



Australian Government
Australian Transport Safety Bureau

Derailment of train 3WB3

Nambucca Heads, New South Wales | 14 May 2014



Investigation

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Addendum

Page	Change	Date

Safety summary

What happened

At about 1404 on 14 May 2014, the fourth wagon from the end of train 3WB3 derailed whilst exiting the Nambucca Heads crossing loop. The train travelled a further 1,397 m before the derailed wagon tipped on its side causing the train to separate and subsequently stop.

What the ATSB found

The ATSB found that the rod-in-coil load had likely shifted, mostly to the left in the direction of travel. The effect of a load shift to the left would have been to transfer vertical forces from the wagon's right side-bearer to the left side-bearer, causing the right-hand wheels to unload.

At the point of derailment, the track geometry was transitioning out of a left-hand curve which had a relatively high superelevation with respect to the actual speed of train 3WB3 (about 21 km/h). The relatively high superelevation and subsequent twist as the superelevation ramped down through the transition, likely resulted in additional transfer of vertical force from the wagon's right side-bearer to the left side-bearer, resulting in a further unloading of the right-hand wheels.

The combination of superelevation, twist and (more importantly) uneven lateral loading, combined to unload the right-hand wheels which, when steering through a left-hand curve, resulted in flange climb and derailment of wagon RCOF20375S.

What's been done as a result

Following the occurrence, Pacific National Assets and Infrastructure Services engaged a consultant to conduct an audit of procedures and operational processes relating to the development and implementation of the *Freight Loading Manual* (FLM). The audit was scoped specifically to include a gap analysis in relation to current steel loading processes.

In addition, PN have advised that they will be arranging an external engineering group to undertake a twist test and/or computer simulation modelling of an RCOF wagon to record its wheel loading performance characteristics during scenarios based on operational data. It is expected that the outcomes of this work will be used to further refine the FLM and associated procedures and loading practices.

Safety message

The ability for a load to shift during transit is an undesirable condition that can affect the dynamic behaviour of the rail vehicle. All rail freight operators should consider the safety implications of shifting/moving loads and should ensure that all loads are restrained and/or enclosed in such a way that prevents movement in any direction relative to the wagon.

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The occurrence

At about 1355¹ on 14 May 2014, freight train 3WB3 entered the Nambucca Heads crossing loop. The route was set for a through movement via the loop because of trackside work being performed adjacent to the main line.

At about 1404, the trailing wheel set of the leading bogie on wagon RCOF20375S derailed to the right-hand-side in the direction of travel. The train was travelling at a speed of 21 km/h through a left hand curve. The derailed wagon was located fourth from last in the 44 wagon consist.

The train continued to travel with the derailed wagon for 1,397 m, passing over two bridges and reached a speed of 44 km/h before wagon RCOF20375S tipped on its side (Figure 1). The train then parted between the fourth and fifth last wagons. As the wagons parted, the train brake pipe separated, allowing air to vent to atmosphere and the train brakes to apply, bringing the train to a stop in about 320 m.

The train crew notified the network controller and arrangements were made to begin investigative and restoration work. The main line was subsequently reopened at 1816 on 16 May. The Nambucca Heads crossing loop line remained closed until further repairs could be conducted.

Figure 1: Derailed wagon RCOF20375S



Source: ATSB

¹ The 24 hour clock is used in this report. Local time was Australian Eastern Standard Time (EST).

Context

The location

Nambucca Heads is located on the Main North Coast rail corridor between Sydney and Brisbane, about 565 track kilometres from Sydney Central Station. Nambucca Heads is a crossing location with a 1,951 m crossing loop.

The track at the location of the derailment was standard gauge, 53 kg/m rail mounted with resilient fastenings on timber sleepers spaced at about 667 mm centres.

The Australian Rail Track Corporation (ARTC) manages the railway corridor where the derailment occurred. Authorised movement of rail traffic is controlled from the ARTC's Network Control Centre located at Broadmeadow, New South Wales.

