Report 96-105

Collision between Shunt L8 and a Hi-Rail Vehicle

St George's Street (near Avondale)

10 May 1996

Abstract

At 1009 hours on Friday, 10 May 1996, Tranz Rail Limited's Shunt L8, northbound from Westfield to Henderson, collided with a Hi-Rail vehicle near St George's Street on the North Auckland Line. The driver of the Hi-Rail vehicle had time to jump from the vehicle and no injuries were sustained. The cause of the collision was inappropriate authorisation for the progress of Shunt L8.

Transport Accident Investigation Commission

Rail Incident Report 96-105

Vehicles involved:	DC 4323 Hi-Rail vehicle 62125
Date and time:	10 May 1996, 1009 hours
Location:	17.898 km North Auckland Line, St George's Street (near Avondale)
Type of occurrence:	Collision between shunt and Hi-Rail vehicle
Persons on board:	DC 4323: 1 Hi-Rail vehicle 62125: 1
Injuries:	Nil
Nature of damage:	Extensive damage to Hi-Rail vehicle
Investigator in Charge:	R E Howe

1. Factual Information

1.1 On the morning of Friday, 10 May 1996, normal activities on the Newmarket to Waitakere section of the North Auckland Line (NAL) operated by Tranz Rail Limited (Tranz Rail) included scheduled suburban services; the progress of a northbound shunt service; protected maintenance work at a level crossing, and a Ganger on patrol in a Hi-Rail vehicle (HRV). Control of that section of the NAL was in the hands of the Train Control Officer (TCO) on the South Desk of the Train Control Office at Westfield. This office has two desks: one controlling the NAL from Waitakere to Otiria, the other controlling all lines south of Waitakere to Te Rapa. At the time of the event both desks were separately staffed.

1.2 At approximately 0942 hours a Senior Track Maintainer rang Train Control to obtain "track-time", in this case the clearance to permit supervised maintenance work at St George's Street level crossing at 18.23 km. (Appendix 1 details selected transcripts of the Train Control tape, Extract 1A details this communication.) The TCO gave clearance until 1020 hours and in accordance with standard practice drew a line on his Train Control Diagram correctly recording the presence of maintenance work at that locality, and between the hours indicated.

1.3 The next recorded involvement of the TCO (refer Extract 1B of Appendix 1) was when a Ganger at 24.1 km telephoned Train Control at 0945 hours for clearance to carry out a patrol in HRV 62125 from 24.1 to 17.5 km. Again clearance was given until 1020 hours. The Ganger was advised of the work at the level crossing at 18.2 km and the TCO correctly recorded the Ganger's intended progress on his Train Control Diagram. At this stage Shunt L8, a shunting service from Westfield to Henderson, had not left Westfield and did not appear on the Train Control Diagram. (Unlike suburban services, which ran at scheduled times and were pre-printed on the Train Control Diagram, Shunt L8 ran on demand to a variable time and was not pre-printed.)

1.4 Having authorised the movement of HRV 62125 the next recorded involvement of the TCO (refer Extract 1C of Appendix 1) was with Otahuhu Signal Box. Otahuhu Signal Box controlled the exit of trains from Westfield Yard destined for the NAL. For trains to proceed onto the Double Line Automatic Signalling (DLAS) section of the NAL between Westfield and Newmarket it was necessary for Train Control to give verbal Authority to proceed before Otahuhu Signal Box signalled accordingly (refer Figure 1 for a diagrammatic layout of locations and signalling sections).

1.5 Otahuhu Signal Box advised Train Control that Shunt L8, with a length equivalent to "20 crossing"[1], was ready to proceed to Henderson (refer Extract 1C of Appendix 1). The TCO gave the authority to proceed.

1.6 The TCO stated that at this stage he pencilled Shunt L8 on his Train Control Diagram running to Avondale (16.98 km) and entering the loop to clear suburban services 2115 and 2116 before proceeding to Henderson i.e. a path that did not conflict with the level crossing work or the HRV movement (refer Figure 2).

[1] Tranz Rail define the length of all trains in equivalent 7.5 m long wagons to check the capacity of sidings to hold such trains for crossing purposes Shunt L8 was equivalent to 20 such wagons.

