RAIB

Rail Accident Investigation Branch

Rail Accident Report

Near miss with track workers at Pelaw North Junction
21 February 2018

Report 13/2018
August 2018

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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Preface

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. 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.

The RAIB's findings are based on its own evaluation of the evidence that was available at the time of the investigation and are intended to explain what happened, and why, in a fair and unbiased manner.

Where the RAIB has described a factor as being linked to cause and the term is unqualified, this means that the RAIB has satisfied itself that the evidence supports both the presence of the factor and its direct relevance to the causation of the accident. However, where the RAIB is less confident about the existence of a factor, or its role in the causation of the accident, the RAIB will qualify its findings by use of the words 'probable' or 'possible', as appropriate. Where there is more than one potential explanation the RAIB may describe one factor as being 'more' or 'less' likely than the other.

In some cases factors are described as 'underlying'. Such factors are also relevant to the causation of the accident but are associated with the underlying management arrangements or organisational issues (such as working culture). Where necessary, the words 'probable' or 'possible' can also be used to qualify 'underlying factor'.

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

An 'observation' is a safety issue discovered as part of the investigation that is not considered to be causal or underlying to the event being investigated, but does deserve scrutiny because of a perceived potential for safety learning.

The above terms are intended to assist readers' interpretation of the report, and to provide suitable explanations where uncertainty remains. The report should therefore be interpreted as the view of the RAIB, expressed with the sole purpose of improving railway safety.

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.

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Near miss with track workers at Pelaw North Junction, 21 February 2018

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Summary

At around 10:46 hrs on 21 February 2018, two track workers narrowly avoided being struck by a Tyne and Wear Metro train at Pelaw North Junction. The train was travelling at around 65km/h at the time. The track workers managed to move clear of the train two seconds before the train passed them. Neither was injured.

The incident occurred because the track workers were unaware of the train approaching on the line which they were on. A second train, on an adjacent line, had blocked their view of the approaching train. Although two trains passing each other in such a manner is a regular event at Pelaw North Junction, the system of work which had been set up by the track workers did not take the blocking of a lookout's view of one train by another into account. The RAIB found that Nexus Rail's procedures did not assist with the creation of an effective safe system of work. Additionally, there was a non-compliance with the rule book relating to the lookout not providing a warning when the sighting of trains became obscured.

As a result of its investigation, the RAIB has made five recommendations to Nexus Rail. These cover:

- identifying locations on the Tyne and Wear Metro network where multiple lookouts are necessary to establish a safe system of work and providing this information to relevant staff;
- improving the information available to track workers regarding hazards on the Tyne and Wear Metro network;
- improving the quality of on-site risk assessments carried out;
- supporting newly qualified safety critical track staff as they gain experience in making safe decisions; and
- clarifying and strengthening the process that Nexus Rail use to manage staff on prescription medication.

The RAIB has also identified three learning points. One is a reminder to all track workers on the Tyne and Wear Metro of the rule book requirement to stand in a position of safety when a train is passing on another line. The second reminds lookouts to constantly review their sighting of trains and provide a warning to track workers if sighting is lost for any reason. The third advises duty holders of the importance of reviewing the circumstances of near miss incidents promptly, so that perishable evidence is secured and, where appropriate, the RAIB and ORR are notified in a timely manner.

Introduction

Key definitions

1 Metric units are used for speeds and distances in this report, in line with normal practice on the Tyne and Wear Metro system.

2 The report contains abbreviations, explained in Appendix A. Sources of evidence used in the investigation are listed in Appendix B.

The incident

Summary of the incident

3 At around 10:46 hrs on 21 February 2018, two track workers narrowly avoided being struck by a Tyne and Wear Metro train which was travelling at 65 km/h at Pelaw North Junction. The track workers were attending to a reported track circuit[1] fault at that location and were unaware of the approaching train until it was very close to their location. The track workers managed to move clear of the train about two seconds before the train passed them.