Approaching from the southern end, the track through the derailment site consisted of a series of reverse curves between 480 m and 360 m radii on reasonably level track. While the posted maximum track speed was 75 km/h, most rail traffic traversing the loop would travel at considerably lower speed due to 25 km/h speed restrictions over the turnouts.

Train information

Train 3WB3 was a steel products freight service operated by Pacific National between Whyalla and Brisbane via Melbourne, Wollongong, and Morandoo (Newcastle). At the time of the derailment, the train consisted of two locomotives (NR94 leading and AN9 trailing) hauling 44 freight wagons. It was 817 m in length and had a trailing mass of 3,363 t.

Two qualified drivers operated the train. Both had been assessed as fit for duty in accordance with the requirements of the *National Standard for Health Assessment of Rail Safety Workers*.

Analysis of locomotive data logger indicated that there were no anomalies in the train speed, train handling or operational performance leading up to the derailment.

Rolling stock

RCOF wagons are 15.1 m long and approved to carry up to 80 gross tonnes at speeds up to 80 km/h (depending on track speed limits). On the day of the derailment, wagon RCOF20375S (the wagon which derailed) was carrying 40 coils of steel rod, each weighing 1.5 t on average. The coils were arranged two-wide by two-high, in each of the wagon's 10 bays (Figure 2). The coils were contained within the wagon, but they were not otherwise restrained. Wagon RCOF20375S was one of six wagons added to the train at Morandoo for travel to Brisbane.

On-site inspection and preliminary examination of the derailed wagons found no indication of any serious anomalies in rolling stock condition. However, evidence of load shifting was observed in wagons not affected by the derailment, but carrying the same rod-in-coil product.

A number of wagons were quarantined, including RCOF20375S. The bogies of wagon RCOF20375S were transferred to Newcastle where they were examined in more detail by Pacific National.

The examination noted that:

1. Wheelsets on wagon RCOF20375S were inspected and measurements recorded. All wheelsets were in good condition and wheels were within Pacific National requirements. There was nothing evident from inspection of the wheelsets that could have contributed to the wagon derailed.
2. Wagon RCOF20375S bogie and wagon condition was inspected, with no obvious wear or pre incident damage observed that could have contributed to the derailment.
3. A bolster drop test was conducted and the bogies of wagon RCOF20375S. The test confirmed that the overall friction damping was satisfactory.

Based on the available evidence, it was concluded that the mechanical condition of wagon RCOF20375S did not contribute to the derailment.

Figure 2: Loaded wagon RCOF20526B on train 3WB3 carrying rod-in-coil product



Source: ATSB.

Pacific National freight loading manual

The Pacific National freight loading manual (FLM) is a document that provides information to employees and third parties on loading requirements for goods transported on Pacific National trains, to ensure the safe carriage of freight. The manual includes guidance on factors that may affect the stability of the wagon, such as composition, mass and distribution of the load, and the method of securing the load.

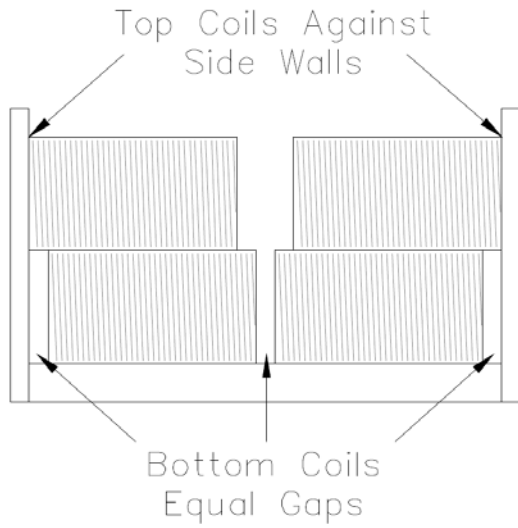
Section 01-10_07 documents the general requirements for mass and distribution of load. The FLM requires the load to be evenly distributed and the centre of gravity (including the weight of the bogies) shall not exceed 2,130 mm. Calculations indicate that a wagon fully loaded with rod-in-coil product would likely result in a centre of gravity at or near the limit documented in the FLM.

