



Australian Government

Australian Transport Safety Bureau



ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Rail Occurrence Investigation – 2006/007

Final

**Derailment of Train 2CM3
near Seymour, Victoria**

12 September 2006



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Rail Occurrence Investigation

2006/007

Final

**Derailment of Train 2CM3
near Seymour, Victoria
12 September 2006**

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office location: 15 Mort Street, Canberra City, Australian Capital Territory
Telephone: 1800 621 372; from overseas + 61 2 6274 6440
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6274 6474; from overseas + 61 2 6274 3117
E-mail: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

© Commonwealth of Australia 2008.

This work is copyright. In the interests of enhancing the value of the information contained in this publication you may copy, download, display, print, reproduce and distribute this material in unaltered form (retaining this notice). However, copyright in the material obtained from other agencies, private individuals or organisations, belongs to those agencies, individuals or organisations. Where you want to use their material you will need to contact them directly. Subject to the provisions of the *Copyright Act 1968*, you must not make any other use of the material in this publication unless you have the permission of the Australian Transport Safety Bureau.

Please direct requests for further information or authorisation to:

Commonwealth Copyright Administration, Copyright Law Branch
Attorney-General's Department, Robert Garran Offices, National Circuit, Barton ACT 2600
www.ag.gov.au/cca

ISBN and formal report title: see 'Document retrieval information' on page iv.

CONTENTS

THE AUSTRALIAN TRANSPORT SAFETY BUREAU	v
TERMINOLOGY USED IN THIS REPORT	vi
EXECUTIVE SUMMARY	vii
1 FACTUAL INFORMATION	1
1.1 Overview	1
1.1.1 Location	1
1.1.2 Track Information	2
1.1.3 Train information	2
1.1.4 CQBY container wagon	3
1.1.5 Train coupler and draft key assembly	4
1.2 The occurrence	8
1.3 Post occurrence	10
1.3.1 Loss and damage	10
2 ANALYSIS	11
2.1 Sequence of events analysis	11
2.1.1 Passage of train	11
2.1.2 Site assessment	13
2.1.3 History of similar incidents and coupler modifications	15
2.2 Coupler components wagon CQBY 0118A	19
2.2.1 Summary of component analysis	22
2.3 Maintenance history wagon CQBY 0118A	22
3 FINDINGS	24
3.1 Context	24
3.2 Contributing safety factors	24
3.3 Other safety factors	24
3.4 Other key findings	25
4 SAFETY ACTIONS	26
4.1 Chicago Freight Car Leasing Australia	26
APPENDIX A : SOURCES AND SUBMISSIONS	28
APPENDIX B : MEDIA RELEASE	29

DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages	ISBN
2006/007	21 February 2008	38	978 1 921165 69 6

Publication title

Derailment of Train 2CM3 near Seymour, Victoria, 12 September 2006

Prepared by

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608 Australia
www.atsb.gov.au

Reference No.

February2008/Infrastructure 08005

Acknowledgements

The identified images used in this report are reproduced with the permission of those organisations and/or individuals.

Other than for the purposes of copying this publication for public use, the map information from the map section may not be extracted, translated, or reduced to any electronic medium or machine readable form for incorporation into a derived product, in whole or part, without prior written consent of those organisations and/or individuals.

Abstract

At approximately 0523 on 12 September 2006, the crew of the Pacific National hauled Patrick PortLink freight train number 2CM3 advised train control that their train had parted and the lead bogie of freight wagon CQBY 0130N had derailed.

There were no injuries as a result of the train parting or derailment and only minor damage to the track and rolling stock.

The investigation found that the draft key on the 'A' end of wagon CQBY 0118A had dislodged from the coupler shank allowing the coupler to withdraw from the draft pocket and fall onto the track. The dislodged coupler bounced under the train and derailed the wheel set of a trailing wagon.

Rectification work by the wagon owner to prevent a recurrence of this event includes the fitting of new drop forged steel retainer and locking pins to all wagons in the CQBY fleet.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal Bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government. ATSB investigations are independent of regulatory, operator or other external organisations.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the Transport Safety Investigation Act 2003 and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, risk controls and organisational influences.

Contributing safety factor: a safety factor that, if it had not occurred or existed at the relevant time, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which ‘saved the day’ or played an important role in reducing the risk associated with an occurrence.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Safety issues can broadly be classified in terms of their level of risk as follows:

- **Critical safety issue:** associated with an intolerable level of risk.
- **Significant safety issue:** associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable.
- **Minor safety issue:** associated with a broadly acceptable level of risk.

EXECUTIVE SUMMARY

At approximately 0523¹ on 12 September 2006 the crew of Patrick PortLink freight train number 2CM3 hauled by Pacific National, travelling from Griffith, NSW, to Melbourne, advised train control that their train had parted² and the lead bogie of freight wagon CQBY 0130N had derailed.

There were no injuries as a result of the train parting or derailment and only minor damage to the track and rolling stock.

At the time of the incident the fleet of CQBY wagons were owned by Chicago Freight Car Leasing Australia (CFCLA) and were leased to Patrick PortLink and other operators who were responsible for their maintenance.

The initial investigation found that the train parted when the draft key³ on the 'A' end of the eighth wagon (CQBY 0118A) became dislodged from the coupler shank allowing the coupler to pull out of the draft assembly. The coupler then fell onto the track and bounced under the train, colliding with various components under trailing wagons and subsequently derailed the rear axle of the leading bogie on the eleventh wagon CQBY 0130N.

The ATSB has concluded that the derailment of train 2CM3 was initiated by the binding of the draft key within the coupler and associated components, that resulted in heavy and biased lateral forces being transferred to the draft key retainer pin and split pin. The subsequent failure of the split pin, which locks the retainer pin in the draft key, allowed the retainer pin to ride vertically up and then fall out of the draft key. The continuous working action and grabbing of the coupler shank on the draft key then forced the draft key laterally out through the draft sill allowing the disengagement of the coupler from the wagon. The grabbing action of the coupler with the draft key was attributed to the horizontal misalignment of the slots in the coupler, yoke and draft sill that are assembled within the wagon underframe.

The investigation noted that CFCLA had previously implemented a modification to add an anti-wear collar at each end of the draft key and that this change was largely ineffective in preventing the disengagement of the coupler on CQBY 0118A. The fitment of draft key type couplers to these wagons is not considered current technology and the majority of new freight wagons of all classes are manufactured with vertical pin type couplers that have a reduced incidence of pulled 'coupler' type failures.

Safety actions recommended as a result of this investigation relate to:

- Conducting detailed inspections and examining design tolerances in the underframe and draft sill area where evidence of biased wear is observed on the coupler wear plate that contributes to hard contact and wear of the draft key retainer pins and split pins.

1 Eastern Standard Time.

2 Train parting also known as train separating.

3 A rectangular metal plate inserted through the shank of each coupler to retain the coupler within the draft sill (also known as a 'Murray Key').

- Assessing wagons where there is evidence of horizontal misalignment of the five slots in the coupler, yoke and draft sill that would result in the coupler ‘grabbing’ the draft key and moving it laterally, applying heavy forces to the draft key and its associated components that may fail, leading to the coupler pulling out of a wagon.
- Carrying out a review of maintenance programs where ‘Azee’ type draft key retainer pins have been fitted to CQBY wagons to ensure continued reliability of existing or revised inspection programs for these items.

1 FACTUAL INFORMATION

1.1 Overview

At approximately 0523⁴ on 12 September 2006 the crew of Patrick PortLink (PPL) freight train number 2CM3 hauled by Pacific National, travelling from Griffith, NSW, to Melbourne advised train control that their train had parted and derailed near Seymour, Victoria.

The derailment sequence started with the coupler being pulled out of the eighth wagon (CQBY 0118A) in the consist⁵. The coupler then fell onto the track structure between the rails and, shortly after, derailed the lead bogie of the eleventh wagon (CQBY 0130N).

There were no injuries recorded and minimal damage was sustained to rolling stock. A total of 264 m of track was damaged.

1.1.1 Location

Seymour is a regional city in north-eastern Victoria and is located approximately 97 km from Melbourne (Figure 1).

Figure 1: Location of Seymour, Victoria



Railways of Australia. Copyright ©

⁴ Eastern Standard Time.

⁵ Listed order of the vehicles arranged to make up a complete train.

The derailment occurred at the 104.237 km point in the Longwood to Seymour track section near the Hume Freeway road overpass approximately four kilometres north of Seymour.

1.1.2 Track Information

The section of track comprising the Defined Interstate Railway Network (DIRN) from Melbourne through to Sydney substantially consists of a single standard gauge line with crossing loops to facilitate the passing of trains. The track at the derailment location consisted of timber sleepers with 47kg rail fastened with 'Rex-Lok'⁶ clips. For approximately four kilometres leading up to the point of derailment the track was straight and consisted of level and mildly undulating grades of approximately 1:148.

The Victorian broad gauge rail line runs close to and mainly adjacent with the standard gauge line between Melbourne and Albury.

The Australian Rail Track Corporation is responsible for access to and maintenance of this section of the DIRN, with the maintenance contracted to a private track and infrastructure company, Works Infrastructure.