4 The driver applied the train's emergency brake when he saw the track workers in the path of his train, but released the brake once they moved clear, and the train continued on its journey. Neither track worker was injured.

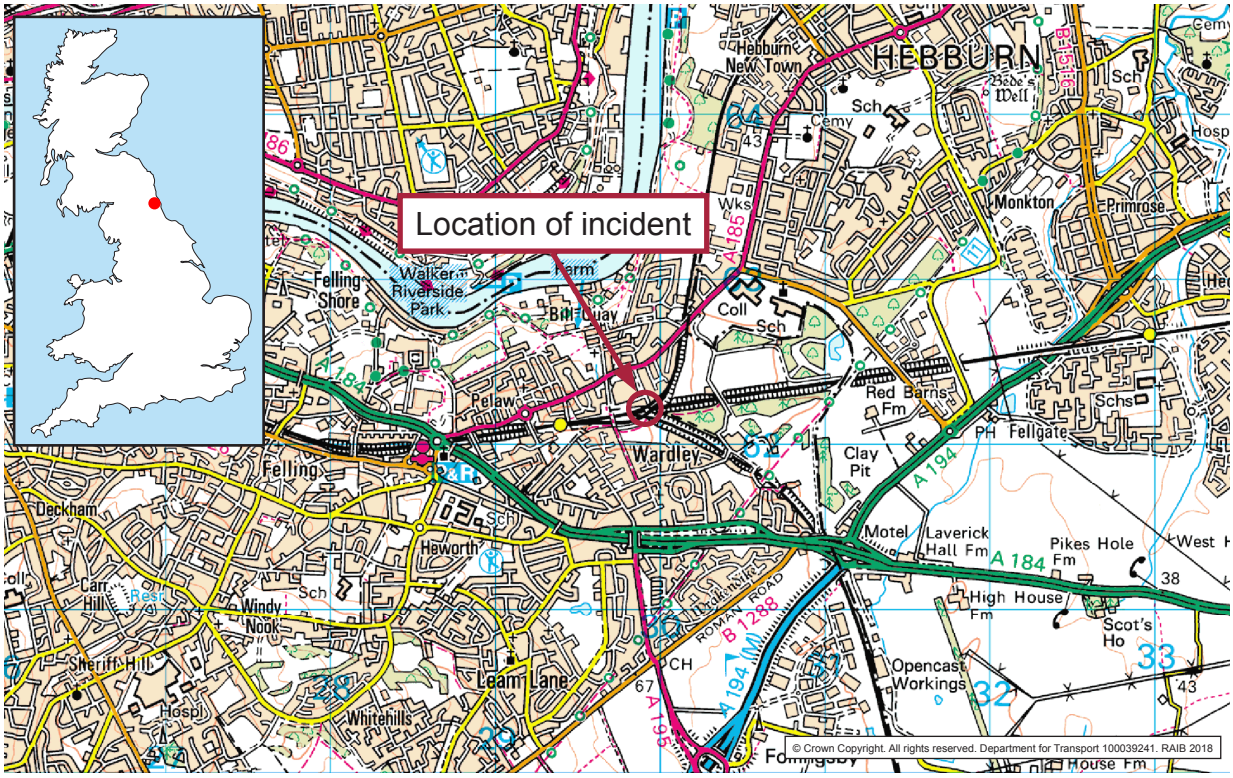

Figure 1: OS Map of Pelaw

Context

Location

5 Pelaw North Junction is part of the Tyne and Wear Metro railway system (figure 2). It is located between Pelaw station to the west, and Hebburn station, which is on the line towards South Shields (figures 2 and 3). The junction is approximately 11 km from a datum point at South Gosforth[2].

[1] A track circuit is an element of the railway signalling system, and is used to detect the presence of trains. Paragraph 18 provides further information on the track circuit involved.

[2] South Gosforth is to the north of Newcastle city centre, and is the operational headquarters for the Tyne and Wear Metro.