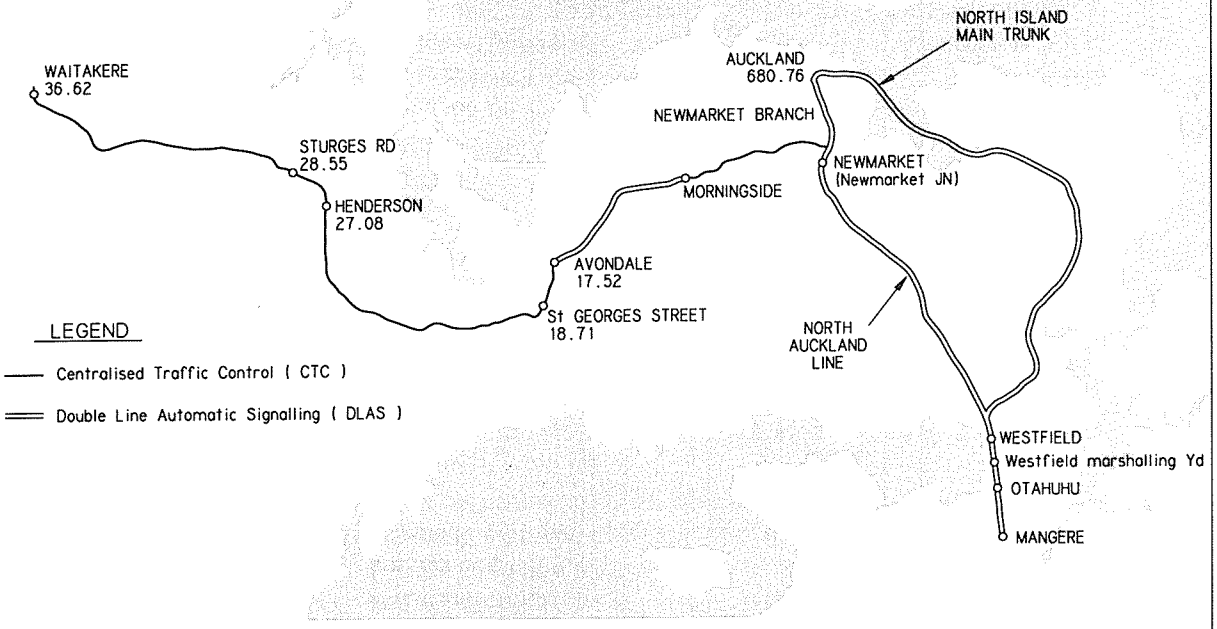

Figure 1
Locality diagram and signalling system
(Not to scale)

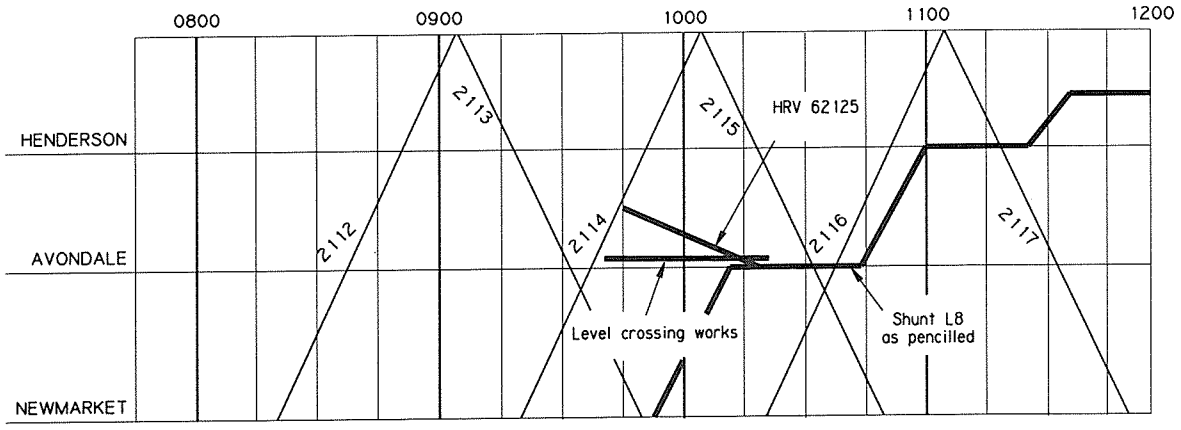

Figure 2
Train Control Diagram as originally plotted

1.7 Having entered the DLAS main line between Westfield and Newmarket Shunt 8 came under the direction of Train Control until it reached Newmarket, where it came under the control of the Signal Box. For Newmarket to signal a train onto the Centralised Traffic Control (CTC) section of the NAL commencing at Newmarket it was necessary for Newmarket Signal Box to obtain authority to proceed from Train Control in the form of a signalled response. On the day in question this was achieved by Newmarket setting the required route for Shunt L8 which initiated a "siren" in the Train Control Office and brought up a "Train Waiting" indication at the appropriate signal position. This occurred at approximately 0950 hours and the TCO stated that he responded by pressing the necessary controls to "give L8 the light" i.e. allowing the movement set up by Newmarket Signal Box onto the NAL at Newmarket to be signalled.