1.1.3 Train information

Train 2CM3 was hauled by Pacific National locomotives for Patrick PortLink. A driver and co-driver crewed train 2CM3, which consisted of three locomotives with 8153 leading, T392, and GM36 trailing, hauling 37 wagons. The leading two locomotives were owned by Pacific National and GM36 was leased from the Seymour Railway Heritage Centre. Total train mass was 2559.3 tonnes with an overall length of 789.3 metres. There were nine NQPY wagons owned by PPL, 10 CQBY wagons leased from Chicago Freight Car Leasing Australia (CFCLA) and 13 VQCY and five VQTY wagons owned by Pacific National.

⁶ Rex-Lok is a registered company that manufactures resilient rail fastening systems.

Figure 2: Locomotive 8153 leading with T392 & GM36 trailing near the Hume Freeway railway overpass



Locomotives 8153, T392 and GM36 were each equipped with a Hasler tape data recorder. These data recorders are used for capturing information such as train speed and time, brake pipe and independent brake pressures. Data from the recorders was used in examining the sequence of events leading up to the occurrence.

1.1.4 CQBY container wagon

The CQBY is a flat wagon designed for transporting containerised freight. (Figure 3) CFCLA own 125 CQBY wagons that were built in the north of China by Qiqihar Railway Rolling Stock Company Ltd (QRRS).

The CQBY wagons have a tare weight of 19.7 tonnes, a maximum gross mass of 92.0 tonnes, have a rated maximum speed of 115 km/h and are 19.4 metres long to the end of the couplers. Bogies are a low-level, three-piece diagonal linked type with constant contact side bearers and axles are rated at 25 tonnes. The coupler is a 35 mm offset bottom operated type with a horizontal draft key.

Figure 3: CQBY container wagon



CFCLA photograph. Copyright ©

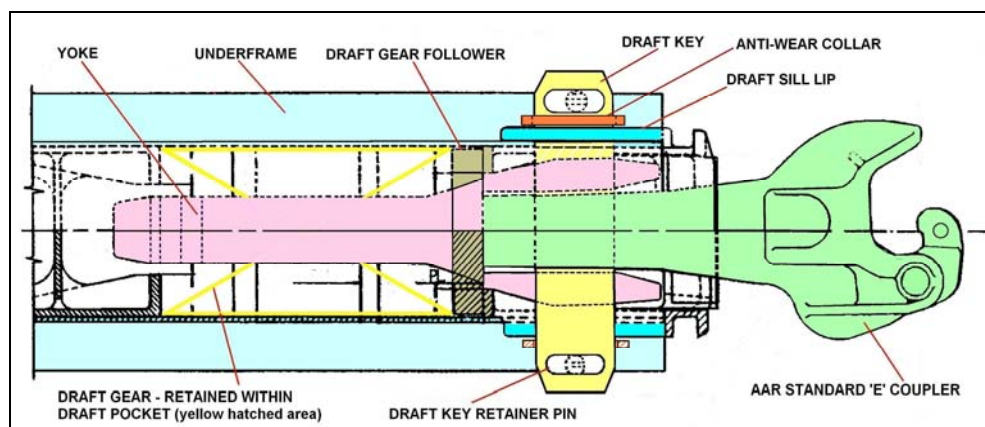
The CQBY wagons were built in two batches. The first batch was built in the year 2000 and are known as the CQBY Series 1. They are numbered CQBY 0101 to 0150. The second batch was built during 2004 and are known as the CQBY Series 2. These wagons are numbered CQBY 2001 to 2075.

The CQBY wagons have been leased to various organisations including Lachlan Valley Rail Freight, PPL, Pacific National, Genesee & Wyoming Australia and Interail. These wagons are predominately operated on corridors from Melbourne to Brisbane and Melbourne to Perth.

1.1.5 Train coupler and draft key assembly

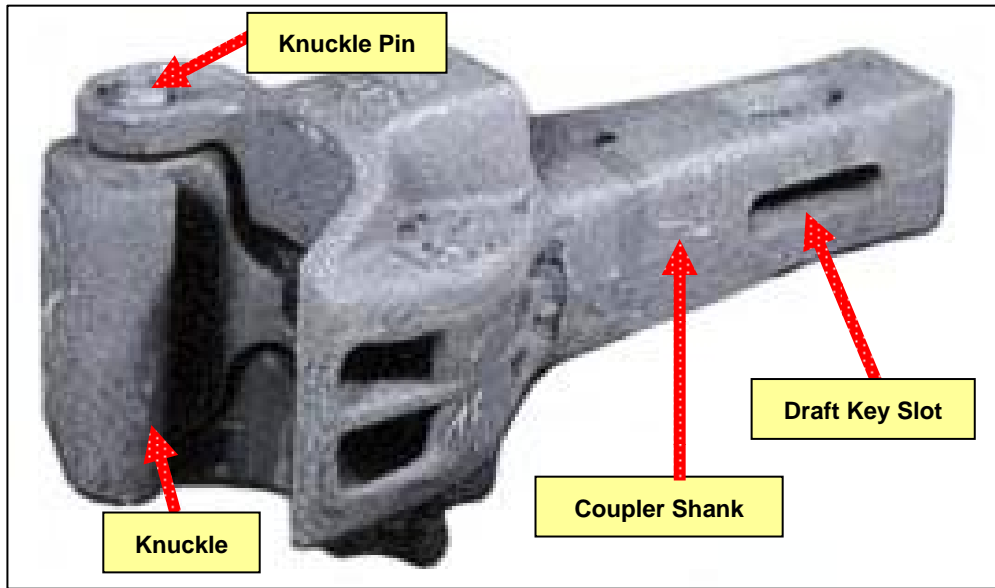
The draft equipment fitted to CQBY 0118A consists of the coupler, draft gear, draft key, yoke, yoke carrier and follower. Major components discussed in the investigation are shown in Figure 4.

Figure 4: Sectioned general arrangement diagram of a mounted 'E' coupler and associated components



Train couplers should be capable of withstanding the draft, buff and compressive end loads relevant to the particular type and class of vehicle. Couplers should be self-locking when coupled and require a positive manual action to un-couple or disengage. The couplers used on CQBY wagons are a Type E 'clasped-hand' device (Figure 5) that couples automatically when one or both knuckles are open and wagons are pushed together. When the couplers make contact, the knuckles move into the closed position and a lock drops in place securing the connection between vehicles. To open, a lever reaching from the side of the wagon unlocks the knuckle allowing it to swing open and disengage from the mating coupler.

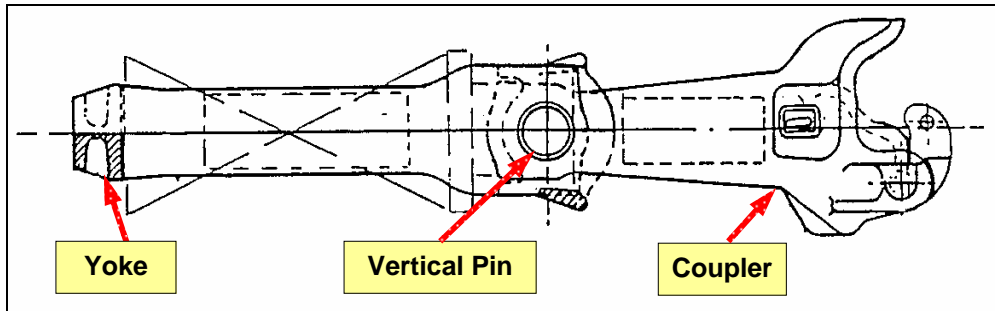
Figure 5: Photo of Type 'E' Coupler showing position of draft key slot in the shank



McConway & Torley. Copyright ©

The coupler fitted to CQBY wagons was a Type 'E' rigid shank model based on a USA design (Figure 5). Type 'E' couplers have previously been fitted to rolling stock in Australia but have largely been superseded by Type 'E/F' vertical pin type assemblies now recommended as standard fitment in accordance with the Australian Code of Practice for rolling stock. (Figure 6)

Figure 6: Type 'E/F' vertical pin coupler



The yoke is a cast steel device that surrounds the draft gear and provides a physical connection between the draft gear and the coupler (Figure 7). The yoke is located within the draft sill and draft pocket.

Figure 7: Photo of a yoke showing position of draft key slot



McConway & Torley. Copyright ©

The draft gear (Figure 8) is an assembly of components that functions to absorb a substantial part of the longitudinal forces in the train during normal operation. The draft gear is also known as the draft gear package and consists of springs or other compression and impact absorbing material mounted within a casting or fabricated steel structure for containment. The draft gear is located within the draft pocket.

