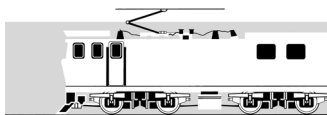
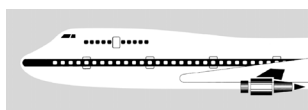


## RAILWAY OCCURRENCE REPORT

04-102 motor trolley, derailment, Lepperton

25 January 2004



TRANSPORT ACCIDENT INVESTIGATION COMMISSION  
NEW ZEALAND

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## **Report 04-102**

### **Motor trolley**

### **derailment**

### **Lepperton**

**25 January 2004**

### **Abstract**

On Sunday 25 January 2004, at about 1130, a consist of 3 motor trolleys coupled together was on a scenic ride on the Waitara Branch, when the trailing motor trolley, with a driver and 4 passengers on board, became detached from the consist and derailed. The driver and passengers were catapulted from the motor trolley when it came to an abrupt halt and slewed through 90 degrees.

The driver and 3 of the passengers received moderate to serious injuries.

The safety issues identified were:

- The coupling of motor trolleys together during revenue earning trips
- The conveyance of passengers on motor trolleys without adequate constraints
- The unlicensed operating of motor trolleys for fare paying passengers

One safety recommendation addressing these issues was made to the operator.



Photograph courtesy of OSH

**Derailed motor trolley**

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## Abbreviations

km	kilometres(s)
km/h	kilometres per hour
m	metre(s)
mm	millimetre(s)
OSH	Occupational Safety & Health Service
Tranz Rail	Tranz Rail Limited
WRPS	Waitara Railway Preservation Society Incorporated

## Data Summary

<b>Train type and number:</b>	Motor trolley
<b>Date and time:</b>	25 January 2004 at about 1130 <sup>1</sup>
<b>Location:</b>	Lepperton
<b>Persons on board:</b>	crew: 1 passengers: 4
<b>Injuries:</b>	crew: 1 serious passengers: 2 moderate 1 serious
<b>Damage:</b>	minor
<b>Operator:</b>	Waitara Railway Preservation Society Incorporated
<b>Investigator-in-charge:</b>	D L Bevin

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<sup>1</sup> All times in this report are New Zealand Daylight Saving Times (UTC+13) and are expressed in the 24 hour mode.





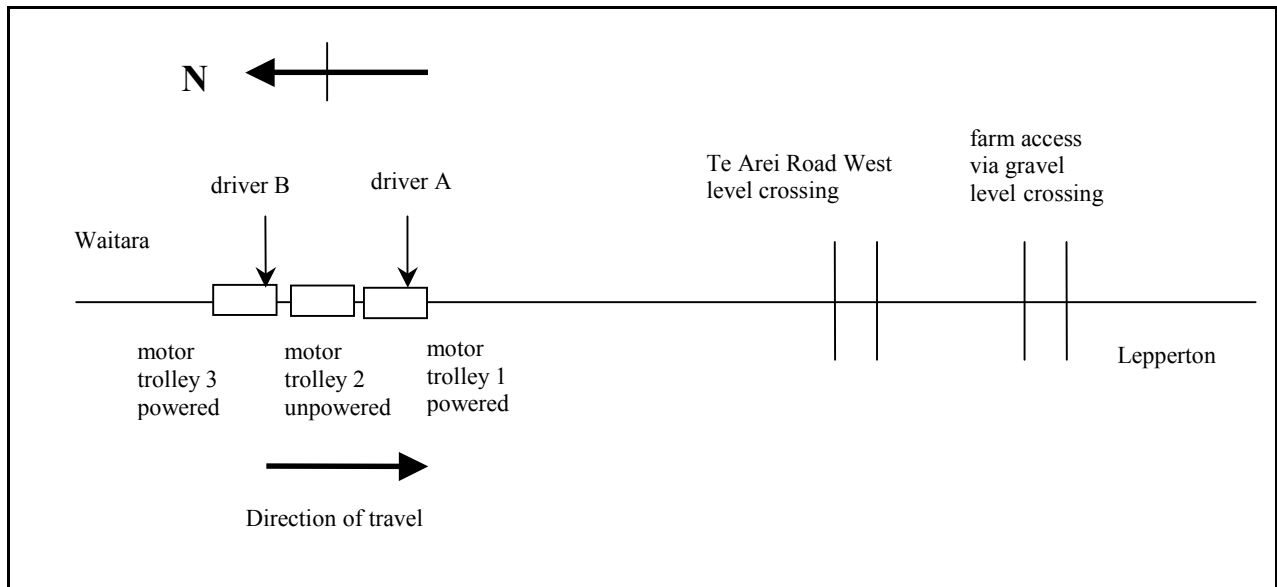
# **1 Factual Information**

## **1.1 Introduction**

- 1.1.1 The Waitara Branch was a 7 km long, 1068 mm gauge (3 feet 6 inches) railway line between Lepperton (on the Tranz Rail Marton to New Plymouth main line) and Waitara. The Branch had originally been part of the Tranz Rail network, but had been owned and operated by the Waitara Railway Preservation Society Incorporated (WRPS), since 2003.
- 1.1.2 The WRPS was an incorporated railway preservation society and held a current Rail Service Licence, issued by the Land Transport Safety Authority under the terms and conditions set out in the Transport Services Licensing Amendment Act (No. 3) 1992.
- 1.1.3 On 1 March 2004 the WRPS advised that between October 2003, when revenue-earning operations commenced, and 7 February 2004, 2653 passengers had been carried. During Labour Weekend in October 2003, 955 passengers had been carried, of which 208 had ridden on the motor trolleys.
- 1.1.4 Motor trolleys had been used on 4 occasions by WRPS since it commenced operations: once in conjunction with a train and 3 times when the train locomotive had been unavailable due to servicing requirements. There had been no accidents involving motor trolleys prior to 25 January 2004.

