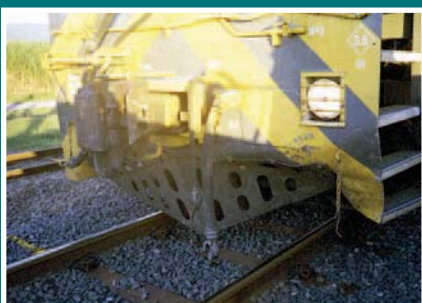




Fatal collision between passenger train 3C37 and a Ford Falcon station wagon

at the Hesp Road/Bennett Road level crossing
Aloomba 23 May 2003



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ISBN 1 877071 48 4

SEPTEMBER 2003

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CONTENTS

Terms of reference	v
Executive summary	vii
Investigation team	ix
Investigation Methodology	xi
1. Incident description and factors	1
1.1 Overview of Alooomba and its environs.	1
1.2 Basis of the report	2
1.2.1 Journey of train 3C37	3
1.2.2 Journey of Ford Falcon station wagon	4
1.3 The collision and immediate aftermath	4
1.4 Fatalities and injuries	7
1.5 Damage	7
1.5.1 Locomotive 2200F	7
1.5.2 Ford Falcon station wagon	7
1.6 Environmental conditions	7
1.7 Train crew details	7
1.8 Vehicle particulars	8
1.8.1 Train 3C37	8
1.8.2 Ford Falcon station wagon	8
1.9 Infrastructure and train control	9
1.10 The level crossing	10
1.11 Queensland Transport level crossing upgrade program	11
1.12 Rail Safety Accreditation	12
2. Analysis	15
2.1 Train operations	15
2.2 Road traffic	18
2.3 Hesp Road/Bennett Road level crossing at 1651.580 km	23
3. Conclusions	25
4. Safety Measures initiated	27
5. Safety Recommendations	29
Attachment 1 – Field Assessment Sketch	31
Attachment 2 – Sketch of Cross falls	32

TERMS OF REFERENCE

In pursuance of the powers given to me under Section 103/2 of the Transport Infrastructure Act 1994, I hereby require you to chair an independent investigation and report on the circumstances and cause of the accident involving a level crossing collision at Aloomba (DOT reference 1209) which occurred on 23 May 2003 and report your findings in writing to Tony Kursius, Executive Director, Land Transport & Safety Division, Queensland Transport by 23 June 2003 (should a full report be unable to be provided by this date an interim report must be submitted).

The investigation will, specifically in respect of the Aloomba Level Crossing Accident:

1. Undertake a systematic investigation into the accident.
2. Establish the factual circumstances leading to, and immediately following the accident.
3. Identify the direct cause or causes of the accident and any other contributing factors including human factors or any underlying matters which may have caused or contributed to the accident
4. Examine the systems and procedures which were in place prior to the accident and establish if appropriate risk management procedures were in place and/or applied to minimise the risk of such an accident.
5. Identify any safety actions to prevent, to reduce the risk of reoccurrence, future injury or damage and generally improve any safety system as it applies to the Aloomba Level Crossing.

The investigation report should be based on a systematic style investigation approach and should not be written in a manner that apportions blame.

The investigation team will comprise:

Mr Kit Filor – Investigation Team Chairperson, Australian Transport Safety Bureau

Mr Graham Guy – Principal Advisor (Rail Safety Unit) Queensland Transport

Tony Kursius

Executive Director (Land Transport & Safety Division)

EXECUTIVE SUMMARY

At about, or a little before, 1558 on 23 May 2003, while approaching the public level crossing on the North Coast railway line approximately 700 m south of the small town of Aloomba, Queensland, the two drivers of the Sunlander passenger train 3C37 saw a station wagon car travelling ahead and parallel to the railway line on the adjacent roadway to the east. The train driver maintained a prolonged blast on the train horn as the car slowed and came to a halt at the crossing.

As the train approached the crossing at a speed of about 80 kph the car was seen to move onto the level crossing immediately ahead of the train. A matter of seconds later both drivers lost sight of the car as it passed out of line of sight ahead of the locomotive. Almost simultaneously, they felt and heard an impact and the front of the cab was showered with shards of glass. At the same time the locomotive driver applied full service brakes prior to making an emergency brake application. The train locomotive came to a stop 430 m after the impact. The train was not derailed.

