Special Commission of Inquiry Into the

Glenbrook Rail Accident

Interim Report

June 2000

The Honourable Peter Aloysius McInerney

Special Commission of Inquiry into the Glenbrook Rail Accident

6 June 2000

His Excellency the Honourable Gordon Samuels A.C., C.V.O.
Governor of the State of New South Wales
Office of the Governor
Macquarie Street
SYDNEY NSW 2000

Your Excellency,

I was appointed by Letters Patent issued on 9 December 1999, and varied by Letters Patent issued on 14 April 2000, under the authority of the Special Commissions of Inquiry Act 1983 to inquire into and report to Your Excellency on the following matters:

1. The causes of the railway accident at Glenbrook on 2 December 1999 and the factors which contributed to it;

2. The adequacy of risk management procedures applicable to the circumstances of the railway accident; and

3. Any safety improvements to rail operations (including any relevant structural changes) which the Commissioner considers necessary as a result of his findings under matters 1 and 2 and as a result of consideration of the reports of the rail safety investigations and any coronial report into railway accidents at:

   - Redfern on 6 April 2000
   - Hornsby on 9 July 1999 and 11 January 2000
   - Olympic Park on 2 September 1999 and 14 November 1999
   - Waverton on 20 December 1999
   - Kerabee on 18 August 1998 and
   - Bell on 15 October 1998.

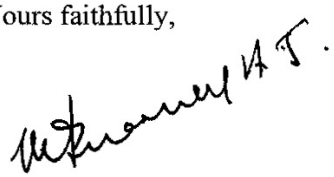
By the said Letters Patent it was declared that sections 22, 23 and 24 shall apply to and in respect of the Special Commission the subject of Your Excellency's Letters Patent.

The Letters Patent, as so varied, stated "AND OUR further will and pleasure is that you do deliver any interim report and your final report in writing of the results of your inquiry as expeditiously as possible, but in any case on or before 31 August 2000, to the office of Our Governor in Sydney".

I have not completed my inquiries, however, I have prepared an interim report in relation to the first matter into which I was asked to inquire and report upon to Your Excellency, namely, the causes of the railway accident at Glenbrook on 2 December 1999 and the factors which contributed to it.

I present my interim report on that matter for Your Excellency's consideration.

Yours faithfully,



The Honourable Mr Acting Justice Peter Aloysius McInerney,

FRONTISPIECE

Aerial view of accident location

TABLE OF CONTENTS

PHOTOGRAPHS AND DIAGRAMS

1. Procedural History

By Letters Patent issued on 9 December 1999 and varied by Letters Patent issued on 14 April 2000, I was appointed as a Commissioner under the Special Commissions of Inquiry Act, 1983, to inquire into and report to the Governor on the following matters:

1. The causes of the railway accident at Glenbrook on 2 December 1999 and the factors which contributed to it;

2. The adequacy of the risk management procedures applicable to the circumstances of the railway accident; and

3. Any safety improvements to rail operations (including any relevant structural changes) which the Commissioner considers necessary as a result of his findings under matters 1 and 2 and as a result of consideration of the reports of the rail safety investigations and any coronial report into railway accidents at:

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The Letters Patent, as so varied, stated "AND OUR further will and pleasure is that you do deliver any interim report and your final report in writing of the results of your inquiry as expeditiously as possible, but in any case on or before 31 August 2000, to the office of Our Governor in Sydney".

By Instrument of Appointment dated 10 December 1999 Christopher Thomas Barry QC and David Cowan were appointed by the Attorney General as Counsel Assisting.

Following the placement of advertisements and the sending of letters to interested parties the Commission sat for the first time on 22 December 1999 and applications were received for leave to appear at the hearing of the Special Commission of Inquiry.

On that occasion leave to appear was given to Rail Access Corporation, Mr Kevin Sinnett, Mr David Clarke, the State Rail Authority of New South Wales, the Director General, Department of Transport, Rail Services Australia, Great Southern Railway, National Rail Corporation Limited, the Legal Representation Office on behalf of the relatives of the deceased and the injured passengers and the Australian Rail, Tram and Bus Industry Union, New South Wales Branch, and the members of that trade union other than those separately represented.

This interim report deals only with the causes of the railway accident at Glenbrook on 2 December 1999 and the factors which contributed to it.

Leave was given to the various organisations because they each had a role to play in the subject accident. The State Rail Authority is responsible for the operation of the inter

urban train as well as providing the train control and signalling functions. The latter two functions are provided under contract to Rail Access Corporation.

Rail Access Corporation is responsible for the track and signalling infrastructure and the operating procedures which are referred to as safeworking units.

Maintenance of the infrastructure and signalling systems is performed by Rail Services Australia under contract to Rail Access Corporation.

Great Southern Railway is the operator of the Indian Pacific Train. National Rail Corporation Limited provided the locomotive and locomotive drivers under contract to Great Southern Railway.

The Department of Transport is responsible for administering the Rail Safety Act 1993. As such the Department of Transport is the regulator of rail safety in New South Wales.

Subsequently, leave to appear was given on 21 February 2000 to David Willoughby and Peter Marshall, Michael Vincent Browne and Damien Mulholland to enable them to be separately represented at the Special Commission of Inquiry.

A list of the legal representatives of the parties who appeared in the first stage of this Inquiry is annexure A to this interim report.

On 22 December 1999 directions were given for the conduct of the hearing. Annexure B to this interim report contains the directions that were then made.

Following the directions hearing on 22 December 1999 the Chief Justice made Court 10A of the Supreme Court available to the Special Commission. Without the Chief Justice making available a court room of sufficient size to accommodate all the legal representatives, it would not have been possible for this public inquiry to have proceeded as expeditiously as it did. I am grateful to the Chief Justice for his assistance and co-operation in that regard.

Given the number of parties, legal representatives and documents, it was necessary for the court room to be equipped with information technology facilities and for real time transcript. This project was undertaken during the court vacation by Ms Janine Taggart of the Supreme Court staff and I am grateful to her for the effort she made in having the court room equipped and ready for the commencement of the hearing.

A second directions hearing was held on 27 January 2000 and on that occasion the hearing was fixed to commence on 14 February 2000.

Except for two days upon which inspections were conducted, and one day allowed for counsel for the parties to prepare oral submissions, the Special Commission sat continuously from 14 February 2000 until 19 April 2000 when I adjourned for the purpose of preparing this interim report.

The Special Commission of Inquiry attracted considerable public and media interest and a large number of persons was present in the public gallery of the court room, particularly in the early stages of the hearing. In view of the public interest, evidence from witnesses

was taken orally rather than by the tender of written statements, so that all parties and other interested persons could follow the proceedings. This also had the advantage that where there were likely to be disputed questions of fact the process of examination provided the most reliable means of trying to ascertain the truth. Facilities were made available for the media in a separate room adjacent to the court room with a video monitor, real time transcript, copies of the exhibits and a hard copy of the transcript.

Evidence was taken from the witnesses in the order of their involvement in the accident and its aftermath. Accordingly, evidence was taken from the train driver who last drove through the area of track with a clear passage, then from the crew of the Indian Pacific, the signallers at Springwood and Penrith, the train controller, the crew of the inter urban train which collided with the Indian Pacific, followed by police and passengers from the trains.

At the conclusion of that lay evidence, I then heard evidence in relation to the investigation of the signal fault which commenced the chain of events leading to the collision; the communication systems; the braking systems on the inter urban train; and the training and instruction of the train crews.

I heard evidence from 96 witnesses and admitted into evidence 92 exhibits. Annexure C to this interim report is an alphabetical list of witnesses.

After hearing the evidence of the factual and expert witnesses, I heard oral submissions from counsel for the parties and then adjourned for the purpose of preparing this interim report.

I was impressed by the evidence of many of the passengers about the way in which they supported and cared for each other after the accident. In particular, I should mention Mr Robert Stoyef who climbed over the roof of the inter urban train, with electrical wires damaged by the impact in the near vicinity, for the purpose of obtaining access to the front carriage to try to save or assist persons located in that section of the carriage. Unfortunately, his courageous acts and those of other passengers were to no avail since each of the deceased died immediately upon impact.

It is usual in Inquiries of this nature for the terms of reference to include the adequacy of the emergency response. In the present case there was little, if any, complaint about the emergency services. I heard evidence about the speed and efficiency with which the emergency services went about their respective tasks. The only criticism that was made was that some greater steps could have been taken to shield injured passengers from the sight of deceased persons and to spare them the long walk from the site of the accident to Glenbrook railway station where their details were recorded.

I also note at this stage that although criticism is later made of the conduct of Mr Browne, the train controller at West Control, and Mr Mulholland, the signaller at Penrith, in the events leading up to the accident, the response by Mr Browne, Mr Mulholland, and the train crews after the accident was quick and effective. It prevented the disaster from being even worse than it was by taking appropriate steps to protect both railway lines, to stop a train approaching from Lapstone and to stop trains following the two damaged trains from being involved in the accident.

A number of witnesses indicated that they were unwilling to give certain evidence unless compelled to do so and I afforded them, on the applications of their respective counsel, the protection conferred by section 23 of the Special Commissions of Inquiry Act whereupon they answered the questions asked of them. In the absence of the powers conferred by that Act, it would not have been possible to identify all the causes of the accident and the factors contributing to it because a number of important witnesses would have claimed, as was their right, privilege from incrimination.

The evidence and submissions from the hearing relating to the first matter into which I was asked to inquire and report occupied 3415 pages of transcript.

On 28 February 2000 I conducted an inspection of that part of the Train Control Centre at Central terminal known as West Control, Illawarra Control and Metropolitan Operations Control. On the same day I also inspected the Indian Pacific train and an inter urban train stationary at Central railway station.

On 29 February 2000 I conducted inspections of the Springwood signal room, the Penrith signal box, the former Glenbrook signal room, the track in the vicinity of Glenbrook railway station and signals 41.6 and 40.8.

Not all legal representatives were present with me at the time of these inspections, because it was not physically possible to accommodate them in the cabins of trains or in signal boxes or rooms. However, I understand that any party or legal representative who wished to inspect these places had the opportunity to do so. Counsel Assisting indicated, in the hearing, what had been done and transcripts of the inspections were prepared, published, and tendered as exhibits.

Having reviewed the oral evidence, the exhibits and having heard the submissions of counsel I will set out my findings about the circumstances of the accident before dealing specifically with its causes and the factors which contributed to it.

2. Introduction

At 8:22 am on 2 December 1999 a State Rail Authority inter urban train collided with the rear of the Indian Pacific tourist train. The accident occurred on the main western line east of Glenbrook railway station, in the Blue Mountains west of Sydney. The Indian Pacific was on the last leg of its journey across Australia from Perth to Sydney, while the inter urban train, which originated in Lithgow, was conveying commuters to Sydney.

The accident occurred because a fault in an area of automatic signalling caused signal 41.6 just on the eastern side of Glenbrook railway station, and the next signal at 40.8, to go to the red or stop position. As the signalling system was not functioning normally, control of train movements through the area was therefore managed by the signaller and drivers.

With the authority of the signaller at Penrith both trains passed the first signal. At the time it was not known that signal 40.8 was red. For reasons which will become clear in this interim report the Indian Pacific stopped at signal 40.8 in response to the red signal. Visibility of the rear wagon was restricted by the terrain. When the inter urban train was authorised to pass the failed signal 41.6 the driver and the signaller believed that the track ahead was clear of the Indian Pacific.

Figure 1 - Rear of the inter urban after collision

The rear wagon on the Indian Pacific was a car carrier wagon called a "motorail", which penetrated the leading carriage of the inter urban train for a distance of approximately 7.5 metres.

Figure 2 - View of Impact Point

Figure 3 - Side View of Impact Point

There were seven passengers and the driver in that section of the train. All seven passengers were killed instantly. The driver of the train avoided serious injury as he managed to flee the driving compartment and ran through part of the first carriage when a collision appeared imminent.

Dozens of passengers on both trains sustained injuries. Fifty one of those passengers required transportation to hospital by ambulance. There was extensive damage to both trains and considerable disruption to the rail network.

The accident occurred in a cutting through a sheer sandstone rock face, on a 270 metre radius curve in the railway line which was on a relatively steep grade of 1 in 60. The collision occurred in daylight hours on a fine clear morning. There is no evidence that weather conditions contributed to the accident.

The purpose of this interim report is to examine the circumstances surrounding the accident, to determine the causes of the accident and the factors which contributed to it, and to make interim recommendations pending the final report of this Special Commission.

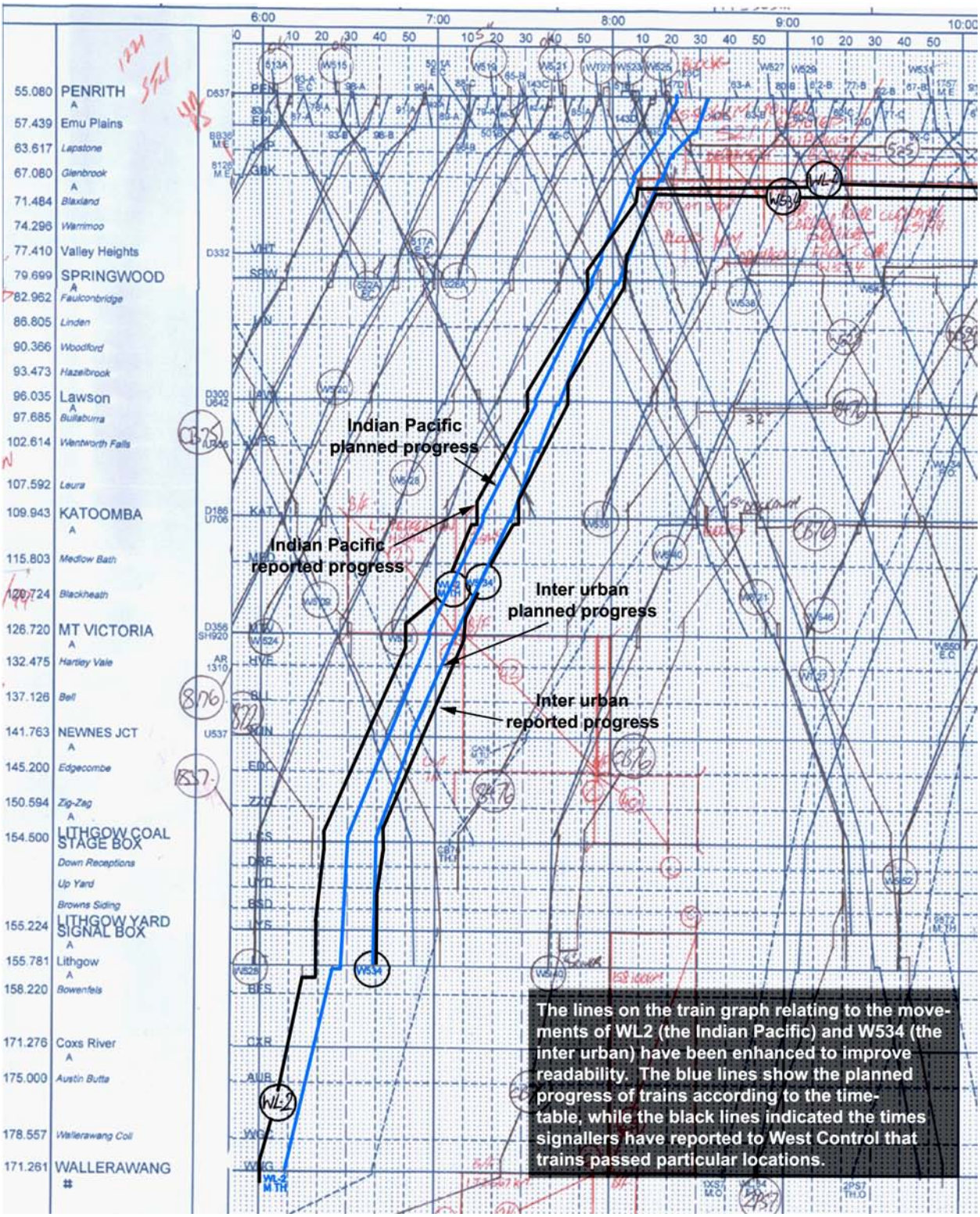


Figure 4 - Train Control Diagram

3. Train Recording

I have been assisted by a number of separate methods by which the positions of the trains at various times could be reliably ascertained. The most reliable piece of information that was placed before the Commission was the analysis of a data logger fitted to the Indian Pacific train.

This was a computerised system, similar to a black box flight recorder in aircraft, by which each movement of the train and essential components in the operation of the train were recorded. The times that these took place were calibrated, via satellite, to Greenwich Mean Time.

Mr David Edwards, the National Manager Safety, National Rail Corporation Limited performed an analysis of the material in the data logger relating to the movement of the Indian Pacific from Springwood railway station until after the accident. His evidence remained unchallenged and he described the way in which he performed this analysis. I am satisfied that his analysis is accurate and it provides the best evidence available in relation to the movement of that particular train. The data logger analysis became an exhibit in the hearing.

Another contemporaneous record was the closed circuit television video tape from Glenbrook railway station. The times shown on this tape do not coincide precisely with the data logger analysis but the difference is only a matter of seconds. The tape has been of considerable benefit in identifying the times at which the two trains arrived at and departed from Glenbrook railway station. It largely corroborates the material recorded in the data logger. However, where there are differences, I prefer the more reliable data logger analysis report to the closed circuit television footage.

The third source of information about the way in which this accident occurred is the tape recording of the conversations between the train controller at West Control, Mr Browne, the signaller at Penrith, Mr Mulholland, the signaller at Springwood, Mr Marks and the driver of the inter urban train, Mr Sinnett. The taping of those conversations provided a contemporaneous record of what was said. It also provided insight into what was in the minds of these persons at the time when these trains were being managed through the relevant area following the signal failure.

The fourth source of information upon which I have been able to rely for the timing of the events that occurred are handwritten records. These were created in two ways. First, there are recordings of train movements made in signal boxes in the form of a train register book. Secondly, there is a train control diagram prepared by Mr Browne. The relevant part of this document is reproduced in this interim report.

The train control diagram is a printed sheet and has on it blue lines representing where each train should be in accordance with the timetable. During the course of the train journey, the train controller receives information and with a pencil line adjacent to the blue line, is able to chart the progress of that train throughout the course of its journey and make any adjustments to other trains if that train is running late. It is an archaic method when one compares it with the sophisticated method on the Illawarra line which shows the movement of trains on a computer with the number of each train designated.

The train control diagram enables me to compare the information there recorded with the other sources of information.

The fifth source of information is the transponder records of the Metronet radio calls between the signallers, train controller and the driver of the inter urban train.

X1679L **TRACK BLOCK AND AUTOMATIC SIGNALLING AND BLOCK TELEGRAPH** 78

"TRAIN REGISTER BOOK", FOR DOUBLE LINES

Station..... PENRITH..... Date 2ND DECEMBER 1999. . **UP TRAINS**

TRAIN		TIMES OF SIGNALS FROM AND TO SIGNAL BOX IN REAR						TIMES OF SIGNAL TO AND FROM SIGNAL BOX IN ADVANCE						Trains delayed at Automatic Signals, and Signals worked by Accepting Levers		REMARKS
			REPLY SENT						REPLY RECEIVED							
Description as Signalled	No.	Is Line Clear or accept train described Signal received	Is Line Clear acknowledged or Accepting Lever pulled	Section Clear but Station or Junction Blocked	Train Departure received	Obstruction or Blocking Back sent	(a) Train Arrival or Obstruction Removed sent	Is Line Clear or accept train described Signal sent	Is Line Clear acknowledged or train accepted	Section Clear but Station or Junction Blocked	Train Departure sent	Obstruction or Blocking Back received	Train Arrival or Obstruction Removed received	Signal No.	Observer's message received	
		WEATHER FINE:- WARM.					POINTS & SIGNALS OK				TIME OK					
	73c		X EMU				549				550					
	83A					X 6014	N°1				604					
W	512						609				610				WO	
	67A					X 1645	N°1				615			1"		
	78A					X 3006	N°3				621			1"		
	93B		X EMU				630				631					
W	514						639				640			OK	WO	
	98A		X EMU				643				644					
	91A					X 5014	N°1				650					
W	518						655				656			OK	WO	
	42A					X 5006	N°1				705			4"		
	89A					X 4014	N°3				707			3"		
		89A 7.01AM.			NO GUARD.		92A. TO FORM		89A LIFTED UP		TO FORM 89A, 7.04AM.					
W	520						N°2				711			OK	WO	
	96B		X EMU				713				714					
	79A					X 4006	N°3				717					
	5010		X EMU				722				723					
W	524						N°2				729			1"	OW	
	88c					X	N°1				731					
	82A					X 5006	N°3				736			1"		
	52A						738				739			OK	OW	
	65c		X EMU				746				747					
	85A					X	N°1				750					X143
W	528						754				756			OK	WO	
	143D					X	N°2				812			3"		
		143D NO GUARD.					FORMED		84		151B					
W	532						813				814			OK	O	
		SIGNAL HI·6 AUTOMATIC AT GLENBROOK REPORTED														
		A FAILURE AT 8.10AM BY WL·2. WEST ADVISED														
		AT 8.12AM.														
	151c					X 6014	N°3				826			6"		X143 & 85A
		~~W537~~	~~RAN~~		~~UP~~	~~HI·2~~	W534				COLLIDED	IN	THE			
		REAR OF WL·2 AT GLENBROOK. CONFIRMED AT 8.35AM.														
		WEST ADVISED. 8.20AM.						WL·2	AND		W534 ADVISED		BY	SIGNALLER TO		
	147B					X	N°1				809				PASS	SIGNAL
	63B					X	N°3				850				HI·6	AT STOP.
W	527						911				FERM N°2		D/S			
	80c					X	N°1				909					
	62c					X	N°3				921			1"		

(a) When a train arrives at a Station and the "Train Arrival" Signal cannot be given at once in accordance with the Regulations, the actual time the Train arrived must be placed over the time the "Train Arrival" Signal is sent, thus: 9.30 / 9.35.

Bell Signals not provided for in the columns must be recorded in the Remarks column.

Figure 5 - Relevant page from Penrith train register book

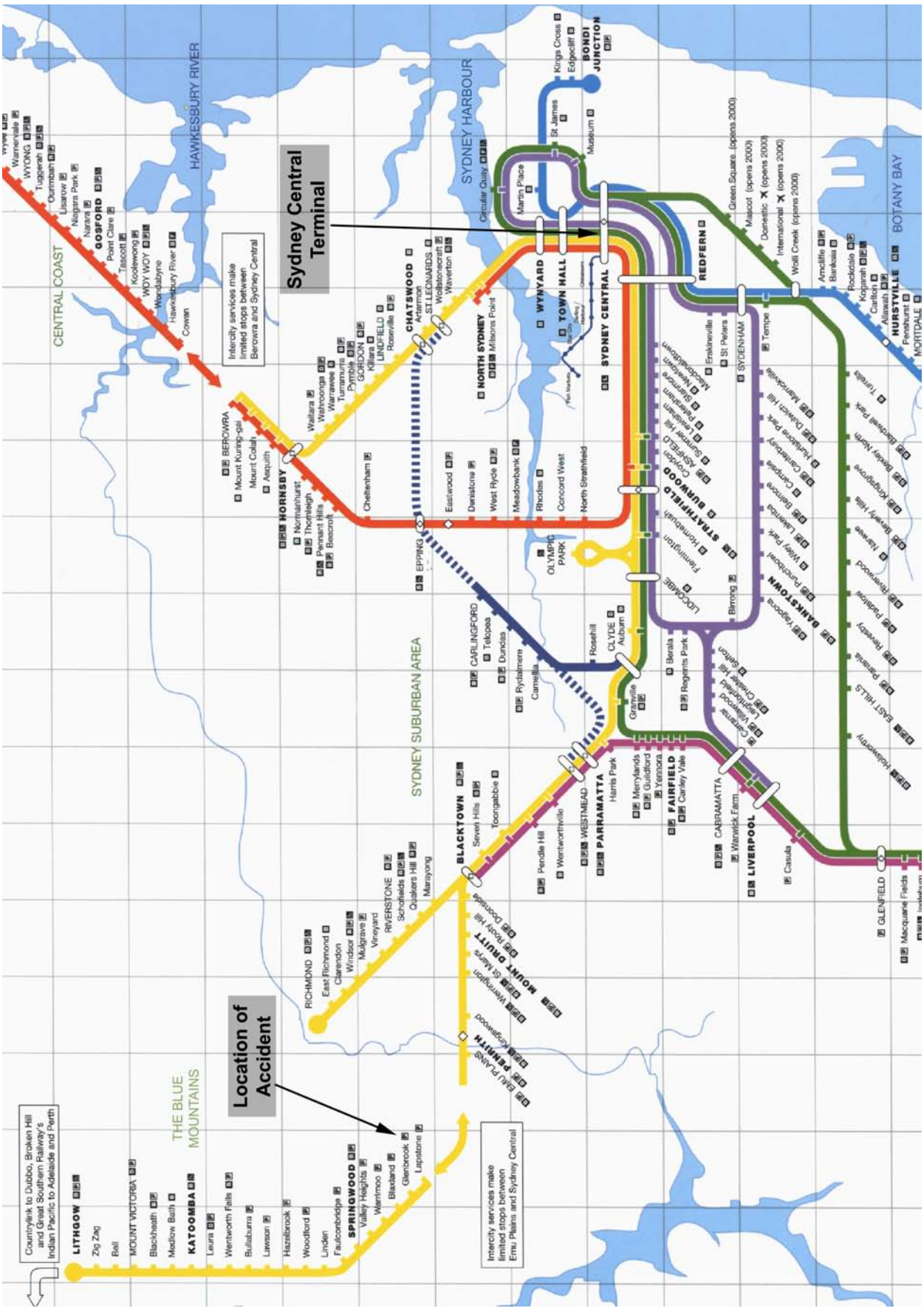


Figure 6 - CityRail Network Map

4. The Timing of the Collision

The Indian Pacific commenced its trans Australian journey on 29 November 1999. That train was known as WL2 in railway designation when it entered New South Wales. It runs twice a week, arriving in Sydney each Monday and Thursday morning. It was due to arrive at Sydney Central terminal on 2 December 1999, at 9:15 am.

