

Rail Accident Report



Fatal accident involving a track worker at Saxilby 4 December 2012

Report 21/2013
October 2013

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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Fatal accident involving a track worker at Saxilby, 4 December 2012

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Summary

At 13:50 hrs on Tuesday 4 December 2012, a train travelling from Scunthorpe to Lincoln struck and fatally injured a track worker at Saxilby, near Lincoln. The individual concerned was acting in the role of Controller of Site Safety (COSS) at the time of the accident. He was involved in work taking place on one of the two tracks at this location which was closed to rail traffic, but standing close to the adjacent line over which trains were still operating.

The RAIB's investigation found that the COSS stepped back into the path of the train as it passed the site of work. The following factors led to the accident:

- the COSS had not implemented a safe system of work for the task that was being undertaken at the time that the accident occurred;
- none of the other track workers on site challenged the absence of a safe system of work or the actions of the COSS who was working within an unsafe area;
- the COSS became distracted and did not see or hear the approaching train;
- no effective action had been taken in response to the involvement of the COSS in two other safety incidents in the two months preceding the accident;
- the COSS had not been subject to an effective formal performance review by the agency (SkyBlue) that had hired him for COSS duties for the work taking place on 4 December 2012 and on other occasions; and
- deficiencies and omissions within SkyBlue's management systems had not been identified by its parent company (Carillion).

The RAIB has also observed that the processes employed by the railway industry during its own investigation into the accident at Saxilby may have taken insufficient account of the trauma that some of the witnesses were suffering as a result of their proximity to the accident.

The RAIB has made four recommendations. Three recommendations have been made to Network Rail regarding the use of agency staff in safety leadership roles, measures to address the risk arising from the use of agency staff in any role that involves working on and around the track and its processes for interviewing witnesses after serious incidents and accidents. One recommendation has been made to Carillion in conjunction with SkyBlue in respect of reviewing the effectiveness of changes made to safety management arrangements following the accident at Saxilby.

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 any inquest or fatal accident inquiry, and all other investigations, including those carried out by the safety authority, police or railway industry.

Key definitions

- 4 All dimensions in this report are given in metric units, except speeds and locations which are given in imperial units, in accordance with normal railway practice. Where appropriate the equivalent metric value is also given.
- 5 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

- 6 At 13:50 hrs on Tuesday 4 December 2012, train 2P67, the 11:19 hrs Northern Rail service travelling from Scunthorpe to Lincoln struck and fatally injured Mr Scott Dobson, a track worker, at Saxilby, near Lincoln.



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

Context

Location

- 7 The route between Lincoln and Gainsborough Lea Road comprises twin-track non-electrified lines used by passenger and freight services. The line used by trains travelling towards Lincoln is designated the up line and that towards Gainsborough is designated the down line. The site of the accident was in the space between the up and down lines (known as the 'six-foot') near to Sykes Lane underbridge (figures 1 and 2), which is approximately eight miles from both Lincoln and Gainsborough. The maximum permitted speeds for trains on the up line at this location is 50 mph (80 km/h) (figures 3 to 5).
- 8 The line is signalled in accordance with the *absolute block regulations*, with the up line under the control of Stow Park signal box and the down line under the control of Saxilby signal box. The design and condition of the signalling system and the actions of the signallers played no part in this accident.

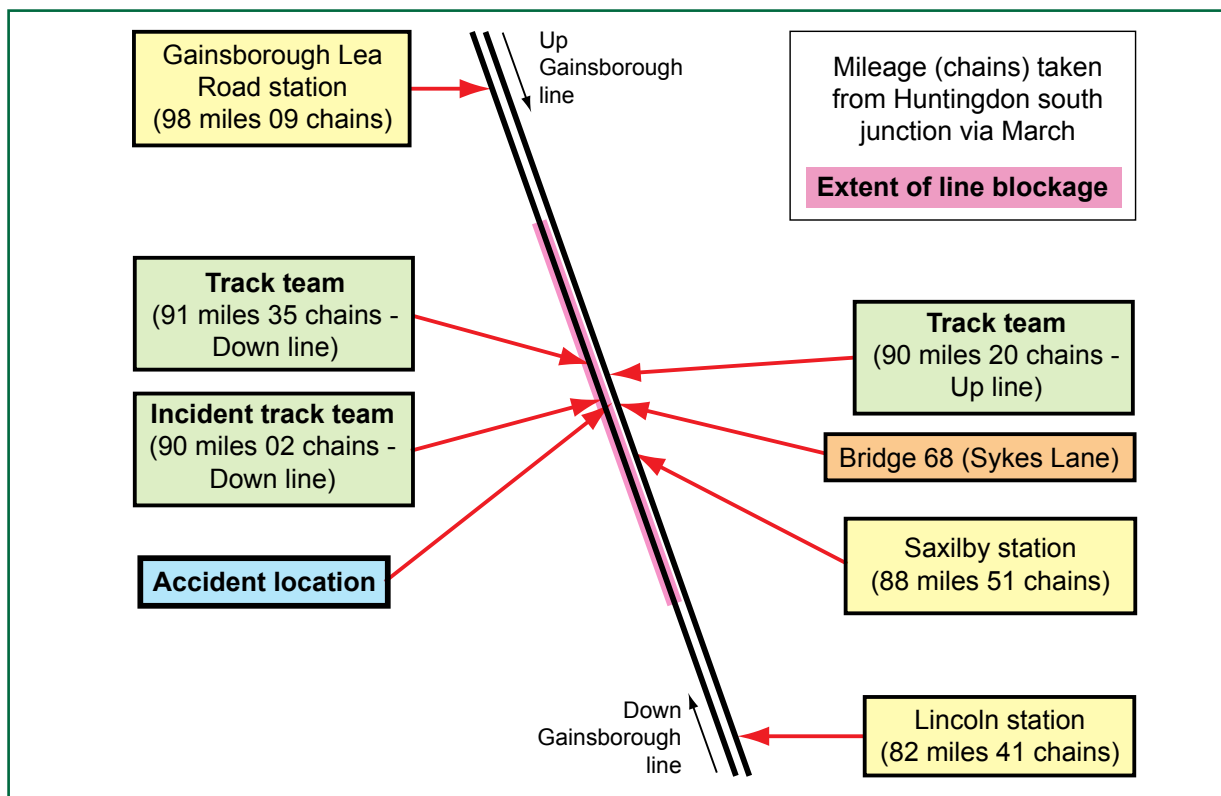


Figure 2: Line diagram showing the locations of the work groups and extent of the line blockage



Figure 3: Sykes Lane underbridge and (inset) Google Earth image showing locations of access point and areas of work for the first and second line blockage



Figure 4: The scene of the accident, looking along the down line, showing the available view of trains approaching on the up line



Figure 5: The down line at the scene of the accident, looking in the opposite direction to figure 4, showing the available view of down trains

Organisations involved

- 9 Network Rail owns, operates and maintains the railway infrastructure at Saxilby.
- 10 SkyBlue Solutions (recruitment and rail divisions), referred to as SkyBlue in the remainder of this report, is part of the Carillion group of companies. It is an agency that hires self-employed individuals to work on specific tasks for contractors working on Network Rail infrastructure. It had hired the *Controller of Site Safety* (COSS) involved in the accident at Saxilby on 4 December 2012.
- 11 Carillion Construction Limited (referred to as Carillion for the remainder of the report) had been contracted by Network Rail to undertake work to enhance the infrastructure of the railway between Peterborough, Lincoln and Doncaster, known as the Great Northern/Great Eastern line¹ and had secured from SkyBlue the services of the COSS and gang working at Sykes Lane at the time of the accident. Carillion was the employer of the track quality supervisor who was present at the time of the accident.
- 12 Amey Colas is a contractor to Network Rail. It had obtained the services of the COSS involved in the accident from Sky Blue on numerous occasions prior to the accident.
- 13 Northern Rail was the operator of train 2P67, and the employer of the train driver.
- 14 Network Rail, SkyBlue, Carillion, Amey Colas and Northern Rail freely co-operated with the investigation.

Train involved

- 15 Train 2P67 was the 11.19 hrs service from Scunthorpe to Lincoln (via Sheffield). It was formed of a two-car Class 142 diesel unit. The condition of the train had no bearing on the accident.

Rail equipment/systems involved

- 16 Petrol driven *reciprocating hammers*² (referred to as hammers in the remainder of this report) were used by the track gang (figure 6) to move and compact the ballast under the track (figure 7) with the aim of rectifying various types of track fault (paragraphs 36 and 63).

Staff involved

SkyBlue

The controller of site safety (COSS)

- 17 Mr Scott Dobson had six years experience in the rail industry. He was first hired by SkyBlue in 2006, and qualified to act as a COSS in 2008. Although at times he also performed the role of *site warden* on the day of the accident, he is referred to as the COSS in the remainder of this report, except when describing his actions in relation to two incidents that occurred in the months leading up to the accident when he is referred to as the 'Saxilby COSS'.

¹ The Great Northern/Great Eastern infrastructure project is being delivered by Network Rail, Carillion, Babcock Rail and Invensys and was managed as an alliance between the four companies.

² This type of tool is sometimes referred to in the rail industry as a kango hammer, but the hammers in use at Saxilby were not manufactured by Techtronic Industries Co Ltd, the owners of the Milwaukee Kango brand.



Figure 6: Hammer used at the time of the accident

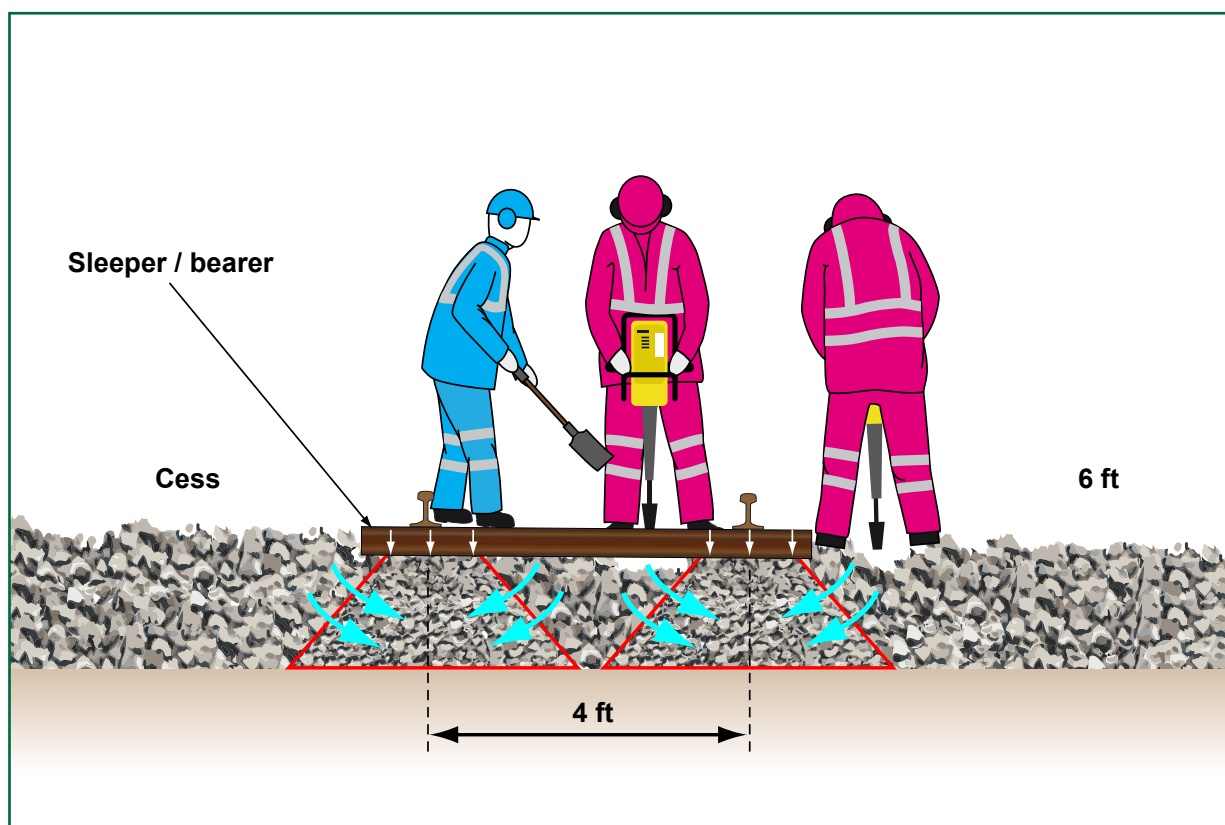


Figure 7: Diagram showing how Hammers are used to cross pack the ballast

The track gang

- 18 The track gang comprised five track workers all hired by SkyBlue, and with experience ranging from 6 months to 25 years. The gang also included a Carillion supervisor who had 22 years railway experience, of which 6 years had been spent as a Carillion track quality supervisor, referred to as 'the supervisor' in the remainder of this report. The supervisor's role was to undertake a site risk assessment of the general arrangements that were in place and ensure the work was properly executed.

