



Report 99-103

middle ferry shunt and siding shunt

collision

Wellington ferry terminal

11 March 1999

Abstract

On Wednesday 11 March 1999, at approximately 1120 hours, a head-on collision occurred between the middle ferry shunt and the siding shunt at Wellington ferry terminal. The locomotive engineer's seat in the siding shunt locomotive was torn from its mountings, and the locomotive engineer was propelled to the front of the cab, sustaining lacerations and concussion. Two shunters riding on the leading ends of their respective shunts were able to jump clear before the collision.

The safety deficiencies identified included:

- the failure of existing procedures to prevent a head-on collision involving opposing shunt movements
- the lack of understanding of staff as to the application of the procedures to be adopted when entering the work area of another shunt.

Two safety recommendations were made to address these issues.

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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.

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Contents

List of Abbreviations	ii
Data Summary	iii
1. Factual Information	1
1.1 Narrative	1
1.2 Middle ferry shunt movements	3
1.3 Siding shunt movements	4
1.4 Early ferry shunt movements	4
1.5 Site information	5
1.6 Personnel	5
1.7 Procedures for avoiding conflicting movements	5
2. Analysis	6
3. Findings	8
4. Safety Recommendations	8

Figures

Figure 1	Site plan of the collision area	1
Figure 2	The view from the middle ferry shunt 40 m before the point of impact	2

List of Abbreviations

km/h	kilometres per hour
LE	locomotive engineer
m	metre
OC	operations controller
t	tonne
Tranz Rail	Tranz Rail Limited
TXO	train examiner operations

Rail Incident Report 99-103

Data Summary

Train type and number:	middle ferry shunt and siding shunt	
Date and time:	11 March 1999, approximately 1120 hours	
Location:	Wellington ferry terminal	
Type of occurrence:	collision	
Persons on board:	crew: middle ferry shunt: 2	siding shunt: 2
Injuries:	middle ferry shunt: nil	siding shunt: 1 minor
Damage:	DSC2609: moderate	DSC2746: minor
Operator:	Tranz Rail Limited (Tranz Rail)	
Investigator-in-Charge:	R E Howe	

1. Factual Information

1.1 Narrative

- 1.1.1 On Wednesday 11 March 1999, at approximately 1120 hours, the middle ferry shunt, comprising DSC2746 propelling UK7960 (approximately 90 t all up), was moving west along road E6 to Wellington yard from the ferry terminal. The shunt was under the control of a senior shunter positioned on the leading end of UK7960 and driven by a locomotive engineer (LE) from the cab. The shunter making up the third member of the crew was in the train examiner operations (TXO) office at the ferry terminal at the time.
- 1.1.2 The siding shunt comprising DSC2609 running light (41 t), was moving east to the ferry terminal on road E6. The shunt was under the control of a shunter riding in the front right-hand refuge in the direction of travel of the locomotive and driven by an LE from the cab. The LE was driving from the left hand side of the locomotive in the direction of travel facing backwards, which was considered normal for the siding shunt as it best suited its work movements.
- 1.1.3 The senior shunter of the siding shunt had stayed in Wellington yard to set the road for the return from the ferry terminal. Figure 1 shows the site plan of the area.
- 1.1.4 The operations controller (OC) on duty in Wellington yard had been advised that UK7960 was required in Wellington yard for transshipping. He had contacted the TXO at the rail ferry terminal at approximately 0930 hours to see if the wagon could be brought over by the early ferry shunt¹, and said if not, he would make other arrangements to get it moved. He also spoke to the senior shunter on the siding shunt, advising him that the wagon was required at the Wellington yard.