Mr David Willoughby and Mr Peter Marshall took control of the train at Parkes in the early hours of the morning of 2 December 1999 to drive it on the last leg of its journey to Sydney. Mr Willoughby drove the train to Lithgow and Mr Marshall drove thereafter. During the time Mr Marshall was driving, Mr Willoughby took charge of communications.

The Indian Pacific was a long and heavy train. It weighed over 900 tonnes and was 426 metres in length. The train consisted of 17 wagons. The last wagon was a motorail. The train was hauled by a locomotive described as an NR class diesel locomotive.

The wagons on the train were owned by the Great Southern Railway which conducted the passenger service with its own crew. The locomotive and its crew were provided by National Rail Corporation Limited which was contracted to the Great Southern Railway under a "hook and pull" arrangement.

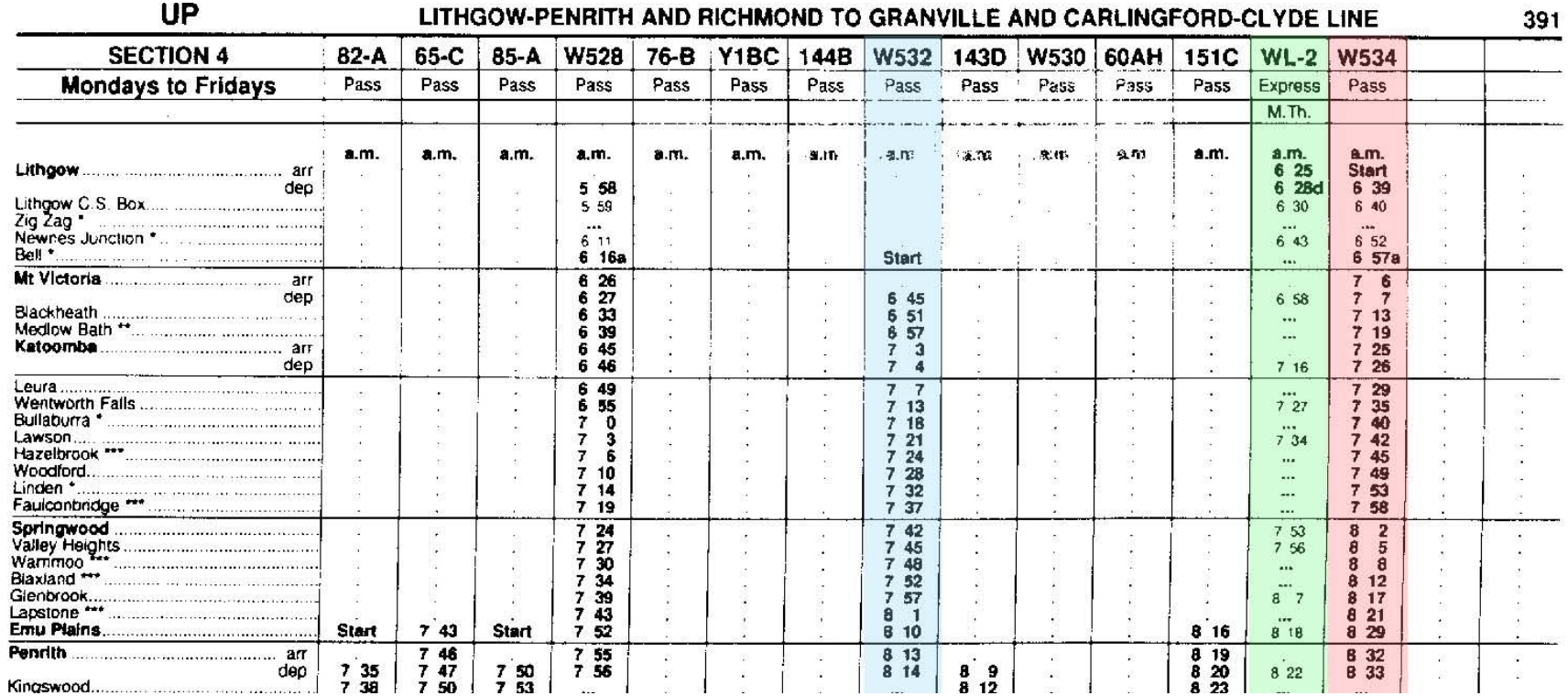
During the course of its journey from Lithgow the train passed through railway stations at Zig Zag, Newnes Junction, Bell, Mount Victoria, Blackheath, Medlow Bath, Katoomba, Leura, Wentworth Falls, Bullaburra, Lawson, Hazelbrook, Woodford, Linden, Faulconbridge, Springwood, Valley Heights, Warrimoo, Blaxland and then Glenbrook.

The line carried rail traffic in both easterly and westerly directions. The line towards Sydney is called the "up" main line. The line from Sydney in a westerly direction is called the "down" main line.

Along the section of track between Lithgow and Emu Plains there are signals which are designated by numbers which correspond with their approximate distance in miles from Sydney Central terminal. For example, in the section of track between Valley Heights and Warrimoo there is signal 46.6 indicating that that signal is approximately 46.6 miles from Sydney Central terminal. The signals on the up line heading towards Sydney end in an even number. Those on the down line proceeding away from Sydney end in an odd number.

It did not set down or pick up any passengers at any of the stations along the route. Prior to Glenbrook it was running ahead of the timetable. Its journey to that point had been uneventful except that signal 46.6 was at caution as the Indian Pacific approached. This led Mr Marshall to believe he may have been catching up to a train in front. However, it turned to green before the train reached the signal and the Indian Pacific proceeded to pass it.

According to the timetable the Indian Pacific was to pass Lithgow signal box at 6:28 am leaving a gap or headway, in railway parlance, of 11 minutes between the trains.



UP LITHGOW-PENRITH AND RICHMOND TO GRANVILLE AND CARLINGFORD-CLYDE LINE 391

SECTION 4	82-A	65-C	85-A	W528	76-B	Y1BC	144B	W532	143D	W530	60AH	151C	WL-2	W534		
Mondays to Fridays	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Express	Pass		
													M.Th.			
	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.		
Lithgow ..... arr													6 25	Start		
dep				5 58									6 28d	6 39		
Lithgow C.S. Box				5 59									6 30	6 40		
Zig Zag *				...									...	...		
Newnes Junction *				6 11									6 43	6 52		
Bell *				6 16a				Start					...	6 57a		
Mt Victoria ..... arr				6 26										7 6		
dep				6 27				6 45					6 58	7 7		
Blackheath				6 33				6 51					...	7 13		
Medlow Bath **				6 39				6 57					...	7 19		
Katoomba ..... arr				6 45				7 3						7 25		
dep				6 46				7 4					7 16	7 26		
Leura				6 49				7 7					...	7 29		
Wentworth Falls				6 55				7 13					7 27	7 35		
Bullaburra *				7 0				7 18					...	7 40		
Lawson				7 3				7 21					7 34	7 42		
Hazelbrook ***				7 6				7 24					...	7 45		
Woodford				7 10				7 28					...	7 49		
Linden *				7 14				7 32					...	7 53		
Faulconbridge ***				7 19				7 37					...	7 58		
Springwood				7 24				7 42					7 53	8 2		
Valley Heights				7 27				7 45					7 56	8 5		
Warrimoo ***				7 30				7 48					...	8 8		
Blaxland ***				7 34				7 52					...	8 12		
Glenbrook				7 39				7 57					8 7	8 17		
Lapstone ***				7 43				8 1					...	8 21		
Emu Plains	Start	7 43	Start	7 52				8 10				8 16	8 18	8 29		
Penrith ..... arr		7 46		7 55				8 13				8 19		8 32		
dep	7 35	7 47	7 50	7 56				8 14	8 9			8 20	8 22	8 33		
Kingswood	7 38	7 50	7 53	...				...	8 12			8 23	...	...		

Figure 7 - Portion of the State Rail Authority Working Timetable

It appears that the Indian Pacific left some six minutes earlier. The gap between the starting time of the inter urban train and the Indian Pacific at Lithgow was 17 minutes. The Indian Pacific was required to stop at Katoomba railway station to pick up a document described as a "warning to driver" which related to the condition of the track and the speed at which the Indian Pacific was permitted to pass through Woodford railway station. The speed was to be reduced to a maximum speed of 25 kilometres per hour. This reduced the gap between the Indian Pacific and the inter urban train.

The Indian Pacific was due to pass Valley Heights railway station at 7:56 am. It in fact passed at 7:51 and 40 seconds so at that point it was four minutes and 20 seconds ahead of the timetable.

Prior to reaching Glenbrook the driver of the Indian Pacific had expected signal 41.6 to be red because the previous signal 42.0 was in the yellow or caution position. The driver of the Indian Pacific thought that perhaps the train was catching up with the inter urban train W532 in front which was travelling from Mt Victoria to Sydney.

The Indian Pacific arrived at signal 42.0 just west of Glenbrook station at 8:02 and 9 seconds and, according to the data logger analysis report, it reduced its speed from 66 kilometres per hour to 39 kilometres per hour after passing signal 42.0. The Indian Pacific arrived at signal 41.6 and came to a stop at 8:04 and 1 second. Accordingly, it was almost three minutes ahead of the timetable at Glenbrook.

At signal 41.6, just east of Glenbrook railway station, the driver of the Indian Pacific telephoned the signaller at Penrith on the signal telephone and obtained authority to pass signal 41.6 in the stop position. The train departed that signal at 8.11 and 15 seconds. The train then proceeded at various speeds, the maximum being 18 kilometres per hour, until it arrived at signal 40.8, which was at stop, at 8.19 and 3 seconds. Here the train stopped. Thus, it took some seven minutes and 45 seconds to reach that position. The Indian Pacific took that amount of time to travel the distance from signal 41.6 to signal 40.8 because the driver of the train, as he understood the procedures, proceeded with extreme caution having been authorised to pass the previous signal in the stop position.

At that time the locomotive was in the vicinity of signal 40.8, but the trailing motorail was located in a cutting with a sheer rock face 426 metres behind the front of the locomotive. It was in a position where the rock face restricted the visibility of the motorail to the driver of a train approaching from behind. When the Indian Pacific stopped Mr Willoughby alighted from the locomotive and went to use the signal telephone at signal 40.8 to contact the signaller at Penrith.

At 8:22 and 2 seconds, after Mr Willoughby had unsuccessfully attempted to contact the signaller, the Indian Pacific began slowly to move off.

The other train involved in this accident was an inter urban train, designated W534. It was known as a four car V-set. It was 95 metres long and weighed 204 tonnes. It had commenced its journey from Lithgow to Sydney at 6:39 am. The driver was Mr Kevin Sinnett.

At approximately 8:20 am and 49 seconds, Mr Sinnett obtained authority from the signaller at Penrith, Mr Mulholland, also to pass signal 41.6 in the stop position. Had the inter urban train been running on time it would have been about to leave Blaxland just as the Indian Pacific left signal 41.6. The running time for an inter urban train between Blaxland and Glenbrook is five minutes. The inter urban train however was running three minutes behind schedule and arrived at Glenbrook at 8:20 am.

The Indian Pacific had been stationary at Glenbrook railway station for seven minutes and 14 seconds and took a further seven minutes and 45 seconds to travel from signal 41.6 to signal 40.8. Accordingly, the separation time between the trains was reduced to just over one minute when the inter urban train left Glenbrook railway station.

At 8:22 and 18 seconds the inter urban train W534 slammed into the motorail at the rear of the Indian Pacific.

Given the reduced separation time, the slow speed of the Indian Pacific, its position in the cutting and the speed at which the inter urban train proceeded from Glenbrook railway station towards the cutting, a collision of some violence was inevitable.

The relative positions of the two trains at various times has been plotted on a diagram against the scheduled timetable.

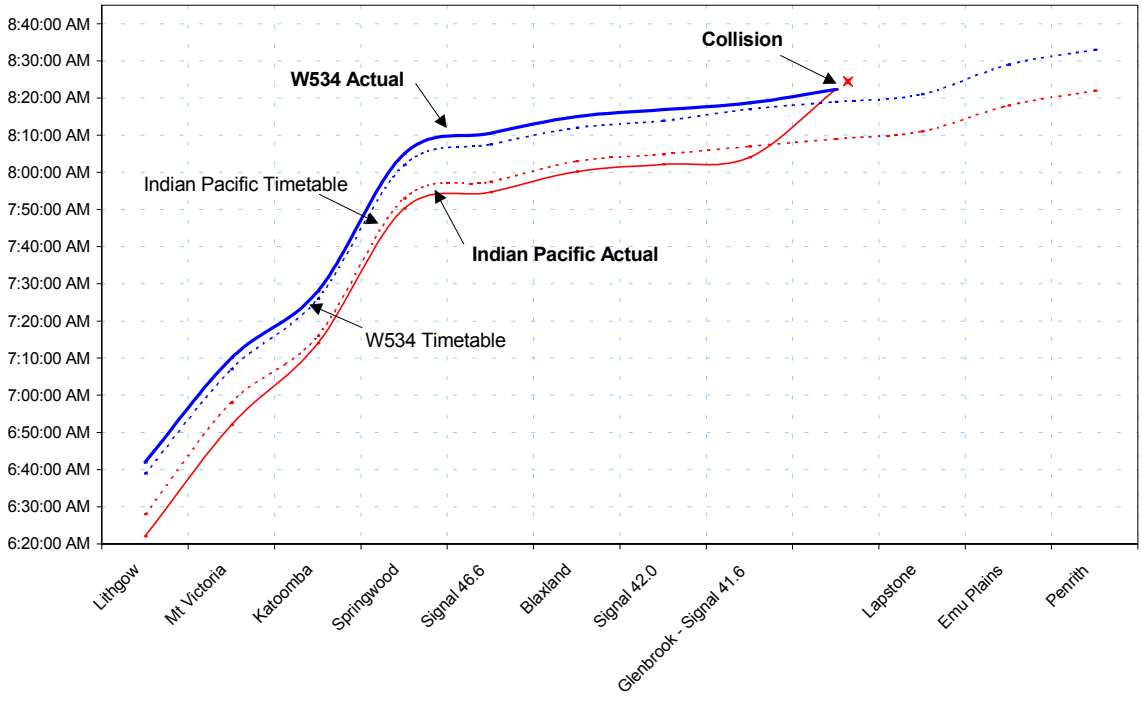


Figure 8 - Timetabled and Actual Train Movements - 2 December 1999

5. Signalling

There are two types of signalling systems in the Blue Mountains which are relevant to this Inquiry. Some areas of track are controlled by signallers setting the signals and track ahead of the train. In these areas the signal boxes are equipped with a board known as a train indicator board which enables the signaller to detect when a train enters and leaves the section of track he controls, as well as its progress through that section. The signaller is able to regulate the flow of trains, including the separation between them, by setting the signals on the route along which a train travels.

The other type of signalling is automatic signalling. With automatic signalling the signals are controlled by electronic circuits designed to sense the presence of a train in a particular length of track. When this circuitry detects the presence of a train it sets the signals behind that train to prevent another train entering that length of track.

The signalling system in the area where the accident occurred is an automatic one. This fact assumes major significance in this Inquiry. The particular section of automatic signalling ran from near Warrimoo, west of Glenbrook to an area known as Knapsack, which is just before Emu Plains.

The section of track where this accident occurred was in the control of the Penrith signal box. The Penrith signal box did not have a train indicator board covering the automatic section of track where this accident occurred and thus had no board to mimic the position of any train through the section of track between Warrimoo and Knapsack. The signaller had to rely on train timetables and any information he received from drivers, other signallers or from railway personnel to assess the position of trains in that section of track.

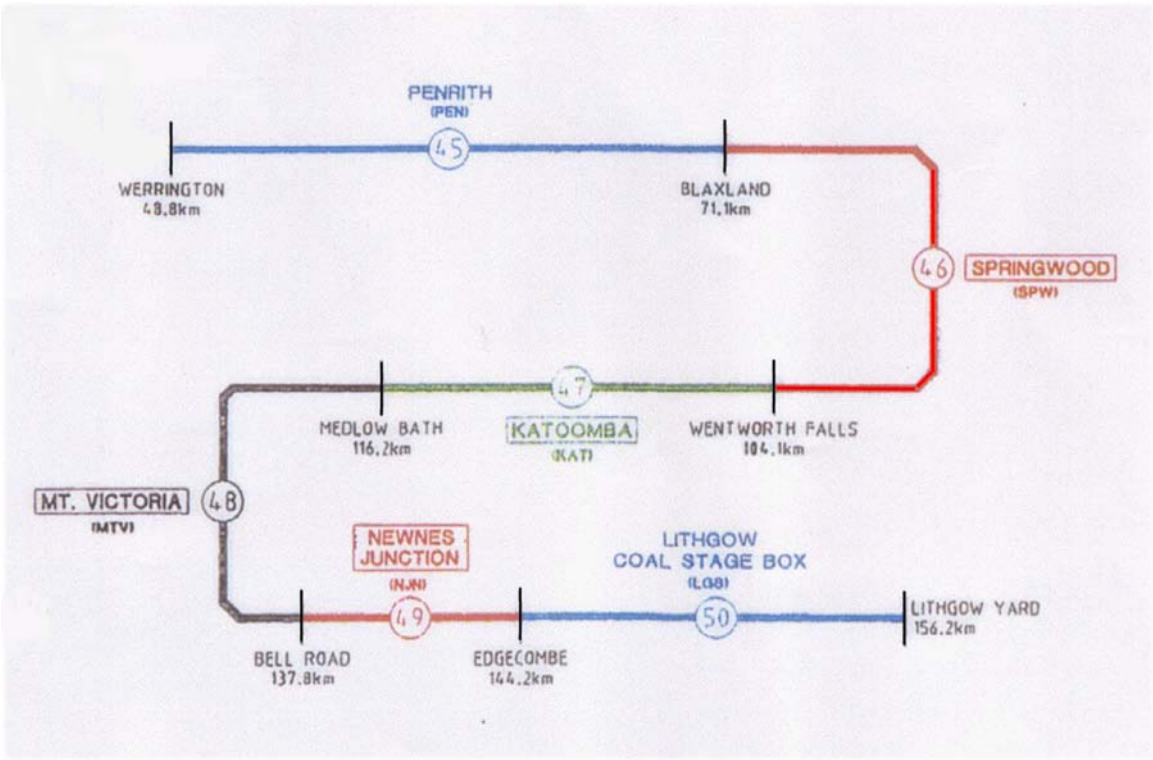


Figure 9 - Portion of diagram depicting areas under control of signal boxes

The geographical features, together with the absence of a train indicator board, made this area hazardous. It was described in evidence as a "dark area" or "no man's land", by which was meant that the signaller did not know, other than by the above means, the position of any trains in that section.

Evidence was given by Mr Alexander who in 1990, was the design manager for the State Rail Authority project known as the Signal Renewal Modernisation Project. It covered many areas of the State's rail system including the area between Emu Plains and Valley Heights, including the location of this accident. The project commenced after the State Rail Authority had received advice from an English authority known as London Transport about improving the signalling system in these areas within the CityRail network and the Authority was determined to renew certain parts of the Blue Mountains track.

Mr Alexander was asked why a train indicator board covering the area of the accident was not put in the Penrith signal box. His answer was that such boards were provided to give signallers information that they needed manually to control signals and points, but not automatic sections. That, he said, was the traditional practice and still is. He conceded however that, if required, a train indicator board could have been provided at Penrith signal box.

He said that in an automatic signalling section, if a signal fails then the operators have to rely on the relevant safeworking units. I gained the clear impression from this witness that he was not prepared to concede any deficiency in the system he installed. When questioned by Senior Counsel Assisting the Commission, he said he could not comment on whether the signaller was in a disadvantageous position because Mr Alexander did not know the safeworking units that applied. Then, not a page later, when further questions were asked about the desirability of some technological assistance to the signaller, his answer was that he believed the current safeworking units were adequate on the basis it appeared that the driver was to proceed with extreme caution.

More importantly, the deficiency in the signalling system to which his attention was being directed was that when the automatic signalling system failed to operate as an automatic system it operated as a controlled system. Yet the signaller did not have the assistance of a train indicator board to mimic the position of trains which he would have in a controlled signalling area.

Prior to the time of this upgrade trains used to terminate at Glenbrook. In order to allow trains to change from the down line to the up line there was a signal room at the station which controlled the signals and interlockings. There was also a train indicator board which indicated trains on the track approximately 400 metres on each side of Glenbrook railway station. When there was a train on the track, the lights on the board were extinguished to indicate the train's presence.

Mr. Higgins, the station master at Glenbrook thought the train indicator board had been removed in 1995, but in fact it was removed in 1990. At the time Mr Alexander was asked to redesign the signalling in the area, he was told that the only train terminating at Glenbrook was being phased out. As the only function of the train indicator board at Glenbrook railway station was to deal with that train, retaining the train indicator board would serve no useful purpose.

There was some evidence that if the train indicator board had been operating at the time of the accident, Mr Higgins, could have seen the Indian Pacific stationary and warned the inter urban train of its position. This is not correct. The train indicator board showed an area of about 400 metres to the east of Glenbrook railway station. It would not have shown the presence of the Indian Pacific, the rear wagon of which was located about 700 metres east of Glenbrook railway station. Furthermore, the train indicator board was not located in the station master's office but in another room. There was no requirement for it to be operational at the time of the accident.

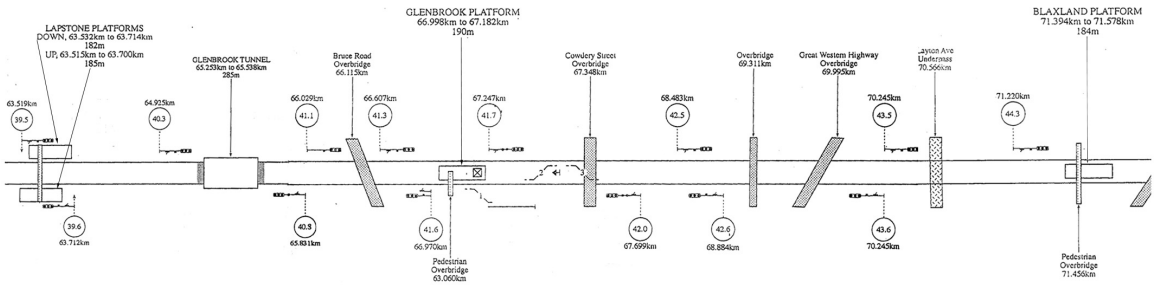


Figure 10 - Location of signals from Lapstone to Blaxland

In order to understand the signalling involved in this accident there are four relevant automatic signals on the up line that figure prominently. The first is signal 42.0 situated a few hundred metres west of Glenbrook railway station, the second is signal 41.6 situated just east of Glenbrook railway station. The third is signal 40.8 which is located approximately 1.1 kilometres east of signal 41.6. The fourth is signal 39.6 situated some hundreds of metres east of the Glenbrook tunnel and prior to Lapstone station. Glenbrook tunnel is another hazard to trains since it is unlit and has a bend within its confines.

It is axiomatic that the purpose of having signals on railway tracks is to keep trains safely apart. The automatic signalling is designed to control the separation of trains.

The signals in the area contain four lights. There are three lights vertically aligned which are capable of showing green, yellow or red. The green light is the topmost indication, the yellow light in the middle and the red light is at the base. There is a further light which is beneath, and offset from, the vertical cluster. This light when illuminated is red and is known as a marker light. When the signal shows a green light, this indicates the track is clear of any train or other obstruction between it and the next signal. A yellow light is a caution signal and indicates to a driver that the next signal he will encounter is likely to be red, the stop position. Thus the driver must proceed past the yellow light at a speed which will enable him to stop at the next signal. If the signal is at red that means there is another train or some other obstruction on the line ahead of the signal and the driver must stop his train before reaching the red signal.