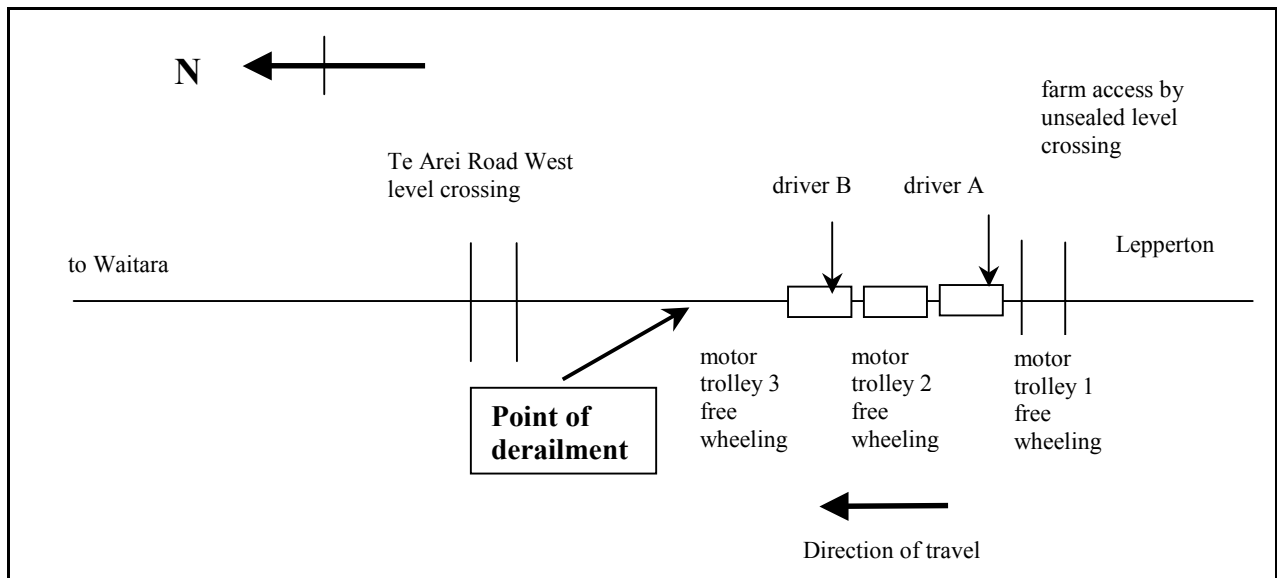
## **1.2 Narrative**

- 1.2.1 On Sunday 25 January 2004 the WRPS held an “open day” and advertised rides over the Waitara Branch. The WRPS usually operated an ex-Tranz Rail DSC class locomotive hauling a suitably fitted-out flat top wagon for such rides but on this day the locomotive was unavailable because of servicing requirements, and had been replaced by motor trolleys to transport the passengers.
- 1.2.2 At the beginning of the day’s operation 2 motor trolleys had been used, each operated separately with its own driver. However, the number of intending passengers exceeded expectations and, to increase capacity, a third motor trolley was brought into service. This motor trolley was mechanically defective but, when coupled between the 2 other motor trolleys, could be used as a non-powered vehicle to provide additional capacity, as had been done in the past. The 2 powered units provided enough power and braking ability to cope with the combined weight of the 3 motor trolleys and their passengers. The motor trolleys were coupled by means of a draw bar secured to the draw gear of one motor trolley and to the lifting rail of the motor trolley in front in a “hi-low” configuration.
- 1.2.3 The driver of the leading motor trolley, Driver A, checked the draw gear and couplings of the consist before the passengers boarded for the first trip from Waitara to Lepperton. One of the passengers, Passenger A, confirmed that the crew did what he considered a thorough inspection of the motor trolleys, including the couplings and how the passengers were seated before the consist departed at about 1100.
- 1.2.4 There were 12 adult and 2 child passengers as well as the 2 crew members riding on the 3 motor trolleys. Figure 1 shows the positions of the crew members on the outward journey. There were 4 passengers and a driver riding on motor trolley 1.
- 1.2.5 The consist arrived at Lepperton at about 1125 after an uneventful trip from Waitara.



**Figure 1**  
**The outward journey (not to scale)**

- 1.2.6 At about 1130, shortly after departing from Lepperton, the consist entered a right hand curve. As it did so, the draw bar between motor trolleys 1 and 2 detached from the lifting rail at the rear of motor trolley 2 (see Figure 6) and, while still attached to the front end of motor trolley 1, dropped to the right hand side of the track where it jammed against a rail screwspike.

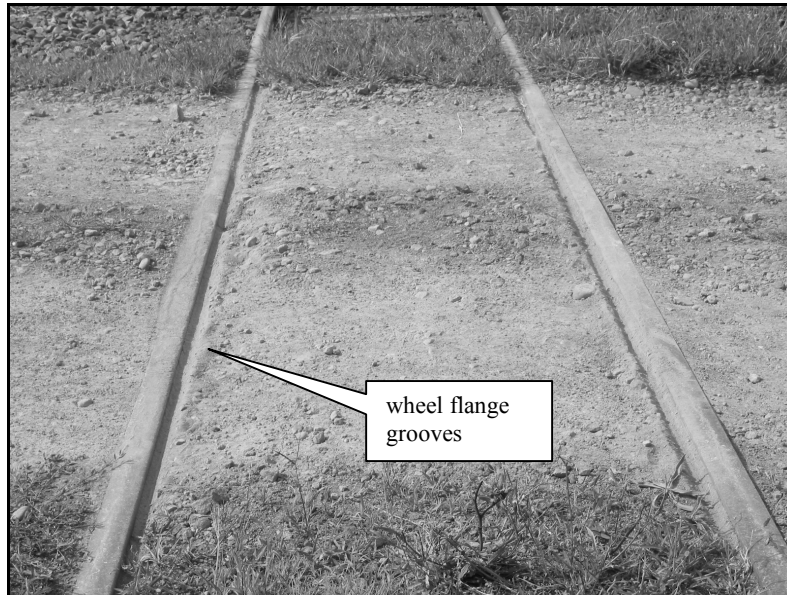


**Figure 2**  
**The return journey (not to scale)**

- 1.2.7 Motor trolley 1 derailed immediately and slewed 90 degrees from its direction of travel. The occupants of the motor trolley were catapulted off and landed on the track formation at varying distances in front of the now stationary, but still upright, motor trolley.
- 1.2.8 Two passengers and Driver A were treated for their injuries at hospital and discharged.
- 1.2.9 The third injured passenger was hospitalised for 3 days following the accident as a result of head injuries, concussion and extensive bruising of her back and legs. She was again hospitalised 6 weeks after the accident for a further 2 weeks because of complications associated with her recovery.

