



Rail Accident Investigation Branch

Rail Accident Report



Container doors hit passenger trains, Penrith Station and Eden Valley Loop, Cumbria 4 July 2009

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.

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Any enquiries about this publication should be sent to:

| | |
|-------------|---|
| RAIB | Email: enquiries@raib.gov.uk |
| The Wharf | Telephone: 01332 253300 |
| Stores Road | Fax: 01332 253301 |
| Derby UK | Website: www.raib.gov.uk |
| DE21 4BA | |

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Summary

- 1 On 4 July 2009 train 4M16 was travelling from Scotland¹ to Daventry, when two freight container doors came open, probably as a result of criminal action. They struck three passenger trains on the West Coast Main Line, a TransPennine Express class 185 at 16:02 hrs as train 4M16 passed through Penrith station, a Virgin Trains class 390 Pendolino at 16:18 hrs and a Virgin Trains class 221 Super Voyager at 16:27 hrs, both while train 4M16 was stationary at Eden Valley loop.
- 2 There were no casualties as a result of the collisions; however the container doors and the passenger trains were all damaged (Figures 2, 3, 4 and 5).

Locations of the incidents

- 3 The West Coast Main Line consists of two tracks at the locations of the collisions, with the *up* direction being towards London, and the *down* towards Carlisle. Railway distances are measured from Lancaster; Penrith, the first station south of Carlisle, is 51 miles from Lancaster and the Eden Valley Loop is 3 miles further south, at 48 miles (Figure 1).

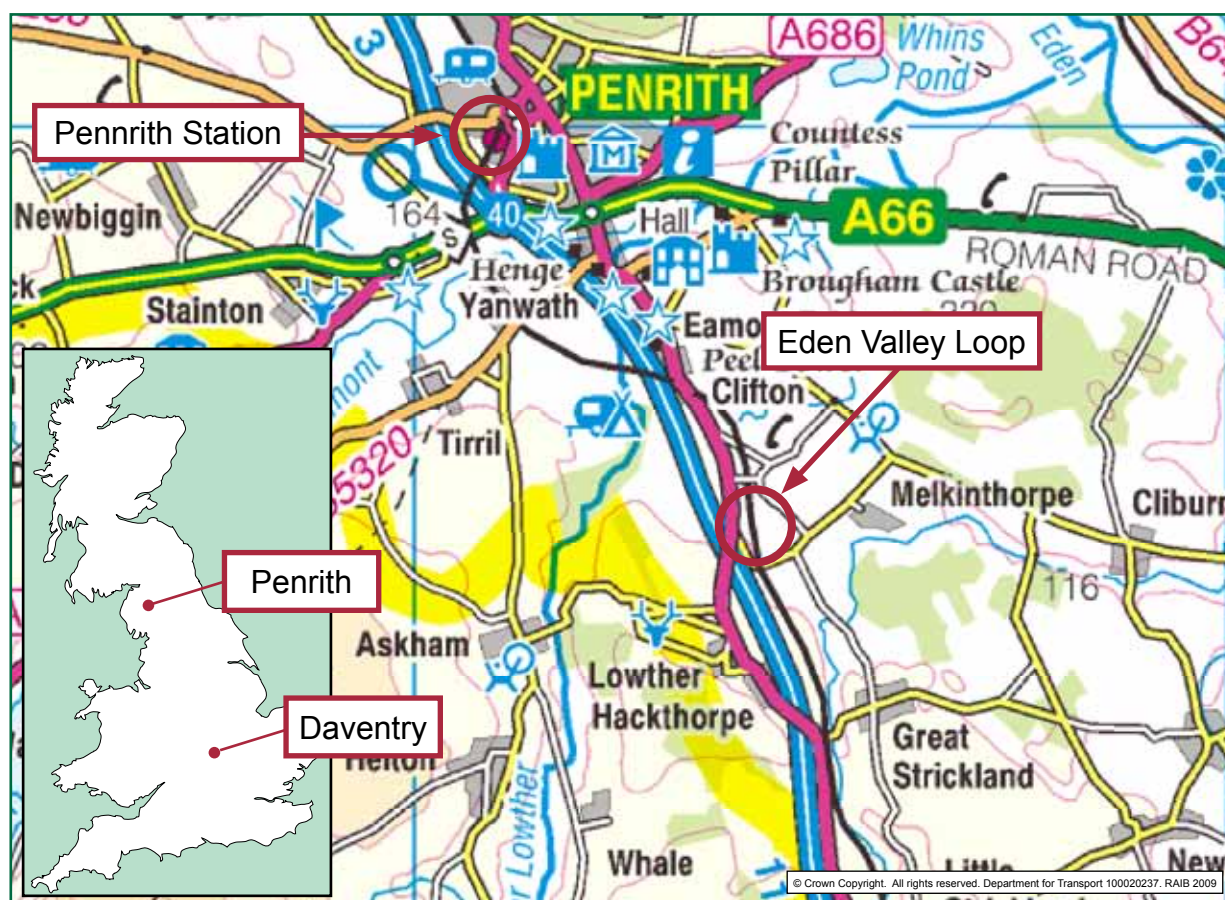


Figure 1: Extract from Ordnance Survey map showing locations of the collisions and the final destination of train 4M16 (inset)

