

Rail Accident Report



Unsafe movement of locomotives being coupled on the Bluebell Railway, East Sussex 9 August 2025

Report 11/2026
October 2026

This investigation was carried out in accordance with:

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

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Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253 300
Website: www.raib.gov.uk

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Preface

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Use of the word 'probable' means that, although it is considered highly likely that the factor applied, some small element of uncertainty remains. Use of the word 'possible' means that, although there is some evidence that supports this factor, there remains a more significant degree of uncertainty.

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Unsafe movement of locomotives being coupled on the Bluebell Railway, East Sussex, 9 August 2025

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Summary

At around 15:00 on Saturday 9 August 2025, a shunter was coupling two steam locomotives together when they unexpectedly moved while the shunter was in between them. The locomotives moved around 3 metres (10 feet) before the movement was stopped by another member of staff who was on the platform. The shunter was uninjured but was shaken by the incident.

The incident occurred during the Bluebell Railway's 65th anniversary mini-gala event. The locomotives, named Fenchurch and Stepney, were being coupled in preparation for their return to a nearby shed.

The two locomotives unexpectedly began to move because steam pressure was able to build up in the cylinders of Fenchurch, which caused it to make an uncommanded movement. This pressure build-up occurred because the regulator valve was not fully closed, which admitted steam into the cylinders. In addition to this, the reverser was not in a position that would have reduced the risk of movement by the locomotive.

Fenchurch had also not been effectively immobilised. This was because its air brake was not fully applied. In addition, the actions the shunter took to prevent Fenchurch from moving were ineffective because they had not been made aware of the type of braking system used by the locomotive.

An underlying factor to the incident was that the Bluebell Railway was not effectively managing the risks associated with coupling air-braked rolling stock.

RAIB has made one recommendation to the Bluebell Railway. This recommends that the railway undertakes a risk-based review of its arrangements for coupling and uncoupling rail vehicles.

Introduction

Definitions

- 1 Metric units are used in this report, except when it is normal railway practice to give speeds and locations in imperial units. Where appropriate the equivalent metric value is also given.
- 2 The report contains abbreviations and acronyms, which are explained in appendix A. Sources of evidence used in the investigation are listed in appendix B.

The incident

Summary of the incident

- 3 At around 15:00 on Saturday 9 August 2025, a shunter was coupling two steam locomotives together when they unexpectedly moved while the shunter was in between them. The locomotives travelled around 3 metres (10 feet) before the movement was stopped by another member of staff.
- 4 The shunter who was undertaking the coupling operation was uninjured but was shaken by the incident.

Context

Location

- 5 The incident occurred at Sheffield Park station, which is part of the Bluebell Railway, located in East Sussex (figure 1).



Figure 1: Extract from Ordnance Survey map showing location of the incident at Sheffield Park.

- 6 The Bluebell Railway is an 11-mile (17.7 km) preserved standard-gauge heritage railway. The railway operates steam train services for members of the public as a tourist attraction between Sheffield Park and East Grinstead with intermediate stations at Horsted Keynes and Kingscote (figure 2). On the day of the incident, the railway was undertaking a mini gala that featured a more intensive timetable than usual (see paragraph 21).

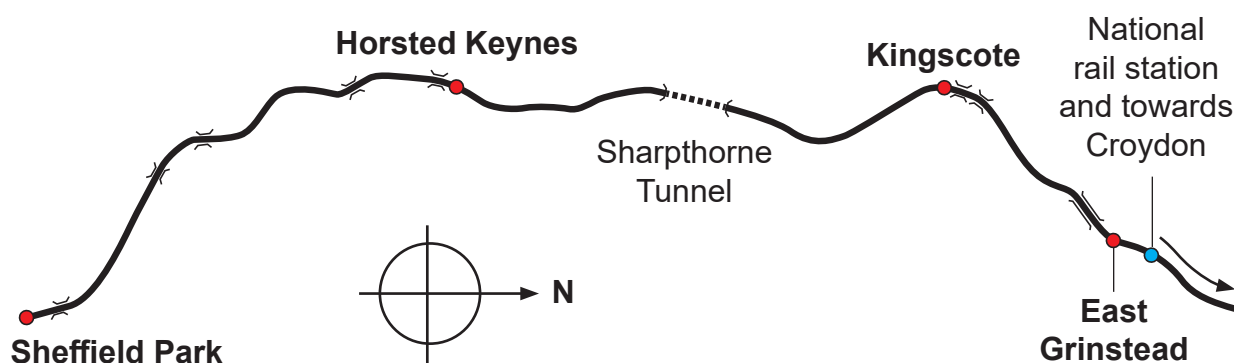


Figure 2: Map showing the Bluebell Railway route.

- 7 Sheffield Park station is located at the south-western end of the railway's route. It has two platforms and has connections to the nearby locomotive shed, workshop, museum and sidings. The incident occurred adjacent to platform 1 (figure 3). The track at the location where the incident occurred is straight and level.

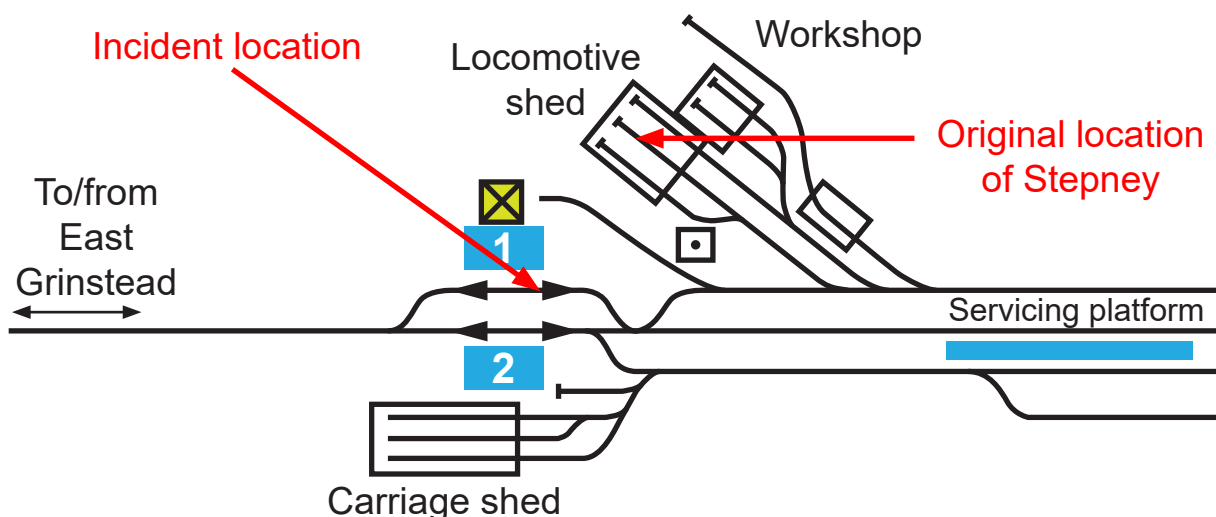


Figure 3: Track layout showing Sheffield Park station, nearby connections, the incident location, and the original position of the locomotive 'Stepney'.