### 1.3 Site information

- 1.3.1 There was an unsealed farm access level crossing about 2 m wide and 50 m before the end of the line at Lepperton (see Figure 3). Use of the level crossing by road vehicles regularly resulted in the railway lines becoming covered with gravel and it was often necessary for the lines to be dug clear by WRPS staff before the motor trolleys could use the track.
- 1.3.2 The gradient from Lepperton averaged 1 in 220 for the first 200 m but then averaged about 1 in 60 for the next 1800 m, including the point of derailment.



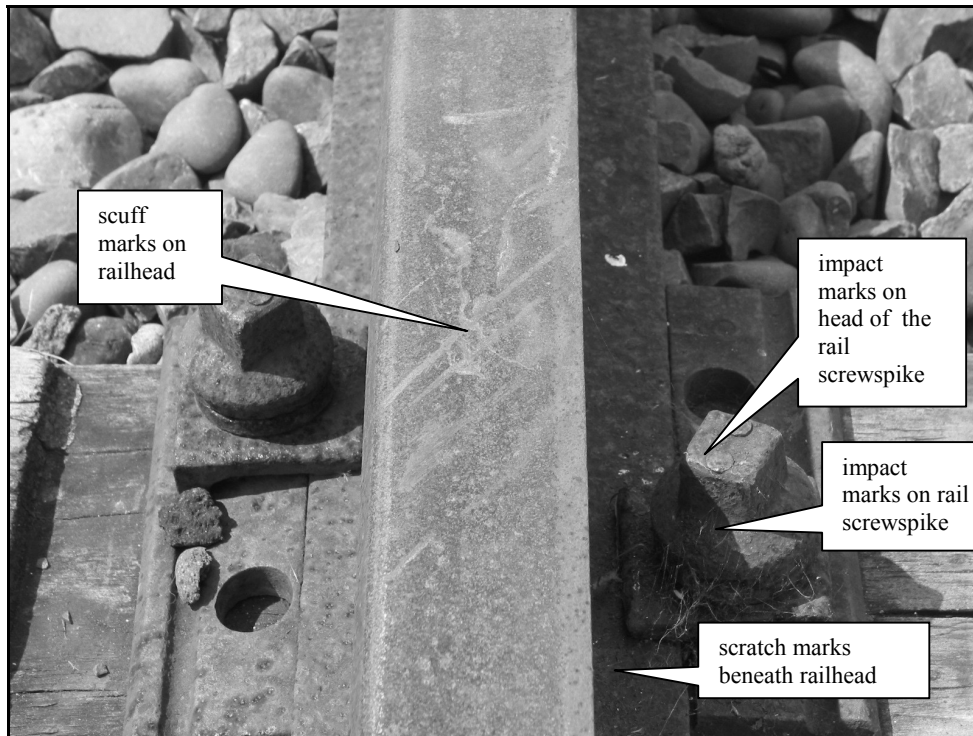
**Figure 3**  
**The unsealed farm access level crossing at Lepperton**

- 1.3.3 The derailment occurred about 400 m north of Lepperton as the branch line negotiated the downhill gradient and entered a right hand curve. Figure 4 shows the derailed motor trolley at the point of derailment.



**Figure 4**  
**The derailed motor trolley at the point of derailment, looking back towards Lepperton**

- 1.3.4 The point of derailment was identified from marks on the rail head of the right hand rail and marks on the head of an adjacent rail screwspike on the outside of the right hand rail (see Figure 5). Further scratch marks were also visible beneath the railhead immediately opposite the rail screwspike.

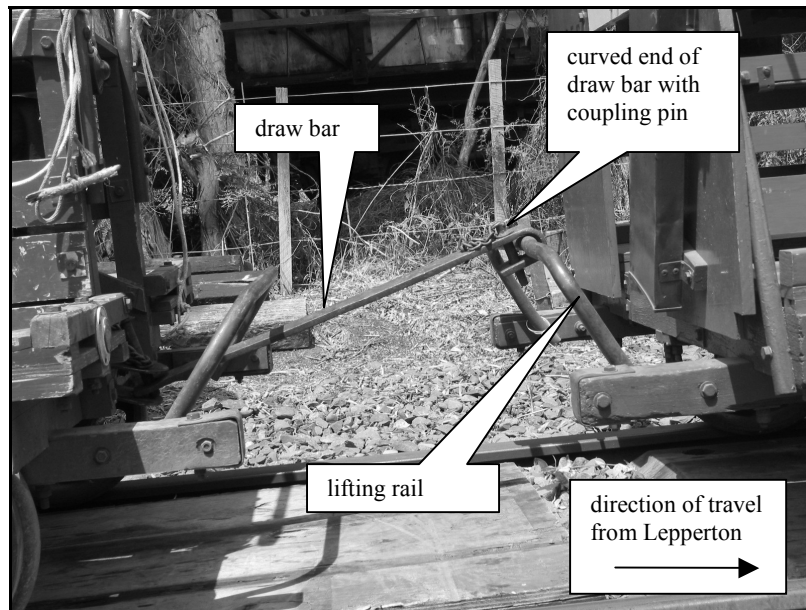


**Figure 5**  
**Marks at the point of derailment**

- 1.3.5 There were no impact marks on the sleepers or gouge marks in the ballast immediately preceding the point of derailment which would have indicated that the detached draw bar had fallen between the rails before coming to rest on the railhead.

