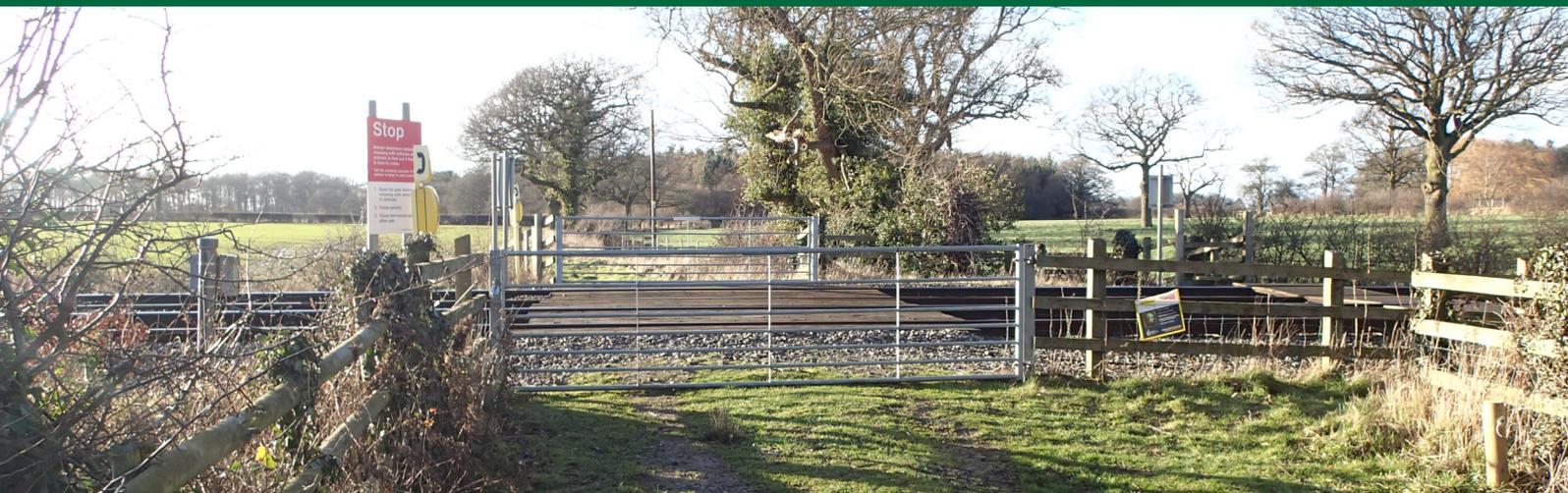




Rail Accident Investigation Branch

Rail Accident Report



Passenger train collision with trolley at Bridgeway User Worked Crossing, near Shrewsbury 16 January 2014

Report 25/2014
November 2014

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.

Passenger train collision with trolley at Bridgeway User Worked Crossing, near Shrewsbury, 16 January 2014

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Summary

At around 23:58 hrs on Thursday 16 January 2014, a passenger train travelling between Crewe and Shrewsbury struck a welder's trolley that had been placed on the line at Bridgeway user worked crossing. The train was travelling at about 85 mph (137 km/h) at the point of collision and stopped in just under 0.5 miles (0.8 km). A track worker, who was on the trolley loading it with tools, jumped clear when he became aware of the approaching train a few seconds before impact. He suffered minor injuries. The train sustained significant damage to its front and to underframe equipment, including the fuel tank, and the trolley was destroyed. Neither the train driver, conductor, nor the one passenger on board the train were injured. The group of three staff involved (Controller of Site Safety (COSS), welder and track worker) were taken back to Shrewsbury depot some four hours after the accident.

The accident occurred because the trolley was placed on a line that had not been blocked to normal train operations. The Controller of Site Safety (COSS) had blocked the opposite line on the advice of the welder, who had been misled by the presentation of information in the paperwork describing the safety arrangements for the job. However, the welder later realised that the work was actually on the line that had not been blocked, but he still placed his trolley on that line believing that no train would approach because of engineering work taking place elsewhere in the area. The COSS was not directly supervising the workers when the trolley was placed on the line. Prior decisions made in work planning and resourcing, and the absence of relevant information in the paperwork about the location of the work, contributed to poor decision-making by the track workers on the night of the accident. In investigating this accident, the RAIB also observed that there were a number of deficiencies in competence management at Shrewsbury Maintenance Delivery Unit, and that welfare arrangements for the track workers in the immediate aftermath of the accident were poor.

The RAIB has identified three learning points and made three recommendations, all to Network Rail. The learning points relate to competence management practices and briefings at Shrewsbury Maintenance Delivery Unit, and the importance of staff relying on their own safe systems of work rather than making assumptions about work taking place elsewhere. The recommendations focus on the presentation of information in the paperwork describing the safety arrangements for the job, factors affecting planning decisions at Shrewsbury Maintenance Delivery Unit, and Network Rail's competence management processes for staff on secondments or returning to work from a period of absence.

Introduction

Preface

- 1 The purpose of a Rail Accident Investigation Branch (RAIB) investigation is to improve railway safety by preventing future railway accidents or by mitigating their consequences. It is not the purpose of such an investigation to establish blame or liability.
- 2 Accordingly, it is inappropriate that RAIB reports should be used to assign fault or blame, or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.
- 3 The RAIB's investigation (including its scope, methods, conclusions and recommendations) is independent of all other investigations, including those carried out by the safety authority or railway industry.

Key definitions

- 4 All dimensions in this report are given in metric units, except speed and locations which are given in imperial units, in accordance with normal railway practice. Where appropriate the equivalent metric value is also given. Mileages in this report are measured from a zero datum at Crewe South Junction.
- 5 The terms 'up' and 'down' in this report are relative to the direction of travel along the railway. The up direction is towards Shrewsbury; the down direction is towards Crewe.
- 6 The report contains abbreviations and technical terms (shown in *italics* the first time they appear in the report). These are explained in appendices A and B.

The accident

Summary of the accident

- 7 At around 23:58 hrs on Thursday 16 January 2014, a passenger train travelling between Crewe and Shrewsbury struck a welder's trolley that had been placed on the line at *Bridgeway user worked crossing (UWC)*, approximately four miles (6.4 km) north-east of Shrewsbury (figure 1). The train was travelling at about 85 mph (137 km/h) at the point of collision and came to a stand in just under 0.5 miles (0.8 km).
- 8 A track worker, who was on the trolley loading it with tools, jumped clear when he became aware of the approaching train a few seconds before impact. He suffered minor injuries.