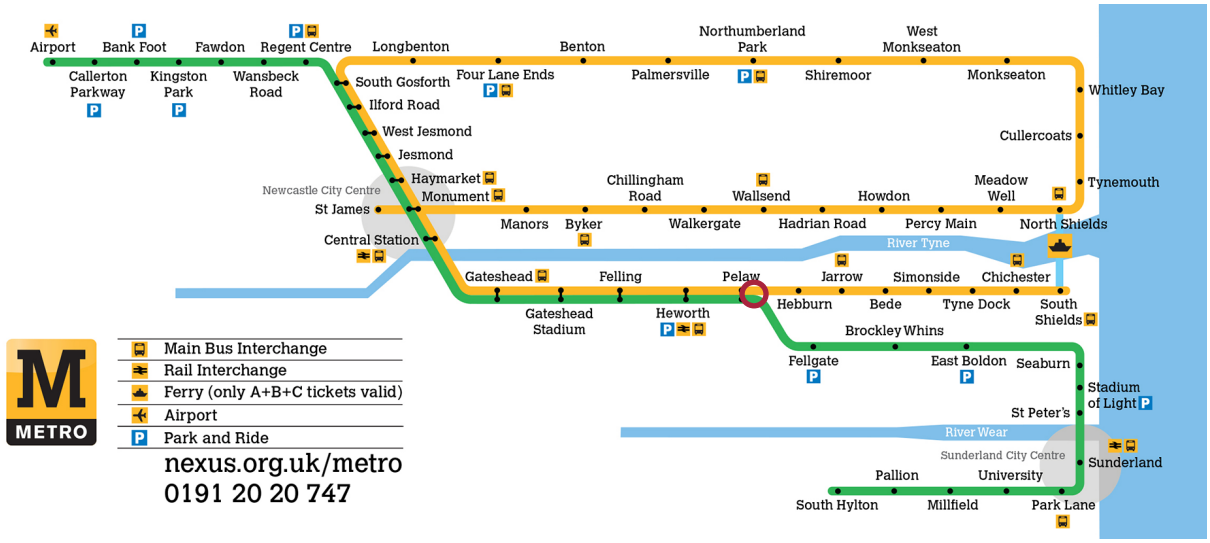

Figure 2: Nexus map of the Tyne and Wear Metro system (courtesy of Nexus)

6 There are both Tyne and Wear Metro and Network Rail (NR) railway lines at Pelaw. The Tyne and Wear Metro lines in the area of Pelaw North Junction are designated as 'inbound', on which trains normally travel towards South Shields and Sunderland, and 'outbound' on which trains normally travel towards Gateshead and Newcastle.

7 Pelaw North Junction allows trains which are travelling in the inbound direction to diverge from the inbound line towards South Shields and run round a curve towards the Network Rail lines which Metro trains then use to reach Sunderland.

8 The inbound and outbound lines for South Shields combine as a single line at Bill Quay Junction (figure 3). The railway becomes a double line again near to Hebburn station. Signal 767 controls access to the single line section from the Pelaw end (figure 5).

9 The Tyne and Wear Metro system is electrified using an overhead power supply, energised at 1500V DC.

Organisations involved

10 Nexus is the owner of the Tyne and Wear Metro. It is responsible for both the operation and the maintenance of the system on behalf of the North East Combined Authority which co-ordinates public transport in the Tyne and Wear area.

11 Nexus Rail is a directorate of Nexus and is responsible for the maintenance of all Tyne and Wear Metro assets with the exception of rail vehicles. It is the employer of the signalling technicians and the Infrastructure Manager involved in the incident.

12 North East Metro Operations Ltd (NEMOL) is a subsidiary of Nexus and is responsible for the operation of the Metro, and for the maintenance of rail vehicles used on the system. NEMOL is the employer of the train drivers involved in the incident, and also the control centre staff with the exception of the Nexus Infrastructure Manager.

