Report 96-104

Collision between Hi-Rail Vehicles

Kotemaori

2 May 1996

Abstract

At 1030 hours on Thursday 2 May 1996, two Hi-Rail vehicles collided on a curve near Kotemaori on the Palmerston North-Gisborne Line. The four occupants of the vehicles were uninjured. The cause of the collision was insufficient information available to the employee in charge of one of the Hi-Rail vehicles.

Safety deficiencies addressed in the report are the suitability of the existing Operating Rules covering conflicting Hi-Rail vehicle movements. Safety issues addressed in the report are the compliance with Train Control procedures and the compliance with certification requirements for operating Hi-Rail vehicles.

Transport Accident Investigation Commission

Rail Incident Report 96-104

Vehicles involved:	HRV[1] 8813 HRV 11067
Date and time:	2 May 1996, 1030 hours
Location:	251.46 km Palmerston North-Gisborne Line, near Kotemaori
Type of occurrence:	Collision between Hi-Rail vehicles
Persons on board:	HRV 8813: 3 HRV 11067: 1
Injuries:	Nil
Nature of damage:	Minor damage to HRVs
Investigator in Charge:	R E Howe

[1] Hi-Rail vehicle.

1. Factual Information

1.1 On Monday 2 May 1996 the maintenance activities planned on the Palmerston North - Gisborne Line operated by Tranz Rail Limited (Tranz Rail) included:

- The movement of Hi-Rail vehicle (HRV) 8813 from 186 km (just north of Napier) to 266 km (just north of Raupunga) between 0830 hours and 1045 hours.

- HRV 11067 working between Putorino and Raupunga in the vicinity of 250 km commencing at 0845 hours with a requirement to make a check call to Train Control at midday. (See figure 1 for a diagrammatic layout of the relevant localities.)

There were no planned train movements over the section of track on the morning in question.

1.2 The approved movements required HRV 8813 to travel through the work site of HRV 11067, typical of many such movements authorised during Tranz Rail's day to day operations. At 1030 hours as this was taking place the HRVs collided at 251.460 km.

1.3 HRV 8813 was an Isuzu NKR[2] five-tonne truck, modified for road and rail running and allocated to the Napier Bridge Gang. On 2 May the three-man gang was en route to the 266 km to carry out work in a tunnel, with a culvert to check and some gear to pick up on the way. The Leading Building Tradesman in charge of the gang stated that such travel by rail instead of road was common and encouraged by Tranz Rail for travel north of Napier.

1.4 At 0832 hours the Senior Maintainer from the bridge gang, who was employee in charge of HRV 8813 and the driver on the day in question, rang Train Control from Napier for permission to "on-track" and travel from the 186 km to the 266 km, and requested "until 1045" for the proposed movement.

1.5 Train Control authorised the movement and advised "Roger, no other track enquiry straight up the 266 between Raupunga and Waihua 10.45 from the 186 over". HRV 8813 then proceeded north.

1.6 HRV 11067 was also a modified Isuzu NKR five-tonne truck and allocated to a temporary three-man heavy maintenance track gang which had been formed two weeks prior to the incident. The HRV was equipped with a one-tonne truck crane mounted on the rear of the vehicle to assist with material handling.

1.7 At 0845 hours the Ganger who was employee in charge of HRV 11067 rang Train Control from Kotemaori for permission to "on-track" and work. The following discussion was recorded on the Train Control tape.

[2] NKR defines the Isuzu model.