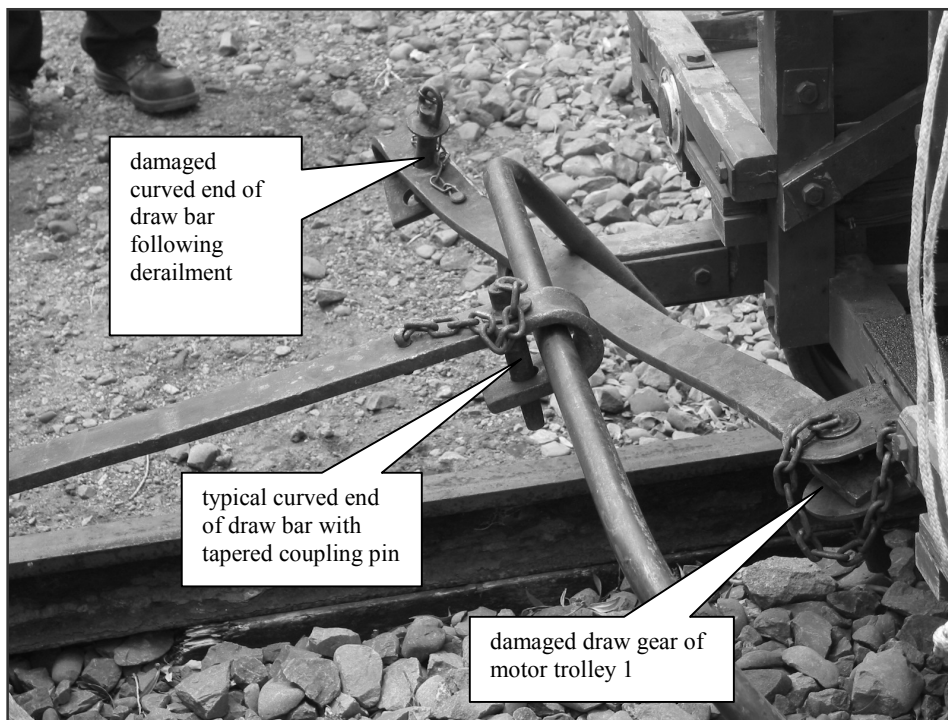
#### **1.4 The motor trolley operation**

- 1.4.1 The non-powered motor trolley was coupled between the 2 powered units, both of which faced in the direction of travel on the outward uphill journey to Lepperton. This provided better driver and power co-ordination between them than if the powered units were facing one in each direction.
- 1.4.2 The driver sat on the left side at the front while the passengers sat behind him on both sides of the engine housing. The occupants all sat on the engine housing with their legs facing at 90 degrees to the direction of travel. There was no restraint along the sides of the motor trolley to prevent passengers falling.
- 1.4.3 The motor trolleys were coupled by means of a draw bar secured to the draw gear of one motor trolley and the lifting rail of the motor trolley in front. The drawbar end attached to the lifting rail was curved to hook over the lifting rail and was secured there by a 100 mm long tapered pin (see Figure 6). Although secured by a pin, the coupling connection was not restricted from sliding laterally along the lifting rail.
- 1.4.4 When the coupling pin was in place, about 20 mm of the pin extended below the lower hole in the curved end of the draw bar. There was a chain attached to the top of the coupling pin and welded to the draw bar, but there was no clevis lock on the bottom of the pin to stop it lifting or vibrating out. The pin fitted loosely when in place.



**Figure 6**  
**The draw bar as attached between motor trolley 1 (left) and motor trolley 2**

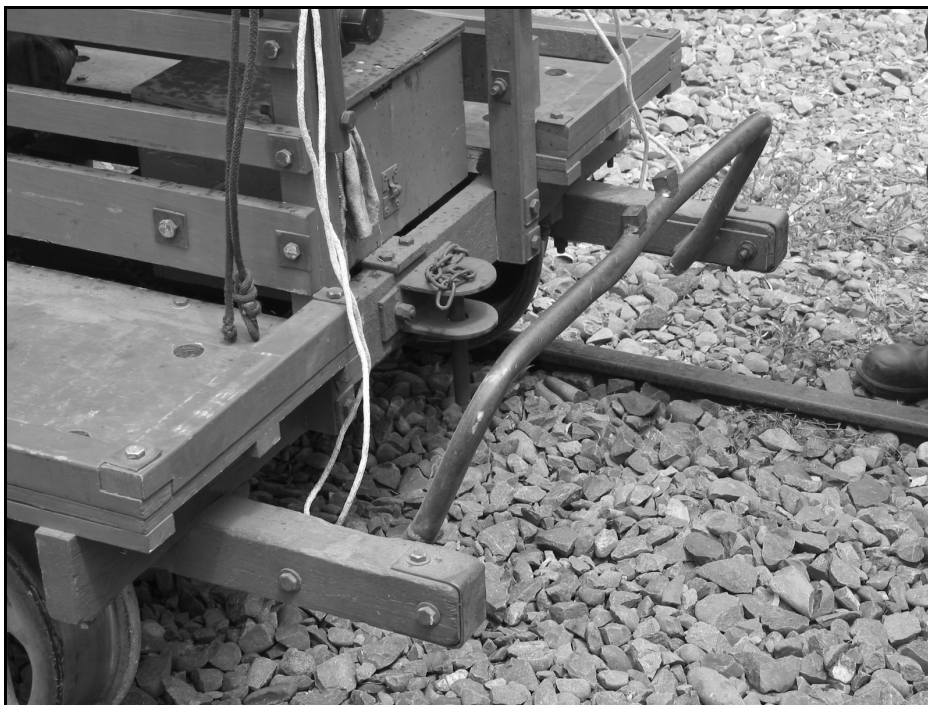
1.4.5 The flat end of the drawbar was secured to the draw gear of the next trolley. Once the draw bar became detached and dropped, the curved end was able to move 90 degrees to either side of the centre line (see Figure 7).



