No. 95-112

Te Rapa North Shunt

Frankton

31 May 1995

Abstract

On Wednesday 31 May 1995 at about 0400 hours the Te Rapa North Shunt operated by New Zealand Rail Limited was shunting at Frankton. The Senior Shunter in charge of movements was riding on the footplate on the rear of the locomotive when he lost his footing and fell under the single attached wagon. The Senior Shunter was seriously injured. The causal factor was the Senior Shunter's loss of balance while attempting to read the wagon destination card during the shunting movement. Safety issues identified were the control of the movement of defective wagons, the control of shunting speed due to track condition, the practice of painting shunters' footplates on locomotives, the use of hands free radio communication and the position of shunters' footplates on locomotives.

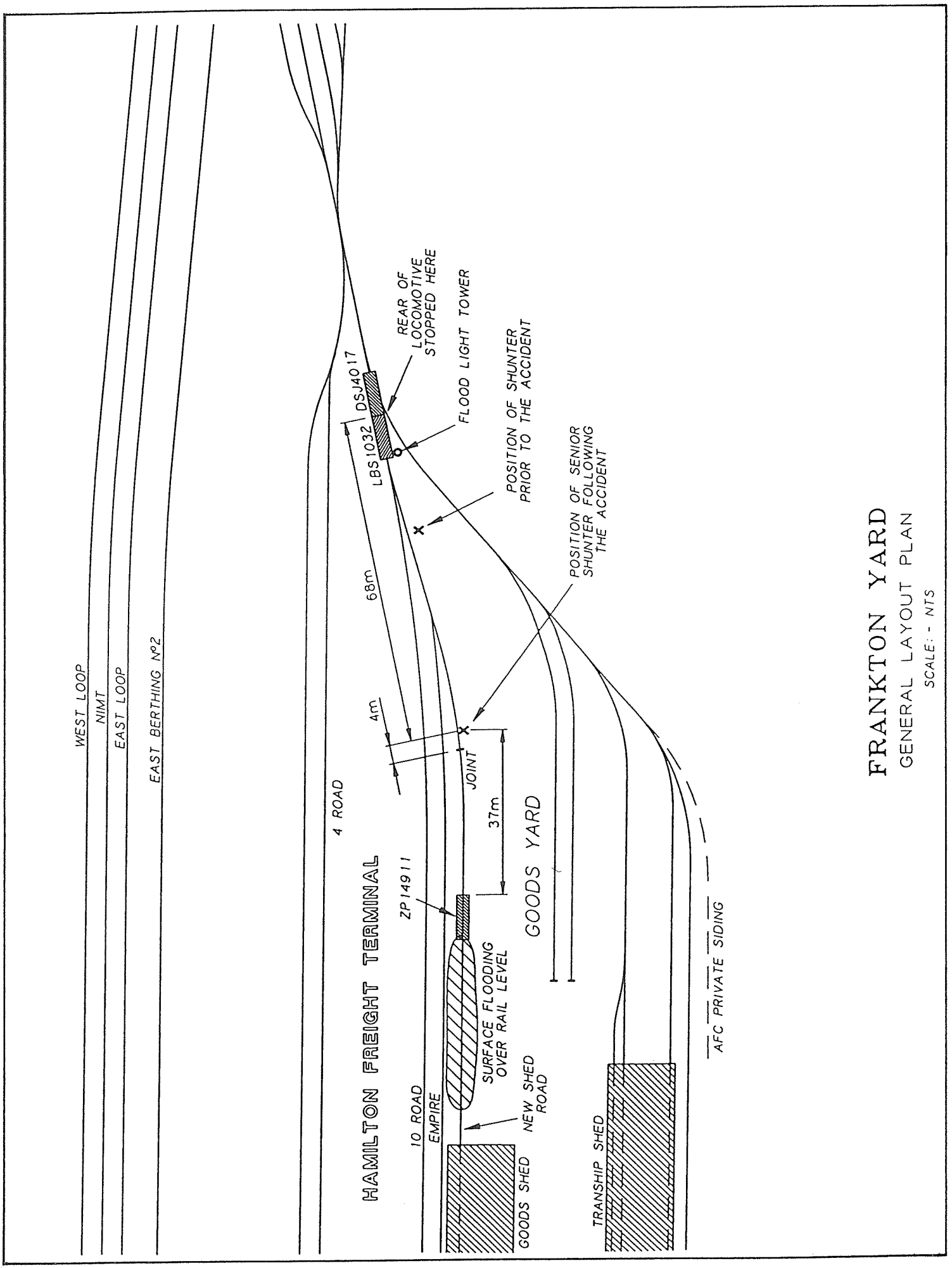
FRANKTON YARD
GENERAL LAYOUT PLAN
SCALE: - NTS
WEST LOOP
NIMT
EAST LOOP
EAST BERTHING Nº2
4 ROAD
HAMILTON FREIGHT TERMINAL
10 ROAD
EMPIRE
GOODS SHED
NEW SHED ROAD
SURFACE FLOODING OVER RAIL LEVEL
ZP14911
JOINT
4m
37m
68m
GOODS YARD
TRANSHIP SHED
AFC PRIVATE SIDING
LBS1032
DSJ4017
REAR OF LOCOMOTIVE STOPPED HERE
FLOOD LIGHT TOWER
POSITION OF SHUNTER PRIOR TO THE ACCIDENT
POSITION OF SENIOR SHUNTER FOLLOWING THE ACCIDENT