Train driver (Northern Rail)

- 19 The train driver had 11 years experience. His performance played no part in this accident.

External circumstances

- 20 The accident occurred in an exposed rural location. The weather was cloudy with scattered showers. The temperature ranged between 1 and 2 degrees Celsius, but windspeeds of 13 to 24 km/h would have made it feel colder³. This factor may have had a bearing on the accident (discussed further at paragraphs 40 and 65).

Sequence of events

- 21 On Tuesday 4 December 2012, the COSS and gang were due to work from 07:00 hrs to 17:00 hrs undertaking remedial work on the down line after a *waybeam* had been installed on underbridge SPD3/68 at Sykes Lane over the previous weekend⁴. The COSS met the Carillion supervisor at the *access point* in Sykes Lane before the work was due to start, but the COSS was then requested to take one of the track gang to attend a nearby worksite in Branston to undertake a survey to detect underground services. As the weather was very cold the COSS decided it was best for the welfare of the gang to take all of them by vehicle to Branston (they would not have been able to continue work in his absence).
- 22 After the work at Branston was completed, the gang returned to Sykes Lane sometime after 11:00 hrs. The COSS had a number of telephone conversations with the Saxilby signaller as he tried to obtain a *line blockage* for the down line. The signaller telephoned the COSS and asked if he would be prepared to work under another individual acting as COSS for a separate gang located nearby and who would act as *Protection Controller*, allowing both gangs to work under a single line blockage. Both parties agreed to this request and between 12:43 hrs and 14:25 hrs two line blockages of the down line (figures 8 and 9) were granted. At around 13:50 hrs, during the second line blockage, train 2P67 approached on the up line. At this time the gang was working on the down line and the COSS was standing between the up and down lines, facing the down line and side-on to the approaching train.

³ The Meteorological Office temperature data for Saxilby for 4 December 2012 (07:00 to 14:00 hrs) ranged between 1 to 2 degrees Celsius. Data available from the Meteorological Office indicates that a wind of 13 - 24 km/h may have made the temperature feel like -3 to -9 degrees Celsius.

⁴ This work should have been started on the evening of Sunday 2 or Monday 3 December, but was deferred until Tuesday 4 December because the gang had agreed and been authorised to extend the work until 14:00 hrs on Sunday and were rostered time off to recover.

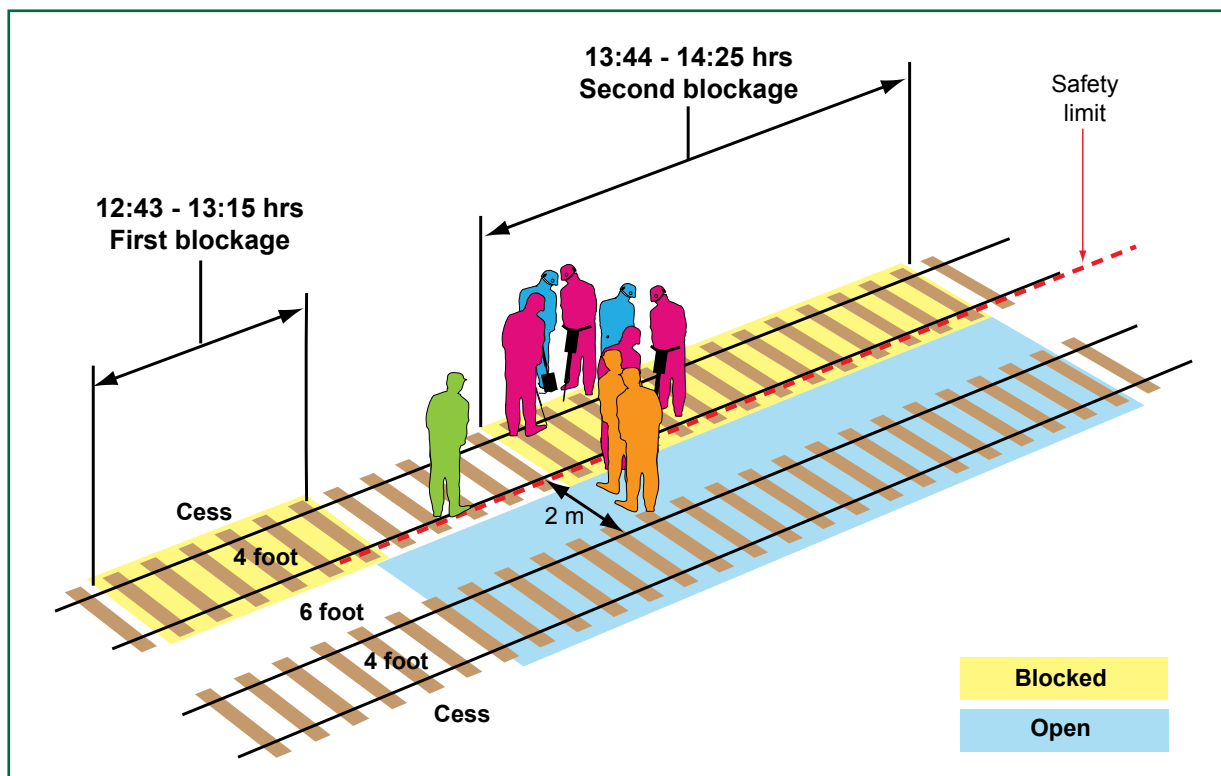


Figure 8: Diagram based upon witness evidence showing the areas of the first and second line blockage and positions of: the hammer operators (coloured pink); staff using shovels (blue); the COSS's original position (green); and location during the second line blockage (orange)

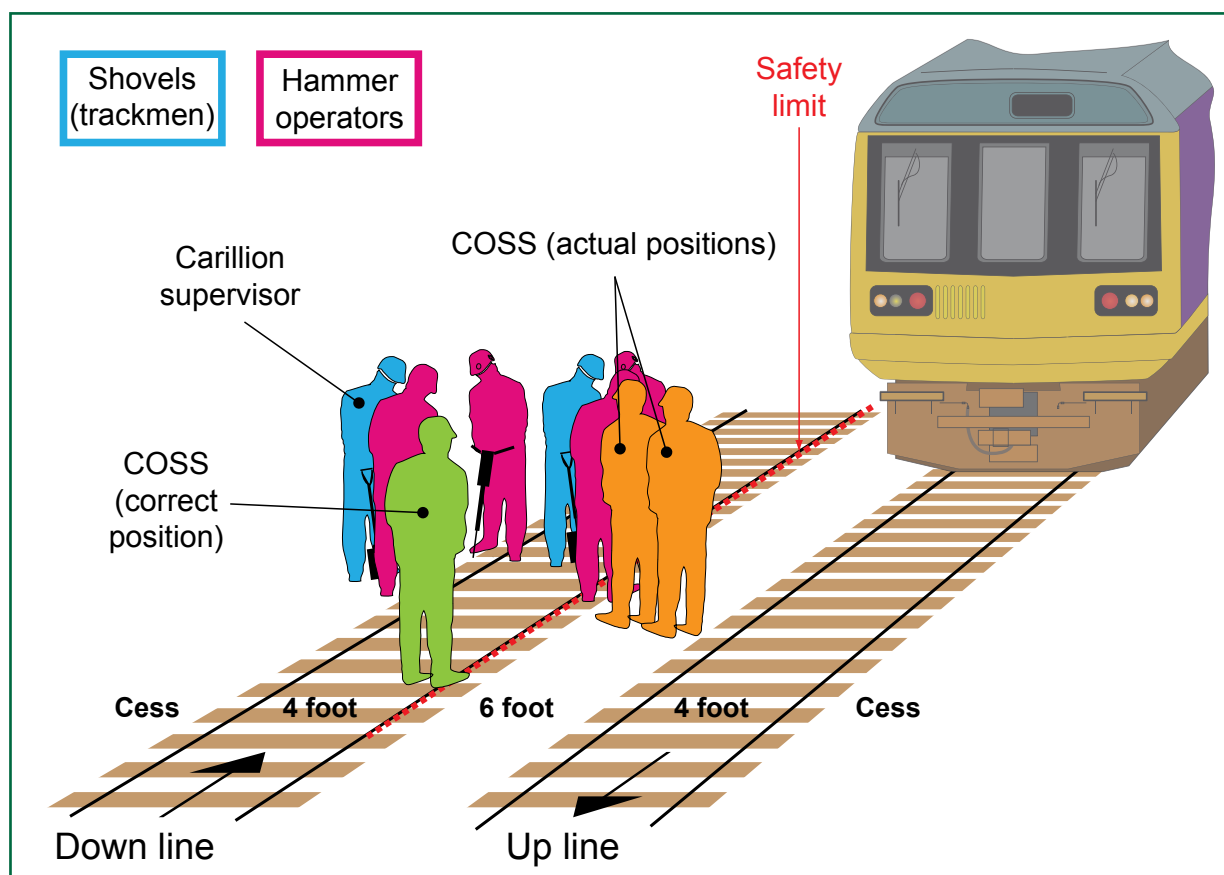


Figure 9: Diagram based upon witness evidence showing the final positions of trackmen: hammer operators (coloured pink) working in the cess, four foot and six foot area on the down line; staff using their shovels (blue); the COSS's original position (green); and location prior to the accident (orange)

- 23 As train 2P67 approached the worksite, the train driver observed the COSS step back into the path of his train (figure 10). The train driver applied the *emergency brake*, but the train struck and fatally injured the COSS. The train driver made an emergency call to route control in York at 13:54 hrs. York control room contacted Lincolnshire Police and East Midlands Ambulance services and British Transport Police. York route control also contacted the Saxilby signaller who attempted to call the COSS. Members of the track gang went to the assistance of the COSS, but it was soon apparent that he had succumbed to his injuries. A manager from Carillion attended the site and obtained a first account of the accident from the track gang.