13 All of the organisations involved freely co-operated with the investigation.

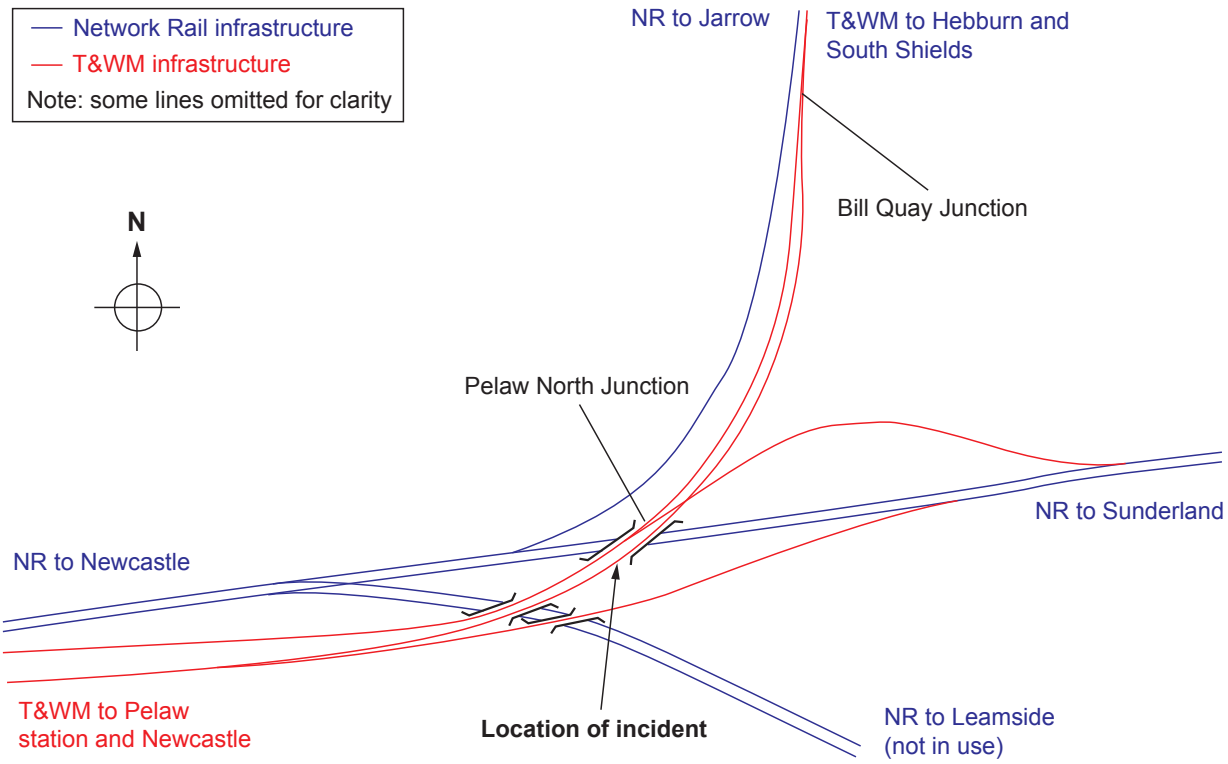

Figure 3: Schematic diagram of railway lines in the area

Trains involved

14 Train 124 was the 10:30 hrs service from South Shields to St James via the Coast[3] and was the outbound train which narrowly missed the track workers.

15 Train 127 was the 09:37 hrs service from St James to South Shields via the Coast and was the inbound train which was in the area just prior to the arrival of train 124.

16 Both trains were formed of two Metrocars coupled together. A Metrocar is the standard vehicle used to form all passenger services on the Tyne and Wear Metro (figure 4). Each Metrocar is 27.8 metres long and has a maximum speed of 80 km/h.

17 There is no evidence that the condition of the trains nor the manner in which they were driven prior to the incident had any bearing on it.