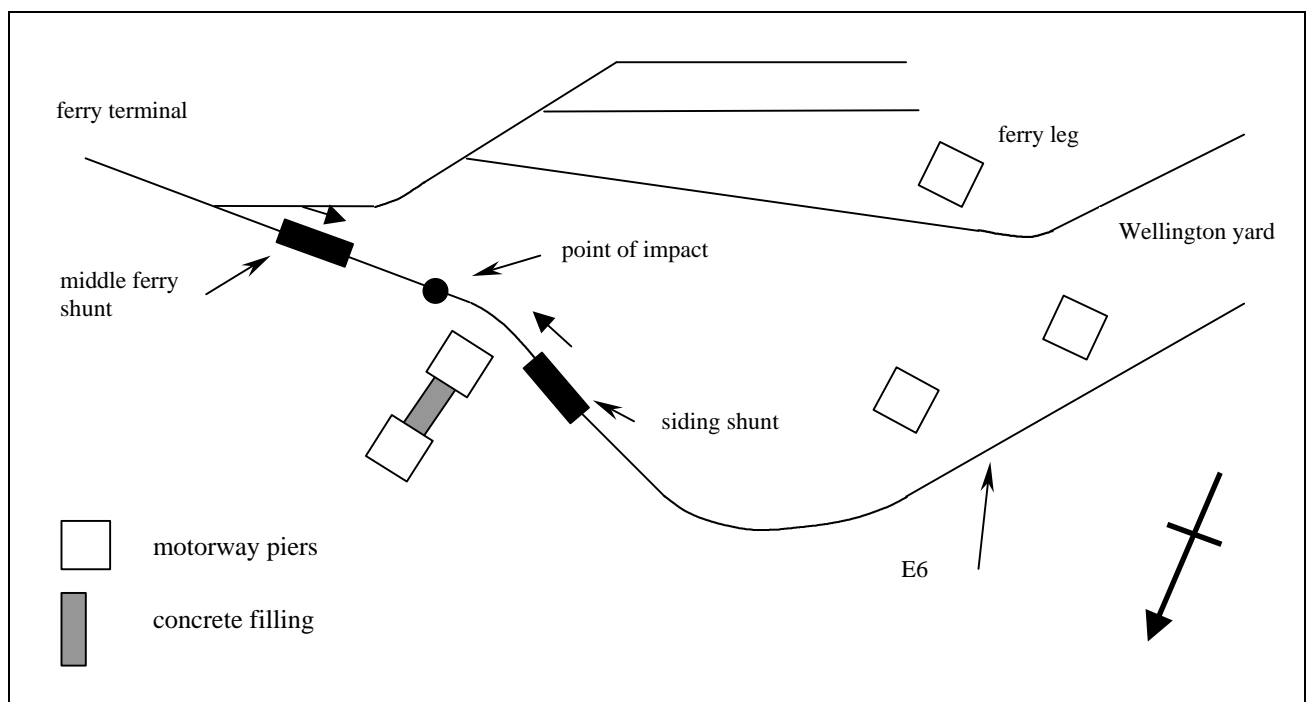


Figure 1
Site plan of the collision area (not to scale)

¹ The early ferry shunt had completed its work in the grid area and had returned to the shunters' lodge in the Wellington yard for a meal break before the middle ferry shunt commenced work at 1000 hours.

- 1.1.5 The OC was told by the TXO at approximately 1020 hours that the early ferry shunt had not had time to get the wagon, so the OC again contacted the senior shunter on the siding shunt and asked him to go to the ferry terminal and bring the wagon to the Wellington yard. The senior shunter was also aware of another wagon UK18313 at the ferry terminal to be brought to Wellington yard so decided to get both wagons at once.
- 1.1.6 At about the same time the TXO at the ferry terminal asked the senior shunter on the middle ferry shunt to take the same wagon (UK7960) from the ferry terminal to the Wellington yard for transhipping, so he decided to take it while on the way to the yard to lift a wagon required to complete the 1230 sailing make-up.
- 1.1.7 The ferry leg road normally used for travelling between the ferry terminal and Wellington yard was closed for maintenance so each shunt was using the route through road E6².
- 1.1.8 Both crews estimated the speed of their respective shunts as 10 - 15 km/h, i.e. below the maximum allowable speed of 25 km/h.
- 1.1.9 The senior shunter travelling on the leading end of UK7960 stated he saw DSC2609 when it first appeared from behind the motorway column, approximately 40 m ahead of him. Figure 2 shows the view available.



