RAIB
Rail Accident Investigation Branch

# Rail Accident Report

## Child fell from train on the Nene Valley Railway 16 February 2008

Department for Transport

Report 15/2008
July 2008

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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This report is published by the Rail Accident Investigation Branch, Department for Transport.

## Introduction

1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and accidents and improve railway safety.

2 The RAIB does not establish blame, liability or carry out prosecutions.

3 Access was freely given by the Nene Valley Railway (NVR) to their staff, data and records in connection with the investigation.

4 The descriptions 'left' and 'right' in this report are relative to the direction of travel of the train.

## Summary of the Report

5 On 16 February 2008, a two-year-old child fell from the vestibule of a carriage in the late running 11:20 hrs train from Wansford to Peterborough on the NVR. The train was running at approximately 20 mph (32 km/h) at the time of the accident. The child received injuries to her head and some general bruising but was discharged from hospital the same day after treatment.

6 The accident happened because the child was able to easily open one of the carriage doors. The carriages are of Danish origin, and are only operated in the UK by the NVR.

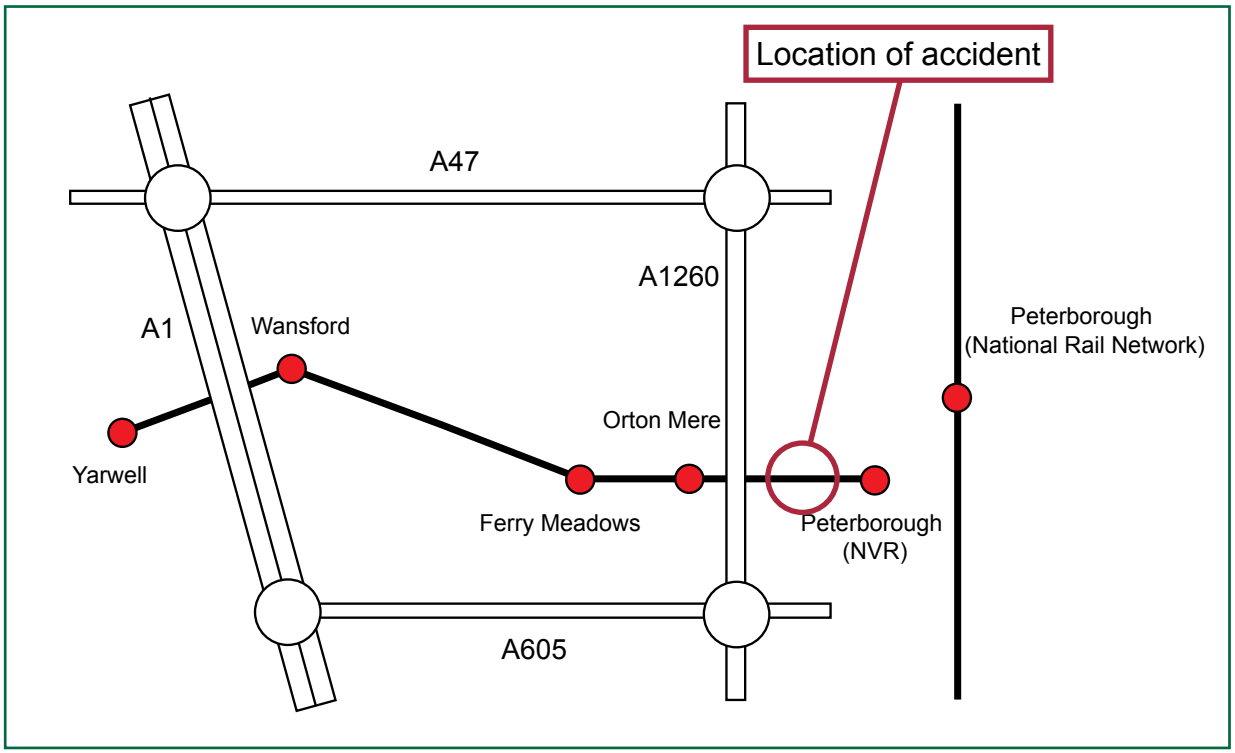


*Figure 1: Schematic diagram of the NVR showing location of the accident*

## Background

7 The NVR is a heritage railway that operates the Peterborough (NVR) to Yarwell section of the former British Railways line between Peterborough and Northampton (Figure 1). Its headquarters is at Wansford. It operates steam and diesel hauled trains on its railway and, because the size of its bridges allows the use of larger trains than is normal in Britain, it is able to use continental rolling stock in a way that no other British railway can do.

