



# ASSOCIATION OF TOURIST & HERITAGE RAIL AUSTRALIA

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## ATHRA ALERT #30 – April 2007

### Derailments – How the Various Factors can Line Up

Two overseas reports into derailments on 381mm (15 inch) gauge railways demonstrate how the track and vehicle factors can combine together to result in an incident. The report on derailments on the Driving Creek Railway in New Zealand can be obtained from the Transport Accident Investigation Commission NZ website using the link: <http://www.taic.org.nz/rail/05-109.pdf>. The report on derailments on the UK based Ravenglass & Eskdale Railway can be obtained from the Rail Accident Investigation Branch UK website: [http://www.raib.gov.uk/cms\\_resources/20070327\\_R072007\\_RER.pdf](http://www.raib.gov.uk/cms_resources/20070327_R072007_RER.pdf). Both reports are recommended reading for track and vehicle maintenance personnel.

**Driving Creek Railway:** - A series of three derailments were investigated. Bogie control issues when combined with twist in the track contributed to the sequence of events leading to the first derailment. The over-steer in the bogie axles resulted in excessive flange pressure on the low leg of the curve, exacerbating the track deficiencies. The second derailment was due to a bogie fault and the third was due the failure of an undersized and corroded fishplate. The third derailment was exacerbated by poor sleeper placement at the joint; placing additional stress on the fishplate.

**Ravenglass & Eskdale Railway** – The first derailment involved a carriage of a locomotive hauled train and it occurred on the exit of a curve. The restricted movement of a leading axle box in combination with a void or a “hole” beneath the track resulted in a derailment. The restricted movement was due to insufficient clearances between the axle box and the bogie horn guide in which it slid. In the second derailment, rough track in the form of voiding, alignment and cant (twist) problems were sufficient to cause excessive sway in a carriage of a locomotive hauled train. The bogie suspension arrangement reduced the leading bogie’s tolerance to degraded track features and caused excessive wheel unloading when the carriage was empty. The contributory factor which led to this was a previous suspension modification to improve ride quality that had removed the flexibility between the bogie frame and wheelset in the unloading direction.

**Track factors** involved were:

- The failure of old track materials; the deterioration of which had not been identified because of inadequate inspections and maintenance.
- Poor track laying practices related to the location of sleepers relative to joints.
- Lack of timely remedial action to known rough track conditions where there was sufficient voiding, alignment and cant (twist) problems to cause excessive vehicle sway.
- A system for reporting track faults had not been mandated.
- Urgency of repairs had not been conveyed to track maintenance staff.
- No temporary speed restrictions where the track was known to be poor.

**Mechanical factors** involved were:

- Bogie design deficiencies (Vehicles had been specially built for the railway).
- Suspension modification to improve ride quality, had removed the flexibility between the bogie frame and wheelset in the unloading direction.
- The sensitivity of some rollingstock to sway at higher speeds was not recognised.
- No specific requirement to check the clearances of axleboxes in their horn guides, or lubricate this interface, during periodic maintenance.

***Key Message***

Although these derailments occurred on less than 600mm gauge railways; track and mechanical factors can combine together when vehicle and track characteristics or principles are not fully understood by those carrying out construction, modifications or maintenance on a railway of any gauge with the potential result of a higher risk of a derailment.

***Recommended Actions:***

- Make the reports available to your vehicle and track maintenance crews.
- Ensure the relevant factors are considered in your risk analyses.
- Track inspection personnel are aware that excessive twist in track that can lead to a derailment.
- Vehicle maintenance personnel are aware of maintenance issues and when modifications are undertaken to vehicles that the ride characteristics are not degraded.
- Facilitate good leadership to ensure that there is good quality communication between your maintenance teams and awareness of the risks to enable appropriate decision making.