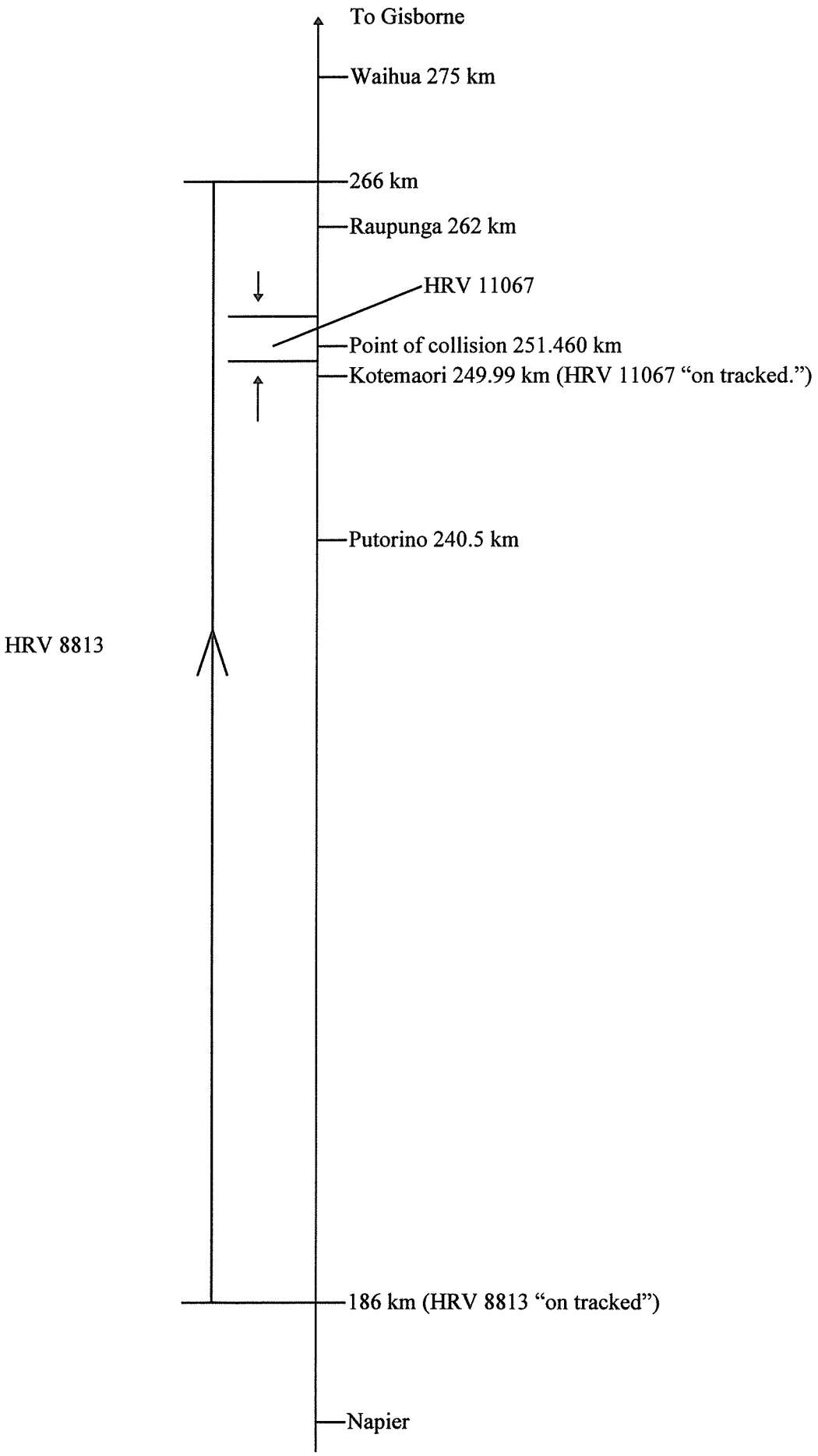

Figure 1
Diagrammatic layout of localities (not to scale)

Ganger:	Control, I'd like to on track at the 250, Kotemaori mate, and work between 245 and 250 (unclear transcript) Kotemaori. How long can we have please?
TCO:	Roger, time now is 8.45, 8.45 the time. Work between the 245 and the 250 between ah, it is between Putorino and Raupunga actually. Time now is 8.45. Show you working between 245, 250, um, check call midday. I have also got 8813 going up to the 266 by 10.45. Will you keep an eye out for him, over.
Ganger:	Control, will keep an eye out for him and give you a check call at midday, thanks.
TCO:	Yeah, roger that. Understand you are aware of this guy coming up and you will keep an eye out for him. Thank you very much. Hear from you at midday. Control out.

This was the last contact between either of the HRVs and Train Control before the collision.

1.8 HRV 11067 "on-tracked" at Kotemaori and proceeded north to 251.2 km where lengths of rail were lying close to the track on the right-hand side of a 160 m radius right-hand curve between 251.2 km and 251.5 km. The curve was programmed for ballast tamping and regulating to improve top and line and the rails on the right-hand side were in the way of the regulator. The gang's job on the day was to move the rails north beyond 251.5 km and roll them well clear of the track.