8 The NVR owns, amongst its other rolling stock, five carriages formerly operated by Danske Statsbaner (DSB), the national railway in Denmark. They entered service on the NVR around 1978. The carriages have double doors (Figure 2) that give access from the platform to vestibules at each end.


*Figure 2: Leading right hand pair of doors on ex-DSB carriage 1478*

9 Each external door is secured by two door locks and handles (Figure 3). The upper slam lock is sprung, and the handle inside the carriage is horizontal when the latch is engaged. The lower lock is not sprung, thus providing a deadlock, and the handle on the inside of the carriage should be vertical when the lock is engaged.

10 There are signs in Danish, French and German on the inside of the door stating that it should not be opened whilst the train is in motion; the only sign in English explains how the door handles should be worked to open the door.


*Figure 3: Incident door showing slam door and deadlock handles*

11 The NVR's dispatch procedures require the train crew to check the position of both door handles from the outside, before a train is dispatched from a station. Both external door handles are horizontal when correctly closed.

12 People regularly book space on NVR trains for social events. On 16 February 2008, such a booking was made for a family birthday celebration consisting of a party of 12 adults, 8 children, and 6 infants (one-year-old or under) who were on board the delayed 11:20 hrs from Wansford to Peterborough return. The NVR booked the party into the front half of the leading carriage, one of the DSB vehicles. Another party was booked into the rear half of the same carriage.

## The Accident

13 The late running 11:20 hrs departure from Wansford to Peterborough consisted of a steam locomotive and four DSB carriages; No. 1478 was the leading carriage. The guard reported that before it left Wansford, he had checked that all the carriage doors were correctly shut and deadlocked. Subsequently, the guard and a passenger reported that the driver had also got down from the locomotive and checked the doors of the leading vestibule of carriage No.1478, because a passenger had opened the forward-most right-hand (non-incident) door after the guard's check. The guard had noticed this and told the person to shut the door. The guard also reported that he checked all the doors at Orton Mere before departure, although he did not think the incident door had been used there.

14 During the journey many of the children and two adults from the party were travelling in the leading vestibule. This allowed a good view of the locomotive and gave space for the children to play. One of the adults who was present in the vestibule during the journey estimates that some nine children, including the two-year-old, were in the vestibule after the train left Orton Mere.

15 The two adults in the leading vestibule had noticed that the two-year-old child involved in the accident was sitting on the vestibule floor near the rear-most right-hand door, and that two other slightly older children were in the same area. Both the adults had turned to look at the locomotive and then shortly after, became aware that the door was open and that the two-year-old child had fallen out of the train. They shouted for the train to be stopped and after a few seconds of confusion, a third adult pulled the passenger alarm, and the train brakes were applied.

16 While the train was slowing, the guard spotted the child in the right hand cess from the guard's van, located in the next carriage, and used his radio to inform Wansford Station. As soon as the train was moving slowly enough, three of the passengers jumped down onto the ballast and ran back to the child, who was by now some 200 metres behind the rear of the stopped train. As soon as he had applied the hand brake to the train, the guard, who was a qualified first-aider, also ran back to the child. An initial assessment of the child's condition revealed that she was conscious and responsive and that she had cuts to her head and some general bruising, but no more serious injuries. The guard decided that the best course of action was to use the train to transport the child to Peterborough station. He then rang the Wansford office and asked for an ambulance to be sent to meet the train there.