1.8 At this stage the TCO, who controlled all signals on the NAL north of Newmarket to Waitakere, stated he set a clear route for Shunt L8 to proceed to Avondale and enter the loop, the first stage of his planned progress of Shunt L8 (refer paragraph 1.6).

1.9 At approximately 1000 hours Newmarket Signal Box contacted Train Control to give details of train times through Newmarket. Included in this information was the passage of Shunt L8 through Newmarket at 0956 hours (refer Appendix 1, Extract 2).

1.10 At approximately 1005 hours the TCO looked up at his panel, which portrayed the area under his control and the position of trains, and saw that suburban service 2114 was running some minutes late on its journey to Waitakere, and that on its return journey as 2115 from Waitakere to Auckland it would still be running late at Henderson. This opened up the possibility of advancing Shunt L8 to Henderson before the arrival of 2115. The TCO stated that he then reset the route for Shunt L8 to take the main line to Henderson without reference to his Train Control Diagram.

1.11 The TCO could not explain why he did not check his Train Control Diagram, but considered that the following factors may have affected his performance that day:

- His difficulty in coping with the South Desk workload following recent certification and a break from duty.
- The hours he was working, which in his opinion were excessive.
- The working of long shifts (up to 13 hours and 15 minutes) without rostered breaks.
- The change in the type and location of the collars/blocks used for panel protection.
- The distractive work environment in the Train Control Office.
- His health at the time.

The relevance of each of these factors is considered in this report.

1.12 Shunt L8 comprised DC 4323 leading; DC 4012, and wagons giving a consist totalling 169 t and 145 m long. It was crewed by one Locomotive Engineer (LE).

1.13 The LE reported his journey from Westfield as normal, his route was correctly signalled for him, and he followed signals with no checks and no communication with Train Control until his sighting of the HRV.

1.14 Shunt L8 was on a 1 in 40 downgrade at approximately 17.7 km when the LE saw the HRV an estimated 250 m ahead. The shunt had just exited a 440 m radius left hand curve to traverse a 150 m straight preceding a gentle 700 m radius right-hand curve.

1.15 The LE made an emergency brake application and Shunt L8 came to a stop from 52 km/h in 27 seconds as indicated by the locomotive electronic event recorder log. The LE saw the Ganger vacate the HRV when he was "50 to 100 m" from it. He estimated the speed of his train at impact as 40 km/h.

1.16 HRV 62125 was a 3.5 t Ford Transit Crewcab adapted for road/rail running and allocated to the Length Ganger. On 10 May 1996 the Ganger was carrying out planned inspection requirements when the incident occurred. The tray of the HRV was loaded with jacks, lifting gear and other equipment which the Ganger estimated weighed about 800 kg.

1.17 Having passed through the level crossing maintenance work at 18.23 km the HRV was traversing the 700 m radius curve (refer paragraph 1.14) at approximately 17.95 km when the Ganger saw Shunt L8 approaching. He had accelerated from the level crossing and recalled being in fourth gear and travelling at 40 to 50 km/h at the time of sighting the shunt. He "jumped on the brakes" and the motor stalled as the HRV slowed and skidded on the rail. As the HRV slowed, the Ganger was able to jump out. He estimated the shunt was some 10 m from him as he jumped out, and he ran towards the locomotive to escape any flying debris from the imminent collision.

1.18 The HRV was caught up in the front of the locomotive on impact and pushed approximately 130 m before the vehicles came to rest. The rear wheels of the HRV were derailed by the impact.

Site conditions

1.19 The shunt and HRV met in an area where the alignment (either straight or a large radius curve) gave good view lines, as evidenced by the sightings when the vehicles were some 250 m apart. This was in marked contrast to the view available in the 200 m radius right-hand curve between approximately 18.3 and 18.6 km (some 500 m north of the collision point) where views were generally restricted to approximately 50 m.

1.20 The weather was fine and the rail head dry at the time of collision.

1.21 The work being carried out at St George's Street level crossing involved re-sealing the road. The work was under a 25 km/h speed restriction, and being carried out in such a manner that had Shunt L8 reached this location the Senior Track Maintainer would have been able to ensure all persons and plant were clear of the line.