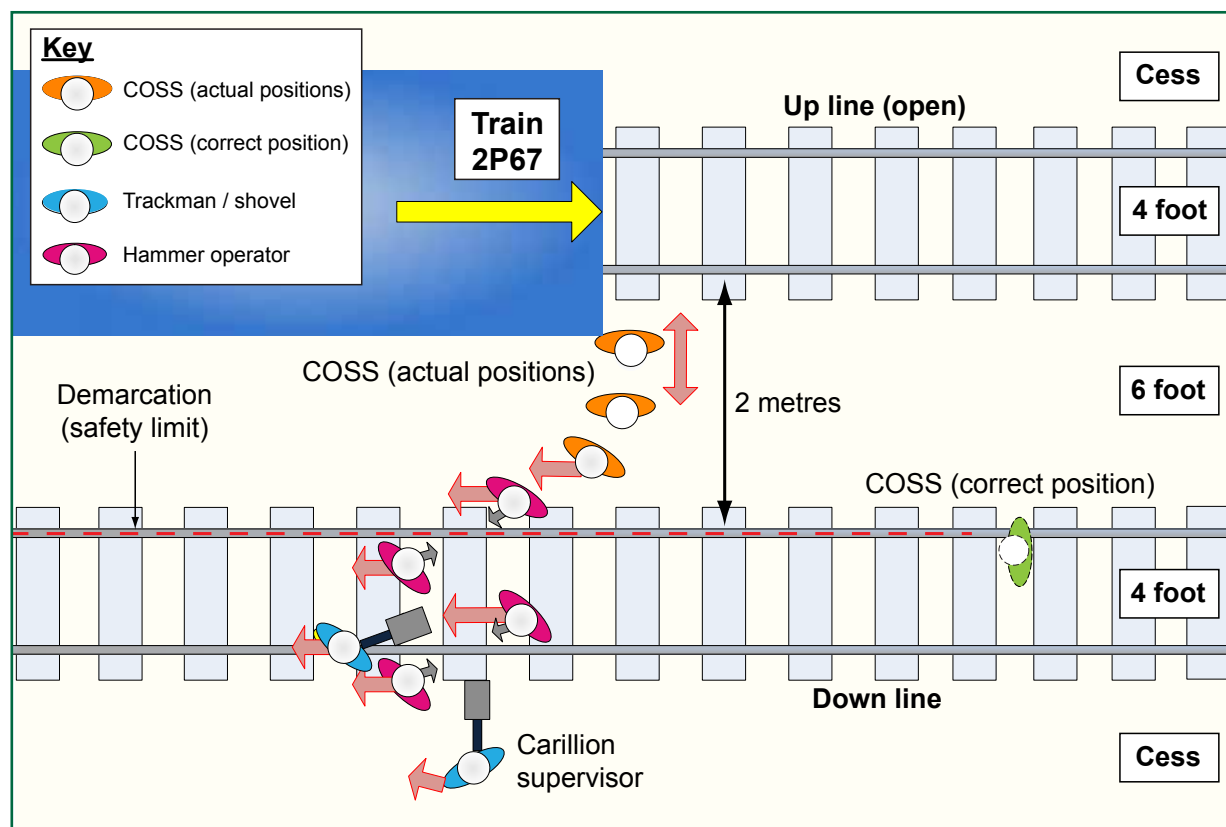


Figure 10: Diagram based upon witness evidence showing position of the COSS at the time of the accident

The investigation

Sources of evidence

24 The following sources of evidence were used:

- witness statements;
- data from the train's on-train data recorder;
- site photographs and measurements;
- examination of the train involved;
- local weather reports and observations for the day of the accident;
- pathology reports;
- Network Rail company standards;
- human factors research relating to situational awareness (the ability of an individual to remain aware of his or her immediate environment and any changes that may affect it);
- SkyBlue/Carillion company procedures;
- data from the industry's confidential reporting system (CIRAS); and
- a review of previous RAIB investigations that had relevance to this accident.

Key facts and analysis

Identification of the immediate cause⁵

- 25 The COSS stepped back into the path of train 2P67 as it passed the site of work.

Identification of causal factors⁶

- 26 The accident occurred due to a combination of the following factors:
- the COSS had not implemented a *safe system of work* (SSOW) for the task that was being undertaken (paragraphs 28 to 42);
 - nobody on site challenged the absence of a SSOW (paragraphs 43 to 58); and
 - the COSS did not hear or see the approaching train (paragraphs 59 to 64).
- 27 Each of these factors is now considered in turn.

The absence of a SSOW

- 28 The COSS had not implemented a SSOW for the task that was being undertaken. This was a causal factor.

Planning of the work

- 29 Network Rail's company standards stipulate that staff working *on or near the line* must always do so in accordance with a SSOW. The relevant arrangements for the establishment and operation of a SSOW are described in Network Rail standard NR/L2/OHS/19, Issue 8 'Safety of people working on or near the line', published in September 2010. The processes, if followed, should ensure that when staff work on or near the line they are protected from the movement of trains. A detailed explanation of the SSOW process is given in Appendix D.
- 30 The SSOW is developed by a *planner* working for Network Rail or for one of its contractors. Depending on the size and type of work to be undertaken, the SSOW pack and application for the line blockage is then approved by Network Rail. For the work to be undertaken at Saxilby on 4 December 2012, the Carillion SSOW planner had recognised the possibility that members of the gang would have to work in the six-foot. Standard NR/L2/OHS/019 mandates that in circumstances where work is to encroach within two metres of an open line, it is necessary for train movements on that line to cease for the duration of the work. The documented SSOW therefore prescribed that the COSS would take a line blockage of both lines when staff were required to work in the six-foot. The planner had also recognised that there would only be a limited number of occasions during the day when the signaller would be able to grant a double line blockage, which had to be fitted in during periods when no trains were operating on either line. He had thus allowed four days within the work plan for the tasks to be completed, and five additional days were also available the following week, if required.

⁵ The condition, event or behaviour that directly resulted in the occurrence.

⁶ Any condition, event or behaviour that was necessary for the occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.

- 31 Standard NR/L2/OHS/019 mandates that the COSS must review and agree the SSOW. The documentation for the SSOW shows that the COSS had signed to confirm his agreement on 2 December 2012.

The system of work applied during the first line blockage

- 32 Prior to starting the work to be undertaken during the initial line blockage, the COSS briefed the gang (including the Carillion supervisor) on the system of work to be applied to remove a *twist fault* on the *cess* side rail of the down line. This work was undertaken under a line blockage arranged by a second COSS (paragraph 22), who assumed the role of Protection Controller.
- 33 The initial line blockage between 12:43 hrs and 13:09 hrs did not require any of the gang to work in the six-foot⁷. Therefore, it was only necessary for the line blockage to apply to the line on which staff were working (the down line) and not the adjacent up line, which remained open. For these circumstances, the SSOW required that a site warden be appointed, whose sole responsibility was to monitor the gang working on the down line and issue an immediate verbal warning if any of them strayed into an area that was less than two metres from the open up line (in this case the six-foot rail of the down line was the safety demarcation limit). The railway rule book does not require a site warden to look for approaching trains.
- 34 The COSS recorded the names of the work group on the task briefing form (RT9909). Although he had recorded on the form that another individual within the group would act as site warden, he assumed that role himself (a COSS is permitted to undertake site warden duties) and briefed the gang accordingly, indicating the six-foot rail of the down line as the demarcation line.
- 35 The first line blockage was completed without incident and the gang moved back to a position of safety in the down line cess.

The system of work applied during the second line blockage

- 36 After the first line blockage was given up, the COSS and another track worker moved to the up line cess. It was identified that further work was required to deal with gaps under the track (voids) that had been observed when a train passed over the down line. To eliminate the voids, it was necessary for the ballast under both down line rails to be packed. This would require one of the gang to work with a hammer in the six-foot. For this to be carried out in accordance with the railway rule book, it was necessary to block both lines to traffic.

⁷ The work was originally planned to take place between 29 September and 1 October 2012 but the work was cancelled and rescheduled for December. The SSOW pack and line blockage application was generated and approved between 15 November and 28 November. The system that was planned to be used was a site warden warning. A site warden warning is a system to protect staff by blocking the line(s) on which they are working while permitting trains to pass on an adjacent line. It is defined in Handbook 7 of the railway rule book, which states that the working area must be separated from the line open to traffic by a minimum distance of 3 metres unless a site warden is appointed, when the distance can be reduced to 2 metres. The purpose of the site warden is to ensure that none of the staff move out of the safe work area. The system for the protection of staff complied with Network Rail standard NR/L2/OHS/019 'Safety of people on or near the line'.

- 37 As with the initial work undertaken, the COSS proposed to work under a line blockage taken by the Protection Controller. In requesting this, he did not tell the Protection Controller what work was to be undertaken or request a line blockage of both lines; his request to the Protection Controller was for a blockage of the down line only. Based upon the information provided by the COSS the Protection Controller assumed the track gang were continuing their work on the cess side rail of the down line and contacted the signaller for a second line blockage, which was granted at 13:44 hrs. Once the Protection Controller advised the COSS that the blockage of the down line had been arranged, the gang began work. On this occasion, the COSS and at least one other member of the gang worked in the six-foot.
- 38 Persons working in the six-foot were closer than two metres to the open up line (which is not permitted by Handbook 7 of the rule book) and at risk of being struck by passing trains. For the work being carried out, both lines should have been blocked. There were a number of factors which may have influenced the COSS in not requesting the Protection Controller to seek a blockage of both lines:
- his previous experience (before and on the day⁸ of the accident) was that it was difficult to obtain a line blockage of one line at this location and that there would be even less chance of getting a double line blockage;
 - the COSS may have wanted to complete the task as soon as possible and the cold weather may have acted as an additional incentive;
 - the cold weather may also have affected the clarity of his decision-making processes (further discussed in paragraph 65); and
 - his familiarity with the location and the long sighting distance that was available for trains approaching on the up line (figure 11) may have convinced him that he could provide adequate protection to anyone working in the six-foot.
- 39 Although the track gang were aware of the nature of the work to be undertaken during the second line blockage, witness evidence indicates that there was no formal briefing by the COSS on the system of work to be adopted or by the Carillion track quality supervisor on the method of work. It is thus not clear how the COSS envisaged the work in the six-foot could be carried out safely. It was no longer appropriate for a site warden to be employed, as staff were required to work in the six-foot and someone would have to look for approaching trains (which a site warden does not do). The RAIB considers that the COSS probably intended to act as a lookout⁹ for trains approaching on the up line so that he could provide a warning to staff working in the six-foot to move clear¹⁰. This method of working, although informal and prohibited by the rule book, could have been implemented safely if the COSS had remained in a position of safety within the *four-foot* and focused on lookout duties.

⁸ The COSS had four conversations between 11:19 hrs and 12:39 hrs with the Saxilby signaller during which he tried to gain the agreement of the signaller to block the down line so that the gang could start work. On the first three occasions there was insufficient time available for the work that the gang needed to carry out. On the fourth occasion, the COSS agreed to the signaller's request for the COSS to work under another COSS acting as a Protection Controller.

⁹ A COSS is not permitted to act as a lookout as defined by Handbook 3 of the railway rule book.

¹⁰ At the time of the accident the COSS/site warden was not wearing the requisite COSS or site warden armband and he was not in possession of a whistle or horn (as per the requirements of GERT8000 Handbook 3 'Duties of the lookout and site warden').



Figure 11: Image taken from the four-foot of the down line showing the extensive sighting distance of trains approaching on the up line

- 40 From the start of the second line blockage at 13:44 hrs witness evidence indicates that track workers immediately began to pack the ballast in the cess and four-foot. One track worker began to work in the six-foot with another member of the gang intermittently stepping over from the four-foot into the six-foot. The packing created surface voids which were filled by a track worker shovelling ballast in the four-foot on the down line and by the Carillion track quality supervisor from the cess.
- 41 At some point between the taking of the second line blockage and the approach of train 2P67 the COSS stepped into the six-foot¹¹. Evidence from witnesses did not identify when he stepped into the six-foot and was unclear about his subsequent actions. However, although there is conflicting evidence on this point, the RAIB considers it likely that he became distracted by the progress of the work and may also have become involved.
- 42 The RAIB considers that the interest of the COSS in the work activity, combined with the noise from the equipment, may have resulted in him losing awareness of his position relative to the open line and overlooking the risk from approaching trains. He was struck when side-on to the approaching train and was looking towards the work activity, seemingly oblivious to the train and his close proximity to the up line.

¹¹ Witness evidence and data from the on train data recorder shows that the period between the start of the second line blockage (at 13:44 hrs) and the accident (at 13:50 hrs) was six minutes.

The actions of other staff on site

The actions of staff contracted by SkyBlue

43 None of the staff contracted by SkyBlue challenged the absence of a SSOW for the second line blockage. This was a casual factor.