**Figure 7**  
**The damaged draw gear on motor trolley 1**

1.4.6 The coupling system was used during the days of Tranz Rail's predecessors when motor trolleys were used to tow flat top trolleys to transport materials. Research of historical data revealed that the Way and Works Branch Trolley Drivers Handbook, 1982 edition, stated that the towing of material trolleys was permitted only if both vehicles were designed for the purpose, were in good condition and were securely coupled by a an approved design tow bar.

- 1.4.7 Historically the type of draw gear as shown in Figure 8 was fitted to the rear of the larger motor trolleys, which were capable of carrying 4 or 6 people. Those material trolleys designed for towing had similar fittings at both ends. Approved draw bars were short lengths of rectangular section steel bar with a hole at each end. No draw gear was fitted to the front of motor trolleys (as opposed to a materials trolley) because the towing of motor trolleys was prohibited.
- 1.4.8 Although the practice of towing motor trolleys was prohibited they were mechanically unreliable and when they broke down it was common for the driver to arrange a tow from a passing trolley to a place where the problem could be dealt with.
- 1.4.9 The design of the motor trolleys for their original working environment was based on both the unimpeded egress of the occupants in an emergency and the ease of mounting and dismounting enroute for work purposes, hence the “side-saddle” seating arrangement. Because of the nature of the employment of the motor trolleys unimpeded egress in an emergency was considered preferable to security against falling off.
- 1.4.10 There was no facility at Lepperton to turn the motor-trolleys, so it was necessary for the consist to free wheel backwards to the Te Arei Road West level crossing, about 1 km towards Waitara, where the sealed pavement allowed the now-leading motor trolley to be uncoupled and turned. After being coupled again, this motor trolley provided the only power required on the downhill run back to Waitara.
- 1.4.11 Motor trolley 3 had central stoppers fitted to the lifting bar to stop the attached curved end of the draw bar sliding laterally from the centre of the lifting bar (see Figure 8).



**Figure 8**  
**The central stoppers on the lifting rail of motor trolley 3**

- 1.4.12 These central stoppers had been fitted to some trolleys when they were working on the main line. Driver A said that at that time they had been used in conjunction with a drawbar that had a clevis pin and yoke that would not allow the yoke to slide sideways. However, if used with a U type bar, as it was with WRPS, it was able to slide either way. The central stoppers were present when the WRPS acquired the motor trolley.
- 1.4.13 There were no central stoppers fitted to the lifting rail of motor trolley 2.

## **1.5 Personnel**

### **Driver A**

- 1.5.1 Driver A was an experienced motor trolley driver, having driven motor trolleys for many years during his employment with Tranz Rail and its predecessors before his retirement and with WRPS since it commenced operations.
- 1.5.2 He had been involved in securing the draw bars when the 3 motor trolleys were initially coupled at Waitara and had completed a check of the couplings, draw gear and draw bars after the motor trolleys were coupled. He was adamant that the coupling pin securing the curved end of the draw bar to the lifting rail of motor trolley 2 was in place before the consist departed.
- 1.5.3 Driver A said that he had been positioned on the left hand side of motor trolley 1 and had driven it to Lepperton with the other 2 motor trolleys attached. The trip to Lepperton had been uneventful. As usual on the return trip, the consist free-wheeled downhill back towards Te Arei Road West level crossing.
- 1.5.4 Driver A said that shortly after departing from Lepperton, the consist crossed a farmers crossing, which he considered had a severe stone problem in the wheel grooves (see Figure 3). The stones on the crossing were a known problem and when travelling to Lepperton the motor trolleys were required to slow down to negotiate the crossing. However, when free-wheeling back at the start of the return journey, the stones tended to slow the motor trolleys anyway.
- 1.5.5 As the consist negotiated the curve, he was talking with the passengers when suddenly he was thrown off the motor trolley and knocked unconscious. When he came to he saw people lying unconscious on the ground. He managed to get up and tried to assess the extent of the injuries but was inhibited by his own condition. However, he did see his colleague, Driver B, on the road guiding the emergency services to the scene.
- 1.5.6 Driver A later assumed that the pin, which secured the curved end of the draw bar to the lifting rail of motor trolley 2, had vibrated out as the consist had crossed the rough, unsealed level crossing. He thought that the draw bar had stayed hooked over, but no longer secured to, the lifting rail until motor trolleys 2 and 3 entered the curve, at which time motor trolley 1 ran in on motor trolley 2. This had eased the previous tension on the draw bar, which then slid along the lifting rail and dropped free to the right hand side.
- 1.5.7 Driver A had not undertaken a check of the draw bar, coupling pins and draw gear had not been undertaken prior to leaving Lepperton.

### **Driver B**

- 1.5.8 Driver B had driven motor trolley 3 in multiple with motor trolley 1 which was also in power for the outward journey to Lepperton. There was no WRPS crew member present on motor trolley 2. The outward journey was uneventful and when departing Lepperton to return to Waitara, the consist freewheeled backwards towards Te Arei Road west level crossing.
- 1.5.9 Driver B said that the ride across the unsealed level crossing on the return journey had as usual been rough, but he had not noticed anything untoward as a result. His motor trolley was well into the right hand curve away from Lepperton when passengers travelling behind him called to him to stop. He turned to see what had happened and saw the rear motor trolley (motor trolley 1) had turned at right angles to the track and the 4 passengers and Driver A had been thrown off. He estimated his speed was about 13 – 15 km/h when he applied his brakes and stopped about 80 m beyond the point of derailment.