The car was struck by the left hand side of the locomotive's cowcatcher at the rear left hand door pillar causing severe damage. The car was struck so that it rotated violently anticlockwise, probably through 630 degrees, so that it came to rest on the broad grass verge on the west side of the track. There were three occupants in the car, a woman, who was driving, and her two male children, of seven and five years in the rear seats. The seven year old, was seated on the left hand side with a seat belt fastened, the five year old was on the right hand side in a purpose designed child seat and restraints.

The locomotive driver immediately notified train control of the accident. The passenger service staff on board the train immediately rang '000'. Witnesses in a car approaching from the opposite direction drove directly to the local shop, about 700 m from the crossing from where a further call was made to the emergency services. Ice and blankets were supplied by the shop owner, who went with a number of local residents to assist.

The seven year old male child was pronounced dead at the scene. The woman and five year old child were taken to hospital, the child suffering from severe head injuries.

The investigation established that the locomotive and rolling stock were in good operational condition. The train brakes worked within specification, the horn was operational, the head light was on full beam and the yellow locomotive should have stood out and been visible against the predominantly green background of the sugar cane and other vegetation. The track and train control systems did not contribute to the accident.

Although the driver of the car initially stopped, she either did this in 'automation' mode and did not check that the line was clear, or she did not see the train before starting over the level crossing.

The investigation established some problems with the approach angle and sighting distance of cars approaching the crossing from Moller Road and Fixter Road. There was also an absence of pavement markings associated with the passive protection for this level crossing. These observations have to be set against the driver's knowledge of the area. She (and her family) had been a long term resident of Aloomba and would have been familiar with the crossing and the adjacent roads.

The signage at Hesp Road/Bennett Road level crossing has been upgraded and pavement markings renewed following this accident. Sign off on the Memorandum of Understanding for the Management and Funding Responsibility for Level Crossing Safety in Queensland developed between the Local Government Association of Queensland, the Department of Main Roads, Queensland Transport and QR should formalise responsibility for the ownership of the level crossing componentry.

Sighting distances assessments made for the Hesp Road/Bennett Road level crossing for the Queensland Transport Public Level Crossing Upgrade Program did not represent the actual angle of approach for cars travelling from Moller Road to Fixter Road and vice versa. The investigation recommends that in accordance with the requirements of the Level Crossing Upgrade Program, the crossing be re-assessed in light of this report and that the proposals to meet the risk threshold and compliance be implemented as a matter of priority.

INVESTIGATION TEAM

Chair Christopher William Filor, Deputy Director Surface Safety Investigations,
Australian Transport Safety Bureau

Member Graham C Guy, Principal Advisor, Rail Safety, Queensland Transport

Assisting

Mr Geoffrey Featherstone, Service Delivery Manager, Coal and Freight Services, QR

Mr Lindsay Johnson, Rail Safety Coordinator, Network Access, QR

INVESTIGATION METHODOLOGY

The purpose of this investigation is to enhance rail safety at the Hesp Road/Bennett Road level crossing at Alooomba, North Queensland; firstly, by determining the sequence of events which led to the accident; and secondly, by determining why those events occurred. Of particular importance was the need to understand what the accident revealed about the environment within which this particular rail operation was being conducted, and to identify deficiencies with the potential to adversely affect safety at the level crossing.

The Reason model was used as the framework for the analysis of this accident.

During the investigation, information was obtained and analysed from a number of sources, including:

- Visits to the accident site
- Extraction of data from the ATP event recorder and analysis of that data
- In-cab observations of train operations at the level crossing
- A review of aspects of QR's Safety Management System
- Rollingstock and track maintenance records
- Interviews with personnel directly associated with the accident
- Interviews with management personnel relevant to the accident
- Interview with the Police Officer in charge of the police accident investigation
- Interviews with witnesses
- A review of safety occurrences at the crossing
- A review of the drivers medical assessments and training history
- Advice received from QR technical experts
- Analysis of Fatigue Management Score
- Review of local factors
- Review of QR Safety Risk Report
- Examination of rosters
- Examination of train control records
- Examination of Ford Falcon station wagon
- Examination of site maps, route maps and charts
- A limited review of driver behaviour at the Hesp Road/Bennett Road level crossing

The investigation team acknowledges the full co-operation received from all parties to this investigation both, individuals and organisations.