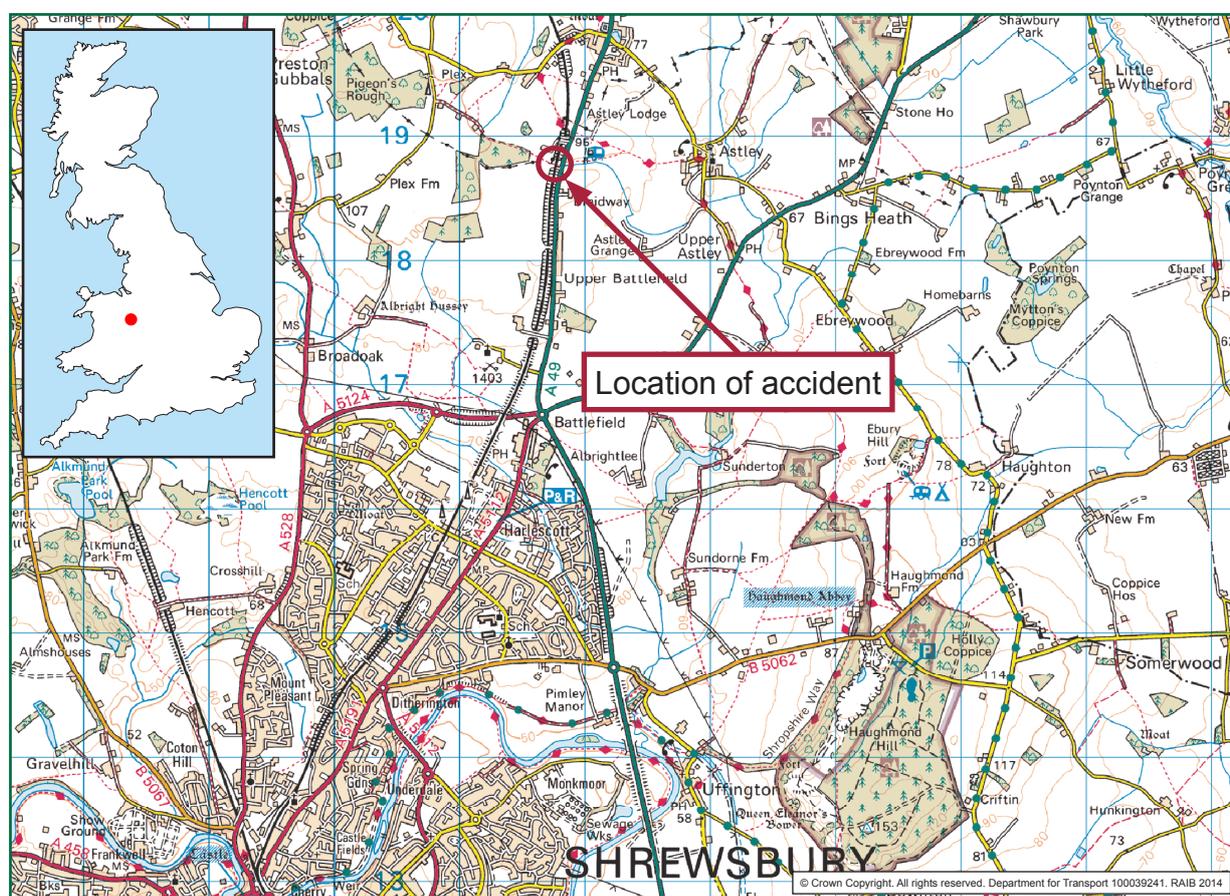


Figure 1: Extract from Ordnance Survey map showing location of accident

- 9 The train sustained significant damage to its front and to underframe equipment, including the fuel tank, which was ruptured. The trolley was destroyed (figure 2).

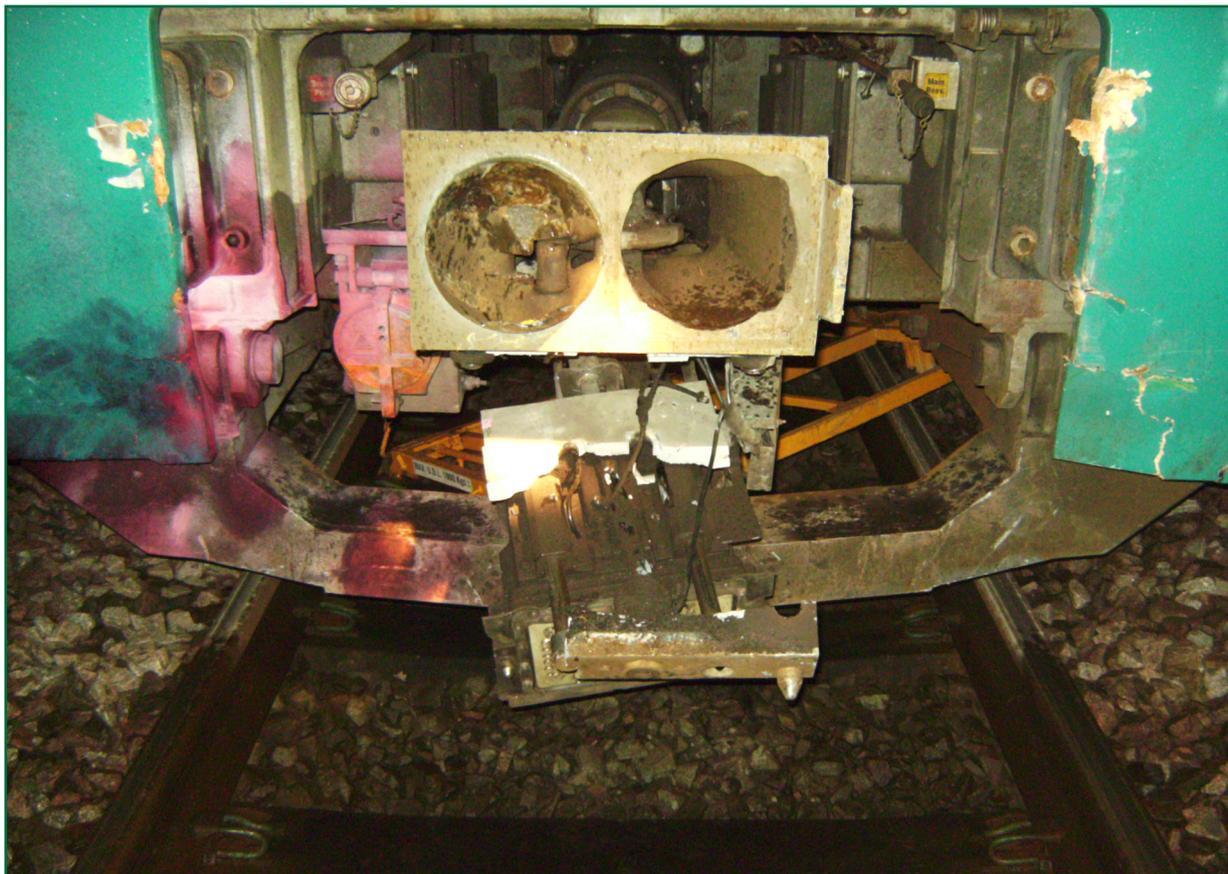


Figure 2: Damage to the front of the train. The remains of the yellow trolley can be seen underneath the train (photograph courtesy of British Transport Police).

Context

Location

- 10 Bridgeway UWC is located at 28 miles 35 *chains* on the double track railway that runs between Crewe and Shrewsbury (figure 3). The maximum permitted speed for passenger trains running in the normal direction on both lines is 90 mph (145 km/h).
- 11 At this location, the railway runs broadly parallel to the A49 Shrewsbury Road. The crossing is used by vehicles and pedestrians to access farmland adjacent to the railway. It is equipped with a locked gate for vehicles, a stile for pedestrians, and telephones for people to contact the signaller when crossing with vehicles or animals. The crossing is also used as an *access point* by track workers.
- 12 In October 2013, the line was resignalled, with *bi-directional* signals provided on both the up and down lines and *axle counters* for train detection. Signalling is controlled from Shrewsbury North workstation at Network Rail's Wales Railway Operating Centre, in Cardiff.

Organisations involved

- 13 Network Rail is the owner, operator and maintainer of the railway infrastructure, and employer of the three workers involved in the accident.
- 14 Arriva Trains Wales operated the train and employed the train driver and conductor.

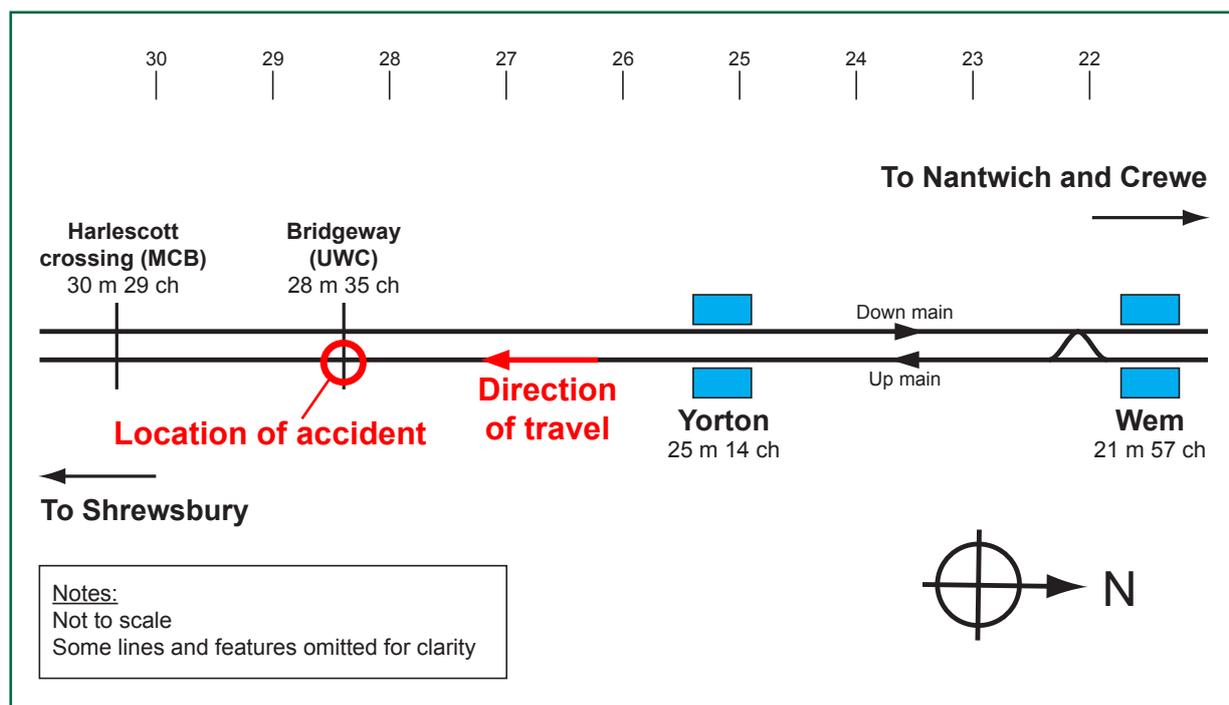


Figure 3: Track diagram showing direction of travel of train and collision location