1.9 The gang was down to two men on 2 May 1996, the Ganger and his assistant. The Ganger had organised his work by getting his assistant to drive the HRV while he sorted and turned rails on to their feet prior to hooking them up to the truck crane. The assistant towed the rails behind the HRV to the new site, placed them at the side of track and returned for more.

1.10 Just prior to the approach of HRV 8813 a rail had been attached and HRV 11067 was moving slowly north at approximately 5 km/h. The Ganger stated that he was on the right-hand side of the line approximately 50 m south of HRV 11067 and walking south to turn the next rail when he looked up and saw HRV 8813 between 10 and 20 m south of him. He immediately put his hands up in the "stop" sign. He estimated the speed of HRV 8813 as approximately 25 km/h.

1.11 The left front passenger in the approaching HRV 8813 had the clearest vision ahead and was the first to see the Ganger. He stated that he saw the Ganger on the left hand side of the track and a "split second later" saw the HRV towing a rail approximately 40 m ahead. At this stage he yelled a warning and took protective action.

1.12 The driver of HRV 8813 saw the Ganger give the "Stop" signal at about the same time as the warning came from his passenger. He applied the brakes and then saw the HRV ahead. He stated that HRV 8813 did not slow appreciably, but slid along the rails. He estimated the speed at impact as 15 to 20 km/h, which was supported by other witnesses.

1.13 The crew of HRV 8813 stated that when they ran into the back of HRV 11067, their vehicle rode up on the rail being towed on the right-hand side and the extended crane arm on HRV 11067 hit the right front window pillar on HRV 8813, cracking the windscreen, buckling the roof and travelling 300 millimetres past the windscreen. HRV 8813 then fell to the left and came to rest as HRV 11067 was propelled forward by the impact. The two front-seat occupants of HRV 8813 had seen the potential danger from the crane arm and were lying below the dashboard, on the front seat, at the time of impact.

1.14 The driver of HRV 11067 was looking forward in the direction of travel and his first indication of the incident was when he felt the impact.

Operating rules and codes applicable

1.15 HRVs operated under Tranz Rail's Engineering Rules 194 to 199 (Appendix 1) and Operating Instructions for Train Control relating to this incident were detailed in Tranz Rail's Rail Operating Code Section 6, 11.0 to 11.1.6 (Appendix 2).

Site details

1.16 The collision occurred on a 160 m radius right-hand curve with a posted speed of 40 km/h. The track was on a descending grade of 1 in 70 for northbound rail traffic. The alignment skirted a high bank on the right-hand side that restricted forward vision for northbound rail traffic to between 50 and 70 m depending on the position in the curve.

1.17 It was not raining at the time of impact, although the rail head was wet from earlier rain.

Personnel

1.18 The employee in charge/driver of HRV 8813 was a Senior Structures Maintainer with 23 years experience and held a current Operating Certificate for the duties being carried out.

1.19 The employee in charge of HRV 11067 was a Ganger with 22 years experience of which 14 years had been as Ganger in the area. He held a current Operating Certificate for the duties being carried out.

1.20 The driver of HRV 11067 had 15 years experience with the operator, mainly as a track welder within the Napier area. Neither he nor the third member of the gang, who was not present on the day of the incident, held the appropriate Operating Certificate required for driving an HRV although they were reported as frequently required to drive "on-track".

Communications

1.21 Both HRVs were fitted with multi-channel (E-band) radios similar in design and performance to those installed in locomotives. These provided two-way communication between HRVs and train control, using Tranz Rail's alternative train crewing (ATC) radio repeater network.

1.22 The Napier-Gisborne section of the line was not operating under ATC (i.e. single man operation) because radio coverage could not be guaranteed to the standards defined for such operation. The limitations of radio coverage were associated with the number and location of repeaters and the difficult terrain traversed by the rail line, with problems manifesting themselves as intermittent short "blind spots" with loss of contact.

1.23 The crew of HRV 8813 stated that, although they had their E-band radio on scan, which was normal practice, and could thus listen in to all conversations between Train Control and other users within their reception area, they did not hear any discussion between HRV 11067 and Train Control at about 0845 hours. At the time HRV 8813 was within the reception area of the repeater at Mount Erin (located south of Napier) on Channel 2 and HRV 11067 was within the reception area of the repeater at Mohaka (located north of Napier) on Channel 3. Although both radios were on scan, and therefore covering all channels, due to their respective locations it was unlikely that they would have heard each other's transmission.