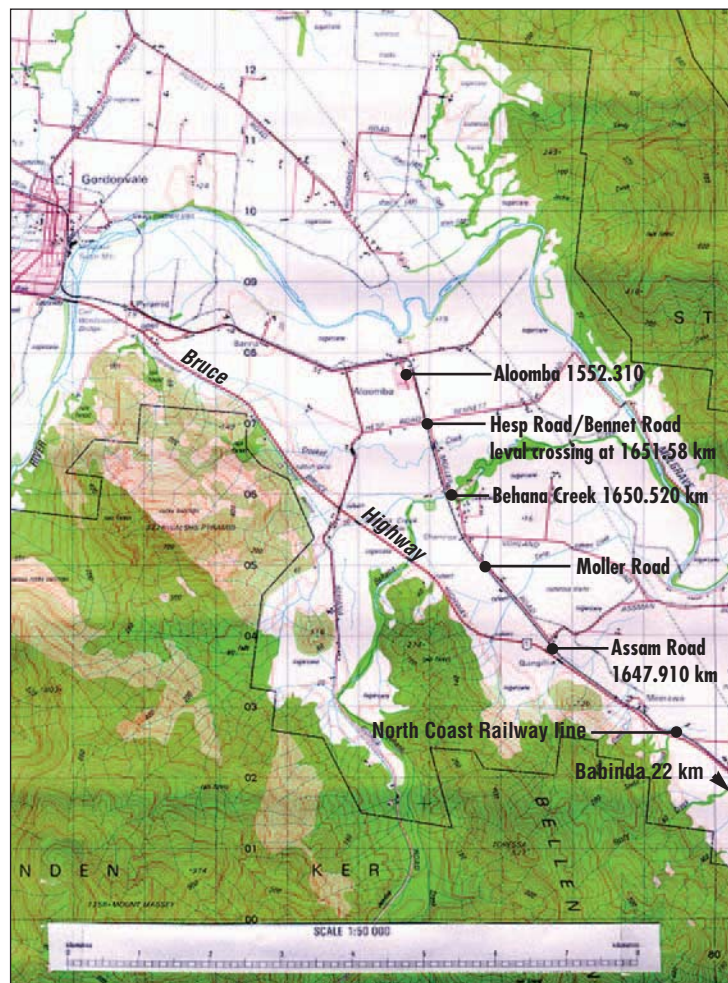
1. INCIDENT DESCRIPTION AND FACTORS

1.1 Overview of Alooomba and its environs

Alooomba is a small township of about 200 people, about 30 km south of Cairns Railway Station. The area is predominantly a sugar cane farming area.

The North Coast railway line from Brisbane to Townsville and Cairns is narrow gauge (1067 mm). Between Townsville and Cairns the line is single track, with passing loops at various locations. At Alooomba the line runs to the east of the main township and there is also a passing loop. Each day there are seven regular train movements on the line. In the sugar season this increases to as many as 17 movements. From the south, Alooomba is approached over Behana Creek and Crooked Creek, through a short left hand curve (1609 radius) and up a short gradient of 1:94 before levelling just before the Hesp Road/Bennett Road level crossing with passive protection at 1651.580 km from the zero kilometre post at Roma Street Station, Brisbane. The line speed approaching and on the gradient is 80 kph, 15 m after the crossing there is a 70 kph speed board at the points to a 794 m loop. The railway line runs at a bearing of 350° to the east of the main township before a left hand curve of 160 m radius.

FIGURE 1:
Extract from Australian Topographic Survey Gordonvale 8063 1 - scale 1:50 000



The level crossing at 1651.580 km is about 700 m southeast from the centre of Aloomba. It is also a junction of five roads: Fixter Road runs north of the crossing, parallel with and to the west of the track; Broughton Road north of the crossing, parallel with and to the east of the track; Hesp Road east of the crossing, Bennett Road west of the crossing and Moller Road south of the crossing, parallel with and to the east of the track. Fixter, Hesp, Bennett and Moller roads are paved bitumen roads.

FIGURE 2:
Hesp Road/Bennett Road level crossing at 1651.80 km from Hesp Road



Photo May 2002

Moller Road runs for about 3 km south from the Hesp Road/Bennett Road level crossing, mostly parallel to the railway line to Quingilli and a junction with the Bruce Highway about 26 km from the town of Babinda.

The cultivated land bordering the roads each side of the crossing was mature, ready to harvest, sugar cane.

1.2 Basis of the report

This report is based on interviews with key witnesses including the train drivers and people in the vicinity of the crossing at the time of the accident. More information was gathered from datalogger downloads, QR technical experts, maintenance records of track and rollingstock together with records of the field assessment of the crossing by the Cairns Local Level Crossing Committee.