Train involved

- 15 Train reporting number 1J76 was the 22:36 hrs service from Manchester Piccadilly to Shrewsbury, consisting of a three-car class 175 diesel multiple unit.
- 16 There were three people on board – the driver, the conductor and one passenger, none of whom were injured in the accident.

Staff involved

The Controller of Site Safety (COSS)

- 17 The *Controller of Site Safety* (COSS) worked in the signalling and telecommunications (S&T) section at Shrewsbury Maintenance Delivery Unit, and had 13 years' experience in this role. He had been a COSS for about 10 years prior to the accident.
- 18 At the time of the accident, he was undertaking one year's secondment to the track maintenance section, which was due to end in March 2014. He had also had a period of extended sick leave from 26 June 2013 to 1 December 2013. He then took annual leave and returned to work in January 2014.
- 19 His most recent competence review was on 13 May 2013, in which he initially failed his COSS knowledge test. In accordance with Network Rail's competence assurance process (paragraph 78), he was subsequently passed as competent on 18 June 2013 following re-briefing and re-questioning from his S&T line manager.
- 20 There was no evidence that he had had any experience acting in the role of COSS during his period of secondment, until 15 January 2014 (the day before the accident).

The welder

- 21 The welder had worked on the railway for 37 years, and had been a welder since 1979. In his last competence review on 9 July 2013, he failed the knowledge tests for a number of track safety competences, including *personal track safety* (PTS), *lookout* and COSS. However, his line manager reviewed the one incorrect question for PTS, and two incorrect questions for lookout, and subsequently passed the welder in these competences on the same day.

The track worker

- 22 The track worker had 13 years' experience on the railway. His last competence review was on 28 May 2013, in which he failed his PTS knowledge test on one question, but was re-questioned by his line manager and then passed as competent on the same day.

External circumstances

- 23 It was dark and cold on the night of the accident, with a temperature of 6°C (43°F). Conditions were damp from rain earlier in the evening. These conditions were not a factor in the accident.

Events preceding the accident

- 24 On the night of 15/16 January 2014 (the night before the accident), the COSS was assigned to work with the welder and the track worker who were involved in the accident the following night, plus another track worker to carry out two *weld repairs* in the vicinity of Bridgeway UWC. One was on the down line at 26 miles 879 yards, and the other was on the up line at 29 miles 1231 yards (figure 4).
- 25 The COSS had been re-assigned to the work group at the last minute because the original COSS for this job had called in sick. This delayed the start of work to around 01:30 hrs on 16 January 2014.
- 26 The safety arrangements were defined by a Network Rail *planner* and recorded in a set of documents known as the *safe system of work pack* (SSOWP)¹. This included details of two separate *line blockages*, one for the down line and one for the up line, which were to protect the track workers from train movements.
- 27 When the COSS contacted the signaller to arrange for protection from train movements, he decided to only ask for a block of the down line. On the advice of the welder, he also opted not to apply the *detonator protection* that had been planned in the SSOWP, because he correctly determined that the work as they intended to carry it out would not affect the safety of the line².
- 28 Because of the late start, only the weld repair on the down line was completed on the night of 15/16 January 2014. The COSS, the welder and the track worker therefore returned on the night of 16/17 January 2014 in order to carry out the weld repair on the up line.

¹ NR/L2/OHS/019 'Safety of People Working On or Near the Line' defines the process for planning and documenting the Safe System of Work arrangements.

² The Rule Book Handbook 8 (GE/RT8000/HB8 'IWA, COSS or PC blocking a line') states that additional protection, such as detonator protection, is necessary if the work will affect the safety of the line.

- 29 The planner produced a SSOWP for the work to be undertaken on the night of 16/17 January 2014, which was largely a replica of the one for the previous night, with some minor amendments to mileages to account for the work that had been completed on the down line. The two line blockages were planned in an identical way to the night before.
- 30 At approximately 22:45 hrs, the COSS and the track worker left Network Rail's Shrewsbury Maintenance Depot in a Network Rail van, while the welder left the depot in a separate van. They initially went to the level crossing at Harlescott (figure 4) at around 23:05 hrs in order to set up the safe system of work (it was close to the location where *detonators* were to be placed) and for the COSS to conduct his worksite safety briefing.
- 31 The COSS contacted the signaller at about 23:10 hrs and, in a series of phone calls over the next 30 minutes, set up the safe system of work. After consulting with the welder about which of the planned line blockages they needed, he again decided to block only the down line (paragraph 45). This time, though, he agreed with the signaller to place detonator protection because they were planning to use an on-track trolley to convey their equipment to site. In conversation with the signaller, the COSS expressed his unfamiliarity with the new signalling system which had been commissioned while he was on sick leave (paragraph 18).
- 32 The COSS placed the detonator protection himself at the protecting signal on the down line on the approach to Harlescott Level Crossing. Meanwhile, the welder departed for Bridgeway UWC in his van, arriving there at around 23:45 hrs. Upon arrival, he opened the crossing gate, reversed the van towards (but not onto) the up line, and awaited the arrival of the COSS and the track worker. At some point during this time, he referred to a job sheet in his van, and realised that the weld repair they had to do was actually on the up line.

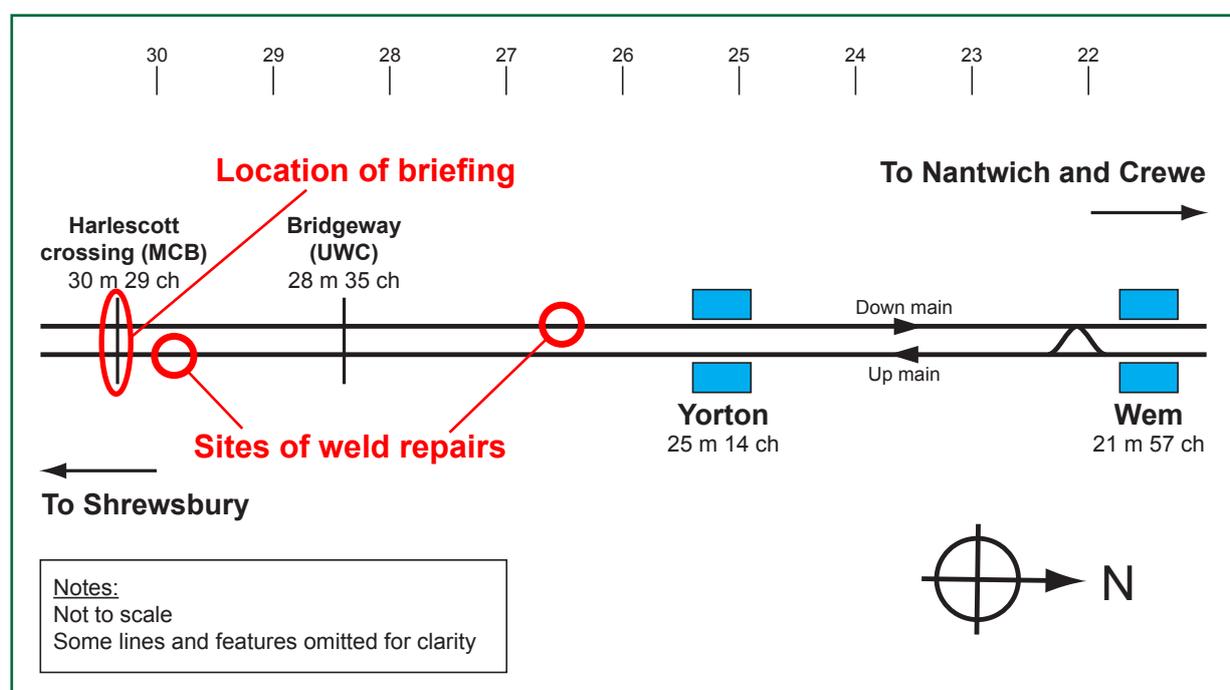


Figure 4: Track diagram showing sites of weld repairs and location where the COSS set up the system of work and conducted the site safety briefing

