RAIL SAFETY INVESTIGATION REPORT

RUNAWAY GRAIN WAGON

TEMORA

28 JULY 2009
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CONTENTS

TABLE OF PHOTOS ii
TABLE OF FIGURES ii
ACRONYMS AND ABBREVIATIONS iii
GLOSSARY OF TERMS iv

EXECUTIVE SUMMARY v

PART 1 CIRCUMSTANCES OF THE INCIDENT 1
Incident Synopsis 1
Location and Track Information 1
Before the runaway
   The wagon 3
   The handbrake 3
   The crew 5
   Shunting 5
   Conditions 6
   Applying the handbrake 6
The runaway 9
After the runaway
   The crew 12
   The wagon 13
   Recovery 14
   Immediate safety response 15
Damage 15
Temora Track Rationalisation Program 18
  Risk assessment, absent or failed defences 19
Incident Response 23
  EZT 23
  ARTC 23
Other Safety Matters 24
  Wagon Maintenance 24
  Wagon Reflector Strips 25
  Wheel Chocks 25
Remedial Actions 26

PART 2 FINDINGS 27
Causation 27
Contributing Factors 27
Anticipation and Management of Risk 27
Incident Response 29

PART 3 RECOMMENDATIONS 30
Chicago Freight Car Leasing Australia 30
El Zorro Transport Pty Ltd 30
Australian Rail Track Corporation 30
Independent Transport Safety & Reliability Regulator 31

PART 4 APPENDICES 32
Appendix 1: Sources, Submissions and Acknowledgements. 32
## TABLE OF PHOTOS

<table>
<thead>
<tr>
<th>Photo</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Handbrake arrangement including AAR IP93 assembly and chain path</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Handbrake chain and counterweight extended towards the ground</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Brake block in contact with wheel tread</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Handbrake linkage at extended travel with chain under tension</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Remnants of the crushed wheel chock found where the wagon was detached</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Wagon standing in vicinity of Thanowning Road level crossing</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>Handbrake chain jammed behind guide bracket</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>Load compensating valve adrift from bogie</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>Non-standard temporary buffer stops as fitted on various dead end sidings at Temora</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>Remnants of temporary buffer stop in Sub-Terminal yard</td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td>Derailer and markings</td>
<td>17</td>
</tr>
<tr>
<td>12</td>
<td>Damaged Frame C points</td>
<td>17</td>
</tr>
<tr>
<td>13</td>
<td>Remnants of temporary buffer stop found at Victoria Street level crossing</td>
<td>18</td>
</tr>
<tr>
<td>14</td>
<td>Remnants of the clamping arrangement on one side of the temporary buffer stop</td>
<td>22</td>
</tr>
</tbody>
</table>

## TABLE OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Incident Locality</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Curve and Gradient Diagram</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>CQGY wagon outline</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Temora Wheat Sub-Terminal layout</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Track configuration at Temora Wheat Sub-Terminal prior to rationalisation</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Temporary track configuration at Temora Wheat Sub-Terminal during rationalisation</td>
<td>19</td>
</tr>
<tr>
<td>7</td>
<td>Temporary buffer stop configuration from TDS 16</td>
<td>21</td>
</tr>
</tbody>
</table>
ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTC</td>
<td>Australian Rail Track Corporation</td>
</tr>
<tr>
<td>CFCLA</td>
<td>Chicago Freight Car Leasing Australia</td>
</tr>
<tr>
<td>DIP</td>
<td>Directly Involved Party</td>
</tr>
<tr>
<td>EZT</td>
<td>El Zorro Transport Pty Ltd</td>
</tr>
<tr>
<td>FAID</td>
<td>Fatigue Audit Interdyne</td>
</tr>
<tr>
<td>ITSRR</td>
<td>Independent Transport Safety and Reliability Regulator</td>
</tr>
<tr>
<td>NCCS</td>
<td>Network Control Centre South, Junee</td>
</tr>
<tr>
<td>OTSI</td>
<td>Office of Transport Safety Investigations</td>
</tr>
<tr>
<td>RIC</td>
<td>Rail Infrastructure Corporation</td>
</tr>
<tr>
<td>RSU</td>
<td>Rolling Stock Unit</td>
</tr>
<tr>
<td>SIA</td>
<td>Safety Interface Agreement</td>
</tr>
<tr>
<td>TOC</td>
<td>ARTC Train Operating Conditions Manual</td>
</tr>
<tr>
<td>TTM</td>
<td>Train Transit Manager</td>
</tr>
</tbody>
</table>
# GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Active control (level crossing equipment)</th>
<th>Control of the movement of vehicular or pedestrian traffic across a railway level crossing by devices such as flashing light signals, gates or barriers, or a combination of these, where the device is actuated prior to and during the passage of a train through the crossing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>'B' end</td>
<td>The end of the wagon nearest to the handbrake.</td>
</tr>
<tr>
<td>Catch points</td>
<td>A single or double blade set of points placed on a siding to protect the main line by derailing rail traffic that may enter or foul an adjacent running line. Alternative device: derailer.</td>
</tr>
<tr>
<td>Consist</td>
<td>Listed order of the vehicles arranged to make up a complete train.</td>
</tr>
<tr>
<td>Derailer</td>
<td>A specially shaped block placed over one rail of a siding to protect main line traffic from any runaway vehicles or unauthorised moves. This protection is achieved by derailing any locomotive or wagon that comes in contact with the derailer. In some terminals derailers are also used to prevent unauthorised entry into sidings. Alternative device: catch point(s).</td>
</tr>
<tr>
<td>Down and Up direction</td>
<td>Trains travelling away from Sydney are referred to as Down trains. Movements in this direction are referred to as being in the Down direction. Trains travelling in the down direction are odd numbered. Trains travelling towards Sydney are referred to as Up trains. Movements in this direction are referred to as being in the Up direction. Trains travelling in the up direction are even numbered.</td>
</tr>
<tr>
<td>FAID (Fatigue Audit Interdyne)</td>
<td>A computerised model that calculates a fatigue score which is compared with the fatigue expected to be induced by working a particular pattern of work. The principal use of FAID is to better manage shiftwork, scheduling and fatigue risk.</td>
</tr>
<tr>
<td>Fishplate</td>
<td>A steel component (normally used in pairs) for the purpose of joining rail ends together.</td>
</tr>
<tr>
<td>Foul</td>
<td>In a position to obstruct rail traffic on an adjacent line.</td>
</tr>
<tr>
<td>Ground frame</td>
<td>A small track side interlocking machine used for manual points operation at yards, sidings, crossovers and loops.</td>
</tr>
<tr>
<td>Kilometrage</td>
<td>The distance by rail as measured from Central Station in Sydney.</td>
</tr>
<tr>
<td>Load compensating valve</td>
<td>A device fitted in the airbrake system of a wagon to increase or decrease braking effort on the wagon dependent on the load.</td>
</tr>
<tr>
<td>Network Controller</td>
<td>A qualified worker who monitors and controls train movements from a Control Centre.</td>
</tr>
<tr>
<td>Passive control (level crossing equipment)</td>
<td>Control of the movement of vehicular or pedestrian traffic across a railway level crossing by signs or devices, none of which are activated during the approach or passage of a train but, instead, rely on the road user detecting the approach or presence of a train by direct observation.</td>
</tr>
<tr>
<td>Points</td>
<td>A crossing comprising of two matching half sets of points together with associated components. A set of points permits rail traffic to change from one track to another. Points are nominally referred to as left or right hand denoting the turnout direction as viewed from the toe end.</td>
</tr>
<tr>
<td>Points clips</td>
<td>A screwed clamping device which, when applied, locks the switch blade of the points to prevent the points from being moved.</td>
</tr>
<tr>
<td>(Temporary) buffer stop</td>
<td>A structure erected across and at the end of a track at main line terminals or dead end sidings which is intended to stop rolling stock.</td>
</tr>
<tr>
<td>Trailed through</td>
<td>A wheel set movement through a set of points when the switch blades are set against the movement.</td>
</tr>
<tr>
<td>Wheel chock</td>
<td>A wedge shaped block of timber placed on the rail head behind a wheel to prevent vehicle movement.</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

