



Formal Inquiries

Inquiry process ●

Inquiry announcements ●

Inquiry Recommendations ●

Summary of reports ●

Rail Accident Investigation Branch ●

Back to main menu >>

Formal Inquiries

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Aberystwyth report and recommendations

Rail Safety and Standards Board has issued its formal inquiry report into the circumstances that led to the derailment of a train at Aberystwyth on 12 May 2003.

The formal inquiry was convened under independent chairmanship and included representatives on the panel from the involved parties. As with all such inquiries the panel's task was to establish the immediate and underlying causes of the accident and make recommendations to prevent or reduce the risk of recurrence.

Sequence of events

After arriving in Aberystwyth at 1720hrs as 1J23 the 1534hrs Birmingham New Street-Aberystwyth, the Class 158 unit departed from the platform at Aberystwyth on time as 1G87 the 1734hrs Aberystwyth-Birmingham New Street. Almost immediately and before the train had cleared the platform, the leading end of a broken final drive shaft impacted the front stretcher bar of a facing set of points. This caused the left hand point blade tip to be bent inwards, the right hand one already being locked open. The derailment of three rearmost axles of the train resulted.

The driver applied the emergency brake to bring the unit to a halt, ascertained that the guard was not incapacitated and informed the on-duty signalman at Machynlleth of the accident by radio electronic token block radio and platform telephone. Passengers were de-trained back on to the platform under the supervision of Wales & Borders trains and Network rail Great Western Zone production staff and taken to Machynlleth by bus. A track blockage was subsequently set up in conjunction with the signal box.

Conclusions

The immediate causes of the derailment were:

The leading end of cardan shaft 'C' connecting the two final drives on the leading bogie of vehicle 52837 and which had become detached at the slave drive end, striking the front stretcher bar connecting the tips of points of number 2 ground frame. This action bent the left hand tip inwards by several inches (the right blade being held open by the facing point lock.) The trailing wheelset of the leading bogie and both wheelsets of the rearmost bogie passed through the resulting gaps and derailed.

Some underlying causes of the derailment were:

- The fatigue failure of the raceway of a pinion shaft bearing the slave final drive box
- The failure of the oil analysis regime to detect the commencement of this failure in the sample of 6 May.
- The possibility that the bearings on the pinion shaft assembly had been pre-loaded radially when the drive was overhauled in October 2002 and the omission of the specified check 24 hours after assembly to verify that this was not the case.
- The propagation of this failure to other bearings on the shaft, eventually resulting in the complete destruction of the whole pinion shaft bearing assembly, allowing the shaft to droop, causing the universal joint at the slave drive end to run at an excessive angle, ultimately leading to its failure.
- The successive failure of both safety hoops around the cardan



shaft causing it to come to rest on the anti-roll bar, such that its free end was about 23mm below rail level.

- An absence of any report of unusual noise or vibration in the unit during the incoming journey to Aberystwyth, which could have led to the problem being identified, being drawn to the train crews attention before departure from Aberystwyth.

Recommendations

The report makes recommendations for improvements in a number of key areas and these are summarised as follows:

Carry out a full product and process audit of the Gmeinder final drive overhaul facility at Crewe.

The design of the safety hoop for the cardan shaft on Class 158 vehicles and other DMU vehicles with a similar arrangements should be improved.

Review of the current oil sampling regime.

Where practical, overhauled Gmeinder final drives should be filled with the corresponding oil to that used on the maintenance depot.

Encourage train staff to be alert for unusual noises and if in doubt, draw these to the attention of the conductor or driver.

Review the purpose, performance and management of the SMIS and USRDD database systems.

Rail Safety and Standards Board has issued a full copy of the report to each member of the Railway Group and the other organisations involved in the accident. All recipients of the report need to review the findings and recommendations and take actions where appropriate to address identified deficiencies within their own systems. Rail Safety and Standards Board will track the industry's response to this report.