Organisations involved

- 8 The Bluebell Railway is run by Bluebell Railway plc, a not-for-profit company that owns many of the locomotives (including the two involved in the incident), the rolling stock, and the stations. It also operates the railway and is majority owned by the Bluebell Railway Preservation Society, which has 9,500 members.
- 9 The railway predominantly operates preserved steam locomotives and coaching stock. It currently runs 11 operational locomotives, 7 of which are steam powered. The railway owns another 22 locos which are currently non-operational. A number of static steam locomotives are on display in its museum at Sheffield Park station.
- 10 The railway employs a small number of paid staff and has more than 900 active volunteers, of whom around 35 to 40 are deemed competent to drive trains. Around 100 volunteers log more than 20 hours of voluntary work per week on the railway.
- 11 The Bluebell Railway freely co-operated with the investigation.

Locomotives involved

- 12 Both locomotives involved in the incident were part of the London, Brighton and South Coast Railway class A1X, commonly known as 'Terriers'. Such locomotives were built between 1872 and 1880 and were originally designed to haul passenger trains on the urban rail network of south-east London.
- 13 Locomotive No. 55, 'Stepney', arrived on the Bluebell Railway in 1960 and was the railway's first locomotive (figure 4). It had a major overhaul in 2010 but has been out of service since a steam pipe failure in 2014. The locomotive is unable to move under its own power and is normally displayed in the museum. It is fitted with a handbrake to secure it when stationary and unattended. On the day of the incident, Stepney had been hauled by Fenchurch from the shed to platform 1 for a photo shoot. It was then secured using the handbrake (see paragraph 44).



Figure 4: Stepney (courtesy of James Cummins).

- 14 Locomotive No. 72, 'Fenchurch', has been based at the Bluebell Railway since 1964, undergoing major overhauls in 2001 and 2022 (figure 5). While the locomotive itself is equipped only with air-operated brakes, it is fitted with vacuum-brake equipment to operate the railway's coaching stock (see paragraph 42).



Figure 5: Fenchurch (courtesy of James Cummins).

Staff involved

- 15 The driver of Fenchurch (referred to as the driver from here on) had been qualified in this role since 1979, when they started volunteering at the railway. At the time of the incident, they were deemed competent to drive Fenchurch and to perform coupling operations. Their last driving assessment before the incident was in September 2024, on a different locomotive, which they passed successfully. They also successfully passed an online operational knowledge assessment in September 2024. The driver is also a driver inspector, which means they assess other drivers.
- 16 The fireman¹ involved in the incident (referred to as the fireman from here on) has been a volunteer at the Bluebell Railway for over 45 years. They are qualified as a driver, which permits them to also work as a fireman. They had completed their training as a driver in 1995 and have also been a driver inspector since 2010. They were last assessed as a driver in February 2025 and passed an online operational knowledge assessment in August 2024.
- 17 The shunter carrying out the coupling procedure during the incident (referred to as the shunter from here on), who is also a volunteer, is a grade 3 cleaner,² training to be a fireman. They were also qualified as a running foreman, a role which oversees the preparation and stabling of locomotives. They completed their cleaner rules assessment in July 2023 and their running foreman's assessment in December 2023. Qualification as a cleaner permits staff to undertake shunting duties.

¹ Firemen are responsible for keeping steam locomotives supplied with fuel and water during a journey, for managing the fire, and assisting the driver when required to do so.

² Cleaners are responsible for assisting in general duties around trains and in depots. A cleaner is usually the first role undertaken by someone working on steam locomotives as train crew.

- 18 There were two other cleaners indirectly involved in the incident. Cleaner 2, a volunteer, was on board Fenchurch at the time of the incident at the request of the duty operations manager (DOM). Cleaner 3, who was also a volunteer, was on board Stepney, again at the request of the DOM.
- 19 The DOM, who was a volunteer, was at Sheffield Park on platform 1 at the time of the incident. The DOM was responsible for the safe and efficient management of railway operations during periods of duty, including incident management, operational decision-making, leadership of safety-critical staff, service recovery, and ensuring compliance with the safety management system and Bluebell Railway Rule Book.

External circumstances

- 20 The weather at the time of the incident was sunny and warm with a temperature of about 22°C with clear visibility. The warm temperature may have had an effect on the incident (see paragraph 58).

The sequence of events

Events preceding the incident

- 21 To celebrate its 65th anniversary, the Bluebell Railway hosted a 3-day mini gala from 8 to 10 August 2025. This featured extra train services and support from numerous volunteers. On these days, the railway had also arranged for Fenchurch to move Stepney from the nearby locomotive shed to platform 1 on Sheffield Park station, so that people could take photographs of the two locomotives. Following this photo opportunity, the plan was for Fenchurch to move Stepney back to the shed.
- 22 On the day of the incident, both the driver and fireman started their shift at 07:00. Between them they prepared Fenchurch for the day's duties. The driver and fireman then worked Fenchurch as it hauled a passenger train on two round trips between Sheffield Park and Horsted Keynes.
- 23 The train arrived from the second trip at platform 2 of Sheffield Park station at 14:06. Fenchurch was then uncoupled from the south end of the train and travelled to the locomotive shed (figure 3) to move Stepney. Fenchurch was coupled up to Stepney while it was in the shed and the two locomotives moved to platform 1. Stepney was uncoupled from Fenchurch at 14:22.
- 24 Following this, Fenchurch moved to platform 2 to allow more photographs to be taken of the locomotives separately. The fireman left Fenchurch at this point to go for a meal break on platform 1.
- 25 At 14:38, the DOM, who was located on platform 1, asked cleaner 2 to act as "extra eyes" on Fenchurch. Cleaner 2 made their way to platform 2 and boarded Fenchurch, standing on the right-hand side of the cab. The DOM also instructed cleaner 3 to board Stepney and check whether the handbrake was applied. They checked the handbrake and stated that it was applied.
- 26 Shortly after this, Fenchurch was driven from platform 2 to platform 1 by the driver to start the process of coupling to Stepney. Witness evidence indicates there were a few attempts to move the locomotives close together at very slow speed so that the buffers just touched without being compressed (a process known as 'buffering up') with Stepney moving slightly each time Fenchurch made contact with it. The fireman was on platform 1 during this process, on their meal break. The shunter was also on the platform awaiting instructions to go in between the locomotives to perform the coupling operation.

Events during the incident

- 27 When the driver was satisfied that the locomotives had buffered up correctly, and the shunter had sought assurance from cleaner 3 that Stepney's handbrake was applied, the driver and the shunter agreed between them that it was safe for the shunter to go between Stepney and Fenchurch to couple the locomotives together.

- 28 While the shunter was between the locomotives, coupling them together, they heard a sound described as a “chuff”. A short while later, they heard a second chuff before both locomotives began to move and continued to do so at walking speed.
- 29 The fireman, who had by now finished their meal break and was standing with one foot on the platform and one foot on the footplate of Fenchurch, became aware that the locomotives were moving with the shunter between them. The fireman told the driver what was happening and then reached inside Fenchurch to access its controls. Although the fireman noticed the air brake valve appeared to be in the fully applied position, they moved it back and pushed it into the fully applied position again to check. A short while after this, the locomotives stopped moving. Before coming to a stand, the locomotives had moved around 10 feet (just over 3 metres).
- 30 The fireman recalled a member of staff on the platform telling the shunter to “stand up and keep walking”. The shunter, heeding this advice, steadied themselves by holding on to both locomotives and walking along as the locomotives moved.