The FLM also provides loading guidelines for specific products and wagons. Section 5-13_07 of the manual (dated 3 July 2013) documented the specific requirements for transporting rod-in-coil product on RCOF and RCWF wagons, and stated:

- a) Where possible, the top and bottom layer MUST cover the full width of the wagon's frame to ensure the load cannot collapse.
- b) Where the load does not cover the full width, the bundles are to be loaded as follows:
 - i. The bottom two bundles must be placed so that all gaps are consistent.
 - ii. The top two bundles are to be placed against the side walls of the cage.
- c) If the bottom bundles are too wide to allow all three gaps, place bundles against side walls of frames/stanchions.
- d) Coil bundles placed on the on bottom tier MUST be of sufficient strength to ensure coil collapse will not occur in transit.

Figure 3 illustrates the requirements specified above and has been reproduced from Pacific National's freight loading manual.

Figure 3: Loading requirements for rod-in-coil product on RCOF wagons



Source: Pacific National freight loading manual (Section 5-13_07, dated 3 July 2013).

On site observations indicated that rod-in-coil product on both RCOF and RQRY wagons exhibited inconsistent gaps on the lower level, with the upper level having collapsed towards the centre of the wagon (Figure 4).

Figure 4: Loaded wagon RCOF20526B with shifted coils



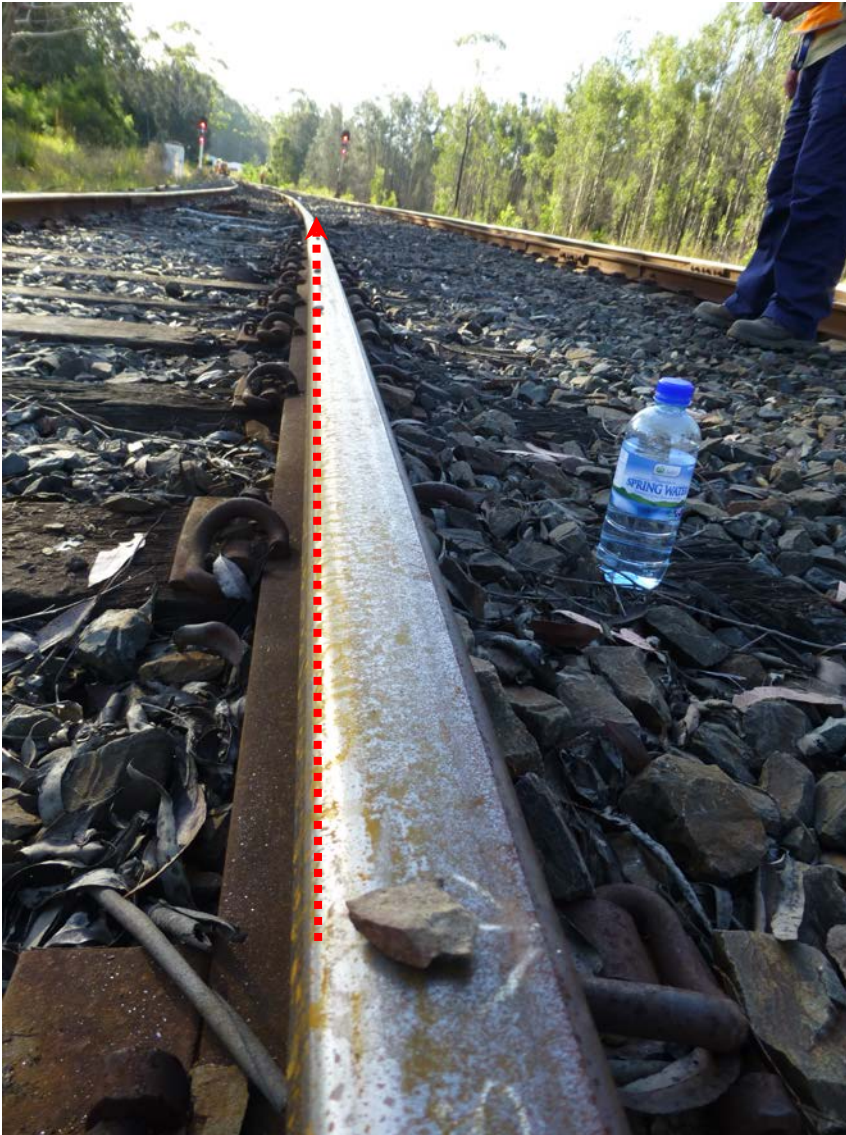
Source: ATSB.