At approximately 3:05am on 28 July 2009, empty grain wagon CQGY 540S, owned by Chicago Freight Car Leasing Australia (CFCLA) and leased by El Zorro Transport (EZT), ran away from the Temora Wheat Sub-Terminal\(^1\) during a shunting operation to detach it from a train. The wagon was being detached for stowage and subsequent transfer to Junee for scheduled maintenance requirements and because of defects identified during a previous safety inspection.

The wagon ran for a total of 7.8 kilometres before coming to a stand near the locality of Sproules Lagoon. During this time, it demolished a temporary buffer stop, struck an uncommissioned derailer and damaged a set of points, all of which were associated with an Australian Rail Track Corporation (ARTC) track infrastructure rationalisation program. The wagon traversed seven level crossings on the main line recording an average speed of 44.5km/h between the active level crossings at Junee Road and Victoria Street in Temora. Fortunately, there were no persons injured or vehicles struck during the runaway.

The investigation found that, while the crew followed correct procedure when detaching the wagon, it ran away because the handbrake was not fully applied due to the brake chain becoming jammed behind the guide bracket of the gear assembly. The chain jammed because of the ineffective design of the guide bracket installed to cater for the horizontal mounting of the AAR IP93-type geared handbrake wheel assembly. Despite the damage from chains jamming being regularly repaired by rolling stock maintainers, the problem was not communicated to the wagon owner or operators. There was also excessive travel within the handbrake system attributable to lack of adjustment during maintenance.

The only defence in place against a runaway on to the main line was a temporary buffer stop which proved to be insufficiently robust to stop the wagon. It was constructed using a “light duty” standard in the absence of any available ‘heavy duty’ standard that would have been appropriate to the situation at Temora. Additionally,

\(^1\) As at 29 July 2009, Temora Wheat Sub-Terminal ceased to exist as a distinct location and is considered part of Temora Yard in accordance with ARTC Safe Notice 2009 No. 2-1110.
the standard does not specify sizes for bolts and washers and the tie down arrangements installed were not fully in accordance with the standard. In addition to addressing the shortfalls in its temporary buffer stop specifications, it is recommended that ARTC address a number of infrastructure related risk management issues.

In response to the runaway incident and subsequent regulatory action by the Independent Transport Safety and Reliability Regulator (ITSRR), CFCLA (the wagon fleet owner) modified the handbrake system on CQGY wagons to eliminate the cause of the chain jamming.

In addition to the remedial action already undertaken, it is recommended that CFCLA:

- design and fit an indicator system to its rolling stock that alerts operators and maintainers to excessive travel within the handbrake linkage;
- review the handbrake design of its other types of wagons to ensure similar design problems are not apparent; and
- ensure minimum maintenance requirements and standards for wagons are clearly defined and adhered to in the Safety Interface Agreements (SIA) with the operators and maintenance providers of its rolling stock.

It is recommended that EYT, as a rolling stock operator, review any SIA with rolling stock maintenance contractors to ensure that maintenance requirements and standards conform to the contractual specifications and provide for regular audit.

The full details of the Findings and Recommendations of this rail safety investigation are contained in Parts 2 and 3 respectively.
PART 1 CIRCUMSTANCES OF THE INCIDENT

Incident Synopsis

1.1 At approximately 3:05am on 28 July 2009, empty grain wagon CQGY 540S, owned by Chicago Freight Car Leasing Australia (CFCLA) and leased by El Zorro Transport (EZT), ran away from the Temora Wheat Sub-Terminal during a shunting operation to detach it from a train. The wagon was being detached for stowage and subsequent transfer to Junee for scheduled maintenance requirements and because of defects identified during a previous safety inspection. The incident did not result in any injuries but the track infrastructure sustained some damage.