Railway systems involved

18 Track circuit 'RM' is located in the track section where the inbound line towards Sunderland crosses the outbound line from South Shields (figure 3). It is a 'reed-type' track circuit which means that it operates by the generation, transmission and detection of an electrical signal of a given frequency. The presence of a train interrupts the transmission process, and hence indicates the presence location of trains to the signalling system.

19 The track circuit used at Pelaw North Junction requires Insulated Block Joints (IBJs) to electrically isolate the section of track covered by track circuit 'RM' from those surrounding it. The track circuit also uses track bonds to physically connect cables from the lineside equipment to the rails.

[3] Coast means the stretch of railway between Whitley Bay and Tynemouth.

Figure 4: A Tyne and Wear Metrocar, similar to the trains involved in the incident

Staff involved

20 Both of the track workers involved in the incident worked within the signalling maintenance team of Nexus Rail. One was the Work Site Controller (WSC), responsible for setting up a safe system of work that is needed to protect workers from moving trains. The other track worker was the lookout. His role was to look for approaching trains from a position of safety, clear of the track, and warn the WSC (who was carrying out the inspection work) to get off the track to a position of safety when a train approached.

21 The WSC is a signalling technician. He had worked for Nexus Rail for six years and five months. He held Tyne and Wear Metro certificates of competence for personal track safety, and to enable him to act as lookout and as work site controller.

22 The lookout is an assistant signalling technician. He had worked for Nexus Rail for three years and five months. He completed his apprenticeship approximately five months prior to the incident. He also held Tyne and Wear Metro certificates of competence in personal track safety, and to enable him to act as lookout and as work site controller.

23 The signalling maintenance team consists of eighteen staff directly overseen by two supervisors. They normally work in pairs comprising a technician and an assistant technician. Team members are allocated either to fault-finding or to maintenance work. The WSC and the lookout did not normally work together, but did so on this occasion due to the absence of other staff. They had worked together occasionally before the day of the incident.

24 Infrastructure faults on the Tyne and Wear Metro system are managed by the Nexus Infrastructure Manager (NIM). The NIM is an employee of Nexus Rail, and is located within the Metro control centre at South Gosforth.

External circumstances

25 The day of the incident was cold and dry with bright sunshine. There is no evidence that the weather, or the position of the sun, had any bearing on the incident.

The sequence of events

Events preceding the incident

26 The WSC and the lookout booked on duty at the Nexus Rail depot at South Gosforth at 06:30 hrs on the day of the incident. They were allocated to fault-finding. As there were no urgent faults to attend to, they were instructed to take a road vehicle and drive to Wallsend station to attend to a non-urgent problem with a passenger information display.

27 At 09:59 hrs, control centre staff noted that track circuit 'RM' at Pelaw North Junction was showing the presence of a train when the track section was known to be clear. The fault was transitory and self-corrected quickly. However, a prolonged track circuit failure in this location would cause considerable disruption to the operation of the Metro system. The fault was brought to the attention of the NIM by a controller in the control centre.

28 The NIM called the WSC and the lookout at 10:05 hrs and asked them to attend to the fault at Pelaw North Junction. The WSC and the lookout then drove to an authorised access point close to Pelaw station.

29 At 10:40 hrs, the WSC called the control centre and advised them that he and the lookout were at the access point, and were now going onto the track to investigate the fault.

30 The WSC later reported to the RAIB that he had given the lookout a safety brief before they went onto the track. Because the fault had self-corrected earlier, trains were still operating normally.

Events during the incident

31 At around 10:46 hrs, train 127 passed the WSC and the lookout. Train 127 was travelling on the inbound line towards Hebburn and was moving slowly as it was approaching signal 767 (figure 5), which was showing a 'stop' aspect. This is because the single line section beyond Bill Quay Junction, towards Hebburn and South Shields, was occupied by outbound train 124.

32 Closed-circuit Television (CCTV) evidence from train 127 shows the lookout walking in the direction of South Shields on the cess[4] side sleeper ends of the outbound line, and the WSC walking in the same direction in the four-foot[5] of the outbound line. The WSC was inspecting IBJs and track bonds (paragraph 19) associated with track circuit 'RM' at the time.