The system is also designed so that if there is a failure of part of the signalling system, or a defect develops in any of the components, then the signals turn to the red or stop position. That is necessary because the alternative could be that signals could give a false indication of the condition of the track ahead.

The red marker light is designed to operate as a fail-safe system should the red light in the cluster fail. If the red marker light is the only light illuminated, it indicates that the signal is in the stop position and that one or more of the lights above has failed for some reason. When the signal is operating correctly both the red light in the cluster and the marker lights are red. By this means any indication other than a yellow caution light or a green light will require the train to stop. This is because the signal is in the stop position (red main light and red marker light) or one of the lights is defective (red marker light).

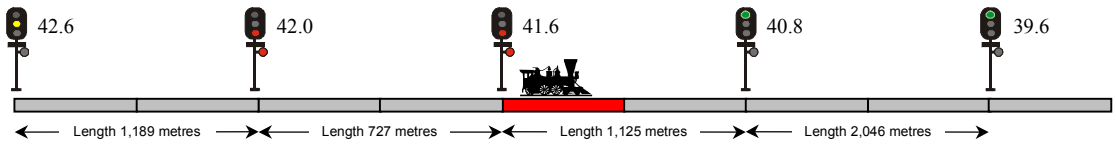
Figure 11 - View of Signal 41.6 showing position of marker light and signal telephone

It is unnecessary to go into elaborate technical details about how the signals operate. It is clear that there was a fault in one of the components of the system affecting signals 41.6 and 40.8 causing both those signals to go to red as the system was designed to do.

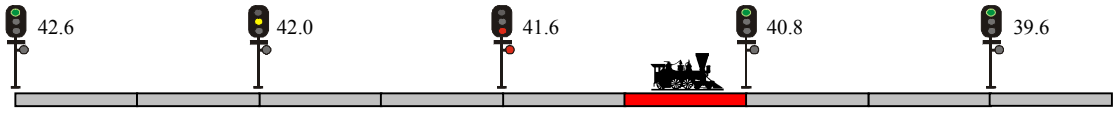
At the time the signal 41.6 went to red there was no train between them. The train preceding the Indian Pacific, W532, was well clear when the Indian Pacific arrived at Glenbrook railway station. It was not known at the time whether there was any other reason, such as an obstruction on the track, or a broken rail, that may have caused the signals to go to the stop position.

The automatic signalling system is designed on an overlap principle. This means that when a train has passed a signal it will be protected by at least one red signal and a signal at caution behind it. The overlap system provides an extra measure of safety by extending the train sensing circuit beyond the next signal.

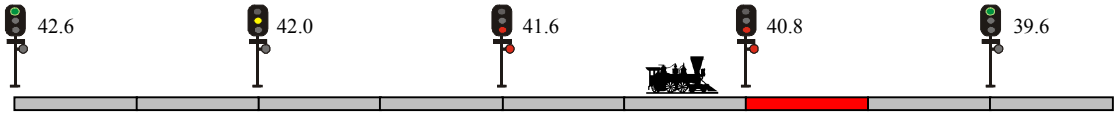
In general terms the signal system is operated by various track circuits. The track circuits, which were installed as part of the resignalling project in 1990, are audio frequency jointless track circuits. These circuits have a transmitter and receiver at either end of the length of the track which the circuit covers. The transmitter sends electrical current of a particular frequency down the rails and the receiver detects the presence of that particular frequency. When a train passes over a particular track circuit, the energised section is short circuited and the receiver no longer picks up the frequency. A signal relay is connected to the track circuit and when the receiver no longer picks up the frequency the relay turns the signals to red. Separation between adjacent track circuits is achieved by setting them to transmit a different audio frequency.



The train is positioned over the first sensing circuit for signal 41.6 and the overlap sensing circuit for signal 42.0. Consequently signal 41.6 shows a stop indication, signal 42.0 shows a stop indication and signal 42.6 shows a caution indication.



The train is positioned on the second sensing circuit for signal 41.6. Consequently, signal 41.6 remains at stop, signal 42.0 changes to a caution indication and signal 42.6 changes to a clear indication.



The actual situation on the day of the accident. The power supply failure caused the sensing circuit in front of signal 40.8, which is also the overlap circuit for signal 41.6, to act as though a train was present. This caused signals 40.8 and 41.6 to show a stop indication and signal 42.0 to show a caution indication.

Figure 12 - Diagram illustrating the operation of the overlap system

The overlap circuit is the first train sensing circuit of the next signal in the direction of travel. The length of each of these circuits varies. The total length of the track circuit for signal 41.6 and the overlap circuit for signal 41.6 is 1730 metres which will hold signal 41.6 at stop if any part of a train is present on any part of that length of track.

There is no dispute that at the time of the accident signal 42.0 was displaying a caution indication and that both signals 41.6 and 40.8 were at stop. However it was not known initially what the state of signal 40.8 was or whether the signal failure had been caused by a broken rail or some obstruction on the track.

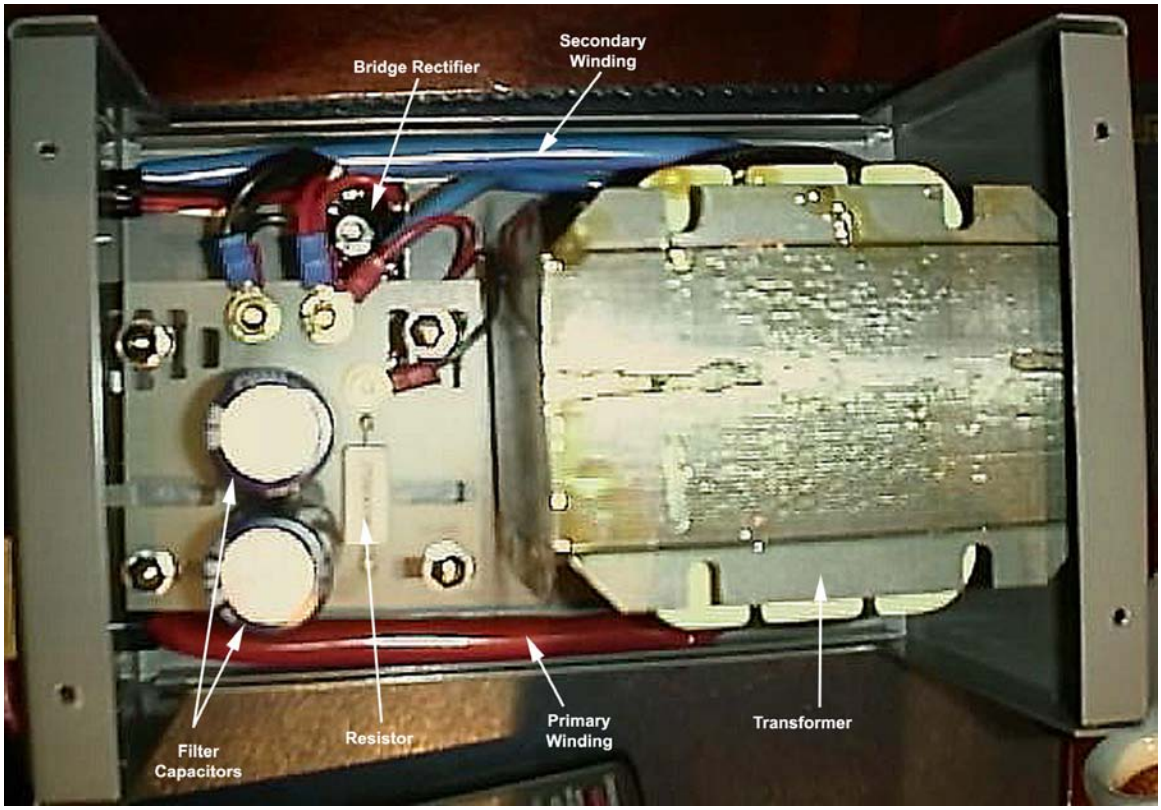


Figure 13 - Power Supply Unit similar to that which failed at Glenbrook

The reason that both signals 40.8 and 41.6 turned to red was that a fuse blew, which disconnected the supply of electricity to a track circuit for signal 40.8, which was also the overlap circuit for signal 41.6. Whilst that fault continued, the signals affected remained at stop even though there was no train in the section or any obstruction on the track. The fuse blew because a diode, which formed part of a bridge rectifier in a power supply unit, failed and the electrical circuit began to draw current in excess of the rating of the fuse causing it to blow. One of the functions of the power supply unit is to reduce the normal 240 volts supply to 120 volts, at the same time converting it from alternating current (AC) to direct current (DC). It is the bridge rectifier which performs the latter function. There are four diodes in the bridge rectifier.

The most important practical consequence for the running of trains when such a fault occurs in the signalling system in an automatic section of track is that the signalling system is no longer automatic and the movement of trains is managed by signallers and drivers.

The procedures that individuals are required to follow are set out in regulations referred to as safeworking units. A lot of hearing time was taken up by an examination of safeworking unit 245. Safeworking unit 245 is reproduced as annexure D to this interim report. This unit purports to set out the procedures to be followed by the signaller and the driver of any train proceeding through an area where an automatic signal is a stop. These procedures, and the communication of information between signallers and drivers, are the means by which the potential danger created by a train passing an automatic signal at stop is designed to be avoided.

Inter urban train W532 passed Glenbrook railway station at 7:57 am and encountered green signals at signals 41.6 and 40.8. The analysis of the data logger report from the Indian Pacific and the evidence of Mr Willoughby, which I accept, established that signal 42.0, just west of Glenbrook railway station, was in the caution position when the Indian Pacific passed that signal at 8:02 and 9 seconds. It follows that signal 41.6 must have been in the stop position at that time. By that time the previous train, W532, was well past the overlap section for signal 41.6.

It has not been possible to establish why the failure of the diode occurred during that particular five minute period. Mr Szacsvay, a senior engineer with Rail Services Australia, investigated the cause of the failure, and was of the opinion that the relevant power supply boxes were properly maintained. He said the component that failed was a completely enclosed unit which was usually very reliable. Furthermore, there was no means of inspection to determine if the bridge rectifier, which was part of a sealed unit, or any part of it was likely to fail. Mr Szacsvay postulated that lightning activity some ten days before the accident may have caused a weakening of the component leading to the failure some days later.

There is no evidence that the failure occurred because of a lack of maintenance or that the failure could have been anticipated. Furthermore, the component having failed, the signals operated as they were designed to do by going to stop. The only way it could be established that there was a signal failure was an investigation involving the removal and testing of the components, as was carried out by Mr Szacsvay several days after the accident. Even if this had been done shortly before the failure it would not have detected that a failure was about to occur. Although it was suggested that there could have been a back up power supply system this would have meant duplication to protect the circuitry against the possibility of an extremely rare failure in an otherwise reliable system. Such cost would not have been justifiable.

Accordingly, I find that there was no deficiency in the maintenance or operation of the signalling system which caused the accident. There is no mechanical or electrical system which is completely fail-safe and this one operated as well as could be expected except for the unlikely and unpredictable failure of the diode in the bridge rectifier.

6. Communications

There is no single integrated system which enables communications between the various trains, signallers and controllers involved in operations on the rail network. In the case of this particular accident there were five different communications systems which were involved, namely, three different two-way radio systems (known respectively as Metronet, Countrynet and WB or 450.50 radio systems), dedicated line telephones at the bases of signals, called signal telephones, and mobile telephones operating on either the GSM terrestial based network or by satellite. A brief description of each of these systems and the parties that had access to them is necessary to understand the role they played in the accident.

The Metronet system is a two-way radio system exclusively available to CityRail services. It came into operation in October 1998. It is designed to prevent third parties transmitting unauthorised messages across the system.

The Metronet system enables drivers to contact the signal box controlling the area in which the train is situated by simply pressing a button labelled "CS" (call signaller) on a console in the driver's compartment. The driver is also able to contact the train controller, but is unable to contact both the signaller and the train controller at the same time. Furthermore, the Metronet system was specifically designed not to permit driver to driver communication or to enable drivers to listen to communications occurring between signallers and other drivers.

The Metronet system does permit signallers or train controllers to broadcast messages of an emergency nature to all trains on that system within a particular area if this is necessary.

The Countrynet system is an open channel two-way radio system. Communications over this network can be heard and made by anyone who is within range to transmit or receive them. It is available to State Rail Authority Countrylink services, National Rail Corporation Limited services and other freight operators, such as FreightCorp in New South Wales. It is the principal form of communications for trains operating outside the Sydney metropolitan area.

The Countrynet system permits driver to driver communications. It was available to the signaller at Penrith and the drivers of the Indian Pacific. The drivers of the Indian Pacific could communicate with the nearest signaller within range by pressing a segment on a computer display in the locomotive cabin labelled "local".

The WB or 450.50 radio system is also an open channel radio system which was previously used by all trains prior to the introduction of the Metronet and Countrynet systems. It was discontinued as a primary form of communications between trains and signallers, apparently because it had a limited operating range and it was not secure. The system is, however, still in widespread use for localised communications between railway employees.

The WB system was available to the drivers of the Indian Pacific, the signaller at Penrith and the guard on the inter urban train. It was not available to the train controller.

Mobile telephones were available to the crew of the Indian Pacific and to any other person who had been issued with one by their employer or who carried one for his own personal use. The evidence is that only the drivers of the Indian Pacific and some railway staff responding to the accident had mobile telephones.

The locomotive hauling the Indian Pacific incorporated a sophisticated mobile telephone system. This system was designed to operate on the GSM terrestial based system, but if that was not available, then to initiate the call via satellite.

Signal telephones are situated at the base of each signal stand. They are connected by cable to the signal box with responsibility for that signal. Signal telephones are old technology and require the cranking of a handle in order to contact the signal box. All the signal telephones along a section of track are connected on a party line so that anyone using them can hear other conversations occurring on that line.

Under the existing safeworking units, once the Indian Pacific had passed Lithgow it was not permissible for it to communicate with the signal boxes by the train radio or telephone for the purpose of obtaining authority to pass a signal in the stop position. Only signal telephones or the Metronet system were approved for the purposes of obtaining authority to pass an automatic signal at stop.

If the driver of a train such as the Indian Pacific, which was not fitted with the Metronet system, wished to contact a signaller for the purpose of obtaining authority to pass automatic signals at stop he was required to use a signal telephone by virtue of the provisions of safeworking unit 245.

The signal telephones in the area were on a party line connected to the Penrith signal box. The voice communication was separately powered by a battery. The signaller was notified that someone wanted to speak to him on a signal telephone by a separate electrical circuit which was energised by the caller turning the handle on a magneto which sent an electrical current down the line. In practical terms, there was a buzzer that sounded in the signal box as well as a light on a console situated behind the signaller. There was another light on a console directly in front of the train recorder's seated position in the signal box. The train recorder assisted the signaller and recorded the movement of trains through the area. He sat on the other side of the console facing the back of the signaller.

Some of the signal telephones were equipped with a button in a collar with the phrase "press to ring" stamped on the collar. The telephones were enclosed in a box and when the box was opened what could be seen was the press to ring button, a hand piece and a handle on the face of the signal box. There were a number of photographs tendered of the relevant telephones situated at signals 41.6 and 40.8. These photographs show the outer casing of signal telephones 41.6 and 40.8 in their respective positions on the signal stands. Whilst most signal telephones have a press to ring button, it serves no purpose in contacting signallers.

The press to ring button originally had the function of making and breaking the ringing circuit of the telephone. Its original purpose was to enable a caller to send a coded sequence of bell rings to identify who the caller was endeavouring to contact. By

pushing this button in a predetermined pattern while cranking the telephone, a series of short and long rings would be heard in telephones connected to the line.

The buzzer in the Penrith signal box is designed to inform the signaller that there was a caller on the telephone. To make the buzzer operate, the handle of the telephone is turned and the greater the number of turns, the longer the buzzing sound.

A call from either signal telephone 41.6 or 40.8 is shown in the Penrith signal box as being a call from the up main line. For the signaller to speak to a person calling from a signal telephone he uses the hand piece which does not sit on a cradle, but lays on the desk in front of him.

To open the line between the signal box and the signal telephone, the signaller or train recorder presses the up main button on the control panel which is illuminated. That enables a conversation to take place between the signaller and the caller.

7. Safeworking Procedures

(i) Safeworking Unit 245

I have previously observed that in the automatic section of track where the accident occurred the means of moving trains through when a signal failure occurs changes from being an automatic system which is electronically controlled to a system controlled by signallers and drivers. Their conduct is governed by safeworking unit 245. This unit is reproduced as annexure D to this interim report.

This safeworking unit was amended in 1998 to allow the use of the Metronet radio to obtain authority to pass a signal at stop for those trains so equipped. All other trains must use signal telephones for that purpose.

There was considerable time devoted in the hearing to the requirements of drivers and signallers under the provisions of safeworking unit 245. Despite it having been in existence for over 30 years, different interpretations were offered as to the requirements imposed upon both drivers and signallers. It was conceded by Mr Garling for the State Rail Authority that the safeworking unit is confusing and needs amendment. He also conceded that it makes no provision for a second train passing the signal at stop.

Mr MacFarlane, the former Manager for Safeworking of the State Rail Authority, was involved in redrafting these safeworking units in the years between 1989 and 1992. The intention was to put the safeworking units into plain english. Mr MacFarlane had considerable experience in various aspects of railway operations but he had no training in drafting safeworking units and he had undertaken no course of study in drafting safeworking units. It appears, however, that safeworking unit 245 was not amended in any substantial way.

His view of safeworking unit 245 was that the signaller had one essential task, namely to determine, when a signal is in the stop position, whether the line ahead is occupied by a train or the signal has failed. The signaller is not required to consider any reason for the signal having failed such as a broken rail or other obstruction on the track. If there was no train ahead the signaller would be satisfied that the signal had failed.

According to his interpretation once the signaller has given a driver authority to pass an automatic signal at stop the driver must proceed at extreme caution in case there are obstructions on the track. This is so, he said, because the signallers have no way of knowing what is on the track unless someone advises them of the condition of the track.

There are phrases in this safeworking unit which have caused confusion. Evidence was given by a number of drivers who said they found it to be confusing. The safeworking unit uses the expression “line ahead”. It also refers to “the line between where the train is standing and the next signal”, the “section” and “section in advance”. It is not clear whether these phrases have the same or several meanings.

Mr MacFarlane was of the view that the words “section ahead” meant the section of track from interlocking to interlocking. Other witnesses thought this phrase meant the line of track to the next signal. Mr MacFarlane justified his interpretation of the phrase “section ahead” by reference to the glossary.

The glossary formed part of the Safeworking Emergencies Manual until 1996. It was removed from that manual because the binder containing the manual could not accommodate it. It remained a part only of the Safeworking Engineering Manual although the definitions in it were applicable to all safeworking manuals.

The word "section" is defined in the glossary, in respect of double line areas, as "the portion of line running between the yard limits of adjacent attended interlockings". The definition of "attended interlocking" is an interlocking which is being operated, either directly or remotely, by a signaller".

As a matter of logic it is difficult to disagree with Mr MacFarlane's interpretation of the phrase "section ahead". However, when applied to the circumstances of this accident, the safeworking unit cannot be intended to have that meaning. If that were the case Mr Mulholland would not be able to authorise W534 to pass signal 41.6 until the Indian Pacific had passed out of the section near Penrith. That would cause unnecessary lengthy delays.

The problem with signal 41.6 is the length of its track circuits, including the overlap, of 1,730 metres. The track circuits and overlap are of such a length because of the topography of the area, the gradient of 1 in 60 and the presence of the Glenbrook tunnel. In the metropolitan area the signals are much closer together with the consequence that the overlap circuits are much shorter and "section ahead" could be given its glossary definition without producing unnecessary delays.

In order to give efficacy to safeworking unit 245 in the circumstances of this accident it is necessary in my view to give the phrases "the line ahead", "the section", "the section ahead" and the "line between the signals" the same meaning, namely, the line between signals 41.6 and 40.8.

Evidence has been given that drivers do not adopt a uniform practice of proceeding at extreme caution after passing an automatic signal at stop. It was said that some would drive their train at extreme caution over the whole 1730 metres, others would not. To suggest that Mr Sinnett in the circumstances of this accident, with the belief that the track ahead was clear of any train or any obstructions, would drive for 1730 metres at extreme caution is not realistic.

There is no definition of the speed at which a driver is required to travel at extreme caution. The reason for that is that this has been left to the discretion of the particular driver and that speed would be dictated by the area in which the signal is located. Mr Lamont, the Safety Audit and Standards Manager for Train Crewing of the State Rail Authority, stated that a driver proceeding at extreme caution should proceed at a walking pace, a speed of between three and five kilometres per hour. If that were the case it would take almost half an hour for a train to traverse the track circuits and overlap of signal 41.6.

Mr Hogan, an Operations Inspector, Train Crewing, who conducted safeworking schools regarded "extreme caution" to be a maximum speed of ten kilometres per hour. Mr Marshall, the driver of the Indian Pacific, who was a very experienced driver of electric trains and freight trains, drove the Indian Pacific, a long and heavy train, at a speed which

reached a maximum of 18 kilometres per hour when driving at extreme caution on a gradient of 1 in 60 between signals 41.6 and 40.8. This highlights the fact that drivers have widely different views of what speed they should travel at if driving with extreme caution.

As will be seen later Mr Sinnett took the view that he could proceed at caution, and not extreme caution, on the indication given to him that the track was clear between signals 41.6 and 40.8. He regarded caution in those circumstances to be at a speed which would enable him to stop at signal 40.8 if that signal was at stop. Whatever may be the proper interpretation of safeworking unit 245 it is not applicable to a second train such as the inter urban train W534 that was being driven by Mr Sinnett.

When Mr Mulholland was contacted by Mr Willoughby at signal 41.6 he was able to determine that the track between that signal and signal 40.8 was clear because the train ahead of the Indian Pacific was on the train indicator board in Penrith signal box. Therefore, he was able to determine that the line ahead was unoccupied and he concluded that the signal had failed.

He cannot have known, or he must have overlooked, the fact that the Indian Pacific was required to proceed at extreme caution because he believed it would come onto his train indicator board at 8:22 am or 8:23 am at the latest. At this time it was possible that something had happened to the track after W532 had traversed it which caused the signal to go to red.

When Mr Sinnett first called from signal 41.6 at 8:20 am and 19 seconds Mr Mulholland was then faced with a dilemma to which safeworking unit 245 did not provide an answer. He then had to determine whether the line ahead was occupied, having already determined that it was a signal failure.

In the circumstances there was nothing in the safeworking unit that gave him any guidance as to what he should do, or how he should determine whether the Indian Pacific had passed beyond signal 40.8.

He concluded that as it was about nine minutes since he had spoken to Mr Willoughby and he had not heard from him, the Indian Pacific had passed beyond signal 40.8. It was with that belief that he indicated to Mr Sinnett that the track was clear.

Since the Indian Pacific had passed over the section beyond signal 41.6 he assumed there was no broken rail or other obstruction on the track that caused the signal to go to stop. That would have confirmed, in his mind, the fact that it was a failed signal.

Since Mr Sinnett was told it was a failed signal he believed there was nothing on the track requiring him to drive at a slower speed and the requirement to drive at extreme caution was not necessary in the circumstances.

Mr Anthony, a Network Superintendent, when asked what should happen in the circumstances of successive trains, said that the first train should proceed at extreme caution because of the possibility of obstructions on the track and the second train should proceed at caution. In effect, that was just what Mr Sinnett was doing and, as a matter of

logic, it was a sensible solution. Tragically, however, the line ahead was occupied by the Indian Pacific and the collision occurred.

Apparently, a review of the safeworking units is currently being conducted. Mr Jamie MacDonald, the General Manager, Safe Working Systems and Operational Standards, of Rail Access Corporation gave evidence. He had held the position since 1999. In October or November of that year he was directed by his chief executive to undertake a complete reworking of the safeworking units. He described it as a total rewrite. All that Mr MacDonald was prepared to concede in relation to the safeworking units was that one of the problems associated with them was that they were brought into effect before the vertical separation of the various rail organisations and that they needed to be brought up to date to reflect the current rail environment.

In the course of his evidence Mr MacDonald stated in relation to safeworking unit 245 that his belief was that it was quite clear what its intended purpose was and how it should be applied, in particular what a driver must do in order to pass an automatic signal at stop. I do not agree. It is clear from what I have stated above that there is a number of significant problems associated with safeworking unit 245. It is of concern that the officer charged with the leadership of the team responsible for the rewriting of the safeworking units has not identified any problem associated with safeworking unit 245 following this accident.

(ii) Training and Recertification of Mr Sinnett

It is necessary to examine how persons in authority in the rail organisations thought safeworking unit 245 should have been applied, and briefly to examine the training and recertification of Mr Sinnett.

One such witness was Mr Hogan, an Operations Inspector in Train Crewing. He conducted safeworking schools. It was also part of his function to attend to late running reports although he said that he had never given an unsatisfactory report. He stated that he never had a driver who had said there was delay caused by passing an automatic signal in the stop position. He stated that a driver might be delayed some 30 seconds before the signal cleared and he might not have to pass the signal at stop.