17 The ambulance arrived at Peterborough station within a few minutes of the train arriving and the child was taken with her parents to a hospital in Peterborough initially, and later to Addenbrooke's hospital in Cambridge for further tests. After receiving attention to her cuts and tests were completed, she was discharged from hospital at approximately 20:00 hrs. She has made a full recovery.

18 The NVR immediately notified the RAIB of the accident, and an Inspector attended later on the day of the accident. He interviewed the guard, reviewed statements provided by two witnesses and inspected the carriage doors. He found no evidence of any mechanical faults with the door involved in the accident or its locks. However, he did find that only a small force of about 20 N[1] at the end of the handles was necessary to move each of the two door handles to the open position.

[1] 1 N (newton) is the force exerted by gravity on a mass of 0.102 kg (about the weight of a small apple)

## Analysis

19 Measurements, using a digital spring balance, were taken of the force required to turn both the deadlock and slam door handles of the incident door and a sample of other doors on the ex-DSB coaches. Comparative measurements were also made on a sample of door handles on NVR's ex-Belgian coaches.

20 The measurements showed that the incident door required a force of 32.1 N at the centre of the natural grip position (approximately 80 mm from the pivot) to open the door. The deadlock handle required a force of 34.1 N at the same position to unlock it.

21 A sample of ten other similar slam door handles on the ex DSB coaches showed a range of 11.6 – 60.0 N, the average being 41.6 N. A sample of ten deadlock handles showed a range of forces from zero to 34.1 N, and the average was 17.4 N. A sample of six doors from the Belgian coaches (which have shorter handles and a knob located 80 mm from the pivot on which to push down) gave a range of forces which were much higher than the ex DSB coach door handles, at 143.6 – 185.4 N, with an average of 154.0 N.

22 From these measurements it was evident that the ex-DSB coach door handles are very easy to turn, the slam door handles requiring, on average, forces approximately one quarter of that for a Belgian coach. It was also noted that some of the ex-DSB coach doors were even easier to open than the door involved in this accident.

23 Both of the adults in the vestibule at the time of the accident provided statements to NVR. They were looking forwards out of the gangway window at the locomotive and did not see the door being opened. However one of them was sure the handles were in the correct locked position before the accident. Whilst it is impossible to be sure about exactly how the door became open and how this led to the child falling out of the train, a likely scenario is that the two-year-old child pulled herself up from her sitting position on the floor, by using the two handles consecutively. The lower handle would have rotated and unlocked the door so that as soon as she pulled the upper handle, the door, which opens into the train's slipstream, was free to swing open and drag her out of the train.

## Improving Door Safety

24 NVR reported that this was the first such accident in approximately 30 years of operating the ex-DSB carriages.

25 The Accident Investigation Board, Denmark have confirmed to the RAIB that the type of coach involved in this accident (built around 1962) no longer operates on their national network but it is still used on some Danish heritage railways. No similar accident is registered on their incident database which was established in 1996, by which time this type of coach had been withdrawn from main line services.

26 The absence of any previous similar door incidents on the NVR and their perception that the doors were difficult to open accidentally (by virtue of the combination of a slam lock and deadlock) led them to believe that the doors were safe. Therefore, the NVR did not have any warning notices on the doors or safety announcements to alert adults about the ease with which the doors could be opened or to take special precautions in their vicinity.

27 The use of internal door handles in the UK does not accord with The Office of Rail Regulation's document "Railway Safety Principles and Guidance", Part 2 section H (guidance on minor railways), first published by the Health and Safety Executive in 2005, which states that carriages:

"… should have …… a means of preventing passengers, particularly children, falling out (eg closed carriages should have latched doors with external handles, and open-sided ones should at least have bars or chains across the entrances)."

Compliance with RSPG is not mandatory; however, the guidance reflects best practice and sets out what is considered acceptable to Her Majesty's Railway Inspectorate (HMRI), the UK's rail safety regulator. The ex-DSB coaches were procured in 1978 by the NVR before the introduction of the RSPG guidance. The NVR's ex-DSB coaches do not have opening door windows and therefore internal door handles are required for passengers to be able to open the doors.