Events following the incident

- 31 Once the locomotives stopped moving, the shunter was able to climb onto the platform. Although uninjured, they were shaken by what had occurred.
- 32 In accordance with the Bluebell Railway’s procedures, both the driver and the shunter were relieved of duty and tested for the presence of drugs and alcohol. Both returned clear results.
- 33 The Bluebell Railway arranged for independent testing of Fenchurch and Stepney’s braking systems (see paragraph 70).

Background information

Steam locomotive driving controls

- 34 The controls of steam locomotives can vary significantly between individual types and designs. However, there are several controls which are common, including some which are relevant to this investigation (figure 6).

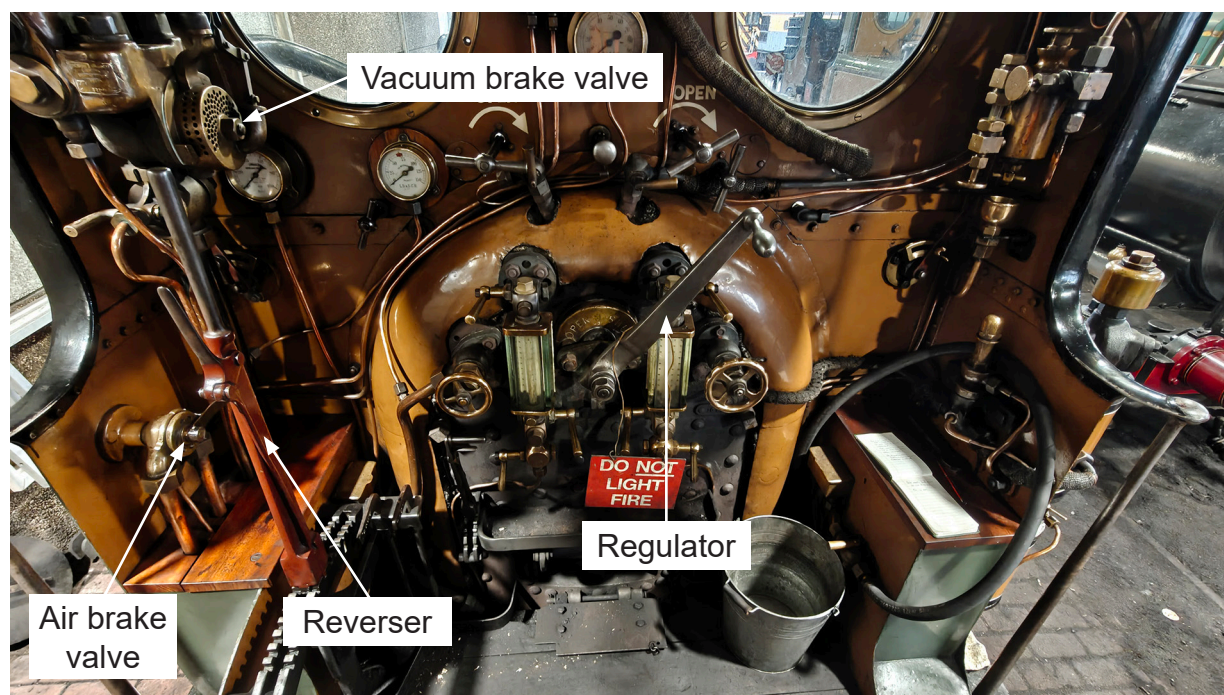


Figure 6: The controls on Fenchurch.

- 35 Steam is generated from water heated within the boiler. A regulating valve allows steam to be drawn from the boiler and supplied to the cylinders for propulsion. The regulator valve is manually opened and closed by the driver using a control located in the driving cab, usually referred to as the regulator. This is connected to the valve by a rod which passes through a pressure seal into the boiler.
- 36 When opened, the regulator valve allows steam to pass into the main steam pipe of the locomotive. The steam then passes, via a valve chest, into the locomotive's cylinders. In the case of the locomotives involved in this investigation, there are two cylinders, located at the front of the locomotive, between the main longitudinal frame members. These cylinders contain a reciprocating horizontal piston which is moved by the steam pressure, which applies on alternate sides of the piston head. Connecting rods then transfer this motion to the locomotive's wheels.
- 37 A system of valves directs the steam to either side of the pistons. These valves are controlled by the locomotive's reverser which allows the driver to select the direction of travel of the locomotive, among other things. In the case of the locomotives involved in this investigation, the reverser takes the form of a lever, located in the cab and operated by the driver.

- 38 When the regulator valve is closed, residual steam will condense into water. This water will accumulate at the lowest point in the system, which is the cylinders. Because water is incompressible, allowing the locomotive to move with water trapped in the cylinders can potentially cause damage. For that reason, small valves, known as 'drain cocks' are provided at each end of each cylinder. These cocks are manually controlled by the driver from the cab (figure 7). Opening the drain cocks will allow any condensed water to escape when steam is readmitted into the cylinders.



Figure 7: Drain cock operating handle on Fenchurch.

Steam locomotive braking systems

- 39 Most steam locomotives are configured to operate trains consisting of rolling stock fitted with vacuum brakes. On these locomotives, a device called an ejector creates a vacuum using a flow of pressurised steam. The stored vacuum is used to create a vacuum in brake cylinders located on the locomotive (used to mechanically apply the brakes) and in the automatic vacuum train pipe which is connected to the vehicles forming the train (such as passenger coaches). The vacuum brakes will apply if air is admitted into the vacuum train pipe via a control valve in the driving cab or if the vacuum train pipe separates, such as if the vehicles accidentally separate. The resulting admission of air destroys the brake pipe vacuum, which in turn applies vacuum to the brake cylinders so the brakes apply on all portions of the train, rendering it fail-safe.
- 40 When not in use, vacuum pipes lodge onto blank couplings, known as 'dummies', which are located on the buffer beam of vehicles. If a vacuum brake pipe is removed from a dummy coupling and left open to the atmosphere, the vacuum will be destroyed, and the brakes will fully apply on the vehicle in question. When coupling vacuum-braked vehicles, the vacuum brake pipes are removed from the dummy coupling before any other actions. This prevents a vacuum being created and prevents accidental movement of the vehicles.

- 41 Although most steam locomotives, including those involved in this incident, can generate vacuum and control the vacuum brakes on any attached vehicles, the braking systems for the locomotive itself can be of several different types. In some cases, a locomotive's braking is provided by means of air pressure, while in other cases braking may be by means of steam pressure, generated by the locomotive's boiler. It is usual for some form of combining valve to be provided such that a driver can apply the brakes on both the locomotive and any attached rolling stock by operating a single control.
- 42 Fenchurch is fitted with air brakes. A steam-driven pump provides compressed air to the air brake valve in the driving cab. The air brake valve, operated by the driver (figure 6), allows this compressed air to be supplied to a brake cylinder on the locomotive which in turn applies the brake blocks to the wheels by means of mechanical linkages. As with the vacuum braking system, the locomotive can provide air to other vehicles via the automatic air brake pipe. With the brakes released, this pipe is pressurised and a loss of air pressure causes the brakes to apply, again providing a fail-safe function. This loss of pressure can occur if vehicles separate unintentionally, or if an air brake pipe cock (located on the automatic air brake pipes at the front and rear of the locomotive) is opened, venting the air to atmosphere.
- 43 Fenchurch can work with air-braked rolling stock, such as coaches, but this facility is not normally used on the Bluebell Railway because it generally uses vacuum-braked rolling stock to form its trains. To allow it to operate vacuum-braked stock, Fenchurch is equipped with a combining valve, known as a 'Jackson Valve'. This allows the driver to use a single control (separate from the air brake control) which operates the vacuum brakes on the train and the air brakes on Fenchurch.
- 44 Steam locomotives are normally provided with a handbrake. On locomotives such as Fenchurch and Stepney, the handbrake control is a simple mechanical system (figure 8), using a vertical handbrake column in the cab. Operation of the handbrake applies the locomotive's brake blocks to the wheels through a system of mechanical linkages. The braking force exerted by the brake blocks when using the handbrake depends on the torque applied to the handle. The torque that can be applied is inherently limited by the physical capacities of the person using it.
- 45 Handbrakes are intended to prevent the locomotive rolling away on shallow gradients and are not designed to resist it being moved by another vehicle under traction power.