When it was suggested to him that a failed signal would take more than 30 seconds to pass, he said that was just an example he was trying to give. He stated that drivers would tell him where the signal was, that they had tripped past it, and whether they continued as normal depended upon where it was.

It was pointed out to him that if drivers pass a failed signal and have to travel at extreme caution to clear signals, they could not make up the time and he agreed. He was asked what speed he regarded "extreme caution" should be and he said ten kilometres per hour. He said if there was a delay of 12 minutes that could cause considerable problems to the trains behind and he did not know if a blind eye was being turned to drivers who did not proceed beyond a failed signal at extreme caution. He said he could only go by what drivers told him. He said drivers are not punished for being late. They might receive some counselling by senior inspectors, which he described as an "interface with the senior inspector for on-time running."

It was Mr Hogan who conducted a rail performance test on Mr Sinnett in November 1999, approximately one month before this accident. He stated that he remembered travelling from Sydney to Springwood and asking Mr Sinnett a number of questions and that he alighted the train at Springwood and thereafter filled in an assessment form. He was specifically asked whether he spoke to Mr Sinnett about the procedure for passing an automatic signal at stop. He stated he was told by Mr Sinnett that he would bring the train to a stand before the signal and, if he could not contact the signaller, would trip past the signal and proceed with caution. After Mr Hogan stated that, he changed his answer to "extreme caution". He stated that he had never failed a driver on a road performance test.

The Safety Audit and Standards Manager for Train Crewing of the State Rail Authority of New South Wales, Mr Lamont, said that it was his job to manage the on road assessments of all train crews. He referred to the procedure for an inspector to travel with the driver and observe the driver's handling of the train.

He acknowledged that signals did fail and that he had investigated about 30 or 40 signals passed without authority during the previous year. He stated that those signals passed without authority led to three derailments. He stated that in the metropolitan area drivers were not expected to seek the authority of a signaller to pass a signal at stop. Trains were fitted with a trip valve and signals were fitted with a train stop. Drivers were expected to pass the signal after a short space of time provided the track was clear.

He stated that he ensured drivers were familiar with safeworking units such as safeworking unit 245 by training, re-accreditation and recertification of train crews.

Mr Lamont was taken specifically to the provision of safeworking unit 245 which requires a driver to proceed at extreme caution after passing an automatic signal at stop. He stated that while no speed was laid down, in his view such a speed is a walking pace of between three to five kilometres per hour and no more. His attention was specifically directed to the requirement that the driver of a train passing an automatic signal at stop needed to proceed with extreme caution not only to the next signal but to the signal after that. He was unable to explain why, if one made the assumption that signal 40.8 was green in the present case, a train should proceed at extreme caution to the next signal. His answer was that it was an assurance that the track circuitry was functioning correctly, because the next signal may be a failed signal in the green position. However, as I have previously demonstrated in the chapter on signalling, there was built into this automatic signalling system a fail-safe device that would cause a signal to turn red if there was a train or obstruction on the track ahead. Anything which interfered with the passage of current from the transmitting component of the circuitry to the receiver would cause the relay mechanism to turn the signal and marker light to red.

Contrary to other evidence Mr Lamont stated that he noticed that when signals failed this did result in train delays. If a major delay of eight to ten minutes occurred, when a train sat at a signal that would cause confusion. He believed the drivers were observing the requirements of extreme caution. This statement is inconsistent with the evidence of Mr Phillips who taught Mr Sinnett to proceed with caution and who did not really understand the safeworking unit. Mr Phillips thought the phrase "extreme caution" had been written out of the safeworking unit at the time he was teaching Mr Sinnett.

Mr Lamont's attention was specifically directed to the consequence of a driver following the speed he nominated as "extreme caution" namely, five kilometres per hour. It was suggested to him that in the circumstances of a section of track with the circuitry and overlap of the length of signal 41.6, that would mean at least a half hour delay.

He acknowledged that the problem in the country was different from the problem that existed in the metropolitan area where signals are in some cases only 200 metres apart.

Signal 41.6 and its overlap circuit extended for 1,730 metres. He agreed that in the circumstances of a signal and overlap section of that length a train would lose its path coming into the metropolitan area if it travelled at the speed that he nominated as "extreme caution". He said that it would have to be given a path when time permitted so that it would have a lesser impact on other services. A delay of over 30 minutes while a train proceeded at about five kilometres per hour does not show any concern about passengers in the particular train being delayed to that extent. It would also cause considerable delay to following trains and their passengers.

Mr Sinnett stated in his evidence that he believed that the safeworking unit required him to travel at caution. The safeworking unit that was in force refers to extreme caution and not caution. This misunderstanding by Mr Sinnett led me to examine how it could be that a driver whose competence had been assessed in November 1999 and who had attended a Safeworking Course in July 1999 could be mistaken about such an important safeworking unit. It transpired that the misunderstanding arose because drivers at that course in July 1999 were taught procedures under a proposed amended safeworking unit 245 and not the safeworking unit that was actually in force. One material difference between the two is that the latter refers to "extreme caution" whereas the drivers were taught in accordance with a proposed amendment which referred to "caution".

To add to the confusion and to perhaps explain why Mr Sinnett thought, at least at one stage in his evidence, that the provision required him to travel only at caution, I received into evidence a proposed amended safeworking unit 245. It transpired that, although the Department of Transport had not approved the proposed amendment, employees of the State Rail Authority, including Mr Sinnett, were instructed in accordance with the terms of this proposed amendment. The evidence relating to the way in which the proposed amended safeworking unit 245 was used by the State Rail Authority may be summarised as follows.

At the course in July 1999 drivers were taught in accordance with the proposed safeworking unit. Its status at that time was that it had been distributed for comment but not sanctioned by the Department of Transport, the regulator of safety matters for the rail industry.

Mr Craven, a training officer at Australian Rail Training at Petersham, produced to the Commission a work book that was issued to drivers in the course of the July 1999 recertification course. The third part of the work book dealt with the passing of automatic signals at stop. Mr Craven's evidence was that the recertification course had been a full day course and that the third section went from after lunch until the end of the day.

Mr Craven stated that what he taught the drivers was that they were obliged to travel at a speed slow enough to allow the train to stop short of any obstruction within the distance that the driver could see along the track ahead. Also, to proceed to the first signal ahead and if that signal was displaying a proceed indication, continue to proceed under the same conditions to the second signal and obey the indication of that signal. His belief was that this was an accurate statement of the current form of safeworking unit 245.

Mr Craven agreed that proposed amended safeworking unit 245 made no reference to extreme caution or to establishing the cause for any delay, as required by the current safeworking unit 245. Mr Craven's evidence was that he took the drivers through the work book and worked off it.

Mr Craven agreed that the instruction which he taught in July 1999 was identical to the wording of the proposed amended safeworking unit 245, and not the actual or current safeworking unit 245. Mr Craven agreed that this could create some confusion. When asked whether he still taught in accordance with the work book, he stated that he currently taught the current safeworking procedures.

Mr Craven agreed that the changes in the proposed amended safeworking unit 245 were significant. Mr Craven gave evidence that he did not bring up the changed direction relating to the speed at which a driver was required to travel after being authorised to pass an automatic signal at stop. In cross-examination, Mr Craven stated that he did not think there was any longer a requirement, in the proposed amended safeworking unit 245, for the driver to establish the cause of the delay.

Mr Craven had told the drivers in these courses that the proposed amendments were going to be circulated to them to be included in their safeworking manuals.

The work book contained statements to the effect "State Rail has amended safeworking procedures" and "State Rail will train all safeworking employees in the content of the safe working amendments" and "this process may take a while consequently, once you learn these amended procedures you are not to use them until State Rail has trained all other employees" and "State Rail will advise you when these procedures come into force".

Mr Kitanov, the training officer who actually taught Mr Sinnett his recertification course in July 1999, then gave evidence. His evidence was that he taught Mr Sinnett in accordance with the amended safeworking unit and made no mention of the existing one. His evidence was also that he taught the drivers that if they were able to contact the signaller, to follow the instructions of the signaller.

Mr Kitanov was under the impression that the proposed amendments were to come into effect in the early part of 2000. He was aware that the proposed amendments eliminated the phrase "extreme caution".

Mr Jamie McDonald, the General Manager, Safeworking Systems and Operational Standards, of Rail Access Corporation, as stated above, gave evidence. He stated that the proposed amendment had been around for about two years "and still had not made it into the safeworking units". He further stated that industry consultation had given rise to a number of concerns about the proposed amendment and that Rail Access Corporation,

together with the Department of Transport, had decided jointly that they would not be proceeding with the previously proposed amendment. This meant that the training given last year by the State Rail Authority on the proposed amendment was now of no value because the amendments were not to be introduced. That decision had been taken in the first week of February 2000. Mr McDonald gave evidence that there had been no advice to drivers that the amendment was not proceeding. Rail operators had only been advised of this a day or two prior to 7 April 2000 when he gave evidence.

Finally, Mr Mitchell, the Manager, Safe Working Competencies Standards of the State Rail Authority was called to give evidence. He was the officer ultimately responsible for the recertification courses conducted in July 1999. He authorised the teaching in accordance with the proposed amended safeworking unit 245 because, he said, Rail Access Corporation instructed that the amendments were to be introduced. However, later in his evidence he said that he was not too sure that Rail Access Corporation had signed off on those amendments at the time the recertification course was conducted. However his belief was that there had been no approval by the Department of Transport at the time of the recertification course and that until such approval by the Department was received, the amendments could not come into operation.

In view of this evidence it is hardly surprising that Mr Sinnett did not know the procedure that he was supposed to follow at Glenbrook on 2 December 1999. He was taught in accordance with a proposed amendment not then in force and he was not recertified in accordance with the actual procedure. Further, the trainers and inspectors had no clear understanding of the correct procedures to follow.

Even if Mr Sinnett had been taught the correct procedure for a driver to follow after being authorised to pass an automatic signal at stop, the evidence of Mr Lamont and Mr Hogan in relation to "extreme caution" would have made the provision impractical and unworkable. As previously observed, Mr Lamont, the Safety Audit and Standards Manager for Train Crewing of the State Rail Authority, stated that "extreme caution" meant three to five kilometres per hour. He conceded that, since the track circuits and overlap for signal 41.6 were 1730 metres long, this would have caused the journey of Mr Sinnett's train to take at least half an hour to traverse that section of track. Even Mr Hogan's interpretation of "extreme caution" as being ten kilometres per hour would have caused significant delays. This demonstrates that the provision is impractical and unworkable in areas with long overlap sections.

There are obviously very serious deficiencies in the drafting of safeworking procedures and in the processes of training, inspecting and recertifying of drivers to which I shall have to devote considerable attention in the next phase of this Inquiry.

(iii) Supervision of Penrith Signal Box

I have discussed the difficulty that Mr Mulholland had in trying to fit the circumstances of a second train seeking to pass a signal at stop into the wording of safeworking unit 245. I have discussed the deficiencies in that particular safeworking unit. I have also indicated my views about the training, inspection and recertification of drivers. The same concerns apply to signallers.

However, in the case of Mr Mulholland there are two further matters of concern. These relate to the circumstances in which a relatively young and inexperienced Grade 1 signaller could be left in charge and without assistance in a very busy signal box which required a Grade 3 signaller with the assistance of a train recorder.

Two witnesses with particular knowledge of Mr Mulholland and the supervision of signal boxes were called. They were Mr Anthony and Mr Ripinskis, who were described as Network Operation Superintendents for Blacktown, which includes the Penrith and St Marys areas.

It is the responsibility of these two officers to inspect the signal boxes and to ensure that they are running satisfactorily and are managed satisfactorily. One of these officers certified that Mr Mulholland was capable of running the Penrith signal box although he was a Grade 1 signaller and it was a Grade 3 signal box.

The usual practice was that either Mr Anthony or Mr Ripinskis would attend Penrith signal box between 6:00 am and 8:00 am and for the afternoon peak period. Penrith is an important signal box because most of the trains leaving from there have been there overnight. Mr Anthony said he would normally arrive at Penrith signal box at 6:00am and leave at 8:00 am. Unfortunately he was on leave on the day of the accident and there was no person rostered to attend the Penrith signal box that morning. Accordingly Mr Mulholland was not being supervised when this situation arose. It may be, if he had been, that this situation could have been avoided but that is by no means clear. The supervisor may have left before Mr Mulholland received the telephone call shortly after 8:00 am from Mr. Willoughby.

Mr Anthony was asked what his function was and he said that he sat in the signal box and observed and monitored the signallers at work monitoring the trains to ensure the trains depart on time and that the signaller has cleared the appropriate signals to allow that to occur. He said Network Operation Superintendents more or less sat in the corner of the signal box and monitored what goes on. If there were any incidents, they obtained the details of those incidents so that they could be reported upon later in the day. If the train was late for any particular reason or a defect or anything like that occurred, he got the set number, or the car number of crews who ran late and those who were late for duty. He obtained all the relevant details. He said there is an Operations Control, which is a central body in Sydney, that controlled all train movements and that information was required because they have a meeting after the morning peak period to see where things went wrong and they required the information to determine the responsibility for those incidents. He said he would interview the signaller if there was a problem which caused a train to be delayed or where a signaller misrouted a train.

He said it was normal practice for the train recorder to leave the signal box for breakfast after the peak hour had passed which is around 8:00 am. The signaller therefore is left to control the signal box on his own and if he is busy he may not be immediately able to answer a telephone call. He agreed there was a radio in the Penrith signal box, but said it was normally turned low and as far as he was aware it did not distract the signaller from his work. He agreed it is contrary to a safeworking unit that prohibits radios to be played in signal boxes but he has done nothing about it. He had to agree that superiors disregarding safeworking units did not show a good example to other staff.

He was asked about the communications protocol in safeworking unit 135 and said that if he heard a signaller communicating in a casual and informal way and not complying with radio protocols he would take steps to overcome that. The way Mr Mulholland carried on conversations on this morning suggests to me that he was not much concerned about the protocol. Mr Anthony said that although he had never heard Mr Mulholland follow the protocol, he has never observed any problems with particular communications. He understood, and everyone else understood, what the communication was about. It seems therefore, if one accepts that evidence, that this is the only occasion when communications from Mr Mulholland to a train driver were seriously misleading. He agreed that Mr Sinnett was entitled to expect from the manner in which Mr Mulholland communicated with him that the track was clear. He said however that despite that fact he would be required to proceed at caution and/or extreme caution. Once again this is another example of the interchange of the words 'caution' and 'extreme caution'. He further clarified the situation by saying that the first train over the section in which the signal failure was located would pass with extreme caution to establish what is in that section and any following movements would be done with caution because after the passage of the first train the condition of the track may have been established. Whilst that makes considerable sense, it is not what the safeworking unit requires of each driver.

Mr Anthony said that signallers are recertified every two years at the Australian Railway Training College at Petersham and that he regarded Mr Mulholland's work as entirely satisfactory. He could not recall Mr Mulholland having to deal with a signal failure whilst he was observing Mr Mulholland's activities in the signal box. He agreed that there can be problems between a signaller and a driver if drivers do not pass the signal at stop. If there is an incident, it is investigated if it comes to his knowledge, particularly if there is a delay of the train.

It is a requirement that all trains between 6:00 am and 8:00 am are recorded. These trains and their running times are placed on a block sheet for both the morning and afternoon peak periods which is forwarded to a central office in Sydney. This is done because of requirements in relation to on time running. Although these witnesses would have me accept that the standard of performance of Penrith signal box was satisfactory, in my opinion the evidence demonstrates a lack of proper supervision.

Having heard this evidence about the work of the persons who attended Penrith signal box, apparently in a supervisory capacity, it would appear that there was, in reality, almost no supervision, unless it related to an issue of on time running. The so called superintendents did not superintend anything except on time running. It is therefore, not surprising that at the forefront of the minds of the employees responsible for managing these trains through this automatic section of track with at least one failed signal was the motivation to keep the trains moving through the section of track with little or no understanding or regard for the procedures in the safeworking units.

This lack of adequate supervision and training is a matter which will require further consideration in the next stage of this Inquiry. It should be observed that officers in a senior position acknowledged the deficiencies that existed in this area. Mr Camage, the Manager of Train Operations for the metropolitan area of the State Rail Authority conceded that as a result of the evidence that had been given there was a misunderstanding as to the safeworking units and there were problems with aspects of training. He said that steps needed to be taken to overcome these problems and he

believed that there should be a review of the safeworking manuals, the radio protocols and the procedure for dealing with the presence of trains occupying the track in front of other trains. He said that attention needed to be given to drivers' understandings of the particular requirements necessary, to overcome confusion as to how the safeworking units should apply.

Mr Lamont, to whom reference has earlier been made, also agreed that in the circumstances of this accident it was apparent that there was a problem with the training of the employees involved. To my mind this understates the situation. I shall be making some detailed recommendations in relation to safeworking procedures, training, supervision and recertification in my final report.

It is sufficient at present to observe, before dealing with the individuals involved and what actually occurred, that there are serious problems in these areas which need to be addressed.

Further, the training that the train controller, Mr Browne, the signaller Mr Mulholland, and the driver Mr Sinnett received did not equip them to deal with that situation in an appropriate manner. These factors, in my opinion, were major causes of this accident.

8. The Individuals Involved

Once the signalling system had failed, the passage of the Indian Pacific and the inter urban train through that automatic section of track became controlled by a number of individuals. It is their conduct in managing the trains through that section of track that now requires careful attention. It is necessary to make some observations about the relevant backgrounds and experience of those persons.

The Indian Pacific was being driven by Mr Marshall with the co-driver, Mr Willoughby taking charge of communications. Both were extremely experienced drivers. Mr Marshall had joined the Government railways in 1970 and became a driver at Enfield in 1979. He drove freight trains until 1986. He then transferred to the suburban train system and drove electric trains until 1991. He then transferred back to FreightCorp and remained there until 1994 when he was employed by National Rail Corporation Limited. He has had considerable experience over many years in driving freight trains in the Blue Mountains area.

Mr Willoughby started work for the Government railways at the Clyde wagon works as a shop boy and by April 1986 he became a driver class 5 in the electric train running section. In about September 1986 he became a driver stationed at Sydney Terminal and in 1995 he joined National Rail Corporation Limited.

Mr Sinnett, the driver of inter urban train W534 had been employed by the Government railways for some 36 years. He was a freight train driver until 1996 and on a number of occasions drove the Indian Pacific when it used to be hauled by New South Wales Government locomotives. In 1996 he joined CityRail and since that time he has driven inter urban trains from Lithgow to Sydney and return eleven times every two weeks. He was thoroughly familiar with the track. Nothing of an adverse nature was suggested in evidence about the previous competence or experience of any of these drivers.

Mr Clarke, the guard on the inter urban train, joined the Government railways in 1984 and was experienced in his duties. The two other persons directly involved in the circumstances leading to this collision were the train controller at West Control, Mr Michael Browne and the Penrith signaller, Mr Damien Mulholland.

Mr Browne held the position of Senior Controller at West Control. His duty was to control trains in the area from Emu Plains to Wallerawang and then between Ballbone Junction and Kandos. He has been employed by the Government railways for 17 years and was promoted from the position of junior station assistant to signaller Grade 3, then to area controller and then senior controller.

He stated his position is similar to that of a signaller but he communicated with a larger number of people including signal box staff. His duties were defined by safeworking unit 130 as being to plan, organise and control the movement of trains throughout his area. All train operations in a specific area are directed by the train controller. The safeworking unit stated that the effective operation of the system of train control depends on the train controller continually receiving accurate information about any event that could effect the movement of trains.

Mr Browne was a very experienced officer and nothing adverse was known about his previous service with the railways. The train controller has no authority to give instructions to drivers of trains. This is the duty of the signallers controlling the section of track in which the train is located. The train controller can, however, give instructions to the signallers.

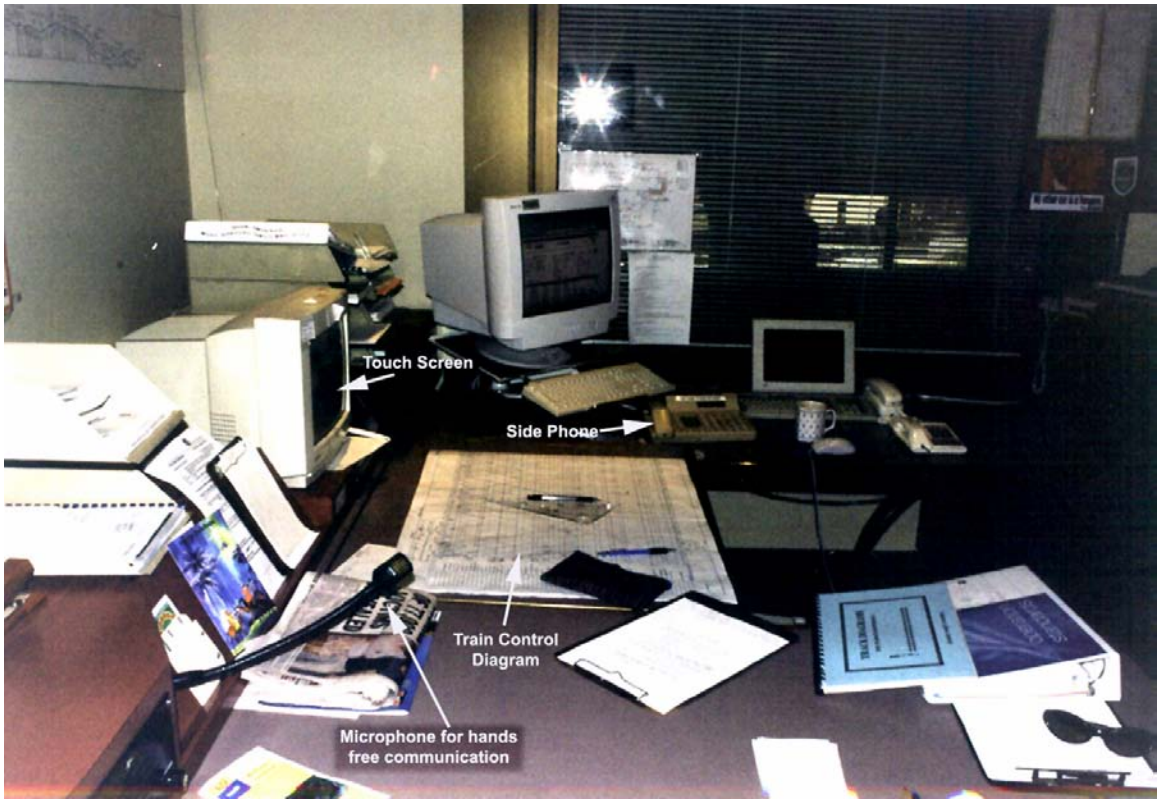


Figure 14 - West Control workstation

Mr Damien Mulholland was the signaller in charge of the Penrith signal box on the morning of the accident. He was a Grade 1 signaller. Grade 1 signal boxes are the least demanding signal boxes. They have low to medium densities of train movements. A Grade 3 signal box is the second most demanding signal box. Grade 3 signal boxes are so designated because they have a large physical area of operation, multiple interlocking sections and high densities of traffic communications. They require a signaller to be able to undertake a number of tasks at the same time.

Mr Mulholland joined the railways at 19 years of age. He was 24 years of age at the time of the accident. He started duties at Katoomba as a station assistant doing right of way duties. He later did a safeworking signalling course and was promoted to signaller Grade 1 and started working as a signaller three years ago. After completing the course he became a signaller at Katoomba relief, which controlled the area from Leura to two kilometres west of Katoomba. He occupied that position until the day of the accident. However, he had worked in other signal boxes and he had received ten to fifteen days on the job training in every signal box he worked. He spent time working at Mount Victoria, Springwood, Penrith, Seven Hills, Westmead, Granville and Parramatta in a relieving capacity. Katoomba and Mount Victoria are Grade 1 signal boxes. Springwood is a Grade 2 signal box and Penrith is a Grade 3 signal box. Whenever he had a spare day he

was sent to those signal boxes to learn how to work them. He said he finished his signal training on 30 August 1996.

Mr Mulheron, who was a Senior Rostering Officer responsible for rostering signal box personnel, stated that Mr Mulholland had attended a Safeworking School held at the Australian Rail Training College at Petersham in September 1996. Mr Mulheron did not know what sort of training took place at the school and he was not qualified in any safeworking units. He was therefore not able to tell the difference between operating a Grade 1 signal box and a Grade 3 signal box.

He said there is an industrial agreement whereby he is allowed to roster signallers up to two grades higher after a signaller has done twelve months training in his own grade. After he has done that time he is assessed by the inspector before he takes up the higher grade.

He stated that Mr Mulholland came to him as a Grade 1 signaller in September 1996 and he carried out Grade 1 signalling for two years and then he did the necessary 15 days training. When he rostered Mr Mulholland for the Penrith signal box he had no Grade 2 signallers available.

He said Mr Mulholland was rostered on the 6am shift to cover a member of staff who had reported sick. He said this rostering of Grade 1 signallers in Grade 3 signal boxes was not unusual.