28 The RAIB advised the NVR by phone on the evening of the accident that they should consider extra precautions on their ex-DSB carriages in order to prevent a repetition and issued a related Urgent Safety Advice to the NVR on 18 February (Appendix A). The Urgent Safety Advice was also sent to the European Rail Agency who alerted other national accident investigation bodies in Europe.

29 NVR have reported that they have taken the following measures:

- the deadlock handles have been turned through 90 degrees so that they are now horizontal and have to be lifted upwards to unlock;
- half the doors on each coach (the outer doors of each door pair) have been permanently locked out of use; and
- guards and travelling ticket inspectors have been briefed to be vigilant if young children are close to the handles of the external doors in the vestibule area.

## Recommendations

30 The following safety recommendation is made[2]:

1. NVR should investigate and urgently implement measures to reduce the risk of people being able to accidentally open the doors of their ex-DSB coaches, and any other carriages on the railway employing internal door handles. Their considerations should include, either singly or in combination :
   - modify the door handles to make them less easy to open accidentally (for example by making them stiffer to turn).
   - provide clear warning information to passengers, such as signs on the inside of the doors or safety announcements, in order to alert them and young children in their care, to keep away from the door handles while the train is in motion.

[2] 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 (HM Railway Inspectorate) 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.

RAIB SF-3.1.9.1
ISSUE : 2
27 OCTOBER 2005

## URGENT SAFETY ADVICE

| 1. INCIDENT DESCRIPTION | | | |
|---|---|---|---|
| LEAD / INSPECTOR | | CONTACT TEL. NO. | |
| INCIDENT REPORT NO | 0268 | DATE OF INCIDENT | 16/2/08 |
| INCIDENT NAME | Wansford, Nene Valley Railway | | |
| TYPE OF INCIDENT | Child fell from train travelling at approx 20 mph | | |
| INCIDENT DESCRIPTION | A vestibule door on former Danske Statsbaner (Danish Railways) carriage 1478 came open whilst the train was running from Wansford to Peterborough, allowing a young child to fall onto the railway track. | | |
| SUPPORTING REFERENCES | See attached photograph for details of the door handle arrangements | | |

| 2. URGENT SAFETY ADVICE | |
|---|---|
| USA DATE: | 18/02/08 |
| TITLE: | Door locking arrangement on former Danske Statsbaner carriages |
| SYSTEM / EQUIPMENT: | Nene Valley Railway |
| SAFETY ISSUE DESCRIPTION: | The former Danske Statsbaner carriages used on the NVR have vestibule doors with two interior handles, a lower one to deadlock the door and an upper one to open the slam lock. The lower lock is not sprung; the upper lock is. |
| CIRCUMSTANCES: | Initial RAIB tests indicate that only a small force is necessary to open both interior door handles– estimated at about 2 kilos applied at the end of the door handles. If the lower lock is moved to the open position and the upper lock is then turned the door is free to open, allowing egress from the train. The forces to turn the handles are such that they can be applied by a small child. |
| CONSEQUENCES | Risk of fall from train. |
| REASONS FOR ISSUE: | The Nene Valley Railway should investigate and urgently implement one or more measures to reduce the risk of people being able to open the doors of carriage 1478, and any other carriages on the railway employing the same door lock arrangement.<br>This advice is also sent to the Heritage Railway Association in case any other railway has a similar arrangement, and to the European Rail Agency, in case the door arrangement is still in use in Denmark, or on heritage railways in Europe. |

| USA SIGN-OFF* | | | |
|---|---|---|---|
| INSPECTOR NAME: | | CI / DCI NAME: | |
| INSPECTOR SIGNATURE: | ELECTRONIC COPY | CI / DCI SIGNATURE: | ELECTRONIC COPY |
| DATE: | 18/2/08 | DATE | 18/2/08 |


Slam lock handle
Slam lock - sprung to this position
TO OPEN ENSURE BOTH HANDLES ARE HORIZONTAL THEN DEPRESS TOP HANDLE
Låset
Fermé
Zu
Åben
Ouvert
Offen
Deadlock - not sprung
Deadlock handle
Carriage lock
Carriage lock key slot

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