1.24 Both HRVs had been fitted with an extended "maintenance" radio system known as "Fleet Link" some weeks before the incident. This was in effect an improved vehicle-to-vehicle radio communications system with additional features allowing linkage to national systems. This system was not part of Tranz Rail's procedures for protecting Hi-Rail vehicle movements and was not intended to be used for this purpose.

HRV braking characteristics

1.25 The following representative stopping distances were included in the results of a series of brake tests carried out by Tranz Rail on a fully laden Isuzu NKR in 1994:

- 12 m from 50 km/h on level track, dry rail
- 42 m from 50 km/h on level track, wet rail

Tests carried out during commissioning of Ford Transit HRVs in 1995 showed a 15% increase in stopping distance for dry rail on a 1 in 40 down grade.

No test results were available for wet rail on a down grade.

2. Analysis

2.1 Movements authorised were within the applicable Tranz Rail Rules and Code requirements relating to the control of HRVs. When authorising the on tracking of HRV 11067 in accordance with Rule 198(b) (Appendix 1) full information relating to HRV 8813 was given to the employee in charge who was then expected to carry out the Rule 198(b) requirement:

> It will be the responsibility of the employee in charge to have his trolley or hi-rail vehicle under sufficient control to enable him to stop clear of those movements when encountered.

2.2 HRV 11067 was authorised to work between two limits and such authority allowed movement in either direction between those limits at speeds up to the appropriate maximum allowable speed. Such movements were common practice in these circumstances. Fortuitously HRV 11067 was proceeding north away from HRV 8813 at low speed at the time of impact and not returning south at a higher speed to pick up another rail.

2.3 Statements indicated that despite HRV 8813's reported low speed (25 km/h) it did not slow appreciably before the impact due to the wet rail head conditions on a 1 in 70 down grade causing the vehicle to slide. The crew of HRV 8813 were unaware of the presence of HRV 11067 and if HRV 8813 had been travelling at the allowable curve speed of 40 km/h the consequences of collision would have been more severe.

2.4 Based on the available view, grade, rail head condition, and HRV braking characteristics the only method that could have possibly been employed by the employee in charge of the HRV towing the rail (11067) to fulfil the requirements to "stop clear of those movements when encountered" was to be "off-tracked". It was apparent from discussion with maintenance staff that this was not the normal practice and such conflicting movements were usually successfully achieved without "off-tracking", a solution strongly implied by the wording of Rule 198(b).

2.5 Procedures relating to information on "locations between[3]" were not strictly followed by the employees in charge of both HRVs when contacting Train Control. This did not cause any problems for HRV 8813. In the case of HRV 11067 it created the potential for confusion when the Ganger at Kotemaori (kilometrage on Train Control Diagram 249.99 km) incorrectly requested to work "between 245 and 250" (see 1.7). The (unclear) portion of the transcript referred to was not capable of precise interpretation but considered to be "just past", wording which fits the Ganger's statement that he knew he was to work north of Kotemaori but inadvertently quoted the kilometrage south. The Train Control Officer (TCO) correctly quoted locations between as Putorino and Raupunga since 250 km was just beyond the defined kilometrage for Kotemaori. HRV 8813 was working between these locations although the TCO drew HRV 8813 on his diagram between 245 km and 250 km when it was actually working between 250 and 255 km. Although this had no effect on the incident under investigation, it could have had an adverse effect if procedures had been in place to advise HRV 8813 of HRV 11067's presence.

2.6 Neither of the two men allocated to the Ganger to make up his temporary gang was certified to drive HRVs. With only one man present with him on 2 May 1996 the Ganger elected to sort the rails to be moved in order, and to prepare them for pick up. It was apparent that the use of uncertified staff to drive HRVs was relatively common as the Ganger tried to utilise his track skills and resources to best effect. It is considered the natural temptation to do this to achieve the end results should be addressed by Tranz Rail encouraging additional staff to obtain the required certification, or by reviewing the composition of gangs to provide such a backup.

3. Findings

3.1 HRV 8813 was under the control of, and driven by, an appropriately certified staff member, and operating within the applicable Tranz Rail rules.

3.2 The crew of HRV 8813 had no knowledge of the presence of HRV 11067.

3.3 HRV 11067 was under the control of an appropriately certified staff member and operating within the applicable Tranz Rail rules.