- 44 In addition to the COSS, five members of the track gang had been contracted by SkyBlue to work at Saxilby on the day of the accident. The experience of the gang varied (paragraph 18), as did the range of competence qualifications held. One track worker had previously been qualified to act as COSS, and the Carillion supervisor had been qualified as a COSS since 2007. Although members of the track gang stated that they were not aware of the location of the COSS in the six minutes before the accident occurred, the RAIB considers that, given the close proximity of the members of the gang to each other during that time, it is highly probable that at least some of them would have been in a position where they would have been aware of his presence in the six-foot. None of the track gang raised the matter with the COSS or stopped work.
- 45 Witness evidence indicates that some members of the track gang did not fully understand railway safe systems of work. One member of the gang believed he was allowed to work in the six-foot until the site warden touched him to warn of an approaching train, while other members of the gang believed it was solely the job of the COSS to warn other members of staff of an unsafe act and that they had no personal responsibility to do so. However, four members of the gang were more experienced and knowledgeable. Despite this, no-one challenged the COSS regarding the absence of a briefing and the way the work was being undertaken.
- 46 Witness evidence indicates that the method of working adopted during the second line blockage (staff working in the six-foot with only one line blocked) had been adopted on other work sites before the accident on 4 December 2012.
- 47 SkyBlue operated a reporting process ('don't walk by') to encourage staff to refuse to work on grounds of safety and report any safety related matter. However, some members of the gang said that they believed raising safety related matters on site might result in work being delayed, the cause of which could be attributed to them. Some said they believed this could affect their future opportunities for work and thus constituted a disincentive to challenge or report unsafe work practices.
- 48 The COSS had worked with the other members of the track gang since the start of the Great Northern/Great Eastern project. Carillion and SkyBlue managers had actively encouraged the COSS to 'create' a track gang with regular members, as this was seen to promote reliability and productivity. The COSS had done so and they worked together frequently as a unit. The COSS became the focal point for organising the availability of the individuals and he also had social links with members of the gang. These factors led to the COSS being seen as the 'natural' leader and decision-maker within the gang.

- 49 The track gang's acceptance of the overall leadership and decision-making role of the COSS, combined with their personal desire to get the work completed quickly, probably led the gang to focus their attention on the work in hand. Although they were aware that the Carillion supervisor was present to review and check the quality of the work, the gang believed that he had some element of management responsibility for the SSOW. The lack of briefing by the Carillion supervisor on how the voiding would be rectified before and during the second line blockage may have reinforced the gang's belief that he was also content with the COSS's approach to the work, including *cross packing* in the six-foot. The strength of this belief may have been further enhanced by the Carillion supervisor's participation in the work activity during the second line blockage.

The actions of the Carillion supervisor

50 The Carillion supervisor on site did not challenge the absence of a SSOW for the second line blockage. This was a causal factor.

- 51 The work being undertaken at Saxilby on 4 December 2012 had been contracted by Network Rail to Carillion. Carillion, in turn, had secured the services of the track gang hired by SkyBlue to undertake the work. However, because the work had been contracted to Carillion, its normal practice was to supply a supervisor on site if the work was being performed by non-Carillion staff.
- 52 Carillion company risk assessment procedure PLC/CORE/HSSQ/PRO/082 requires the supervisor to:
- complete and brief a *point of work risk assessment* form for every task;
 - monitor the course of the work (although not the behaviour of the gang) and if any changed circumstances are encountered, carry out, agree and communicate an additional point of work risk assessment;
 - accompany the agency workers while on site;
 - ensure the effectiveness of controls is reviewed as work progresses especially in connection with adjacent activities; and
 - check the quality of the work.
- 53 The Carillion point of work risk assessment form (reference RAIL/HSSQ/PRO/082-F008) includes a series of questions. Although the 14 questions are mostly concerned with general site safety matters such as the presence of tripping hazards and equipment being in good order, the second question on the form was: 'Has everyone in the gang received SSOW briefing (is it correct & fully understood)?'. The form indicates that work should not be started until all questions could be answered 'yes' or 'not applicable' and asks the supervisor to record what action had been taken in the event that the answer to any question was 'no'.
- 54 Evidence shows that the supervisor was aware of his responsibility to complete and brief the form to all staff on site, but did not do so¹². The RAIB understands that he had not previously submitted any such forms for work on the Great Northern/Great Eastern project before the accident. A review undertaken by Carillion after the accident on 4 December 2012 showed Carillion supervisors had not routinely completed the forms on site and this non-compliance had not been identified or acted upon.

¹² The POWRA form should be completed in conjunction with the COSS task briefing form.

- 55 The Carillion supervisor considered that his role was focused on the quality of work rather than its safety, which was the responsibility of the COSS. His belief was based upon his knowledge that he was the only person qualified to understand some of the equipment being used on site and to judge the quality of the work being undertaken.
- 56 Carillion was unable to provide a job description for the site supervisor's role. However, it considered that the supervisor's principal role was one of technical support to all aspects of the work being undertaken. In respect of safety, it considered that the track quality supervisor worked under the SSOW that had been implemented by a COSS. While this was true, it did not take account of the requirement for the supervisor to consider whether the SSOW briefing was correct (paragraph 53). The supervisor was a qualified COSS and was in a position to make a judgement about the correctness of the SSOW. In addition, Carillion had not considered the risk that the role of the supervisor could be misinterpreted by agency workers (paragraph 49) and how this could affect the implementation of a SSOW.
- 57 The supervisor believed that the work proposed for the second line blockage could have been delayed to the following day or incorporated into a *possession* planned for the following weekend. However, he did not discuss these options with the COSS or challenge the absence of a SSOW briefing.
- 58 While the supervisor was not directly responsible for the safety of the gang, he was in a position to challenge the COSS if the SSOW was not briefed or not correct. Witness evidence indicates that the COSS was held in high regard in respect of his leadership role and had a strong social relationship with the other five members of the gang. This may have been apparent to the Carillion track quality supervisor, giving him the impression of being an 'outsider', and could have made him reluctant to challenge the COSS over the absence of a briefing or to insist on the work being completed at another time.

The COSS's awareness of the approaching train

59 The COSS did not see or hear the approaching train. This was a causal factor.

- 60 As indicated in paragraph 39, it is not clear what system of work the COSS thought he had implemented. If he was acting as site warden, there was no requirement for him to be present in the six-foot. If he was acting as lookout, he should have been looking towards approaching up trains; this task could also have been undertaken from the four-foot of the blocked down line. However, at some stage after the second line blockage was taken, the COSS took up a position within the six-foot. He then became distracted and may have participated in the work (figure 12). He was not looking towards the train and did not see it approaching.



Figure 12: The scene of the accident looking at the area of work on the down line with ballast tidied around the sleeper ends within the six-foot

- 61 Witness evidence indicates that the driver of train 2P67 sounded the horn as he approached and passed a separate track gang working in the up line cess, 250 metres north of the gang working at the Sykes Lane underbridge. When the gang working to the north of Sykes Lane acknowledged the sounding of the horn, the driver sounded the horn for a second time. The train driver considered that the second sounding of the horn for the first work group also constituted the first warning for the gang working at the underbridge. The driver stated that at least one of the gang working at Sykes Lane acknowledged this warning and he then said that he sounded the horn for a third time. He believed that the entire gang working near the underbridge was in a position of safety (not in the six-foot), and he then focused his attention on a signal on the up line.
- 62 A reconstruction undertaken by the RAIB showed that from a distance of 200 to 250 metres, a train driver would have had difficulty in distinguishing if a person was standing in an unsafe position if that person was located in the six-foot, but to the rear of people working in close proximity to each other (figures 13 and 14).



Figure 13: Image taken from the four-foot of the down line showing an up line train approaching underbridge 68 (approx. 200 to 250 metre distance from the location of the accident)



Figure 14: Reconstruction image showing the view from a cab of train travelling on the up Gainsborough line approaching Sykes Lane (approx 250 metre distance)

- 63 Members of the track gang stated that they did not hear the train's horn being sounded and were therefore unaware of its approach. Although the COSS and other track workers operating the hammers were not wearing ear defenders (which might have masked the sound of the train horn being sounded), the noise created by the machinery¹³ may have prevented them from hearing the approaching train¹⁴ (figures 15 to 17).
- 64 Toxicology and haematology reports show that the COSS was in good health and was not under the influence of drugs and alcohol. The COSS had no known medical condition that could have impaired his ability to see or hear the approaching train. The pathology reports, the examination of the train and the location of the injuries show that the COSS was struck a glancing blow on the right side of his body and that he was not falling or tripping at the time of the accident. He was standing in an upright position facing towards the track gang and down line cess. This evidence indicates that it is highly probable that the COSS was completely unaware of the approaching train at the time of the accident.

¹³ Technical data for the Atlas Copco 'Cobra' hammers approved by Network Rail show the noise generated by the machine to be 109 dB(A). This does not include the noise created or diminished by the material being worked on or the number of machines operated in one operation.

¹⁴ Railway Group Standard GM/RT 2482 'Audibility Requirement for Trains' mandates the minimum and maximum sound pressure levels for train horns to be 101 to 106 dB(A). Post-incident testing showed that on the unit involved, the low and high tones produced sound levels ranging from 108 to 110 dB(A) which were higher than the current standard (but appropriate for when the unit was designed). The audibility of the horn at the time of the accident would have been affected by the noise from the equipment, environment (weather/wind) and how far the train was from the worksite when the horn was sounded.



Figure 15



Figure 16



Figure 17

Figures 15 to 17: Police/RAIB reconstruction showing the location of the COSS: standing in the six-foot next to the six-foot rail of the down line (top); within the six-foot (middle); and next to the six-foot rail of the up line (bottom) at the time of the accident.

- 65 Aside from his involvement in the work, the cold conditions and the noise generated by the hammer equipment may both have had a negative effect on the ability of the COSS to maintain his concentration and awareness of where he was standing in the six-foot. Following an accident at Whitehall West Junction on 2 December 2009, in which a lookout was struck and fatally injured by a train after moving from a position of safety into its path, Network Rail commissioned research¹⁵ into situational awareness and other factors that may affect the vigilance of safety critical staff. The research suggests that there are several factors relevant to how effective humans are at locating sound and an individual's ability to hear a train approaching and act appropriately. Key factors found to have an impact included:
- temperature (very cold or very hot), which can affect an individual's concentration levels and place extra demands on them; and
 - noise, which can also act as a source of stress if it is loud or perceived to be annoying by the individual.

Identification of underlying factors¹⁶

SkyBlue's response to previous incidents involving the COSS

66 No effective action had been taken by SkyBlue in response to the involvement of the COSS in two other incidents in the two months preceding the accident. This was an underlying factor.

67 On 4 October 2012, the COSS was involved in a serious near-miss incident affecting a track worker between Clay Cross and Wingfield. He had been hired by SkyBlue to act as a Protection Controller for Amey Colas. In that capacity, he had requested a *hand signaller* (hired by another agency) to go onto the track to lift *detonator protection* but had not established the hand signaller's actual location at the time of the call and assumed he could accomplish the task quickly. In practice, the hand signaller had between 200 and 300 metres to walk to reach the protection. As a result, the Protection Controller (the 'Saxilby COSS') advised the signaller that the line could be reopened almost immediately after his call to the hand signaller, and consequently the signaller allowed a train to approach. The hand signaller was removing the first detonator when he became aware of the approaching train and had to jump clear. Amey Colas, the contractor for the site of work, was asked to lead a local investigation which commenced on 9 October 2012 and concluded on 21 November 2012, before the accident occurred at Saxilby.

¹⁵ Research completed by University of Nottingham, (2011):

- 'Does train noise assist the railway lookout?' The Institute for Occupational Ergonomics Centre for Rail Human Factors. IOE/RAIL/12/03/R; and
- 'Vigilance and the Railway Lookout'. The Institute for Occupational Ergonomics Centre for Rail Human Factors. IOE/RAIL/11/03/R.