Examination of the track post-derailment

An onsite inspection was conducted on 15 May 2014 by the ATSB investigation team, ARTC, and an officer from the Office of the National Rail Safety Regulator (ONRSR).

Evidence of flange climb was found on the high rail in a curve exit (Figure 5) at the 565.577 km point. The flange mark ran across the rail head and dropped off the field side of the high rail about 7 m further along the track. The rail did not show any signs of unusual wear.

Figure 5: Point of climb and derailment



Source: ATSB

The site was surveyed to record the track geometry on the approach and departure to the point of derailment. The measurements were recorded at 2 m intervals from 40 m on approach and 14 m on departure. The measurements were compared against the design parameters documented in the ARTC *Engineering (Track & Civil) Code of Practice, Section 5, Track Geometry (CoP)*.

It was evident from the measured track geometry that the derailment had occurred in the curve transition² where the curve superelevation³ runs-out to zero for the section of track leading to the turnout.

Track geometry parameters for curve design are largely dependent on train speed. In this case, the posted track speed was 75 km/h, though trains would rarely exceed 25 km/h due to the turnout (located about 200 m from the point of derailment). Analysis of the track measurements found that, at the point of derailment, a number of design parameters were approaching their recommended limits, especially at track speeds lower than 75 km/h. Despite this, there was no evidence of irregular track wear that can occur where trains regularly traverse track at speeds significantly lower than design.

Maintenance and inspection

The section of track at Nambucca Heads was maintained in accordance with ARTC's CoP. The manual outlined two complementary inspection and assessment types:

- scheduled inspections, and
- unscheduled inspections.

At the time of derailment, the ARTC mandated that scheduled inspections for this section of track be performed by track patrols (at intervals not exceeding 7 days, or 28 days on crossing loops), 'front-of-train inspections' (at intervals not exceeding 6 months), and the track geometry car (at intervals not exceeding 4 months, or 24 months on crossing loops). Defects identified during inspections were to be recorded, assessed, and actioned in accordance with criteria documented in the CoP.

Previous track inspections did not record any defects in the vicinity of the derailment point. The previous track geometry car inspection, conducted on 14 January 2014, had not recorded any defects that required immediate rectification.

Examination of the survey data showed some variation in superelevation, track gauge and lateral alignment. While the variations in track geometry indicated a possibility of track movement in this area, when assessed against the CoP the magnitude of the measured geometry variations had not reached levels that would have required maintenance intervention.

Post-incident repairs

The ARTC performed rectification work on the track. The work involved the replacement of sleepers beyond the point of derailment, including part of the curve on the loop line. As part of the rectification work, the track was realigned and tamped which resulted in a reduction of superelevation and removal of the minor alignment variations through the curve near the point of derailment.

Mechanism of derailment

A flange climb derailment (as was evident in this case) occurs when a wheel has climbed up and over the top of the railhead. Flange climb is likely to occur in situations where the wheel experiences high lateral forces combined with a reduction in vertical force. The ratio of lateral to vertical force is often referred to as the L/V ratio. As this ratio increases, the likelihood of flange climb (derailment) also increases.

Flange climb derailments often occur on curves or track exhibiting alignment irregularities. A moving mass will try to continue moving in a straight line unless an external force is applied. On

² Track of variable radius, usually applied between tangent track and curved track or track comprising curves of different radii.

