Worldwide FI
Summary

September 2012

This is a collation of some of the world’s railway formal inquiry reports. It includes a brief incident synopsis, along with the main causes and recommendations from each investigation.

Readers may find some of the actions and recommendations useful to their own operations.

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Key issues in this edition:

- Dangerous goods
- Track testing – fallibility of ultrasonic testing
- Operating notices
- Wide and out-of-gauge loads
- Database accuracy
- Stacking distance
- Road profile: vehicle profile
- Road traffic levels
- Weather (and weather monitoring)
- Staff policy, procedure and training
- Wagon maintenance
- Track maintenance
- Crossing user behaviour
- Risk assessment
- Staff road vehicle use
- OHL installation and inspection
- Time pressures
For the full report, click here: [LINK](#).

At around 09:35 (local time) on 21 October 2011, seven wagons of a Canadian National (CN) freight derailed near Alix Junction, Alberta. The derailed wagons were carrying containers loaded with a variety of products, including phosphoric acid, around 900 litres of which were released. There was also damage to 470 feet of track.

There were no reported injuries.

The investigation undertaken by the Transportation Safety Board of Canada (TSBC) found that neither the condition of the rolling stock nor the manner in which the train was driven contributed to the accident. Focus then fell on the condition of the rail.

The 1950s and 1960s vintage rail in the area of the derailment did not exceed CN's wear life specifications, despite having been in service for over 45 years. The rail had been ultrasonically tested on a regular basis. Recently, this testing had been occurring at an increased frequency. Despite this increased testing, the transverse detail defect at the initial point of derailment had not been detected.

From rail pieces at the derailment site, a number of rail sections showed head checking and shelling in the central region of the running surface. Ultrasonic rail testing can be unreliable when the rail surface condition is poor or contaminated. In these situations, the ultrasonic signal may not adequately penetrate the rail surface, resulting in the masking of any developing internal rail defects, increasing the risk from a broken rail derailment. TSBC concluded that, despite advances in ultrasonic testing technology, the timely detection of all internal rail defects continues to be problematic.

CN addresses rail fatigue by increasing the frequency of its rail testing programme and by closely monitoring the numbers and types of defects detected. In addition, major rail relay programmes are used to replace rail that is close to its fatigue life. In the previous four years on the section around Alix Junction, the rail maintenance programmes had focused on removing older rail. At the time of the accident, approximately 4.25 miles of vintage rail remained in place. The TSBC noted that, while it remains, ‘the number of rail fatigue defects will continue to increase, resulting in an increased risk of [sic] rail failure.’

**Safety action**

The revised *Rules Respecting Track Safety*, which came into effect on 25 May 2012, significantly increased the mandatory requirement for rail flaw testing and includes a requirement and mitigation for ‘Missed Segments of Rail Flaw Inspection’:

**Section 5.8 – Missed Segment of Rail Flaw Inspection**

- **If the operator assigned to operate the rail defect detection equipment determines that, due to rail surface condition and or other reasons, a valid search for internal defects could not be made over a particular length of track, the test on that particular length of track cannot be considered as a search for internal defects under this section.**

- **If a valid search for internal defects cannot be conducted for reasons described in (a), the railway company must, before the expiration of time or tonnage limits:**
  - Conduct a valid search for internal defects, or
  - Reduce class of track to bring the track into compliance until such time as a valid search for internal defects can be made, or
CN continues to work closely with its rail flaw detection suppliers to improve rail testing protocols and procedures.

Declared to ERA 10 September

Czech Republic: Collision between freight train and obstacle at Hradčany station, 22 November 2011

At 23:15 (local time) on 22 November 2011, a freight train carrying a special 'excessive' load collided with the edge of the platform at Hradčany station. There were no reported injuries.

The investigation found the direct cause to be that there had been no prior announcement about the 'excessive' load. Furthermore, the size of the gap between train and platform at Hradčany – insufficient for a load of this type – was not included in the infrastructure manager’s ‘database of obstacles’ and had been repeatedly missed during checks.