This research was commissioned by Network Rail's Senior Ergonomist who produced a document entitled 'The Role of the Lookout: the implications of research on vigilance' (2011).

¹⁶ Any factors associated with the overall management systems, organisational arrangements or the regulatory structure.

- 68 As the first investigation was progressing, a second incident involving the Saxilby COSS occurred. On 4 November 2012, a *tamper* passed a signal at danger on the up main line between Derby and Tamworth at Clay Mills without the authority of the signaller. Before the incident the Saxilby COSS, who had been contracted by SkyBlue to work on the Amey Colas worksite, had also been acting in the role of COSS on site. However, he volunteered to change to the *level crossing attendant's role*, as the planning process had not identified nor allocated any person to perform that role. Another SkyBlue agency worker took over the COSS's role. The crossing was taken under *local control* and the tamper was authorised to cross. It is alleged that the tamper technician advised the level crossing attendant (Saxilby COSS) that he would not be returning over Clay Mills crossing. However a short time later the tamper driver returned, passed the signal at danger and approached the crossing when the barriers were under normal working (ie no attendant present) and in the raised position. The tamper driver stopped short of the crossing and reported the incident.
- 69 Network Rail led the investigation. It identified that miscommunication had occurred between the level crossing attendant (Saxilby COSS), the *Engineering Supervisor* and the tamper driver. It also identified that there had been no COSS safety briefing given by either of the two members of SkyBlue staff who had performed the role of COSS during the work.
- 70 Further issues included some agency workers failing to correctly book onto the Amey Colas site via the site access control point (paragraph 94) and the COSS paperwork could not be found. The investigation was ongoing at the time of the accident at Saxilby on 4 December 2012.
- 71 Despite the involvement of the Saxilby COSS in both of these serious incidents, no action was taken that prevented him from continuing to work as a COSS, or to address his safety performance and competence. The reasons for this were:
- SkyBlue did not have a process to ensure the details of all incidents or accidents affecting people it had hired had been reported and recorded, and that the necessary follow-up actions had been completed;
 - the actions of the SkyBlue Rail Manager; and
 - confusion within SkyBlue as to who was following up the incidents.
- Each of these is now considered in turn.

SkyBlue's management of incidents affecting people it had hired

- 72 SkyBlue did not have a process to ensure all incidents or accidents affecting people it had hired had been reported and recorded, and that the necessary follow up actions had been completed.**
- 73 SkyBlue and its parent company Carillion maintained a database (called 'AIRLine') within which details of accidents and incidents affecting people working for Carillion, or on Carillion contracts, could be entered. Dependent on the severity of the event (minor/ moderate/major) a designated manager would be allocated to investigate the incident or accident and there was a requirement that actions were recorded. Carillion and SkyBlue managers could also manually enter details of the accident or incident on the database if another contractor (such as Amey Colas) notified them of a safety related incident involving Carillion or SkyBlue staff. SkyBlue managers were aware of the incidents involving the Saxilby COSS described in paragraphs 67 and 68, but these were not recorded on the AIRLine database. Managers from Carillion have explained that the purpose of AIRLine was to record events occurring on Carillion projects and that Carillion did not expect Sky Blue to record third party incidents on AIRLine. However, the RAIB has seen evidence of other incidents and accidents on third-party sites recorded on the database.
- 74 Responsibility for recording details of the incidents involving the Saxilby COSS would have fallen to the SkyBlue Rail Manager once he was advised of them. With no details of the two incidents on the database, there was no opportunity for anyone within the company to monitor or see the outcome of the investigations. Furthermore, when the Rail Manager resigned (referred to in the next section of this report), there was no information recorded that would have enabled his successor to gain an early understanding of the situation in respect of the Saxilby COSS.

The actions of the SkyBlue Rail Manager

- 75 The SkyBlue Rail Manager did not take action in response to the October 2012 incident and the following incident in November 2012.**
- 76 The SkyBlue Rail Manager joined the company in 2004 in another role and was promoted to Rail Manager in May 2012. As Rail Manager, his role was to manage the office, liaise with clients and organise the resources to meet the client's specification for the planned work. The Rail Manager reported to the Regional Manager. Both the Rail and Regional Managers were able to call upon the technical assistance of the Rail Delivery Manager who was the only manager with railway experience.

- 77 On 5 October 2012, owing to the serious nature of the near miss incident at Clay Cross on the previous day, Network Rail's Production Manager for the project contacted SkyBlue's Rail Manager and requested that the Saxilby COSS (who had been acting as a Protection Controller on 4 October) should have his 'Sentinel' certification¹⁷ to act in safety critical roles removed with immediate effect. The SkyBlue Rail Manager acknowledged this request and stated that he would arrange for the individual to be spoken to on 8 October. Amey Colas, Network Rail's contractor for the site on which the near-miss had occurred, arranged a preliminary investigation meeting for 9 October and the Saxilby COSS was asked to attend. The SkyBlue General Manager was advised and asked SkyBlue's Rail Delivery Manager to attend to support the Rail Manager because of the former's experience in the rail industry.
- 78 Witness evidence indicates that both the Amey Colas and SkyBlue managers involved in the meeting on 9 October 2012 were concerned not only about the incident itself, but also about the Saxilby COSS's attitude and his unwillingness to recognise that his own actions had contributed to the incident. Documentary and witness evidence shows that Amey Colas believed the outcome from the meeting was that the certification of the Saxilby COSS would be temporarily suspended pending the outcome of the local investigation. Amey Colas recorded that the Rail Delivery Manager would lead for completing the actions on behalf of SkyBlue (paragraph 88).
- 79 Despite the mutually agreed outcome of the meeting, the SkyBlue Rail Manager neither applied the process to suspend the Saxilby COSS's certification on the Sentinel system nor did he withdraw his Sentinel card. The Rail Manager did not advise the Rail Delivery Manager of this fact. The RAIB considers that this lack of action was for the following reasons:
- the Rail Manager was a friend of the Saxilby COSS and the suspension of his COSS certification would affect their social relationship; and
 - the Saxilby COSS was a key person in the Great Northern/Great Eastern project and the focal point for arranging the track gang's availability - suspending him could have affected the Rail Manager's ability to organise resources for the project in the future.
- 80 On 5 November the Rail Manager was informed that the Saxilby COSS had been involved in the incident at Clay Mills. Network Rail launched an investigation and requested Amey Colas, the contractor for the Clay Mills site, to act as a contact point for communication to and from SkyBlue. A rail industry panel meeting was arranged for 13 November and SkyBlue's Rail Manager was asked to arrange the attendance of the two SkyBlue agency workers who had been involved (paragraph 68). On 12 November, SkyBlue's Rail Manager advised Network Rail and Amey Colas that the Saxilby COSS had refused to attend the meeting or provide a statement for the investigation panel. In addition, the Saxilby COSS had advised SkyBlue that in future he would not accept work placements on Amey Colas work sites.

¹⁷ The Sentinel management system was introduced in April 1999 by Railtrack (the predecessor of Network Rail) to ensure that individuals working on its infrastructure had attained the necessary certification of safety competency. A Sentinel cardholder must be registered and managed by a sponsor or employer. Individuals who pass the assessment are provided with certification and a Sentinel card which shows the details of certification are valid and in date.

- 81 The industry panel meeting took place, during which it became apparent to all parties that the Saxilby COSS had been involved in both the Clay Cross and Clay Mills incidents. However, this did not prompt Amey Colas or Network Rail to ask SkyBlue's Rail Manager why the Saxilby COSS had not had his certification withdrawn after the first incident.
- 82 There is conflicting evidence over whether, prior to the SkyBlue Rail Manager leaving the company, he consulted with and obtained a verbal agreement from the SkyBlue Rail Delivery Manager to allow the Saxilby COSS to work for Carillion as a COSS on the Great Northern/Great Eastern project for work planned in the Peterborough area in late November 2012. The Saxilby COSS duly undertook this work. On 16 November the Rail Manager left the company. No formal handover took place between the Rail Manager, his temporary replacement or the SkyBlue Regional Manager at any time.
- 83 The Saxilby COSS acted as a COSS on 19 occasions between 5 October and 16 November (the date when the Rail Manager left the company) and continued to perform duties as a COSS, being used a total of 16 times between 16 November and 4 December.

Confusion within SkyBlue over responsibility for following-up the two near-miss incidents

- 84 **There was a lack of clarity within SkyBlue as to who was responsible for managing the follow-up for the two near-miss incidents involving the COSS.**
- 85 A number of managers within SkyBlue were aware of the incidents on 4 October and 4 November, but no-one took responsibility for managing the issue.
- 86 The Regional Manager was on a training course between 5 and 29 October, and was advised that the Rail Manager, supported by the Rail Delivery Manager, would deal with the investigation. The Regional Manager was also made aware of the incident on 4 November, but was not briefed by the Rail Manager that the same individual had been involved in both incidents. Prior to the Rail Manager leaving SkyBlue the Regional Manager did not arrange a meeting with the Rail Manager. Had this been undertaken it is highly probable that the status of the Saxilby COSS and his involvement in the two incidents would have been identified.
- 87 On 19 November, the Regional Manager appointed a Manager to temporarily fill the vacant Rail Manager's post. The Manager had no railway experience. As no effective handover had taken place and no additional information had been provided by the Rail, Regional or Rail Delivery Managers the details relating to the Saxilby COSS's involvement in the two incidents and the omission of data on SkyBlue's accident investigation database were not known to his replacement.

- 88 On the same day, Amey Colas emailed the Clay Cross investigation report to SkyBlue's Rail Delivery Manager and other contractors involved in the incident. The report formally confirmed the recommendation to suspend the Saxilby COSS's certification with immediate effect. This required a SkyBlue manager to submit a temporary suspension form to 'Sentinel' to suspend the certification. This would have prevented the Saxilby COSS acting in a safety critical role but would have allowed him to continue to work at track worker level until his reinstatement was confirmed by SkyBlue. However the Rail Delivery Manager stated that he did not open this email until after the accident on 4 December 2012 and thus he did not respond to Amey Colas or take any action.
- 89 Documentary evidence shows that Amey Colas managers had become increasingly frustrated at the lack of action by SkyBlue in respect of the Saxilby COSS (and other matters not related to safety) and requested a meeting to discuss the issues. SkyBlue's Regional and Rail Delivery Managers met with Amey Colas on 27 November. During the meeting Amey Colas brought the matters relating to the Saxilby COSS to the attention of the two SkyBlue managers. The SkyBlue Regional Manager requested the Rail Delivery Manager to clarify the status of the investigation relating to the Saxilby COSS and his involvement in respect of the Clay Cross investigation, and to obtain a statement from him relating to the Clay Mills incident. At this time the Rail Delivery Manager was unaware that Amey Colas had sent the Clay Cross investigation report by email. The Saxilby COSS was instructed to attend the SkyBlue offices on 29 November, which he did, and the Saxilby COSS provided a statement in relation to the Clay Mills incident of 4 November.
- 90 Witness evidence indicates that the Rail Delivery Manager believed that the actions of the Saxilby COSS had not contributed to the Clay Mills incident. Despite the Rail Delivery Manager having knowledge of the Saxilby COSS's involvement in the Clay Cross incident, and also knowing the actions, information and outcomes from the various meetings he had attended in October and November 2012, this did not prompt him to make any enquiries to Network Rail or Amey Colas about the results of the Clay Cross investigation, nor did he check the current certification of the Saxilby COSS.
- 91 After the Rail Manager left SkyBlue, the Rail Delivery Manager and Regional Manager did not come to a clear understanding on who was actually leading for SkyBlue in relation to the two investigations or confirm the status of any outstanding actions in relation to the Saxilby COSS. Each stated that they believed it was within each other's remit to manage the Saxilby COSS.
- 92 Had a clear understanding about who was managing the investigations and the status of the Saxilby COSS been agreed, it is possible that the Saxilby COSS's certification would have been withdrawn pending action to address the deficiencies identified. He would have been permitted to work only at track worker level until SkyBlue was satisfied that his certification could be restored¹⁸. It is unlikely, given the time necessary to complete all these activities, that he would have been on site at Saxilby on 4 December 2012 in the COSS role.