The times of calls to the ambulance service and their record of attendance is provided by the Queensland Ambulance Service. Other information relating to the accident site and subsequent actions were provided by the Queensland Police Service.

There were a number of different records based on internal clock systems. Therefore a variation exists in some of the times recorded but none of the critical times vary by more than 60 seconds.

The driver of the road vehicle involved in the accident was not interviewed on the advice of the local police and the trauma councillor. The account of the driver's actions are based on eyewitness accounts of the accident and what the car driver is alleged to have said after the accident.

The investigators recognised the extreme stress under which any such statement was made.

1.2.1 Journey of train 3C37

Train 3C37, departed Brisbane Roma Street Station on the morning of 22 May 2003 on the 'Sunlander' passenger service on the North Coast railway line to Cairns, with a scheduled journey time 31½ hours and a scheduled arrival at Cairns Station of 1625 on 23 May.

The locomotive and 18 rail vehicles made up a consist of 332.4 m and 557 tonnes.

By the time 3C37 arrived at Townsville Station at 0842 the train was about 51 minutes late. A Townsville crew of two drivers relieved two Mackay drivers and boarded the diesel locomotive of the 2170 class, number 2200F. The drivers were provided with a new 'Train Wire'¹ and entered the maximum 80 kph parameter in the locomotive computer. Train 3C37 left Townsville at 1006, 58 minutes behind schedule with about 14 passenger service staff and about 150 passengers aboard. The two drivers decided to share the driving duties over the 340 km of track, changing at Cardwell at about 1235. The passage of the train was uneventful to this stage of the journey.

Between Tully and departing Innisfail, 3C37 made up 14 minutes on its schedule. It departed Innisfail with 129 passengers at 1452, 53 minutes behind schedule. The train passed through Babinda at 1538, Deeral at 1543 and crossed the level crossing at Assam Road, Quingilli at about 1552. There was a volume of road traffic on the Bruce Highway to the west of the train, but neither driver saw any vehicle at the Assam Road crossing. At this crossing, train 3C37 was travelling at about 65 kph, as recorded on the train's event recorder, accelerating to 80 kph, the designated line speed.

At Behana Creek 1070 m from the crossing the train reached a speed of 85 kph (23.61 m/s), marginally over line speed. From this point the train gradually decelerated, crossing Crooked Creek about 390 m from the level crossing, and climbing the short rising gradient of about 125 m. As the train passed the whistle board about 300 m before the crossing both drivers saw a station wagon on Moller Road, travelling ahead of the train towards the crossing. Both train drivers pushed their respective horn controls at this point and continued to sound the horn until the impact.

As the car reached the eastern, Moller Road, side of the level crossing the locomotive drivers saw the car come to a stop at an angle to the crossing. As the train approached the crossing at about 82 kph (22.777 m/s) the car moved forward onto the crossing.

¹ Train Wire – A form containing details of the consist and details of any dangerous goods carried together with ATP Train Parameter input data including train length and maximum line speed to provide braking characteristics.

1.2.2 Journey of Ford Falcon station wagon

On the day of the accident, students from Aloomba State School attended a sports carnival at Babinda School about 31.5 km by road south of Aloomba. Parents and teachers took the students by private cars and minibus to the carnival, the start of which was delayed by a late bus. As a result, the carnival ended about 15 or 20 minutes after its scheduled time.

The driver of the Ford Falcon station wagon left the sports ground some time after 1520 but before 1530, with her two children properly and adequately secured in the rear passenger seat. She drove via the Bruce Highway for about 24.4 km and turned off onto Assam Road to take Moller Road to Aloomba. A second car with two adults and children left soon after the Ford Falcon. The journey of the second car coincided with the passage of the Sunlander. The second car ran parallel and, for a while, in company with the Sunlander passenger train. Children in the car waved to the train. Passengers on the train responded. The car and the train lost visual contact as the Bruce Highway and the railway line diverge north of Quingilli. This car stayed on the Bruce Highway to Hesp Road, about 3.5 km beyond Assam Road.

When the Ford Falcon station wagon reached Quingilli the driver turned onto Assam Road and crossed the Quingilli level crossing approximately 3.6 km from the Hesp Road/Bennett Road level crossing. Train 3C37 was apparently not in view. Moller Road is relatively straight, but narrow. It runs adjacent to and parallel with the railway line except for a length of road of about 700 m which diverges from the track over Behana Creek and rejoins the railway line about 1.7 km before Aloomba, 950 m from the Hesp Road/Bennett Road level crossing. At 1550, probably after the Ford Falcon wagon had turned onto Moller Road, a phone call was made from the driver's mobile telephone. There is no evidence that the driver was talking on the phone at the level crossing.