Recommendations

- The infrastructure manager should compare the obstacles in the database and compare them with reality.
- The infrastructure manager should also establish a means to keep the database up-to-date and accurate in light of the above.

New Zealand: Collision between freight train and bus at Beach Road level crossing, Paekakariki, 31 October 2011

For the full report, click here: [LINK](#)

At 22:29 (local time) on Monday 31 October 2011, a 'super-low-floor' bus crossed Beach Road level crossing at Paekakariki and stopped at the road intersection with State Highway 1, where it became stuck. There were three sets of tracks at the crossing; the bus encroached on two of them.

There were six passengers plus the driver on board. The driver tried various methods to free the bus but did not succeed. After about five minutes, a freight train approached the level crossing at about 70 km/h and collided with the rear of the vehicle. The driver and passengers had seen the train approaching and managed to vacate the bus moments before the collision. The train driver was the only person on board the train. There were no reported injuries, although the bus was extensively damaged. The train sustained minor damage and did not derail.

Had the bus not become stuck, it could have pulled forward far enough to just clear the train on the main line when stopped at the stop sign, but there was not sufficient 'stacking distance'1 available to ensure it was clear of the third set of tracks. The Transport Accident Investigation Commission (TAIC) found that the bus complied with road vehicle standards, but that the profile of the level crossing and short section of road leading up to the road intersection was not compatible with long and low road vehicles, as required by NZ Transport Agency Rules.

The TAIC listed the following key lessons:

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1 The distance between a road intersection and a level crossing.
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- Changes to rules and standards for road transport can compromise safety at rail level crossings. Groups responsible for setting standards for road vehicles and rail level crossings should therefore consider the consequences for other users before making those changes; and

- Drivers of long road vehicles need to know if there is insufficient room for their vehicles between a road intersection and a rail level crossing.

As a consequence of the collision, the bus operator has included the emergency telephone number for the National Train Control Centre in its vehicle operating plan, and has advised other bus operators of this safety action through an industry magazine.

Recommendations

- The NZ Transport Agency should advise other operators of large road vehicles to furnish their drivers with the National Train Control Centre emergency telephone number, so that they can alert the train controller in any similar situation.

- The Land Transport Safety Authority (LTSA) should liaise with Transit New Zealand, Tranz Rail and the appropriate local authorities to initiate a review to define all public level crossings where the stacking distance for long road vehicles was insufficient to ensure safe entry to or exit from the crossings, and to ensure that appropriate action was taken, consistent with the frequency of use and the potential consequences of collision.

  After this recommendation was first made in 1996, the LTSA set up a Land Transport Safety Authority Level Crossing Forum, which met for the first time on 22 August 2002. 'All those attending the Forum considered it very useful, with a variety of issues, including stacking distances being discussed.' However, since the 2008 merger of the Land Transport Safety Authority (initial rail regulatory body) and Transit New Zealand (road transport funding agency), the opportunity for communication issues to arise between the rail and road regulatory divisions has somewhat diminished.

- The NZ Transport Agency should address the compatibility of super-low-floor buses with Beach Road level crossing’s profile. The profile (specifically the rate of change in gradient) of the Beach Road level crossing has been formed in such a way that those super-low-floor buses like the one involved in the accident (or of similar design) are at risk of becoming stuck with their back ends foul of the line when they stop, as they are required to, at the stop sign before turning right to State Highway 1. In other words the same or a similar accident could happen again.

  In response, the NZ Transport Agency has erected a surveillance camera on-site and is currently monitoring the usage of the crossing by heavy vehicles, driver behaviour and the number of incidents caused by road profiling and/or stacking distances. The design and profiling of the level crossing have also been assessed. As a result, remedial work covering re-profiling the intersection and redesign of the splitter island to create room for a large vehicle to make a left turn in the situation when a right turn is not possible is under way. Works are expected to be completed by 16 May 2012. Aspects of the bus design have also been considered, it having been found that the ground clearance of the incident bus did not comply with standards.