Figure 8: Handbrake on Fenchurch (circled).

Analysis

Identification of the immediate cause

46 The locomotives unexpectedly began to move while the shunter was between them.

- 47 The shunter was required to be between Fenchurch and Stepney to couple them together. The activity was preplanned, and the staff involved were all aware of what was going to take place and held the appropriate competencies to undertake the task.
- 48 Before climbing down from the platform to go between the locomotives to couple them, the shunter had sought and obtained verbal permission from the driver to do so. The driver gave the shunter permission to go in between the locomotives to couple them believing Fenchurch to be safely secured and that it would not move (paragraph 27).
- 49 When Fenchurch began to move, the handbrake on Stepney could not resist the movement, as it was not designed to (paragraph 45).

Identification of causal factors

- 50 The incident occurred due to a combination of the following causal factors:
- Steam pressure was able to build in the cylinders of Fenchurch, which caused it to make an uncommanded movement (paragraph 51).
 - Fenchurch was not effectively immobilised during the coupling operation (paragraph 67).

Each of these factors is now considered in turn.

Steam pressure

51 Steam pressure was able to build in the cylinders of Fenchurch, which caused it to make an uncommanded movement.

- 52 This causal factor arose due to a combination of the following:
- The driver had not ensured the regulator was fully closed, which admitted steam to the cylinders (paragraph 53).
 - The reverser was not, and was not required to be, in a position that would have reduced the risk of movement by the locomotive (paragraph 62).

Each of these factors is now considered in turn.

Operation of the regulator on Fenchurch

53 The driver had not ensured the regulator was fully closed, which admitted steam to the cylinders.

54 The regulator controls the rate at which steam is admitted to the cylinders, which in turn generates the force needed to move the locomotive (paragraph 36). To prevent any steam being passed to the cylinders, the regulator must be in the fully closed position. On Fenchurch, to reach the fully closed position, the driver must push the regulator lever all the way to the right. Since the driver is positioned to the left of the lever, this motion pushes it away from them (figure 9). The driver believed they had fully closed Fenchurch's regulator, but immediately after the incident found that they were able to move it a little further towards the fully closed position. This indicates that it had not actually been fully closed and that steam had been able to pass to the cylinders.

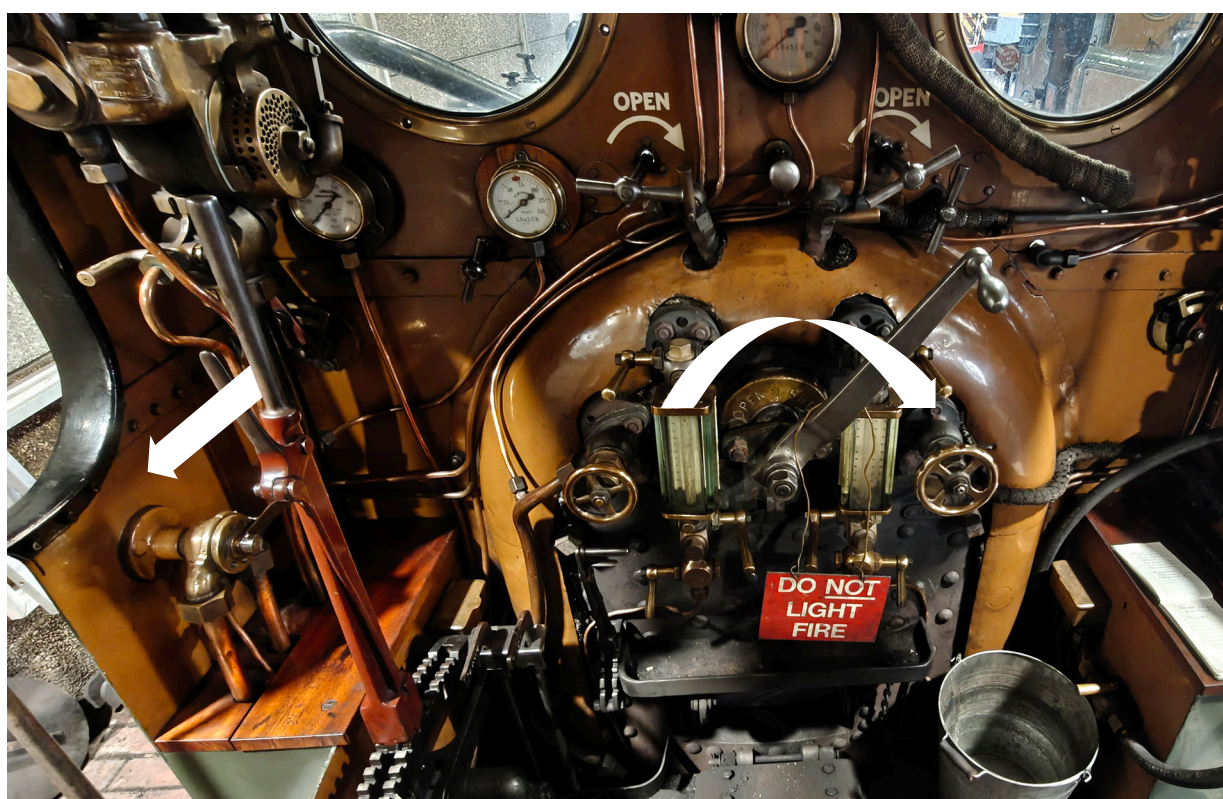


Figure 9: The regulator (right) and reverser (left) on Fenchurch.

55 At the time of the incident, the reverser (paragraph 37) was pulled all the way back into the full reverse position (figure 9). The driver was positioned to the left of the cab, so in this position the reverser was partially blocking the drivers access to the regulator and therefore restricting the driver's range of movement when closing it. This also made it more difficult to see the regulator's position when closed.