Figure 8: Draft gear assembly

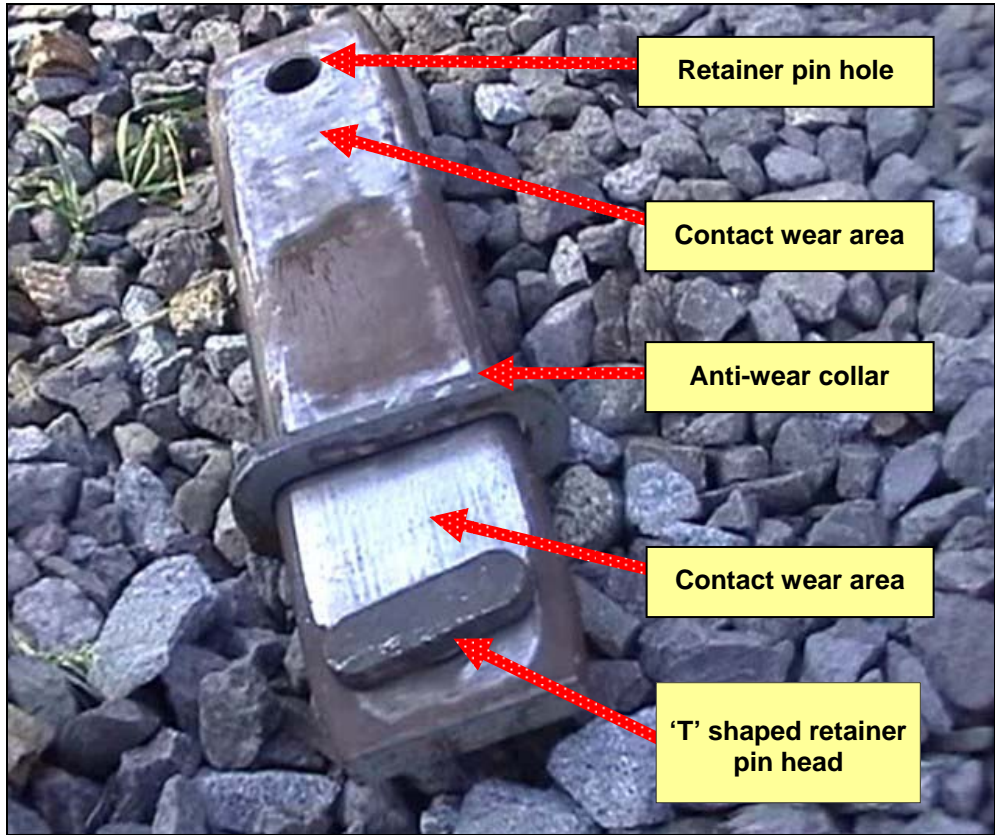


Miner Enterprises Inc. Copyright ©

The draft key (also known as a Murray Key - Figure 9) is a flat steel bar with holes drilled at each end and its primary function is to retain the coupler within the yoke. The draft key passes through horizontal key slots in the draft sill, coupler and yoke and is restricted in lateral movement by the insertion of 'T' shaped retainer pins through holes drilled in each end (Figure 9 Figure 11). The draft key is manufactured to AAR⁷ Standard S-121 or equivalent with dimensions of 152 mm x 38 mm and a length determined by underframe design.

⁷ Association of American Railroads.

Figure 9: Draft key top view with retainer pin showing pronounced wear near retainer pin ends



In October 2004 CFCLA implemented a program to fit anti-wear collars over each end of new draft keys (Figure 10). The collars were designed to 'float' between the draft sill lip and the draft key retainer pin. The collar was made from 12mm thick, flame cut mild steel plate and its primary function was to stop the wear of the draft sill lip caused by regular contact with the draft key retainer pin

Figure 10: Draft key anti-wear collar from CQBY 0118A showing wear and deformation



The draft key retainer pin (Figure 11) is designed to restrict lateral movement of the draft key. These pins are located at each end of the draft key in nominally 38 mm diameter holes.

Figure 11: Draft Key Retainer Pin



The retainer pin is 'T' shaped with a flat head, is 38 mm in diameter and a 55 mm long shaft. This pin has a hole drilled at the base of the shaft that accepts a 70 mm x 10 mm diameter split pin. When assembled, the function of the split pin is to stop the retainer pin moving vertically when positioned within the draft key.

1.2 The occurrence

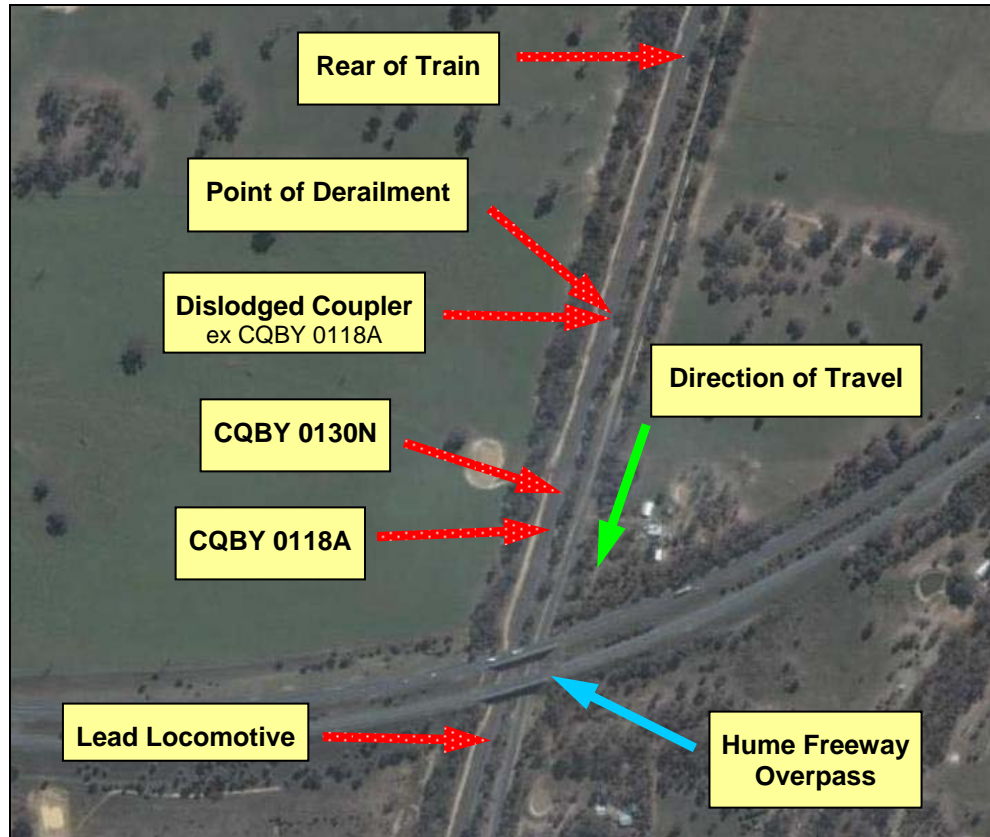
On Monday 11 September 2006 freight train 2CM3, carrying containerised freight, was prepared at Griffith NSW. The train's fitness to travel was confirmed using a pre-departure checklist and a train inspection certificate was issued at 1205. The train departed Griffith at 1535 and arrived at Leeton where another 11 wagons were added to the consist. After departing Leeton at 1815 with a new crew, the train arrived in Junee at 2100. At Junee, locomotives were changed to haul the load over gradients between Junee and Wodonga before three more wagons were added at Bomen. At 0245 on 12 September the train arrived at Wodonga and a rested crew from Melbourne relieved the arriving crew. At 0305, the train departed Wodonga and the drivers changed positions at Euroa, approximately half way between Wodonga and Melbourne.

The drivers reported the trip was normal between Euroa and Mangalore (located approximately 10 km from Seymour). About 3 km after Mangalore the driver reduced the train speed from 106 km/h to 85 km/h and about two minutes later reduced speed to about 68 km/h and coasted for approximately 1 km. At this time the drivers observed a yellow flashing light ahead and soon thereafter passed a road-rail vehicle travelling in the opposite direction on the adjacent broad gauge track. The drivers then noticed a rapid loss of brake air indicated by the brake pipe pressure gauge. Before the train crew were able to determine the cause for the loss of air, they were advised by the driver of the road-rail vehicle that the train had parted between the seventh and eighth wagons behind the locomotives. At 0523 the locomotive co-driver contacted the ARTC Adelaide train control centre and immediately thereafter contacted the Pacific National operations centre to advise that their train had parted and that they would update them with further details after an inspection of the site.

On inspection it was found that the coupler from the leading end of the eighth wagon (CQBY 0118A) had fallen onto the track. The dislodged coupler had bounced under the trailing vehicles causing minor damage to brake rigging and other low mounted equipment before being caught under the 11th wagon (CQBY 0130N) where it derailed both wheels of the rear axle on the leading bogie. The train continued over the dislodged coupler (Figure 13) that was later found

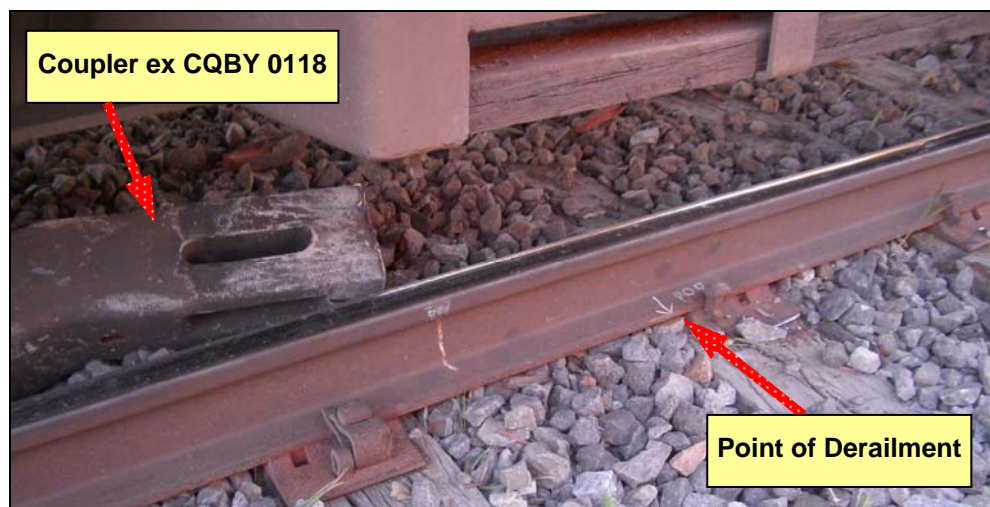
under the 22nd wagon (NQPY 14587T). The standing distance between the seventh and eighth wagons after separation was approximately 30 metres.