A witness standing on the veranda of his Moller Road house, talking on a telephone, saw the Ford Falcon driving up the slight incline outside his house about 300 m from the Hesp Road/Bennett Road level crossing. It was travelling at a steady but not fast pace. He recognised the car and its driver. A few seconds later he heard the horn of the approaching train, which sounded a loud and sustained blast. He then saw the train pass his house proceeding towards the Hesp Road/Bennett Road level crossing. The witness lost sight of the Ford Falcon as it approached the crossing. As he saw the train close the crossing he saw the Ford Falcon on the crossing travelling slowly, the car was then obscured by the train. He remarked to the person to whom he was speaking that the 'driver had just made it'. He also formed the opinion from the timing of his observations of the car that the car must have stopped at the crossing for a few seconds.

1.3 The collision and immediate aftermath

As the car started to move across the level crossing, train 3C37 was probably between 90 and 70 m from the crossing. There was little reaction time and no possibility that anything done by the driver could have avoided a collision. The drivers lost the Ford Falcon from their line of sight as the train neared the level crossing. Both drivers heard an impact and shards of glass sprayed across the locomotive's windscreen.

The precise time of the impact could not be accurately determined but from the train records has been taken as 1558. A number of emergency calls were received by the Cairns Ambulance Service. The first three calls logged by the centre were received at 1557:50, 1558:43 and 1601:59.

The car was hit by the locomotive's cowcatcher in way of the rear left hand door pillar. The impact spun the car anticlockwise, across the road pavement on to the grass verge, narrowly missing the steel rail utilised as a post for a traffic warning sign for the crossing. The vehicle came to rest about 25.8 m from the point of impact.

At or just after the impact the driver applied full service brakes prior to making an emergency brake application. The train came to a complete halt in 40 seconds in a distance of 430 m. The train driver immediately contacted the train controller in Townsville, reporting the accident. The train controller immediately contacted emergency services.

At about this time the second car was approaching the crossing from Hesp Road. The occupants of the car saw the train carriages crossing the level crossing. As they approached the junction of Fixter Road they saw the Ford Falcon wagon on the grass verge on the north side of the crossing and realised that there had been an accident. They did not stop, but accelerated to the local shop about 700 m north of the level crossing. At the shop they asked the owner to dial '000' and contact the emergency services. They left the children at the shop and with another adult returned to the scene to render what help they could.

The train passenger services staff heard the prolonged blast on the train horn and felt the train brake. Three staff, in the Conductors Cab in the train's mid length, saw dust and a car on the grass strip alongside the railway line on the left hand side of the train. The On Board Service Technician (OBST), a railway man with 43 years experience immediately realised that the train had hit the car. As the train came to a halt he jumped down from the train to render what assistance he could. He ran about 150 m or so to the car where two women were assisting the female driver. He looked in the rear passenger seat and established that a young boy on the driver's side had a pulse. The second boy in the left hand seat had blood coming from his mouth and the OBST could not detect a pulse. At this time the OBST was joined by three or four other passenger service staff.

The Passenger Service Supervisor (PSS) was at the front of the train ready to handle luggage at Gordonvale, about five minutes from Alooomba. He too heard the prolonged whistle blast and felt the braking of the train. As the train stopped he looked out of the window and realised that the train had been in collision with a car. He walked rapidly to the conductor's compartment, picked up two first aid kits and alighted from the train. He instructed one of the other staff to keep all passengers on board and accompanied by two other staff went immediately to assist.

FIGURE 3:
Extract of photograph by the Queensland Department of Natural Resources of Bartle Frere 8063



With the arrival of the PSS and the two other staff and under instruction from the train controller Townsville, the OBST assumed on site command, controlling the traffic in and about the immediate area of the accident. The PSS and his staff assessed the younger of the two boys as having possible neck injuries, but with the absence of a pulse in the older child, they removed him from the car using an improvised stretcher. They then administered Cardio Pulmonary Resuscitation until relieved by the arrival of the ambulance. One Sunlander passenger, a nurse, offered assistance and alighted from the train for a brief period, but returned to the train with the arrival of the ambulance. The police from Gordonvale were on the scene within minutes. The first ambulance from Cairns arrived at 1618. Ambulance officers removed the younger boy from the car.