- 56 The regulator can get stiffer to operate the longer a locomotive is used during a shift due to the effects of heat, steam pressure and thermal expansion increasing friction within the regulator mechanism. The driver had noticed that this was the case as the day went on. The driver also stated that the regulator can be quite difficult to control when trying to move the locomotive at slow speeds. A report commissioned by the Bluebell Railway after the incident found that the regulator was operating as it should, and although it was stiff to operate, this was consistent with other locomotives, and there were no faults present. However, the report stated that stiffness near the end of the regulator's travel may make drivers think it is closed when it is not.
- 57 The driver stated that they felt under some pressure to get the move finished, and "they kept waving me forwards". This perceived pressure may have influenced the driver to complete the operation more quickly. Time pressure, whether internally or externally driven, is a well-established contributor to degraded performance in safety-critical environments and is likely to have increased the driver's perceived workload. Increased workload has been shown to reduce spare attentional capacity and affect information processing and decision-making.³ Under high workload conditions, operators may focus on immediate goals, leaving them less able to process other safety-critical information.
- 58 The driver also stated that they were feeling quite warm as it was a sunny day (paragraph 20). Environmental stressors are recognised contributors to variability in human performance and can increase operator workload.⁴ However, when the driver was observed carrying out the same procedure after the incident, the weather was not as warm, and the driver operated the locomotive in the same manner as during the incident. This suggests that the environmental conditions may have had less of an impact on their actions than other factors.
- 59 To avoid damage to the cylinders (paragraph 38) it is considered good practice to open the drain cocks when the locomotive is stationary. However, the Bluebell Railway's processes at the time of the incident did not require this to be done during coupling and the driver had not opened the drain cocks when they positioned Fenchurch next to Stepney ready for coupling.
- 60 The size of the drain cocks is small in comparison to the volume of steam passing through the cylinders. Generally, a steam locomotive can therefore move with the drain cocks open.
- 61 Opening the drain cocks has the by-product that if there is steam entering the cylinders (either through a leak, or the regulator not being closed) then a cloud of steam may emerge from the front of the engine. Although not intended to act as a warning system, the visible steam cloud and the sound of steam escaping from the drain cocks may have alerted the driver and the shunter that the regulator was not fully closed, and that Fenchurch was at risk of moving, before the shunter went between the locomotives.

³ Wickens CD, 'Multiple Resources and Mental Workload', Human Factors, 50(3), pages 449 to 455 (2008).

⁴ Hancock PA and Warm JS, A Dynamic Model of Stress and Sustained Attention, Human Factors, 31(5), pages 519 to 537 (1989).

Operation of the reverser on Fenchurch

62 The reverser was not, and was not required to be, in a position that would have reduced the risk of movement by the locomotive.

- 63 On a steam locomotive, one of the functions of the reverser is to allow the driver to set the direction of travel of the locomotive (paragraph 37). Before the incident, the driver left the reverser on Fenchurch in reverse, the same direction of travel needed to buffer up to Stepney. Leaving the reverser set this way on Fenchurch allowed steam to be admitted to the cylinders. Because the regulator was not fully closed (paragraph 54) the locomotive was able to move towards Stepney and the shunter. Good practice is to put the reverser in the mid-gear position (analogous to neutral in a road vehicle) as this can reduce the risk of the locomotive moving when not intended.
- 64 Given that the regulator was not fully closed (paragraph 54), the pressure, which had built in the cylinders, meant that the position of the reverser was able to overcome the force from the partially applied air brake (see paragraph 68) and cause Fenchurch to move.
- 65 The railway's procedures at the time did not require the reverser to be in the mid-gear position during coupling operations. Other operating procedures relating to stationary locomotives on the Bluebell Railway, such as requiring access to ash pans, did include the requirement to put the reverser into the mid-gear position to reduce the risk of movement.

Immobilising Fenchurch

66 Fenchurch was not effectively immobilised during the coupling operation.

- 67 This causal factor arose due to a combination of the following:
- The driver had not fully applied Fenchurch's air brake (paragraph 68).
 - The actions the shunter took to prevent Fenchurch from moving during the coupling operation were not effective (paragraph 73).

Each of these factors is now considered in turn.

Fenchurch's air brake valve

68 The driver had not fully applied Fenchurch's air brake.

- 69 Fenchurch is one of only two air-braked locomotives in the operational Bluebell Railway fleet. Fenchurch has an air brake valve separate to the combining valve used to control vacuum-braked rolling stock (paragraph 43). When used by the driver, the air brake valve will apply the air brakes on Fenchurch only, and not any other vehicles connected to the automatic vacuum pipe. It is primarily provided to hold the locomotive stationary, for example, when coupling and uncoupling, or when operating as a light locomotive, without any rolling stock attached.
- 70 Testing of Fenchurch commissioned by the Bluebell Railway after the incident found that the locomotive did not move when the air brake was fully applied, even with the regulator fully open.
- 71 The driver did not check the angle of the air brake valve when they applied it (figure 10). After the incident, the driver concluded that they had not fully applied it, stated that they could not understand why, and speculated that they might have applied it, but it had then somehow been knocked.

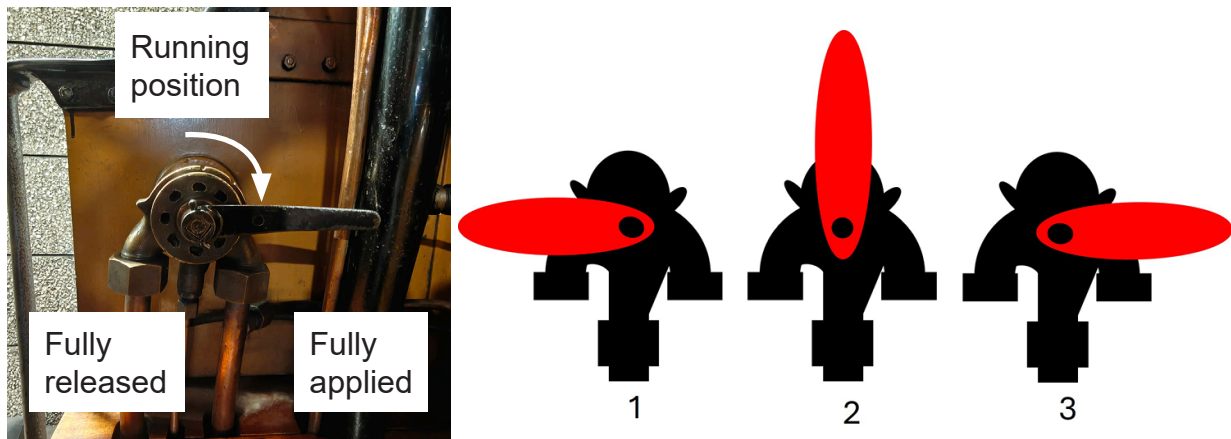


Figure 10: Fenchurch's air brake valve (left) and operating positions (right). Position 1 is the fully released position and will cause the brakes to be fully released. Position 2 is known as the 'running' position. Movement beyond this position towards position 3 will cause an increasing application of the brakes, depending on the exact position of the control. Position 3 will cause a rapid and full application of the brakes (known as the 'emergency' position).

- 72 When the fireman noticed that the locomotives were moving, they reached into Fenchurch from the platform and operated the air brake valve to check it was fully applied (paragraph 29). This action stopped the locomotives from moving any further during the incident indicating that the air brake had not been fully applied at the time of the incident.

Fenchurch's air brake pipe

73 The actions the shunter took to prevent Fenchurch from moving during the coupling operation were not effective.

- 74 Before coupling vehicles together, the person going in between them must immobilise the vehicles to prevent accidental movement. To do this on vacuum-braked vehicles, the vacuum pipes on both must be removed from their dummy couplings. This will prevent a vacuum from being created and will destroy any vacuum in the system, if the driver has not already done so (paragraph 40), thus applying the brakes. On air-braked vehicles, the air brake cock must be opened to vent air pressure already in the system or to prevent air pressure from being created, to similar effect (paragraph 42). It is vital, therefore, that the person immobilising vehicles before coupling is aware of the braking system that is in use.
- 75 The shunter removed the vacuum brake pipe from its dummy coupling on the rear of Fenchurch believing that would immobilise the locomotive. They were unaware from their training and Bluebell Railway's operational briefings that Fenchurch was an air-braked locomotive and that removing the vacuum pipe from its dummy coupling would therefore have no effect on its brakes (see paragraphs 86 to 98).

