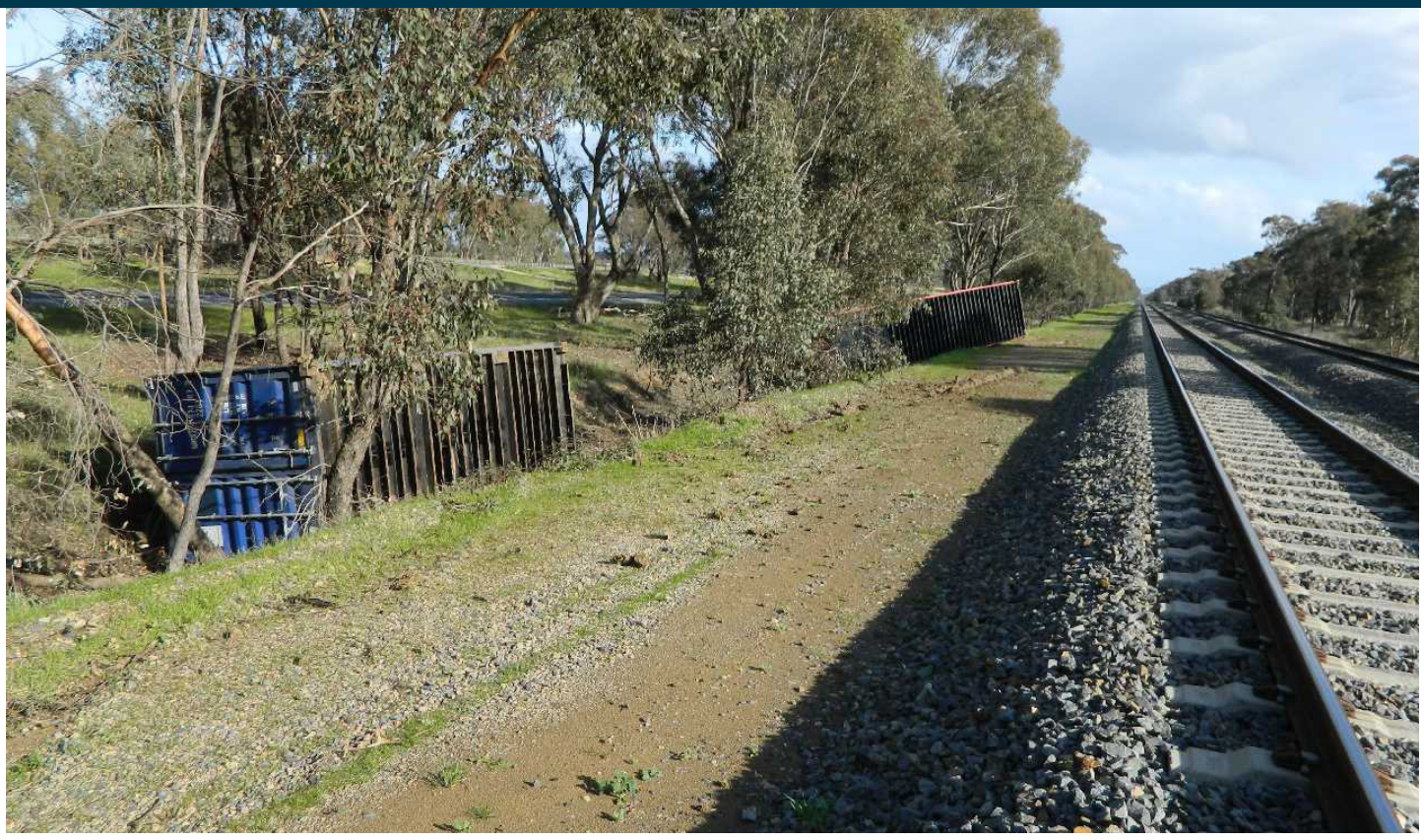
Australian Government
Australian Transport Safety Bureau

Loading irregularity on train 6MC2

near Bowser, Victoria | 24 July 2015



Investigation

ATSB Transport Safety Report
Rail Occurrence Investigation
RO-2015-013
Final – 19 August 2016

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Addendum

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Safety summary

What happened

On 24 July 2015, container freight train 6MC2 lost two containers from the train as it passed through Bowser, north of Wangaratta. The two containers lost from the train landed clear of the track on the eastern side. The train continued its journey with the crew unaware of the incident.

At about 0430 the following morning, the driver of another freight train noticed a container and reported it to train control.