³ The height difference, at a common location, between the running surfaces of two rails.

curved track, the external force occurs at the wheel flange/rail interface, in order to steer the wheel (and bogie) through the curve. The magnitude of lateral force is influenced by factors such as curve radius, vehicle speed, wheel/rail profiles and suspension characteristics.

As a vehicle traverses a curve, the vehicle is also subjected to overturning forces acting towards the outside of the curve. To limit the overturning forces on a vehicle, superelevation is applied whereby the outer rail is raised to a higher level than the inner rail. The magnitude of the overturning force is dependent on the radius of the curve, the amount of superelevation, and the speed of the vehicle.

In this case, train 3WB3 was negotiating a relatively tight curve at a relatively low speed. The superelevation of the left-hand curve at Nambucca Heads was high with respect to the actual speed of train 3WB3 of about 21 km/h. This would likely result in overturning forces acting towards the inside of the curve. That is, a transfer of vertical force from the wagon's right side-bearer to the left side-bearer, resulting in a corresponding unloading of the right-hand wheels. For wagons exhibiting a high centre of gravity, such as RCOF class wagons loaded with rod-in-coil product, the wheel unloading effect would be further enhanced.

At the point of derailment, wagon RCOF20375S was negotiating a curve transition. Transitions apply a twist to the track as the superelevation is ramped in or out at the entry and exit of the curve. Any variation in track superelevation under the bogies of a wagon is another factor that can contribute to wheel unloading.

It was also evident that the rod-in-coil product loaded on train 3WB3 (and most likely on wagon RCOF20375S) had collapsed (in most cases) to the left in the direction of travel. It could not be ascertained whether the load in wagon RCOF20375S had shifted prior to arriving at Nambucca Heads, or if it had dynamically shifted when passing through the curve. Regardless of when the load moved however, the effect of a load shift to the left would also transfer vertical forces from the wagon's right side-bearer to the left side-bearer, compounding the unloading of the right-hand wheels. A dynamic shift would also result in a lateral shock load, which could have added undesirable wagon dynamics and additional wheel unloading effects.

Dynamic modelling of wagon RCOF20375S

Following the derailment at Nambucca Heads, PN engaged consultants to undertake dynamic modelling of a RCOF wagon loaded with rod-in-coil product. However, the consultant noted that due to the limited data provided, a number of assumptions were required for both the vehicle and track models.

The analysis results over the measured track geometry showed that L/V ratios for the lead axles in each bogie were tending towards the criterion limit considered acceptable for stable vehicle behaviour. As expected, the L/V ratios were higher for laterally unbalanced loads than for balanced loads. The modelling also indicated that cyclic track irregularities exhibited wavelengths similar to the roll resonance of the vehicle when travelling at a speed of 23 km/h. However, the modelling did not specifically predict values high enough to suggest derailment.

The consultant suggested a need for further refinement to the model to better understand the propensity for derailment under various loading conditions.

ATSB assessment of derailment mechanism

While the dynamic modelling predicted an increase in unstable vehicle behaviour for wagon RCOF20375S when traversing the track geometry measured at Nambucca Heads, it did not specifically predict derailment. Of note however, was the analyst's statement that with further refinement of the model, the propensity for derailment under unbalanced load conditions is likely to *increase*.

As discussed previously, while the assessment of track geometry against the CoP found the variations were not of a magnitude that would have required maintenance intervention, it was

evident from the modelling that variations in track geometry had probably influenced the behaviour of wagon RCOF20375S.

The ATSB concluded that a combination of superelevation, twist and (more importantly) uneven lateral loading had combined to unload the right-hand wheels of wagon RCOF20375S, which, when steering through a left-hand curve, resulted in flange climb and derailment. Regardless of whether the rod-in-coil load shifted before or during the train's passage through Nambucca Heads, its ability to shift in relation to the wagon was an undesirable condition that likely adversely affected the wagon's dynamic behaviour.