Location and Track Information

1.2 The incident occurred at Temora which is approximately 60kms West of the town of Cootamundra in the South West Region of NSW (see Figure 1).

1.3 Temora is located on the Cootamundra to Lake Cargelligo branch line. The line is a standard gauge single line track and forms part of the Country Rail Network owned by the Rail Infrastructure Corporation (RIC) but managed by

Figure 1: Incident Locality
the ARTC in conjunction with the 60 year lease agreement of the Defined Interstate Rail Network with the NSW Government. Under this arrangement, ARTC is responsible for train control and track maintenance functions.

1.4 The wagon ran away from the No. 1 Siding in the Wheat Sub-Terminal located on the Eastern side of Temora, in the Stockinbingal to Temora section. It was found towards Lake Cargelligo, near the locality of Sproules Lagoon, in the Temora to Barmedman section, North-North-West of Temora.

1.5 The line has a falling gradient from the Wheat Sub-Terminal to the point where the wagon was found (see Figure 2). The runaway began at a location (486.346kms) with a falling gradient of 1:98 (1.02%). The falling gradient continues until 494.500kms where a 1:173 rising gradient begins. The wagon was found standing at 494.194kms, on level ground leading up to the base of the rising gradient.

Figure 2: Curve and Gradient Diagram (Diagram courtesy of ARTC)
Before the runaway

1.6 CQGY 540S was a wagon within a grain train consist which had been operating between Port Kembla and the South-Western Region for a number of weeks.

The wagon

1.7 CQGY 540S is a flat top container wagon owned by CFCLA and fitted with two 50 cubic metre bulk grain hoppers (see Figure 3). The wagon measures 20.1m in length and has a tare weight of 26 tonnes.

![Figure 3: CQGY wagon outline](Diagram courtesy of CFCLA)

1.8 A total of 75 CQGY type wagons were built by engineering firms in Tasmania and NSW for CFCLA between 2001 and 2002. At the time the wagons were built, CQGY type wagons were required to meet various RIC wagon design and performance standards to operate on the NSW rail network. The wagons had to meet the requirements of Section 4.1 of RIC’s Rolling Stock Unit (RSU) 441 Braking Performance, in particular, that “the spring parking or handbrakes shall be able to hold the loaded vehicle on a 1 in 30 grade indefinitely”. Confirmation that the wagons met the requirement was given by RIC when CFCLA were authorised to operate the wagons on the NSW Network.

The handbrake

1.9 The handbrake system on CQGY-type wagons consists of a chain and linkage arrangement connected to the brake beams of each bogie and operated by a geared handbrake wheel assembly (AAR IP93 type) mounted on the ‘B’ end of the wagon. As the handbrake is being applied, its chain is fed through a geared drive and pulls on the linkages attached to the brake
beams of the bogie to exert a braking force on the wheels on the right hand side of the wagon. The normal air brake system on the wagon also co-acts on these brake beams. A ratchet mechanism is included on the handbrake wheel to prevent unintended release of the handbrake.

1.10 The AAR IP93 assembly is typically mounted in a vertical position. However, on CQGY type wagons, it was mounted in a horizontal position (see Photo 1) to reduce the potential for damage when containers are being either loaded or offloaded from the wagon. Because the horizontal mounting altered the direction of the chain feed into the gear mechanism to side on, an additional guide bracket and tube were engineered to prevent the chain from jamming within the mechanism.

Photo 1: Handbrake arrangement including AAR IP93 assembly and chain path

1.11 During a safety inspection conducted at Cootamundra on 27 July 2009, the load compensating valve, part of the air brake system on the wagon, was found to have come adrift from its mountings on the bogie. As the defect could not be repaired immediately, the air brake system was isolated and the matter reported to the EZT Maintenance Manager.
1.12 As the wagon was also due for scheduled maintenance, EZT arranged for the wagon to be detached from train No. 3992 at Temora and stowed until it could be transferred to maintenance facilities at Junee for inspection and repair.

The crew
1.13 The two-man crew for train No. 3992, based out of Junee and Melbourne, signed on for duty at Junee at 10:30pm on 27 July 2009. The driver, an employee of a labour-hire firm, had 25 years driving experience with different operators and had been under hire to EZT for approximately six weeks at the time of the incident. The assistant driver was an EZT employee with 14 months rail experience.

1.14 Both crew members were within their respective medical and competency assessment periods. Both were also familiar with, and qualified for, the routes through Temora. Although a Certificate of Competency had not been formally issued by EZT, the driver’s competencies had been accepted by EZT in recognition of his qualifications and previous experience.

1.15 Training and competency assessment in shunting practices, the application of handbrakes and the setting of wheel chocks is conducted as part of the initial training course for EZT locomotive crew.

1.16 Both crew members had been provided with copies of the relevant ARTC Safe Notices which advertised the changes in the yard configuration associated with the rationalisation program at Temora. The ARTC Safe Notices were also available on the ARTC web site.

Shunting
1.17 The crew was initially required to take replacement locomotives for the train to the Temora Wheat Sub-Terminal siding to attach to the train and shunt CQGY 540S. They arrived at the Sub-Terminal siding at approximately 1:30am on 28 July 2009.

1.18 After the locomotives were attached to train No. 3992, the wagon was shunted onto the rear of the train. The train was then placed at the Western end of the No. 1 Siding where a safety inspection could be conducted and the wagon detached and stowed clear of other rail traffic.
Conditions

1.19 The Sub-Terminal is equipped with yard lighting which was operating at the time of the incident. However, it only afforded limited illumination of the area where the wagon was detached, and the ground within the yard in the vicinity of the area where the wagon was being detached was ballasted and uneven, making it awkward to walk on. In addition, the train crew described conditions at the time of the incident as being dark, cold and raining. The Bureau of Meteorology recorded 6.2mm of rain and a minimum temperature of 4.1°C for Temora on the night of the runaway.