Identification of underlying factors

Safety management

- 76 **The Bluebell Railway was not effectively managing the risks associated with coupling air-braked rolling stock.**

Risk assessment process

- 77 In accordance with its legal duties under health and safety law, including those in the Railways and Other Guided Transport Systems (Safety) Regulations 2006, the Bluebell Railway is required to undertake suitable and sufficient assessments of the risks associated with its operations. The railway describes its method of doing so in General Instruction GI028 'Assessment of risk', version 2, dated 19 December 2019, which was current at the time of the incident.
- 78 GI028 requires that department managers have arrangements in place for assessing risk and for the identification and implementation of suitable and sufficient risk control measures. This instruction requires the risk assessment process to:
- identify hazardous activities and processes
 - identify the adequacy or otherwise of existing controls
 - identify any new control measures which are required
 - identify training needs
 - help the prioritisation of safety expenditure
 - help to demonstrate that risks are controlled to '*as low as is reasonably practicable*' (ALARP).
- 79 GI028 then requires risk assessors to rank risks using a 5x5 risk matrix (a table that has 5 categories for probability along one axis, and 5 for severity of outcome across the other, and which uses scores to signify low to high). These scores are multiplied together to give a risk factor score of between 1 and 25.
- 80 Assessors are required to identify existing safety measures and to assess them to ensure they are sufficient to reduce the risk to as low as is reasonably practicable, referring to good practice and relevant standards. If the risk factor score remains above 6, then additional measures should then be implemented, with departmental managers being responsible for ensuring that this occurs. Any implementation timescales or reasons for non-implementation should be recorded in the assessment.
- 81 GI028 requires that any measures implemented should follow a hierarchy of risk controls where the removal or reduction of the risk should be considered before the application of controls via systems of work.

Risks associated with coupling

- 82 The latest risk assessment for coupling and uncoupling undertaken before the incident was dated June 2024. It was prepared by the locomotive operations department and, among other hazards associated with coupling, had identified the hazard '*risk of crushing due to stock movements while between*', which refers to persons being between locomotives when coupling.

- 83 The 5x5 risk matrix assessed the likelihood of being crushed as 4 (*‘strong probability of occurring once every 6 months’*) with the resulting severity of being crushed scored as 5 (*‘death’*). Multiplying these scores gave a risk factor score of 20 out of a maximum score of 25, before applying risk controls. This score was colour-coded red, putting the hazard in the highest risk category.
- 84 The assessment then identified the following risk controls:
- ‘No-one to go between engines or vehicles until all have come to a stop, and the operative has received an assurance that the driver will not move the engine, and that other staff will not release brakes or remove scotches.*
 - The operative must satisfy themselves that unattended vehicles will not move, by checking that brakes are applied, or vehicles are securely scotched.*
 - The operative must satisfy themselves that no engine will approach stock while they are in between.*
 - Where two or more engines are attached to a train (including in the rear) operatives to receive confirmation that it is safe to go between.*
 - The driver will apply their brakes and take other steps to see that the engine will not move.*
 - The operative must take steps to prevent the driver from releasing the continuous brake until the operation is complete.*
 - Staff under training must be supervised by the driver/fireman/guard or shunter.*
 - No staff will remain between while any necessary “easing up” is carried out’.*

With these controls in place, the residual risk factor score was deemed to be 0. This was based on a residual likelihood and severity score of 0, indicating that the assessor had determined that no residual risk remained from coupling operations, no matter how remote. A severity score of zero if vehicles move with a person between them and a probability of that happening being zero when the protections are primarily based on human actions is not considered to be realistic by RAIB.

- 85 The risk controls listed are focused on individual actions and ways of working (see paragraphs 97 to 107). Despite this, they do not include references to the specific processes, procedures or training intended to ensure that these actions are undertaken. For example, risk control (f), which states that staff *‘must take steps to prevent the driver from releasing the continuous brake until the operation is complete’*, does not detail how the Bluebell Railway will achieve this in relation to the differences between air and vacuum-braked rolling stock, or refer to appropriate rules, or to the relevant training and competence standards.

Risk associated with operating Fenchurch

- 86 In October 2022, the Bluebell Railway locomotive operations department conducted a risk assessment to identify the risks associated with operating Fenchurch, which they were aware had unique features within the railway. The risk assessment identified that removing the vacuum brake pipe from its dummy coupling would not guarantee that the locomotive would not move (paragraph 75). The assessment recorded that staff could be crushed or scalded if the locomotive moved while people were in between vehicles.

- 87 The 5x5 risk matrix assessed the risk factor score for this hazard as 12. This was based on a likelihood score of 3 (*‘one event per year’*) x a severity of 4 (*‘a major injury resulting in long term absence from work’*) before applying any risk control measures. The control measure identified was:

‘Staff reminded of the risk, and briefed to apply the handbrake, and or to remove the air Train pipe from the dummy, and open the air brake pipe, to prevent the TP [train pipe] from being re-charged.’

No assessment of the effectiveness of this control and the level of residual risk remaining was recorded on the risk assessment.

- 88 RAIB also noted that the words ‘and or’ in the control measure could be interpreted to mean that there is no need to open the air brake pipe cock if the handbrake has been applied. However, in some circumstances, a locomotive could move with its handbrake applied, as demonstrated by Stepney during the incident, as they are designed to hold a stationary locomotive against moderate falling gradients.
- 89 The shunter was not aware that they needed to open Fenchurch’s brake pipe cock to prevent it from moving when they went in between it and Stepney to couple them together (paragraph 74). Witness evidence was that none of the staff at cleaner grade were aware of this risk, or that Fenchurch was different to other steam locomotives. RAIB found no evidence that this requirement had been formally briefed to staff before the incident or that had it been included in any work instructions, method statements, training, or operating rules.

Rules and method statements

- 90 The Bluebell Railway Rule Book dated 1 October 1997, which was current at the time of the incident, is based on the British Railway Rule Book from 1955. It contains a number of outdated rules and terminology and generally does not reflect modern heritage railway operations.
- 91 There are many rules in the Bluebell Railway Rule Book that reference coupling or uncoupling. Of these, Rule 12 (a) is of particular relevance and requires that:
- ‘Members of the staff must exercise proper care in getting between vehicles for the purpose of coupling or uncoupling them’.*
- This rule does not mention removing vacuum brake pipes before coupling or uncoupling, and neither this rule, nor any others, mentions opening air brake pipe cocks to prevent locomotives or vehicles accidentally moving before coupling or uncoupling them.
- 92 The Bluebell Railway also has a General Appendix to its Rule Book. This contains modifications to some rules and includes additional instructions. General Appendix section 10 (undated) is titled ‘Regulations for automatic braking systems’. It contains instructions related to operating vacuum-braked and air-braked rolling stock. The regulations for working air-braked rolling stock describe the air braking equipment on locomotives, including brake hoses and cocks, and how the air brake functions.