¹⁸ Such a process had been adopted by the contractor who had hired the hand signaller involved in the incident on 4 October 2012, and it was able to confirm to Amey Colas that his re-briefing and re-training had been completed by 19 November 2012.

The actions of Amey Colas

- 93 There was no follow up by Amey Colas in respect of the Saxilby COSS after publication of their report into the near-miss at Clay Cross. This was an underlying factor.**
- 94 After the Clay Cross incident on 4 October 2012, Amey Colas believed that SkyBlue had temporarily suspended the Saxilby COSS's certification (as recorded on the Sentinel system). Amey Colas's managers believed that employment law prevented them from taking any direct action to suspend the Saxilby COSS's certification because the Saxilby COSS did not work for them. However, Amey Colas used its site access database to bar the Saxilby COSS (and other SkyBlue staff) from gaining access onto any Amey Colas work site, but did not always check this database for all personnel seeking to work on its sites. The Clay Mills incident on 4 November 2012 highlighted not only that SkyBlue had not suspended the Saxilby COSS's certification, but also that he had been able to gain 'unauthorised' access onto an Amey Colas site.
- 95 Amey Colas published the Clay Cross investigation report on 21 November 2012. The company defined the recommendation to SkyBlue as closed because it had sent details of the recommendation to SkyBlue. However, SkyBlue had not provided a response on how it intended to address the recommendation. Amey Colas did not have a process to identify whether recommendations that it had made on other contractors or agencies had been completed, and it did not identify that the SkyBlue Rail Delivery Manager had not acted upon its email and the report recommendation.

The actions of Network Rail

- 96 There was no action taken by Network Rail in respect of the Saxilby COSS after the near-misses at Clay Cross in October 2012 and Clay Mills in November 2012. This was an underlying factor.**
- 97 As a result of SkyBlue's response to the e-mail sent on 5 October 2012 (paragraph 77), Network Rail's Production Manager believed the Saxilby COSS's certification had been temporarily suspended. When the further incident took place in November 2012 at Clay Mills, Network Rail appointed an Operations Manager to lead the investigation; he had also attended the Clay Cross incident. However the fact that the Saxilby COSS had been involved in both incidents was not highlighted to Network Rail until 13 November when the Saxilby COSS refused to attend the industry panel hearing and Amey Colas representatives advised the panel of the previous incident in October. In line with its own company standards relating to the temporary suspension of certification when an individual is involved in a safety of the line incident, Network Rail should have checked the status of the Saxilby COSS's certification or ensured that SkyBlue had done so.
- 98 Documentary and witness evidence indicates that Network Rail had considered direct action to temporarily suspend the Saxilby COSS's certification after he had refused to attend the panel hearing on 13 November or to provide a statement. However Network Rail's lead investigators believed that Amey Colas was following up the issues relating to both investigations with SkyBlue. This led to no action being taken.

- 99 The RAIB considers that the lack of co-ordination between Amey Colas and Network Rail in the management of the investigations led to a lack of engagement and information-sharing which obscured the status of the two ongoing investigations being known, and the link between them. When Network Rail did become aware, the inexperience and knowledge of the investigation managers combined with a continued lack of co-ordination between the stakeholders resulted in no decisive follow-up action in respect of the certification held by the COSS. This allowed him to continue to perform safety critical duties throughout the period, up to and including the date of the accident on 4 December.

Monitoring the performance of agency workers

100 SkyBlue had no effective performance review regime for managing the competence of people it hired for work on Network Rail infrastructure. This was an underlying factor.

- 101 The SkyBlue competence management process (CI/SB/HSSQ/PRO/015) outlines how the company manages the competence of its agency workers. The Rail Manager's responsibilities included managing the competence of people it hired. If deficiencies were found, the process called for the development of the individual concerned by coaching, instruction and mentoring. However, the Rail Manager did not have the necessary competence to assess the performance of anyone acting in key safety roles such as COSS. In practice, he made announced quarterly visits to site to check on the welfare of individuals that SkyBlue had hired, but not to assess their competence in a site environment.
- 102 In the absence of a designated competent individual within SkyBlue to directly monitor the performance of agency staff in key safety roles such as COSS, the competence management process relied upon:
- managers meeting with clients on a six-monthly basis to identify generic problems;
 - a contractor raising a safety-related matter (which could result in a SkyBlue manager making a site visit); and
 - a SkyBlue manager responding when someone it had hired was involved in an incident or accident.
- 103 There is no legal or contractual requirement from Network Rail for agencies to develop a training and development strategy or to engage in close monitoring of the performance of the staff that they hire for work. Most people that SkyBlue hired also worked for other agencies and there was no close employer/employee relationship. Had contractual employer/employee relationships been in place, it is likely that the actions of the Saxilby COSS in the two incidents in October 2012 and November 2012 would have, in a formal manager/employee relationship, resulted in immediate action from his line manager. The involvement of one person in a second incident so soon after the first would inevitably have raised an employer's concern and caused it to consider whether the employee was properly focused on his work or was exhibiting unsafe behaviours in safety critical roles.

Deficiencies in Carillion's management systems

104 Carillion had not identified the omissions and deficiencies within its own or SkyBlue's management systems. This was an underlying factor.

105 Carillion uses SkyBlue to hire self-employed individuals for Carillion worksites and to supply such individuals to other contractors. The processes and guidelines used by Carillion are in many areas 'mirrored' within SkyBlue's processes. Before the accident, Carillion had not identified several omissions or deficiencies within its own or SkyBlue's management systems. These related to the following areas:

- the 'point of work risk assessment' process was not being routinely completed by all Carillion supervisors (paragraphs 50 to 57);
- deficiencies in the accident reporting management system which was supposed to ensure that all notified accidents and incidents were included and that actions to be taken were recorded by the designated manager (paragraphs 66 to 71);
- deficiencies in the application of processes for temporary suspension of Sentinel certification and ensuring necessary action had been taken by the designated line manager (paragraphs 75 to 82);
- a lack of clarity within SkyBlue as to who was responsible for managing the follow-up for the two near-miss incidents involving the Saxilby COSS (paragraphs 84 and 92); and
- deficiencies in the application of the competence management process for individuals that it hired for work (paragraphs 100 to 103).

Discounted factors

106 When officers from the British Transport Police examined the scene after the accident, they identified a portion of *geomesh* (figure 18) protruding from the ballast within the six-foot area. Initially the police thought that the COSS may have tripped or fallen over it immediately before the accident. The RAIB's examination of the site showed that the geomesh was some distance away from where the COSS was standing at the time of the accident. Furthermore, witness evidence and the location of the injuries to the COSS provide evidence that he was standing at the time he was struck.

Observations¹⁹

Industry investigations into serious incidents and accidents

107 Some of the people who had witnessed the accident were interviewed a number of times by different parties and felt that this had had an adverse effect on them. Due to the circumstances of the accident and information that had been provided, some organisations interviewed witnesses more than once in order to clarify details of their accounts, to allow the witnesses the opportunity to comment on new findings from the ongoing investigations or to resolve apparent inconsistencies between different accounts.

¹⁹ 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.



Figure 18: The geomesh at the site of the accident

108 Some witnesses stated that the trauma they experienced as a result of their proximity to the accident was compounded by the nature of the interview processes used within rail industry investigations, which feature a panel of interviewers and often a significant number of questions.

Previous occurrences of a similar character

109 Since October 2005, the RAIB has investigated 18 accidents or incidents involving track workers, including the accident at Saxilby. Five of the accidents resulted in fatal injuries to the person involved, and a further eight resulted in serious injuries. Some of the investigations resulted in recommendations with relevance to the circumstances of the accident at Saxilby; these can be found in the section on previous RAIB recommendations relevant to this investigation commencing at paragraph 114.

Summary of conclusions

Immediate cause

110 The COSS stepped back into the path of train 2P67 as it passed the site of work (**paragraph 25**).

Causal factors

111 The causal factors were:

- a. the COSS had not implemented a SSOW for the task that was being undertaken at the time that the accident occurred and was standing in an unsafe position as the train approached (**paragraph 28, Recommendation 1**);
- b. none of the staff contracted by SkyBlue challenged the absence of a SSOW or the actions of the COSS and others working within an unsafe area (**paragraph 43, Recommendation 2**);
- c. the Carillion supervisor did not challenge the COSS on the lack of briefing prior to the work commencing and the absence of a SSOW (**paragraph 50, see paragraph 143**); and
- d. the COSS became distracted during the second line blockage and did not see or hear the approaching train (**paragraph 59, Recommendation 2**).

Underlying factors

112 The underlying factors were:

- a. No effective action had been taken by SkyBlue in response to the involvement of the COSS in two other incidents in the two months preceding the accident (**paragraph 66, Recommendations 2 and 3**). The reasons for this were:
 - SkyBlue did not have a process to ensure all incidents or accidents affecting people it had hired had been reported and recorded and that the necessary follow up actions had been completed (**paragraph 72**);
 - the SkyBlue Rail Manager did not take action in response to the October 2012 incident and the following incident in November 2012 (**paragraph 75**); and
 - there was a lack of clarity within SkyBlue as to who was responsible for managing the follow-up for the two near-miss incidents involving the COSS (**paragraph 84**).
- b. There was no follow up by Amey Colas in respect of the 'Saxilby COSS' after publication of its report on 19 November 2012 into the near-miss at Clay Cross (**paragraph 93, see paragraph 144**);
- c. There was no action taken by Network Rail in respect of the 'Saxilby COSS' after its investigations into the near-misses at Clay Cross in October 2012 and Clay Mills in November 2012 (**paragraph 96, see paragraph 145**);

- d. SkyBlue had no effective performance review regime for managing the competence of people it hired for work on Network Rail infrastructure (**paragraph 100, see paragraph 145, Recommendations 2 and 3**); and
- e. Carillion had not identified the deficiencies and omissions within its own or SkyBlue's management systems (**paragraph 104, Recommendation 3**).

Additional observations

- 113 Although not linked to the accident on 4 December 2012, the RAIB observes that the processes employed by the railway industry during its own investigation into the accident at Saxilby may have taken insufficient account of the trauma that some of the witnesses were suffering as a result of their proximity to the accident (**paragraphs 107 and 108, Recommendation 4**).

Previous RAIB recommendations relevant to this investigation

Introduction

114 Paragraphs 115 to 142 contain details of previous incidents and accidents involving track workers with one or more factors that were relevant to the accident at Saxilby on 4 December 2012. The following paragraphs describe relevant recommendations made by the RAIB following its investigation into those incidents and accidents.

Trafford Park – 26 October 2005 (RAIB report 16/2005)

115 A train struck and fatally injured a track worker at Trafford Park West Junction. The RAIB's investigation found that the 'safe' system of work was not defined, appropriate or adequate and that nobody on site challenged the inadequate safety arrangements, despite being qualified to do so.

Recommendations

116 The RAIB made two recommendations to Network Rail which address factors also identified in this investigation:

Recommendation 8

Network Rail must ensure the selection, training and performance assessment regime achieves and maintains the prescribed standard of performance required of the COSS. A review is required which should consider:

- *at the selection stage, an assessment of the individual's personal attitudes to safety, adherence to rules and inter-relational personal skills;*
- *an assessment prior to qualification, and if appropriate, post-qualification, to more accurately reflect the performance required in the workplace; and*
- *the development of a new robust monitoring process to ensure that an individual's on-the-job performance routinely achieves the prescribed level.*

Status of actions taken as reported by the Office of Rail Regulation

117 In June 2007, the ORR commented to the RAIB that the COSS's attitude to safety would be difficult to assess and that robust (Network Rail) monitoring systems were already in place. Network Rail had considered the recommendation but believed that carrying out an appraisal as recommended was the responsibility of the employer (the COSS was an employee of a contractor), and proposed no further steps beyond existing competence standards. The ORR reported that the recommendation was closed in March 2008. (Since then, Network Rail has reported that it has taken steps to address the selection of suitable persons to act as COSS – this is referred to in paragraphs 120 and 123.)