Personnel

1.22 The LE had 18 years experience as an LE and held the appropriate Operating Certificate for the duties being carried out.

1.23 The Ganger in charge of HRV 62125 held the appropriate Operating Certificate for the duties being carried out.

1.24 The TCO had 18 years experience with Tranz Rail and its predecessors, of which 17 years were in operational areas including the operation of signal panels. His last five years had been spent as a TCO, initially in Taumaranui until that office was closed in late 1995 and he shifted to Auckland.

1.25 The TCO stated that he was suffering from influenza on the day preceding and the day of the event, although he was not on any medication. He felt "drained, physically and mentally" by the hours he was working.

1.26 It was usual practice for the Train Control Office staff to resolve unplanned relief amongst themselves. The Controller on duty at midnight on Wednesday 8 May felt indisposed and telephoned the TCO in question at home to request him to return to duty and complete the shift. The TCO in question had finished his own shift at 1330 hours and had been out for the evening. He declined the relief duty on the ground that he "didn't feel up to it". He stated that normally he would endeavour to accept such requests as he felt under some pressure to do so because of the limited staff numbers operating the roster and the team spirit which prevailed.

Training and certification

1.27 The area controlled by the Auckland Train Control Office took in all lines north of Hamilton. The workload was split between two desks, commonly referred to as the North Desk and the South Desk. The North Desk controlled all track north of Waitakere, i.e. lines working under Track Warrant Control (TWC) north of Auckland. The South Desk controlled all lines between Waitakere and Hamilton and included sections under CTC and DLAS. It was recognised that the South Desk involved a much greater workload than the North Desk and TCOs required separate certification for each area.

1.28 It was a Tranz Rail requirement, when TCO's relocated to a new office involving areas not previously controlled, that they go through a period of training and familiarisation prior to certification in that area. Following his transfer to Auckland in November 1995, the TCO underwent such a programme resulting in his certification for the NAL (North Desk) on 10 January 1996. At the time the Manager carrying out the assessment commented on the assessment sheet "more time needed to gain certification for South Line. Certification for NAL only at this stage".

1.29 On 31 January 1996 the TCO was again assessed for the South Desk at which stage he was not considered ready for certification resulting in an annotation on his assessment sheet recommending "Another week's training in South position." The TCO declined to sign this assessment sheet, although this was standard practice. The reason recorded by the Network Control Manager (NCM) was that the TCO "considered things a bit picky".

1.30 On 9 February 1996 the TCO was certified for the South Desk. During the period 31 January to 8 February the TCO was rostered on to the North Desk although he worked only two seven hour 30 minute shifts during this period, on 1 February and 2 February (the rest of the period was sick leave or days off). He stated he spent no time sitting at or gaining experience in the South Desk and this was confirmed by examination of the relevant Train Control Diagrams. The assessment sheet certifying the TCO included the comment "Total competent performance, All procedures followed correctly. A much quieter, professional, more "in control" performance". The TCO signed this assessment sheet.

1.31 Prior to going on leave for a month in early April the TCO had spent two months working normal rostered shifts, which gave him approximately one month's experience on the South Desk. He stated that during this time he worked only four day shifts on the South Desk, which was the most demanding shift and the shift he was working on the day of the incident.

1.32 When interviewed shortly after the incident and asked whether he felt confident in the South job the TCO stated "when I went away on leave I felt confident about the South, no worries" and (on return from leave) "I felt confident but I knew I was going to struggle." On later reflection he stated that he felt his certification was hurried as others had to go on leave.

1.33 On return from leave on the 6 May 1996 the TCO was rostered on shift 16121, involving South shifts for the first week. His first working period was scheduled for 9 May 1996 following three "Rostered Days Off" (RDOs). In the event two of the six TCOs were absent at various times during that week and the TCO actually worked North shifts from Monday 6 May to cover. His first South shift worked was on Friday 10 May, the day of the incident, when he swapped his 13 hour 15 minute North shift with a colleague due to a social engagement. It was his first shift on the South Desk for five weeks, and when interviewed he said he felt he was "struggling quite a bit". This is supported by a comment he made to this effect during a discussion with A Box at approximately 0950 hours.

North/South Desk and Train Control consolidation

1.34 The TCO considered that the particularly high workload on the South Desk was a contributory factor in the circumstances leading up to the incident. The imbalance between workload on the North and South Desks had been recognised by Tranz Rail for some time, but action to address the imbalance had become part of an overall Tranz Rail project to centralise Train Control in Wellington. The transfer of Auckland Control to Wellington is currently planned for February 1997.