Safety analysis

Rolling stock loading

Evidence indicated an issue with rod-in-coil load shifting while the train was en route. Closed circuit television camera (CCTV) footage from Telarah, Maitland, Wallarobba, and Dungog stations was analysed. The footage, through Maitland particularly, shows evidence of load-shift on the wagon RCOF20375S. It was also evident that this was not an isolated instance, as video evidence of other trains travelling to Brisbane showed similar movement and collapsing of rod-in-coil product into the central void (in most cases to the left in the direction of travel). Given the tendency of rod-in-coil product to move (and possibly bounce), it is very likely that the load within wagon RCOF20375S had shifted during the journey from Morandoo, or possibly as train 2WB3 travelled through Nambucca Heads.

Figure 6: Rod-in-coil product on another train



Source: ARTC

Pacific National freight loading manual

An introduction to Pacific National's freight loading manual stated 'it is essential that the load is restrained to prevent any movement in any direction relative to the wagon'. While the manual also provided specific instructions on the positioning of rod-in-coil product when loaded on RCOF and

RQRY wagons, there were no particular instructions or requirements to otherwise restrain the load and prevent it from shifting.

Following the incident, Pacific National reviewed the manual and published an update (FLM 05-13_08) dated 15 August 2014. The update added some detail as to how rod-in-coil must be loaded, but the requirements largely remained the same as the superseded version.

On 13-14 January 2015 an Office of National Rail Safety Regulator (ONRSR) audit noted that rod-in-coil product had been shifting en route – in a manner very similar to that shown in Figure 6. Accordingly, while it is almost certain that trains had been arriving in Brisbane with shifted rod-in-coil loads, there was no indication that the condition of arriving loads had been regularly reported back to Pacific National for consideration and corrective action.

During a subsequent inspection, the ONRSR observed that the wagons were loaded predominately from the left side with a fork lift. The loading did not generally conform to the freight loading manual, which required equal lateral spacing of coils on the bottom layer. This was most likely due to the loading method and lack of specific awareness of Pacific National requirements. Post-loading inspections did not detect the loading irregularity and were mainly focussing on out-of-gauge (uncontained) product or rolling stock running gear defects.

Uneven distribution of load on rail wagons can result in undesirable dynamic behaviour when traversing normal (within tolerance) track geometry. Consequently, it is essential that freight is restrained from shifting, to ensure that the load is not redistributed during its journey. In this case, it is likely that the shifted load significantly affected the lateral load distribution within the wagon, with this being enough to critically affect the vehicle handling dynamics around the curve where the derailment subsequently occurred.

Findings

From the evidence available, the following findings are made with respect to the derailment of train 3WB3 at Nambucca Heads, New South Wales, on 14 May 2014. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (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 operating environment at a specific point in time.

Contributing factors

- The derailment of wagon RCOF20375S likely occurred due to imbalance effects stemming from uncontrolled shifting of the rod-in-coil load.
- The relatively high track superelevation and twist at the point of derailment, in conjunction with some minor variations in track geometry leading up to the point of derailment, exacerbated the uneven loading and the dynamic behaviour of wagon RCOF20375S.
- **The Pacific National freight loading manual, and application of it, was ineffective at preventing load shift of rod-in-coil product. [Safety issue]**

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and 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 action, rather than to issue formal safety recommendations or safety advisory notices.

All of the directly involved parties were provided with 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.

Where relevant, safety issues and actions will be updated on the ATSB website as information comes to hand. The initial public version of these safety issues and actions are in PDF on the ATSB website.

Loading rules and procedures

Number:	RO-2014-007-SI-01
Issue owner:	Pacific National
Operation affected:	Rail: Freight
Who it affects:	All transporters of rod-in-coil product

Safety issue description:

The Pacific National freight loading manual, and application of it, was ineffective at preventing load shift with rod-in-coil product.