Figure 12: Aerial photograph of track showing point of derailment and location of vehicles in train consist



Map - Google Earth. Copyright ©.

Figure 13: Dislodged coupler under NQPY 14587T and point of derailment



Photograph – Dept of Infrastructure Victoria. Copyright ©

1.3 Post occurrence

At 0540 the train driver contacted the ARTC and Pacific National to provide additional details of the derailment and track damage and advise that there were no injuries. The ARTC train controller told the train driver that train 2CM3 was protected from other train movements on that section of track. Subsequently a freight service was held at Glenrowan and the following XPT passenger train, which had been stopped at Longwood, was sent back to Benalla to detrain passengers. In the meantime the Pacific National operations control centre were asked by the ARTC to provide details of any broad gauge train movements on the adjacent line managed by Pacific National's Network and Access Division in Melbourne.

At 0605 a track ganger arrived and organised flagmen to protect the disabled train and other train movements on the adjacent line and at 0745 representatives from the train operator arrived to provide assistance in the recovery process.

Post occurrence response was effective and efficient. There were no dangerous goods carried on train 2CM3 and there was no spillage of goods or product because of the derailment.

The standard gauge section of line through the derailment site was closed to all rail traffic from the time of the accident until track restoration works were completed. Train 2CM3 cleared the track section at 1732 and the track was reopened for traffic at 1815 the same day. The derailment incurred service delays of approximately 35 hours on the Defined Interstate Rail Network (DIRN).

1.3.1 Loss and damage

A total of 264 metres of track was damaged in the derailment of wagon CQBY 0130N. Track restoration required 71 sleepers, 165 double shouldered plates, 36 metres of 47 kg rail, 8 'Thermit' welds and various track/rail fasteners. Damaged items of track and components from the derailed wagon were confined to the DIRN and did not affect the adjacent broad gauge line.

2

ANALYSIS

On 12 September 2006 an investigation team from the Australian Transport Safety Bureau (ATSB) was dispatched to investigate the derailment near Seymour Victoria, on the DIRN, approximately 97 km north-east of Melbourne.

An inspection by investigators of the derailment site and rolling stock equipment indicated that a failure of the components associated with the coupler was the likely initiator of the derailment.

Other evidence was sourced from Pacific National, CFCLA, the ARTC and Public Transport Safety Victoria. The evidence included among other things, train control graphs, train control voice and data logs, locomotive data logs, train consist and inspection information, organisational procedures, technical documents, maintenance records, track diagrams, train driver/co-driver statements and records. The investigation team also examined and photographed the accident site.

2.1 Sequence of events analysis

2.1.1 Passage of train

On the downgrade approach to Seymour, at about the 106 km post, the driver reduced speed from 106 km/h with a 100 kPa brake pipe reduction and with a dynamic brake application at notch two. With brake pipe pressure full the driver released the train brakes at approximately 85 km/h and 500 metres later released the dynamic brake when the train had reduced speed to 68 km/h. The train continued to coast steadily at speeds varying between 66 and 68 km/h for approximately one kilometre and while passing the track maintenance road-rail vehicle on the adjacent broad gauge track.

At 0520:30, and 440 m before the train stopped, the brake pipe pressure started to steadily decrease while the independent brake pressure was increasing. At 0520:40 the train driver observed an illumination of the vigilance warning light and the brake pipe pressure gauge indicated a rapid loss of air (the simultaneous timing of these observations was coincidental). With the independent brake at high pressure and brake pipe pressure on locomotive 8153 indicating 438 kPa, train speed had now decreased to 62 km/h.

At 0520:51 with the throttle position at idle, train speed was recorded at 34 km/h (approximately 79 m before coming to a stop). The train stopped at 0520:56 with the brake pipe pressure on locomotive 8153 reading 343 kPa and exhausting to low.

At the time of the occurrence, train 2CM3 was under the direction of the ARTC Victorian Northeast train controller located in Adelaide. The timing of the occurrence has been confirmed by train control and locomotive event data information. A review of the data from the locomotive data recorders established that 2CM3 was driven below posted speed limits in the time leading up to the derailment.

The event data loggers on locomotives 8153 and T392 record time, speed, distance, brake and driver vigilance acknowledgements. The train speed used for analysis

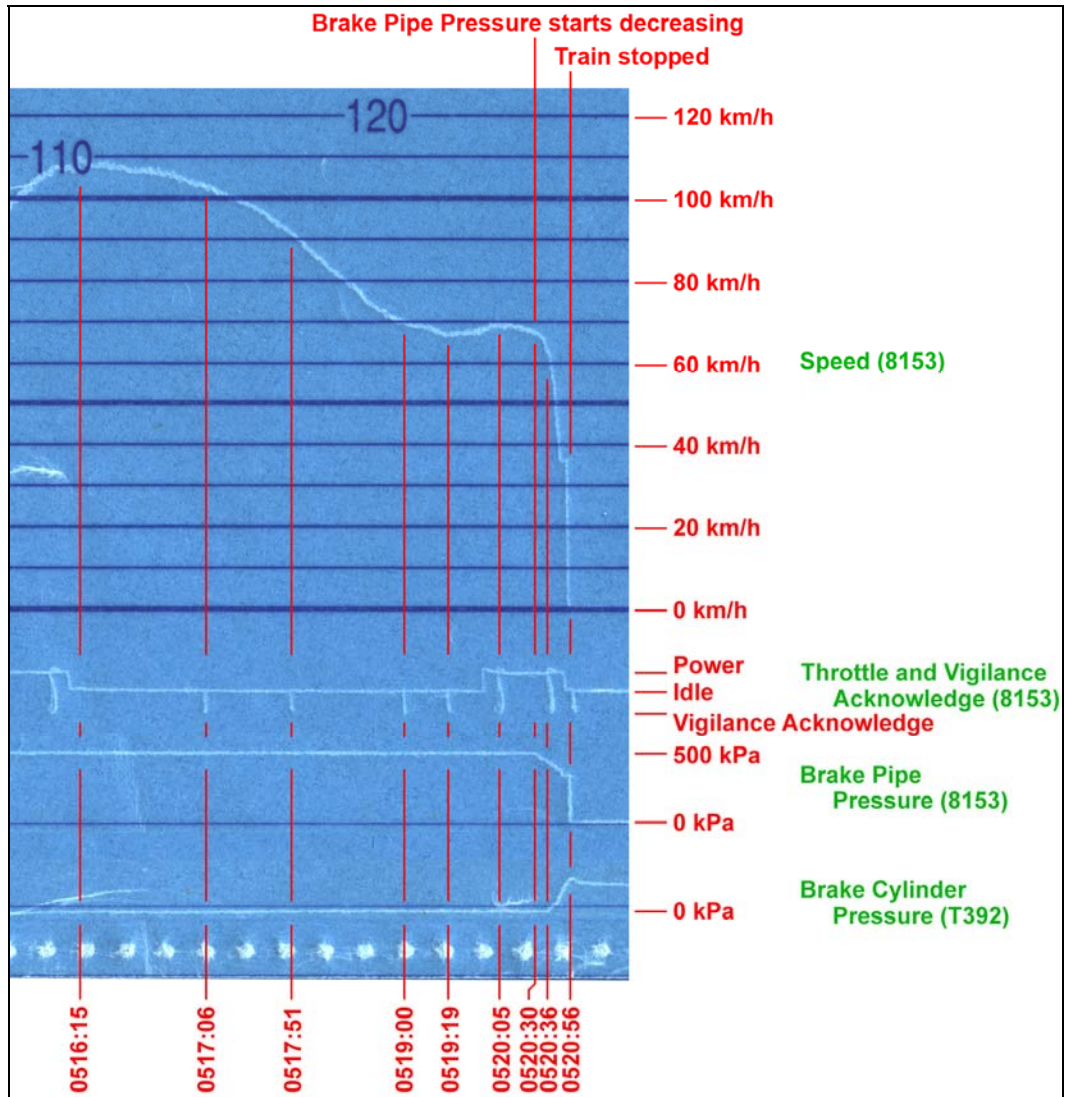
was recorded by lead locomotive 8153 (Figure 2) and the extracted information has been corrected for wheel diameter.