1.35 Tranz Rail's original intent with regard to the workload imbalance was to provide a second panel for the Auckland area, or to duplicate the existing panel, and agreement to this effect was reached some years ago prior to the shift of the Auckland area Train Control from Auckland Station to Westfield in 1994. Allowance was made for wiring two panels during this shift but the work was not completed due to the planned short future of Westfield prior to centralising to Wellington.

1.36 Since 1994 Tranz Rail had considered taking Paerata and Huntly off local signal panels and adding them to the South panel at Westfield. Paerata was actioned because it was felt it would not cause a significant increase in workload, and staff feedback since the change has confirmed this. Huntly was not actioned due to staff concern as to the extra workload it would generate for the South Desk.

1.37 Tranz Rail carried out a limited comparison of the workload of the Auckland South Desk and Wellington North Island Main Trunk Desk based on quantifiable parameters such as:

- Number of trains through CTC.
- Number of crossings in CTC.
- Number of track movements.

On the data compared Tranz Rail concluded that the Auckland South Desk had a significantly higher workload than the equivalent Wellington desk. Experienced staff stated that only the Christchurch North Desk, covering the Main North Line TWC area, compared with the Auckland South Desk in terms of demand on a TCO, although direct comparison was difficult because of the different operating conditions.

Rostering of the Auckland Train Control Office

1.38 The roster approved for staffing of the Auckland Train Control was based on six different shifts to cover the 60 rostered work periods supplying the approximate 480 hours coverage necessary to operate the office each fortnight. This required TCOs working an average of 80 hours per fortnight based on a normal shift length of eight hours (maximum 10 hours) and 10 shifts per fortnight, which is in accordance with the collective employment contract covering operating staff. Working of the roster assumed full availability of six TCOs and made no allowance for annual leave, sickness, training or other absences.

1.39 Each fortnight shift included four RDOs, the equivalent of weekends for staff working normal hours.

1.40 Unlike the larger Wellington and Christchurch Train Control Offices Auckland did not have a relief shift available to cover annual leave and sickness. The need to allow for this was recognised by having one roster shift/week earmarked as "relief" and planning the pattern of RDOs such that when absences required the use of the "relief" shift, cover could be supplied by other TCOs working their RDOs.

1.41 As a result of this practice it was normal for Auckland TCOs to work RDOs and extended shifts as reflected in a survey of hours worked during the period fortnight ending 16 December 1995 to fortnight ending 18 May 1996, which showed the following:

Auckland Train Control, hours worked/fortnight

TCO	F/E 16/12	F/E 30/12	F/E 13/1	F/E 27/1	F/E 10/2	F/E 24/2	F/E 9/3	F/E 23/3	F/E 6/4	F/E 20/4	F/E 4/5	F/E 18/5	TTL HRS	AVG HRS worked/ full fortnight*
A	113	97	100	107	83	109	106	75	72	114	83	119	1178	103
B	101	41	0	96	91	86	86	99	94	100	90	0	884	94
C**	82	65	64	85	39	86	109	107	83	0	0	49	769	92
D	110	95	122	40	99	99	40	33	74	80	84	99	975	101
E	95	41	0	59	41	99	86	105	83	91	107	88	895	94
F	63	108	106	104	109	10	60	60	64	96	107	118	1005	107

* Obtained by excluding fortnights where less than 80 hours were booked due to leave or other reasons.

** TCO C was on duty at the time of the incident.

Maximum number of consecutive shifts

TCO	
A	20
B	12
C**	13
D	19
E	16
F	20

Breakdown of shifts in excess of 10 hours

10 - 11 hours	**11 - 12 hours**	**Over 12 hours**
13	4	17

1.42 Tranz Rail advised working RDOs and extended shifts was on a voluntary basis. There was a recognised Roster Officer in the Train Control Office at Auckland although the position was not formally structured (the six TCOs at Auckland were under the control of the NCM in Wellington with no one person locally in charge).

1.43 The Roster Officer had not seen any necessity to call for relief assistance during the period reviewed in paragraph 1.41.

1.44 The TCO in question raised the issue of excessive hours with the NCM in January 1996. The NCM stated this was the first complaint on the new roster since its introduction in November 1995 and he chose to let the roster run for a further period and see if other TCOs gave him feedback to confirm a problem. The NCM said he received no negative feedback prior to the incident.

1.45 Although working RDOs and extended shifts was defined as "voluntary" the TCO in question stated that in real terms this was not the case. His understanding was that, with a roster virtually one man short, if he wanted leave he could not expect to get it unless he worked RDOs to let others get their leave, an issue he said he raised with the NCM in January.