¹ The report does not give exact details of the various locations involved within Scotland to avoid encouraging any further action similar to that which led to this event.

Trains

- 4 Direct Rail Services (DRS) operated train 4M16, a Saturday only container freight train from Scotland to Daventry International Rail Freight Terminal. It consisted of a class 66 loco (66416) and 14 IKA wagons (Figure 7), semi-permanently coupled pairs of bogie mounted units. The train was carrying 28 empty 45 foot curtain sided containers. All the containers were returning after making deliveries to a Tesco depot. Eddie Stobart Ltd was the logistics company moving the containers on behalf of Tesco. W H Malcolm was the logistics provider who operated the two rail termini.
- 5 The doors that were open were those on the right-hand side of the leading container on the twelfth wagon (container number 450073) and the leading container on the thirteenth wagon (container number 450082). The doors were at the trailing end of both containers.
- 6 The class 185 (185127) was a 3-car diesel multiple unit, train 1S66, operating from Manchester Airport to Edinburgh Waverley.
- 7 The class 390 Pendolino (390040) was a 9-car tilting electric multiple unit, train 1M15, operating from Glasgow to Euston.
- 8 The class 221 Super Voyager (221112) was a 5-car tilting diesel electric multiple unit, train 1M86, operating from Edinburgh Waverley to Birmingham New Street.
- 9 There were no known defects on any of these trains that contributed to the incidents.

Summary of events

- 10 On 3 July 2009 the containers were sealed with unique numbered seals at a Tesco distribution centre in Scotland. The containers were then delivered by road to a freight terminal, where they were transferred onto the DRS train during the early hours of 4 July 2009.
- 11 At 11:04 hrs on 4 July 2009 train 4M16 departed the terminal, and was held at the adjacent junction until 11:09 hrs. The train next stopped at junction 'A' at approximately 12:20 hrs, where it was held for 14 minutes, and then at Carlisle Exchange sidings at 14:30 hrs where it was held for approximately 60 minutes, before proceeding to platform 4 at Carlisle Station at 15:36 hrs, where it was held 5 minutes for a crew change.
- 12 At 16:02 hrs 4M16 passed through Penrith Station and a door struck train 1S66, which was stationary on the down line. No-one observed or noticed the collision.
- 13 At 16:08 hrs train 4M16 was signalled into Eden Valley Loop to allow faster trains to pass. At 16:18 hrs train 1M15 passed and struck one or both open doors; at 16:27 hrs train 1M86 passed and struck one or both open doors.
- 14 The crew of train 1M86, the class 221 Super Voyager, heard the impacts and stopped to report the damage to their control at 16:28 hrs. The crew of train 1M15, the class 390 Pendolino, found and reported the damage to their train to Carlisle *Power Signal Box* at 16:45 hrs during a routine stop at Oxenholme station.
- 15 Later checks at Edinburgh revealed damage to train 1S66, the class 185.

- 16 While held in Eden Valley Loop the driver of 4M16 contacted Carlisle Power Signal Box via the *signal post telephone*, and was informed of reports of scraping sounds by drivers of passing trains. The signaller asked him to examine his train and he identified the open doors on the leading containers on wagons 12 and 13.
- 17 The driver was unable to fully close either door, although he did effect a temporary repair and informed the signaller that he could reopen the down line to traffic, but to *caution* all trains on the up line past train 4M16.
- 18 When the Network Rail *Mobile Operations Manager* and Direct Rail Service's on call team arrived they secured the damaged doors (Figure 2) and agreed that train 4M16 was safe to continue to Daventry. It departed Eden Valley Loop at 18:51 hrs and arrived at Daventry at approximately 23:00 hrs with no further incidents.



Figure 2: Damaged container doors

- 19 There was superficial bodywork damage to one car of the class 185 (Figure 3), although the crew and the passengers were unaware that any collision had occurred. The class 390 Pendolino suffered severe impact damage to the bodywork (30 mm deep) of five vehicles, requiring cut and weld repairs (Figure 4). The class 221 suffered damage to all cars consisting of scratching to bodywork, in particular doors, severe damage to one foot step (Figure 5) and structural damage in the area of a cab door. However, all three passenger trains were fit to continue and conclude their journeys.