Proactive safety action taken by Pacific National

Action number: RO-2014-007-NSA-019

Pacific National advised of the following actions:

Pacific National (PN) Assets and Infrastructure Services has engaged a consultant to conduct an audit of PN procedures and operational processes relating to the development and implementation of the Freight Loading Manual (FLM), specifically performing a gap analysis in relation to current steel loading processes. The key focus of this project will be processes relating to steel services within and ex-Newcastle (Morandoo terminal) which will provide a good overview of the application of the FLM across all major loading locations.

The scope of the project will include the interfaces and processes between Customers, the Freight Loading Manual (Engineering) itself and the PN Operations group. The following specifics will be within phase one of the project:

- A study of the steel loading processes for Morandoo only in the first instance
- A review of the Freight Loading Manuals (FLMs) and guidelines
- An Inspection regime post-loading – how we ensure compliance against the FLMs if work is undertaken by a third party
- Development of a load assessment tool, and
- Identification of any recommendations.

It is proposed that the scope of work should be completed within a period of 20 days, finalised with a report comprising observations, findings and recommendations for improvement of the processes and interfaces relating to the Freight Loading Manual

In addition, PN will be arranging an external engineering group to undertake a twist test and/or computer simulation modelling of an RCOF wagon to record its wheel loading performance characteristics during scenarios based on the data. The final report will contain recommendations that can be utilised to further refine our Freight Loading Manual and associated procedures and loading practices. This work is scheduled to commence in May 2015.

Pacific National have further advised improvements in the loading system, such as:

- Revised interface agreement
- Quality control pre departure
- Revised despatch process
- Pre departure inspections and training
- Load fault handling, and
- Further promotion of the freight loading manual including updates.

ATSB comment in response

The ATSB acknowledges that Pacific National has initiated a review of their Freight Loading Manual and has taken action to ensure freight is loaded in accordance with established procedures prior to departure.

However, the ATSB draws attention to a fundamental requirement of freight loading, in that it is essential that the load is prevented from moving in any direction relative to the wagon, as a shifting load at any point during transit is an undesirable condition that can affect the dynamic behaviour and safety of the vehicle. While Pacific National’s action serves to ensure freight is loaded in accordance with the Freight Loading Manual upon commencement of its journey, no action has been proposed to specifically address the demonstrated potential for shifting and movement of the rod-in-coil product while in-transit. Accordingly therefore, the ATSB issues the following safety recommendation.

ATSB safety recommendation to Pacific National

Action number: RO-2014-007-SR-01

Action status: Monitor

The Australian Transport Safety Bureau recommends that Pacific National undertake further work to address the possibility that rod-in-coil product could shift during transit, thereby creating an undesirable condition that could affect the dynamic behaviour of the vehicle.

Current status of the safety issue

Issue status: Safety action pending

Justification: At the time of this report release, the safety actions advised by Pacific National had not yet been fully implemented.

General details

Occurrence details

Date and time:	14 May 2014 – 1404 EST	
Occurrence category:	Accident	
Primary occurrence type:	Derailment	
Location:	Nambucca Heads, New South Wales	
	Latitude: 30° 37.48' S	Longitude: 152° 58.69' E

Train details

Train operator:	Pacific National	
Registration:	3WB3	
Type of operation:	Freight	
Persons on board:	Crew – 2	Passengers – nil
Injuries:	Crew – nil	Passengers – nil
Damage:	Substantial	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Australian Rail Track Corporation Engineering (Track and Civil) Code of Practice, Section 5 – Track Geometry
- Pacific National Freight Loading Manual

Submissions

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

A draft of this report was provided to Pacific National, the Office of National Rail Safety Regulation, and the Australian Rail Track Corporation.

Submissions were received from Pacific National, the Office of National Rail Safety Regulation, and the Australian Rail Track Corporation. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

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; 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 operations involving the travelling public.

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 identify and reduce safety-related risk. ATSB investigations determine and communicate the 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.

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 initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

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Investigation

ATSB Transport Safety Report Rail Occurrence Investigation

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