Events during the accident

- 33 At around 23:52 hrs, the COSS and the track worker arrived at Bridgeway UWC. The COSS gave authority for the welder to go on the line (although there is conflicting evidence as to whether he specified which line; see paragraph 62), and the track worker immediately began helping the welder to unload his van. Meanwhile, the COSS stayed with the other (second) van.
- 34 The welder and the track worker placed the trolley on the up line. The track worker then climbed onto the trolley while the welder handed him tools and equipment from the van.
- 35 Just before 23:58 hrs, train 1J76 approached Bridgeway UWC, travelling at around 85 mph (137 km/h). The train driver sounded the train horn when he saw a vehicle parked on the crossing (railway rules do not require the train horn to be routinely used at such crossings between 23:00 hrs and 07:00 hrs). At about the same time, the track worker realised the train was approaching and jumped from the trolley to the side of the van. Two to three seconds later, the train struck the trolley. The train missed the back of the van by a margin that was possibly³ as small as 100 mm.

Events following the accident

- 36 The train driver applied the train's brakes and made an emergency radio call to Network Rail's control centre in Manchester reporting that he had struck a Network Rail vehicle. The information was relayed to the signaller responsible for that section of line at the Wales Railway Operating Centre. At approximately 00:07 hrs, the signaller telephoned the COSS and instructed him to ensure that nothing on the site was moved until a *Rail Incident Officer* (RIO) arrived. The workers were therefore obliged to wait on site for the RIO to arrive.
- 37 The Incident Support Controller at the Wales Railway Operating Centre attempted to contact several members of on-call maintenance and operations staff as part of Network Rail's response to the accident. However, there were difficulties in identifying suitable local support because of other incidents in the area, and the staff that did attend had to travel some distance to Shrewsbury. This meant that the on-call supervisor for the maintenance function was not on site until 02:07 hrs, and the RIO did not arrive until 02:48 hrs.
- 38 In the meantime, officers from the British Transport Police arrived at around 00:30 hrs. They breathalysed and took statements from the COSS, the welder and the track worker.
- 39 A representative from Arriva Trains Wales arrived at 01:20 hrs. The driver was relieved of duty and left site around 01:30 hrs. The passenger on the train was picked up by car at about 01:45 hrs. The train was moved off site at 04:03 hrs after the trolley had been removed and the train had been deemed fit to move. The line was re-opened at 04:26 hrs.

³ RAIB site measurements, vehicle specification data and witness evidence suggest that the clearance was between 100 mm and 850 mm.

- 40 At 04:00 hrs, the RIO was stood down and accompanied the three workers to Shrewsbury depot where, at around 04:30 hrs, they were tested for drugs and alcohol, in accordance with railway procedures for staff involved in safety incidents. The results of these tests were clear for all three members of staff. The track worker then went to hospital for treatment to his injuries.

The investigation

Sources of evidence

41 The following sources of evidence were used:

- witness statements;
- the train's *on-train data recorder* (OTDR);
- Forward-facing Closed Circuit Television (FFCCTV) recordings taken from train 1J76 on the night of the accident and from another train in daylight hours;
- mobile phone records for the three members of staff involved;
- telephone voice recordings to and from the Shrewsbury North workstation at Wales Railway Operating Centre;
- vehicle movement tracking data for the Network Rail van used by the COSS and track worker;
- Network Rail company standards;
- Network Rail's competence records and personnel files for the three members of staff;
- Network Rail's planning documents for the work on the nights of 15 and 16 January 2014;
- site photographs and measurements;
- weather records at the site for the night of the accident; and
- a review of previous RAIB investigations and other incidents on Network Rail controlled infrastructure that had relevance to this accident.

Key facts and analysis

Identification of the immediate cause⁴

42 The trolley was placed on an open line.

43 The COSS had arranged for a line blockage of the down line only, but the welder subsequently placed the trolley on the up line, which was still open to rail traffic.

Identification of causal factors⁵

44 The accident occurred due to a combination of the following causal factors:

- the COSS blocked the down line on the advice of the welder, who had initially inferred that the work was on the down line from the record of arrangements form in the SSOWP (paragraph 45);
- the presentation of information on the line blockage form misled the welder into making an incorrect assumption about the location of the work (paragraph 51);
- the welder later realised that the work was actually on the up line, but assumed that it was safe to place the trolley on that line because he believed that engineering work taking place at another location north of Bridgeway UWC meant that the up line was blocked anyway (paragraph 56); and
- the COSS did not exercise full control over site safety (paragraph 61).

Each of these factors is now considered in turn.

45 The COSS blocked the down line on the advice of the welder, who had initially inferred that the work was on the down line from the record of arrangements form⁶ in the SSOWP.

46 It is the COSS's responsibility to implement and manage the safe system of work, but the COSS is not responsible for the actual work undertaken on site. The SSOWP includes limited information about the type and location of work (paragraph 70), so the COSS was reliant on the welder to provide him with this information. Consequently, during his conversation with the signaller to set up the line blockage, the COSS asked the welder which line he wanted blocked. The welder told the COSS that he wanted the down line, and the COSS relayed this to the signaller.

⁴ The condition, event or behaviour that directly resulted in the occurrence.

⁵ Any condition, event or behaviour that was necessary for the occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.

⁶ RT9909 Record Of Work Arrangements and Briefing Form V13.

- 47 Although the welder had participated in the previous night's work and knew that they had completed the weld repair on the down line, he formed the impression that their work was again on the down line because he had seen the arrangement for the blockage of the down line on the front page of the SSOWP (the arrangements for the blockage of the up line were on the next page; see paragraph 55). He had collected the SSOWP from the depot to give to the COSS, but he did not have the detailed job sheet for the weld repair with him because he had returned it after the previous night's work. However, he did have a summary sheet of the week's jobs available (paragraph 57). The summary sheet showed that the work was on the up line, but he only referred to it later.
- 48 Partly because he did not have his job sheets to hand, and partly because of the late notice planning for this work (paragraph 67), the welder was guided by the information on the front page of the SSOWP when he told the COSS that he would be working on the down line.
- 49 The signaller, who also held paperwork associated with the planned blockages, noticed the additional blockage for the up line, and asked the COSS a number of times if he needed the up line to be blocked as well. Although the COSS was aware that he could have taken both blockages, he declined to take the up line because he believed the welder intended to work only on the down line.
- 50 The RAIB has considered the possibility that the signaller, in offering the blockage of the up line, could have led the COSS to believe that there were no train movements on the up line. However, the COSS stated that he was aware of the possibility of trains running on the up line.
- 51 The presentation of information on the line blockage paperwork misled the welder into making an incorrect assumption about the location of the work.**
- 52 The SSOWP included two separate, but linked, line blockages. One of these is designated the 'working' (ie primary) system, while the other is designated 'parallel'. Although the form implies that the 'working' system would encompass the actual work, while the parallel blockage provides additional protection where available, the planner believed that there was no priority implied by these arrangements and that the designation of blockages as working or parallel was at his discretion.
- 53 The practice of planning separate, but parallel, line blockages is a deliberate one intended to provide flexibility in implementing the safe system of work. The planner could have opted for a single blockage covering both lines, which would have offered a higher level of protection. However, if a train needed to pass the work site, then the COSS would have to suspend all work and clear both lines to give up the blockage temporarily. By planning independent line blockages, the COSS could give up one of the bi-directional lines to allow a train to pass while permitting work to continue on the remaining blocked line, providing that it could be done safely. It was, however, the planner's assumption that both lines would be blocked where possible.
- 54 The paperwork that is produced using this method of planning has the blockage arrangements for each line detailed on separate sheets within the pack of information provided to the COSS (figures 5a and 5b). On each sheet, one line is designated as 'blocked' while the other is stated to be 'open', and it is necessary to read them in conjunction with each other to establish that there are blockage arrangements for both lines.