33 Because of the curvature of the track (figures 5 and 6), the presence of train 127 obscured the lookout's view towards South Shields. The lookout and the WSC were therefore unaware of the approach of outbound train 124, which was approaching from that direction. Train 124 was travelling at, or close to, 65 km/h, its maximum permitted speed at Pelaw North Junction.

[4] The cess is the area alongside the line; the outbound line cess is on the outside of the curve at Pelaw North Junction.

[5] The four-foot is the space between the two rails which together form a railway line.

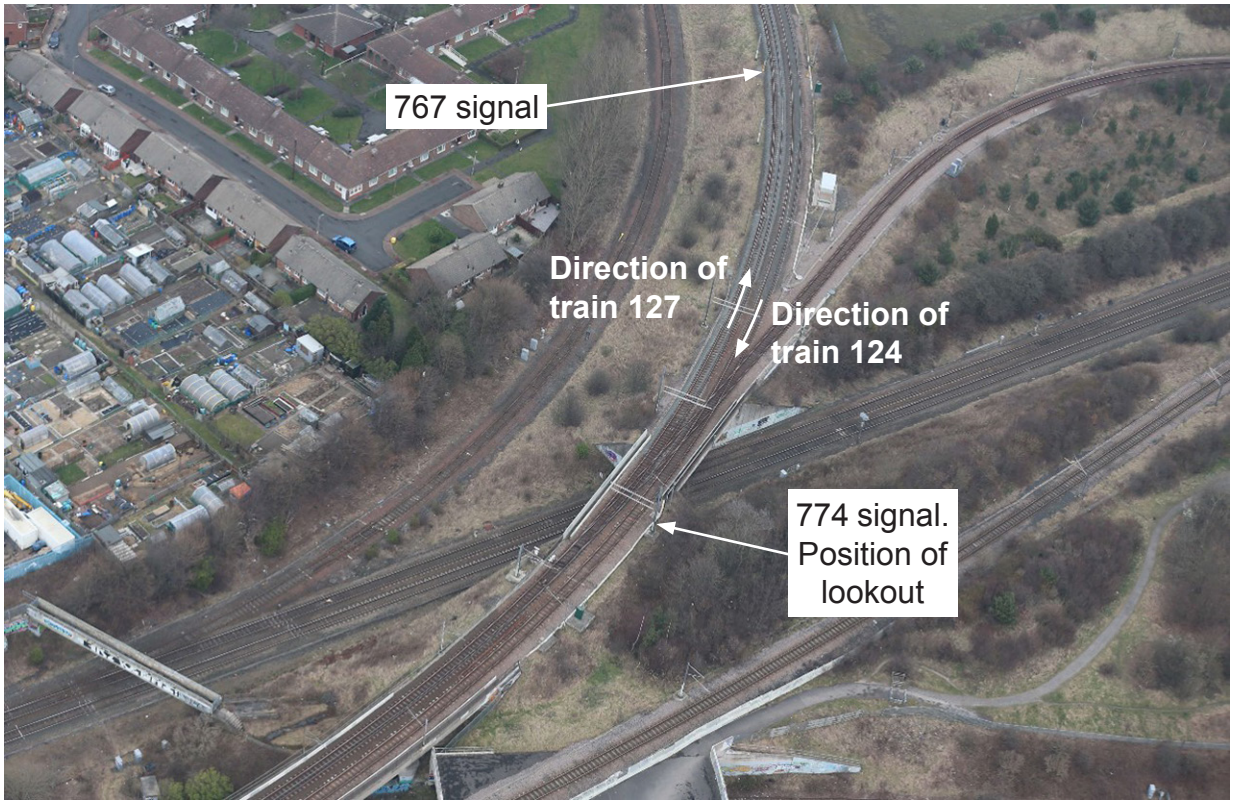

Figure 5: Image from the Network Rail Routeview system of Pelaw North Junction (courtesy of Network Rail)