Figure 1

1.12 The LE recognised the repeat of "stop" as a command to stop quickly for something unusual and immediately brought his train to a stop with the rear of the locomotive coming to rest approximately 68 m from the accident site. He estimated the speed of the train on receipt of the command to be between 10 km/h and 15 km/h.

1.13 The Shunter moved eastwards away from the New Shed Road to obtain a better view and heard the Senior Shunter calling out that he had had an accident and to advise Operations (at this stage he said he could not see the Senior Shunter in the available light).

1.14 The Shunter switched his radio to the Operations channel and advised NZRL Hamilton Operations of the accident and need for an ambulance.

1.15 He heard the Senior Shunter calling for assistance to apply a tourniquet. By the time he reached the accident site the Senior Shunter had used his radio belt as a tourniquet and was sitting and holding it in position. The Shunter took over this role until the arrival of the ambulance approximately seven minutes after the accident. The Senior Shunter was admitted to hospital approximately 18 minutes after the accident.

1.16 The site was attended and secured by the Hamilton Police who had picked up the emergency call from Operations and were on site approximately six minutes after the accident.

Weather conditions

1.17 Weather conditions at Frankton during the early morning of 31 May 1995 were poor with intermittent heavy showers of rain. Although it was not raining at the time of the accident all ground and vehicle surfaces were wet.

Ground conditions

1.18 The wet weather had resulted in extensive surface flooding over the south end of the New Shed Road (refer Figure 1) with standing water above rail level.

Track conditions

1.19 Four metres south of the accident site there was a loose, low and misaligned joint which was moving under load.

Lighting

1.20 Lighting for the area was supplied by a flood light tower near the junction of 10 Road and New Shed Road. This was directed to illuminate the length of New Shed Road and was operating normally on the morning of the accident.

Wagon details

1.21 Wagon LBS 1032 did not display a current Certificate of Inspection and there was no record that one had been issued. The wagon was marked "not to use - laid up" and had an inoperative handbrake. The handbrake ratchet and bracket were missing and the handbrake lever was tied in the release position with rope. The handbrake lever was on the right hand leading end of wagon LBS 1032 during the accident movement.