The examination of the event data from locomotives 8153 and T392 and communication logs have established that:

- At 0516:15 and approximately 5900m before the train stopped, the speed was 107 km/h (highest) where the maximum permitted speed was 110 km/h. Throttle was at power and brake pipe pressure was 500 kPa.
- At 0517:06 train speed was 101 km/h, throttle was at idle. Distance to stop was 4509 m.
- At 0517:51 train speed was 90 km/h and slowing - distance to stop was 3443 m.
- At 0519:00 train speed was 68 km/h and distance to stop was 2043 m.
- At 0519:19 train speed had slowed to 66 km/h and was 1066 m before the stopped position.
- At 0520:05 train speed has increased to 68 km/h maximum and speed starts to decrease. Distance to stop was 879 m.
- The train parted at 0520:30 and approximately 440 m before the train stopped. Brake pipe pressure was 500 kPa and started to decrease. Train speed was 66 km/h.
- At 0520:36 brake cylinder pressure on loco T392 was 0 kPa and started increasing. Brakes were progressively being applied.
- At 0520:40 train speed was 62 km/h and brake pipe pressure had reduced to 438 kPa.
- The train came to a stop at 0520:56 with brake pipe pressure indicating 343 kPa and reducing.
- The ARTC train control centre in Adelaide was advised that the train had come to a stop at 0523 and a driver would investigate what had caused this to occur.
- At 0551 a Works Infrastructure employee advised ARTC train control that track damage included missing clips, minimal sleeper damage and a broken rail.

Figure 14 provides a graphical representation of the sequence of events for train 2CM3 leading up to the train parting and shortly after the train came to a stop.

Figure 14: Combined extracts of 'Hasler' event data loggers from locomotives 8153 & T392 (horizontal blue line division = 10km/h)



2.1.2 Site assessment

When ATSB investigators arrived at the derailment location, an inspection of the site found the train separation and subsequent derailment was probably due to the failure of components directly associated with the coupler. Detailed inspections were carried out on the draft key, (that remained lodged within wagon CQBY 0118A) the draft key anti-wear collar and retainer pin (Figure 15). Additional assessments were made of damage under trailing wagons including broken and bent brake rods/beams, determining and recording the point of derailment, GPS⁸ positioning of locomotives, wagons and dislodged components, photographing the site and interviewing rail personnel. The next day investigators examined the recovered vehicles and other CQBY wagons at the Dynon (Vic) rail yards. The inspection included lifting some wagon bodies from their bogies to

⁸ Global Positioning System.

examine wheel profiles and wear, bogie tracking, centre bowls⁹ and constant contact side bearers¹⁰ to establish if any of these components may have had an influence on the train parting.

Figure 15: Retainer pin, distorted anti-wear collar and split pin inspected on site



The ATSB's site investigation has identified that:

- The track was in good condition and was not a contributing factor to the derailment.
- Wheels and bogies were being maintained within engineering tolerances and specifications.
- The centre bowls of wagon CQBY 0118A did not show signs of binding that would have severely restricted bogie rotation.
- Constant contact side bearers were in good condition and did not display excessive wear.
- The draft key was a clearance fit for each of the coupler shank, yoke and draft sill.
- Wagon CQBY 0118A was not overloaded.
- The trailing load behind wagon CQBY 0118A was approximately 2084 tonnes.

⁹ A cylindrical or hemispherical recess or enclosure in or on the bolster or frame that accepts an equivalent top centre plate and is used to provide rotation of the bogie in the horizontal plane. (Source: Code of Practice for the Defined Interstate Rail Network - Volume 5 Rollingstock, Part 1: Introduction, RCP-1011: Standard Terminology for Rollingstock).

¹⁰ A side bearer installation that is normally intended to operate with the body-mounted and bogie-mounted elements in continuous contact. (Source: Code of Practice for the Defined Interstate Rail Network - Volume 5 Rollingstock, Part 1: Introduction, RCP-1011: Standard Terminology for Rollingstock).

- The train crew were appropriately trained and qualified, medically fit and the handling of the train by the train crew did not contribute to the derailment.
- Environmental factors did not play a role to the derailment.

The balance of the investigation focuses on analysing the factors that contributed to the failure of coupler components on wagon CQBY 0118A before the derailment, these being:

- a) the failure of the split pin, designed to lock the 'T' shaped retainer pin in the draft key, which then allowed the retainer pin to work its way out of the draft key which in turn allowed the key to become dislodged from the coupler;
- b) the evident binding between the coupler and the draft key that did not permit the draft key to float freely within the draft sill, yoke and coupler; and
- c) a misalignment of the draft equipment within the wagon underframe which led to a biased and abnormal lateral force being frequently applied to the draft key retainer pin, split pin and anti-wear collar while the wagon was in service.

2.1.3 History of similar incidents and coupler modifications

A total of six CQBY Series 1 wagons have been involved in incidents where the wagon coupler has failed. These events have occurred in NSW and Victoria. No train partings or coupler faults on CQBY wagons have been recorded in South Australia or Western Australia. Wagons on these corridors operate independently on each route and rarely do wagons from one corridor operate on the other.

In June 2004, CFCLA issued *Maintenance Improvement Circular 09/04* where operators and maintainers of the CQBY fleet were required to inspect the draft key retainer pin. If the retainer pin was found to be severely worn or missing, the draft key was to be replaced with a longer draft key and the retainer pins could be replaced or repaired in a specified way. Further instructions stated that 'All wagons found with the Murray key badly worn shall be repaired on the spot or the vehicle is to be red carded¹¹ for repairs...' Details of all wagons that had been red carded were to be provided by phone or facsimile to CFCLA so repairs could be carried out.

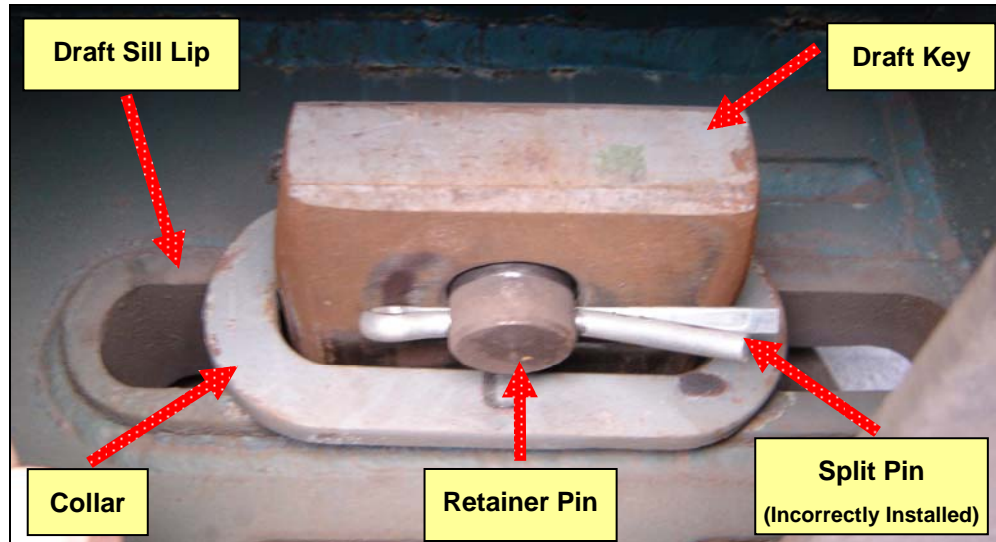
The refit program started in October 2004 and included the fitment of anti-wear collars at each end of the draft keys on all series 1 & 2 CQBY wagons. The intention was to reduce or prevent wear on the retainer and split pins with the goal of stopping the retainer pins from dislodging from the draft key.

On 30 March 2005 (wagon CQBY 0104) and 27 February 2006 (wagon CQBY 0136) two further coupling failures occurred. It was noted that these wagons had been modified and both failures were attributed to the incorrect installation of the split pin within the retainer pin (Figure 16).

¹¹ Red carding is a process used to identify an item of rolling stock with a defect that prevents the vehicle from operating on the network until repaired.

When a coupler fell from unmodified wagon CQBY 0129 at Galong NSW on 24 May 2005, CFCLA reconfirmed the need for all fleet operators and maintainers to inspect draft key components and complete the refit program as matter of urgency.

Figure 16: Draft key assembly in position through the draft sill aperture



During its annual rail safety audit in 2005 (between 6 and 8 June), CFCLA made a commitment to the Victorian Department of Infrastructure¹² and the NSW Independent Transport Safety and Reliability Regulator (ITSRR) to upgrade all CQBY Series 1 and Series 2 wagons before December 2005. Corrective action had been initiated on 1 June 2005 to fit new anti-wear collars, new draft keys and to re-use retainer pins but the upgrade was not completed by the committed date.

On 4 April 2006, the coupler fell out of CQBY 0114 and struck a stanchion before severing a counterweight cable supporting the overhead conductors for a section of the Sydney passenger rail network. As a result, the loosened overhead conductors became entangled in the pantograph¹³ of a passing suburban passenger railcar, tearing the pantograph from the roof. No one was injured in the incident but one elderly passenger suffered a broken ankle during the subsequent evacuation of the railcar.

A CFCLA investigation found that wagon CQBY 0114 had not been upgraded in accordance with *Maintenance Improvement Circular 09/04* even though the lessee of the wagon was aware of the circular and the availability of parts to carry out the modification.