Mr Mulholland agreed he was comparatively inexperienced in Grade 3 signal box operations. Most of his work had been done at Katoomba as a Grade 1 signaller, however he had worked in Grade 2 signal boxes. He had had six months previous experience at Penrith, a Grade 3 signal box.

The agreement with the trade union provided that no signaller would be called on to work more than two higher grades.

9. The Communication between Mr Mulholland and Mr Willoughby at Signal Telephone 41.6

When the Indian Pacific arrived at Glenbrook railway station Mr Marshall and Mr Willoughby expected signal 41.6 to be at stop because signal 42.0 had been at caution.

Mr Marshall, who was driving the train, thought that signal 41.6 may have been in the stop position because the Indian Pacific had caught up with the train ahead, W532. For this reason the drivers waited about a minute to a minute and a half for the signal to clear. When this did not occur Mr Willoughby put on his visibility jacket, left the locomotive on the platform side, proceeded down the platform and down and across the ramp in front of the locomotive to signal telephone 41.6. He found this signal telephone was secured by a chain and an SL lock. It was the first signal telephone that he had found to be locked having used signal telephones many times. Evidence was given by other drivers that most of the signal telephones are unlocked. Mr Willoughby had to return to the locomotive to obtain an SL key and then return to the signal telephone. This brought about an additional delay of some minutes.

Figure 15 - View of signal 41.6 and its telephone from Glenbrook railway station

Mr Willoughby then picked up the handset to ensure that no one was talking, replaced it and pushed the press to ring button and then turned the handle. He picked up the handset and heard someone say "Penrith here". There was no doubt that he was put in contact with the signaller at Penrith, Mr Mulholland.

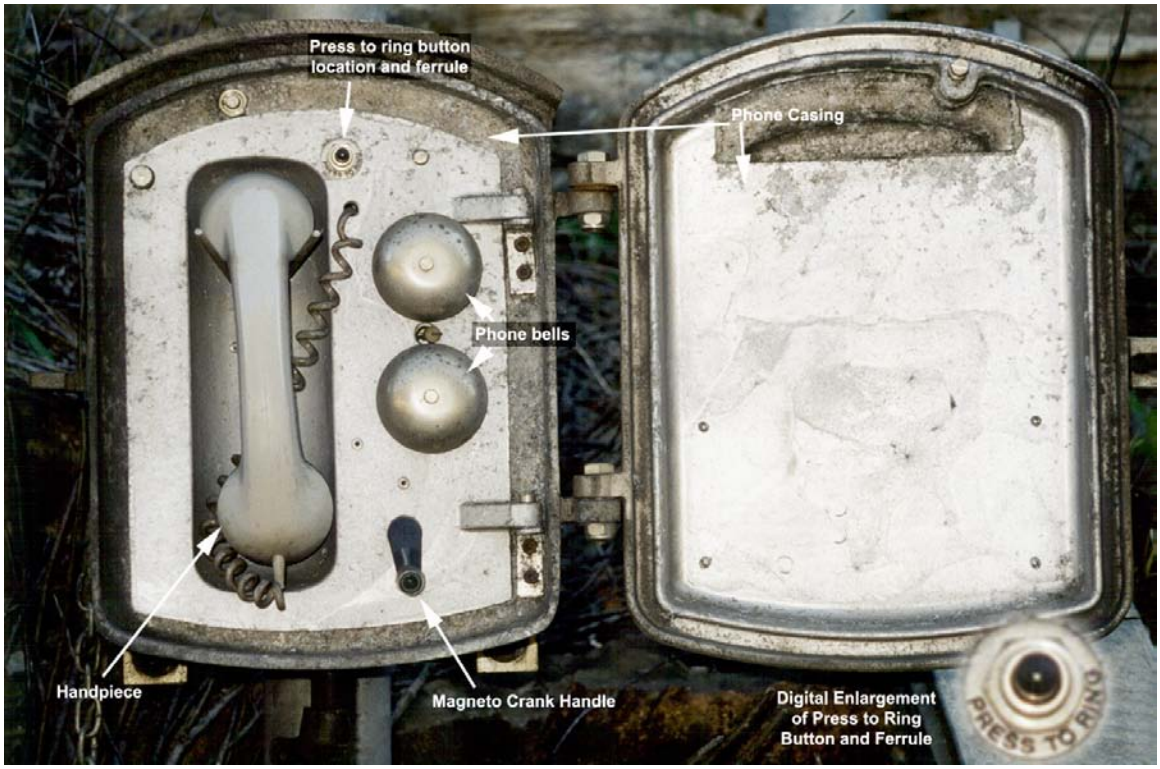


Figure 16 - View of signal telephone 41.6

According to Mr Willoughby, after Mr Mulholland had identified himself Mr Willoughby said "driver of the Indian Pacific signal 41.6 at Glenbrook. The signal is in the stop position". Mr Mulholland then said "You are okay to go past the signal at stop and can you please report to me the indication of the next signal that you come across which is further down the track".

Mr Willoughby was asked whether the signaller said anything to him about the manner in which he should proceed from signal 41.6 to the next signal. He said he thought he added the words "with caution", but he could not quite recall. Mr Willoughby said he then said to Mr Mulholland "Yes, I understand that instruction". He then hung up the telephone, locked the signal telephone and returned to the locomotive.

According to Mr Willoughby, he climbed back into the locomotive and said to Mr Marshall "I've got hold of the signalman at Penrith. He has okayed us to go past the signal in this stop position, we will proceed ahead".

Mr Marshall said that to the best of his recollection what Mr Willoughby said when he returned to the locomotive was "that he'd spoken to the signaller at Penrith and he was given permission to pass that signal in the stop position and to proceed cautiously to the next signal".

He said that he told the train manager, Mr Pantich, that he was going to "sneak down" to the next signal. After Mr Pantich had assured him that the doors on the train were secured he released the automatic brake on the locomotive, put the reverser forward and slowly released the independent brake permitting gravity to draw the train away from Glenbrook railway station, having been delayed there for seven minutes and 14 seconds. According to Mr Marshall he then proceeded towards the next signal with extreme

caution. It took a further seven minutes and 45 seconds for the Indian Pacific, proceeding with extreme caution, to travel from signal 41.6 to signal 40.8.

It was permissible for Mr Mulholland to authorise the Indian Pacific to pass signal 41.6 at stop because Mr Mulholland was able to establish the position of the train immediately in front of the Indian Pacific. That train, W532, was on the train indicator board in Penrith signal box. According to Mr Mulholland, the preceding train W532 had come on to his train indicator board at approximately 8:06 am, at least three minutes before he received the call from Mr Willoughby at signal 41.6.

Mr Mulholland gave inconsistent versions of the conversation with Mr Willoughby in two consecutive answers. In one version he said that when he spoke to Mr Willoughby he said to him "it must be failed, mate, just proceed past that signal down to the next one".

In the next answer, when asked to repeat what he had just said so that a note could be made, he stated that he said to the driver "the signal must be failed, just proceed past that signal and get back to me at Emu Plains to report any other signals out".

The inconsistency between these two answers was brought to his attention. He was asked to clarify whether the direction that he gave the driver of the Indian Pacific was to proceed through to Emu Plains and then report whether there had been any other signals out or whether the direction was to proceed to the next signal. His answer was "I can see the problem".

When asked which of these two instructions was correct he appeared confused. He then said that he thought that he was going to hear from the driver of the Indian Pacific at Emu Plains and then, not more than a few answers later, that he assumed that if there were any other signals at stop that the driver of the Indian Pacific was going to make contact with him.

He was asked specifically whether he was giving the driver of the Indian Pacific the right to go through the signals to Emu Plains regardless of their colour and he answered: "No, I was thinking more along the lines of waiting at the signal for one minute and waiting if the signal cleared and proceeding at caution. That is what I may have been thinking at the time. I was in no way giving him authority to keep on resuming without following any of the protocol."

Mr Willoughby said that what Mr Mulholland asked him was what the next signal was showing. This version of the conversation between Mr Mulholland and Mr Willoughby derives some support from the fact that in the later recorded conversation with Mr Sinnett, Mr Mulholland asked Mr Sinnett what the next signal was showing. Mr Mulholland said to Mr Sinnett "Can you just let us know what the signal in advance says when you get to it thanks?".

On the other hand, immediately after the conversation between Mr Willoughby and Mr Mulholland, Mr Mulholland called Mr Browne at West Control and the recorded conversation was as follows:

Mr Browne:	*Penrith*
Mr Mulholland:	*Oh, yeah, what have we got for you, now buddy? 41.6 signal at Glenbrook reported as a failure by the Indian Pacific. He has been delayed there for five minutes.*
Mr Browne:	*It is only an auto, isn't it?*
Mr Mulholland:	*It is only an auto, mate, that's correct, but the driver decided to call me five minutes later.*
Mr Browne	*Ah, let me find it here eh?*
Mr Mulholland:	*Sorry?*
Mr Browne:	*Let me just find it, here. 41.6.*
Mr Mulholland:	*Yeah, mate. I will let Springwood know if you could get hold of an electrician for us. We have got a bloody stack of dramas down here this morning.*
Mr Browne:	*Yeah, okay, I'll…what time did he tell you that?*
Mr Mulholland:	*They told me at 10 minutes past, mate. That will do.*
Mr Browne:	*8:10 any other signals out? Just that one was it?*
Mr Mulholland:	***As far as I know mate. I will ask him when he gets to Emu Plains if that was the only signal, mate.***
Mr Browne:	*Well, what was the trouble? Did it have no top indication? Did it have a red marker light on it?*
Mr Mulholland:	*No, it was at stop mate. That's all he told us.*
Mr Browne:	*Well, then, stop, okay.*
Mr Mulholland:	*Okay, thanks.*

That conversation tends to confirm that Mr Mulholland expected Mr Willoughby to proceed to Emu Plains. If he had asked Mr Willoughby to report what the next signal was showing, the fact that he had not received a report may have led him to believe that there was nothing to report about signal 40.8.

Then, when W534 came along, approximately eight minutes had elapsed between his conversation with Mr Willoughby, and Mr Sinnett's request for authority to pass signal 41.6.

Mr Mulholland may have assumed that the amount of time that had passed and the fact that he had heard nothing from Mr Willoughby meant that the Indian Pacific had passed signal 40.8 in the clear position. This is consistent with his evidence that he thought the Indian Pacific would come onto his train indicator board at Knapsack at about 8:23 am at the latest.

It is not possible to make a positive finding because of these differences in the versions given by Mr Mulholland and Mr Willoughby. Both witnesses stated that they were not sure of the precise content of the conversation and other evidence supports each possible version of this conversation.

One thing is clear, however, and that is, that for whatever reason, Mr Mulholland thought that the Indian Pacific would be well clear of signal 40.8 at the time that he authorised Mr Sinnett to pass signal 41.6. His evidence was that this belief was based upon his knowledge of the working timetable and the effluxion of time between the signal telephone call from Mr Willoughby and the call from Mr Sinnett approximately eight minutes later.

In coming to that conclusion it is inescapable that Mr Mulholland did not expect the driver of the Indian Pacific to travel at extreme caution. This may have been because Mr Mulholland did not himself know of that requirement or that he overlooked its existence or that his previous experience of other drivers not following any particular practice led him to believe that the driver of the Indian Pacific would proceed in the usual way to Emu Plains. The third alternative is supported by the fact that Mr Mulholland had not previously experienced more than one signal failure at a time. Accordingly, on this hypothesis, when he did not hear from Mr Willoughby his prior experience of signal failures led him to believe that the Indian Pacific had safely cleared signal 40.8.

The fact that he did not subsequently attempt, prior to the collision, to ascertain the whereabouts of the Indian Pacific confirms that Mr Mulholland's belief was that the Indian Pacific had proceeded well past signal 40.8 and was on its way to Emu Plains.

I have indicated that I found Mr Mulholland's evidence confusing and contradictory. In my opinion, the reason why it was so was because he had no firm guidance or training about how to deal with the circumstance of a second train seeking to pass a signal at stop.

Safeworking unit 245 did not give him any clear direction in that regard. He had no way of knowing where the Indian Pacific was on the track ahead of the inter urban train because he did not have a train indicator board covering that area of track. Consequently, he was thrown back on his prior experience which told him that signals only failed one at a time, that the Indian Pacific was eight minutes ahead, and that the amount of time that had elapsed would leave the track clear between signal 41.6 and at least signal 40.8, when he received Mr Sinnett's call.

This scenario demonstrates the deficiency in safeworking unit 245 to which I have already referred, and it highlights the lack of training and experience that Mr Mulholland had.

The other feature of the exchanges between Mr Willoughby, Mr Mulholland and Mr Browne that needs to be highlighted is the undisciplined and colloquial way in which important matters relating to rail safety were communicated.

In my opinion there were misunderstandings between Mr Mulholland and Mr Willoughby caused by the failure to follow a clear and precise language protocol. For the purposes of communicating information relating to rail safety, namely the passing of a red signal, the language used was inappropriate. Expressions such as "buddy" and "it's only an auto mate" are entirely inappropriate in these circumstances. Imprecise and colloquial expressions are inappropriate because they lead to misunderstandings, as occurred in this case and because they fail to recognise the seriousness that should attend communications that relate to safety matters. If the language is not casual the occasion for its communication will not be regarded as a casual exchange.

Equally important was the fact that the information communicated was inaccurate. The driver of the Indian Pacific did not report that there was a signal failure. He reported, correctly, that signal 41.6 was at stop.

10. The Communication between Mr Browne and Mr Sinnett.

The call by Mr Mulholland to Mr Browne resulted in Mr Browne calling Mr Sinnett at approximately 8:12 am. This recorded conversation was as follows:

Mr Browne: *West Control to the driver of W534.*
Mr Sinnett: *Yes, mate.*
Mr Browne: *I've just had a report there from the driver of the Indian ahead of you, 41.6 signal, Penrith side of Glenbrook platform is at stop.*
Mr Sinnett*:* *Oh, right.*
Mr Browne: *Are you around that area yet?*
Mr Sinnett: *I'm just heading towards Blaxland now mate.*
Mr Browne: *Heading towards Blaxland, all right, okay. Well, I don't know what - he just said it's failed, so I don't if it's a red marker light or what the story is, its only an auto.*
Mr Sinnett: *All right mate, I'll get on to Penrith anyhow or whatever, whoever I get there.*
Mr Browne*:* *Yeah, okay.*
Mr Sinnett*:* *Thanks a lot.*
Mr Browne: *Well, yeah, it's only an auto so just trip past it.*
Mr Sinnett: *All right mate.*
Mr Browne*:* *Okay, thanks.*

Mr Browne acknowledged that he had no authority to give advice to a driver in these circumstances. I have no doubt that the conversation Mr Sinnett had with Mr Browne conditioned Mr Sinnett to believe that signal 41.6 was a failed signal and that there was no train between signals 41.6 and 40.8.

It was submitted that what was meant by the words "it's only an auto, so just trip past it" as used by Mr Browne to Mr Sinnett, was that Mr Sinnett should stop and contact the signaller. I do not accept this explanation because safeworking unit 245 does not require the driver to contact a signaller if the train is fitted with a trip valve and the signal has a train stop. In those circumstances, provided that the driver can see that the line ahead is unoccupied, he may "trip past" the signal at stop.

This is where the expression "trip past it" originates. However there are no train stops in this section of track. Mr Browne could not have meant, as he asserted in evidence, that he wanted Mr Sinnett to stop and contact the signaller. The direction to "just trip past it" was given after Mr Sinnett had advised Mr Browne that he intended to speak to the signaller at Penrith.

Despite the advice of Mr Browne "it's only an auto so just trip past it", Mr Sinnett said he had no intention of doing that but intended to speak to the signaller at Penrith in any event. Despite that statement of intention by Mr Sinnett, I nevertheless believe that Mr Browne's advice was a factor that conditioned Mr Sinnett to believe that signal had failed and that it was safe for him to go through it.

Mr Browne relied upon safeworking unit 724 to justify his warning Mr Sinnett of the condition of signal 41.6. In my view safeworking unit 724 is of no application. It refers to incorrect signal indications. The signal was showing a correct indication, namely that

because of a failure of the circuitry it had gone to stop as it was designed to do. At the time Mr Browne called Mr Sinnett he did not know why signal 41.6 was at stop. Safeworking unit 724 stipulates those incorrect signal indications which are to be treated as stop signals. None of those is applicable to these circumstances. This signal was not showing an incorrect signal indication within the meaning of safeworking unit 724.

The issue of on time running was raised as a motivating factor because of the delay caused by the Indian Pacific at signal 41.6. I believe that the delay of the Indian Pacific at signal 41.6 was a factor which caused Mr Browne to call Mr Sinnett to ensure there was no further delay by Mr Sinnett at signal 41.6.

The inter urban train was running about two minutes late when it reached Glenbrook. Mr Sinnett was not concerned about this. Mr Browne when asked about the effect of a signal failure on time running said "when you have a signal failure you have delays". Although Mr Browne emphasised that he would not try to secure on time running by going outside the safeworking units, the only logical reason that he called Mr Sinnett must have been to avoid further delay.

Mr Browne was required to complete a train control diagram to record what occurred in relation to the progress of trains. He was required to report any delays to his superior. On time running is regarded as a matter of considerable importance and, in my opinion, it motivated both Mr Browne and Mr Mulholland on this day. Neither of them believed there was any compromise to rail safety in what they said to Mr Sinnett because they both believed the Indian Pacific was well clear.

Mr Browne believed that signal 41.6 had failed. He further believed that by the time inter urban train W534 would arrive at signal 41.6, both the preceding inter urban train, W532, and the Indian Pacific would be clear of that area. Mr Browne's belief that the signal had failed resulted from what Mr Mulholland had told him. In substance this was that signal 41.6 had been reported as a failure by the Indian Pacific and Mr Mulholland asked Mr Browne to arrange for an electrician to attend signal 41.6.

Although, in cross examination, Mr Sinnett agreed that the call from Mr Browne did not influence his subsequent actions, I find that the way he drove the train after passing signal 41.6 indicates that he was conditioned to believe the track was clear. In my opinion the conversation with Mr Browne contributed to Mr Sinnett's belief about the condition of the track ahead of him.

11. The Communication between Mr Mulholland and Mr Sinnett

My finding that Mr Sinnett's mind was conditioned to the belief that there were no trains between signals 41.6 and 40.8 is supported by the manner in which he spoke to Mr Mulholland when he reached signal 41.6. When he stopped the train at the four car marker at Glenbrook railway station, some metres distant from signal 41.6, he observed that it was showing two reds. He immediately called the Penrith signal box on the Metronet and the recorded conversation was as follows:

Mr Mulholland:	*Yeah, 534?*
Mr Sinnett:	*Yeah, who have I got there, matey?*
Mr Mulholland:	*Penrith, mate.*
Mr Sinnett:	*Yeah, it is 41, 41.6,* ***I'm right to go past it, am I ,mate?***
Mr Mulholland:	***Yeah, mate, you certainly are****. Listen, can you get back to us? What was the previous signal showing?*
Mr Sinnett*:*	*Yellow.*
Mr Mulholland:	*Yellow, okay, and what's that signal exactly showing, just red or…?*
Mr Sinnett*:*	***Yeah, two reds, mate.***
Mr Mulholland:	***Two reds, no worries. All right mate, can you just let us know what the signal in advance says when you get to it, thanks?***
Mr Sinnett*:*	*Okay, matey.*
Mr Mulholland*:*	*Okay, thanks*

There are a number of significant aspects to that conversation. The fact that Mr Sinnett's mind was conditioned to believe that the line was clear is supported by his expectation that he could pass the signal at stop. He indicated that he was at signal 41.6 without reporting it at stop, as one would have expected him to have done. He assumed, correctly, that the signaller at Penrith knew it was at stop and furthermore it was indicated to him that it was a failure. The evidence that his mind was so conditioned was the way in which he sought authority to pass it with the words: "I'm right to go past it, am I, mate?" This expectation was confirmed by the immediate and definite reply "yeah mate, you certainly are".

I accept Mr Sinnett's evidence that the request for him to report what the next signal was showing further confirmed in his mind that the track ahead was clear. Several counsel challenged the evidence by Mr Sinnett about his state of mind.

I have reservations about Mr Sinnett's evidence in two respects. The first is that Mr Sinnett denied that on the day of the accident he told Mr Halls, an Operations Inspector, that he was travelling at 50 kilometres per hour. For reasons which I shall later give, I do not accept that denial.

The second reservation that I have about Mr Sinnett's evidence relates to the conversation he had as he was approaching Blaxland. It transpired that Mr Sinnett thought at the time that he was talking to a signaller at Springwood not to Mr Browne at West Control.

However, when the conversation was played to him he failed to indicate to me that he thought he was talking to a signaller. Even worse, he embraced the suggestion that because it was a train controller who was talking to him he was justified in taking the

action that he did because of the relative position that a train controller held in the hierarchy governing the operation of train services.

Mr Sinnett's denial of the speed which I accept he told Mr Halls the train was doing and his failure to reveal the mistake that he then made about the identity of the person to whom he was speaking when he was being asked questions about the effect of that conversation upon him, require me to treat his evidence with some caution. Nevertheless, I accept that he believed that the track between signals 41.6 and 40.8 was clear as a result of the earlier conversations that he had with Mr Browne and Mr Mulholland.

A number of drivers were asked how they would have reacted if they had the same conversation that Mr Sinnett had with Mr Mulholland. They all said that they would have believed on that information that the track ahead was clear. It was submitted that I should reject the evidence of these other drivers because they were favourably disposed to Mr Sinnett. However, these drivers did not all come from Lithgow, one was a former driver and had been promoted to inspector and even Mr Lamont, Safety Audits and Standards Manager, said on that information the driver would be quite entitled to conclude that the track ahead was clear to the next signal.

Although I have considered each of those matters, I have come to the firm view that at the time Mr Sinnett left Glenbrook railway station he was of the view that the track was clear between signals 41.6 and 40.8. He had been led to that belief by the conversations that he had, and other factors.

12. Mr Sinnett's State of Mind when the Inter Urban Train departed Glenbrook Railway Station

The reasons that I have come to the conclusion that Mr Sinnett believed that the track ahead of him was clear when he left Glenbrook railway station may be summarised as follows.

First, the fact that when he left Lithgow the Indian Pacific was about 20 minutes ahead of him. Normally it was 11 minutes ahead and he said from experience driving down the mountains over the four years that he had never caught up with the Indian Pacific and the gap between the trains was maintained. This makes sense to me because the timetable should ensure that one train would not catch up with the other. He was not aware that the Indian Pacific was required to pick up a driver instruction at Katoomba and to go through Woodford at a reduced speed.

Second, he believed from the information that he had received that it was a failed signal. This belief was a reasonable one because both Mr Mulholland and Mr Browne had communicated to him that this was so. It was in fact a failed signal.

Third, he was not given any information about the Indian Pacific other than that it had reported signal 41.6 as a failure. He was not told that it had been delayed there for at least five minutes.

Fourth, Mr Sinnett believed from the timetable that it was at least at Knapsack and on the track indicator board in the Penrith signal box because he was not told by Mr Mulholland that Mr Mulholland did not know where the Indian Pacific was located.

Fifth, the way Mr Browne spoke to him indicated to him that it was unnecessary to contact the Penrith signaller and just to go past the signal.

Sixth, the conditioning of his mind by Mr Browne that signal 41.6 should not be a cause for any delay was confirmed by the manner in which Mr Mulholland authorised him to pass the signal. His expression "you certainly are" conveyed to him that there was no danger to him and he was being given a verbal green light. Mr Sinnett said "he was indicating there was nothing on the track in front of me."

Seventh, Mr Mulholland asked him to report what the signal ahead was showing. To Mr Sinnett this meant that there was no other train between his train and that signal.

Mr Sinnett, I am satisfied, was otherwise a prudent and careful driver with considerable experience. He was well aware the area was a dangerous one with curves and cuttings reducing visibility and he would not have driven his train at the speed that he did if he believed for a moment that there was a train in front of him.

The manner of his driving of his train corroborates in my view that he thought the track was clear of any obstruction or any other train. It must be borne in mind that he was driving at the extreme front of the train and if there was any obstruction with which it could collide he would be the first to suffer injury.

13. Signal Telephone 40.8

When the Indian Pacific arrived at signal 40.8, which was in the stop position, the train was stopped by Mr Marshall and Mr Willoughby left the locomotive with the intention of contacting the Penrith signal box. Mr Willoughby, on arriving at the signal telephone, saw that the lock and chain securing the telephone had been broken.

Figure 17 - The Indian Pacific at signal telephone 40.8 after the accident

He picked up the handset to see if anyone was on the line and there was no one on the line. He then went to press the “push to ring” button and it was missing from the housing. He attempted to call Penrith signal box by turning the crank handle five to ten times. He did not get any response from the Penrith signaller but he “could distinguish that there were voices in the background as if there was a receiver on a table and there was someone on the other end of the phone and there was a conversation going on". He said "I couldn’t understand any of the words in the conversation or if anyone was talking to me.”