- The NZ Transport Agency should address the stacking distance between Beach Road level crossing and State Highway 1. The distance between the compulsory stop line and the rail corridor at Beach Road level crossing is 10.5 metres. The incident bus was 12.6 metres long. Many other buses and various configurations of lorries are longer than 10.5 metres, which means that when one of them stops at the stop sign (as required), the back of the vehicle will foul the line. Technically, any such vehicles intending to turn right to State Highway 1 cannot comply with the road rules when using Beach Road crossing. Additionally, there is no signage at the crossing to warn drivers of long vehicles that there is only a 10.5-metre stacking distance.

  NZ Transport Agency has acknowledged the stacking distance issue, but notes that a solution is problematic. Restriction of turning movements out of Beach Road is not favoured by the Kapiti Coast District Council. However, the prohibition of right turns out of Hill Road would simplify
movements at the intersection and might aid right turns out of Beach Road. This option will be investigated further. Installation of traffic signals is a high-cost option requiring land acquisition. Although favoured by the Kapiti Road District Council, it has the potential to impose significant delays on the State Highway resulting in queuing and the potential to increase the collision risk. The current crash record at the intersection is low and it is likely that this option would increase it. Further to the above, the NZ Transport Agency has been advised by the Greater Wellington Regional Council that it is considering the mandating of shorter buses at the Beach Road crossing.

- The NZ Transport Agency should take 264 other public level crossings where there are similar stacking distance issues for long vehicles into account.

KiwiRail has advised that there are now 252 level crossings with less than 23 metres distance between the centreline of the nearest railway line and the continuity/edge line at an adjacent intersection where road traffic from the railway does not have right of way. There are nine crossings that had two or more collisions. Of these five had alarm upgrades during this period and there have been no further collisions. This matter is subject to further discussion between KiwiRail and NZ Transport Agency.

### Published 19 September

**Australia: Derailment of a freight train near Katherine, NT, 27 December 2011**

For the full report, click here: [LINK](#)

At around 05:42 (local time) on 27 December 2011, a Genesees & Wyoming Australia (GWA) freight train derailed at the Edith River rail bridge near Katherine in the Northern Territory. The driver was unhurt, but the co-driver suffered back injuries. There was significant damage to the bridge and rolling stock, a number of wagons falling into the water.

The Australian Transport Safety Board (ATSB) determined that the derailment was caused by the wash-away of the south-eastern embankment, associated sub-grade and ballast on the approach side of the Edith River rail bridge. The magnitude of the wash-away meant that the track could not support the weight of the train. The wash-away was the result of a severe flood event caused by torrential rains that fell within the Edith River catchment area in the aftermath of cyclone ‘Grant’. The ATBS also list the following contributory factors:

- GWA did not have systems in place to adequately monitor the level of the Edith River, although near real-time river height information was available from the Bureau of Meteorology;
- GWA did not re-check track or infrastructure integrity, including flood risk, prior to the dispatch of the train from Katherine on 27 December 2011;
- GWA policies, procedures and training had little if any guidance for employees or contractors with respect to quantifying the duration, consequential dangers and responses to severe weather events;
- The warning systems in place to alert GWA staff as to the severity of a flood event at the Edith River Rail Bridge were ineffective; and
- Without pre-warning of the flood event at the Edith River, the train driver assumed that the line from Katherine to Darwin was safe for the passage of the train.
Recommendations

- GWA should improve its policies, procedures and training, which had little if any guidance for employees quantifying the duration, consequential dangers and responses to severe weather events.
- GWA should improve the warning systems it has in place to alert GWA staff as to the severity of a flood event.

As a result of the derailment, GWA has undertaken a range of actions to enhance its policies, procedures and employee training with respect to managing the risks associated with severe weather events. GWA will also enhance its systems for alerting staff to severe weather events, including flood risks.

Published 19 September

UK: Derailment at Bordesley Junction, Birmingham, 26 August 2011

For the full report, click here: [LINK](#)

At around 00:44 on 26 August 2011, the rear four PHA wagons of an empty aggregates train derailed and re-railed at 11 mph on a crossover near Bordesley Junction.

During the derailment, another freight was approaching on the adjacent line. This train stopped when its driver saw the signal for the junction change from green to red in front of him. He could also see clouds of dust from the rear of the train coming towards him. The two trains stopped alongside each other. Neither driver was injured.