- 93 General Appendix section 6 (undated) is titled 'Shunting'. Within this, subsection 4.3 'Coupling and Uncoupling' states that:

'The vacuum brake pipes must be kept off the dummy couplings until such time as the work of coupling or uncoupling the other apparatus referred to has been completed unless it is necessary for an easing-up movement to be made'.

General Appendix section 6 subsection 4.3 does not contain any instructions related to opening air brake pipe cocks to prevent vehicle movement before coupling or uncoupling air-braked vehicles, including locomotives.

- 94 General Appendix section 10, clause 10.1, 'Coupling and uncoupling engines or vehicles fitted with the automatic vacuum or air brake' also includes additional instructions relating to brake pipe cocks:
- The section titled 'Detaching of engines or vehicles' includes an instruction that *'The brake pipes cocks on both vehicles at the point of division must be opened in order to ensure that the brakes are applied'*. However, there is no such similar instruction to open brake pipe cocks to prevent movement before coupling vehicles.
 - The section titled 'Before starting' does not include any instructions to first open air brake pipe cocks to prevent accidental movement of vehicles when coupling.
- 95 Method statements sit within the Bluebell Railway's risk management manual. They describe the sequence of steps necessary to safely undertake an activity. Method statement MS 016 for coupling and uncoupling was prepared by the Bluebell Railway in April 2019. It refers to the risk assessment for coupling and uncoupling (paragraph 82) and General Appendix sections 6 and 10. The instructions in method statement MS 016 include a requirement that the vacuum hose is removed from the dummy coupling when between a locomotive and vehicles. However, there is no similar instruction to open the air brake pipe cock on rolling stock fitted with air brakes.
- 96 It is not clear from the available evidence how these method statements are communicated to staff, and they are not referenced in any of the training material for relevant roles reviewed by RAIB as part of its investigation.

Training

- 97 Familiarisation sessions for Fenchurch were conducted on 28 and 29 January 2023 following the latest overhaul of the locomotive. Not every member of the locomotive department was given this familiarisation and information provided by the Bluebell Railway was that 19 drivers and firemen working on the railway completed it. However, Bluebell Railway was unable to tell RAIB how many drivers were active at the time of these familiarisation sessions. The decision to hold these sessions was based on the number of new drivers and firemen who had taken these roles since Fenchurch last ran in 2011.
- 98 The driver was not included in the familiarisation training as they had worked extensively on the locomotive's overhaul, and it was assumed they knew about the features of Fenchurch's braking system, which differed from the other locomotives on the railway. Staff holding cleaner competency (including the shunter) were not included in these sessions as they were not regarded as operational staff. This meant that they were not trained in the differences between the braking system on Fenchurch and other locomotives.

Competency management

- 99 Following the incident, the driver's competency was assessed while undertaking a similar coupling activity to the one in the incident. During this assessment, the locomotive again moved unexpectedly. As a result of this, the driver felt at this point that it would be best for them to stop undertaking driving duties, which they did. They stated that their decision to stop driving was, in part, also due to other commitments on their time.
- 100 The driver had over 40 years of experience. They were a senior driver on the railway who, in their role as a driver inspector, assessed the competency of others to undertake the driving role. Competency assessments at the Bluebell Railway are carried out every 2 years for staff between the ages of 60 and 70, and every year for staff from the age of 70. As the driver was over 70 years of age, they were subject to a yearly competence assessment. Their last assessments took place in September 2024, around 11 months before the incident (paragraph 15). No issues had been raised before the incident about the driver's operational performance.
- 101 The Bluebell Railway's competence management system for drivers consists of 10 units. Unit 430, 'Shunting and marshalling of trains', issue 3 dated August 2021, is relevant to this incident. The purpose of unit 430 is for drivers to demonstrate their competence to shunt vehicles and marshal trains. To be deemed competent, the unit requires drivers to have been assessed on a prescribed range of activities including coupling and uncoupling. However, the unit does not require an assessment of a driver's knowledge and practical application in ensuring locomotives are secured from movement, before authorising staff to go in between vehicles to couple or uncouple them.
- 102 Assessors use an assessment checklist based on the individual units to record overall competence. Part 4 of the checklist concerns shunting and is based on unit 430. The checklist covers starting train movements, agreeing shunt moves, physically discharging the shunt, completing the shunt in a timely manner, ensuring that the train is formed correctly, verifying the operational efficiency of the braking system, and reporting difficulties in shunting operations. Part 4 of the checklist does not mention configuring the locomotive if working with a cleaner during coupling activities or making sure locomotives are safely secured from movement before coupling or uncoupling. Coupling is only mentioned once, and that is in relation to drivers making sure the locomotive has been properly coupled to the adjacent vehicle.
- 103 This contrasts with part 6 of the checklist 'Handing over a locomotive on relief by another crew' (based on unit 460 'Handover and dispose of trains'). This requires that before handover to another crew the locomotive is correctly secured, which includes the following requirements:
- handbrake on
 - drain cocks open
 - power brake on (this refers to the locomotive vacuum or air brake).
- 104 Driver competency assessments are not locomotive specific and can be undertaken on any type of locomotive. For example, the driver's last competency assessment took place on the locomotive 'Sir Archibald Sinclair', a different type of locomotive to those involved in the incident, which is not air braked.

- 105 Medical examinations are carried out at the same intervals as competency assessments. These examinations cover hearing, sight, and general mobility. The driver's last medical assessment was on 10 June 2025, which did not raise any concerns.
- 106 The assessment checklists for cleaners (who perform shunting operations), is also based on a number of competence management system units and includes questions relating to what to do before going in between vehicles and what hazards may be encountered. It asks when vacuum brake pipes should be coupled but does not mention anything about opening air brake pipe cocks to prevent movement of air-braked vehicles.
- 107 Heritage Railway Association (HRA)⁵ guidance note HGR-A0050 'Competence management systems for all tasks, including safety critical tasks', issue 3 dated February 2020, states that safe methods of coupling and uncoupling should be an included component of a competence management system.

Previous occurrences of a similar character

- 108 RAIB identified three previous investigations that were relevant to this incident.
- 109 In February 2006, a steam locomotive travelling at low speed towards Loughborough Central station collided with the rearmost of six carriages berthed at platform 1 ([RAIB report 07/2006](#)). Two members of Great Central Railway staff sustained minor injuries and the locomotive and one carriage sustained damage. The immediate cause of the accident was that the driver did not apply the locomotive's brakes. Factors that contributed to the incident were the driver and fireman being distracted from looking out, reduced visibility due to a concentration of steam, and the driver's reduced visual acuity when not wearing spectacles.
- 110 In July 2006, a volunteer train guard on the Gwili Railway became trapped between two carriages as they were being coupled together during a shunting manoeuvre at Bronwydd Arms ([RAIB report 22/2007](#)). The guard later died of their injuries. The immediate cause of the accident was a misunderstanding of shunting hand signals, resulting in the driver moving a carriage to couple up to others that were stationary, while the guard stepped into the gap between the carriages in the belief that the vehicles would not move. An underlying factor to the accident included the management of safety at the railway.
- 111 In May 2012, a volunteer train guard was fatally injured after becoming trapped between two coaches at Grosmont station on the North Yorkshire Moors Railway ([RAIB report 23/2012](#)). The immediate cause of the accident was that the guard was between vehicles during a shunt move when the locomotive and a coupled coach that were moving away unexpectedly changed direction. Factors in the accident included the reverser moving from reverse to forward gear, causing the locomotive to change its direction, and the driver omitting to engage a latch which would have prevented this. It is likely that the guard moved back between some coaches because he had no reason to believe that the locomotive and coach, which was originally moving away from them, would change its direction.