- 1.5.10 Driver B immediately notified emergency services on his cellphone then went back to render assistance. He observed that some of the injured were unconscious, but one passenger had not been injured, and Driver A, who was injured, was trying to stand up. Other passengers arrived at the scene to help so Driver B went to the main road to wait for and direct the emergency services.

### **Passenger A**

- 1.5.11 Passenger A was travelling on motor trolley 1. He said that after leaving Lepperton the consist freewheeled backwards at a fairly constant speed; he estimated about 12 – 15 km/h, and he didn't think that they were accelerating.
- 1.5.12 The passage over the unsealed level crossing had been rough and was not something Passenger A would have expected. He thought they could have slowed down a little bit to go across that area. However, he emphasised that the motor trolley hadn't felt like it was bouncing off the track. They had also bounced over the unsealed level crossing on the outward journey, shortly before, but that had been under power and it hadn't seemed quite as rough.
- 1.5.13 Passenger A thought that with the freewheeling there would have been very little force on the draw bar between motor trolley 1 and motor trolley 2 and that the coupling pin could have bounced out, either from normal rail vibration, or from bouncing over the unsealed level crossing.
- 1.5.14 There had been no prior warning of the derailment, such as a rattling sound, that Passenger A could recall, and when it happened, it was so quick that the passengers were catapulted from the motor trolley. He was uninjured and thought he must have perhaps landed on his feet before doing a couple of rolls.
- 1.5.15 Passenger A said his wife, who had been hospitalised following the accident, had been sitting in the centre between Driver A and another passenger and had been concerned that there was nothing for her to hold on to in that position.
- 1.5.16 The 2 other passengers travelling with Passenger A and his wife on motor trolley 1 also said that the speed at which the consist had freewheeled backwards from Lepperton had not given them an impression of high speed; in fact they felt they had travelled faster on the outward trip.

### **Passenger B**

- 1.5.17 Passenger B had been accompanied by his partner and 2 children, one 3 years old and the other 5 years old. He had expected a train ride and had been a little surprised when the motor trolleys arrived instead.
- 1.5.18 After they had boarded motor trolley 3 at Waitara, one of the drivers tied a string around the outside of the motor trolley. Passenger B described it as "a small string line across the front of us" and said that he had held on to his younger child as an added precaution.
- 1.5.19 Passenger B said that he had no real concerns about the trip. Although the consist had not been travelling very fast as it free wheeled backwards from Lepperton, it had hit the unsealed level crossing with quite a severe bump which he later thought might have been sufficient to dislodge the draw bar.
- 1.5.20 Although he had walked past the derailed motor trolley and seen the detached draw bar, he could not see any evidence of where it had made contact with anything between the rails, such as the sleepers, which could have caused the derailment.



## **1.6 Safety system, procedures and equipment**

1.6.1 Section 2.3 of the WRPS safety system, entitled Safety Management, included references to risk identification, risk analysis and results of risk analysis.

1.6.2 Section 2.3.3 Risk Identification included references to, among other things:

- Risk of runaway trains
- Train derailment
- Slips and subsidence
- Fire risk on trains or surrounding country
- Accidents to passengers
- Operating and shunting staff accidents
- Level crossing accidents

1.6.3 The safety procedures did not include a requirement for a safety briefing before departing from Waitara or a safety reminder before departing from Lepperton.

1.6.4 The WRPS safety system, which had been approved by the Land Transport Safety Authority (LTSA), provided for the use of motor trolleys for track inspections and maintenance work but not for the conveyance of fare paying passengers. There had been no subsequent variation to the safety system submitted to the LTSA to cover the use of motor trolleys for passengers.

1.6.5 On 25 March 2004 the Chairman/Operations Manager of WRPS wrote in part:

A new attachment to the Safety System and Operating Rules in regards to operations of motor trolleys with non member passengers is to be produced. This will include a safety restraint system sufficient to retain passengers for their own safety, and the need for competent operators on all trolleys whether coupled together or not.

1.6.6 A complete audit of the safety system was required to be carried out annually by an LTSA approved independent auditor. The purpose of the audit was to check that the safety system was adequate and was being complied with. The WRPS had only been operating since July 2003 so it's first annual audit had not yet fallen due.

## **2 Analysis**

2.1 Although the drivers had carried out an inspection of the coupled motor trolleys and the seated passengers prior to departure from Waitara, a passenger safety briefing identifying the risks involved should have been part of the pre-departure process. However, in view of the action since taken by the operator regarding this issue, no safety recommendation has been made.

2.2 There was no evidence to suggest that the coupling pin was not in place in the curved end of the draw bar attaching motor trolley 1 to motor trolley 2 when the consist departed Waitara. It was not been possible to determine exactly where or when the coupling pin had finally worked free of the curved end of the draw bar and allowed it to detach from the lifting rail of motor trolley 2. However, the uphill trip to Lepperton would have kept the curved end of the draw bar in tension against the lifting rail of motor trolley 2 and the coupling pin would have been under no stress. Because the coupling pin was both tapered and a loose fit in the hole, it would have been free to vibrate and bounce throughout the 7 km trip.