3.4 Although HRV 11067 was being driven by a gang member who was not certified for such duties it is considered that this did not contribute to the incident.

3.5 The non-compliance with required communication procedures to establish "locations between" details which contributed to the misunderstanding regarding HRV 11067's position, did not contribute to the incident.

3.6 Although the employee in charge of HRV 11067 was aware of the approach of HRV 8813 the combination of factors (available view, grade, rail head conditions and HRV braking characteristics) present at the site where the two HRVs met, meant that he could not fulfil the requirement of Rule 198(b) without previously "off-tracking".

3.7 Current practice was not to "off-track" in all such conflicting movement situations thereby creating the potential for similar incidents to occur in other areas on the Tranz Rail system where a combination of grade and alignment restricted views and adversely influenced braking ability.

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[3] "locations between" refers to the need for callers advising "Stations, Sidings or Intermediate Boards between" in addition to metrage, when calls are made from track locations or when movements "terminate at a track metrage. (Code, Section 6, 11.1.2, see Appendix 2.)

4. Safety Recommendation

4.1 As a result of the investigation of this incident it was recommended to the Managing Director of Tranz Rail on 13 May 1996 that he:

> Introduce measures to ensure that where two trolleys/HRVs, operating under Rule 198 and Rule 199, are authorised to occupy a particular section of track at a common time each must be given full particulars of the other's position and progress before the second is authorised to "on-track" and that where contact cannot be made with the first, adequate steps are taken to safeguard its progress before the second is permitted to "on-track" (021/96).

4.2 Tranz Rail responded to the Safety Recommendation on 12 September 1996 advising that:

> Tranz Rail Ltd on completion of it's internal investigation into this incident considered and implemented a rule change covering the operation of Hi-Rail vehicles/trolleys in an area common to more than one movement.

5. Safety Actions

5.1 Following this incident Tranz Rail initiated a specific follow up with all TCO's to reinforce the need to conform with the requirements to establish "locations between".

5.2 Tranz Rail has taken steps to promulgate and reinforce the need for staff to hold the appropriate Operating Certificate before driving HRVs.

11 December 1996

M F Dunphy
Chief Commissioner

Appendix 1

Engineering Rules

TROLLEY AND HI-RAIL VEHICLES

194 Definitions

(a) Trolley - The term "trolley" in the following rules includes any velocipede or trolley (except a material trolley) either hand-operated or motor, which can readily be removed from the line by not more than two persons, and is used for the conveyance of staff and tools.

(b) Hi-Rail Vehicle - A hi-rail vehicle in the following rules is a road vehicle, used for maintenance or inspection duties, weighing up to an unladen weight of 10 tonne, fitted with rail trolleys such that it can be driven along the track and can also be driven on or off track at level crossings or other suitable place.

(c) Employee in Charge - The employee who is responsible for the safe movement of a trolley or hi-rail vehicle or a group of such vehicles.

195. Persons Authorised to Drive Trolley or Hi-rail Vehicles - No person shall be permitted to drive a motor trolley or hi-rail vehicle unless they hold a current appropriate Operating Certificate, which must be exhibited on demand to any person in authority.

196. (a) Purposes for Which Trolleys or Hi-Rail Vehicles May be Used - Except as provided in clause (c) of this rule, a trolley or hi-rail vehicle must not be used for private purposes unless prior written authority has been obtained by the employee in charge, from the Area Manager Rail Operations in charge of the area where the employee is located.

(b) Trolley Permits - The written authority referred to in clause (a) of this rule shall be in the form of a permit which must be exhibited on demand, to any person in authority.

(c) Use in Emergency - In emergencies Train Control may authorise an appropriately certificated driver to use a trolley or hi-rail vehicle, for private purposes.

197. Colour, lights and Equipment

(a) Trolleys must be painted red and be equipped with a white light showing to the front and a red light showing to the rear. Red reflectors must also be fitted front and rear.

(b) Each Trolley and hi-rail vehicle must be equipped with two red flags, two green flags and a supply of detonators.

198. Requirements for on-track movements of Trolleys and Hi-Rail Vehicles

(a) Inquiries - Every employee in charge of a trolley or hi-rail vehicle who proposes to on-track on the main line, must personally advise Train Control of his requirements including the time required before off tracking.