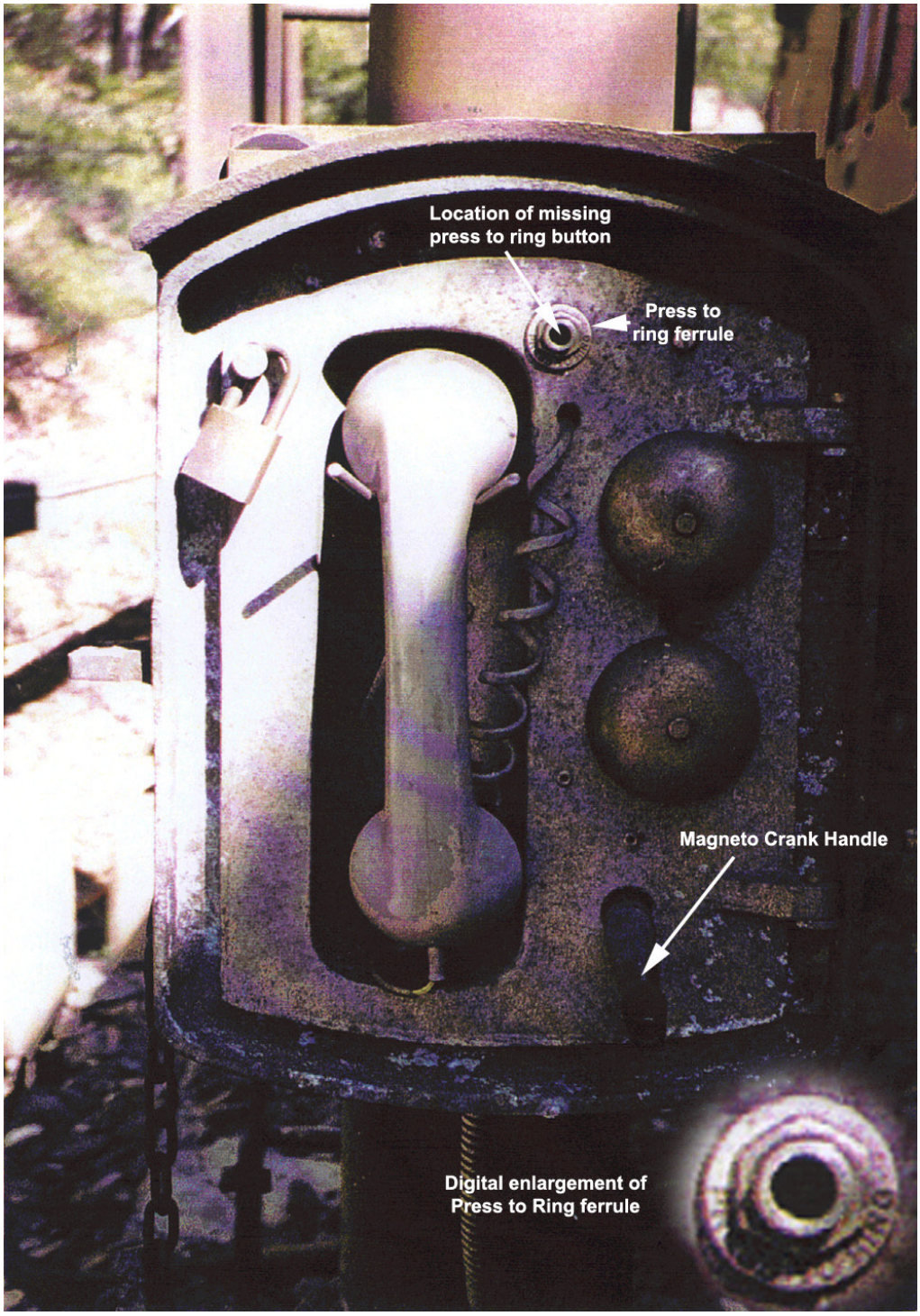


Figure 18 - Signal telephone 40.8 on 2 December 1999

He also said that he thought there may have been two voices "because to me it sounded like not as if someone was talking to themselves but were having a conversation if you get what I mean". He twice said into the handset "Penrith, WL2 here at signal 40.8" but there was no response on each occasion. On the second occasion he shouted into the handset.

Mr Anthony to whom I have previously referred in the section of this report dealing with the supervision of Penrith signal box provided several possible explanations of what Mr Willoughby may have heard. He said the signaller could have been using a hand held microphone talking to station staff in the yard or he could have been on the Metronet or talking to a train controller. He also suggested that what may have been heard were public announcements from the station platform if the window was open in the signal box. He said the most likely situation that could result in the caller hearing voices was if the signaller pressed the button on the console but did not put the handpiece to his ear to speak to the caller.

He said that could have happened because the signaller was engaged in another conversation and was not able to speak to the caller on the signal telephone. He has seen that happen. If it happens and the train recorder is there and the signaller does not have the time to speak at that particular point to the caller the train recorder would answer the call on the signaller's behalf. He said when the signal telephone call is cancelled the button is pressed and that causes the lights to drop out. He confirmed that the handpiece is left loose on the desk.

Mr Willoughby realised he could not get the attention of any person at the other end. He thought that the telephone was broken. He then replaced the receiver, closed the door of the telephone and returned to the locomotive.

The fact that Mr Willoughby was not able to make himself heard and yet could hear voices on the line has resulted in a great deal of evidence about the operation of that particular signal telephone, particularly as Mr Mulholland denied any suggestion that he failed to answer a call from signal 40.8.

The importance of this issue is that if Mr Willoughby had in fact spoken to the Penrith signaller the accident may have been avoided.

Mr Curtin, the Principal Signalling Engineer of Rail Access Corporation, described the operation of signal telephone 40.8.

His experience was that between 1974 and 1984 he was a district signal engineer in the Blue Mountains and was familiar with the general area. From 1984 to 1989 he was the Senior Training Engineer of the State Rail Authority. In 1996 when the re-organisation occurred he was transferred to Rail Access Corporation becoming its Signal Standards Engineer.

He said the telephone line from signal 40.8 to the Penrith signal box is a party line. It connects the particular signal telephone to the Penrith signal box. All other signal telephones operate in the same fashion. He said the signal telephones are separately powered from the signal post to which they are attached. Thus the failure of signal 40.8

would not effect the operation of signal telephone 40.8. The failure of signal 41.6 did not effect the operation of signal telephone 41.6.

The technology is not new, it has been in existence since the turn of the last century. Some of the telephones came equipped with a button in an aperture surrounded by a collar on which are stamped the words "press to ring". According to Mr Curtin the press to ring button had no operational purpose. It was a feature of such telephones that they could be used for contacting different destinations using the press to ring button using a type of morse code. However, since on this line the only destination was Penrith signal box, this feature had been bridged out. It was unfortunate that this fact was not communicated to drivers of trains. They were not aware that the absence of the press to ring button did not effect the operation of the telephone. Had Mr Willoughby been aware that the press to ring button served no purpose he may not have thought the telephone was broken and may have persisted in his attempts to contact Penrith signal box. If that had occurred there may have been time for the signaller at Penrith to warn Mr Sinnett that the Indian Pacific was stationary at signal 40.8.

Mr Curtin said that turning the handle generated an electric current which was sent down the line and was converted to a buzzing sound and illuminated a square light on the console behind the signaller. The illuminated light then informed the signaller of the line from which the call was being made. A call from either signal telephone 41.6 or signal telephone 40.8 would illuminate the up main line button. The length of time for which it buzzed depended on how long the caller turned the handle.

An interface card at the Penrith signal box converts the electrical energy coming from the line and operates a relay that switches on the buzzer, in effect converting the current to a buzzing sound. Mr Curtin said that regardless of how many times the handle was turned the volume of the buzzing sound did not alter.

As previously observed, Mr Mulholland claimed that he did not hear any buzzing sound in the signal box or see any light on the console. I am satisfied that Mr Willoughby did turn the handle five to ten times in an effort to contact Penrith signal box. It is therefore necessary to examine the evidence about the testing of signal telephone 40.8.

Mr Curtin conducted tests on signal telephone 40.8. When he did so he was aware of Mr Willoughby's evidence about what had occurred when Mr Willoughby attempted to contact the Penrith signal box from signal telephone 40.8. Mr Curtin said that if there were background noises those noises would transmit along the line. If another person was talking to someone on another signal telephone further up the line the words would have been quite clear to anyone listening at signal telephone 40.8.

The only sources of voices on the line were either background noise from Penrith signal box or someone on the party line from another signal telephone. If the latter had been the case, Mr Willoughby would have been able to hear the conversation clearly. Since he could not do so the only alternative was that background noises were emanating from Penrith signal box.

Mr Curtin said that if the handset in the Penrith signal box was placed on a table some distance from people having a conversation in the signal box, Mr Willoughby would make out voices but probably not the actual conversation.

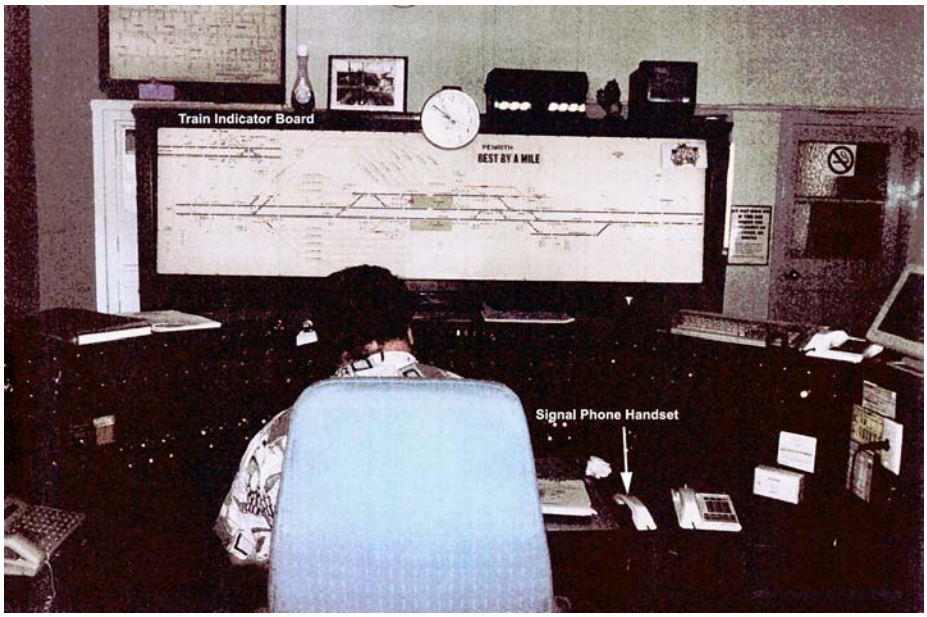


Figure 19 - Penrith signal box

The only other possibility, he said, was that a telephone on that party line somewhere else could have been left off the hook and there were some people conducting a conversation in the vicinity of the signal telephone. This is an unlikely scenario.

Mr Curtin discounted the possibility that the magneto did not have the effect of sending the power down the line to make the buzzer work because he had tested the telephone himself that day. He said the only way that voices emanating from Penrith signal box could be heard on signal telephone 40.8 was if the up main line auto button had been pressed.

The only two realistic possibilities on the evidence of Mr Curtin are that either the button was left pressed in after Mr Mulholland had finished the telephone call from signal 41.6 by Mr Willoughby or he had pressed it when Mr Willoughby telephoned from signal telephone 40.8 but failed to speak to him before Mr Willoughby had hung up the signal telephone. Mr Mulholland denied both alternatives.

It was suggested that signal telephone 40.8 may have been subject to an intermittent fault. This resulted in a number of tests being carried out on that signal telephone.

By way of routine maintenance signal telephone 40.8 was regularly tested prior to the accident. It was usually tested on a 60 day cycle. It had been tested on 2 September 1999 and found to be in good working order. It was separately tested by several persons on the day of the accident and during the months following the accident.

Mr Curtin tested the telephone on the afternoon of 2 December 1999. Mr Curtin said the door of the telephone was open, he picked up the handset, heard a low hum, indicating that the line was open between the telephone and Penrith signal box. He then picked up the handset, put it back and then turned the handle five or six times. The Penrith signal box answered and said “you’re a little faint”. The signaller agreed that he had received what he described as the “bell”, which I understood was the buzzing sound.

Mr Leamey, the District Signals Engineer, also tested the signal telephone at 40.8 on 2 December 1999 and found it was working.

Mr Sheather, the Regional Network Superintendent responsible for the area from Lapstone to Bowenfels tested the signal telephone at 40.8 at about 4:15 pm on the day of the accident. He turned the handle, picked up the receiver and spoke to the signaller at Penrith. He asked the signaller to ring the bells at signal telephone 40.8 and that occurred. He was told by the signaller that it was a clear test. He said he turned the handle briskly ten to twelve times. He took photographs of the signal telephone and they are in evidence before me. He did not know why the press to ring button was removed.

Mr Sheather conducted a further test on 9 December 1999 at the request of Mr Bernie Hudson, the Regional Network Manager, and he said it operated as it should. He tested it again between Christmas Day and 2 January 2000 when it was again working correctly and he also tested it on 10 or 11 February 2000 when it operated correctly.

Between Mr Sheather's two tests a decision was made to place a sign on the inside of the casing of signal telephone 40.8. This is the only signal telephone to have such a sign and it was specially produced by Mr Garry Leamey, the District Signals Engineer, Rail Services Australia. It was placed in the signal telephone by Mr Greg Carty, Signals Electrician, Rail Services Australia, on 27 January 2000.

Mr Leamey stated that the words contained on the sign were his. He was asked why he chose to include an instruction to turn the handle 15 times and replied that this was done because it was his personal practice when operating such a telephone to turn the handle 15 times. He stated that the sign was installed to prevent any confusion about the operation of the telephone.

Figure 20 - Signal telephone 40.8 in February 2000

On 18 February 2000 Mr Hartman, Regional Network Operations Superintendent, State Rail Authority, conducted certain tests on signal telephones 41.6 and 40.8. After speaking from signal telephone 41.6 he directed the signaller not to clear the circuit. He then replaced the handset, cranked the handle and the buzzer sounded but the signaller could not talk to him until the signaller again pressed the up main line button. The signaller tried to talk to Mr Hartman again before he pressed the button and Mr Hartman could not hear him. He told the signaller not to press the "clear all" button before he tried to telephone from signal telephone 40.8. He then went to signal telephone 40.8 and picked up the handset. He heard an electronic noise, put the handset back on the cradle and turned the handle ten times or more. The signaller said he heard the buzzer but he had to press the up main line button before he could make himself heard to Mr Hartman.

On 23 March 2000 Mr Hartman conducted another test of signal telephone 40.8. On that occasion Mr Hartman was in the Penrith signal box and Mr Ripkinskis was at signal telephone 40.8. On that occasion the signal telephone was again working correctly.

Mr Minchin, a Project Manager with Rail Services Australia, attended signal telephone 40.8 on 19 February 2000. He attended with legal representatives from Rail Access Corporation and Mr Glen Pinkerton, the Infrastructure Maintenance Engineer West, Rail Access Corporation. Also present was Mr John Hopper, the Asset Manager, Metropolitan West, Rail Access Corporation. Mr Minchin picked up the handset to check that no one was on the line. He then replaced the handset and then rotated the handle twice. He picked up the handset and Penrith signal box answered. He then did a sequence of tests using two turns of the handle, five turns of the handle and fifteen turns of the handle. Mr Minchin was asked to speak into the telephone for a minute and then listen. He said that when he listened he heard voices but could not determine what they were saying. He then yelled as loud as he could for thirty seconds and said that he could not be heard in Penrith signal box.

He agreed that hearing voices could occur if a previous call from signal telephone 41.6 was not cleared or alternatively if it was cleared, then the up main line button was depressed and no communication took place from the Penrith signal box.

Mr Byron, the Senior Product Manager of Argus Communications, which he said was a division of Rail Access Corporation gave evidence which in some respects did not accord with the evidence of Mr Curtin. He spent three days testing signal telephones 41.6 and 40.8 on 28 and 29 March and 14 April 2000. His report only came to light after the evidence had closed. The version of what Mr Willoughby heard at signal telephone 40.8 was put to him and his answer was, that assuming that the voices came from the Penrith signal box, this implied in one way or another the turning of the handle was not registered by the equipment at Penrith signal box. He said that this was because the handle may not have been turned vigorously enough or there was a failure of the telephone equipment.

He then said, as did Mr Curtin, that a line would only be open because a signaller had at some stage pressed the main up line button. He then said that if there had been a conversation on the line a few minutes previously and the line was not cleared, voices could be heard.

I find the evidence of Mr Byron about the tests that he supervised to be very unsatisfactory. He spent three days on this investigation. On the last date he also attended with Mr Rummage, and an apprentice Mr Kerr, Mr Curtin, Mr Tate, his superior and Mr Hedley. He said he was asked to attend because of a certain amount of confusion as to whether or not a second operation of a magneto generator over the top of an already established and existing call could disconnect the speech part. There were disagreements about it and he was there to clarify the issue. His evidence did not clarify this or any other aspect of the operation of this signal telephone. The answers that he gave about the signal telephone and the Penrith signal box were inconsistent and inconclusive.

Mr Byron's evidence did support the evidence of Mr Curtin in relation to one critical matter. That was the explanation given by Mr Curtin that if Mr Willoughby could hear voices this meant that either Mr Mulholland did not disconnect the call after he had spoken to Mr Willoughby from signal telephone 41.6 or that he had pressed the button and made the connection when Mr Willoughby telephoned from signal telephone 40.8.

In one of his tests at signal telephone 40.8 Mr Byron arranged for an apprentice to attend Penrith signal box while he carried out a series of tests turning the handle at various times from one to fifteen rotations. No one answered any of these calls.

Mr Byron said that he did not know whether the signaller was ignoring him. He said that the apprentice stationed in the signal box was not close enough to the console to say one way or the other whether the buzzer had sounded. Mr Byron said that the signaller had told him that he had not heard any buzzer sounding.

Mr Byron then conducted a test by placing a voltmeter on the connections and making another call. That call was immediately answered by Penrith signal box. This did not tell him without ambiguity whether the signaller previously had just not answered or whether the equipment had failed.

After these inconclusive and indeterminate tests Mr Byron conducted a further series of tests which produced a response from the Penrith signaller on every occasion.

Mr Byron's hypothesis was that if the handle was not turned vigorously enough this might account for Mr Willoughby hearing voices and the call not being registered by the equipment at Penrith signal box.

The fact that Mr Byron did not pursue obvious avenues of inquiry when conducting these tests left his evidence in a totally unsatisfactory state and it has not been of any assistance to me in deciding whether or not signal telephone 40.8 was in good working order when Mr Willoughby attempted to telephone the Penrith signaller on the morning of the accident. However, on the evidence relating to all the other testing of this telephone, I reject the hypothesis that there was some intermittent fault which affected the signal telephone when Mr Willoughby attempted to use signal telephone 40.8.

I do not accept that Mr Willoughby turned the handle so tentatively or in such a hesitant manner that the buzzer did not sound. I find that he did turn the handle five to ten times in the same way that he successfully used signal telephone 41.6.

As I have earlier stated, Mr Mulholland has at all times strenuously denied that signal telephone 40.8 caused a buzzer to sound in the Penrith signal box that morning or that he answered the call. The evidence that he did is purely circumstantial. His evidence was that the buzzing sound made by an incoming call from a signal telephone was not extremely loud, but it was enough to get his attention. He said that he was "pretty tuned in" to various noises in the signal box and that never before did he have to be alerted by the train recorder to the buzzing sound. He could give no explanation as to how it was that Mr Willoughby heard voices on signal telephone 40.8. He said that he had never failed to clear a call, even when busy. He said "you clear every call".

The only person in the signal box at the time was Mr Mulholland. If Mr Willoughby had not heard voices on the line when he turned the handle and put the handset to his ear I would have had a doubt about the matter. On his evidence, which is not contested, I conclude that the only rational explanation for hearing those voices is one of two scenarios. The first is that after Mr Willoughby's conversation with Mr Mulholland at signal 41.6 Mr Mulholland overlooked pressing the button to sever the connection. In those circumstances the line between 41.6 and the Penrith signal box remained open, which means that a person at signal telephone 40.8 may be able to hear any conversation that was taking place in the Penrith signal box. Alternatively, he closed the line and the buzzer sounded from signal telephone 40.8, he then pressed the up main line button which opened the line. Although it is impossible to be certain about it I find on the evidence that Mr Mulholland did open the line to Mr Willoughby from signal telephone 40.8. This seems the probable explanation for Mr Willoughby hearing the voices on the line.

In coming to this conclusion I have not overlooked that Mr Mulholland was operating the signal box at that time without assistance, that he was under pressure because of the number of demands upon him and that his experience was not sufficient to enable him to cope with all those demands.

I do not accept his evidence that he had overcome the dramas by the time of the attempted telephone call from Mr Willoughby at signal telephone 40.8. When he spoke to West Control shortly after Mr Willoughby telephoned him from signal telephone 41.6 he said he was "having dramas", not "had dramas", and was apparently so pressed for time that it was necessary for him to ask West Control to call Springwood to try to organise an electrician to attend to signal 41.6.

There is no detailed evidence about these "dramas". However, the Metronet transponder record registered the call from Mr Sinnett as having occurred between 8:20 am and 19 seconds and 8:20 am and 49 seconds.

I have previously observed that the data logger records the Indian Pacific arriving at signal 40.8 at 8:19 am and 3 seconds.

Mr Willoughby immediately left the locomotive and if one allows one minute and 16 seconds for Mr Willoughby to attempt the telephone call from signal telephone 40.8, there is a real possibility that one of the matters to which Mr Mulholland was attending at the time of Mr Willoughby's attempted call was Mr Sinnett's Metronet call.

He may have initially been aware that he had a call on that line but was distracted by his other duties from dealing with it until after Mr Willoughby had left signal telephone 40.8. The second alternative is that he completely forgot that he had pressed the button until after the accident.

He did say in his evidence when recalled that he expected the Indian Pacific to appear on his track indicator board at around 8:20 am and that when the Indian Pacific did not do so he had broadcast a call on the two-way radio to the driver of the Indian Pacific. Mr Mulholland said he asked the driver whether he was having problems and the driver said "we've just received a large shunt in the back of our train".

I have stated that Mr Mulholland was working at the time of Mr Willoughby's attempted call without assistance. The train recorder on duty at the time, Sean Lamont, had left the signal box to obtain his breakfast by the time Mr Willoughby was seeking to use signal telephone 40.8. In retrospect this was at a most inopportune time. It was justified by Mr Mulholland on the basis that the peak hour had just finished and things were starting to quieten down. However, when he spoke to West Control about having received a message from the Indian Pacific at signal 41.6 he asked West Control to contact Springwood to get a signal electrician to attend at signal 41.6 because he said he was having a "stack of dramas" that morning.

Mr Hartman who in my view was a reluctant witness and whose sympathies were clearly with Mr Mulholland, concluded that the time between 8 am and 8:30 am was a busy time, just after peak hour and it was not a desirable practice for the train recorder to leave the Penrith signal box at that time. Mr Webb, who was a train recorder who was rostered on the afternoon shift at the Penrith signal box on 2 December 1999, said it was his practice not to go to breakfast until 9:30 am when he was on the morning shift.

If Mr Mulholland did clear the line after the call by Mr Willoughby from signal telephone 41.6 and did not open the line from signal telephone 40.8 when Mr Willoughby was attempting to telephone Penrith signal box there is no natural explanation as to why, in those circumstances, Mr Willoughby heard voices on the line.

Times become critical because W534 stopped at the four car marker at Glenbrook railway station and contacted Penrith signal box by the Metronet. It appears from the Metronet record of calls that at 8:20 and 9 seconds a call was placed from W534 to Penrith. It appears that at 8:20 and 19 seconds the call was answered by the Penrith signal box and at 8:20 and 49 seconds the call concluded.

In the meantime Mr Willoughby had left the Indian Pacific at signal 40.8. The data logger analysis records the Indian Pacific as becoming stationary at signal 40.8 at 8:19 and 3 seconds. Mr Willoughby said he did not hesitate in leaving the locomotive and attempting to use signal telephone 40.8. If one allows up to one minute for him to leave the locomotive and attempt to use the signal telephone, the times correspond with the time of Mr Sinnett's call to Mr Mulholland. The data logger analysis report records that after the unsuccessful attempt at communication from signal telephone 40.8 and Mr Willoughby's returning to the locomotive, the locomotive began a gradual brake release, commencing at 8:21 and 47 seconds. By this time Mr Sinnett had finished his Metronet call to Mr Mulholland and his train was proceeding towards the rear of the Indian Pacific. Thus, it seems that the sequence of events beyond and after the recorded Metronet call

between Mr Sinnett and Mr Mulholland supports the probability that Mr Willoughby was trying to get through to Mr Mulholland at the same time as Mr Mulholland was speaking to Mr Sinnett.