Figure 2
The view from the middle ferry shunt 40 m before the point of impact

² Tranz Rail advised both the ferry leg and E6 were used for travelling between the ferry terminal and Wellington yard in either direction and were both in common use. Shunting staff interviewed indicated the ferry leg was the preferred route and generally used when available.

- 1.1.10 The shunter travelling on the leading right refuge on DSC2609 stated his attention was directed to the right and that the first he knew of the impending collision was when he was just turning his attention back to the track ahead and heard the senior shunter on the middle ferry shunt call to his LE. He saw the wagon approaching and jumped off some 5 m before impact.
- 1.1.11 After impact it was found the brake lever was in the emergency position and the direction lever was in the forward position in DSC2746, the middle ferry shunt locomotive. For DSC2609, the siding shunt locomotive, the brake lever was also in the emergency position but the direction lever was in reverse.
- 1.1.12 The requirements for controlling the speed of shunting movements were documented in Tranz Rail's Rail Operating Code, Section 5, Instruction 1 and included:

1.7 Propelling

When propelling rakes of vehicles, staff must signal the movement from a position at or near the head of the rake in the direction of travel from which a clear view of the intended route can be obtained.

1.10 Maximum Speed of All Movements on All Lines other than Main Lines and Industrial Lines

The maximum speed of all movements on other than Main Lines and Industrial Lines must NOT exceed 25 km/h. The speed of the movement must be so regulated that it can be stopped in the clear distance seen ahead.

1.2 Middle ferry shunt movements

- 1.2.1 The middle ferry shunt had no defined area of operation. The middle ferry shunt was one of 3 shunts, all referred to as "ferry shunt", which operated at separate times.
- 1.2.2 The middle ferry shunt commenced work at 1000 hours and its first job was to go down to the reclaim area and make up the 1230 hours rail ferry sailing tonnage before returning to the Wellington yard with tonnage off the 1150 hours rail ferry arrival. In doing so it was operating within the work area of the ferry shunt.
- 1.2.3 The crews of the early ferry shunt and the middle ferry shunt liased at the shunters' lodge. Once the early ferry shunt had arrived at the lodge the middle ferry shunt was authorised to operate the ferry terminal area until a similar handover of control some 2 hours later. This was the regular local practice for these shunts.
- 1.2.4 While making up the 1230 sailing rail ferry rakes the senior shunter was advised by the TXO that wagon UK7960 was at the ferry terminal and was to be taken to the Wellington yard for transshipping.
- 1.2.5 The senior shunter placed UK7960 to a holding road with the intention of taking it to the Wellington yard after completing the make-up duties.
- 1.2.6 The TXO then advised the senior shunter that there was an additional wagon at the Wellington yard that was to be included in the 1230 sailing make-up, so the senior shunter decided to take UK7960 to the Wellington yard, returning with the additional wagon required to complete the make-up.
- 1.2.7 Because there was only one wagon involved in the movement, and his second person was some distance away, the senior shunter elected to undertake the movement by himself.

- 1.2.8 After lifting the wagon from the holding road the senior shunter boarded the refuge on the locomotive and instructed his LE to pull out. The points were not set for road E6 so the LE pulled up short of the points to allow the senior shunter to reset them.
- 1.2.9 After setting the points for road E6 the senior shunter called his LE forward from his position on the ground adjacent to the points. As he did so he noticed the handbrake on the right hand side in the direction of travel was down on the wagon, so called the LE to stop while he lifted it.
- 1.2.10 Once the handbrake was in the correct position the senior shunter climbed on to it, and then instructed his LE to go “down the yard”.
- 1.2.11 The senior shunter was facing the direction of travel as the wagon was propelled. He estimated his shunt had only moved about 45 m when he noticed the siding shunt locomotive appear from behind the motorway pier, some 40 m ahead.
- 1.2.12 He saw that the shunter accompanying the opposing locomotive was not looking in his direction, and after telling his LE by radio to stop, he jumped off knowing that a collision was imminent. The 2 shunts collided some 25 m from where he had jumped off.