Record Of Work Arrangements and Briefing Form V13 Plan: 1871624 Type: Non-Cyclic Status: Accepted RT9909

WORK INFORMATION

Plan ref no. 1871624 Function P Way Number of Safe Systems 2

Name of COSS/IWA Sentinel card no.

Local Name Wem - Harlescott

Nature of work Arc Weld Repair (Defect No AA12032-1F)

Worksite Mileages ELR SYC Start 28 m 30 ch End 29 m 60 ch

Start date and time of work 16/01/2014 22:30 End date and time of work 17/01/2014 05:40

Name of authorised access point Braidway User Worked Crossing Mileage 28 m 35 ch

Post code OS Grid Ref GPS Co-ord

Narrative Text (Arrangement to walk to site description)
Access Track At Authorised Access Point.

SAFE SYSTEM OF WORK - Working Start 16/01/2014 22:30 Duration 430 mins Safe System 1

ELR SYC FROM 28 m 30 ch TO 29 m 60 ch WON

	Safeguarded	Lines blocked with SW (or fence)	Fenced	SW Warning	Lines Blocked as PoS	Equipment warning				Lookout warning or IWA
						ATWS	TOWS	LOWS	PeeWee	
Planned		YES								
Actual										

Name	Direction	Status	Speed	Blocked From	Blocked to	Electrification	SLW
Up Main	Bi	Open	90			None	
Down Main	Bi	Blocked	90	SC 8325	SC 8361	None	

Resource Lookout requirements
Site lookout / IWA 0
Touch Lookout 0

Method of warning
Position of safety (workgroup)

Line Speed
Warning Time

Figure 5a: Extract from the front page of the safe system of work pack highlighting the arrangements for the 'working' line blockage

Record Of Work Arrangements and Briefing Form V13 Plan: 1871624 Type: Non-Cyclic Status: Accepted RT9909

SAFE SYSTEM OF WORK - Parallel Start 16/01/2014 22:30 Duration 430 mins Safe System 2

ELR SYC FROM 28 m 30 ch TO 29 m 60 ch WON

	Safeguarded	Lines blocked with SW (or fence)	Fenced	SW Warning	Lines Blocked as PoS	Equipment warning				Lookout warning or IWA
						ATWS	TOWS	LOWS	PeeWee	
Planned		YES								
Actual										

Name	Direction	Status	Speed	Blocked From	Blocked to	Electrification	SLW
Up Main	Bi	Blocked	90	SC 8374	SC 8330	None	
Down Main	Bi	Open	90			None	

Resource Lookout requirements
Site lookout / IWA 0
Touch Lookout 0
Intermediate/Distant 0
Site Warden 1

Method of warning
Position of safety (workgroup)

Line Speed
Warning Time

Required sighting distance
Available sighting distance

Equipment/Staff Resources
Type of fence (fenced only)
None
Distance from nearest open line (fenced or Site Warden warning)
Distance of at least 2m 6 ft 6 inches (COSS + 2 or more + site wardens)

Lines for each lookout to observe and lookout position(s) for safety

Name of authorised egress point Braidway User Worked Crossing Mileage 28 m 35 ch

Post code OS Grid Ref GPS Co-ord

Narrative Text (Arrangement to walk from site description)
Exit Track At Authorised Egress Point.

Figure 5b: Extract from the second page of the safe system of work pack highlighting the arrangements for the 'parallel' line blockage

55 Moreover, on this occasion, the 'working' blockage was shown as being for the down line, even though the work was on the up line, because much of the information in the plan was copied over from the night before (paragraph 29). Consequently, the down line blockage was presented on the front page of the SSOWP, and it was necessary to turn over the page to see the blockage for the up line. As the work was to be undertaken on the up line, it should have been designated as the 'working' line blockage (and thus the first sheet of the SSOWP), with the down line as the 'parallel' line blockage. Had this happened, the welder would almost certainly have advised the COSS to block the up line instead of the down (paragraph 47).

56 The welder later realised that the work was actually on the up line, but assumed that it was safe to place the trolley on that line because he believed that engineering work taking place at another location north of Bridgeway UWC meant that the up line was blocked anyway.

57 The welder travelled to Bridgeway UWC in a separate van from the COSS and the track worker (paragraph 32). In his van was a summary sheet of the week's welding jobs, which included information about the location of each job. While he was waiting for the COSS and the track worker, he referred to this sheet and realised that the weld repair for that night was actually on the up line.

58 The welder was aware that engineering works were taking place that night at Nantwich, some 24 miles (39 km) to the north-east on the same line. These works involved a *possession* of both up and down lines and, since there were no junctions between Nantwich and Bridgeway UWC, the welder assumed that no trains would be able to pass through this section of line in the up direction.

59 However, the possession was not planned to be taken until after midnight, and train 1J76 passed Nantwich on its way to Shrewsbury at 23:23 hrs.

60 Because the welder believed the line to be effectively closed, he decided to place the trolley on the up line even though he knew that the COSS had arranged for a blockage of the down line only. He did not inform the COSS of his actions. He has also stated that he felt under pressure to complete the work due to other issues associated with work planning and resourcing at Shrewsbury (paragraph 66), which influenced his decision to immediately place the trolley on the line.

61 The COSS did not exercise full control over site safety.

62 When the COSS arrived at Bridgeway UWC, he gave the welder verbal authorisation to go on the line. There is conflicting evidence about what was said. It is not certain whether the COSS specifically stated that they were to put their equipment on the down line, or whether he gave a general authorisation that it was safe to begin work. There is also conflicting evidence as to whether a safety briefing was given by the COSS at all. Nevertheless, it is clear that the welder understood that the COSS had arranged a blockage only of the down line.

- 63 The COSS was not directly supervising the welder and the track worker when the equipment was placed on the up line. This was in contravention of Handbook 7, Clause 4.1 of the railway Rule Book⁷, which requires a COSS to ‘*stay with your group so that you are able to personally observe and advise everyone*’ when they are working. The COSS spent several minutes in or around the second van, during which time he stated that he was arranging his paperwork and his personal protective equipment. It was not possible for him to see what the welder and the track worker were doing at this point, because the welder’s van obscured his view, and he stated that he did not realise that they were placing equipment on the up line.
- 64 If the COSS considered that the work was taking place on the down line and all of the welder’s equipment was being placed on the down line, it would still have been necessary for the welder to cross the open up line when moving equipment from his van to the down line. The COSS stated that he would have addressed this by keeping watch for trains while they crossed the line. However, the railway Rule Book⁸ states that carrying heavy or awkward equipment across the line constitutes work that affects the safety of the line, and thus requires the line to be blocked.
- 65 There were further irregularities on the SSOWP paperwork used by the COSS on the nights of 15 and 16 January 2014. These included:
- members of the gang signing the wrong part of the form to state that they had received their briefing;
 - the COSS not ticking a box to state that he had received the SSOWP without the requisite notice period (paragraph 69); and
 - the COSS not obtaining the authority of a *Responsible Manager* to proceed under such circumstances (as required by company standards⁹)¹⁰.

Identification of underlying factors¹¹

Availability of information used in decision-making

66 Decisions made in work planning and resourcing, and the absence of relevant information in the SSOWP, contributed to poor decision-making by the track workers on the night of the accident.

67 Pressures from workload and resourcing at Shrewsbury Maintenance Delivery Unit meant that maintenance activities were often planned according to proximity of deadlines. Such a reactive approach can lead to an inefficient use of resources, and time pressures on front line staff, which was evidently the case at Shrewsbury.

⁷ GE/RT8000/HB7, Handbook 7, ‘General duties of a controller of site safety’, available at www.rgsonline.co.uk.

⁸ GE/RT8000/HB7: Section 3.2.

⁹ NR/L2/OHS/019: Section 11.2.

¹⁰ Although the requirement for a Responsible Manager’s authorisation provides an additional check in the process, the RAIB considers it unlikely that such a check would have prevented the accident. The Responsible Manager would not have been aware of the location of the work (welding came under the control of another manager) and was thus not in a position to query the line blockage arrangements.

¹¹ Any factors associated with the overall management systems, organisational arrangements or the regulatory structure.