Applying the handbrake

1.20 Once the wagon was positioned, the assistant driver then applied the handbrake on the wagon. However, he needed to use a torch to provide direct lighting for his tasks. The use of the torch by the assistant driver was hampered by the requirement to place it down when he used both hands to apply the handbrake and operate the auto-coupler lift pin. (Subsequently, his torch was found on the wagon step when the runaway was located [see Photo 1]).

1.21 The assistant driver stated that, when shunting, he had been directing the train movements from ground at the rear of the train. He was aware of the air brake system being isolated on the wagon and that the wagon would be left standing on a downhill grade. When he positioned the wagon and applied the handbrake he assessed the risks of leaving the wagon on the downhill grade. He also used a number of visual cues to satisfy himself that the handbrake had been applied correctly. These cues included the following:

a. the handbrake wheel was tight and could not be wound any further;

b. the chain and counterweight were extended and hung near the ground (see Photo 2);

c. the brake blocks on the right hand side were in contact with the wheels (see Photo 3); and

d. the handbrake levers on the wagon underframe were towards full extension (see Photo 4).
Photo 2: Handbrake chain and counterweight extended towards the ground
(Photo courtesy of EZT)

Photo 3: Brake block in contact with wheel tread
In addition to a visual check that the handbrake had been applied properly, the assistant driver also tested the tension of the handbrake chain because of the grade. He decided the chain did not feel as tight as normal so sought to place a chock under one of the wagon wheels. Unable to source any chocks nearby, he sought the assistance of the driver in locating one. The driver eventually found a chock on one of the locomotives and passed it to him when they met half way along the train.

The assistant driver then placed the chock under the wheel nearest to the auto-coupler lift pin. He then re-checked the handbrake before directing the driver to “ease up” in order to operate the auto-coupler lift pin.

As the brakes released on the train, the pressure on the auto-coupler lift pin released and the assistant driver was able to release the coupling. He directed the driver to stop then pull forward. It was during this manoeuvre that the wagon was bumped and got away. On realising he could not stop the wagon, the assistant driver informed the driver of the situation.
1.25 The application of the handbrake was consistent with the requirements contained in the ARTC Train Operating Conditions (TOC) Manual for holding a train stationary on a grade.

The runaway

1.26 As the driver released the train brakes and began to pull forward, there was a slight time lag between the release of the brakes and the locomotive commencing to power. This lag caused the train to sag back slightly and push the now uncoupled wagon over the wheel chock, crushing it (see Photo 5). The assistant driver then observed the wagon commence to roll away down the gradient and gave chase. As he chased the wagon, he attempted to apply the handbrake further but the wagon continued to gain momentum. No longer able to keep pace with the wagon, the assistant driver stopped and notified the driver by radio. The driver then contacted the Signaller at Temora station by mobile phone to report the runaway.

![Photo 5: Remnants of the crushed wheel chock found where the wagon was detached](image)

1.27 The runaway wagon then collided with a temporary buffer stop (see Figure 4) which had been attached to the track as part of the yard rationalisation works, breaking its clamps and pushing the timbers in front of the wheels.
1.28 Continuing on, the wagon then struck an uncommissioned derailer which was not connected to the ground frame, resulting in the wheels forcing the derailer clear of the rail head without derailing the wagon.

1.29 The wagon then trailed through the points at Frame C, which were clipped for main line movements, springing the switch blades and damaging various connecting rods. Two points clips which locked the points in position were also sprung and damaged. Now on the main line, the wagon continued to roll downhill, crossing through the Cootamundra Road level crossing at 487.312kms\(^2\) before activating the warning equipment for the Junee Road level crossing at 488.114kms.

1.30 After passing through the Junee Road level crossing, the wagon activated the warning equipment for the Victoria Street level crossing at 488.818kms. As it travelled through the Victoria Street level crossing, the two sections of the temporary buffer stop, which were still being pushed by the wagon, fell away clear of the line.

**After the runaway**

1.31 First notification of the incident was made at 3:07am when the Signaller at Temora reported to the Network Controller at Network Control Centre South (NCCS Junee) that a train, thought to be EZT train No. 9397 en route from 2 Of the seven level crossings traversed by the runaway wagon, only the Junee Road and Victoria Street crossings were protected with active controls. All other crossings were protected with passive controls.
Cootamundra to West Wyalong, had passed his location without stopping to fulfil safeworking requirements.

1.32 In response, the Network Controller immediately contacted the driver on train No. 9397 to ascertain his location. The driver replied that he had not yet arrived at the station as he was still in the Stockinbingal to Temora section several kilometres East of Temora.

1.33 As the Network Controller and the Signaller were conferring on the location of train No. 9397, the Signaller received a phone call from the driver of train No. 3992 alerting him to the runaway wagon. The Signaller immediately relayed this information to the Network Controller.

1.34 Assessing the potential for a collision or track damage caused by the runaway wagon, the Network Controller contacted the crew on train No. 9397 and directed that they stop their train on arrival at the home signal for Temora and wait for further instructions. He then contacted track maintenance staff from Temora and directed them to commence a search for the wagon and inspect the track.

1.35 The Train Transit Manager (TTM) at NCCS notified the EZT Operations Manager of the runaway at 3.37am before notifying the Office of Transport Safety Investigation’s (OTSI) Duty Officer at 3:39am. EZT’s Operations Manager also notified OTSI of the incident.