What the ATSB found

The ATSB found that it was very likely that the twist locks that secured the containers to the train were ineffective prior to the incident. This condition allowed the unsecured containers to fall from the train. It is probable that strong winds contributed to the movement of the unsecured containers. Other external forces, such as train and track dynamics, may have also contributed to the movement. However, there was no evidence of such contribution.

Given the containers were located some distance behind the locomotives, and that no other train operational systems were affected when they fell from their respective wagons, the train crew were not aware of the incident.

What's been done as a result

As a result of the incident, Pacific National undertook an internal investigation into the incident and has taken action to:

- initiate a process to include checks for twist lock operation as part of wagon maintenance and inspection
- develop a twist lock inspection manual
- update freight loading manuals to include methodology for identifying defective twist locks
- update wagon maintenance manual to include methodology for identifying defective twist locks
- update twist lock training materials to include identification of defective twist locks
- initiate a review of twist lock integrity history
- initiate a review of twist locks currently in service – supply and type
- calculate the failure rate of twist locks across the Intermodal fleet for probability and risk mitigation considerations.

Safety message

Rail operators should satisfy themselves that their procedures can ensure that all twist locks are effective at securing freight containers to their respective wagons before the transit of trains.

The occurrence

At about 1428 on 24 July 2015, container freight train 6MC2 departed Appleton Dock, Melbourne headed for Griffith, New South Wales. The train was programmed to detach wagons at certain locations along the standard gauge route. Train 6MC2 was owned and operated by Pacific National (PN). The train consisted of three locomotives (two were off line) hauling 60 wagons, was 1272 m long, with a total mass of 2051 t. The train was a scheduled service, transporting containers between Melbourne and Griffith.

At about 1805, train 6MC2 passed through Wangaratta travelling on the east track. A short time later near Bowser (North Wangaratta), the train passed V/Line passenger train 8630 on the west track heading to Melbourne. A little further on, the train crew noticed the trees alongside the track swaying violently in a localised storm event. The crew commented that the wind swayed the locomotive. At this point, unbeknown to the train crew, two containers fell off the train.

The train continued on its programmed journey towards Griffith. At Ettamogah, 13 wagons were detached, but the missing containers were not noticed.

At about 0430 on 25 July 2015, the driver of freight train 3PW4 (travelling on the west track) sighted a shipping container lying next to, but clear of, the east track between Wangaratta and Springhurst at the 244.500 track km point. The driver reported the container to the Australian Rail Track Corporation (ARTC) Network Control Centre South located at Junee, New South Wales. The ARTC network control centre warned another following train, XPT passenger train ST21 travelling from Sydney to Melbourne on the east track, to proceed at caution. At 0447, the driver of ST21 confirmed the details and location of the container with the ARTC network control centre.

Figure 1: Containers laying adjacent the track

Note: The blue container in the foreground was located on the 17th wagon. The red container in the background was located on the 13th wagon. The direction of travel shown with a red arrow.
Source: Pacific National

The ARTC arranged to have the track inspected. At about 0634, the inspector arrived on site and discovered a second shipping container near the track. Both containers were clear of the track and normal train running resumed.

The ARTC established that the containers had fallen from train 6MC2 the previous night. By then, seven trains had passed the location since the containers were lost from train 6MC2. Of the seven passing trains, five were on the West track and two on the East track.

Safety analysis

Twist locks

Containers are loaded onto suitable rail vehicles and secured at each corner by twist locks. Pacific National's *Freight Loading Manual*[1] (FLM) details specific requirements for securing containers to wagons. The manual specifies:

- All devices used to secure containers to rail wagons must be in a sound and serviceable condition.
- All containers MUST have all four securing devices locked in position prior to transit.

There are four types of approved securing devices:

- Portable twist locks (automatic operation)
- Portable twist locks (manual operation)
- Portable anchor brackets
  - Internal hook type
  - External clamp type
- Retractable fixed twist locks
  - Hinged type
  - Pop up type

Patrick Port Logistics (PPL) loaded the two containers that subsequently fell from train 6MC2. PPL also had requirements[2] for securing containers to rail wagons. These requirements largely reflected the Pacific National (PN) specific requirements. On the day of the incident, PPL used eight automatic twist locks, one on each corner, securing both containers to the rail wagons. PPL used a combination of two Gavan, one Celtec Cel-Lock TFA, and five Celtec Cel-Lock TFAD twist locks, Figure 2 and Figure 4.

Figure 2: Twist lock types

Source: Pacific National

1 Freight Loading Manual FLM 03-08_10.
2 Patrick Port Logistics Integrated Management System *Securing of Containers to Rail Wagons: GOP 5.10*

The normal position of an automatic twist lock is in the locked position, Figure 3. When a container is loaded onto a rail wagon the container pocket unlocks the twist lock head. When the container is fully seated, the twist lock head returns to the locked position, securing the container. When a container is unloaded, the lifting action applies sufficient force to unlock the twist lock head and releases the container.