- 68 The rail defects on the down and up lines that were to be repaired on the nights of 15 and 16 January 2014 had been identified on 22 and 23 October 2013 respectively. The defects were allocated a three-month timescale for completion, which meant that their respective due dates were 21 and 23 January 2014.
- 69 The need to complete the work before the deadline, combined with a sickness absence in the team that was originally planned to carry out the repairs, meant that the staff involved were assigned these jobs at short notice. Consequently, the COSS did not have the requisite notice period specified in Network Rail company standards¹² to review the SSOWP.
- 70 The planning process inherently separates safety issues from planning for the work. The Network Rail SSOWP form does not give any information about the work to be undertaken, other than a brief reference to the job number(s) along with start and end mileages for the work site. This means that, if a COSS wants to know about the nature or specific location of the work (which could influence their decisions about how to set up a safe system of work), they must cross-reference the SSOWP with other paperwork (such as the welder's job sheets), or, as was the case in this accident, rely on those people in the team who are actually carrying out the work. The RAIB has seen equivalent examples of the RT9909 form used by both Network Rail and contractors, some of which include information about the particular lines affected by the work as well as worksite mileages, and some which include track diagrams highlighting the protection arrangements.
- 71 Network Rail's relevant company standard¹³ states that a SSOWP should include signalling or track diagrams, where appropriate. These were not included in the SSOWPs used by the COSS on the nights of 15 and 16 January 2014, other than the basic requirement for extracts from Network Rail's *Sectional Appendix*. Given the recent resignalling and the COSS's relative unfamiliarity with the new signalling scheme (paragraph 85), it would have been helpful if the pack had included a signalling diagram, particularly if this had been used to indicate the site of work.
- 72 The SSOWP software used by the planner provides the opportunity to replicate previously used plans. The planner took advantage of this facility on this occasion, copying the plan for the work on 15/16 January 2014 over to the night of 16/17 January 2014. He made some minor updates to the location information for the work, since the weld repair on the down line had been completed, but did not modify the arrangements for the line blockages. Had he felt it necessary to do so, he could have changed the 'working' blockage (paragraph 52) to be the up line, which in turn would have meant that this would be presented on the front page of the SSOWP.

¹² NR/L2/OHS/019: Section 11.1 states that the COSS should verify the proposed safe system of work at least a shift in advance of the work. Exceptions are allowed for specified circumstances, including sickness absences.

¹³ NR/L2/OHS/019: Section 10.2.

- 73 The practice of planning parallel line blockages (paragraph 53) provides the COSS with the freedom to choose either or both of the blocks when setting up the safe system of work – although witness evidence indicates that there is an implicit understanding that both will be taken. Had the COSS been given time to review the SSOWP in advance, he may have identified that taking both blocks would provide a higher level of protection. However, the COSS did state that on the night of the accident, he was aware that he could have taken both line blockages but decided not to because the welder told him that he only wanted to work on the down line (paragraph 45), implying that the work could be undertaken safely without any need for the up line to be blocked.

Discounted factors

- 74 Witness evidence suggests that the COSS and the welder were familiar with the local area, and did not confuse which line was up and which was down. The welder stated that he knew he was placing the trolley on the up line and that he knew the COSS had blocked only the down line.
- 75 There was no evidence that the track workers were affected by fatigue or other factors outside work. Although they were on night shifts, their shift patterns did not present a significant risk from fatigue on the night of the accident, nor did any of the track workers report feeling fatigued at the time.
- 76 The RAIB investigation found no evidence that interpersonal issues between the COSS and the welder played a causal role in this accident. Nevertheless, at the time of the accident the COSS had not yet undergone any of the *non-technical skills* training or assessments (which include teamworking, conscientiousness and communication) that Network Rail had launched in January 2013.

Observations¹⁴

Competence and knowledge management

- 77 Network Rail's competence management requirements for individuals carrying out track safety activities on its infrastructure (which includes the COSS competence) are set out in company standard NR/L2/CTM/021 'Competence and Training in Track Safety'. NR/L2/CTM/021 specifies that the COSS competence shall be re-assessed at least once every 24 months, with an interim assessment between 9 and 15 months after each assessment or re-assessment.
- 78 Network Rail's internal competence assurance process – known as *Assessment in the Line* (AiTL) – is defined in NR/L3/CTM/306. AiTL covers track safety competences (including COSS) as well as technical competences (such as signal engineering). Under AiTL, competence decisions consider three types of evidence: records of performance and work experience, behavioural observations, and a computer-based knowledge test. If an employee fails the knowledge test, the process allows a line manager some discretion in making a decision about their competences, as long as a development action plan is in place for any gaps identified in the knowledge test. This is known as 'levelling' within AiTL.

¹⁴ An element discovered as part of the investigation that did not have a direct or indirect effect on the outcome of the accident but does deserve scrutiny.

- 79 While the COSS was on secondment to the track section, his track safety and signal engineering competences were still being managed by the S&T section. While there is no statement within NR/L2/CTM/021 or the AiTL standard about how competence is managed for secondments, Network Rail has told the RAIB that its human resources systems should transfer competence management responsibilities with the secondee – but that did not happen in this case. However, many of the competences held by the COSS were specific to S&T, so the track section would not have had the expertise to manage these anyway.
- 80 This situation raised the potential for aspects of the COSS's competence management to be overlooked. For instance, the S&T section manager felt that site observations of the COSS (which are required under AiTL¹⁵) and the return to work process following his sickness absence should have been handled by the track section manager. Meanwhile, the track section manager maintained that he was not responsible for the COSS's AiTL because this had not been transferred through the human resources system. No records of formal site observations of the COSS were available.
- 81 The track section manager did conduct a return to work interview with the COSS, but this comprised a simple medical questionnaire and did not address any competence or knowledge gaps. However, due to the timing and duration of the COSS's sickness absence, this did not contravene the AiTL requirements with respect to managing absences¹⁶, which states that a competence review shall be completed if the employee has been absent for less than nine months and has missed a competence review. The COSS was absent for six months and underwent a competence review just prior to his absence.
- 82 There were no records of the COSS having had experience of performing COSS duties during his secondment, other than on the nights of 15 and 16 January 2014. Network Rail's company standard¹⁷ requires the Responsible Manager to check the familiarity of the COSS when they allocate such duties, considering "... their experience of the type of work, the type of protection arrangements and the time lapsed since they last undertook such duties."
- 83 The absence of records regarding the COSS's recent experience of performing COSS duties indicates that either he had not carried out that role, or that appropriate records were not being kept. Both section managers believed that work experience books for the COSS competence were no longer required, but this was not in line with Network Rail company standards¹⁸. However, the COSS's competence was still valid as his most recent review had taken place within the last nine months.

¹⁵ NR/L3/CTM/306: Section 11.2 mandates on-site surveillance checks as part of the competence review process. It also states that line managers shall maintain records of on-site surveillance.

¹⁶ NR/L3/CTM/306: Section 14.

¹⁷ NR/L2/OHS/019: Section 5.2.

¹⁸ NR/L2/CTM/021: Section 13 states the mandatory use of work experience books for all track safety competences. Appendix D further states that there should be four entries in the work experience book between competence reviews, which are 9-15 months apart.

- 84 There was a tendency at Shrewsbury Maintenance Delivery Unit to train the majority of staff in the COSS competence, in order to provide flexibility in resourcing. However, the corollary of this is that there may be a number of employees who do not have the opportunity to regularly practise the competence.
- 85 A significant resignalling scheme affecting the area had been commissioned while the COSS was on sick leave (paragraph 12). Some witnesses expressed dissatisfaction at the quality and extent of the original briefings on the resignalling, and the COSS stated that he had never received a briefing. A briefing was delivered in 2012, but the commissioning was delayed until a year later, and no re-briefing was given.
- 86 Consequently, there was little awareness of, or access to, signalling plans amongst the track workers, and the COSS expressed his unfamiliarity with the new signalling scheme in his conversations with the signaller to set up the line blockage (paragraph 31). Similarly, there was limited understanding of the rules regarding additional protection of bi-directional lines, such as the use of *lockout keys* and detonators¹⁹. Network Rail's Professional Development and Training team stated that they expect any knowledge gaps, such as those arising from a secondment or absence, to be addressed with a development action plan. Furthermore, Network Rail's competence assurance standard states that the line manager should arrange for all technical and safety briefings to be delivered following a period of absence²⁰. However, there was no evidence of any attempt to fill the COSS's knowledge gaps on his return to work.
- 87 The COSS, the welder and the track worker failed key elements of their track safety competences on their knowledge tests, and were subsequently passed as competent by their respective line managers (paragraphs 17 to 22). While this levelling process is sanctioned within AiTL (paragraph 78), it was not clear whether this was a widespread practice at Shrewsbury Maintenance Delivery Unit, because Network Rail could not produce AiTL audit documentation for this depot that would have identified how many decisions are made in this way.