Relevance to the Saxilby investigation

- 118 The Saxilby investigation found that the COSS had not been subject to an effective performance monitoring system (paragraph 100). This issue has now been addressed in recommendations 1 and 2 of this investigation.

Recommendation 9

Network Rail should consider further work and the expansion of the current programme of research into understanding the causes of rule violation, in direct contravention to the training people have received, to include track safety skills.

Status of actions taken as reported by the Office of Rail Regulation

- 119 In August 2007, the ORR reported to the RAIB that research conducted in response to this recommendation by RSSB and research available from other sources meant that there was no longer a need to conduct further research in this area. At the time, Network Rail had planned an initiative called 'SAF 7' which was concerned with improving safety culture and led to changes in the COSS selection process. In September 2008, the ORR reported to the RAIB that this recommendation was closed. (Since then, Network Rail has reported that it is taking steps to promote the safety of existing track workers – this is referred to in paragraphs 135 to 137.)

Relevance to the Saxilby investigation

- 120 The Saxilby investigation found that the COSS had not implemented a SSOW (paragraph 28). Although Network Rail took some action in response to this recommendation, the actions were focused on its own staff and were not imposed on COSS-qualified personnel hired through agencies such as SkyBlue. This issue has now been addressed in recommendations 1 and 2 of this investigation.

Ruscombe – 29 April 2007 (RAIB report 4/2008)

- 121 An empty train running from Old Oak Common depot to Reading depot struck and fatally injured a welder at Ruscombe junction, between Maidenhead and Twyford. The welder did not move to a position of safety and continued to work even though it is likely that he had been warned of the approaching train. Relationships and interactions within the team affected the safety decisions prior to the accident.

Recommendation

- 122 The RAIB made one recommendation to Network Rail which addresses factors also identified in this investigation:

Recommendation 2

Network Rail, in consultation with RSSB, should carry out human factors research into the impact of peer pressure, group communications and dynamics on safety decision making in small COSS led work teams. This should include a consideration of how teams are constituted and how a relatively inexperienced COSS can deliver authority, compliant behaviour, leadership and a challenge function. The findings of this research should be used to inform a review of training and management systems.

Status of actions taken as reported by the Office of Rail Regulation

- 123 In April 2011, the ORR reported to the RAIB that Network Rail had done a great deal of work to identify the qualities of a COSS needed to promote safety, resulting in the introduction of new COSS selection and assessment procedures being incorporated into Network Rail standards. The recommendation was therefore deemed closed by the ORR. (Since then, Network Rail has reported that it is taking steps to promote the safety of existing track workers and COSS staff – this is referred to in paragraphs 135 to 137.)

Relevance to the Saxilby investigation

- 124 Although the COSS at Saxilby was not inexperienced, the research referred to in recommendation 2 was not limited only to circumstances where peer pressure had influenced the COSS; it was focused on the general issue of peer pressure, group communications and dynamics within the group. The investigation into the accident at Saxilby found that the staff on site had not challenged the absence of a SSOW (paragraphs 43 and 50). Network Rail's proposals in response to recommendation 2 only applied to the recruitment of its own staff and did not apply to personnel hired through agencies such as SkyBlue. This has now been addressed in recommendations 1 and 2 of this investigation.

Grosvenor Bridge - 13 November 2007 (RAIB report 19/2009)

- 125 A COSS was struck and seriously injured by a train just outside Victoria station in London. The RAIB's investigation found that the COSS had moved away from the line that was subject to lookout protection and into the path of an approaching train. The investigation also identified that the COSS briefing to the team including the lookout was incomplete, that the COSS was not challenged by the lookout and that the close working relationships and culture within the team may have distracted them from following the safety rules.

Recommendation

- 126 The RAIB made one recommendation to Network Rail which addresses factors also identified in this investigation:

Recommendation 4

In order to verify their effectiveness, Network Rail should monitor recently introduced processes that will show whether an individual's on-the-job performance routinely achieves the prescribed level with regard to safety. If necessary these processes should be enhanced.

Status of actions taken as reported by the Office of Rail Regulation

- 127 The ORR last reported to the RAIB on Network Rail's progress in implementing this recommendation in June 2010. At that stage, the ORR was seeking clarification on whether Network Rail was intending to use its planned general inspection process as its means of implementing the recommendation. Network Rail has reported that it has enhanced its planned general inspection process to meet the intent of this recommendation.

Relevance to the Saxilby investigation

- 128 The Saxilby investigation found that the COSS had not been subject to an effective performance monitoring system (paragraph 100), although the recommendation was targeted at Network Rail. The extension to agency staff of the scope of recommendation 4 from the Grosvenor Bridge investigation has been addressed in recommendations 1 and 2 of this investigation.

Whitehall West – 2 December 2009 (RAIB report 15/2010)

- 129 A train struck and killed a lookout as it passed Whitehall West junction near Leeds. The RAIB's investigation found that the lookout had lost situational awareness and moved from a position of safety, possibly unaware that he had moved into the path of the approaching train. The research work undertaken by Network Rail on situational awareness following this accident is described in paragraph 65.

Recommendation

- 130 The RAIB made one recommendation to Network Rail which addresses factors also identified in this investigation:

Recommendation 1

Network Rail should consider ways to reduce the risk of lookouts moving dangerously close to trains and if appropriate make arrangements to physically identify a safe position by:

- a. marking its limits on the ground;*
- b. placing barriers at its limits;*
- c. placing a rest in a safe position to allow a lookout to remain in comfort; or*
- d. other appropriate arrangements.*

Status of actions taken as reported by the Office of Rail Regulation

- 131 The ORR last reported to the RAIB in April 2012, describing the research into vigilance techniques for safety critical staff and subsequent training that Network Rail had put in place in response to this recommendation. The relevant research work undertaken by Network Rail on situational awareness following this accident is described in paragraph 65 of this investigation report. ORR is reviewing the totality of the actions undertaken and proposed by Network Rail to address the intent of this recommendation.

Relevance to the Saxilby investigation

- 132 The Saxilby investigation found that the COSS had stepped back into the path of train 2P67 as it passed the site of work, indicating he may have lost awareness of where he was standing in an unsafe position within the six-foot and/or that he had not been aware of the approaching train.

Washwood Heath – 6 March 2010 (RAIB report 1/2011)

- 133 A train passing the site of track maintenance work at Washwood Heath, Birmingham struck a piece of rail that was being moved, damaging the train and slightly injuring the driver. Although this incident was not one of the 18 accidents or incidents involving track workers referred to in paragraph 109, it was relevant to the circumstances at Saxilby in a number of key respects. The RAIB's investigation found that the system of work was unsafe and did not comply with the rule book or Network Rail's procedures. In addition, the supervisor in charge of the work was not adequately managed and was not challenged over his unsafe method of work.

Recommendation

- 134 The RAIB made one recommendation to Network Rail which addresses factors also identified in this investigation:

Recommendation 3

Network Rail should extend the work it is undertaking to improve the methods and criteria used when selecting staff to undertake safety leadership roles to include consideration of the training and assessment of those staff who are already qualified in those roles.

Status of actions taken as reported by the Office of Rail Regulation

- 135 The ORR reported to the RAIB that, in response to this recommendation, Network Rail introduced in December 2010 an element of pre-selection against a range of behavioural markers into its training course for staff being trained for the first time in the COSS role. This assessment against behavioural markers had been extended from June 2011 to cover the recertification of existing holders of the COSS competence.
- 136 Network Rail has also designed a training course entitled 'Managing Site Safety', aimed at front line supervisors and team leaders who have a role to play in leading safety behaviours. The course is intended to help individuals understand the role they have in developing and leading a safety culture within Network Rail and is now mandatory for all staff involved in leading site safety. The first course took place in May 2011.
- 137 Network Rail has additionally reported that all existing holders of a COSS certification working for either Network Rail or their principal contractors will be required to undertake a 'Non-technical Skills' development day by June 2015. This is intended to develop the thinking and interpersonal skills needed to undertake the COSS role.

Relevance to the Saxilby investigation

- 138 The Saxilby investigation found that although the COSS had not set up a SSOW (paragraph 28), its absence was not challenged by other SkyBlue (paragraph 43) or Carillion (paragraph 50) personnel on site at the time. The reason for this was, in part, due to the COSS being seen as the natural leader of the work group (paragraph 48). The work proposed by Network Rail in response to Washwood Heath recommendation 3 does not extend to agency staff; recommendations 1 and 2 from this investigation address this omission.

Stoats Nest Junction – 12 June 2011 (RAIB report 16/2012)

139 A train struck a member of railway staff at Stoats Nest Junction on the main line between London and Brighton. The track worker who was struck remained in the path of the train as it approached and passed the site of maintenance work. Work was taking place in the vicinity of an open line, and no measures were put in place to protect personnel from the passage of trains on that line. The RAIB's investigation found that the authority of the COSS had been undermined by the presence of senior managers on site.

Recommendation

140 The RAIB made one recommendation to Network Rail which addresses factors also identified in this investigation:

Recommendation 1

Network Rail should develop a time based programme which expedites the implementation of its existing activities designed to improve safety culture and qualities of safety leadership for:

- a. track maintenance staff; and*
- b. their managers.*

Activities covered by this programme should include steps to enhance the quality of safety leadership provided by the COSS, and to address the behaviour of managers when working on site such that this role of the COSS is not undermined.

Status of actions taken as reported by the Office of Rail Regulation

141 The ORR advised the RAIB in February 2013 that Network Rail is taking action to address the recommendation. The action taken is described in paragraphs 135 to 137 above, as Network Rail considers that the action it was already taking in response to Washwood Heath recommendation 3 also covered the action required to address Stoats Nest Junction recommendation 1.

Relevance to the Saxilby investigation

142 The relevant issues found in the Saxilby investigation are as described in paragraph 138.

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

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

- 143 Carillion Construction Limited (encompassing Sky Blue) has introduced a requirement for a manager to review all completed point of work risk assessment forms. The review is intended to ensure supervisors understand their responsibility to complete the forms and to brief them to all parties on site. A training programme is being implemented for all supervisors, which explains the point of work risk assessment process.
- 144 Amey Colas has introduced a new procedure to specify how proposed restrictions on the certification of employees and agency workers arising from investigations into incidents and accidents should be dealt with.

Other reported actions

- 145 Carillion Construction Limited (encompassing Sky Blue) has reported that it has:
 - Established a Competency, Compliance & Rail Training (CCRT) unit to control, monitor and manage compliance with its own procedures and rail industry standards. All requests for temporary suspensions of certification will be made to the CCRT. A programme has been established to ensure all SkyBlue workers are trained and mentored.
 - Re-briefed SkyBlue Rail Managers on their responsibilities to manage and develop agency workers to meet the required level. If sub-standard performance is identified, the Rail Manager will support and develop the competence or withdraw the worker from the particular activity.
 - Employed staff to undertake on-site safety critical observational assessments, mentoring and developing agency workers and support the implementation of safety training and initiatives in conjunction with Carillion's customers.
 - Enhanced its incident database to provide an increased level of information relating to rail accidents and incidents involving external contractors. Carillion managers will now conduct frequent checks to review information relating to any incidents, accidents, performance or behavioural issues to identify common trends and linked investigations/individuals.
 - Nominated a senior management team member as the responsible lead in the event of an incident, responsible for communications with the parties involved and deciding on the course of action to be taken.
 - Ensured that if an agency worker is involved in a safety critical incident, the worker's certification (COSS) will be temporarily limited to track worker level until the outcome of any investigations is known.
 - Stipulated that a designated manager will undertake a formal review of any findings from incident investigations to record appropriate actions to be taken and by whom.