If Mr Willoughby had been able to contact Mr Mulholland or Mr Lamont it is possible that there would have been time to warn Mr Sinnett and thereby avoid the collision. In addition, both lights on the console, on the signaller's side and on the train recorder's side respectively, would have illuminated if the signal telephone was working correctly. Even if Mr Mulholland had not seen or not attended to the call either promptly or at all Mr Lamont could have done so. However, as I have previously observed, Mr Lamont was absent from the signal box at the time that Mr Willoughby was attempting to contact the signal box from signal telephone 40.8. Accordingly, the absence of Mr Lamont from the signal box at that time was inappropriate, because the signaller was left to man the signal box alone at the very time when the demands on the signal box required two people to be there. Secondly, his absence contributed to the accident because had Mr Lamont answered Mr Willoughby's call immediate communication could have been established with Mr Sinnett, probably in time for him to have avoided the collision.

14. The Speed of Inter Urban Train W534

There is debate about the speed of W534 prior to the emergency application of its brakes and its speed at the time of the collision.

When Mr Sinnett gave evidence in chief about the circumstances leading up to the accident he said that the train accelerated after leaving Glenbrook railway station and he reached a speed of 45 kilometres per hour before he applied the regenerative brake after about seven or eight seconds. He later said that the maximum speed that he reached was 48 kilometres per hour. When he was recalled and the conversation with the Inspector, Mr Halls, which he agreed took place immediately after the accident, was put to him, he conceded that he may have got up to approximately 50 kilometres per hour prior to engaging the regenerative brake.

He was asked a number of questions about the speed that the train was travelling at the time that he saw the Indian Pacific motorail on the track ahead of him. In evidence in chief he said that he was travelling at 40 kilometres per hour at the time he made an emergency brake application. He said that he was not looking at the speedometer at that time and that on the last occasion before the accident that he did look at the speedometer, the train was travelling at 42 kilometres per hour. Mr Sinnett denied travelling in excess of 50 kilometres per hour.

The guard of W534, Mr Clarke, said the train departed Glenbrook railway station at what he considered reasonably normal speed and no different from any other time. He said it would usually accelerate away for quite some distance and the driver would normally "shut off" and then coast down the hill for a time. This increased the speed of the train slightly and the train would hold its own. He believed that on this occasion Mr Sinnett shut off early just after the train had passed the platform. He thought the train was losing time and was travelling well under the track speed of 65 kilometres per hour. He estimated the speed of the train at about 35 kilometres per hour before it started to coast. He said the train coasted for a while and he was pretty sure that he heard the regenerative break cut in.

He agreed he did not overly turn his mind to the speed of the train and was not thinking of kilometres per hour. However he believed the train was doing well under what he considered would be a normal speed.

He heard the "air go", a clunking noise and a hissing noise. He saw the pipe gauge falling rapidly to zero, then the train came to a violent stop. This happened over a period of six to seven seconds. He thought the train was travelling at 35 to 40 kilometres per hour at the time of the collision.

A number of passengers on W534 gave evidence of what they observed. They were able to give estimates of speed. As one would expect, in the main they were occupied reading and so on and not taking any particular notice of the speed. Those that proffered estimates of speed differed in their estimates.

Figure 21 - View from driver's compartment 334 metres west of the point of collision

Figure 22 - View from driver's compartment 172 metres west of the point of collision

Mr Mitchell, a railway employee, who travelled from Hazelbrook with the guard in the back car driver's seat, noticed that the inter urban train had stopped at Glenbrook a little longer than usual and moved off normally. He believed it was travelling at its normal speed between stations. He had some experience as he travelled on the inter urban trains daily. He did not look at the control panel in front of him to see what the speed of the train was. He was suddenly aware that it came to a sudden stop. He thought that the train was doing more than 20 kilometres per hour immediately prior to impact but he did not notice any braking.

Mr Crofts, a chartered mechanical engineer from England who gave evidence had worked in the rail industry in the United Kingdom for some 29 years. For the last 20 years his work had concentrated on the structural integrity and crash worthiness of trains. He had been involved in investigating aspects of railway accidents including a number of collisions which had similarities to this one. He, with other engineers, did certain calculations to determine a range of sighting speeds and impact speeds of the W534. He initially took the weight of the Indian Pacific to be 998.64 tonnes with a length of 426.316 metres and that of W534 to be 204.5 tonnes with a length of 85 to 86.9 metres.

He took into account the damage to the inter urban and the car carrier and the generator car attached to the rear of the Indian Pacific. He also examined an inter urban carriage of the same construction as car 8067 which was the leading car of W534 and took measurements. From that material he was able to calculate the energy which was broadly dissipated in the accident and from that energy calculate the impact speed. He took into account the track grade of 1 in 60 and the braking characteristics of W534. He also had a braking report in relation to trains of the same type as W534, including information on delay as to when braking becomes effective. He also took into account a range of driver reaction times. He calculated from all these materials a different range of values.

In a second report he used reaction times ranging from .4 of a second to 5 seconds. The lowest of these was arrived at after discussion with experienced engineers as to the fastest possible reaction time of a driver driving a train in similar circumstances. He said that the driver had to see the obstruction, which in this case was the motorail at the rear of the Indian Pacific, had to recognise what it was and then had to take action. The upper limit of the range of reaction times, 5 seconds, is not relevant in these circumstances because Mr Sinnett's evidence was that he carried out an emergency brake application in a fraction of a second upon seeing the rear of the Indian Pacific. Mr Crofts also, on this occasion, revised his calculations to allow for a reduction in the weight of the Indian Pacific from 998.64 to 912 tonnes.

He concluded the most probable speed of the train at a sighting distance of 135 metres, as determined by Mr May, was 50 kilometres per hour and that probably the impact speed was 32 kilometres per hour. Mr May, to whom reference is made in the next chapter, based his calculations upon his knowledge of the braking capacity of a four car V-set train. Mr Crofts stated that if the reaction time is greater than 0.4 of a second then both speeds would be reduced. He said that his calculations were based on the fact that the Indian Pacific was stationary at the time of the accident.

In calculating the impact speed he said the material qualities of the stainless steel metal of W534 were known. Structural calculations were done to estimate the force required to

deform the metal and calculations were made as to the energy required to produce that degree of deformation.

He then went on to calculate an upper and lower extreme of the most probable amount of energy absorbed in the collision to illustrate the effects it might have on the sighting speed. Energy is the key factor in assessing impact speed.

Penetration of the front carriage of W534 by the car carrier was about seven metres. The construction of the motorail on the Indian Pacific was very dissimilar to W534. It had an under frame and upper and lower deck and was very stiff longitudinally. At impact there was very little deformation and energy absorbed by this car carrier. The energy and deformation was absorbed by the passenger vehicle. In the impact, the top deck of the car carrier penetrated above the floor of W534 and the lower deck penetrated under the floor. Thus it was the top deck which penetrated the body of the W534. Mr Crofts stated that there were steel stanchions in the inter urban train known as collision stanchions. They were vertical and were designed to resist penetration. The impact to the top deck of W534 was sufficient to cause failure of these stanchions and penetration of some seven metres.

After being told that the Indian Pacific was in fact moving at six kilometres an hour at the time of impact Mr Crofts did further calculations. He concluded that in those circumstances the most likely impact speed was 37 kilometres per hour with a sighting speed of 53.5 kilometres per hour. If a one second reaction time were used, the sighting speed would then be about 52 kilometres per hour and with a two seconds reaction time the sighting speed would be 49.6 kilometres per hour.

He next calculated a range of impact speeds between 34 and 41 kilometres per hour and he concluded it was very unlikely that the impact speed would be outside that range. The most probable impact speed in his opinion was 37 kilometres per hour, taking a sighting distance of 135 metres. He said if the sighting distance was 100 metres it would reduce the impact speed.

Having redone his calculations, he was of the opinion that the speed of impact increased from 32 to 37.01 kilometres per hour.

Whilst there are a number of assumptions contained in these calculations and they are at best an estimate, I was impressed with the accuracy of this evidence. In my opinion an impact speed of 37 kilometres per hour and a sighting speed in the vicinity of 50 kilometres per hour are the approximate speeds at which I find that W534 was travelling at those times.

Mr Sinnett conceded that he allowed the train to coast to 48 kilometres per hour before he applied the regenerative brake. The best evidence however of the speed of W534 at the time of sighting was that of a train inspector, Mr Halls. Mr Halls had a conversation with Mr Sinnett at the scene during which he told Mr Halls that as he was leaving the driver's cabin he had looked at the speedometer and it was showing 50 kilometres per hour. This conversation is denied by Mr Sinnett but I have no doubt in accepting Mr Halls' evidence as to what Mr Sinnett said to him. There are a number of reasons why I do this. First, it accords in general terms with the calculations made by Mr Crofts. Secondly, Mr Halls was kindly disposed towards Mr Sinnett. Thirdly, the contents of the conversation, other

than the reference to the speed of the train were all agreed by Mr Sinnett to be accurate. Fourthly, Mr Sinnett told Mr Halls that as he was approaching Blaxland he believed that he was contacted by the Springwood signaller. It transpired that at no time in his evidence, prior to being recalled after Mr Halls had given evidence, did Mr Sinnett mention that he believed at the time that he was speaking to the Springwood signaller. It was only after Mr Halls' evidence that the fact came to light. I accept Mr Halls as an accurate historian.

Figure 23 - Driver's compartment of an inter urban train similar to that involved in the accident

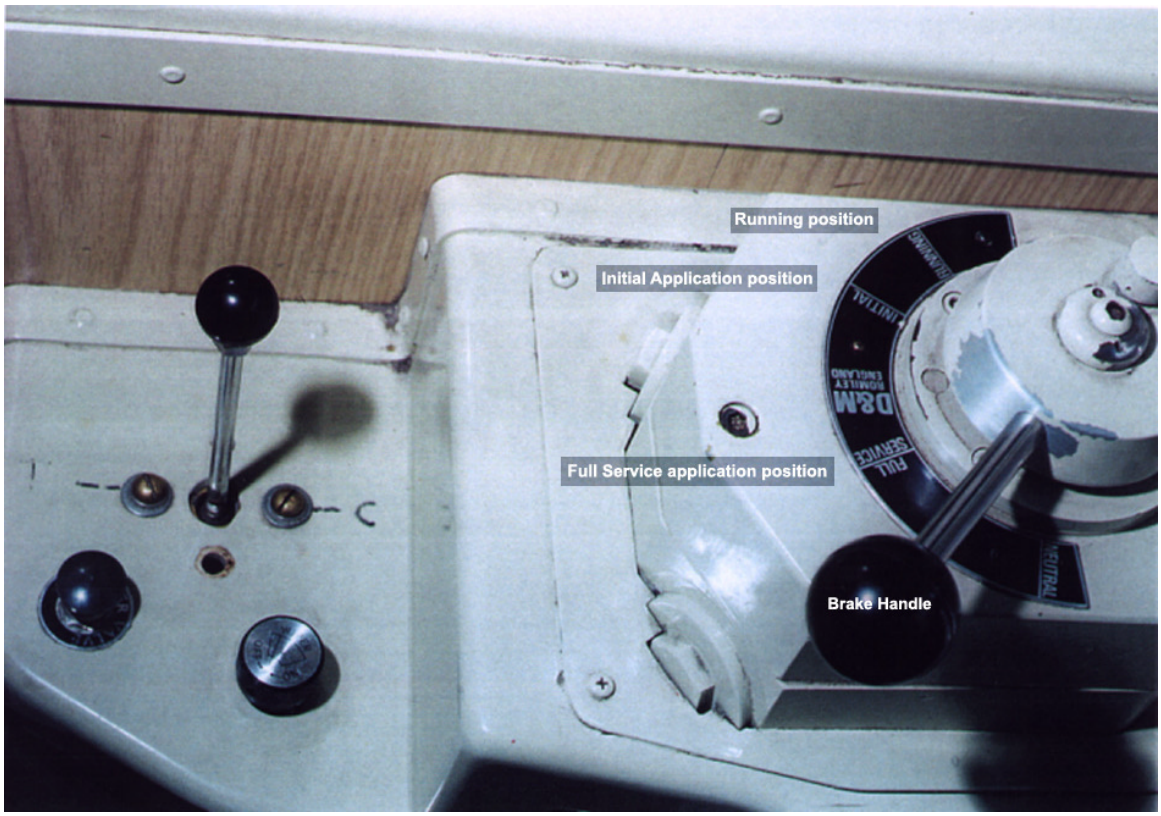


Figure 24 - Close up of the service brake of an inter urban train similar to that involved in the accident

15. The Braking System of Inter Urban Train W534

The braking system on W534 is threefold. It consists of a regenerative brake, an electro-pneumatic brake (known as the EP brake) and an automatic brake. They are all operated from the brake handle on the left hand side of the driver's compartment. The main witness in relation to the braking systems on such trains, and the engineer who conducted an examination of the brakes after the accident, was Mr Julian May, Principal Brake Engineer of the State Rail Authority. He said that the EP brake gives a more comfortable ride for passengers but immediately the "dead man's handle" is released the EP system "drops out" and the automatic system takes over.

The brake handle works all three braking systems. If pushed forward to its fullest extent from left to right it is in the full emergency position. There are a number of positions. The first is "initial". That means that if it is in that position then that is where the regenerative brake becomes operative. When the brake handle is moved further from left to right the braking is in full service application and the regenerative brake cuts out.

The other braking feature of this train, the "dead man's handle" is built into the master controller. The arm on the master controller must be subjected to downward pressure and then moved forward to move the train. If the driver's hand is taken off the master controller, thereby removing downward pressure, the brakes come on.

There had been many complaints by drivers about the regenerative brake on the leading car of W534. However, whether the regenerative brake was operating effectively on the day of the accident was irrelevant because, in an emergency application the regenerative brake has no function in stopping the train. On the whole of the evidence I am satisfied that the braking systems on W534 were efficient in this emergency application and did not in any way contribute to this accident.

Mr May also gave evidence in respect of the probable speed of W534 based upon his knowledge of the braking capacity of a four car V-set inter urban train. He stated that the maximum sighting distance that Mr Sinnett would have had of the Indian Pacific would have been in the order of 130 to 140 metres. In his opinion it made a great deal of difference to the probable impact speed if the sighting distance was less than that, for example around 100 metres. He stated that the average stopping distance of the train at a sighting speed of 45 kilometre per hour was 120 metres. In the worst case it was a little over 160 metres. At a sighting speed of 50 kilometres per hour the average stopping distance was 142 metres and in the worst case 185 metres. He said it would only take a fraction of a second to enable the brake handle to be turned to the full emergency brake position and he estimated it would not take much more than a second to enable to the driver to leave his seat.

He stated that if the train was travelling at 50 kilometres per hour the driver would have no prospect of stopping in less than 100 metres. He agreed that if that was the sighting speed of the train and the Indian Pacific was travelling at 60 kilometres per hour the probable impact speed was between 32 and 37 kilometres per hour. He stated that in his opinion the lowest range of impact speed was 26 to 28 kilometres per hour.

These are all estimates and of necessity cannot be accurate. In my opinion, however, this evidence is generally consistent with an impact speed in the vicinity of 32 to 37 kilometres per hour and a pre-braking speed of about 50 kilometres per hour.

16. The Causes of the Accident and the Factors which Contributed to it

There were many causes that brought about the collision between the Indian Pacific and the inter urban train W534 on 2 December 1999. Many of the causes were latent and a number of circumstances coincided to bring about this accident. In accidents which occur in an organisational context this is not unusual. Generally many causes contribute directly or indirectly to major accidents on the railways. I find that the following factors either caused or contributed to this accident.

1 This was an automatic section of track. The significance of this is that the section of track was designed to work with the control of trains being managed automatically by the signalling system without any human intervention. There was a signal failure caused by a component in a bridge rectifier unit, called a diode, failing. However, this was not caused by any lack of maintenance and could not reasonably have been predicted. After the signal failure occurred the management of the trains through the section was not done by electronic means but by signallers and drivers.

2 The nature of the topography between Glenbrook and Knapsack contributed to the accident because it limited the visibility of drivers and it restricted communications between drivers and the Penrith signaller.

3 The signaller at Penrith signal box had no means of establishing the position of a train in the area other than by communications from drivers or other railway employees. The absence of a train indicator board at Penrith signal box which covered the area of the accident was one of the major, if not the major cause, of this accident.

4 Signals 41.6 and 40.8 failed at the same time. It was not known to the signaller at Penrith, at the time that he authorised the inter urban train W534 to pass signal 41.6 that signal 40.8 was also in the stop position. It is not unusual for successive signals to fail if the component that fails operates in the overlap section of the first signal. The fact that the signaller at Penrith did not know that signal 40.8 was also in the stop position contributed to this accident.

5 Drivers of trains not equipped with the Metronet radio are required by safeworking unit 245 to communicate with signal boxes by signal telephone. The Metronet radio system was introduced in 1998. It allows almost instant communication with the nearest signal box, the relevant train controller or the defects section of the State Rail Authority. The driver uses it from the cabin of the train. In contrast drivers of other trains, including the Indian Pacific are not equipped with the Metronet radio. They must leave the cabin of their trains and use a signal telephone at the side of the track. This is time wasting and inefficient and undoubtedly contributed to the accident. The Indian Pacific had a modern two-way radio system that could have been used to contact the Penrith signal box. It was not used because safeworking unit 245 required drivers to use either the Metronet radio system or signal telephones. I see no basis for insisting on the use of the antiquated signal telephone system where no Metronet radio system is fitted if the train has a radio system capable of communicating with the signal box. If this was permitted there would have been no prolonged delay of the Indian Pacific at either signal 41.6 or 40.8. In

addition, the driver of the Indian Pacific would have been able to communicate to Mr Mulholland the fact that he was stopped at signal 40.8. That would have given Mr Mulholland the opportunity of communicating that information to Mr Sinnett thereby preventing the collision. This prohibition on the use of any radio communication system other than the Metronet was a contributing factor to this accident.

6 A significant cause of the accident was the inordinate delay of the Indian Pacific. The reasons for this have been explored and explained earlier in this interim report. However the length of the delay is understandable in the circumstances. I attribute no blame to Mr Willoughby for what occurred at signal 41.6. Similarly the reasons for the further delay of the Indian Pacific at signal 40.8 have been satisfactorily explained and I attribute no blame to Mr Willoughby for that delay.

The signaller at Penrith was required under safeworking unit 245 to determine whether the line ahead of the Indian Pacific was occupied when authority was sought to pass that signal at stop.

When the authority was given the signaller at Penrith knew that the inter urban train W532, immediately in front of the Indian Pacific was due at Emu Plains at 8:10 am and at 8:13 am at Penrith. He also knew that it was on time. He also knew that W532 had passed through both signals 41.6 and 40.8 with green lights. It follows, therefore, that when the Indian Pacific left signal 41.6, W532 would have been on the track indicator board at Penrith signal box which covered the area west to Knapsack.

The signaller therefore was entitled to conclude that the track between signal 41.6 and Knapsack was unoccupied; that the signal had failed; and that it was safe for the Indian Pacific to proceed past signal 41.6.

When the second request was made for authority to pass signal 41.6, by Mr Sinnett driving inter urban train W534, the signaller at Penrith did not know that the Indian Pacific had proceeded at extreme caution, in accordance with safeworking unit 245, reaching a maximum speed of 18 kilometres per hour and had stopped just short of signal 40.8 when Mr Sinnett made that request. Nor did the signaller at Penrith know that the journey from signal 41.6 to signal 40.8 took some seven minutes and 40 seconds with the result that the delay from the time that the Indian Pacific stopped at signal 41.6 until it reached signal 40.8 was 14 minutes approximately. This dramatic reduction in the time between the two trains in my opinion contributed significantly to the cause of this accident.

7 The communication between Mr Sinnett and Mr Browne, as I have earlier indicated, to my mind materially contributed to this accident because it conditioned Mr Sinnett's mind to the belief that the track was clear in front of signal 41.6 prior to his reaching that signal.

There was no warrant for Mr Browne to tell Mr Sinnett to "trip past" the signal. I accept that Mr Browne was acting with the best of intentions, knowing that signal 41.6 was an automatic signal which had failed, believing that W532 was clear of the area and believing, as a result of the earlier contact with Mr Mulholland that the

Indian Pacific was also clear of the area. However, his intervention by calling Mr Sinnett did in my opinion contribute to this accident.

8 A major factor which contributed to this accident was the fact that Mr Browne and others downgraded the significance of the fact that this was a red signal or a signal in the stop position because it was an automatic signal. In Mr Browne's mind there was no complication or danger such as crossovers or points in this area and his contact with Mr Sinnett was for the purpose of ensuring that there was no unnecessary delay by Mr Sinnett when he reached signal 41.6. Attempts were made in the course of submissions to provide other reasons for the terms of the conversation between Mr Browne and Mr Sinnett, but in my opinion the only rational explanation of Mr Browne's call to Mr Sinnett was to ensure that there was no unnecessary delay by Mr Sinnett when he reached signal 41.6.

The conversation between Mr Browne and Mr Sinnett in which Mr Browne said "it's only an auto, so just trip past it" conditioned Mr Sinnett's mind, similarly, to believe that the significance of the signal being in the red or stop position should be downgraded and that the track to at least the next signal was clear.

9 Mr Mulholland believed that the Indian Pacific was well clear of the section of track between signals 41.6 and 40.8 when he spoke to Mr Sinnett and encouraged him to proceed without any fear of danger from Glenbrook railway station.

10 Mr Mulholland did not check the position of the Indian Pacific when Mr Sinnett sought authority to pass signal 41.6 at stop. Although he did not have a train indicator board and was for this reason without the most important resource that he should have had, he had not been trained to use his own initiative to obtain information from other potentially available sources such as the station assistant at Lapstone or the drivers on the inter-urban and XPT trains travelling in the opposite direction. Had he done so, the driver of the XPT would have been able to inform him of the position of the Indian Pacific when he passed it near the Bruce Road overpass.

11 Nor did Mr Mulholland attempt to contact the Indian Pacific directly on the two-way radio until after the accident. He knew that eight minutes had elapsed between any previous communication with the Indian Pacific and the Metronet radio call from Mr Sinnett. It is probable that, had he used the two-way radio during that time, he would have made contact with the Indian Pacific because he in fact spoke to the driver of the Indian Pacific on the two-way radio after the accident. Had he spoken on the two-way radio to the driver of the Indian Pacific before authorising Mr Sinnett to pass signal 41.6 the accident would have been avoided.

12 A culture of on time running caused Mr Browne and Mr Mulholland to pay insufficient regard to the fact that the section of track where the accident occurred was not functioning as it was designed to do for the purposes of keeping trains apart.

13 The failure to communicate to Mr Willoughby that the absence of the press to ring button on signal telephone 40.8 did not affect the operation of the telephone led him to abandon his attempt to contact Penrith signal box rather than to persevere in

circumstances which may have alerted Mr Mulholland to the presence of the Indian Pacific at signal 40.8.

14 Mr Sean Lamont left the signal box to get his breakfast at a time when the demands of the signal box required two persons to be present. Had Mr Lamont been present, he probably would have attended to the call by Mr Willoughby from signal telephone 40.8 if Mr Mulholland had not heard it or had been unable to attend to it. Had Mr Lamont attended to that call, the signaller at Penrith would have been alerted to the presence of the Indian Pacific on the track at signal 40.8 and may have been able to contact Mr Sinnett to warn him and thereby have avoided the collision.

15 The failure of the signaller to speak to Mr Willoughby after the line from signal telephone 40.8 to Penrith signal box was opened contributed to this accident. I have discussed the circumstances under which this occurred in the body of the interim report. This may have occurred because Mr Mulholland was operating a busy signal box without assistance or because he forgot that there was a call waiting. Whatever the reason, the failure to communicate with Mr Willoughby meant that Mr Mulholland did not know that the Indian Pacific was stationary at signal 40.8 when he authorised Mr Sinnett to pass signal 41.6. As I have previously observed the only way a signaller knew where trains were in that section of track was by communication from drivers or other railway personnel.

16 The language used in the communication of information relevant to rail safety was colloquial, and for that reason misleading. All the relevant conversations, except the conversation between Mr Willoughby and Mr Mulholland, were recorded and there can be no dispute as to the terms of those conversations and the manner in which the parties expressed themselves. The language bears no relationship to the radio protocol required by safeworking unit 135 and in my opinion was a substantial contributing factor to this accident. In particular for the reasons I have previously given, the information that Mr Mulholland thought he was communicating to Mr Willoughby, and the information which Mr Willoughby thought was being conveyed to him by Mr Mulholland were different. This lack of precision contributed to the confusion about where the Indian Pacific was expected to be and led Mr Mulholland to authorise the inter urban train to pass through the signal 41.6 while the Indian Pacific was stationary on the track in front.

Another example of the colloquial exchanges and their effect was the communication between Mr Mulholland and Mr Browne. The casual manner of the conversation may well have distracted the two employees from considering the important information in relation to the management of trains through that area that should have been at the forefront of their minds and should have resulted in precise and accurate communication of relevant information.