Maintenance records show that when CFCLA released *Maintenance Improvement Circular 17/06* on 18 April 2006, there were 17 (34%) remaining Series 1 wagons that had not been refitted/modified. Long lead times by operators in returning wagons for repair to CFCLA and other maintainers increased the risk of failures with the draft key retention components. Although CFCLA issued several notices to

¹² Victorian Rail Safety Regulator.

¹³ An apparatus fixed to the roof of electric traction vehicles to draw current from the overhead power supply lines.

withdraw wagons for modification and completed wagons were recorded on the improvement circular form (CFCLA-F-M-011), intermediate monitoring of progress was unclear. As at April 2006, all 19 wagons leased to PPL had been upgraded with approximately half of their fleet upgraded in July 2005 and January 2006 respectively.

CFCLA issued *Maintenance Improvement Circular 17/06* to correct inconsistencies they had detected in the fitment of split pins within draft key retainer pins. Random inspections revealed that some maintainers of the CQBY fleet had not consistently followed good trade practice where some split pins inserted were the incorrect size and the legs of the pins had not been bent around the retainer pins sufficiently to restrict the split pin from rotating within its hole (Figure 16). Maintenance circular 17/06 stated that:

Split pins should be firm in the retainer pin when attempted to be moved with your fingers. Once a split pin is removed it is to be replaced with a new split pin (Old split pins are not to be reinstalled once removed).

Figure 17: 'R' type clip



Other examples of inconsistent modifications were recorded including where two anti-wear collars had been fitted to one side of the draft key and another where 'R' type clips had been used in place of the split pin (Figure 17).

Bullivants. Copyright ©

Further ad hoc modifications to some CQBY wagons were carried out to ensure the retainer pin was unable to work its way out of the draft key should the split pin fail.

These modifications were carried out in two ways by:

- welding a section of steel angle to the end of the draft key (Figure 18) so that the return leg of the angle is positioned above the head of the retainer pin. (this requires grinding or cutting to remove the draft key when the angle is welded to the retainer pins on both ends of the key);
- welding a section of flat bar to the top side of the anti-wear collar over the head of the retainer pin (Figure 19).

Figure 18: Welded angle retainer



Figure 19: Flat Strip retainer



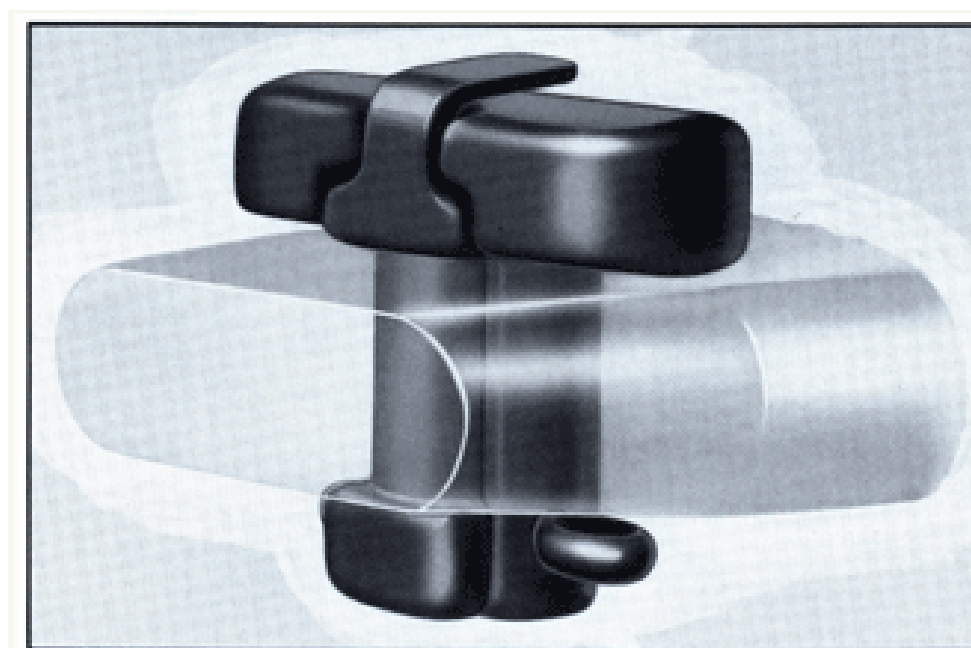
The modifications shown in figures 18 and 19 were applied indiscriminately to the CQBY fleet and were a 'stop gap' method of ensuring the retainer pin could not

disengage should the split pin fail. Neither of these modifications were specified in maintenance circulars 09/04 and 17/06 issued by CFCLA.

The modification programs instigated by CFCLA have been directed at both Series 1 and Series 2 CQBY wagons. No incidents have been recorded of draft keys becoming insecure on Series 2 CQBY wagons leading to the loss of a coupler.

CFCLA has subsequently reviewed the current draft key design deficiencies and has considered various options to reduce the likelihood of other retainer pins dislodging from the draft key. CFCLA have fitted out and trialled three wagons with 'Azee' drop forged draft key retainer pins¹⁴ and keepers (Figure 20). A field trial commenced in November 2006 and it has now been demonstrated that this type of retainer is superior to the original manufactured equipment.

Figure 20: 'Azee' drop forged draft key retainer and keeper



Illinois Railway Equipment Co photograph. Copyright ©

Due to the success of the trial, CFCLA has committed to a program for the replacement of all draft key retainer pins fitted to Series 1 and Series 2 CQBY wagons and have issued *Maintenance Improvement Circular 21/07*. Work on this refit programme started in May 2007.

The Azee retainer pins are manufactured in the USA to the Association of American Railroads standards. As previous incidents have demonstrated that heavy lateral forces can be applied to draft keys and retainer pins, it would be prudent to regularly monitor and record the performance of the new Azee retainers to ensure long-term reliability. Where 'Azee' type draft key retainer pins have been fitted to CQBY wagons, maintenance programs should be reviewed to ensure continued suitability of the inspection intervals for these items. In the interim period CQBY wagons that have not been fitted with 'Azee' type draft key retainers should be regularly monitored to ensure draft keys and associated components are maintained in accordance with current CFCLA procedures and maintenance circulars.

¹⁴ A product of Ireco LLC – a company originally founded as Illinois Railway Equipment Co.

2.2

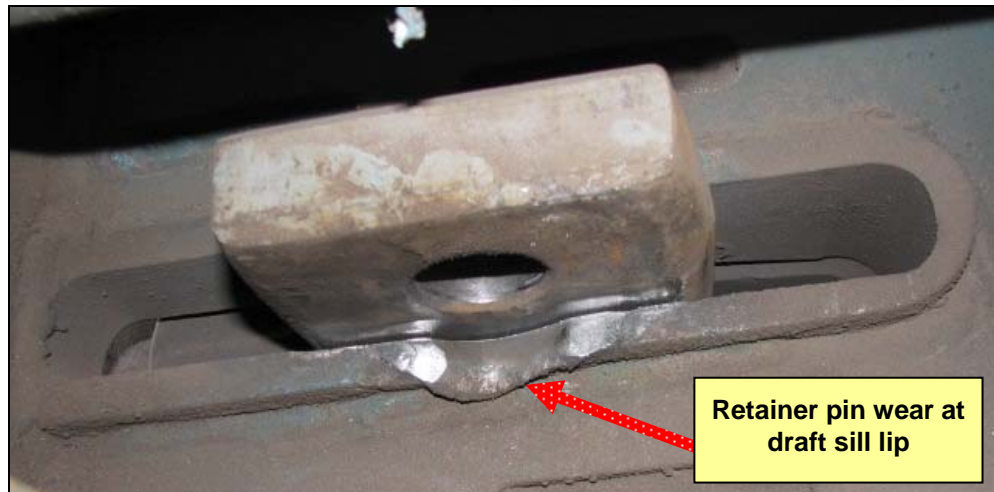
Coupler components wagon CQBY 0118A

The draft key retention system used in the CQBY fleet is a Chinese concept and varies from the vertical pin design now widely used in Australia. The use of horizontal draft keys in Australia has now been largely eliminated and only used on a small number of older low capacity wagons.

When the CQBY Series 1 wagons were commissioned in 2000 they were not fitted with the oval shaped anti-wear collars over the draft key ends. The primary aim of fitting anti-wear collars was to stop excessive point contact wear to the draft sill lips caused by regular contact of the retainer pins between these surfaces (Figure 21).

At the time of the derailment, the draft keys on CQBY 0118A, a Series 1 wagon, was fitted with new draft keys and anti-wear collars (Figure 9).

Figure 21: Draft key shown one side in the normal position indicating abnormal wear on the draft sill lip inflicted by the draft key retainer pin and split pin



The installation of anti-wear collars also meant that these items could be periodically replaced if they became worn, mostly eliminating the need to refinish draft sill lip faces during subsequent maintenance. It was evident that prior to the fitment of the anti-wear collars on CQBY 0118A, the worn draft sill lips had not been refinished to an original condition. As a result of severe contact forces applied through the draft key to the retainer pin, the anti-wear collar had deformed to the worn shape of the draft sill lip.

The Amdel Materials Services Laboratory carried out metallurgical analysis of the draft key retainer pin and anti-wear collar to determine the material type, composition, hardness and strength. Laboratory technicians subjected these components to chemical analysis, metallographic examination at magnifications up to 1000 times and hardness testing using Brinell¹⁵ and Vickers¹⁶ hardness scale

¹⁵ Brinell hardness - an instrument for measuring the hardness of metal, especially heat-treated steels.