- 2.3 The coupling pin had probably begun to work its way out during the outward trip. When motor trolley 1 ran over the unsealed level crossing near the end of the trip, the pin either completely dislodged or settled at such an angle in the top hole of the curved end of the draw gear that it could no longer return to the bottom hole when the motor trolley stopped at Lepperton. If the coupling pin was in such a position, the vibrations from the second trip over the unsealed level crossing might have been sufficient to have dislodged it.
- 2.4 The narrow width of the unsealed level crossing meant it was doubtful it could dislodge the coupling pin on its own, if the coupling pin was in position through both holes in the curved end of the draw bar at the time. However, the bouncing and vibrations as motor trolley 1 crossed, not once but twice, probably was the final factor leading to the draw bar detaching.
- 2.5 Although expressing concerns at the rough crossing of the unsealed level crossing, passenger accounts generally confirmed that the passengers were, on the whole, comfortable and felt quite safe travelling on the motor trolleys. Although Passenger B was concerned about his young son's wellbeing, he took extra precautions to ensure his safety. None of the intending passengers declined to ride on the motor trolley consist.
- 2.6 The safety system did not allow for the use of motor trolleys to convey passengers, so no motor trolley specific risks had been identified. While the identified risk of "accidents to passengers" could be construed to cover either train or motor trolley operation, it is more likely that, because passengers were only conveyed by trains at the time it was written, the identified risk referred to train passengers only.
- 2.7 The use of motor trolleys for the conveyance of passengers probably started after the original safety system had been submitted to, and approved by, the LTSA and as a result there was no reference to this type of operation included. Despite not having a license to do so, the use of motor trolleys by the operator for this purpose had become an accepted practice and a variation to the safety system should have been submitted to the LTSA for approval. However, in view of the action since taken by the operator regarding this issue, no safety recommendation has been made.
- 2.8 The motor trolleys were still in their original design state and were fit for purpose when used by competent WRPS members for track inspections and maintenance. However, the motor trolleys were operated by WRPS on a dedicated section of track so there was no risk of potential conflict with other traffic. Additionally WRPS used the motor trolleys for passenger carriage. With this change of use and environment the need for quick egress became practically non-existent but the need to provide security against falling off, particularly when conveying passengers, should have been addressed. With no restraint in place along the sides, there was nothing for passengers to hold on to or to prevent them from falling off, and it was fortunate that this had not happened since the motor trolley operation commenced. A safety recommendation covering the fitting of restraining apparatus for passengers being conveyed on motor trolleys has been made to the operator.
- 2.9 The ongoing poor condition of the unsealed level crossing was acknowledged by the operator in its procedure to dig the wheel grooves clear before commencing motor trolley operations. However, given the known condition of the unsealed level crossing, its continued use was probably questionable, particularly as it raised concerns with the passengers, even though they generally felt that the handling of the consist over the level crossing was appropriate. Stopping the motor trolleys before the unsealed level crossing would have reduced the length of the ride by about 300 m, but this would be insignificant over the total trip distance of about 14 kms.
- 2.10 The coupling of the motor trolleys was in line with historical practice when motor trolleys were used to tow flat top trolleys loaded with materials. Despite this, the lifting rail was not designed as a towing point so its use as a suitable attaching point for the draw bar was not appropriate and should not have been used for the purpose of coupling the motor trolleys for the conveyance of passengers. The high-low coupling method resulted in the draw bar being at a steep angle, but

the attitude of the draw bar, while attached, did not contribute to the derailment. The operator has since designed and installed a new level draw bar attached to suitable towing points for coupling motor trolleys, therefore no safety recommendation covering this issue has been made.

- 2.11 The initiating cause of the derailment was the apparent ability of the coupling pin to vibrate free from the curved end of the draw bar. This movement was possible because there was no restraining clip or pin at the base to secure the pin when the curved end of the draw bar was attached to the lifting rail. Had such a restraining clip or pin been in place the coupling pin would have been prevented from vibrating out and the derailment would probably not have happened. As part of the new coupling method, the operator has incorporated draw gear coupling pins, fitted with safety chains and a locking device so as to stop the pins from becoming detached, therefore no recommendation covering this issue has been made.
- 2.12 Once the coupling pin had been ejected from the attachment at the lifting rail, the curved end of the draw bar was effectively free to detach from the lifting rail at any time. If motor trolley 2 ran at the same speed as motor trolley 1, the draw bar remained in tension, but motor trolley 1 probably gained speed with run-in and the curved end of the draw bar became detached from the lifting rail and extended beyond it towards the chassis of motor trolley 2. This would have allowed the flat surface of the draw bar to rest unrestrained on the lifting rail of motor trolley 2. With normal track vibration, together with motor trolley 2 entering the curve, the draw bar probably slid along the top of the lifting rail and fell down to the right-hand, or inside rail of the curve, and running briefly with the curved end on the rail head, before it fell over the edge and jammed against a rail screwspike.
- 2.13 Had central stoppers similar to those on motor trolley 3 been installed on motor trolley 2, they would probably have been ineffective given the type of drawbar used to couple motor trolley 2 and motor trolley 1.
- 2.14 The draw gear on motor trolley 1 allowed the flat end of the draw bar to pivot until, with the continued movement of motor trolley 1, it reached the maximum 90 degrees at which point it was hard up against the chassis and could move no further. At this point the curved end probably jammed against the rail screwspike and the leading right hand motor trolley wheel caught up with and ran on to the edge of the draw bar. The rigidity of the jammed draw bar, the effect of the wheel running on to it and the forward momentum and weight of the motor trolley, probably all combined to bring motor trolley 1 to an immediate halt, slew it 90 degrees and catapult the occupants on to the track formation.

### **3 Findings**

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

- 3.1 The operator's licence was current, but its approved Safety System did not allow for the operation of motor trolleys for carrying passengers. The motor trolley consist was therefore not being operated correctly at the time.
- 3.2 Despite not being licensed to do so, the use of motor trolleys by the operator for conveying passengers had become a common practice.
- 3.3 No passenger safety briefings were given prior to the departure of the motor trolley consist from Waitara.
- 3.4 The derailment occurred when a detached draw bar which was protruding forward from motor trolley 1 jammed against a rail screwspike and caused the motor trolley to slew at a 90 degree angle to the track.
- 3.5 The injuries sustained by the occupants were consistent with their being catapulted from the derailed motor trolley, and landing on the track formation.