1.46 Inquiries were made as to provisions covering Train Controller's hours in Australia and Canada to allow comparison with New Zealand practice. Replies indicated the applicable award conditions under which train controllers operate in New South Wales are:

> Shift Hours - Control Officers
> 6 hours 40 minutes whilst actually on the control board, shift work outside this time involves non board duties. 70 hours per fortnight. Maximum length of any shift 12 hours. Minimum interval between shifts before resuming control board duties 8 hours.

The following general information was advised with respect to Canadian practice:

> Canadian labour requirements outline hours of work and all railway collective agreements comply with this requirement of 40 hour workweek. According to the various collective agreements, in the event of an emergency, sickness etc., a controller is to work an additional four hours. There are no other provisions for maximum hours of duty on any given day, though the railway policy is that a controller may only work 12 hours in one shift. However, a controller may work eight hours in one shift, followed by three hours off and then work another eight hour shift in the same calendar day.

1.47 During the course of the investigation the IIC spend some time in the Westfield Train Control Office observing operations on both the North and South Desk during the day shift.

Procedures for protecting track workers

1.48 The TCO stated that he had been distracted by a change in the system of tagging stations to protect track workers. This system was used, either at a Signal Box or in Train Control, to protect particular signals by making it physically impossible to change the signal aspect. Until the TCO went on leave this was achieved in the Auckland Train Control Office by using yellow tags which were placed behind the appropriate station select buttons. The tags were kept in a specific location on the Train Control desk. During his absence on leave the Signalling Technicians had changed the tags to clear plastic cylinders which fitted over the station selectors and achieved the same end result as the yellow tags, without causing wear and tear on the selector buttons. The TCO was not advised of the change on his return from leave. These protectors were not used on the North Desk as there were no signals to protect in TWC territory and the TCO stated that his first perceived need for a tag was at 0942 hours on 10 May when the Senior Track Maintainer telephoned him (refer paragraph 1.2).

1.49 When he looked for the yellow tags in the normal place they were not there. He was unaware of the change to clear plastic cylinders (which were at the time kept above desk level on unused buttons) and after looking around and not finding the tags he continued with his duties.

1.50 Although the use of "labels or collars" was a Tranz Rail requirement in CTC areas when berthing HRVs on the loop to allow trains to pass (Rail Operating Code, Section 6, 11.1.8) or if an HRV user was told that a train would be held at a station until they arrived (11.1.3) Tranz Rail advised that they were not a mandatory requirement in the case of the St George's Street sequence of events. However the practice of the TCO, and indeed general practice, appeared to have been to use them in such situations. The TCO in question considered their use was intended for just such a scenario and that any non-use would have resulted in appropriate follow up.

2. Analysis

2.1 The cause of this incident was the TCO's action in setting up the route for Shunt L8 to Avondale without checking his Train Control Diagram for any authorised conflicting movements or obstructions. By referring to his diagram he would have been able to ensure that no trains conflicted with such movements as required by Rail Operating Code, Section 6, 11.1.8.

2.2 The incident occurred at 1009 hours at which time the TCO had been on duty for approximately three hours and 20 minutes. Although he had worked a 13 hour 15 minute shift the previous day, which finished at 1930 hours, the 11 hour gap between shifts allowed a significant break and compares favourably with practices referred to in paragraph 1.46.

2.3 There appears little doubt that the TCO was aware of the pressure of the South Desk workload during the morning and his ability to respond to that pressure and work confidently had been affected by the five week gap since his last South shift.

2.4 The TCO's perception that his certification was hurried and the lack of any additional South Desk training between 31 January and 9 February focussed attention on his readiness for certification on the South Desk.

2.5 The TCO's South certification followed repeated assessment. The relevant assessment sheets showed a detailed assessment had been made over a four hour period in each case, with explanatory remarks covering deficiencies noted on 31 January 1996. Although in retrospect the TCO considered his certification was hurried, and had raised doubts as to his readiness, his action in not signing the declined certification of 31 January indicated this was not his view at the time.

2.6 Although no additional training on the South Desk was given between 31 January and 9 February it is considered this did not necessarily imply certification could not be given on 9 February. The remarks on the 31 January declination indicated areas of improvement were needed in attitude and application rather than knowledge as reflected in the fact that the TCO did not fail any category; the annotations being "needs attention". It is likely that this was the reason for the TCO declining to sign the assessment sheet, as supported by the comment recorded. (Refer paragraph 1.29.) Again the impression that the TCO had the knowledge necessary, when assessed on 31 January, but required improvement in the manner in which it was applied, is supported by the comment on his eventual certification. (Refer paragraph 1.30.)