Figure 3: Damage to class 185 (images courtesy of TransPennine Express)



Figure 4: Damage to Pendolino 390040 (image courtesy of Direct Rail Services)



Figure 5: Damage to Super Voyager 221112 (image courtesy of Virgin Trains)

The Investigation

- 20 The RAIB investigation's objectives were to determine why the container doors came open, to examine the consequences of container doors coming open in traffic, and to recommend measures to prevent similar incidents in future.
- 21 The investigation considered the following sources of evidence:
- records of sealing of containers;
 - statements from staff at the rail terminal and train crews, taken by employers;
 - CCTV footage from stations where 4M16 passed;
 - forward facing CCTV footage from trains involved;
 - train movements logs;
 - industry procedures for the loading of containers; and
 - discussions with the British Transport Police.

Analysis

Identification of immediate cause

- 22 The immediate cause of the collisions was that the container doors had come open, without this having been identified.**

Identification of causal², contributory³ and underlying⁴ factors

- 23 The doors of the containers were probably open as a result of criminal action in the area of Junction 'A'.**

- 24 The available evidence indicates that the open container doors were closed and sealed when train 4M16 left the rail terminal. Tesco records indicate that they were sealed closed on 3 July 2009. There are no reports of doors being open during the loading of containers onto train 4M16, nor during its despatch examination prior to departure from the terminal. The RAIB concludes that the container doors must have come open en route.
- 25 Station CCTV records at two stations north of Junction 'A' do not show any open container doors on train 4M16. However, station CCTV records from the three stations south of the Junction show the doors to be open. Container door handles are designed to remain locked shut without any external locking, and are not prone to opening under vibration (Figure 6). The distance between the station north of Junction 'A', where CCTV showed the containers closed, and the station to the south, where the CCTV showed them open, is approximately eight miles. Two doors on adjacent wagons coming open within eight miles indicates a common cause rather than two independent random events. Therefore their opening is likely to have been the result of some external interference while the train was stationary. Junction 'A' is the only location where train 4M16 was stationary between leaving the junction adjacent to the terminal and passing the first station south of Junction 'A', where the doors were open. The RAIB concludes that criminal action at Junction 'A', involving trespass onto the railway, breaking the seals and opening the two doors is the most likely cause of the open doors.
- 26 The seals used on these containers were sacrificial plastic seals which are easily removed by hand; other more robust security seals exist, although these can still be removed by bolt cutters. Witness evidence indicated that there is a concern over using heavy duty security seals on curtain-sided containers because it may cause criminals to cut the curtains of the containers to access the contents, which in turn introduces a risk onto the railway. However, it is considered that the use of heavy-duty security seals may deter opportunistic criminals. The use of the light-weight sacrificial seals is a probable contributory factor to the incident.

² Any condition, event or behaviour that was necessary for the occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.

³ Any condition, event or behaviour that affected or sustained the occurrence, or exacerbated the outcome. Eliminating one or more of these factors would not have prevented the occurrence but their presence made it more likely, or changed the outcome.

⁴ Any factors associated with the overall management systems, organisational arrangements or the regulatory structure.



Figure 6: Door handle arrangements on a container

- 27 **The collisions with the passenger trains occurred because there was no feature on the container or wagon to prevent container doors, once they had come open, from going out of gauge.**
- 28 Freight operating companies generally attempt to load containers onto wagons such that the doors are against headstocks or other container doors. This approach limits access to the doors during transit and prevents any open doors going outside the loading gauge. However, when loading a 45 foot container onto an IKA wagon it is not possible to locate the doors adjacent to a headstock, as it is only possible to load one container per half wagon, and the container has to be loaded centrally to distribute the weight satisfactorily (Figure 7). There are no other features on an IKA wagon that would prevent a door that has come open from going outside the loading gauge. The lack of possible loading arrangements and physical features preventing doors that have come open from going out of gauge are contributory factors to the incident.
- 29 At present, there is nothing in Railway Group Standards concerning security of containers or about ensuring that doors do not swing outside of the loading gauge.



Figure 7: IKA wagons and 45 foot containers (image courtesy of Direct Rail Services)

- 30 However, the Rail Safety and Standards Board (RSSB) is developing a Guidance Note on freight train operations. It is proposed that this will contain the following clause to address the security of the load with respect to the risks that it may pose if it is tampered with.