¹⁶ Vickers hardness - an instrument for measuring the hardness of metal, similar to Brinell hardness tests.

testing equipment. Their report stated that the retainer pin was manufactured from steel consistent with a grade 250 (tensile strength 410MPa¹⁷) and the anti-wear collar was consistent with a grade 350 steel (tensile strength 480MPa). Both samples were assessed using *AS/NZS 3679:1996 – Structural steel - Hot rolled bars and sections*. The retainer pin returned a Vickers hardness average of HV137 and the anti-wear collar returned a Brinell hardness average of HBN151. These results indicated that the retainer pin was likely to wear at a faster rate than the anti-wear collar that it is in direct contact with as the facing component.

The retainer pins are critical components in ensuring the draft key maintains its position through all of the components mounted within draft sill. Excessive wear to the retainer pins as a result of the transmission of force from the draft key to the anti-wear collar is undesirable and indicates that the material used to manufacture the retainer pin was unknown and/or hardness testing had not been carried out prior to the selection of material during the design of the anti-wear collar. In the matching of materials for these interacting components it should be considered that the selection of a softer material for the anti-wear collar is desirable as it may be seen as the sacrificial and less safety critical part. Deterioration of the anti-wear collar can be monitored throughout current wagon maintenance schedules where any wear will be visible on the outward facing surface of the collar.

The fitment of anti-wear collars to the draft key still leaves unexplained why only some of the wagons inspected by the ATSB had excessive wear on one side of the draft sill where the retainer pin had been making regular hard contact with the sill. The two collars from wagon CQBY 0118A clearly show that one collar had worn and deformed to the shape of the previously worn draft sill by hard contact with the retainer pin on one side only (Figure 10). The anti-wear collar on the other side of the draft key displayed minor signs of wear in the form of polishing which indicated uneven loading of the draft key.

The top face of the draft key from wagon CQBY 0118A was not deformed although it displayed pronounced wear on each end where the draft key passes through the slots in the coupler and underframe. The abnormal wear was consistent with the coupler shank binding on the draft key. This meant that any lateral movement of the coupler (which would occur in service when the wagon was negotiating curves) was probably resulting in a significant lateral force being transmitted via the draft key to the draft key retainer pin which resulted in hard contact between the pin and the anti-wear collar.

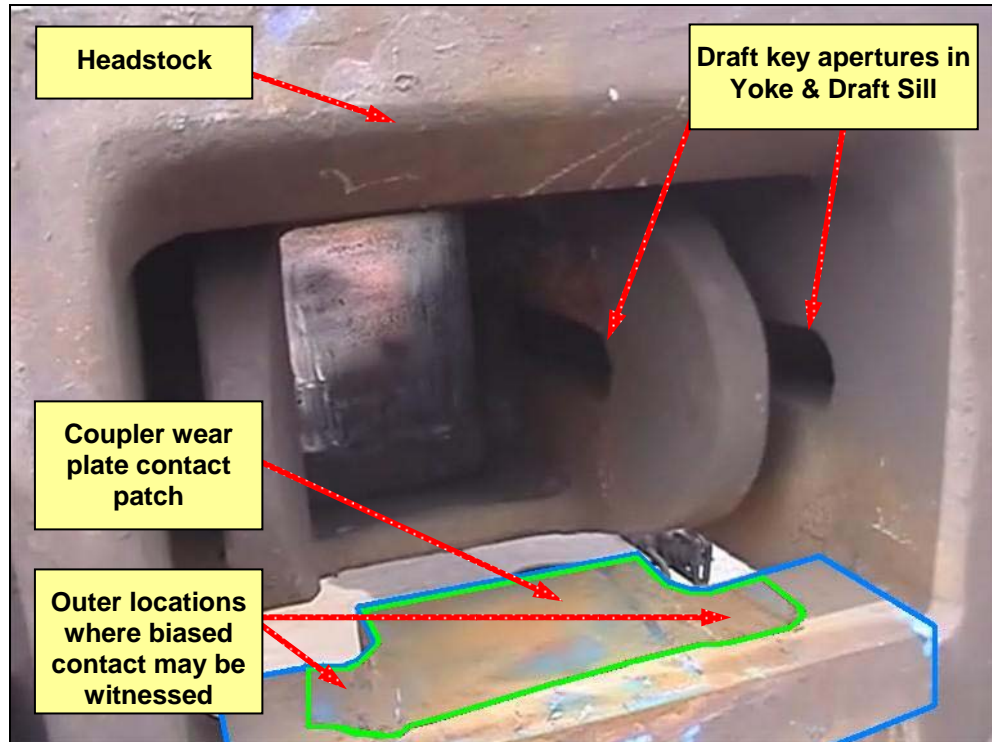
Although the ad hoc modifications made to retainer pins and anti-wear collars by welding steel angle and plates were effective (Figure 18, 19), these changes only prevented the retainer pin/s from riding up and out of the draft key in the short term. These modifications failed to address the underlying cause of the biased loading on the draft key and associated components that initiated the failures.

Inspections of the draft gear on other CQBY wagons during the investigation indicated that there may be variances from the design tolerances in individual wagons during the manufacturing process or as a result of varying tolerances in the casting or machining of draft components mounted within the draft sill and underframe area. This hypothesis is supported by evidence that some coupler

¹⁷ A pascal is a measure of perpendicular force per unit area. In this instance expressed in MPa where Mega = 1 million and 1 pascal = 1 N/m² i.e. equivalent to one newton per square metre.

shanks displayed uneven wear marks to either the left or right of centre on the coupler wear plate where the coupler protrudes from the draft sill and headstock¹⁸ (Figure 22). Evidence of biased wear was seen on some Series 2 CQBY wagons

Figure 22: Wear plate (blue outline) showing contact surface area (green) (CQBY-series 1)



where the plastic coupler wear plate exhibited higher levels of surface scouring and swarf¹⁹.

The draft key arrangement employed for securing the coupler is intended to allow the coupler shank to slide across the draft key when the coupler swings left or right of centre. Depending on the relative roll between wagons, it is possible that the twist of the coupler could enable it to ‘grab’ the draft key and move it laterally. The grabbing of the draft key by the coupler may be attributed to a vertical misalignment of the five slots that the draft key passes through (draft sill, yoke and coupler). On wagon CQBY 0118A, this was evidenced by the contact marks on the draft key between the retainer pin and spacer (Figure 9). It was difficult to confirm this hypothesis as no affected wagons were available during the investigation for complete dismantling to accurately assess and measure the alignment of the draft equipment.

High lateral forces applied to the retainer pin can subject the split pin to abnormal wear and stress and it is likely that this led to the eventual failure of the split pin on wagon CQBY 0118A. When the split pin failed, there was no longer any positive

¹⁸ A structural element or assembly positioned transversely at each end of the underframe. It is not always a principal load-bearing member.

¹⁹ Shavings or chips of material.

retention of the retainer pin and eventually the retainer pin was worked upwards by the transmission of the lateral forces, and/or vibration, out of the draft key thereby allowing the draft key and the coupler to disengage from the wagon.

2.2.1 Summary of component analysis

The analysis of the failed coupler components revealed:

- The use of horizontal draft keys in Australia has now been largely eliminated and they are only used on a small number of older low capacity wagons.
- A repair/modification program, which started in October 2004, led to the fitment of anti-wear collars over each end of the draft key. This modification provided no additional security for the retainer pins in the draft key particularly where the wear on the split pins was high through regular contact with the anti-wear collar.
- That worn draft sill lips had not been refinished prior to carrying out the modifications to the couplers in the fleet.
- Ad hoc variations from CFCLA maintenance circulars were implemented throughout the CQBY fleet to reduce the likelihood of retainer pins working out of the draft key in the event of the split pin failing.

2.3 Maintenance history wagon CQBY 0118A

Rolling stock operators who lease CFCLA's wagons are required to perform periodic maintenance to the vehicles at intervals determined by CFCLA. Most operators have periodic and supplementary maintenance functions carried out by contractors trained in CFCLA's policies, procedures, work instructions and forms.

Wagon CQBY 0118A first entered service in June 2000 and was operated by FCL Interstate Transport. In March 2003 PPL started operating the wagon on the Melbourne-Griffith corridor after an extended period out of service for the fitment of electrical connections. Maintenance records indicate that since wagon CQBY 0118A entered service with PPL it had been maintained by two separate maintenance service providers. These maintainers had been carrying out periodic scheduled and non-scheduled maintenance at the request of PPL and CFCLA. Wagon examination forms were completed and forwarded to CFCLA for checking and filing. Non-scheduled maintenance requests had been authorised by CFCLA which issued the maintenance provider with a purchase order to carry out the repairs. Invoices for these works indicated that repairs had been carried out on the wagon at terminals and field locations.

Maintenance records showed that during a periodic 'A' examination²⁰ of wagon CQBY 0118A on 24 September 2003, three draft key pins and the 'B end' coupler knuckle were replaced. On 30 December 2005 another 'A' examination was carried out where no defects were detected in relation to the draft key, retainer pins and associated components. On 5 January 2006 wagon CQBY 0118A was upgraded/modified with new draft keys and anti-wear collars were fitted in accordance with *CFCL Australia Maintenance Improvement Circular 09/04* -

²⁰ A periodic vehicle maintenance/inspection carried out every two years as specified by CFCLA.