1.36 At 4:13am the Track Supervisor reported finding the wagon standing at 494.194kms, some two kilometres on the Temora side of the locality of Sproules Lagoon with its rear standing approximately 60m past the Thanowning Road level crossing (see Photo 6). He then placed protection on the track 500m prior to and 500m past the wagon.
1.37 Representatives from E ZT then arrived and secured the wagon before the line was closed pending the arrival of two OTSI investigators from Sydney, Australian Rail Track Corporation’s (ARTC) Risk and Safety Officer from Wagga Wagga and E ZT representatives from Melbourne.

**The crew**

1.38 Mandatory drug and alcohol testing of the driver and assistant driver was conducted by accredited nursing staff at Temora Hospital at 8:15am and 8:36am\(^3\) respectively. Both crew members returned negative results to the presence of alcohol. However, drug tests of the driver were positive to the presence of opiates. The driver subsequently advised that he had taken prescription pain killers (Panadeine Forte) for a back condition prior to starting work on the night of the incident, although he had not reported that fact to

\(^3\) The delay for testing outside the three hour time frame required by the NSW Rail Safety (Drug and Alcohol Testing) Regulation 2008 was caused by the limited testing facilities and unavailability of accredited staff at Temora.
supervisory staff in accordance with EZT National Drug & Alcohol Control Procedure EZ-P-019.5.

1.39 The driver had not been rostered for duty on the preceding day and the assistant driver had not been rostered for duty on the preceding two days. Analysis of both rosters using FAID gave a score of 29.9 for both crew members at the time of the incident. (For the driver this took into account a 14 hour night shift worked on 25 July 2009.) This score is well within the normal range and well below the figure of 80 above which fatigue is considered to become a matter for possible concern.

The wagon

1.40 When the wagon was examined on site after the incident, it was found that when the handbrake was applied, albeit not tightly, the chain had slipped behind the guide bracket and become jammed between the gear assembly and the guide tube (see Photo 7). This prevented the chain from feeding through the gear assembly and over the top of the guide bracket when the handbrake was being wound on. It was also found that the load compensating valve was damaged after it had lost its mounting bolts and come adrift from the ‘B’ end bogie (see Photo 8).

Photo 7: Handbrake chain jammed behind guide bracket
1.41 During testing of the handbrake after the removal of the guide bracket and the chain jam, the handbrake functioned correctly. However, due to incorrect regulation of the handbrake linkages, excessive winding of the handbrake wheel was required before sufficient braking force was exerted on the wheels. This was despite the travel in the normal air brake being regulated properly to give the specified limit of 100mm in the brake cylinders.

1.42 Maintenance personnel conducting post incident inspections of the wagon commented that they had regularly encountered handbrake problems on CQGY type wagons. These problems were generally caused by either the guide bracket becoming distorted (bent) or the chain becoming jammed behind the guide bracket. They also commented that, despite repair simply being a matter of loosening and retightening of two bolts, they had not recognised that the design of the guide bracket could render the handbrake inoperative. Additionally, the matter had not been raised with CFCLA as the wagon fleet owner.

Recovery

1.43 The line was reopened at 3:00pm after the wagon had been inspected and recovered to Temora Station at walking pace. The retrieval at walking pace was done in accordance with the ARTC Network Rules which required a
towing chain to be fitted between vehicles when the brakes are isolated on a terminal end vehicle and have a brakeman walk alongside the vehicle to apply the handbrake in the case of a breakaway.

Immediate safety response

1.44 As a result of concerns raised by OTSI during the early stages of its investigation into the incident, the Independent Transport Safety and Reliability Regulator (ITSRR) conducted an inspection of CQGY type wagons being used by other operators. This inspection resulted in ITSRR issuing an Improvement Notice to CFCLA to address various design issues associated with the operation of the handbrake on the wagons. In response, CFCLA issued:

   a. an immediate safety alert No. 20090821 SAA MS 3409 to all operators, and

   b. a work instruction (CFCLA-WOI-TAM-008) to maintainers to modify the mounting of the AAR IP93 assembly and reroute the chain.

Damage

1.45 There was no damage to the runaway wagon. However, it damaged the following track mounted equipment during its passage:

   a. a temporary buffer stop (similar to those depicted in Photo 9) located in the No. 1 Siding at 486.950kms which was demolished (see Photo 10) before being deposited some 1.2kms away at the Victoria Street level crossing;

   b. a derailer fitted but not connected in the No. 1 Siding at 487.100kms which was bruised by the left side wheels of the leading bogie of the wagon before being forced clear of the rail head (see Photo 11);

   c. the connecting rods in Frame C points (487.132kms) which were bent when the wagon trailed through the points (see Photo 12);

   d. two points clips which were attached to the Frame C points; and

   e. the road surface of the Junee Road and the Victoria Street level crossings which suffered minor scrape marks when struck by the remnants of the temporary buffer stop being pushed by the wagon (see Photo 13).
Photo 9: Non-standard temporary buffer stops as fitted on various dead end sidings at Temora

(Photo courtesy of EZT)

Photo 10: Remnants of temporary buffer stop in Sub-Terminal yard

(Photo courtesy of ARTC)
OTSI Rail Safety Investigation

Runaway Grain Wagon, Temora, 28 July 2009

Photo 11: Derailer and markings (Photo courtesy of ARTC)

Photo 12: Damaged Frame C points (Photo courtesy of EZT)
Temora Track Rationalisation Program

1.46 On 23 February 2009, ARTC commenced a rationalisation program for the track and signals at Temora in accordance with ARTC Safe Notice 2009: 2-998. The program was designed to optimise track usage and maintenance at Temora, including the yard and Sub-Terminal, through reconfiguration of the tracks and signalling systems. The program also provided for the closure of Temora as a manned signal location.