- 3.6 Motor trolley 1 was running in reverse, so Driver A was facing away from the consist and therefore was not in a position to effectively monitor the status of the draw bar that attached his motor trolley to motor trolley 2.
- 3.7 The cause of the derailment was the coupling pin vibrating free from the curved end of the draw bar.
- 3.8 The pin probably came out as the consist ran over the unsealed level crossing shortly after the commencement of the return journey to Waitara.
- 3.9 The pin being tapered probably assisted its upward movement.
- 3.10 Had the pin been fitted with a locking device, the derailment would have been avoided.
- 3.11 The use of the lifting rail as a coupling attachment point was not appropriate.
- 3.12 The use of the motor trolleys without adequate restraints in place was not appropriate for conveying passengers.
- 3.13 The potential for a person to fall from the motor trolleys had not been recognised in any risk assessments undertaken prior to the commencement of motor trolley operations.

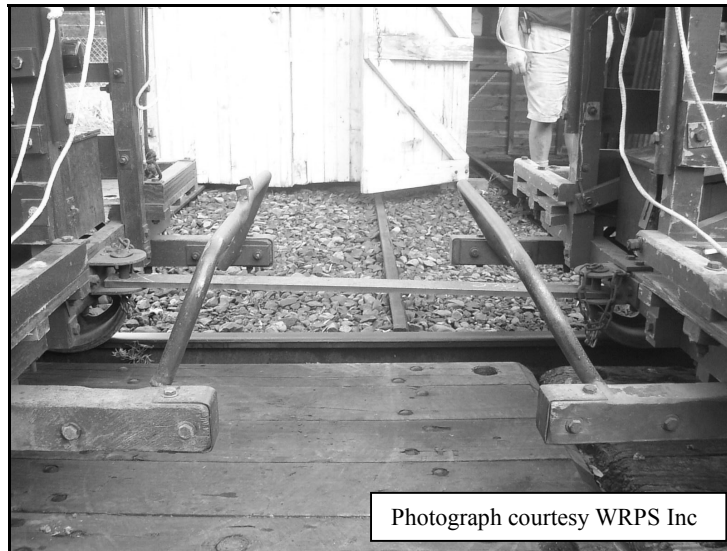
## 4 Safety Actions

- 4.1 On 20 April 2004 the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated wrote in part:

New draw gear has already been manufactured, with anchor points for the draw gear attached at either end of the trolleys. Both front and rear trolley draw gear attachment pins are fitted with safety chains and a locking device so as to stop the pins from becoming detached.



**Figure 9**  
**The new attachments for the draw gear**



**Figure 10**  
**The new draw bar and coupling arrangement**

4.2 On 9 May 2004 the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated advised:

New procedures being developed for the operation of motor trolleys while conveying passengers will include the requirement for a passenger safety briefing before the departure of the motor trolley.

4.3 On 21 June 2004 the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated wrote in part:

Since the release of the draft copy of the report, the Society has taken steps to correct the problem at the farm crossing in question.

Please find photos attached showing the improvement undertaken, two three metre lengths of Timber 125 x 125 level with the crown of the rail and screwed in place. With a 50mm flange gap both sides, and the centre metal lowered to the height of the timbers. The approach either side of the track is to be lowered beneath the crown rail, and we will be monitoring the crossing closely.



**Figure 11**  
**Improvements undertaken to farm crossing (near Lepperton)**

## 5 Safety Recommendations

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

- 5.1 On 8 April 2004 the Commission recommended to the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated, that he:

install a suitable restraint to minimise the risk of passengers falling from the trolley, before reinstating the carriage of passengers on motor trolleys (023/04).

- 5.2 On 20 April 2004 the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated replied, in part:

The Waitara Railway preservation Society Incorporated on the 3 April 2004, implemented the first of four passenger restraints to be installed to motor trolleys, (photos supplied).

This consists of a single 20mm round bar attached at waist height through an eyelet welded on the rear handrail and bolted to the front headboard. A lock pin of substantial length then secures the rod in place through the eyelet mount beside the trolley driver. Passengers may hang on to the bar if they so wish, and when not in use the restraint/handrails for each trolley will be securely attached on board.



**Figure 12**  
**The restraint / handrails fitted to the motor trolley**

5.3 On 7 May 2004 the Commission wrote to the Chairman/Operations Manager, Waitara Railway Preservation Society Incorporated:

On 8 April 2004 the Commission recommended that you:

install a suitable restraint to minimise the risk of passengers falling from the trolley, before reinstating the carriage of passengers on motor trolleys.

The Commission is satisfied that the recommendation has been acted upon and the status of the safety recommendation is closed – acceptable.

The Commission commends you on this positive course of action to improve transport safety and thanks you for your co-operation.

5.4 On 8 April 2004 the Commission recommended to the Director, Land Transport safety, that he:

review those heritage railways using motor trolleys to convey passengers to ensure that the trolleys are equipped with a suitable restraint to minimise the risk of passengers falling from the trolley (024/04).

5.5 On 29 April 2004 the Director of Land Transport Safety replied, in part:

With regard to your recommendation the LTSA has already sought and reviewed information regarding trolley operations from relevant operators. This review confirmed the LTSA view that a mix of trolley passenger safety measures (rather than one single measure) is the most appropriate approach, depending on the nature of the particular operation. Possible safety measures, in addition to passenger restraints, include a maximum permitted trolley speed, consideration of location, drawbar design, etc.

In particular, the LTSA can require operators to fit equipment such as restraints if the Director of Land Transport Safety considers it necessary in accordance with the Transport Services Licensing Act 6F, to avoid a significant risk of death or serious injury. At this stage, the LTSA is unsure if this threshold for intervention has been met.

In addition, given the diversity of trolley operations, the recommendation you make, if universally applied, could very well create new and unforeseen risks.

As such, the LTSA would prefer to continue the work underway in this area. We are currently working with trolley operators on a case by case basis, assessing their circumstances, and then agreeing on the most effective mix of safety measures. In some cases this has included the fitting of suitable passenger restraints.

This approach allows the LTSA to avoid having to impose a safety requirement, especially in situations where it could reduce safety. For these reasons, I regret I am unable to accept your recommendation.

Approved on 30 July 2004 for publication

Hon W P Jeffries  
Chief Commissioner











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