23 September 2004. Another inspection on 28 February 2006 found no defects with the draft keys and associated components.

Programmed modifications where maintenance circulars have been issued by CFCLA to operators and maintainers have been problematic. Communications between the various organisations show that these modifications were not always carried out in a timely manner to reduce the risk of component failure. An explanation provided by CFCLA is that the ongoing demand to meet operational requirements by operators has made it difficult to schedule these wagons out of service for repair. In the interim period, operators and maintainers have continued to monitor known problems until it becomes necessary to carry out the modification in accordance with maintenance circulars or the timing of the proposed modification aligns with fixed maintenance schedules. Although wagon CQBY 0118A's draft components were upgraded approximately nine months before the derailment at Seymour, it is more likely that this failure was related to the draft key slot alignment and the grabbing of the draft key by the coupler than a failure to carry out modifications specifically in accordance with CFCLA maintenance circulars.

ATSB investigators observed that the remaining split pin within the dislodged draft key assembly on wagon CQBY 0118A had been incorrectly installed. At the time of the train parting and derailment, wagon CQBY 0118A had not been reassessed for compliance with *CFCL Australia Maintenance Improvement Circular 17/06* where signs of wear were to be noted and/or repaired and retainer pin split pins were to be checked for correct fitment.

3 FINDINGS

3.1 Context

On 12 September 2006, the crew of freight train number 2CM3 travelling from Griffith, NSW, to Melbourne advised train control that their train had parted and derailed a bogie approximately 4 km north of Seymour, Victoria. A draft key on wagon CQBY 0118A had dislodged from the coupler shank and allowed the coupler to pull out of the draft pocket and fall to the track under trailing wagons.

From the evidence available, the following findings are made with respect to the derailment of train 2CM3 and should not be read as apportioning blame or liability to any particular organisation or person.

3.2 Contributing safety factors

- The design tolerances during the construction of the underframe and draft sill area may have been exceeded on some CQBY wagons. In the case of the failed coupler on wagon CQBY 0118A, this was evidenced by signs of biased wear on the coupler wear plate and contributed to excessive hard contact and wear on the coupler, draft key and associated components, in particular the draft key retainer pins and their split pins. *[Safety issue]*
- A horizontal misalignment of the slots in the coupler, yoke and draft sill allowed the coupler to ‘grab’ the draft key and move it laterally applying a heavily biased lateral force to the draft key, anti-wear collar and retainer pin. These forces ultimately resulted in the retainer pin split pin failing, the retainer pin dislodging, the draft key dislodging and then the coupler pulling out of the wagon. *[Safety issue]*
- The displaced leading end coupler from wagon CQBY 0118A fell from the wagon onto the track and beneath trailing wagons and caused the derailment of CQBY 0130N.
- The modifications in 2004 to replace the draft key and add an anti-wear collar at each end were ineffective in preventing the disengagement of the coupler on wagon CQBY 0118A.

3.3 Other safety factors

- In response to previous failures of draft key retainer pins, Chicago Freight Car Leasing Australia had issued a maintenance improvement circular in September 2004. The circular did not contain sufficient detail to carry out the required modifications consistently across the CQBY fleet. Consequently, not all work was carried out as described in the circular or in accordance with good trade practice.
- A commitment made by Chicago Freight Car Leasing Australia in June 2005 to the Victorian and NSW rail safety regulators to complete a draft key rectification program before the end of December 2005 had not been met. Maintenance records showed there were still 17 (34%) CQBY Series 1 wagon couplers that had not been modified by the nominated date.

- Until April 2006, Chicago Freight Car Leasing Australia had not closely monitored or validated the progress of coupler modifications throughout the CQBY fleet and whether or not the wagons leased to operators had been refitted with new anti-wear collars and draft keys. Notwithstanding this, the materials for the modifications had been supplied to wagon operators or their maintenance providers in September 2003 along with instructions to carry out the work.
- Where 'Azee' type draft key retainer pins have been fitted to CQBY wagons, maintenance programs should be reviewed to ensure continued reliability of existing or revised inspection intervals for these items. *[Safety issue]*

3.4 Other key findings

- Both train drivers' locomotive qualifications and on-road assessments were current and the train was being driven in a manner consistent with good train handling practice.
- The fitment of type 'E' couplers to newly constructed wagons is not considered current technology. The majority of freight wagons are now assembled with Type 'E/F' vertical pin type couplers.

4 SAFETY ACTIONS

The safety issues identified during this investigation are listed in the Findings and Safety Actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety actions, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to the rail industry, the ATSB may issue safety recommendations or safety advisory notices as part of the final report.

4.1 Chicago Freight Car Leasing Australia

Safety Issue

The design tolerances during the construction of the underframe and draft sill area may have been exceeded on some CQBY wagons. In the case of the failed coupler on wagon CQBY 0118A, this was evidenced by signs of biased wear on the coupler wear plate and contributed to excessive hard contact and wear on the coupler draft key and associated components, in particular the draft key retainer pins and their split pins.

Safety actions taken

Chicago Freight Car Leasing Australia has assessed the risks and associated deficiencies with the Chinese manufactured draft key retainer pins fitted to all CQBY series 1 and series 2 wagons. On 26 April 2007 Chicago Freight Car Leasing Australia distributed a safety alert through *Maintenance Improvement Circular No 21/07* for the fitment of all CQBY wagons with Azee draft key retainer pins to ensure a consistent rework/modification program is achieved. Chicago Freight Car Leasing Australia has distributed this safety alert to all operators and maintainers of CQBY wagons and includes a numeric fleet number checklist for repairers to endorse by signature when these wagons have been refitted. Copies of checklists are returned to Chicago Freight Car Leasing Australia's Wagon Asset Manager for audit and retention. The program is continuing.

In the most recent addition to the CQBY fleet, Chicago Freight Car Leasing Australia has fitted vertical pin type couplers to the Mark IV version of these wagons.

ATSB safety recommendation RR20080013

The Australian Transport Safety Bureau recommends that Chicago Freight Car Leasing Australia take action to address this safety issue.

Safety Issue

A horizontal misalignment of the slots in the coupler, yoke and draft sill allowed the coupler to 'grab' the draft key and move it laterally applying a heavily biased lateral force to the draft key, anti-wear collar and retainer pin. These forces ultimately resulted in the retainer pin split pin failing, the retainer pin dislodging, the draft key dislodging and then the coupler pulling out of the wagon.

ATSB safety recommendation RR20080014

The Australian Transport Safety Bureau recommends that the Chicago Freight Car Leasing Australia take action to address this safety issue.

Safety Issue

Where 'Azee' type draft key retainer pins have been fitted to CQBY wagons maintenance programs should be reviewed to ensure existing or revised inspection intervals are appropriate for these items.

ATSB safety recommendation RR20080015

The Australian Transport Safety Bureau recommends that the Chicago Freight Car Leasing Australia take action to address this safety issue.

APPENDIX A : SOURCES AND SUBMISSIONS

References

Amdel Limited metallurgical composition report for retainer pin and collar–
November 1 2006

CFCL Australia *Maintenance Improvement Circular 09/04 - 23 September 2004*

CFCL Australia *Maintenance Improvement Circular 17/06 – 18 April 2006*

CFCL Australia *Maintenance Improvement Circular No 21/07 – 26 April 2007*

Code of Practice for the Defined Interstate Rail Network - *Volume 5 Rollingstock, Part 1: Introduction, RCP-1011: Standard Terminology for Rollingstock (draft)*

Code of Practice for the Defined Interstate Rail Network - *Volume 5 Rollingstock RCP-2103: Vehicle components (draft)*

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

A draft of this report was provided to:

- a) Chicago Freight Car Leasing Australia
- b) Patrick PortLink
- c) Australian Rail Track Corporation
- d) Pacific National
- e) The train driver and co-driver of 2CM3
- f) Department of Infrastructure (Victoria).

Comments and observations from directly involved parties have been incorporated into this report where appropriate.

Submissions were received from:

- a) Chicago Freight Car Leasing Australia
- b) Australian Rail Track Corporation.

APPENDIX B : MEDIA RELEASE

Coupling failure leads to derailment according to ATSB report

The ATSB has determined that the derailment of a freight train on the Defined Interstate Rail Network near Seymour was due to a wagon coupler that fell onto the track and became caught under a trailing wagon.

The Australian Transport Safety Bureau has today released its final report on the investigation of the derailment that occurred near Seymour in Victoria on 12 September 2006.

The train derailed at 0520 while travelling from Griffith NSW to Melbourne and was loaded with food products for export.

The coupler, connecting the seventh and eighth wagons in the train, became dislodged when the draft key holding the coupler in position, slid out following the failure of a locking pin. There have been a number of similar failures involving this type of wagon coupler in the past.

The wagon owner has taken safety action to prevent recurrence of this failure by commencing a rectification programme to fit modified draft key components that meet Association of American Railroad standards.

The ATSB has recommended that all wagons fitted with the modified components be regularly monitored to ensure that the modification is effective.