1.3 Siding shunt movements

- 1.3.1 The defined area of operation for the siding shunt did not include the ferry terminal area.
- 1.3.2 While the shunt was in Wellington yard the senior shunter had been instructed by the OC to lift UK7960 from the ferry terminal. The shunter was authorised by the senior shunter to go and get that wagon and UK18313, while the senior shunter remained in the Wellington yard to set the points for his return.
- 1.3.3 After advising his LE of their planned move the shunter boarded the front right-hand refuge, confirming to the LE as they approached the points to road E6 that they were correctly set. He did not contact either the early ferry shunt or the middle ferry shunt to obtain authority to enter the work area of another shunt. He later stated that he understood the OC’s request was his authority to enter the area.
- 1.3.4 As the siding shunt approached the ferry terminal along road E6 the shunter began looking for the wagon. He could not see it but did notice the TXO moving around some wagons on his right side in the vicinity where he expected to find the wagon. The shunter recalled this being some 30 m back from the point of impact.
- 1.3.5 He later stated that he was turning back in the direction of travel when he heard the senior shunter from the middle ferry shunt calling “Stop. Stop.” at which point he realised a collision was inevitable and jumped clear some 5 m before the point of impact. He stated he did not have time to warn the LE of the impending collision before he jumped off.

1.4 Early ferry shunt movements

- 1.4.1 The early ferry shunt had been working in the reclaim area, its authorised work area as defined in Instruction 5.4 of Local Instructions, Operating Procedures, Wellington Terminal, and had returned to the shunters’ lodge in Wellington yard for a meal break at approximately 0950 hours.
- 1.4.2 It was standard practice for the early ferry shunt to complete work in the grid, lift tonnage from the 0920 hours rail ferry arrival and convey this tonnage to Wellington yard when returning for their meal break.

- 1.4.3 The understanding between Wellington yard operating staff was that once the early ferry shunt arrived back at the shunters' lodge, responsibility for the reclaim area in regards to control of entry and departure was taken over by the middle ferry shunt gang until they completed their work and returned to the Wellington yard and the early ferry shunt could not return to the reclaim area until that time. Other shunting staff, including the siding shunt, were aware of this.

1.5 Site information

- 1.5.1 The ferry leg road and road E6 ran parallel except where they parted to negotiate the motorway piers.
- 1.5.2 The curvature of road E6 and the restrictive effect of the recently filled columns under the motorway bridge restricted the available line of sight to 40 m approaching the point of collision.
- 1.5.3 The force of the impact derailed the leading axle of the trailing bogie of DSC2609. It also broke the LE's seat fixing, and the LE was propelled to the front of the cab, sustaining lacerations and concussion. The LE of DSC2746 received minor injuries.
- 1.5.4 The middle ferry shunt continued forward 2.9 m following impact. The under frame of DSC2609 was bent by the impact, and the left leading window shattered. Glass fragments were scattered up to 8 m from the point of impact.
- 1.5.5 Based on the stated positions at which the senior shunter of the middle ferry shunt first saw the siding shunt, the middle ferry shunt travelled approximately 25 m to impact, and the siding shunt travelled approximately 15 m during the same time.

1.6 Personnel

- 1.6.1 The senior shunter on the middle ferry shunt commenced employment with New Zealand Railways in 1986 and was certified for shunting duties in 1989. He was certified for ASP³ shunting duties in 1990 and certified as senior shunter in 1998. All certifications were current for the duties being performed.
- 1.6.2 The shunter on the siding shunt commenced employment with New Zealand Railways in January 1980 and was certified for shunting duties in November 1980. He was certified for ASP shunting duties in 1990 and for remote control operator (including senior shunter) in 1997. All certifications were current for the duties being performed.