34 CCTV evidence from train 124 shows that the WSC and the lookout became visible to the driver six seconds before the train reached their location. When the driver of train 124 saw the WSC and the lookout in the path of his train, he sounded the train's warning horn and applied the emergency brake. The WSC and the lookout moved clear of the train when alerted, by the horn, to the train's approach. The lookout moved to a position of safety in the cess of the outbound line, close to 774 signal (figure 5). The WSC moved into the four foot of the inbound line. They managed to move clear of train 124 approximately two seconds before the train passed them. When the driver saw that the WSC and the lookout had moved clear of the train's path, he released the emergency brake[6]. The train did not come to a stand, but continued to its next station stop at Pelaw.

35 At 10:50 hrs, while stopped at Pelaw station, the driver of train 124 made a radio call to the control centre, and reported the near miss. The control centre staff recorded this information, advised the NIM, and verified that the driver was able to continue the journey. Neither the WSC nor the lookout reported that a near miss had occurred.

[6] On a Tyne and Wear Metrocar, it is possible to release the emergency brake before the train has come to a stand.

Figure 6: Images taken from the approximate location of the lookout at the time of the incident. It can be seen how an inbound train (second image) obscures the view of an oncoming outbound train (visible in third image).

Events following the incident

36 Following receipt of the report of the near miss, the NIM called the signalling maintenance supervisor, and advised him of the report from the driver. The supervisor was already travelling to Pelaw to assist with the technical work. On arrival at Pelaw, the supervisor assisted the team with the fault-finding on track circuit 'RM'. At 11:10 hrs, the team reported to the control centre that they believed that they had found the cause of the fault with the track circuit.

37 At that time, the severity of the incident was not recognised by the track workers, their supervisor or the NIM. The track workers stated that this was because train 124 had not been brought to a stop by the driver's use of the emergency brake and had continued on to Pelaw station. The guidance provided to NIMs[7] suggests that a train making an emergency stop is a criterion for a serious safety incident; in the case of the near miss at Pelaw North Junction, the train did not come to a stand.

38 A second group of Nexus Rail staff were working on a routine maintenance task at Bill Quay Junction (figure 3). There was some initial confusion on the part of the supervisor about whether it was the group at Bill Quay Junction[8] or the group at Pelaw North Junction who had been involved in the near miss.

39 By 11:25 hrs, train 124 had reached South Gosforth, and another driver took the train to its destination. This was a planned change-over. The driver involved in the incident then spoke with a NEMOL operations manager. Following that conversation, the operations manager went to see the control room staff, including the NIM, and clarified the circumstances and severity of the incident.

40 The NIM called the supervisor (who was still on-site at Pelaw), and appraised him of the severity of the incident and proposed that the staff involved be removed from site. The supervisor discussed what had happened with the WSC and the lookout. They reported to the control centre at 12:08 hrs that they had left the railway at Pelaw, and they returned to the Nexus Rail depot at South Gosforth.

41 Following the near miss at Pelaw North Junction, some evidence was lost. The incident occurred on 21 February 2018 but was not reported to the RAIB until 7 March 2018. These matters are discussed further at paragraph 88.

[7] Nexus NMD/NIM-WI004 'Work instruction: Response to safety related incidents' version 1.0 dated 29/01/2017.

[8] The two groups of Nexus Rail staff were unaware of each other's presence. The group at Bill Quay Junction played no part in the incident.

Key facts and analysis

Background information

Duties of the WSC and available methods of protection from trains

42 On the Tyne and Wear Metro, a WSC is responsible for establishing the safe system of work required for any activity taking place within the area of the operational railway[9].