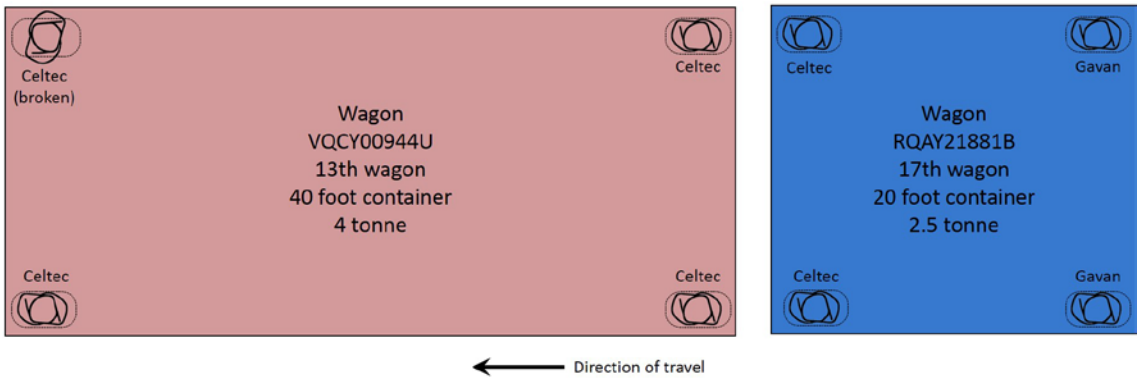
If a twist lock sticks, operators can release the lock manually. Twist locks are fitted with an emergency release pin and/or a visual safety indicator. Once released manually, operators must manually reset before the next use. Loading staff can visually inspect these indicators (indicator and/or pin) to ascertain the state of the twist lock.

Figure 3: Twist lock engagement

Note: Celtec TFAD type twist lock showing unlocked and locked positions. Source: Celtec.

Following the incident, PN found the twist locks still fastened to the rail wagon. One lock was broken and all others were in the unlocked position, as shown in Figure 4.

Figure 4: Twist lock layout as found



Note: Based on 'as found' condition by PN.

Twist lock inspection

Following the incident, Pacific National commissioned a report to investigate the condition of the twist locks. A specialist inspected the twist locks from both wagons to determine the serviceability of them. The report notes:

> All but one twist lock was in open position when collected. 2 X Gavan + 1 X first generation Celtec TFA had broken Emergency Release (See new design Celtec TFAD and TFAE how the house is designed so that ER is not exposed to impact as much as the old TFA). 2 X Celtec TFAD could be returned to activated position. 1 X Celtec TFAD had a broken shaft. The twist locks should not have been in use as they were not activated or could not be activated…
>
> It is concluded that containers MAGU5655514 and MRKU8741873 were able to break free from their respective wagons due to twist locks being in poor condition rendering them completely ineffective.

Based on the condition of the twist locks, and supported by the specialist report, it is very likely that the twist locks were not working prior to the incident. This condition allowed the containers to fall from the train. Given the distance behind the locomotives, dark light condition, and that no other train operational systems were affected, the train crew were not aware of the incident.

Furthermore, the generally poor condition of the twist locks, including serviceability, was not detected particularly during the pre-loading, or post loading inspections. Before loading, twist locks must be inspected for serviceability before use. Any unserviceable twist locks are quarantined from further use until repaired. After loading, the twist locks are not specifically checked during pre-departure or in-service inspections. Although the FLM provides guidance on pre-loading inspection of twist locks, there is no other guidance available to perform adequate post-loading inspections.

At no stage were the defective twist locks identified. In this case, allowing ineffective twist locks to enter service affected the safe transit of the train.

Environmental conditions

Both drivers of train 6MC2 commented on abnormal weather conditions north of Wangaratta. The conditions were such that the leading locomotive was shaken as debris was blown across the track.

Weather station data was obtained from the Bureau of Meteorology (BOM) located at Wangaratta aero, about 12 km from the incident site. At 1500, on the day of the incident, the temperature was recorded as 11 °C, 99 per cent relative humidity, and wind from the north at 13 km/h. In addition, data was obtained from a local council weather station at Bowser, about 6 km from the incident site. At the time of the incident, this data recorded the temperature as 12 °C, 94% relative humidity, and wind from the southwest at 17 km/h.

Notwithstanding the weather data, the train crew witnessed a weather event. Based on the proximity of the Bowser weather station, the event was most likely localised. The local council had no reports of storm damage.