Load integrity and security should be carefully considered so that possible problems that may arise during the journey can be identified so that suitable control measures can be put in place, if necessary, before any loads are conveyed by freight vehicles. Such considerations may include, but should not be limited to:

- i) *the potential for thieves, vandals or other unauthorised persons to gain access to the load. In addition to the risk of theft or damage to the load, the possibility that damaged or insecure doors, load coverings or securing equipment on the affected vehicles might present a risk to passing trains or staff on the track should be considered.*

Severity of consequences

- 31 The severity of consequences would have been worse if one of the doors had hit a passenger on a station platform or staff on track.

- 32 The RSSB's Safety Management Information System (SMIS) reports 20 cases of container doors being open in traffic since July 2004, seven of which have resulted in collisions, but no injuries or fatalities have been reported as a result of them. Similarly there is no evidence of open container doors penetrating locomotive cabs or passenger stock. The RAIB has not investigated the potential impact effects of container doors on rolling stock as part of its investigation.

Conclusions

- 33 The immediate cause of the incident was the doors on two containers coming open. This was probably as a result of criminal action interfering with the closed and sealed doors of the two containers (paragraph 22, Recommendation 1).
- 34 The lack of any physical restraint to prevent a door that had come open going outside of the loading gauge is a contributory factor (paragraph 27, Recommendations 2 and 3).
- 35 The use of light-weight sacrificial seals is a probable contributory factor (paragraph 26, Recommendation 1).

Observations

- 36 It is likely that, as from January 2010, the Tesco traffic between Daventry and Scotland will be operated by DB Schenker. However, DRS will continue to carry container traffic on other routes.

Recommendations

37 The following safety recommendations are made⁵:

1. *The intention of this recommendation is to reduce the risk of container doors being opened by criminal attack.*

Direct Rail Services and DB Schenker should review their existing control measures to secure container doors, and consider whether stronger seals, such as heavy-duty security seals, would reduce the risk of doors being vandalised and coming open outside of the loading gauge (paragraph 35).

2. *The intention of this recommendation is to reduce the risk of open container doors being carried on existing wagons striking trains on adjacent lines, or striking passengers on stations or staff on track.*

Freight Operating Companies should investigate, and, where reasonably practicable, implement, measures so that open container doors cannot swing outside the loading gauge (paragraph 34).

3. *The intention of this recommendation is to minimise the risk of open container doors being carried on future wagons striking trains on adjacent lines, or striking passengers on stations or staff on track.*

Freight Operating Companies should amend their specifications for future builds of container wagons to include measures that prevent open container doors swinging outside the loading gauge (paragraph 34).

⁵ Those identified in the recommendations, have a general and ongoing obligation to comply with health and safety legislation and need to take these recommendations into account in ensuring the safety of their employees and others.

Additionally, for the purposes of regulation 12(1) of the Railways (Accident Investigation and Reporting) Regulations 2005, these recommendations are addressed to the Office of Rail Regulation to enable them to carry out their duties under regulation 12(2) to:

- (a) ensure that recommendations are duly considered and where appropriate acted upon; and
- (b) report back to RAIB details of any implementation measures, or the reasons why no implementation measures are being taken.

Copies of both the regulations and the accompanying guidance notes (paragraphs 167 to 171) can be found on RAIB's web site at www.raib.gov.uk.

Appendices

Appendix A - Glossary of abbreviations and acronyms

| | |
|------|--------------------------------------|
| CCTV | Closed Circuit Television |
| DRS | Direct Rail Services |
| RSSB | Rail Safety and Standards Board |
| SMIS | Safety Management Information System |

Appendix B - Glossary of terms

All definitions marked with an asterisk, thus (*), have been taken from Ellis' British Railway Engineering Encyclopaedia © Iain Ellis. www.iainellis.com

| | |
|---------------------------|---|
| Caution | An instruction requiring the driver to be ready to stop.* |
| Down line | The name generally given to the line used by trains travelling in the direction away from London (northbound). |
| Gauge | The set of dimensions that a load on a rail vehicle must be within in order to run in normal traffic.* |
| Mobile Operations Manager | A Network Rail operations manager who provides first line response to incidents.* |
| Power signal box | A signal box which controls the points and signals over an area by electrical means.* |
| Signal post telephone | A telephone located on or near a signal that allows a driver or other member of staff to communicate only with the controlling signal box.* |
| Up fast line | The name generally given to the line used by trains travelling in the direction of London (southbound). |

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| RAIB | Telephone: 01332 253300 |
| The Wharf | Fax: 01332 253301 |
| Stores Road | Email: enquiries@raib.gov.uk |
| Derby UK | Website: www.raib.gov.uk |
| DE21 4BA | |