1.7 Procedures for avoiding conflicting movements

- 1.7.1 The work areas for the respective shunting services were documented in Instruction 5 of the Local Instructions, Operating Procedures, Wellington Terminal as follows:

5.2 Siding Shunt

All the Grid Yard (excluding Grid Area)
The Freight Terminal
No 12 Running Leg

...

³ "Alternative shunting practices", the use of radios as a means of communication between the shunter and LE during shunting operations instead of the more traditional line of sight method.

5.4 Ferry Shunt⁴

The Reclaim Area⁵.

5.5 Middle Yard⁶ Shunt

As this Shunting Service has no defined work areas the Senior Shunter/Remote Control Operator must operate in accordance with Instruction 5.6 below.

- 1.7.2 The documented procedure for the movements of services operating between work areas was defined in Instruction 5.6 in the same document as:

Before any Shunting Service enters the defined work area of another Shunting Service it will be the responsibility of the Senior Shunter/Remote Control Operator to come to an understanding with the Senior Shunter/Remote Control Operator controlling a work area before encroaching on their area.

Both crews must then take adequate precautions to ensure there are no conflicting movements.

When a shunt is not scheduled to operate other shunts may enter the work area provided the Senior Shunter/Remote Control Operator ensure adequate precautions have been taken to safely enter the area.

Rail Operating Code, Section 5, Instruction 5.8.2 stated:

Work Areas

Each Shunting Service will work within an allocated area. Should there be a need to encroach on another shunt's area the member in charge of each shunting movement must come to a clear understanding of what is to take place.

2. Analysis

- 2.1 The collision occurred as a result of the unauthorised presence of the siding shunt in the ferry shunts work area and the limited visibility on the road being used because of track repairs. Contributing factors were the ineffectiveness of documented procedures designed to control the speed of shunts to ensure 2 opposing moving rail vehicles on the same track would stop clear of each other, and the lack of knowledge of the senior shunter in charge of the siding shunt as to the application of the correct procedures to follow when entering another shunt's territory.
- 2.2 Although Local Instructions, Operating Procedures, Wellington Terminal specified working rights for the reclaim area rested with the "ferry shunt", it was common knowledge among shunting staff that the middle ferry shunt alternated work-wise with the early ferry shunt and occupied the reclaim area at times when it was vacated by the early ferry shunt. The flexibility for the middle ferry shunt to operate in this manner was provided in Instruction 5.6 of the Local Instructions, Operating Procedures, Wellington Terminal as quoted in clause 1.7.2 of this report.

⁴“Ferry Shunt” includes early, day and night shift coverage.

⁵ refers to ferry terminal area.

⁶ refers to the middle ferry shunt.