1.47 Included in the rationalisation program was the removal of redundant track and two sets of catch points which linked the main Temora yard to the Sub-Terminal yard (see Figure 5). The two sets of catch points had been positioned to mitigate against any unauthorised or unintended train movements into and out of the Sub-Terminal yard. After the removal of this infrastructure, the program then called for the installation of a new set of points (Frame C) to connect the siding to the main line (see Figure 4) and maintain the capability for train movements in and out of the country end of...
the Sub-Terminal yard. The program also called for the installation of a
derailer, in lieu of the catch points, to mitigate the risk of runaways from the
yard and protect the integrity of the network.

Risk assessment, absent or failed defences
1.48 When the line was cut and the redundant track, including catch points, was
removed between the Temora yard and the Sub-Terminal yard, ARTC placed
a single temporary buffer stop on the line in the No. 1 Siding at 486.700kms
(see Figure 6) to indicate the end of the track and arrest any accidental or
unintended movement of rolling stock off the line.

Figure 5: Track configuration at Temora Wheat Sub-Terminal prior to rationalisation
(Diagram courtesy of ARTC)

Figure 6: Temporary track configuration at Temora Wheat Sub-Terminal during rationalisation
(Diagram courtesy of ARTC)
The temporary buffer stop was installed using ARTC Engineering Standard TDS 16 ‘Light Duty’ Maintenance Siding Specification. TDS 16 relates to short “maintenance sidings” where rail mounted track maintenance plant and equipment (e.g., tampers, regulators, rail grinders, ‘road-rail’ plant) are stabled during the course of track maintenance activities or where crippled and damaged rolling stock may be stored. It is not intended for yards or sidings like Temora. However, the inappropriate application of TDS 16 at Temora was not recognised during an on-site risk assessment conducted by ARTC on 26 February 2009.

The temporary buffer stop was the only defence in place to protect the main line against runaway vehicles. No additional defences, e.g., portable derailers, had been placed behind the temporary buffer stop to protect the integrity of the network against runaways, particularly after the new set of points were connected to the main line. This was despite the long downhill gradient through Temora, the potential for speed in excess of that posted or the close proximity of several level crossings.

This single defence and its lightweight construction indicated that ARTC had not contemplated any of the following during any risk assessment it had conducted in conjunction with the design and implementation phases of the rationalisation program at Temora:

a. the potential for loaded wagons, rakes of wagons or locomotives to run away from the Sub-Terminal;

b. the potential speed these vehicles could attain in the event of a runaway; and

c. any changes in risk when the track in the Sub-Terminal was connected to the main line.

The temporary buffer stop had been constructed using two timber sleepers, one atop the other, and had been clamped to the underside of the rails, instead of the sleeper, using fish plates, washers and lengths of Ø15mm temporary buffer stops generally consist of a white painted 300mm x 300mm timber bearer strapped to a sleeper. Where timber bearers are unavailable, TDS 16 permits the use of concrete sleepers in lieu.
threaded rod. This type of construction was lightweight, inadequate for its task, and did not conform to guidelines contained in TDS 16 (see Figure 7).

1.53 The nut and washer arrangement on the threaded rods pulled through the fishplate holes (see Photo 14) when the temporary buffer stop was struck by the wagon. The rod was too small in diameter and the washers were inadequate for the task. However, TDS 16 does not provide any specifications for bolt and washer sizes to be used during the construction of temporary buffer stops.

1.54 Subsequent observations of temporary buffer stop construction throughout NSW noted that many did not conform to the guidelines contained in TDS 16.

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Figure 7: Temporary buffer stop configuration from TDS 16

(Diagram courtesy of ARTC)
1.55 While the remnants of the clamping arrangement were found where the temporary buffer stop had been placed on the line (486.700kms), the two timber sleepers and a stop sign, which was also fitted to the temporary buffer stop, were found in the vicinity of the Victoria Street level crossing after being pushed by the wagon some 1.2kms down the track.

1.56 An inspection of the derailer and Frame C points revealed that the channel irons linking the derailer were not connected to the ground frame. ARTC advised that this was because it had not been certified or commissioned; a process which was scheduled to commence on the day of the incident vide ARTC Safe Notice 2009 – 2/1110.

1.57 The inspection of the derailer and the points also revealed that:

   a. two sets of flange marks were apparent on the derailer’s ramp plate indicating that it had been seated over the rail head in the “tripping” position when the wagon had run over it;

   b. as a result of not being connected, the derailer had slid clear of the rail head when struck by the wagon without derailing it;
c. the connecting rods on Frame C points were damaged after the wagon trailed through the points while they lay in the normal (main line) position;
d. two points clips were detached from the switch blades and lay on the ground under the rails; and
e. various scrape marks existed on the steel level crossing decking covering the Cootamundra Road level crossing.

1.58 ARTC replaced the catch points at Temora with a derailer during the rationalisation program. Their policy for the use of derailers and catch points is contained in ARTC Engineering Standard SDS 14 Points. SDS 14 Principles 14.1.2 (Catch Points) and 14.1.3 (Derailer) indicate that the primary consideration for use of catch points or derailers is based on track speed with Principle 14.1.3 stating that derailers can be used at locations where track speeds do not exceed 35km/h. While the permitted track speed through Frame C points was 25km/h (default speed for un-posted turnouts), no consideration had been made by ARTC for the falling gradient in the yard and beyond, the potential speed and mass of runaway vehicles or the close proximity of level crossings to the yard.

Incident Response

EZT

1.59 Incident management procedures for EZT are contained in El Zorro Document Code: EZ-002 Occurrence Management Plan. From voice recordings, it was noted EZT’s 24hr Hotline service did not answer when the ARTC TTM first attempted to report the incident to EZT. Instead, the TTM notified the EZT Operations Manager who then acted in compliance with EZ-002 to report the incident to listed authorities and company representatives. During its review of EZ-002, OTSI observed that the document was out of date as it was due for revision on 1 August 2008.