The rear four wagons which ran derailed suffered damage to their suspension and brake equipment. There was also extensive damage to the track and signalling equipment at the junction.

RAIB found the immediate cause to be that the leading right-hand wheel flange on one of the wagons climbed the rail head and derailed to the right. This was due to a combination of factors related to the wagon’s suspension and the track geometry at Bordesley Junction. RAIB also listed the following causal factors:

- The suspension of the trailing left-hand wheel on the wagon probably became locked-up when it passed over track geometry that increased the dynamic load on it (which then reduced the load on the leading right-hand wheel at the point of derailment).
- The maintenance process for the wagon’s suspension did not detect and rectify the worn suspension components on the trailing left-hand corner.
- No changes had been made to the suspension on the wagon, or the way in which it was operated or maintained, following testing in 2009 which showed that the suspension on PHA wagons was prone to locking-up.
  - Modifications that had been shown to reduce the frequency of lock-ups had not been made to the wagon’s suspension.
  - Neither Lafarge nor Network Rail assessed the risk from continuing to operate the PHA wagon fleet while the work to develop, test and implement the modifications was outstanding.
  - Network Rail had identified new maintenance checks for suspension component wear, but these had not been mandated before the wagon’s last maintenance examination.
- A three-metre track twist more severe than 1 in 200 reduced the load on the wagon’s leading right-hand wheel, causing the flange to climb onto the rail head. Although trains were permitted to operate over track with this degree of track twist, the derailment is unlikely to have occurred in its absence.
The track twists in the vicinity of the point of derailment had been present for a long time. Network Rail staff had attended to them six times during 2011, but carried out work in the wrong place.

The track twists at Bordesley Junction were identified as repeat track geometry faults but no action was taken to investigate why these faults were recurring.

The track on the Down Main (Bordesley) close to the junction was not tamped as planned during overnight work on 21 and 22 August 2011.

The track twists on the Down Main (Bordesley) line had formed due to the deteriorating condition of the formation.

Particular features of the track at Bordesley Junction also increased the likelihood of the leading right-hand wheel flange climbing, such as the track curving to the left, the dynamic cant being more than the designed cant, side wear on the right-hand running rail that changed the contact angle between the wheel flange and rail, and dry rails giving a higher level of friction between the wheel flange and rail.

RAIB also listed the following underlying factor:

Once the PHA wagons were known to have a suspension that was much more prone to locking-up than expected, no organisation took overall ownership of the resolution of the problem.

Recommendations

Network Rail through its Network Certification Body should review its own processes to make sure that the risks of continuing to operate a fleet of wagons are managed once a fleet wide problem is discovered. The review should consider including processes for:

- Assessing the risk of continued operations and identifying the need for any immediate measures that need to be taken to control the risk;
- Identifying the long term measures that need to be taken to resolve the fleet wide problem; and assigning responsibilities, priorities and timescales for implementing and managing both the immediate and long term measures.

Once the review has identified what reasonable improvements can be made to the processes, the Network Certification Body should implement them.

Network Rail through its Network Certification Body, and in conjunction with Lafarge Aggregates Ltd and Wabtec Rail Limited, should lead a fundamental review of how the suspension of the PHA wagon is maintained. The review should call upon relevant technical expertise to:

- Look at how the suspension works as a whole and understand the role that each individual component performs; and
- Use this knowledge to document the actions for maintaining a fully functioning suspension, which may include monitoring, measuring and setting limits for the permitted overall amount of wear in the suspension and also individual component wear, including specific actions and limits set to account for those components that are not fully visible when the wheelset is in place.

Once the review has decided what actions it is reasonable to take, they should be implemented in the maintenance plans for the PHA wagon fleet.

Lafarge Aggregates Ltd should, with reference to POCL 651, implement suspension modifications to its fleet of PHA wagons as soon as practicable to reduce the likelihood of suspension lock-ups.