- 2.3 The OC was unaware that arrangements had been made between the TXO and the senior shunter of the middle ferry shunt to take UK7960 to the freight branch. The TXO was equally unaware that the siding shunt was proceeding to the rail ferry terminal to uplift the same wagon. This lack of communication between the OC and the TXO resulted in the unnecessary entry of the siding shunt into the area of the middle ferry shunt at that time. However, movements of shunts into the work areas of other shunts was a standard operating practice. Procedures were in place, which, if correctly followed, allowed such movements to be carried out safely. The lack of communication therefore did not contribute directly to the collision.
- 2.4 Both shunting gangs were 3-person gangs, which at the time of the collision were operating with only 2 persons for various reasons. This is not considered a contributing factor, as the numbers present were adequate to have safely carried out the intended moves.
- 2.5 The shunter of the siding shunt was aware of the usual procedure for getting approval to enter the work area of another shunt, but mistakenly believed the OC's instruction meant he had approval. This showed a poor understanding of the operating instructions.
- 2.6 Witness accounts and damage sustained in the impact were consistent with a head-on collision at a combined speed of about 25 km/h. Conflicting statements from staff make it difficult to correlate speed and distance travelled. However, the 40 m line of sight meant it was only about 5 seconds from first possible sight of the opposing movement to impact. Allowing for reaction time this left very little time for effective braking as evidenced by the consequences of the collision.
- 2.7 The maximum permitted speed of 25 km/h was not appropriate for road E6 due to the restricted line of sight in the vicinity of the motorway piers. With both trains travelling at 15 km/h, even if both shunters had seen the opposing shunt as soon as it came into view, and reacted immediately, making allowances for normal human reaction times there would still have been a collision, although less severe. For each shunt to stop when travelling at 15 km/h required at least 25 m from sighting an obstruction allowing for normal reaction time. In the event the middle ferry shunt responded immediately but still had little braking time. The siding shunt did not respond until the last moment due to the shunter having been looking to his right at where the TXO was standing, and therefore there was no effective braking.
- 2.8 If road E6 is to continue to be used as access between Wellington yard and the ferry terminal a speed restriction is considered desirable and a safety recommendation has been made in this regard.
- 2.9 The issues of shunting speed, the view available and safe stopping form part of 3 current Transport Accident Investigation Commission investigations. The first involved a collision between a remote control operated shunt locomotive and a stationary train at Southdown (Rail Occurrence Report 99-107), the second involved a collision between a remote control operated shunt locomotive and a stationary locomotive at Middleton (Rail Occurrence Report 99-108, not yet published) and the third a collision between a remote control operated shunt locomotive and a logging truck at Kinleith (Rail Occurrence Report 99-111). All of these incidents occurred in May 1999.
- 2.10 While these previous incidents involved remote controlled locomotives as opposed to the manned locomotives in this report, the issue of controlling shunting movements to ensure a safe stopping distance is common to all. The particular significance of this latest incident is that procedures which require movements to be controlled to stop in the clear distance seen ahead will not necessarily avoid a collision between vehicles moving in opposing directions on the same track.

3. Findings

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

- 3.1 The middle ferry shunt was operating correctly within the ferry shunt approved area at the time of the collision.
- 3.2 The siding shunt was operating in the work area of the ferry shunt without proper authority at the time of the collision.
- 3.3 Neither shunt was aware of the other's presence.
- 3.4 The shunter on the siding shunt did not fully understand the procedures required to enter the area of another shunt, having considered a request from the OC as sufficient authority.
- 3.5 All staff were correctly certified for the duties being undertaken.
- 3.6 The poor communication between Tranz Rail staff arranging the movement of wagon UK7960 did not contribute directly to the collision.
- 3.7 The minimum line of sight available when shunting using road E6 was significantly less than that when using the normal ferry leg road.
- 3.8 Tranz Rail's procedures requiring shunting movements to be able to stop in the clear distance ahead were not sufficient to prevent collision between opposing movements on the same line.

4. Safety Recommendations

- 4.1 On 20 April 1999 the Commission recommended to the managing director of Tranz Rail Limited that he:
 - 4.1.1 urgently review the suitability of, and compliance with, procedures ensuring safe operation of multiple shunts between Wellington yard and the Ferry Terminal (016/99); and
 - 4.1.2 restrict the speed on road E6 to that compatible with the line of sight available (017/99).
- 4.2 On 12 January 2000 the managing director of Tranz Rail responded as follows:
 - 4.2.1 **Safety Recommendation 016/99**

In response to the safety recommendations Tranz Rail has reviewed the instructions covering designated work areas and cross channel communications with the shunting staff involved in the occurrence. Both crews have acknowledged they understand the existing procedures.

Subsequently the instructions have been reinforced with all staff and the understanding of local operating procedures checked by audit of the RCO's.

As advised in our response to safety recommendation 066/99, Tranz Rail has changed the Safety Observation Process specifying a minimum of three formal observations within a two year period at no more than eight month intervals.

Training in the new procedures has been completed for Managers.

4.2.2

Safety Recommendation 017/99

Tranz Rail has erected signs that say “Extreme Care – Restricted Visibility”. We believe a warning of the hazard is more appropriate than a maximum speed to an RCO who is controlling a movement from a moving vehicle.

We stress that the effectiveness of the signs will be determined by staff being vigilant and following procedures.

Approved for publication, 16 February 2000

Hon. W P Jeffries
Chief Commissioner