Welfare arrangements for the track workers

- 88 After the accident, the workers involved were on site for more than two hours before an appropriate supervisor arrived from their depot, and nearly three hours until the RIO arrived (paragraph 37). While they were waiting, they had very little information or support from Network Rail other than their conversations with the signaller (they had been questioned by the British Transport Police, who left site at about the same time as the RIO arrived). After the RIO arrived, it was then over an hour before they left site to return to the depot for drugs and alcohol screening.
- 89 The RAIB considers this response to be inappropriate in terms of dealing with the welfare of the staff involved.

¹⁹ GE/RT8000/HB8: Section 2.6 states that detonator protection must be placed in both directions if working on a bi-directional line. Although the detonators were only placed at one end of the down line signal section (for trains running in the normal direction) on the night of the accident, had they been placed at both ends it would not have prevented the accident, because the train involved was running on the up line.

²⁰ NR/L3/CTM/306: Section 14.1.

- 90 Incident Support Controllers have a set of National Control Instructions, issued by Network Rail, which provide guidance on dealing with incidents. These instructions include definitions of response levels and the expected management response, but do not include examples of incident types that merit different levels of response, which are instead offered at a local level.
- 91 On this occasion, the Incident Support Controller did not attempt to call out any senior managers in the line management chain of the workers.
- 92 Furthermore, the lack of availability of on-call staff in the area (paragraph 37) led to the delays in Network Rail representatives reaching site.

Previous occurrences of a similar character

- 93 The RAIB has investigated a number of accidents involving track workers or items of equipment being struck by trains. Paragraphs 98 to 105 contain details of those with relevance to the circumstances of the accident at Bridgeway UWC.

Summary of conclusions

Immediate cause

94 The trolley was placed on an open line (**paragraph 42**).

Causal factors

95 The causal factors were:

- a. The COSS blocked the down line on the advice of the welder, who had initially inferred that the work was on the down line from the record of arrangements form²¹ in the SSOWP (**paragraph 45**);
- b. The presentation of information on the line blockage form misled the welder into making an incorrect assumption about the location of the work (**paragraph 51, Recommendation 1**);
- c. The welder later realised that the work was actually on the up line, but assumed that it was safe to place the trolley on that line because he believed that engineering work taking place at another location north of Bridgeway UWC meant that the up line was blocked anyway (**paragraph 56, Learning point 1**); and
- d. The COSS did not exercise full control over site safety (**paragraph 61**).

Underlying factor

96 Decisions made in work planning and resourcing, and the absence of relevant information in the SSOWP, contributed to poor decision-making by the track workers on the night of the accident (**paragraph 66, see paragraph 107c and Recommendation 2**).

Additional observations

- 97 Although not linked to the accident on 16 January 2014, the RAIB observes that:
- a. There were a number of deficiencies in competence management at Shrewsbury Maintenance Delivery Unit (**paragraph 77, Learning points 2 and 3, Recommendation 3**); and
 - b. Welfare arrangements for the track workers were poor (**paragraph 88, see paragraph 108**).

²¹ RT9909 Record Of Work Arrangements and Briefing Form V13.

Previous RAIB recommendations relevant to this investigation

Acton West – 24 June 2008 (RAIB report 15/2009)

- 98 Three members of a rail-grinding team were standing with two rail-mounted grinding machines on the up relief line east of Acton West Junction, waiting for permission to push the machines towards Ealing Broadway station. A train ran through the crossovers at Acton West onto the up relief line and struck the machines. The three members of the grinding team scattered as the train approached. Nobody was injured in the collision, but the train suffered damage to braking equipment and a punctured fuel tank on the leading coach.
- 99 The RAIB's investigation found that the format and preparation of SSOWPs were contributory factors in the accident and as a result made the following recommendation:

Recommendation 2

Network Rail should, in its current project to overhaul the RIMINI planning process:

- a. involve those who will use the information on site in developing a revised format for the COSS pack (and the RT9909 form);*
 - b. include a role for the COSS in the planning of their safe system of work; and*
 - c. improve the format of the COSS pack (and the RT9909 form), with particular emphasis on the clarity and consistency of information presented, including, but not limited to:*
 - consistency in the method for identifying key locations such as the site of work, limits of possession and access points;*
 - clarity over the information that is required in each section of the new forms;*
 - the option of identifying in the COSS pack where access to site can be achieved by walking lineside as opposed to on or near the line; and*
 - the use of diagrams and maps to show key locations and their relationship with each other.*
- 100 In response to this recommendation, Network Rail revised the RT9909 form, implemented a proposal for the COSS to have a specific role in developing the SSOWP, and developed a specification for a new software package to make production of the SSOWP quicker and easier, and the output more user-friendly. On 8 December 2009, the ORR accepted Network Rail's response to deliver the recommendation and considered it to be implemented.

Relevance to the Bridgeway UWC investigation

- 101 The actions taken after implementation of Acton West recommendation 2 were intended to address the issues associated with formatting of the SSOWP identified within that investigation. However, the current investigation has revealed problems with production and presentation of information particularly regarding parallel line blockages. These issues have been addressed in recommendation 1 of this investigation.

Clapham & Earlsfield – 8 March 2011 (RAIB report 03/2012)

- 102 Two gangs of Network Rail track maintenance staff were involved in ‘near-miss’ incidents with trains between Clapham Junction and Earlsfield stations.
- 103 The RAIB’s investigation found that Network Rail’s Assessment in The Line process was not effective in managing the competence of the two COSSs involved.

Recommendation 4

Network Rail should review the adequacy of training and assessment of track maintenance staff to deliver practical competence, particularly in skills or situations which are encountered infrequently. Where necessary, improvements should be made to enhance current processes. Consideration should be given to:

- a. the extent to which it is appropriate to have detailed and complex rules for responding to infrequently-encountered situations;*
 - b. methods for providing experience in situations which an individual may encounter infrequently;*
 - c. identifying methods of assessment for situations which it is unlikely a line manager would normally be able to observe;*
 - d. reassessing safety-critical competences when there are significant changes in an individual’s work pattern, eg changing from day patrolling to planned maintenance work on permanent night shifts; and*
 - e. reinforcing the need for regular face-to-face reviews of staff performance and competence by line managers.*
- 104 On 22 April 2013, the ORR reported that Network Rail is taking action to implement the recommendation. At the time of writing, the recommendation status is still in progress, and the RAIB is expecting an update from the ORR in the near future.

Relevance to the Bridgeway UWC investigation

- 105 Although not causal to the accident, this investigation highlighted issues of competence management associated with the Assessment in The Line process, particularly with regard to the COSS. These included the lack of observation and monitoring of the COSS (paragraph 80), his lack of recent experience in the role of COSS (paragraph 82), and his familiarity with the task due to his secondment and his recent sickness absence (paragraph 86). Such issues have been addressed in recommendation 3 of this investigation.

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

106 Shrewsbury Maintenance Delivery Unit has:

- a. given a full briefing on the incident to all members of the welding team, and also briefed the rules for setting up safe systems of work and taking line blockages;
- b. suspended the COSS's competence during the Network Rail investigation and, following a competence review, permanently removed his COSS competence;
- c. instituted a weekly supervisor's briefing in the track section, which includes details of planned works for cascade throughout the teams
- d. issued a depot-wide brief that where both lines are available to block, the COSS must block both lines; and
- e. briefed the availability and usage of lockout devices across the depot (paragraph 86).