When the injured had been removed from the scene, the police and Queensland Rail (QR) investigators surveyed the accident site.

The cowcatcher was removed from the train. Following inspection and authorisation, the train resumed its journey to Cairns at 1822 arriving at about 1915. The train crew were offered counselling from both the Police and QR counsellors.

1.4 Fatalities and injuries

The seven year old male child was pronounced dead at the site. The woman driver who was 26 weeks pregnant at the time of the accident and 5 year old male child were taken to hospital. The 5 year old had severe head injuries.

1.5 Damage

1.5.1 Locomotive 2200F

Damage to the locomotive was confined to a distorted cowcatcher, minor distortion to the steps on the forward left hand side driver's entrance together with damage to some of the light fittings. There was no damage to the rail infrastructure, however the cowcatcher gouged the bitumen road surface between the rails.

1.5.2 Ford Falcon station wagon

The Ford Falcon station wagon was struck at the rear passenger side door pillar. The rear of the car, including the chassis was severely distorted.

1.6 Environmental conditions

The day was fine and clear. The temperature at Cairns Airport at 1500 was 27.1° C with 49 per cent relative humidity and an east-south-easterly wind at 17 kph. At 1558 the sun was bearing 302° at an altitude of 23°.

The track was dry and there was no evidence of grease or dirt that may have affected the performance of the train.

The road was dry and some unsealed shoulder widening works had been carried out on the west side of the junction between Moller Road and Bennett Road.

There were no environmental conditions, including issues of sun glare or angle that inhibited the sighting of the train or otherwise contributed to the accident.

1.7 Train crew details

The two drivers were appropriately fit and qualified for duty.

Crew details	Driver at controls	Co-driver
Gender	Male	Male
Year of birth	1954	1959
Qualified driver Class II	October 1989	1989
Route knowledge	6 August 1996	13 December 1994
Number of trips on route	141	76
Qualified on traction expires	30 September 2004	September 2004
Safeworking re-accreditation date	3 February 2002	14 April 2001
Last medical	September 2002	August 2002
Time on duty	8 hours	8 hours

Following the collision, both locomotive drivers underwent a test for alcohol and returned a negative result.

QR is in the process of implementing a fatigue management program in the management of driver rosters to minimise the possibility of the onset of unacceptable fatigue levels. This will be based on the Fatigue Audit InterDyne (FAID) fatigue modelling program, which was developed by Interdynamics in collaborative partnership with the Centre for Sleep Research at the University of South Australia. The FAID program quantifies an individual's level of fatigue based on hours of work for the previous seven days. Train drivers duty hours, including travel, are entered into the computer program, which returns a 'fatigue index score' for each driver at any given time. Based on the draft QR program, the driver at the controls had a score of 33, while the co-driver's score was 20. The driver's roster was not fatigue inducing. Both scores were well under any score to suggest that fatigue was a contributing factor. Neither driver reported fatigue symptoms.

Passenger service staff consisted of a Passenger Service Supervisor, an On Board Service Technician and twelve other passenger service staff. All were in possession of advanced first aid qualifications and the PSS and other senior staff were qualified in advanced Cardio/Pulmonary Resuscitation techniques.

1.8 Vehicle particulars

1.8.1 Train 3C37

Train 3C37 consisted of a diesel locomotive of the 2170 class, number 2200F, 14 coaches, two vehicle wagons, a power car and one luggage car. The train, including the locomotive, was 332.4 m in length with a mass of 557 tonnes.

Locomotive 2200F completed a major inspection on 27 March 2003 and underwent a full brake test on 18 March 2003. The most recent 'three week' inspection was completed² on 14 May 2003. In addition when the locomotive was connected to the Sunlander a 'Locomotive Serviceability Certificate' was completed and a train-testing certificate was completed in accordance with routine procedures³.

Following the accident a full assessment was made of the locomotive. Brake block thicknesses, brake travel and brake cylinder pressures were examined or tested and found to be fully compliant. Wheels were checked for 'flat' spots⁴. One sanding pipe on the driver's side was found to be not working, otherwise the locomotive systems were fully compliant with proper operating standards. Similarly the remainder of the consist was examined and found to be fully compliant.

² As per business instruction BI-2044-3 and STD/0037/SWK 'Operational Integrity of Trains'.

³ Specification SPC/0048/SWK

⁴ Flat spots – flattening of the wheel through the action of skidding.