17 Mr Sinnett was not provided with all relevant information from the signaller. Any decision he made as to how he should proceed would be based upon the information that he received. He showed in his evidence a healthy respect for a red light indication. He has been described as a competent, capable driver conversant with the particular area of track where this accident occurred. Whilst one can only speculate what action he would have taken, if he had been provided with all the

relevant information, including the fact that the Indian Pacific was not on the train indicator board at Knapsack and that Mr Mulholland did not know where it was, I believe it is likely that he would have proceeded at a slower speed than he did on this day.

18 If a train stop had been fitted at signal 41.6 then under safeworking unit 245 Mr Sinnett would have been in the position that he could have seen that the line ahead of him was unoccupied when he came to that signal and he would have been permitted to "trip past it" without contacting the signaller. This is because his train was fitted with a trip valve. If his mind had not been conditioned by the earlier conversation with Mr Browne and by the subsequent conversation with Mr Mulholland to believe that there was no train positioned between signals 41.6 and 40.8, and he was driving entirely at his own discretion and relying upon his own observations, he would not have known whether or not signal 41.6 was showing a red indication because of another train on the track in front of him. I have found that Mr Sinnett was an experienced and careful driver and I do not believe that he would have proceeded at the speed that he in fact proceeded at if he had any belief that the Indian Pacific may have been the cause for signal 41.6 being in the stop position. The fact that he had spoken to the signaller and the train controller and what they said gave him a false sense of security and contributed to the accident.

19 Safeworking unit 245 does not deal adequately with a second train coming to an automatic signal at stop. The unsuitability of that safeworking unit contributed to this accident because it did not accommodate the situation as it existed at Glenbrook on 2 December 1999.

The safeworking unit requires every train passing a signal at stop to proceed at extreme caution. This is because a signal at stop may have failed to clear as a result of a train on the line ahead, a broken rail or some other factor affecting the track, circuit and signals.

The driver of the second train, in this case Mr Sinnett, was not in the same position as the driver of the Indian Pacific. On the information provided to Mr Sinnett he was entitled to believe that the previous train had passed through the section without encountering any difficulties and that there was no other train or obstruction such as a broken rail on the line ahead. The circuitry for signal 41.6 extends for a distance of 1730 metres beyond that signal. The requirement to drive at extreme caution is imposed because the driver does not know the condition of the track in front of him. If the second train was required to proceed at extreme caution it would take thirty to forty minutes to traverse that section of track. The safeworking unit requires that the train proceed not only to the next signal at extreme caution but to the next signal beyond that signal at extreme caution. In these circumstances there would be considerable delay to rail operations and great inconvenience for a driver to proceed in this way in circumstances where he knew, on the information provided to him, that an earlier train had traversed the section of track without any impediment and he had been provided with information which led him to the firm belief that the line ahead was clear.

This highlights the fact as conceded by Mr Garling, Senior Counsel who appeared on behalf of the State Rail Authority that safeworking unit 245 is inapplicable. In

my opinion, the concession was correctly made. This safeworking unit is not appropriate to the circumstances of consecutive trains passing an automatic signal at stop. It was not submitted that any other safeworking unit could have been applicable. Accordingly, there was no applicable safeworking unit which governed the position of the inter urban train W534 at Glenbrook on 2 December 1999. The absence of a safeworking unit which dealt with the situation of a second train passing and automatic signal in the stop position was a contributing factor. Safeworking unit 245 in the circumstances at Glenbrook was unsafe and unworkable.

Mr Anthony, a Network Superintendent of considerable experience, when asked about the dilemma posed by the situation of a second train believed that the first train should proceed over the section at extreme caution and the second train at caution. This may be a sensible compromise to which I shall give further consideration in the final report.

20 Mr Sinnett was confused about the operation and effect of safeworking unit 245. I have discussed how this came about in this interim report. Under safeworking unit 245 a driver is required to stop at the signal, contact the signaller, give the signaller the identification number of the signal at which he is standing and establish the cause of the delay then act as instructed by the signaller. The cause of the delay at signal 41.6 was a signal failure. Mr Sinnet was in effect told that fact and believed he was given the green light through the section believing it was clear of any train and other obstructions. In those circumstances he believed he was acting as instructed by the signaller.

The concluding part of safeworking unit 245 directs the driver to do the following things:

1. Stop at the signal.
2. Contact the signaller by signal telephone or Metronet.
3. If contact can be made with the signaller: give the signaller the identification number of the signal at which your train is standing, then establish the cause of the delay and then act as instructed by the signaller.

In the position that Mr Sinnett found himself he stopped at Glenbrook railway station just short of signal 41.6; he contacted the signaller; he gave the signaller the identification number of the signal at which his train was standing; he inferred from what he had been told by the signaller that the signal was a failure; and then he acted as instructed by the signaller, namely he drove at a speed which would enable him to stop at signal 40.8 and report back to the signaller about its indication. The fact that this interpretation of these provisions of safeworking unit 245 was available to Mr Sinnett created a situation of danger. The fact that W534 was the second train to pass through signal 41.6 at stop made the interpretation that he should act as instructed by the signaller and proceed to the next signal and report back as to its indication all the more reasonable.

21 Mr Mulholland did not expect the Indian Pacific to travel at “extreme caution” from signal 41.6 to signal 40.8. If he had done so he would not have expected the Indian Pacific to be near Emu Plains when he authorised Mr Sinnett to pass signal 41.6.

This demonstrates that either Mr Mulholland did not know the requirement for drivers to travel at extreme caution or that he had overlooked it or that his own knowledge of the absence of any particular practice amongst drivers about the manner in which they proceeded after passing a signal at stop contributed to this accident. This highlights a lack of training, supervision and recertification of signallers and drivers in safeworking procedures.

22 The training of train controllers, signallers and drivers was inadequate. While rail operations proceeded in accordance with the intended functioning of the automatic signalling system, the deficiency in their training was not apparent. However, as soon as an event occurred which tested their knowledge of safeworking procedures, the train controller, the signaller and the driver of the inter urban were all found wanting. This reflects badly upon their employer and the systems for training, supervision and recertification. It is the responsibility of the employer to ensure that all employees on the rail network are properly trained, supervised and recertified in tasks which have an effect on their safety and the safety of the travelling public. These deficiencies and the means by which they should be addressed will be dealt with in the final report.

23 There was a lack of general awareness of safety considerations by all persons involved in the operation and management of the two trains through the area where this accident occurred. The means whereby this can be addressed will be dealt with in the final report.

There are two further matters that I should deal with relating to causes and contributing factors. The first is the issue of train to train communications. The Metronet system does not allow train to train communication. However prior to the introduction of the Metronet system, trains were equipped so as to permit train to train communications. It was submitted that had the Indian Pacific been equipped with a radio system that allowed train to train communications to take place, this accident may have been avoided. I am not satisfied that this is so or that the absence of such equipment was a contributing factor to this accident. Had Mr Willoughby, on returning to the Indian Pacific after attempting to communicate with the signaller at Penrith from signal telephone 40.8, attempted to communicate with W534 it is unlikely in my opinion that contact would have been made in time to avoid the collision. Further in my opinion, it is unlikely that he would have attempted to do so because he believed that the Indian Pacific was protected at its rear by signal 41.6 at stop.

On the issue of train to train communications generally, Mr Lamont, the Safety Audits and Standards Manager of the State Rail Authority, thought train to train communication was desirable to improve train safety. Trains so equipped for this purpose, if stopped in automatic signal areas, could communicate with following trains. Their positions could thus be indicated and any possibility of collision so avoided. Mr MacDonald, General Manager, Safeworking Systems and Operational Standards, Rail Access Corporation, was of the view that train to train communication would not improve safety and would distract the attention of drivers from the track ahead.

The issue of train to train communications is an important one in the circumstances of this accident. Evidence was given by the driver of an inter urban train, Mr Mark Smith, travelling in the opposite direction that at about 8:13 am he observed the Indian Pacific

heading down towards the Bruce Road overpass. He stated that, at about 8:18 am, as he was leaving Glenbrook railway station, he saw the inter urban train, W534, proceeding towards Glenbrook railway station. When asked about the relative positions of the two trains he said "I thought it was a little bit close to the other train but I knew there was a signal at the end of the platform protecting that train from going any further".

Mr Smith was not able to hear the communications between Mr Mulholland and Mr Sinnett, nor was he able to hear the earlier communications about the signal failure at signal 41.6. If there had been train to train communication which had enabled Mr Smith to hear what had occurred, Mr Smith may have been able to alert Mr Sinnett and Mr Mulholland as to the presence of the Indian Pacific and thereby avoided the accident.

This issue of train to train communication is clearly a matter which requires fuller consideration in the final report.

The final matter with which I should deal was whether the braking system on the inter urban train contributed to this accident. I can find no basis for finding that the braking system on the train was defective and contributed to the accident. Mr Sinnett described the train as "a good train". It is true that there is evidence that the leading car 8067 had for some considerable period a defective regenerative brake and it seems that despite many complaints over a long period of time the brake was not fixed satisfactorily. The evidence satisfies me however that this problem did not affect the emergency braking capacity of the train. Furthermore there is no evidence that the type of system on the inter urban is other than in accordance with up to date and accepted brake design.

17. Interim Recommendations

As I made clear at the commencement of this interim report, this report deals only with the causes of the railway accident at Glenbrook on 2 December 1999 and the factors which contributed to it. The other matters with which I have been asked to deal will be addressed in the final report. However, it is appropriate at this stage that I make interim recommendations pending the final report about matters which appear to me at this stage to require immediate attention. My interim recommendations are:

1 Pending the final report, all trains passing an automatic signal at stop are to proceed with extreme caution until the next signal.

2 Train indicator boards should be installed in signal boxes controlling the Blue Mountains line from Lithgow to Knapsack to mimic the presence of trains in that area. Consideration should be given to installing train indicator boards in all other automatic signalling areas where they are not otherwise provided.

3 Until train indicator boards are installed, no train is to pass an automatic signal at stop in the Blue Mountains between Lithgow and Knapsack until the preceding train has come onto the train indicator board at the next signal box unless the signaller can identify the exact location of the train ahead by other means.

4 Drivers are to call the signal boxes if they come upon an automatic signal at stop between Lithgow and Knapsack if that signal has failed to clear after one minute. The signaller must then convey to the driver concisely and accurately all information in his possession relating to the location of the train in front of the train from which the call is received or any known condition of the track.

5 All trains operating on the CityRail network to be provided with, carry and use, if not otherwise fitted a portable Metronet radio.

6 The protocol in safeworking unit 135 which relates to voice communication is to be strictly enforced.

7 No one is to travel in the driver's compartment of a train operating on the CityRail network unless that person is doing so in the performance of his or her duty.

8 All train controllers, signallers and drivers be required to acknowledge in writing the receipt and reading of all written rail safety information provided to them.

ANNEXURE A

LIST OF PARTIES AND THEIR REPRESENTATION

Counsel Assisting

Mr Christopher Thomas Barry QC and Mr David Cowan instructed by Christine Johnpulle

Kevin Patrick Sinnett and David Clarke
Mr Peter Capelin QC instructed by White Barnes

Damien Mulholland
Mr Alexander Shand QC instructed by Hemphill & Co

Australian Rail Bus and Tram Union and the members of that union
Mr Harold Bauer instructed by McClellands

Rail Access Corporation
Mr John West QC and Mr Ian Neil instructed by Allen Allen &Hemsley

State Rail Authority of New South Wales
Mr Peter Garling SC and Mr Simon White instructed by Mallesons Stephen Jaques

Director General, Department of Transport
Mr Michael Finnane QC and Mr Patrick Saidi instructed by the Crown Solicitor

Rail Services Australia
Mr John Gleeson QC and Mr Martin Shume instructed by Freehill Hollingdale & Page

Michael Vincent Browne
Mr Braddon Hughes instructed by Hughes & Taylor

Mr David Willoughby and Mr Peter Marshall
Mr David Conti instructed by Connery & Partners

Great Southern Railway
Mr Andrew Harris QC instructed by Phillips Fox

National Rail Corporation Limited
Mr Jeffrey Hilton SC and Mr James Stevenson instructed by Minter Ellison

Relatives of the deceased and injured passengers
Mr Peter Bodor QC and Mr Michael King instructed by the Legal Representation Office

ANNEXURE B

SPECIAL COMMISSION OF INQUIRY INTO THE GLENBROOK RAIL ACCIDENT

Directions

1 All persons granted leave to appear are to provide by 24 January 2000 to the Office of the Special Commission of Inquiry all documents and electronically stored information in their custody or control relating to the terms of reference of the Commission.

2 Any further summonses to give evidence and produce issued by the Commission to be returnable on 24 January 2000.

3 Documents subject to summonses to produce may be produced to the Office of the Commission at Level 10, 60-70 Elizabeth Street, Sydney.

4 All witnesses to be called by Counsel Assisting the Commission.

5 Parties with leave to appear to cross-examine by leave.

6 The hearing of the Commission to commence on February 2000 at 10 am, Court 10A, Level 10, Supreme Court, Law Courts Building, Queens Square, Sydney.

7 The Commission to sit normal Court hours Monday to Thursday and from 10am to 1pm on Friday or as the Commissioner may otherwise direct.

8 A full transcript of the proceedings is to be taken.

ANNEXURE C

ALPHABETICAL LIST OF WITNESSES

Alexander, John Norman – Resignalling Design Manager, State Rail Authority
Anthony, Douglas Aubrey – Network Operations Superintendent, State Rail Authority
Bates, Geoffrey John – Passenger, Carriage 1 (the inter urban train)
Boyd, David – Train Crewing Support Manager, State Rail Authority
Boyd, Ross – Assistant Manager, Train Crewing Section, State Rail Authority
Browne, Michael Vincent – Senior Train Controller, State Rail Authority
Byron, Jeffrey Martin – Senior Product Manager, Argus Communications, Rail Access Corporation
Camage, Barry William – Manager Train Operations, State Rail Authority
Carty, Gregory John – Signal Electrician, Rail Services Australia
Clark, Carl Charles – Inspector of Police, Manly Police
Clarke, David Luke – Guard (the inter urban train), State Rail Authority
Collins, Ian – Driver (W573 on 1.12.99), State Rail Authority
Collins, Paul David – XPT Train Driver, Countrylink. Previously a member of the Safeworking Division of the State Rail Authority
Conroy, Rashelle – Constable, Penrith Crime Scene Section
Craft, John Richard – Station Master, Mount Victoria, State Rail Authority
Craven, David Keith – Training Officer Grade 1, State Rail Authority
Crofts, Kevin Thomas – Chartered Mechanical Engineer, Interfleet Technology
Curtin, John Scott – Principal Engineer, Signalling, Rail Access Corporation
De Bortoli, Tania – Passenger, Carriage 4 (the inter urban train)
Doust, Adele Dulcie – Passenger, Carriage 1 (the inter urban train)
Doyle, Rodney Geoffrey – Electrical Foreman, State Rail Authority
Duncan, Ian Richard – Passenger, Carriage 4 (the inter urban train)
Edwards, David Stanley – National Manager Safety, National Rail Corporation
Evans, William Morgan – Passenger, Carriage 1 (the inter urban train)
Evatt, Elizabeth – Museum Director, NSW Toy and Railway Museum
Field, Ronald Laurence – Driver, State Rail Authority
Freeman, Kenneth David – Resident of Bruce Road, Glenbrook
Gadd, Laurence George – Signal Electrician, Rail Services Australia
Garner, Lisa Gay – Passenger, Carriage 1 (the inter urban train)
Golbach, Steven – Passenger, Carriage 1 (the inter urban train)
Grilanc, Serge Gabor – Passenger, Carriage 1 (the inter urban train)
Haddad, Gabriel – Taxi Driver
Halls, Wayne Andrew – Operations Inspector, State Rail Authority
Hancock, Basil Stuart – Passenger, Carriage 1 (the inter urban train)
Hannen, Paul – Senior Constable, Springwood Police
Hartman, Christopher Roy – Regional Network Operations Superintendent, State Rail Authority
Herd, Shanthi – Project Officer, Safeworking, Rail Access Corporation
Higgins, William Leslie – Station Master, Glenbrook Railway Station, State Rail Authority
Hogan, Neil David – Operations Inspector, State Rail Authority
Hollier, Warren Eric – Passenger, (the Indian Pacific train)
Hook, Ian Ramsay – Train Driver, State Rail Authority
Howard, Keith – Crew Area Manager, State Rail Authority

Hunter, Damian Marc – Passenger, Carriage 1 (the inter urban train)
Jamieson, John – Principal, Jamieson Foley & Associates Pty Ltd, Consulting Engineers
Jenkins, Lesley Olive – Passenger, Carriage 2 (the inter urban train)
Kennedy, John Francis – Medical Practitioner, Gosford Hospital
Kitanov, Michael Peter – Training Officer Grade 1, Australian Railway Training College
Kopjar, Daniel Anton – Maintenance Employeee, State Rail Authority
Lamont, Shaun Ian, – Train Recorder (Penrith signal box), State Rail Authority
Lamont, Thomas Leo – Safety Audits and Standards Manager, State Rail Authority
Lane, Michael John – Rail Safety Auditor, Signals and Electrical, Rail Access Corporation
Leamey, Garry Raymond – District Signals Engineer, Rail Services Australia
Leonard, John Francis – XPT Train Driver, State Rail Authority
Liu, Ronald – Station Assistant, State Rail Authority
MacFarlane, James – Former Manager, Safeworking Section, State Rail Authority
Marks, William Joseph – Signaller, State Rail Authority
Marshall, Peter Charles – Train Driver (the Indian Pacific), National Rail Corporation
May, Julian – Principal Brake Engineer, State Rail Authority
McColl, Phillip – Fleet Manager Flemington Maintenance Centre, State Rail Authority
McDonald, Jamie Ian Milton – General Manager; Safeworking Systems and Operational Standards, Rail Access Corporation
Millanta, Lesley Bernard – Maintenance Operations Manager Passenger Fleet Maintenance, State Rail Authority
Minchin, John Gregory – Project Manager, Rail Services Australia
Mitchell, Alexander Hamilton – Manager, Safeworking Competency Standards, State Rail Authority
Mitchell, Steven Ronald – Car Builder, State Rail Authority
Mulheron, Stephen – Senior Rostering Officer, State Rail Authority
Mulholland, Damien Mark – Signaller (Penrith), State Rail Authority
Mulholland, Peter – Network Operations Superintendent, State Rail Authority
Narouz, Peter – Relief signalman
O'Loughlin, Robert – Consultant
Pantich, Michael –Train Manager, Great Southern Railway
Phillips, Roland Neil – Safety Officer, Department of Transport
Plim, Lindsay Owen – Passenger, Carriage 1 (the inter urban train)
Plummer, Larry James – Signalman, State Rail Authority & Passenger, Carriage 4 (the inter urban)
Ralph, Francine – Senior Constable, St Marys Police
Rance, Anthony Robbin – Passenger, Carriage 1 (the inter urban train)
Reath, Jennifer Suzanne – Passenger, Carriage 2 (the inter urban train)
Ripinskis, Uwe – Network Operations Superintendent, State Rail Authority
Salter, Rudolph – Passenger, Carriage 2 (the inter urban train)
Sheather, Kenneth Neil – Regional Network Operations Superintendent, Blue Mountains Area, State Rail Authority
Sinnett, Kevin Patrick – Train Driver, State Rail Authority
Smith, David Gerard – Train Driver**,** State Rail Authority
Smith, Mark – Train Driver, State Rail Authority
Stojanovski,Vojo – Infrastructure Worker 2C, Rail Services Australia
Stoyef, Robert Adrian – Passenger, Carriage 2 (the inter urban train)
Szacsvay, Paul Anton – Senior Engineer, Rail Services Australia

Thompson, Roger Kenneth – Chief Foreman Class 2, State Rail Authority
Vilcins, Aivars Alfreds – Resident of Bruce Road, Glenbrook
Ward, Craig Bruce – Passenger, Carriage 1 (the inter urban train)
Ward, Margaret – Passenger, Carriage 3 (the inter urban train)
Watson, Mack – XPT Train Driver, State Rail Authority
Watson, Patrick John – Passenger, Carriage 1 (the inter urban train)
Webb, Todd James – Train Recorder, State Rail Authority
Wells, Martin Edward – Train Service Technician, Great Southern Railway
Willoughby, David Edmund – Train Driver (the Indian Pacific), National Rail Corporation
Young, Douglas Grant – Brake Engineer, State Rail Authority
Zima, John Walter – Electrical Mechanic, State Rail Authority

ANNEXURE D

SAFEWORKING UNIT 245

Safeworking systems on track-circuited double lines SWU **245**

Passing an automatic signal at stop - Automatic and Track Control (Bi-directional)

procedures for signallers, handsignallers, drivers

[a]

■ Automatic signals at stop must only be passed:

either when the signal has failed and the driver has the verbal authority of the signaller or the authority of a green **caution** handsignal displayed by a handsignaller positioned at the signal and working under the instructions of the signaller

or when the driver is instructed by the signaller to assist a disabled train

or if the signal is fitted with a train stop and the train is fitted with a trip valve,

when the driver can see that the line ahead is unoccupied

or if the signal is **not** fitted with a train stop **or if** the train is **not** fitted with a trip valve,

when the signaller cannot be contacted by telephone and the driver has waited one minute and can see that the line ahead is unoccupied.

To authorise a train to pass an automatic signal at stop [b]

■ When a signaller becomes aware that an automatic signal has failed and it is considered necessary for train working purposes to position a handsignaller at the signal, every effort must be made by the signaller and the controlling station master to provide a handsignaller as soon as possible.

signaller at B

When contacted on the signal telephone by the driver of a train at an automatic signal at stop or by a handsignaller positioned at an automatic signal:

1 Ask for the identification number of the signal.

2 Establish whether the line ahead is occupied or whether the signal has failed:

by checking the track indicator diagram, where provided, to establish whether a train is occupying the line between the signal where the train is standing and the next signal

and by checking the train register book or other recording system to establish if a train is still in the section

and by contacting the signaller at A to confirm the number of the last train which departed from A ahead of the train standing at the signal.

If the line ahead is occupied:

3 Inform the driver or handsignaller of the reason for the delay.

4 Give the driver, or instruct the handsignaller to give the driver, one of the following instructions:

either to wait at the signal until the signal displays a proceed indication

or to wait at the signal for further instructions

or to pass the signal at stop, proceed with extreme caution and assist the disabled train.

If the signal has failed:

3 When you are satisfied that:

the section in advance is unoccupied

and that sufficient time has elapsed to permit the previous train to have passed completely beyond the signal ahead of the failed signal

and that it is safe for the train to proceed

advise the driver or handsignaller that the signal has failed.

p 2

4 **Either** authorise the driver to pass the signal at stop **or** authorise the handsignaller to display a green **caution** handsignal as the authority for the driver to pass the signal at stop.

5 Advise the drivers of all following trains, if possible before they enter the section, of the identification number of the failed signal(s).

handsignaller 1 Display a red handsignal to any approaching train until you are instructed otherwise by the signaller.

2 When a train arrives at the signal, advise the driver why the signal is at stop.

3 When authorised by the signaller, display a green **caution** handsignal to the driver as authority for the driver to proceed.

To pass an automatic signal at stop [c]

■ A signal at stop may have failed to clear as a result of a train on the line ahead, a broken rail or some other factor(s) affecting the track circuit and signal(s). For this reason, a driver must exercise extreme caution when passing a signal at stop.

■ When a train passes an automatic signal at stop, the driver must proceed with extreme caution to the first signal ahead of the signal at stop, prepared to stop short of any obstruction, and obey the indication of that signal. If it is displaying a proceed indication, the driver must proceed with extreme caution to the second signal ahead of the signal at stop and obey the indication of that signal.

If there is a handsignaller positioned at the signal:

driver 1 Stop at the signal.

2 If necessary, find out from the handsignaller why the signal is at stop.

3 When the handsignaller displays a green **caution** handsignal, pass the signal at stop.

If there is no handsignaller positioned at the signal and the signal is fitted with a train stop and the train is fitted with a trip valve:

driver 1 Stop at the signal.

2 **either**
If you can see that the line ahead is unoccupied, trip past the signal at stop.

■ Drivers of electric trains must inform the guard, by bell code, that the train will trip past the signal.

or
If you can see a train occupying the line between the signal at which your train is standing and the next signal ahead, contact the signaller by signal telephone:

If contact can be made with the signaller:	**If** contact **cannot** be made with the signaller:
give the signaller the identification number of the signal at which your train is standing	**either** wait until the signal displays a proceed indication
then establish the cause of the delay	**or** when you can see that the train ahead has proceeded, wait until sufficient time has elapsed for it to have passed completely beyond the signal ahead of the signal at which you are standing and, if the signal fails to clear, pass the signal at stop.
then act as instructed by the signaller	

If there is no handsignaller positioned at the signal and either the signal does not have a train stop or the train is not fitted with a trip valve:

driver 1 Stop at the signal.

2 Contact the signaller by signal telephone.

3 **If** contact can be made with the signaller:	3 **If** contact **cannot** be made with the signaller:
give the signaller the identification number of the signal at which your train is standing	wait one minute and then, provided you can see that the line ahead is unoccupied, pass the signal at stop.
then establish the cause of the delay	
then act as instructed by the signaller	

p 4