(b) Authority - Train Control will refer to train movements plotted on the diagram and, after taking account of requested on track time will either authorise the movement or will instruct that the movement must not take place. If the movement is authorised, then the completion time agreed to for track occupancy will become the nominated time for the movement to be clear of the line.

Before the movement proceeds, Train Control will give the employee in charge full information regarding the running of all trains and the presence of all other on-track movements which may affect the safety of the movement. It will be the responsibility of the employee in charge to have his trolley or hi-rail vehicle under sufficient control to enable him to stop clear of those movements when encountered.

Train movements are not to be forecast for unreasonably long periods. Where a proposed movement of a trolley or hi-rail vehicle is to be of considerable duration, Train Control and the employee in charge should agree when the next enquiry is to be made.

The movements of all trolleys and hi-rail vehicles are to be recorded on the Train Control diagram.

Information regarding movements within station limits must be obtained from the Office in Charge or Signalman as the case may be, and the employee in charge will work under his direction while within station limits. If such movements involve fouling the main line then Train Control must also be advised.

(c) All on Track Movements MUST be Clear of the Line by the Nominated Time - If the employee in Charge is unable to clear the line by the nominated time, he must again check with Train Control, or the Officer in Charge or Signalman if working under his direction within station limits. Unless otherwise instructed protection must be provided.

(d) Safeguarding Positions when Circumstances Alter - If, after authorising an on-track movement circumstances alter which would allow a train to conflict with the agreed on-track time, Train Control must arrange to hold back that train, until the employee in charge has advised he is clear of the line or the nominated time has elapsed.

199. On-Track Operation of Trolley and Hi-Rail Vehicles

(a) Safe Operation - The driver is responsible for the safe operation of the trolley or hi-rail vehicle, and must operate it in accordance with these rules and any other current instructions.

(b) Driver without Local Knowledge - Where for some reason the driver is not an employee with adequate local knowledge, he must be accompanied by a second employee with such knowledge, who holds the appropriate current operating certificate.

(c) Two or more Trolleys or Vehicles operating Together - Where two or more trolleys or hi-rail vehicles are travelling together, the employee in charge shall travel on the leading trolley or hi-rail vehicle. He must give clear information to Train Control regarding the number of vehicles, and give the full information he received to all other drivers involved, and advise them of the authority to move.

(d) Use of Trolleys or Hi-Rail Vehicles Within Block of Line or Protected Work areas - When trolleys or hi-rail vehicles are being used on-track in a Block of Line or protected work area, the employee in charge of the work may obtain authority for movements within that area.

The employee in charge shall give clear information to Train Control on the movements to be made, and shall advise the trolley or hi-rail vehicle drivers of all the relevant information.

If for any reason the driver of trolley or hi-rail vehicle believes that the information received is unclear, he should make his own inquiry.

(e) Stopped at Block of Line or Protected Work Area - If a trolley or hi-rail vehicle should arrive at a Block of Line or established protection, the driver must obtain from the employee in charge of the work, all relevant information before proceeding into the area.

(f) Use of Track Telephones - Where lineside telephones are used and it is not practicable for a journey to be completed near a telephone, or when for any reason the employee in charge is unable to make a prearranged call:

(i) *In the case of Trolley* - He may drive towards the nearest telephone as long as he has an adequate view of both directions. When the view in both directions is not adequate he must ensure the trolley is removed from the track, before walking to the nearest telephone.

(ii) *In the case of a Hi-Rail Vehicle* - He MUST off-track the vehicle and proceed to the nearest telephone.

(g) Care to be Exercised - Any employee travelling on a trolley or hi-rail vehicle must exercise caution and take all reasonable care to protect himself and the vehicle from injury or damage. When main line points at unattended stations are found reversed they must be reported to Train Control. On his authority hand points can be restored to normal, and the points lever locked.

(h) Movement Over Level Crossings - The speed when moving over level crossings must not exceed 10 km/h. When approaching a level crossing the driver must sound the horn to give ample warning of approach.

The driver must be prepared to stop at level crossings, unless it can be clearly seen that there is no road traffic in the vicinity of the crossing.

(i) Parking of Trolleys and Hi-Rail Vehicles - When not on track, trolleys and hi-rail vehicles must be parked well clear of the line so that they cannot become foul. When not under the supervision of an employee, trolleys must either be secured with a chain and padlock, or parked in a locked shed. Trolleys and hi-rail vehicles must either have all their lights extinguished, or be parked in such a way that the lights and reflectors cannot be misinterpreted by the locomotive engineers of passing trains.