2.7 The certifying officer was a senior and experienced Tranz Rail Manager who was fully aware of the TCOs previous background in Train Control, both in Taumaranui and Auckland. He was also fully aware of the staffing situation at Auckland and its relativity to roster demands and the anticipated shift to Wellington. All indications were that these factors were given full and balanced consideration before the TCO was certified and it is considered there is no reason to doubt the suitability of the certification he received.

2.8 Other factors relevant to the recent certification were the short exposure to the South day shift between 9 February 1996 and 6 April 1996 and the four weeks leave taken, involving a five week gap in South duties, before the day of the incident. It is likely that the TCO was less capable of coping with the demands of the South Desk on 10 May 1996 than on his day of certification, an opinion which he supported.

2.9 The fact that the average hours worked by the TCO per *full fortnight* and the maximum number of consecutive shifts were the lowest of the group of six (refer paragraph 1.41) can be compared to his statement that he felt he was working excessive hours in total, and too long without rostered breaks. In general his concerns do not appear to have been shared by the remainder of the Auckland TCOs. However, this needs to be viewed in the context of a small, motivated group

who were apparently prepared to sacrifice their RDOs to ensure full manning of the Auckland Office without calling on external relief. The remuneration from the extra hours worked could have been an important consideration in this level of acceptance.

2.10 While there is no evidence that the hours worked by the TCO influenced the circumstances on the day of the incident such a link can not be dismissed. Train Control duties are demanding. They rely on detailed procedures and require the TCO to be alert at all times to respond to changed circumstances.

2.11 Comparison with the overseas practices outlined in paragraph 1.46 should be made with care as the operating conditions and specific workloads vary greatly. An example of the effect of this can be seen in the Tranz Rail Auckland Office. Extended shifts of up to 13 hours 15 minutes were worked only on the North Desk. A nominal maximum shift of nine hours 15 minutes applied to the South Desk and this was not generally extended. However, of note in the New South Wales practice is the concept of distinguishing between "board" and "non-board" duties, a concept which may have application to Tranz Rail's operations from the new combined Wellington Train Control Office.

2.12 The change of procedures for protecting track workers without specific advice to the TCO had the potential to cause confusion and omissions. Tranz Rail stated such procedures were not a requirement for the type of movements being made on the morning in question although this was not the TCO's perception. For the incident under investigation, the procedure in place to avoid the conflict that occurred was the requirement to refer to the Train Control Diagram before authorising the progress of Shunt L8. However it appears the use of "labels and collars" in such circumstances was common and the TCO believed they were a requirement. It is considered that the Steering Committee referred to in paragraph 4.2 should include clarity as to the circumstances in which "labels and collars" should be used, and possible extension of those circumstances, within their brief.

2.13 All Train Control Offices are interactive control centres with a range of stimuli to which the TCO must react. While the environment is demanding and interruptions can and do occur there appeared to have been nothing unusual on the day in question which should have unduly distracted the TCO.

2.14 The consequences of this head-on collision were fortuitously limited by the good views available. Had collision occurred some 600 m further north it is highly likely a more serious outcome would have resulted.

3. Findings

3.1 Shunt L8 was being operated normally prior to the incident and the LE was appropriately certified for the duties being carried out.

3.2 HRV 62125 was being operated normally prior to the incident and the employee in charge was appropriately certified for the duties being carried out.

3.3 The maintenance work at 18.23 km NAL was appropriately organised and protected.

3.4 The TCO set a route for Shunt L8 which conflicted with the progress of HRV 62125 and the maintenance work at 18.23 km.

3.5 The formal procedures in place to prevent such a conflict were adequate if complied with. The collision would have been averted through the standard practice of checking the Train Control Diagram.

3.6 The additional procedure of using "labels and collars", if available to the TCO, could have avoided the consequence of the non-compliance referred to in 3.5.

3.7 A combination of the TCO's lack of experience on the South Desk and lack of continuity due to recent annual leave placed him under additional pressure in coping with the recognised high workload of this desk and may have contributed to the incident.

3.8 Although the TCO was not given any additional "training" on the South Desk between 31 January 1996 and 9 February 1996 there is no reason to doubt the suitability of the certification he received on 9 February.

3.9 The TCO's recent return from leave and the relatively few shifts worked prior to the incident do not support his perception that excessive work hours contributed to the incident, although in view of the 13 hour 15 minute shift worked on the preceding day, such a connection cannot be discounted.