Network Rail should review and implement changes to its processes for briefing staff responsible for controlling the work carried out by on-track machines, so that their briefings will include information on whether any part of the work should be given priority over another and the reasons for such prioritisation.
UK: Collision between a train and a road vehicle at Llanboidy automatic half-barrier crossing, 19 December 2011

At 09:44 on Monday 19 December 2011, a Milford Haven–Manchester Piccadilly service struck a lorry and trailer loaded with straw bales on Llanboidy automatic half-barrier (AHB) crossing, near Whitland in South Wales.

The impact between the train and the lorry caused the latter to be separated from its trailer and pushed along the track by the train. The lorry driver left his cab prior to the impact, but was struck by the trailer and slightly injured during the collision.

The lorry had stopped on the crossing when the barriers lowered for the approaching train. The train driver saw the lorry when the train was 270 metres away and travelling at 68 mph. The train driver applied the emergency brake, but the unit was unable to stop before reaching the crossing. The train was not derailed but 27 passengers were injured in the collision, one seriously; four received treatment in hospital before being discharged later the same day. The conductor and the catering host received minor injuries and were treated in hospital; the driver suffered shock.

RAIB found the immediate cause of the accident to be that the lorry driver stopped his vehicle on the crossing when the barriers descended for the passage of the train.

The following factors were deemed to be causal:

- The lorry driver did not telephone the signaller to get permission for the lorry and trailer to cross the railway; and
- The lorry driver was encouraged to take a line towards the right of the road because:
  - The road over the crossing did not align with the rest of the road
  - The nearside wig-wag traffic light signal was wrongly positioned, resulting in it being placed too far out into the road; and
  - The contractors working on the line nearby had parked two of their vehicles close to the crossing, partly obstructing the exit.

The following were also factors:

- The Network Rail risk assessment procedure (ALCRM) does not include consideration of misalignment of the road and crossing;
- The ORR guidance on level crossings does not give advice on how to deal with cases where there is misalignment between the road and the crossing and;
- Network Rail did not brief their staff and contractors on where to park when visiting level crossings and the level crossing risk management toolkit did not include this as mitigation to the risk of crossing visitors parking nearby.

RAIB has observed that:

- The risk from detachment of the GRP cab surround from the steel structure during a collision was not recognised during the certification of Class 175; and
- One of the coupler lateral bump stops became detached during the collision.
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### Recommendations

- Network Rail should develop an alternative arrangement for Llanboidy level crossing to reduce the apparent misalignment of the road over the crossing relative to the approaches and to bring the road markings and positioning of equipment including road traffic signals into compliance with current traffic signs regulations. Having developed a suitable design, Network Rail should propose to the ORR a revision of the Llanboidy level crossing order accordingly.

- ORR should revise Railway Safety Publication 7 Level crossings: *A guide for managers, designers and operators* to provide:
  - Guidance on how to assess the misalignment between the centreline of the road over the crossing and the road approaches and how to mitigate its effects; and
  - Guidance supplementing the existing requirement for a 3 m minimum gap between barrier tip and road edge to ensure consideration of the actual vehicle exit path taking into account the largest vehicle permitted to use the crossing without telephoning the signaller.

- Network Rail should revise its risk management process for level crossings to take account of risks arising from the misalignment of the road over the crossing relative to the rest of the road.

- Network Rail should provide guidance to its staff and contractors on where to park their vehicles when working on or around level crossings where there is potential for such vehicles to block the access and egress from the crossing.

- Angel Trains should investigate and, where appropriate implement, means of mitigating the risk to cab occupants from detachment of the cab GRP panels in class 175 units during a collision.

- Alstom and Angel Trains should assess the safety risks of the existing design of the coupler lateral bump stop mounting. Where it is reasonably practicable to reduce the risk of a bump stop detaching and derailing the train, then these improvements should be implemented.

### Published 27 September

**UK: Collapse of the overhead line near Jewellery Quarter tram stop, Midland Metro, 20 April 2011**

For the full report click here: [LINK](#)

At 13:25 on 20 April 2011, Midland Metro Tram No. 13, the 13:05 from Wednesbury Parkway to Birmingham Snow Hill, struck a cantilever forming part of the overhead line equipment (OLE) whilst approaching the Jewellery Quarter tram stop. The cantilever had become partially detached from its supporting pole prior to the arrival of the tram.