Weather effect on train 6MC2

The Rail Industry Safety and Standards Board (RISSB) provides guidelines[3] on calculating wind force on railway vehicles. These guidelines were used to determine minimum wind force needed to unlock twist locks (in good condition and effective) and blow the containers off the train.

Based on the characteristics of the wagons, a perpendicular wind speed in excess of 160 km/h would be needed to apply sufficient lifting force to unlock the twist locks and tip the containers off. There is no evidence of a weather event in that location generating wind speeds in excess of 160 km/h.

Summary of environmental conditions

There was no evidence that environmental conditions existed that were severe enough to tip containers, if secured by effective twist locks.

However, considering the post incident condition of the twist locks in this case, it is probable that the weather witnessed by the train crew contributed to the movement of the unsecured containers (Figure 5). Other external forces, such as train and track dynamics, may have also contributed to the movement however, there was no evidence of such contribution.

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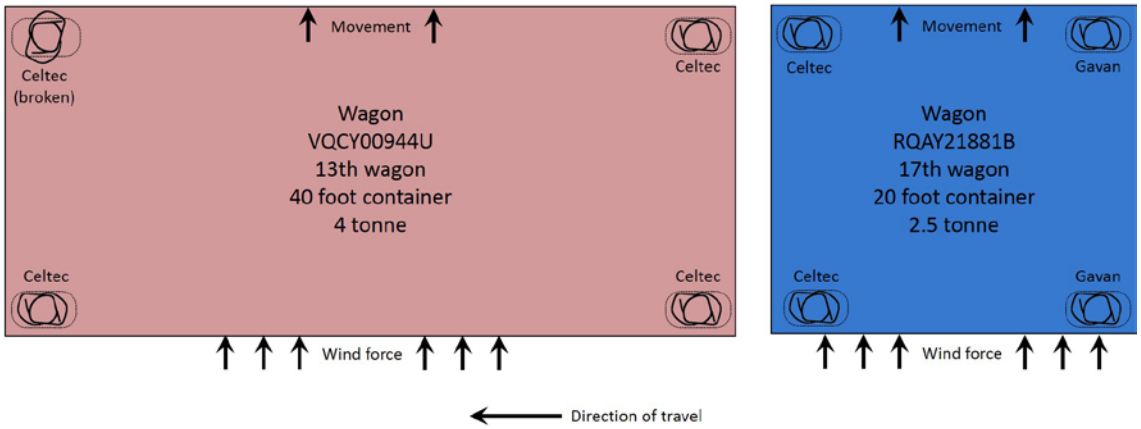
[33] RISSB Australian Standard AS 7509.2

Figure 5: Wind affect



Related occurrences

The Office of the National Rail Safety Regulator (ONRSR) maintains a database of occurrence events reported. A review of that database for the previous 12 months showed 28 reported instances of containers found with ineffective twist locks in service.

Based on this data, it is not uncommon to find ineffective twist locks in service. Although the container remained on the rail vehicle in most instances, the risk of loss still existed.

Findings

From the evidence available, the following findings are made with respect to the loss of containers from train 6MC2 near Bowser, Victoria, on 24 July 2015. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- A localised weather event probably shifted the inadequately secured containers from the wagon.
- The twist locks were in an unserviceable condition meaning that they did not engage during loading. The containers were not adequately restrained during transit.
- Pacific National had documented instructions for pre-loading inspections, but in this case the poor condition of the twist locks was not detected.
- Pacific National did not have any documented instructions requiring post-loading inspection for twist lock effectiveness.

Safety actions

Additional safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Pacific National

As a result of the incident, Pacific National undertook an internal investigation into the incident and completed the following actions:

- initiate a process to include checks for twist lock operation as part of wagon maintenance and inspection
- develop a twist lock inspection manual
- update freight loading manuals to include methodology for identifying defective twist locks
- update wagon maintenance manual to include methodology for identifying defective twist locks
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General details

Occurrence details

Date and time:	24 July 2015 – 1810 EST	
Occurrence category:	Incident	
Primary occurrence type:	Loading irregularity	
Location:	Near Bowser, Victoria	
	Latitude: 36° 17.59' S	Longitude: 146° 23.227' E

Train details

Train operator:	Pacific National	
Registration:	6MC2	
Type of operation:	Container freight	
Persons on board:	Crew – 2	Passengers – nil
Injuries:	Crew – nil	Passengers – nil
Damage:	Minor	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

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.

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

It is not a function of the ATSB to apportion blame or determine liability. At the same time, 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.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

Australian Transport Safety Bureau

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