1.22 Wagon destination cards are normally placed on wagons at the place of origin. They are located on the end of the wagon, usually on the trailing end to protect them from the weather. Not all wagons are carded in this manner and in particular empty wagons are not carded unless they are required for specific customers. Empty wagons being sent to a depot for repairs have a repair card attached. LBS 1032 did not have a wagon destination card or repair card. NZRL also had a system of "marking up" wagons to avoid the shunters having to look at the card on each wagon. The relevant code stated:

> "Marking Up
>
> "Marking up" or chalking of the destination on the side of wagons is done to assist the Shunter when "breaking up" or when marshalling a train. This means that it will not be necessary for him to look at the card on each wagon.
>
> The job of marking up requires a thorough knowledge of local conditions, sidings, sheds and wharves and must be done in bold hand printing otherwise its value is lost.
>
> The best place on the wagon for the chalk marks varies according to the local conditions, but they should be in a position where the Shunter can easily see them. The marks should also be on the end of the train from which shunting will start.
>
> Wagon destination cards are usually placed on the trailing end of wagons on a train to protect them from the weather.
>
> The chalking should generally be done at the end of the wagon nearest to the Shunter and always the same side as the Shunter will work."

In the case of the Te Rapa North Shunt "marking up" was not common practice and had not been done on the day. The ability to mark up with chalk is weather dependent and "marking up" is not a mandatory requirement.

Locomotive details

1.23 The shunters' footplate on DSJ 4017 showed signs of minor distortion due to normal wear and tear but did not have any sharp irregularities. It had been painted yellow with the tread surface paint worn. All of the handrails were in good condition and painted white.

Personnel details

1.24 The LE and Shunter were currently certified for the duties being carried out at Frankton.

1.25 The Senior Shunter had joined NZR as a Trainee Operator in 1985, was re-designated Shunter in 1990 and Senior Shunter in 1993. He was currently certified for the duties being carried out at Frankton.

1.26 The Senior Shunter's attire included safety boots and gloves. He was not wearing any high visibility clothing. The safety boots were disposed of before the IIC had the opportunity to inspect them.

1.27 The Senior Shunter's recollections indicated his sleep and recreational pattern was normal, his health was good, and he was not under medication.

2. Analysis

2.1 The effect of the moving joint four metres south of the accident site on rolling stock was visibly assessed by the Investigator In Charge (IIC) observing a shunt locomotive attached to an LBS wagon negotiate the joint at speeds of approximately 15 km/h and 20 km/h. Although vertical flexing of approximately 11 mm was measured at the joint the shunt rode smoothly with no sign of abnormal vertical or lateral movement of the rolling stock.

2.2 The presence of the low, misaligned joint prompted a detailed measure up of the track in the vicinity. This showed track geometry was below the desirable standard for normal yard operation due to the age and condition of the track materials and the lack of drainage although safe working standards were not compromised. The tests on the relevant track under load confirmed the Senior Shunter's recollections prior to his slipping that speed was "normal" and that there was no unusual locomotive movement, it was "normal yard riding".

2.3 Wagon LBS 1032 was inadvertently supplied to Frankton as a part of the standard pattern of forwarding empty wagons of this class for scrap traffic despite the fact that it was marked as "not to use - laid up" and had an inoperative handbrake. At the time it was possible for local operating staff to override this classification to despatch wagons. Action has now been taken to avoid this possibility as detailed in this report, Section 4.2, Safety Actions. The handbrake lever was tied at a height that approximated that of a normal handbrake lever in the release position.

2.4 The lighting of the New Shed Road was assessed under conditions similar to that applying on the morning of the accident and considered to be consistent with normal yard operation standards.

2.5 The Senior Shunter was dressed appropriately for the duties and conditions. High visibility clothing was not mandatory for the Te Rapa Yard Shunt, nor would it have affected the outcome of the accident.

2.6 The attempt to check the presence of and read the wagon destination card was the trigger to the Senior Shunter's fall. Such cards are not normal on empty wagons. In the particular circumstances ie, an empty wagon which the Senior Shunter had initially decided to place into 10 Road, out of the way, there was no need for the Senior Shunter to attempt to read the wagon destination card while moving and thus initiate the action which caused him to lose his footing.