The striking of the cantilever caused severe damage to the tram’s pantograph and led to a progressive collapse of the OLE for about 200 metres. This caused further cantilevers to become partially or fully detached from their poles and to be struck by the tram, causing damage to its front and rear windscreens, side windows in the driver’s cab and passenger saloon and to the tram’s doors. The driver bought the tram to a stand at Jewellery Quarter, where the passengers were able to alight. Of the two crew members and approximately twenty passengers, three adult and three child passengers suffered injuries which required hospital treatment.

Following the accident, the tramway remained closed for repairs between the Jewellery Quarter and Soho Benson Road tram stops until 24 April 2011, when a limited service resumed. The tramway reopened for normal service on 28 April 2011.

RAIB found the immediate cause of the accident to be the collapse of the overhead line caused by Tram 13 striking the partially detached cantilever. It also listed the following causal factors:

- The cantilever became partially detached because the reducing sleeve was overloaded and fractured. This overloading was a consequence of:
The cantilever becoming momentarily restrained at some point along its length, thus creating a pivot; and either
- The introduction of an abnormal load resulting from the severing of the outer of the two Wolverhampton in-running Parafil ropes (the most likely causal factor); or
- The action of operating loads within the OLE (the less likely causal factor).

Possible factors per RAIB:
- The bracket foot assembly becoming restrained to some degree from rotating around the pole bracket pin and thereby contributing to the restraint of the cantilever;
- The expansion of the contact wire due to ambient temperature;
- The deflection of the cantilever during installation or modification so that it was not perpendicular to the centre line of the track; and
- A reduced mechanical clearance between the tie ropes at 18432 pole and the Wolverhampton in-running Parafil ropes.

Possible underlying factors per RAIB:
- The lack of information available to VolkerRail Power staff regarding the correct installation of cantilevers;
- During safety validation of the proposed OLE modification programme, the potential for the remounting of the parallel feeder wires to result in a loss of restraint of the cantilever was not considered;
- Due to work being completed under time pressure and owing to an incomplete inspection, a reduced mechanical clearance was introduced at pole 18432 and then not discovered before the network was returned to service; and
- The regular OLE inspections undertaken following the modification in October 2010 were not able to detect a potential loss of mechanical clearance at 18432 pole.

Recommendations
- National Express Midland Metro should determine the minimum mechanical clearance necessary around tensioned components within the OLE system to prevent contact that may damage them. It should introduce controls to prevent smaller clearances than this minimum from either being introduced into the system or developing during operational service and not being detected.
- National Express Midland Metro should ensure that staff within its organisation that hold responsibility for supervising work on the OLE and/or for passing it as being fit for service have access to the information needed for them to confirm its correct installation and configuration. This information should be up-to-date and accurate and would typically include items such as manuals, drawings or other supporting documents. This information should be made available to any third-parties undertaking similar duties.
- National Express Midland Metro should determine how the operating loads within the OLE are able to cause the type of deformation observed in the twin track bracket arm assembly at 18512 pole in July 2011. It should identify and implement appropriate measures to remove the causes of this deformation.
- National Express Midland Metro should inspect the tensioned section of the OLE to ensure that there is clearance between the clevises of OLE pole brackets and the clevis covers of bracket foot assemblies sufficient to allow these assemblies to rotate freely around pole bracket pins. Any inadequate clearances identified should be rectified.
- National Express Midland Metro should identify those OLE components which may affect the safe operation of the tramway. It should review the current processes and practices intended to control...
changes to these components and implement any actions required to ensure that effective change control is exercised in the future.

The following recommendations are linked solely to additional observations:

- National Express Midland Metro should assess what, if any, risks would be created by a driver becoming incapacitated during an incident. It should identify and implement appropriate measures to manage any identified risks, such as additional training for CSRs.

- National Express Midland Metro should review the current mandatory competences held by drivers and CSRs in order to identify those which are essential to the safe operation of the Midland Metro. It should identify and implement appropriate measures to ensure that all such competences are maintained.