(j) Use of Lights - Hi-rail vehicles when on track must have headlights, hazard lights and tail lights switched on. When fitted, the flashing roof light must also be switched on.

When trolleys are in use by night, i.e. from half an hour after sunset until half an hour before sunrise, during fog or falling snow, in tunnels or when, for any reason, visibility is poor, they must have front and rear lights switched on.

Appendix 2

NEW ZEALAND RAIL LTD		**RAIL OPERATING CODE**
Section 6:	Operating Instructions for Train Control	**Page:** 11.1
Subject:	Inquiries from Maintenance Workers, Hi-rail Vehicles and Trolley Users	**Date Effective:** 19 September 1994 **Issue No.:** 2

11.0 Inquiries from Maintenance Workers, Hi-Rail Vehicles and Trolley Users

11.1 Accurate and Up-dated information

The necessity for absolute accuracy when dealing with inquiries from trolley, Hi-Rail vehicle users and maintenance staff working on or near the track is vital. There is no margin for error, oversight or indifferent approach concerning the movement of trains, Hi-Rail vehicles, or trolleys when handling enquiries from these members. Their lives depend on the accuracy of information supplied by the TCO and there should be no possibility of misunderstanding by the inquirer. Abbreviated speech or short cuts in procedure must not be adopted by a TCO when handling these inquiries.

The following matters must be watched carefully by a TCO when dealing with the movement of Hi-Rail vehicles, trolleys and maintenance work:-

11.1.1 The employee in charge must personally advise requirements for the proposed movement including the time required before off tracking.

11.1.2 The identity of the caller and the location from which the call is made must be established beyond any possible doubt. The TCO MUST insist upon callers advising "Stations, Sidings or Intermediate Boards between" in addition to metrage, when calls are made from track locations.

Likewise the same requirements are to apply when a movement involving either a Hi-Rail vehicle or a trolley is going to terminate at a track metrage.

11.1.3 Reference must be made to the train control diagram in regard to train movements within the area of the proposed movement. After taking account of the requested track time, together with train movements plotted, TCO will either authorise the movement or will instruct that it must not take place.

Before the movement proceeds the TCO will give the employee in charge, the latest and most complete information obtainable regarding train and other on-track movements. Estimated times must not be used when actual times are obtainable by reference to stations.

If there is any doubt, the TCO should ask the caller to repeat the information. In all cases the TCO must repeat the locations back to the caller.

When giving information, the TCO must avoid use of the expression" on time". Particular care must be exercised to ensure that late trains, unscheduled services and other previously notified Hi-Rail vehicle and trolley movements, are not overlooked. Train movements should not be forecast for an unreasonably long period and where Hi-Rail or trolley journeys, or maintenance work are of considerable duration arrangements are to be made as to when the next enquiry will be made. When dealing with these movements the TCO is to use radio communication to check the progress of trains when this is possible.

In authorising a movement the TCO must be satisfied that there will be no possible conflict with any trains. e.g. If a Hi-Rail or trolley user is told that a train will be held at a station until they arrive then the TCO must ensure the signal concerned for the train to depart is held at 'Stop', this includes cancelling preset crossing computer commands and applying the psuedo block, and/or using appropriate signal tags/magnetic warning tags. Where a Signal box operates CTC on a local panel then the TCO must ensure the Signalbox will also take these safeguards.

IT IS PARTICULARLY IMPORTANT THAT TRAIN MOVEMENTS RECORDED AND PLOTTED ON DIAGRAMS ARE ALWAYS UP-TO-DATE.

Once a movement is authorised then the completion time agreed to for track occupancy will become the nominated time for the movement to be clear of the line.

11.1.4 All Hi-Rail vehicle, trolley movements and maintenance work must be recorded on Train Control diagrams in black biro.

11.1.5 If after authorising an on-track movement circumstances alter which would allow a train to conflict with the agreed on-track time the TCO MUST ARRANGE TO HOLD BACK THAT TRAIN until the employee in charge of the Hi-Rail vehicle, trolley or maintenance work has advised that the movement is clear of the line or the nominated time has elapsed.

11.1.6 At the completion of a shift, the outgoing TCO must draw the attention of the member taken over the shift to the location of maintenance work, Hi-Rail vehicles or trolleys, trains running late and any other unusual circumstances.