2.7 Once the Senior Shunter had lost his footing the position of the shunters' footplate meant that it was highly likely he would fall on or near the track between moving vehicles. Refer Section 4.3(b), Safety Actions.

3. Findings

3.1 The Shunt crew were appropriately certified for the duties being carried out and were complying with the requirements for such duties.

3.2 Track condition in the vicinity of the accident site was below the desirable standard for yard operation but was within safe limits.

3.3 The lighting in the vicinity of the accident site was normal for such yard operation.

3.4 The Senior Shunter lost his footing while turning to look for a wagon destination card on wagon LBS 1032.

3.5 The effect of the wet conditions on footwear and the shunter's footplate surface would have increased the chance of the Senior Shunter losing his footing.

3.6 The paint on the shunters' footplate on DSJ 4017 did not adversely affect the Senior Shunter's foothold.

3.7 The handbrake lever on LBS 1032 was tied at a height similar to the height of a normal handbrake in the release position and therefore did not add to the barriers to the shunter's attempts to roll clear.

3.8 The positioning of the shunters' footplate on the locomotive was such that any loss of footing was likely to have severe consequences.

4. Safety Actions

4.1 NZRL had programmed the New Shed Road and other areas of the Hamilton Freight Yard for a major track improvement programme including drainage and sealing. This programme will be carried out progressively. As a precautionary measure until completion of the remedial work a shunting speed restriction of walking pace has now been applied to all roads which have been programmed for upgrade.

4.2 Immediately following the accident the operator tightened controls on the computerised AMICUS wagon control system to limit the ability to override the classification "laid-up", "condemned" or "bad ordered" to specified Wellington Fleet Engineer staff. Prior to this change it was possible for a wide variety of operating staff to override such classifications and despatch wagons which were not intended to run.

4.3 TRL has recently undertaken a comprehensive review of shunting practices. The report covers two areas which, while not directly related to the cause of this accident, may result in an overall risk reduction in the potentially hazardous shunting operation area.

a) **Hands free radio communication:**
TRL is re-evaluating the advantages and disadvantages of options for hands free radio communication. While the conceptual advantage in isolation is recognised problems associated with operational aspects and equipment need resolution.

b) **Alternatives to the shunters' footplate on locomotives:**
Options are under evaluation based on the review and overseas experience. In particular locomotives recently acquired by TRL from Queensland, which may be used for main line and shunting duties, do not have shunters' footplates as they were mainline locos. However a modification to the steps will be the subject of field trials to establish a safer alternative. In the interim TRL propose to review the current practice of painting shunters' footplates on locomotives in light of the Safety Actions on wagon footsteps arising from the shunting accident at Gracefield on 24 May 1995 (Paragraph 5.4 of Railway Occurrence Report 95-111).

No specific safety recommendations have been made as a result of the Commission's investigation of this accident.

17 April 1996

M F Dunphy
Chief Commissioner

Glossary of Railway Terms

ASP	Audio Shunting Procedures.
Catch on	To attach vehicles by dropping the hook.
Consist	The locomotive(s) and vehicles making up a train.
Couple	To connect brake hoses ready for use.
Cut off	To lift the hook between vehicles.
Kicking	To separate wagon(s) by accelerating the movement a short distance in the direction that is being operated with the hook lifted.
Leading en	The front end of a locomotive or vehicle in direction of travel.
Loose shunting	Kicking or slipping.
Operator	New Zealand Rail Limited, now known as Tranz Rail Limited.
Propelling	Pushing a rake of vehicles.
Rake	A group of vehicles.
Run about	The action of detaching a locomotive from its train and reattaching it at the opposite end.
Slipping	Separating wagon(s) by pulling them, lifting the hook and accelerating the locomotive forward. After the locomotive clears, points are reversed and the following wagon(s) proceed to another road.
Uncouple	To disconnect brake hoses.