3.10 The work environment of the South Desk at Auckland was typical of such work stations in Train Control Offices and did not contribute materially to the incident.

3.11 Although the TCO stated that he was suffering from influenza, he was not on any medication which would have affected his performance.

4. Safety Recommendation

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

> Review procedures and contingencies for rostering Train Control Officers, with particular regard to defining maximum shift hours and maximum hours between breaks, and make appropriate provision for certified relief staff. (022/96)

4.2 Tranz Rail responded:

> Tranz Rail has formed a Train Control Consolidation Steering Committee and part of their brief is to review procedures and contingencies for rostering Train Control Officers.

5. Safety Action

5.1 Prior to the incident Tranz Rail were reviewing HRV track inspections south of Waitakere due to the difficulties being experienced in obtaining sufficient on-track time for the hi-rail vehicle to carry out these during week days because of the train timetable in operation at the time. They have since revised the procedures to ensure that all HRV movements are now restricted to Sundays bringing the operation into line with similar activities carried out in the rest of the Auckland suburban network. This had the effect of reducing the workload on the South Desk during the busy mid-week day shifts.

11 December 1996

M F Dunphy
Chief Commissioner

Appendix 1

Selected extracts from the transcript of the Train Control tape of Friday 10 May 1996 related to events prior to collision.

Extract 1 A

(Approximately 0942 hours)

Phone rings:

TC:	Ah, gidday Train Control.
Senior Track Maintainer (STM):	Yeah, Arnold subby has just gone past St George heading north, Want to get a bit of track time here concerning that crossing, over.
TC:	Are you there mate. Yeah, what, um, whereabouts exactly are you?
STM:	Ah.
TC:	What metrage are you at?
STM:	18.2.
TC:	Yeah, 18.2. So you are between Avondale and, ah, New Lynn are you?
STM:	Yes.
TC:	You are at the 18.2 and you have had a subby just pass you on the, um, on the Up have you.
STM:	Ah.
TC:	From Auckland going, going towards Waitakere. Passed you on the Up has he?
STM:	Yep, yep.
TC:	Ok, now you are at the 18.2. How long are you wanting?
STM:	Ah, well, how long can we get?
TC	Time's 9.43. Understand 2114 has passed you on the Up. I will draw you in now at the 18.2 between Avondale and New Lynn and, um, I will draw you on till, ah, 10.15, so you have got half an hour at this stage, eh.
STM:	Oh yeah, well how does 10.20 sound?
TC:	Eh? Yeah 10.20 sounds OK, yep. Draw you clear at 20 mate.
STM:	And our next train is the return of that subby is it?

TC:	That is the return, return of the subby, yep.
STM:	Yeah, OK then.
TC:	OK!
STM:	Yeah, we are right.
TC:	OK ta..

Extract 1 B

TC:	Control 62125.
Ganger:	Yes, Control it is (Ganger's name) at the 24.1 between Sunnyvale and Glen Eden. After the next, next North bound subby has passed me I would like to get on track here and travel through to the 17.5 between Avondale and New Lynn until 10.20, over.
TC:	Ah, yeah 62125. What metrage are you going to put on again at, ah?
Ganger:	At 24.1 between Sunnyvale and Glen Eden, over.
TC:	Yeah, time is 9.45, that 2114 is, ah through Avondale heading up towards Henderson there. Once he has passed you there you can hop on at the 24.1 and I will give you through till, ah, 10.20 off and clear at the, ah, 17.5 between Avondale and New Lynn and just watch out for the boys working at the 18.2 on the way through, the 18.2.
Ganger:	Roger Control. I will watch out for the jokers working at the 18.2. 62125 out.

Extract 1 C

TC:	Who's there?
Otahuhu Box:	Otahuhu.
TC:	Otahuhu.
Otahuhu Box:	L8 20 crossing Hendy.
TC:	L8 at 20 crossing to Henderson? Yeah, he can go.
Otahuhu Box:	Thank you.
TC:	Ta.

(Extract 1A to 1C were part of a continuous transcript. Unrelated communications from here to the commencement of Extract 2 are excluded)

Extract 2 - (commencing approximately 1000 hours)

Newmarket:	Newmarket.
TC:	Newmarket.
Newmarket:	2114 19/20.
TC:	Yep.
Newmarket:	111 26/28.
TC:	Yep.
Newmarket:	2113 52/54.
TC:	Yep.
Newmarket:	L8 at 56.
TC:	L8 at 56 thank you, good as gold.
Newmarket:	OK.