumes were experienced not only in the car affected but also in the cars on either side.

2.3 The locking of brakes on trains, although not common, happens sufficiently for LEs to be aware of the problem and to know how to correct it. Such corrective action taken on a moving train would bring it to a sudden stop. This is not recommended practice, particularly in the middle of a long tunnel.

2.4 In the event the LE was not aware of the problem until it was made known to him by the guard at Kaiwharawhara. However, had any of the passengers been concerned enough over the fumes to activate the emergency brakes in any one of the affected cars, the train could have come to a stop while still in the tunnel, and in so doing exacerbated an already difficult situation.

2.5 The fumes given off from the overheated brake blocks, while not toxic, had a very pungent odour and it is understandable that passengers were concerned for their safety, especially when no reassurance or explanation was given.

2.6 The passengers' anxiety could have been allayed if the ticket assistant had had the knowledge and ability to explain to the passengers the reason for the fumes, and to dispel any anxieties they aroused. Failing that, he should have immediately contacted the guard.

[2] Composition brake blocks are in common use on Tranz Rail, and in particular are used on Ganz Mavag units. The trial was related to finding a specific block which suited the English Electric unit characteristics.

2.7 Although the ticket assistant had satisfied the company at his induction and training in 1995 that he was capable of handling a situation such as that which occurred by effectively communicating with passengers, this was not supported by his actions on 27 April 1999.

2.8 There was no system in place to confirm the ticket assistant' continued competency to respond appropriately to his expected role in foreseeable events which could adversely effect passenger safety. While it is recognised his role is supporting, and does not require certification to, say, the level of guard, the events of 27 April indicate the importance this "supporting" role can assume.

2.9 A certification procedure, similar to that required for full-time operating positions but at a level appropriate to the duties of the ticket assistants, and re-certification at regular intervals should ensure the continued competency of such staff to respond appropriately to their limited, but important, safety duties.

2.10 The LE's action in fully applying and releasing the EP brake had the desired effect of clearing the fault. However, this clearance was assumed and it would have been prudent to physically check the brakes were released before the train departed Kaiwharawhara.

## 3. Findings

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

3.1 Train 8203 was being operated normally prior to the incident.

3.2 The possibility of brakes becoming locked on was acknowledged in the Tranz Rail system and appropriate methods to correct it were known.

3.3 The ticket assistant had insufficient training and communication skills to satisfactorily respond to the incident.

3.4 The ticket assistant was not required to be certified for his part-time position.

3.5 The guard did not take an early opportunity to ascertain the state of his passengers and address any concerns they may have had.

## 4. Safety Action

4.1 Despite the success of the trials involving composition brakes on English Electric red units such trials have been deferred as a precautionary measure pending further investigation.

## 5. Safety Recommendations

5.1 On 24 September 1999 it was recommended to the managing director of Tranz Rail that he:

5.1.1 Arrange for the training of staff employed as train crew on passenger trains to include sufficient event management training to ensure they are competent to respond appropriately to foreseeable events which could adversely affect passenger safety (038/99); and

5.1.2 Introduce a certification system for part-time ticket assistants, including re-certification at similar intervals to other full-time operating staff, to ensure continued competency in their role in event management to safeguard passenger safety (039/99).

5.2 On 18 October 1999 the managing director of Tranz Rail responded as follows:

5.2.1 **038/99**
Tranz Rail accepts this safety recommendation. Tranz Rail is currently reviewing its training schedule/programme to ensure appropriate event management training is covered in the training package. Train crews will then be given any further training that is necessary.

5.2.2 **039/99**
Tranz Rail accepts this safety recommendation. Tranz Rail is currently endeavouring to introduce a process which will assist with effective reviewing and monitoring of staff to ensure continued competency in all aspects of their work to safeguard passenger safety.

Approved for publication 6 October 1999

Hon. W P Jeffries
**Chief Commissioner**