⁵ The Heritage Railway Association is a trade body which produces guidance on various topics for its members, which includes the Bluebell Railway.

Summary of conclusions

Immediate cause

112 The locomotives unexpectedly began to move while a member of staff was in between them (paragraph 46).

Causal factors

113 The causal factors were:

- a. Steam pressure was able to build in the cylinders of Fenchurch, which caused it to make an uncommanded movement (paragraph 51), **Recommendation 1**. This causal factor arose due to a combination of the following:
 - i. The driver had not ensured the regulator was fully closed, which admitted steam to the cylinders (paragraph 53), **No Recommendation**.
 - ii. The reverser was not, and was not required to be, in a position that would have reduced the risk of movement by the locomotive. (paragraph 62), **Recommendation 1**.
- b. Fenchurch was not effectively immobilised during the coupling operation (paragraph 66), **Recommendation 1**. This causal factor arose due to a combination of the following:
 - i. The driver had not fully applied Fenchurch's airbrake (paragraph 68), **No recommendation**.
 - ii. The actions the shunter took to prevent Fenchurch from moving during the coupling operation were not effective (paragraph 73), **Recommendation 1**.

Underlying factor

114 An underlying factor was:

- a. The Bluebell Railway was not effectively managing the risks associated with coupling air braked rolling stock (paragraph 76), **Recommendation 1**.

Previous RAIB recommendations relevant to this investigation

115 The following recommendations, which were made by RAIB as a result of its previous investigations, have relevance to this investigation.

[Accident at Grosmont, North Yorkshire Moors Railway, 21 May 2012, RAIB report 23/2012, Recommendation 1](#)

116 This recommendation reads as follows:

Recommendation 1

The intention of the recommendation is that the North Yorkshire Moors Railway should review and improve its safety management arrangements relating to shunting. In particular, it is important that the rules covering shunting represent best practice and that training ensures, and assessment tests, a correct understanding of the dangers inherent in shunting and the control measures in place to allow shunting to be carried out safely. As a minimum, it is intended that the review includes consideration of:

- *updating the North Yorkshire Moors Railway's rule book to include relevant rules covering shunting contained in the national network rule book that may reflect learning from accidents that have occurred;*
- *improving the method of training so that it is more formalised and reflects a specific syllabus appropriate to the necessary competence to be achieved;*
- *how assessment and re-assessment should cover all the necessary areas of competence relating to shunting and how the outcomes of assessments should be documented; and*
- *the system of management checks and how they should be documented.*

117 On 3 December 2015, the Office of Rail and Road (ORR, the safety authority for railways in Great Britain) reported to RAIB that in response to this recommendation the North Yorkshire Moors Railway had:

- updated its rule book, supplemented by briefing notes
- introduced a professional shunting course
- introduced guard and shunter question papers as part of its staff assessment activity, along with practical observation, classroom and practical assessments of competence; and formalised safety activity monitoring.

Based on this response, ORR stated that it was content that the recommendation had been implemented.

[Accident at Bronwydd Arms station, 19 July 2006, RAIB report 22/2007, Recommendation 6](#)

118 This recommendation reads as follows:

Recommendation 6

The Heritage Railway Association should issue new guidance on competence and medical standards for safety critical staff. This should be based on the views contained within the letter from the ORR (HMRI) to the HRA of 15 August 2006, ref 4004066. It should include the standards to be achieved for all staff that undertake safety critical duties, denoted on a role based model. Consideration should also be given to examination of safety critical staff of all ages when returning to duty after significant surgery, illness or injury; or if there has been a significant loss of physical health or mental acuity.

119 In response to this recommendation, HRA reported to ORR in August 2007 that amended guidance on medical examinations had been created and would be subject to review. Doctors who examined heritage sector staff would be invited to a meeting to refine the guidance further with the result being placed on the HRA website. Heritage rail operators would be made aware of the revised guidance and asked to take action as appropriate. In 2008 this recommendation was reported by ORR to RAIB as being closed.

Actions reported as already taken or in progress relevant to this report

- 120 A document has since been written and released by the Bluebell Railway, which states specific actions that should have been completed when coupling and uncoupling locomotives (figure 11).



COUPLING AND UNCOUPLING

Following a recent incident Drivers and staff involved in coupling Locomotives to any vehicle must note the following.

- **DRIVERS**

Before giving permission for any operative to go in between to couple or uncouple Drivers must ensure that the following actions have been completed:

Steam Locomotives

- The Vacuum Brake and/or the air brake where fitted has been fully applied and the vacuum ejector fully closed.
- In the case of an air braked locomotive, or as may be required, the hand brake must also be fully applied.
- The regulator is fully closed.
- The Locomotive is in Mid Gear.
- The cylinder cocks have been opened to ensure that any steam trapped in the cylinders is vented. *Note that once it has been established that any trapped steam has been vented then, in the case where the coupling or uncoupling is to be undertaken at the smokebox end of the locomotive, the cylinder cocks may be closed for the duration of the coupling procedure and opened again on completion of the coupling or uncoupling*
- Permission may then be given for coupling/uncoupling operations to proceed.

Figure 11: Revised process for coupling and uncoupling.

Actions reported that address factors which otherwise would have resulted in an RAIB recommendation

- 121 The Bluebell Railway is in the process of rewriting its Rule Book to better reflect its operations.

Actions reported as already taken or in progress relevant to this report

Recommendation

Recommendation

122 The following recommendation is made:⁶

- 1 *The intent of this recommendation is to reduce the risk of harm when undertaking the safety-critical task of coupling and uncoupling.*

The Bluebell Railway should undertake a risk-based review of its arrangements for coupling and uncoupling rail vehicles. This review should consider relevant heritage sector guidance and good practice from other heritage railways and the mainline railway, and include consideration of the following:

- how coupling and uncoupling arrangements will accommodate variations which might apply to different traction types and vehicle braking arrangements
- the responsibilities of each role involved in coupling and uncoupling rail vehicles and how these are reflected in competency management systems, training and operating rules
- how any arrangements will be monitored to ensure they are effectively controlling risk.

Following this review, the Bluebell Railway should develop a timebound plan to make appropriate changes identified to standards, training and competence processes.

This recommendation may apply to other heritage railways (paragraphs 113a, 113a.ii, 113b, 133b.ii and 114a).

⁶ Those identified in the recommendation 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, this recommendation is addressed to the Office of Rail and Road to enable it to carry out its 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 200 to 203) can be found on RAIB's website www.gov.uk/raib.

Appendices

Appendix A - Glossary of abbreviations and acronyms

Abbreviation / acronym	Full term
ALARP	As low as reasonably practicable
DOM	Duty operations manager
HRA	Heritage Railway Association
ORR	Office of Rail and Road
RAIB	Rail Accident Investigation Branch

Appendix B - Investigation details

RAIB used the following sources of evidence in this investigation:

- information provided by witnesses
- site photographs and measurements
- weather reports and observations at the site
- documentary evidence provided by the Bluebell Railway including post-incident test reports, standards, rules, instructions and risk assessments, and staff competence and training and medical records
- HRA guidance documents
- a review of previous RAIB investigations that had relevance to this incident.

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Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253 300
Website: www.raib.gov.uk