ARTC

1.60 Incident management procedures for ARTC are contained in ARTC Document TA44 Incident Management Manual. The review of the voice tapes
associated with the incident indicated that, when notified, the ARTC Signaller, Network Controller and TTM had acted in accordance with the requirements of their respective roles and responsibilities, as detailed in TA44, to report the incident to the respective parties and authorities. In particular, the Network Controller acted diligently in ascertaining the location of trains, stopping approaching trains and verifying the integrity of the network before the wagon was found.

Other Safety Matters

Wagon Maintenance

1.61 Defects like the load compensating valve coming adrift on wagon CQGY 540S are minor in nature and occur infrequently. However, such defects impact on train safety and a robust maintenance system should provide for early detection and rectification.

1.62 Under the wagon lease arrangement between EZT and CFCLA, EZT has responsibility for ensuring the rolling stock is “certified and/or maintained to be fit for purposes”. EZT fulfil this requirement through El Zorro Document Code: EZ-P-003 Rolling Stock Servicing and Maintenance.

1.63 EZ-P-003 stipulates the requirements for a number of different periodical inspections. The scheduling of these inspections is listed in time spans ranging from 28 days to two years and beyond.

1.64 Maintenance records provided by EZT indicated that the inspections had been conducted in accordance with the required intervals. In addition, EZT provided records for a 14-Day Preventative Maintenance (PM) Inspection. However, this inspection is not listed in EZ-P-003 or within the preventative maintenance schedule listed in CFCLA Document CFCLA-PRO-TAM-007 Non Locomotive Maintenance which forms part of its Safety Interface Agreement (SIA) with EZT.

1.65 Records for these 14-Day PM Inspections indicated the inspections were conducted by EZT-approved maintenance contractors. In the 14-Day PM Inspection conducted on 27 May 2009, the contractor indicated that the load compensating valve had been found to be broken. The records then
indicated that the valve was replaced during an out of course inspection conducted at Carrington (Newcastle) on 1 June 2009.

1.66 In a 14-Day PM Inspection conducted by the same maintenance contractor at Carrington on 11 July 2009, maintainers indicated that, amongst other inspection items, the load compensating valve and handbrake had been inspected and certified fit for service.

1.67 OTSI noted that, while the 14-Day PM Inspection tick sheet gives some form of accountability and certification, the items listed did not give any detail relating to specific inspection requirements, maintenance limits, reference standards or other underpinning documents. Despite the handbrake and load compensating valve items being marked as completed on the tick sheet, the excessive travel in the handbrake linkages and the missing or loose mounting bolts from the load compensating valve were long term defects that should have been detected during this inspection. It is probable, therefore, that these items were not properly examined during this inspection. Further, there were no internal or external post-inspection audits or spot checks undertaken to validate the inspection processes and results.

**Wagon Reflector Strips**

1.68 During the post-incident inspection of the wagon, it was noted that the reflector strips fitted to improve conspicuity of the wagon during dark conditions had not been maintained and did not reflect when illuminated. This was despite the reflector strips being signed off as fit for purpose when inspected during the 14-Day PM inspections conducted on 27 May 2009 and 11 July 2009.

**Wheel Chocks**

1.69 ARTC’s TOC Manual requires a minimum of four timber chocks to be available on each locomotive. Accordingly, as train No. 3992 consisted of four locomotives, there should have been at least 16 chocks readily available to the crew to utilise in supporting the wagon whilst it was standing on the downhill grade. That the crew were only able, with difficulty, to locate one indicates that train crews are not ensuring emergency kits contain minimum equipment levels during train preparation.
Remedial Actions

1.70 In response to the improvement notice issued by ITSRR for CQGY type wagons, CFCLA issued an immediate safety alert to all operators regarding the potential for handbrake chains to jam on CQGY type wagons. It also commenced a modification for the mounting of the AAR IP93 handbrake assembly and the routing of the handbrake chain on CQGY type wagons.

1.71 CFCLA report that they are endeavouring to have the current type of load compensating valve gradually removed from all vehicles of its fleet “due to the component not being robust enough for prolonged service”.

1.72 CFCLA also report that rolling stock maintenance service providers have been issued a circular reinforcing the need and detailing how to maintain wagon reflector strips in an acceptable condition (Circular No. 20100219 CJ WA 3710).

1.73 ARTC repaired the connecting rods of Frame C points and commissioned the derailer on 29 July 2009.
PART 2 FINDINGS

Causation

2.1 In relation to those matters prescribed by the Terms of Reference as the principal lines of inquiry, OTSI finds that the wagon ran away because the handbrake was not fully applied due to the chain becoming jammed behind the guide bracket of the gear assembly.

Contributing Factors

2.2 The poor design of the guide bracket installed to cater for the horizontal mounting of the AAR IP93-type geared handbrake wheel assembly permitted the chain to become jammed in the gear drive mechanism. This meant the handbrake was not fully applied when the wagon was detached even though it appeared to be.

2.3 There was excessive travel within the handbrake system caused by the lack of adjustment during maintenance.

2.4 The temporary buffer stop fitted at 486.950kms was insufficiently robust to stop the runaway wagon. The buffer stop was installed using ARTC’s Engineering Standard TDS 16 even though this is only meant to serve “light duty” applications. Additionally, the clamping arrangement used was not in accordance with TDS 16, thereby further weakening the structure.

2.5 No additional defences, such as a portable derailer, were placed on the line to mitigate against runaway rail vehicles and protect the integrity of the network once the No. 1 Siding was connected to the main line.

Anticipation and Management of Risk

2.6 The assistant driver recognised the risk of stowing vehicles on downhill grades and placed an additional defence (the only available wheel chock) under the wagon. However, this defence was neutralised when the wheel chock was crushed when the train sagged back as the wagon was being detached.