107 At a national level, Network Rail advises that it is planning a number of initiatives that have a bearing on the factors identified in this investigation:

- a. The Assessment in The Line process is being replaced with a new Skills Assessment Scheme, following a review that began in January 2012 and which identified that the assessment process was over-reliant on the knowledge test. The new scheme will evaluate each competence (such as PTS, lookout, COSS etc) against a risk assessment carried out within Network Rail, and align it to one of six regimes that in turn will identify suitable ways to manage the competence. At the time of writing, the scheme is going through safety validation and Network Rail states that it is expected to be implemented by December 2014.
- b. A new role of Safe Work Leader (SWL) is being introduced to embrace the role of the COSS under defined circumstances. The SWL will be more involved in planning the work and will be in charge of safety as well as delivery of the work on site. Network Rail's intention is that fewer employees will hold the SWL competence than currently hold the COSS competence. Network Rail states that the role is expected to take effect from April 2015.
- c. A new control of work process, being rolled out nationally from April 2015, will cover the planning, risk assessment, delivery and hand back of engineering work. As part of this process, new electronic permitting technology will replace the systems currently used to produce SSOWPs. The new permit packs will include information about the type and location of the work as well as bespoke track diagrams showing the area that the permit covers.

108 Network Rail is reviewing its National Control Instructions for Incident Controllers to provide clearer guidance on levels of response and welfare arrangements. The new instructions state that controllers should assume the most serious level until there is clear evidence otherwise, in order to avoid the seriousness of the incident being underestimated, as happened in the incident at Bridgeway UWC.

Learning points

109 The RAIB has identified the following learning points²² for the railway industry:

- 1 It is important that all staff involved in working on the track understand that they can only rely on their own safe system of work and the information from their own COSS, rather than making assumptions based on work involving blockages of the line taking place elsewhere, which may be cancelled or amended (paragraph 95c).
- 2 Competence management practices (with respect to Assessment in The Line) at Shrewsbury Maintenance Delivery Unit are not meeting the requirements of the relevant standards (paragraphs 77 to 87). It is important that Network Rail monitors compliance with competence management processes and either amends them or takes steps to enforce them as appropriate.
- 3 Staff working on the track within the Shrewsbury Maintenance Delivery Unit need to understand the characteristics of the bi-directional signalling scheme in the area and its relevance to safe system of work planning and protection (paragraph 97a).

²² 'Learning points' are intended to disseminate safety learning that is not covered by a recommendation. They are included in a report when the RAIB wishes to reinforce the importance of compliance with existing safety arrangements (where the RAIB has not identified management issues that justify a recommendation) and the consequences of failing to do so. They also record good practice and actions already taken by industry bodies that may have a wider application.

Recommendations

110 The following recommendations are made²³:

- 1 *The intent of this recommendation is to minimise the potential for the SSOWP paperwork to mislead its users into blocking the wrong line when opting to take only one of two parallel line blockages.*

Network Rail should, as part of its planning and delivering safe work project, take account of the arrangements and associated wording for parallel line blockages in the new permit packs to ensure that:

- a. presentation of the SSOWP documentation is simple and clear with regard to parallel line blockages, particularly in terms of allowing users to identify which line the work is to take place on; and
- b. designations of 'working' and 'parallel' blockages are verified during production of the SSOWP as referring respectively to the line on which the work is to take place and the adjacent line(s) (paragraph 95b).

continued

²³ 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 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.raib.gov.uk.

- 2 *The intent of this recommendation is to reduce the risk associated with late notice planning of work and planning to deadlines, which can affect decision-making on site due to the availability of information and perceived pressures of work.*

Network Rail should review work planning practices and processes at Shrewsbury Maintenance Delivery Unit and optimise the distribution of information for both planners and track workers to carry out their jobs effectively (paragraph 96). This review should consider:

- a. workload and resourcing to enable more strategic and proactive approaches to work planning;
- b. information available to the planner and the COSS in producing and checking SSOWP documentation, including details of the work to be undertaken; and
- c. local practices and assumptions about planning parallel line blockages with respect to national procedures and processes, particularly concerning the designation of 'working' lines and the inferred level of protection on the part of the planner and the COSS.

Network Rail should also determine whether such issues are applicable at other maintenance delivery units and take action as necessary to address any problems identified.

- 3 *The intent of this recommendation is to strengthen Network Rail's competence management processes for staff in particular circumstances where potential shortfalls in their competence or knowledge might otherwise go unchecked.*

Network Rail should, as part of its review of Assessment in The Line:

- a. clarify the management arrangements for seconded staff so that it is clear which part of the organisation is responsible for each element of an individual's competence and knowledge; and
- b. revise its criteria for refresher training following periods of extended absence, particularly where significant changes to work patterns, practices or infrastructure arrangements have occurred during the absence (paragraph 97a).

Appendices

Appendix A - Glossary of abbreviations and acronyms

AiTL	Assessment in The Line
COSS	Controller of Site Safety
FFCCTV	Forward facing closed circuit television
ORR	Office of Rail Regulation
OTDR	On-train data recorder
PTS	Personal track safety
RAIB	Rail Accident Investigation Branch
RIMINI	Risk minimisation
RIO	Rail Incident Officer
SSOWP	Safe system of work pack
S&T	Signalling and telecommunications
SWL	Safe Work Leader
UWC	User worked crossing

Appendix B - Glossary of terms

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

Access point	A gate or point where authorised staff can gain safe access onto the railway.
Assessment in The Line	Network Rail's internal competence assurance process.
Axle counters	A means of train detection that uses track mounted devices to compare the number of axles entering and leaving a block section.
Bi-directional	An arrangement of signals and interlocking that allows trains to be run in either direction on a reversible line.*
Chain	An imperial unit of length measurement that is equivalent to 22 yards.
Controller of Site Safety	A railway safety critical qualification demonstrating the holder's competence to arrange a safe system of work.
Detonator	A device attached to the rail head which explodes when a train goes over it to attract the attention of the driver.
Detonator protection	Detonator protection for a line blockage consists of three detonators placed 20 metres apart on the same rail with a possession limit board at the first detonator in the direction of travel.
Diesel multiple unit	A train consisting of two or more vehicles, semi-permanently coupled together, with a driving cab at each end. Some or all vehicles may be equipped with axles powered by one or more diesel engines.
Incident Support Controller	A person based at Network Rail's regional control centre whose responsibility is to manage the railway's response to all infrastructure and operational incidents, accidents and emergencies.
Line blockage	A section of line that is blocked, according to defined rules, so that engineering work affecting the safety of the line can be carried out on the railway.
Lockout keys	A system which allows a person requiring access to the track to provide personal protection by placing restrictions on the permissible routes for trains.*
Lookout	A person responsible for observing the approach of trains and warning staff working on the line.
Non-technical skills	Generic skills that underpin and enhance technical tasks, such as teamworking, conscientiousness and communication.

On-train data recorder (OTDR)	A data recorder fitted to a train that records information on the status of train equipment, including speed and brake applications.
Permanent way	A collective term used to describe those persons engaged in the upkeep of the track on the railway.*
Personal track safety	The minimum level of competence for workers to go on to the track.
Planner	A person certified as competent to plan safe systems of work.
Possession	A period of time during which one or more tracks are blocked to trains to permit work to be safely carried out on or near the line.
Rail Incident Officer	A nominated and certificated member of railway staff, charged with the on-site command and control of railway organisations at an incident.
Responsible Manager	The person responsible for the management of staff working on or near the line. This would typically be a line manager or an on-call manager.
Safe system of work pack	A pack of information used by a COSS that provides details of the site of work, the work to be done and the planned safe system of work.
Sectional Appendix	A Network Rail publication which details the layout, direction and maximum permitted speed of running lines. It also shows the location of stations, tunnels, level crossings and other relevant lineside features, but not lineside signals. Running lines are shown schematically and are not to scale.
User worked crossing	A private level crossing where the barriers or gates are operated by the user. There is sometimes a telephone nearby so the user can contact the signaller.
Weld repair	The repair of cracks, damage and wear to crossings and rails using the electric arc welding process.*

Appendix C - Key standards current at the time

GE/RT8000/HB7 issue 2, issued by RSSB, dated 3 March 2012 (now superseded)	Handbook 7: General duties of a controller of site safety (COSS)
GE/RT8000/HB8 issue 2, issued by RSSB, dated 3 March 2012 (now superseded)	Handbook 8: IWA, COSS or PC blocking a line
NR/L2/CTM/021 issue 4, issued by Network Rail, dated 4 December 2010	Competence and Training in Track Safety
NR/L2/OHS/019 issue 8, issued by Network Rail, dated 4 September 2010	Safety of People Working On or Near the Line
NR/L3/CTM/306 issue 1, issued by Network Rail, dated 4 September 2010	Competence Assurance – Assessment in The Line (AiTL)

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Department for Transport.

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