146 Network Rail has reported that it has:

- Developed a system which will enable all staff (including those who book onto the railway through a site access control point) to have their certification checked prior to working on or near the line;
- Introduced the requirement for contractors and agencies to regularly monitor the performance, attitudes and behaviour of agency staff in order to ensure deficiencies are identified and addressed; and
- Issued guidance to all contractors and agencies on their responsibilities in applying the process for temporary suspension of the individual's certification within the Sentinel system.

147 Amey Colas has reported that it has:

- Re-briefed its investigation process to all safety managers.
- Changed its incident logging and tracking database to ensure a nominated safety manager is appointed for an investigation. A periodic status report shows the nominated manager and their responsibility for all actions and recommendations through to closure of the investigation.

Recommendations

148 The following recommendations are made²⁰:

- 1 *The intent of this recommendation is for Network Rail to control the risk arising from the use of agency staff in safety leadership roles.*

Taking account of the findings of this investigation (particularly in respect of the actions of the COSS on site and the absence of any effective performance review applied to the COSS), Network Rail should identify and then implement, suitable controls to assure the adequate performance of agency staff in safety leadership roles and/or take steps to reduce its dependence on such staff (paragraph 111a).

- 2 *The intent of this recommendation is to address the safety risk arising from the management of agency staff in all roles involving work on and around the track.*

Network Rail, in consultation with all Sentinel sponsor organisations, should develop and implement arrangements to more effectively manage the risk arising from the use of agency staff undertaking work on and around the track. In developing the arrangements, Network Rail should, as a minimum, define improvements in respect of the following issues:

- a. the requirement for the performance, attitudes and behaviour of agency staff to be regularly monitored;
- b. the actions to be taken when deficiencies are identified, in particular the possible mechanisms to remedy the deficiency, reasonable timescales within which the deficiencies should be addressed, and the interim measures that can be applied pending resolution;
- c. the process for temporary suspension of the relevant certification within the Sentinel system and for the prompt reinstatement (to include guidance to contractors and agencies on their responsibilities for updating the status of affected agency staff) on Sentinel; and
- d. the arrangements for employers to share information in respect of the individuals involved in multiple investigations (paragraphs 111b, 111d and 112a and 112d).

continued

²⁰ 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.

- 3 *The intent of this recommendation is for Carillion, in conjunction with SkyBlue, to validate, and where necessary improve, the way it manages the performance of agency staff.*

Carillion in conjunction with Sky Blue should commission an independent review of the changes they have made to their safety management arrangements following this accident (referred to in paragraphs 143 and 145), with the aim of confirming that they have delivered the necessary improvements. The review should include specific consideration of whether the measures taken in respect of managing the performance of agency staff, and following-up accidents and incidents involving them, have been effective in controlling the risk identified in this report. The review should be completed by March 2014 (paragraphs 112a, 112d and 112e).

- 4 *The intent of this recommendation is to enhance the welfare of witnesses attending industry investigations into serious incidents and accidents.*

Network Rail, in consultation with other industry partners as appropriate, should review its processes and examine ways of improving their practices for interviewing witnesses who have been involved in serious incidents and accidents. Taking account of best practice from specialists in this area, it should develop guidance on planning for interviews and techniques for dealing with such witnesses. Training should be provided for individuals who are involved in industry investigation panels or conduct interviews as part of an investigation (paragraph 113).

Appendices

Appendix A - Glossary of abbreviations and acronyms

COSS	Controller of Site Safety
CCRT	Competency, Compliance & Rail Training
FFCCTV	Forward Facing Closed Circuit Television
NTS	Non-technical skills
ORR	The Office of Rail Regulation
OTDR	On Train Data Recorder
PTS	Personal Track Safety
RAIB	Rail Accident Investigation Branch
SAC	Site Access Control
SSOW	Safe System Of Work
SSOWPS	Safe System Of Work Planning System

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.

Absolute block regulations	A signalling system that allows only one train to be in a block section at the same time. The block indicator is used to indicate whether the line between adjacent signal boxes is clear or occupied.
Access point	A gate or point where authorised staff can gain safe access onto the railway.
Cess	The area alongside the railway. For the purposes of a lineside vegetation inspection, this is defined as the ground from the outer edge of the ballasted area to 3 metres from the running rail.
Controller of site safety (COSS)	A person certified as competent to implement a safe system of work for a group of persons on Network Rail controlled infrastructure.
Cross packing	A method used to remove voids in the ballast under the sleeper. This can be completed using a shovel or hammer.
Detonator protection	Detonator protection for a line blockage consists of three detonators placed 20 metres (approx. 20 yards) apart on the same rail with a possession limit board at the first detonator in the direction of travel.
Emergency brake (application)	A brake application that uses a more direct and separate part of the control system than that used for a full service brake application.
Engineering Supervisor	The person nominated to manage the works in an engineering worksite.
Four-foot	The area between the two rails.
Hand signaller	A competent person authorised to control to undertake protection of the line (coloured flags / detonator protection) in emergencies and for planned work.
Level crossing attendant	A competent person appointed to operate a level crossing under local control when the railway is under an engineering possession or when single line working is implemented.
Line blockage	An arrangement where a section of line has no train movements and is safeguarded.
Local control (level crossings)	A level crossing under the control of an individual based at the crossing (as opposed to it being operated automatically by the passage of trains or remotely by a signaller).

On or near the line	An area that is on the railway line itself or within 3 metres of a railway line and not separated from it by a permanent fence or structure.
Possession	A period of time during which one or more lines are blocked to trains to permit work to be safely carried out on or near the line.
Planner	A person certified as competent to plan safe systems of work.
Protection Controller	A qualified Controller of Site Safety (COSS) whose duties are to arrange and manage the possession or line blockage arrangements where two or more COSSs are working under the same protection.
Reciprocating Hammer	A hand-held machine for compacting ballast, consisting of a vibrating blade driven by a power source which may be petrol, electric or pneumatic.
Safe system of work (SSOW)	Arrangements to make sure a workgroup that is required to walk or work on or near the line is not put in danger by the movement of trains.
Safe system of work planning system (SSOWPS)	A Network Rail computer system used to plan safe systems of work and which creates the documents used to form the safe system of work pack.
Safe system of work pack (SSOW 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 safety arrangements.
Sentinel system (sponsor)	Network Rail's accreditation scheme where an individual must have a sponsor (contractor / agency) and pass an accredited course. The individual is then issued with a Sentinel smart card to enable them to access and work on the Network Rail managed infrastructure.
Site warden	A person appointed by a Controller of Site Safety to warn all staff to stay in a safe area (at least 2 metres from the nearest line open to train movements).
Six-foot	The standard minimum interval between two adjacent tracks on a railway, as measured between outside edges.*
Tamper	A railway vehicle / on track machine that can lift and move the railway track and simultaneously compact the ballast under the sleeper.*
Twist fault	A change in the cant or cross level of the track which may produce a derailment risk.
Void / voiding	A track fault consisting of spaces under sleepers or bearers in the packing area, often caused by inadequate packing or differential settlement between the sleepers. This type of fault is common after the installation of a waybeam on a structure.

Waybeam

A structural member of a bridge deck that runs parallel to and directly below the rails. This in turn generally supports longitudinal timbers.*

Appendix C - Key standards current at the time

Network Rail Standard NR/L2/OHS/19, Issue 8 'Safety of people working on or near the line'

NR/L3/MTC/PL0175/00, Issue 1 'Infrastructure Maintenance Planning Handbook'

Rule Book GE/RT8000, Module G1 Issue 4 'General safety responsibilities and personal track safety for non-track workers'

Rule Book GE/RT8000, Handbook 8, Issue 2 'IWA, COSS or Protection Controller blocking a line'

Rule Book GE/RT8000, Handbook 7, Issue 2 'General duties of a controller of site safety (COSS)'

Rule Book GE/RT8000, Handbook 1, Issue 2 'General duties and track safety for track Workers'

Rule Book GE/RT8000, Handbook 3, Issue 2 'Duties of the lookout and site warden'

GE/RT8000/TW1, Issue 8 'Preparation and movement of trains (General)'

GM/RT 2482, Issue 2 'Audibility Requirement for Trains'

Appendix D - Safe systems of work – roles and processes (key points)

- D1 Staff working on or near the line work in accordance with the requirements of a safe system of work (SSOW). Observing the arrangements of this system ensures staff are protected from the movement of trains. The procedure for planning, accepting, verifying and implementing a SSOW is detailed within Network Rail standard NR/L2/OHS/19, 'Safety of people working on or near the line', published in September 2010.
- D2 A SSOW is usually created by a planner in advance of the task being undertaken. The planner works to the instructions of the manager who requires the work to be undertaken.
- D3 NR/L2/OHS/19 requires planners to consider a number of factors when creating a SSOW. These include;
 - a. the number of people involved and the nature, location, duration and urgency of the work;
 - b. the tools and equipment to be used and any specific requirements, such as the need for inspections to take place in daylight;
 - c. the availability of opportunities to block the line to traffic; and
 - d. the layout of railway lines and the number, frequency and type of train movements.
- D4 NR/L2/OHS/19 requires planners to select a SSOW from the *hierarchy of safe systems of work* (see table D1). Types of SSOW are listed in the hierarchy with those seen as offering higher levels of protection from moving trains placed towards the top. Planners must select the highest (ie the most protective) SSOW type that they can, given the factors listed above.
- D5 Once the SSOW has been created the planner will produce a SSOW pack. This should include details of the work to be done, the planned SSOW and relevant extracts from the sectional appendix and the national hazard directory. This pack is intended for use by a COSS, who will be responsible for implementing the SSOW at the site of work and ensuring that the group for which they are responsible is protected from the movement of trains. NR/L2/OHS/19 requires that all SSOW packs are reviewed and accepted by the responsible manager before being passed to the COSS.
- D6 The SSOW pack should be reviewed and verified by the nominated COSS at least a shift in advance of the work. They are required by NR/L2/OHS/19 to use their familiarity with the site to judge if the contents of the pack are accurate, appropriate and can be implemented as proposed.

- D7 Even after a SSOW pack has been verified and approved, the COSS remains ultimately responsible for safety on site. This means that, should site conditions be incompatible with the previously verified and approved SSOW, then the COSS must amend the SSOW or suspend the work. Should a COSS wish to adopt a SSOW which is higher up the hierarchy of safe systems of work than that detailed in the SSOW pack (ie it is a more protective system) then they may do so at their own discretion. However if the SSOW to be used is from lower down the hierarchy (ie it is a less protective system) then they must obtain authority from the responsible manager before implementing it.

	NR/L2/OHS/019 Safe System of Work	Equivalent term in the PTS handbook	Basic principle of operation
1	Safeguarded Green Zone	Safeguarded	All lines within the site of work are blocked to train movements.
2	Fenced Green Zone	Fenced	A temporary fence separates the site of work and the nearest open line.
3	Separated Green Zone	Site warden warning	A designated amount of space is provided between the site of work and the nearest open line. If a group are working, then a site warden may be appointed to prevent anyone from moving too close to the open line.
4	Red Zone with warning given by Automatic Track Warning System (ATWS)	Equipment warning	The signalling system or lineside equipment automatically detects an approaching train and gives a warning via sirens, flashing lights and/or personal warning devices.
5	Red Zone with warning given by Train Operated Warning System (TOWS)	Equipment warning	The signalling system automatically detects an approaching train and gives a warning via sirens.
6	Red Zone with warning given by Lookout Operated Warning System (LOWS)	Equipment warning	A lookout detects an approaching train and uses equipment to give a warning via sirens, flashing lights and/or personal warning devices.
7	Red Zone with warning given by one or more Lookouts or COSS/IWA working alone and looking out for him/herself.	Lookout warning	A lookout detects an approaching train and gives a warning by blowing a horn or whistle, by touch or by verbal message.

Table D1: the hierarchy of safe systems of work within NR/L2/OHS/19 Issue 8 and the equivalent terminology for these systems used within RT 3170 Issue 8

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