2.7 Despite having a documented maintenance management system in place for its rolling stock, the system being utilised at the time of the incident was not
listed as an authorised inspection in El Zorro Document Code EZ-P-003

Rolling Stock Servicing and Maintenance. Further, while the unlisted inspections were being conducted by EZT-approved contractors, the tick sheets used by these contractors did not provide any details as to maintenance requirements, limits or reference standards. Also, the tick sheets did not refer to any associated documents underpinning the maintenance system.

2.8 Despite being certified as fit for purpose, the condition of the handbrake, load compensating valve and reflector strips indicated that those items had not been inspected properly during the previous inspection of the wagon.

2.9 While the risk of the handbrake chain jamming in the gear assembly was recognised during the design of the wagon and mitigated by the inclusion of the guide bracket and tube, the potential for the guide bracket to cause the chain to jam during the application of the handbrake was not recognised. Further, despite the chain jam being regularly repaired by maintainers, the problem was not communicated to the wagon owner or operators.

2.10 There were no limit markers on the handbrake linkage to indicate the requirement for re-regulation of the handbrake rigging.

2.11 The ability for the crew to locate only one wheel chock indicated that equipment levels in locomotive emergency kits were not being maintained in accordance with the requirements listed in the ARTC TOC Manual.

2.12 The risk assessments conducted by ARTC during the design and installation phases were inadequate in that they did not identify that:

a. a more robust temporary buffer stop than specified in TDS 16 was required as the Temora Wheat Sub-Terminal was not a small or short maintenance siding;

b. TDS16 did not specify bolt and washer sizes to be used in the construction of temporary buffer stops;

c. changes in risk would occur when the No. 1 Siding was connected to the main line; and
d. ARTC’s preferential use of derailers over catch points, although in accordance with ARTC Engineering Standard SDS 14 Points, did not take into account local conditions at Temora which included the potential speed for runaway wagons, the steep and long gradient at and beyond Temora, the proximity of level crossings or the mass of trains that could potentially run away out of the yard.

Incident Response
2.13 Both EZT and ARTC personnel acted in accordance with the requirements of their respective incident management plans.
PART 3  RECOMMENDATIONS

3.1 To prevent the reoccurrence of this type of rail incident, it is recommended that the following remedial safety actions be undertaken by the specified responsible entities.

Chicago Freight Car Leasing Australia

3.2 Design and fit an indicator system to its rolling stock that alerts operators and maintainers to excessive travel within the handbrake linkage.

3.3 Review the handbrake design of other wagons in its fleets to ensure any handbrake design problems similar to those encountered with the CQGY type wagons are identified and rectified.

3.4 Ensure minimum maintenance requirements and standards for wagons are clearly defined and adhered to in the Safety Interface Agreements with the operators and maintenance providers of its rolling stock.

El Zorro Transport Pty Ltd

3.5 Revise Safety Interface Agreements with rolling stock maintenance contractors to ensure that:
   a. maintenance requirements and standards are clearly detailed;
   b. maintenance periods conform to El Zorro Document Code: EZ-P-003 Rolling Stock Servicing and Maintenance;
   c. contractors’ defects management systems promote the reporting of rolling stock defects and enable repetitive faults to be identified; and
   d. provision is made for regular audits of contractors’ work.

3.6 Ensure specified equipment contents are maintained in locomotive emergency kits.

Australian Rail Track Corporation

3.7 As Frame C points at Temora connect to the main line and runaway vehicle speeds may exceed the limitations of a derailer, replace the derailer at
487.100kms with catch points so as to adequately protect the integrity of the network.

3.8 Develop specifications for the construction of temporary buffer stops in ‘heavy duty’ applications (such as Temora). Such specifications should also include the requirements for secondary or backup defences.

3.9 Add full details on minimum bolt and washer sizes to all specifications for the construction of temporary buffer stops.

3.10 Require all risk assessments associated with the construction of temporary buffer stops to be documented and give due consideration to local conditions such as line gradients, proximity of level crossings, train mass and the nature and likelihood of potential runaways.

3.11 Develop and implement a change management procedure to ensure changes to risk are appropriately identified and mitigated, particularly during major infrastructure renewal or rationalisation programs.

3.12 Revise ARTC Engineering Standard SDS 14 Points so as to ensure appropriate consideration is given to train mass and potential speed when considering the use of derailers in preference to catch points.

3.13 Audit all temporary buffer stops within its NSW network to ensure conformance with ARTC Engineering Standard TDS 16 ‘Light Duty’ Maintenance Siding Specification and, as appropriate, with the specifications developed for ‘heavy duty’ applications.

**Independent Transport Safety & Reliability Regulator**

3.14 Monitor El Zorro Transport’s review of its Safety Interface Agreements to ensure that the recommended enhancements to its defects management system are implemented.
PART 4  APPENDICES

Appendix 1: Sources, Submissions and Acknowledgements.

Sources of Information

- ARTC Network Controller (NCCS Junee)
- ARTC Risk and Safety Officer (South)
- Bureau of Meteorology
- CFCLA
- Crew members of train No. 3992
- Members of the ARTC Track Maintenance Teams involved in the Temora track and signal rationalisation program
- Operations Manager, El Zorro Transport

References

- ARTC Infrastructure Engineering Standards
- ARTC Network Rules and Procedures
- EZT Document Code: EZ-P-003 Rolling Stock Servicing and Maintenance
- Glossary for the National Codes of Practice and Dictionary of Railway Terminology
- Passenger Transport Act 1990 (NSW)
- Rail Safety Act 2008 (NSW)
- Rail Safety Standards Board Rolling Stock Standards

Submissions

The Chief investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- El Zorro Transport Pty Ltd
• Australian Rail Track Corporation
• Chicago Freight Car Leasing Australia
• Independent Transport Safety and Reliability Regulator
• Rail Infrastructure Corporation

Submissions were received from the first four of the above DIPs.

The Chief Investigator considered all representations made by DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the Final Report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.

**Acknowledgements**

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