43 A key aspect of planning the safe system of work is determining how personnel at the work site will be protected from approaching trains. A number of methods for achieving this are defined in the relevant Tyne and Wear Metro rule book module[10]. Such methods are:

- 'Separated work site', which can be used when a work site is greater than 2 metres from the nearest rail of an operational running line and nobody will come within 2 metres of an operational running line;
- 'Site warden', which can be used when a work site is greater than 2 metres from the nearest rail of an operational running line, and a separated work site does not provide adequate protection. An individual known as the site warden is specifically appointed to ensure no-one inadvertently approaches an operational running line;
- 'Barrier', which can be used when a work site is greater than 1.25 metres from the nearest rail of a running line. A fixed barrier ensures that no-one inadvertently approaches an operational running line;
- 'Lookout' which can be used when working on an operational railway line. The lookout provides warning of the approach of trains so that workers are able to move to a position of safety; and
- 'Control of line' for which the passage of trains is stopped for the duration of the work.

When lookout protection is to be used, the WSC must ensure that all persons are able to be clear of the track ten seconds before a train passes. In order to achieve this, Nexus handbook TH3[11] for WSCs states that a lookout sighting distance of approaching trains of at least 350 metres is required.

44 For the work at Pelaw North Junction on the day of the incident, the protection options available to the WSC were 'lookout' or 'control of line' because the work required access onto the track itself. The WSC chose to use lookout protection. The WSC wanted to watch the movement of the IBJs and track bonds as trains passed over them and stopping trains (by using a 'control of line' protection) would not have allowed him to do this.

[9] On the Tyne and Wear Metro, the term Operational Railway means within the boundary fence or 1.25 metres from the platform edge at a station.

[10] Nexus, 'Track Safety Rules for Track Workers, handbook TH1', version 4.0, created April 2015.

[11] Nexus, 'Duties of a work site controller, handbook TH3', version 4.0, created April 2015.

45 Handbook TH3 places a number of duties on the WSC when working with lookouts, which include:

- ensuring that the lookout knows where to stand such that a sighting distance of 350 metres is available;
- using additional lookouts if required (for example, if a single lookout does not have 350 metres of sighting distance available);
- telling the lookout where their place of safety is;
- ensuring that the lookout knows how to give a warning of an approaching train; and
- ensuring that the lookout is aware that they must give the warning if their view of approaching trains becomes blocked.

Identification of the immediate cause

46 **The track workers were unaware of a train approaching on the line which they were on.**

Identification of causal factors

47 The incident occurred due to a combination of the following two causal factors:

a) The system of work set up by the WSC did not account for all the train sighting hazards present at Pelaw North Junction (paragraph 48); and

b) The lookout did not, in accordance with the rule book, provide a warning when he lost visibility of the outbound track (paragraph 64).

Each of these factors is now considered in turn.

The actions of the WSC

48 **The system of work set up by the WSC did not account for all the train sighting hazards present at Pelaw North Junction.**

49 This causal factor arose due to a combination of the following:

a) the WSC had not anticipated that an inbound train could obscure the view of the outbound track when setting up the safe system of work (paragraph 50);

b) the WSC was under some self-created pressure to resolve the fault with the track circuit (paragraph 59), possibly leading to omissions when setting up the safe system of work; and

c) the WSC did not complete a safety brief form for the specific site and the work being undertaken (paragraph 61).

Each of these factors is now considered in turn.

Train sighting hazards at Pelaw North Junction

50 Although the WSC was familiar with the location, he had not anticipated that an inbound train could obscure the view of the outbound track and therefore the view of trains approaching on that line. He stated that he had not encountered this situation before. Consequently, the WSC did not identify all of the risks associated with working at the location.

51 The WSC was responsible for establishing and briefing a safe system of work for the work at Pelaw North Junction (paragraph 42). There are a number of procedures which support this activity, but awareness of site-specific hazards is a key element of setting up a safe system of work.

52 Nexus Rail produce a document known as the hazard directory, which provides a detailed layout of the Metro system, together with specific hazards which are found at individual locations. The section of the hazard directory relevant to Pelaw North Junction is shown in figure 7.

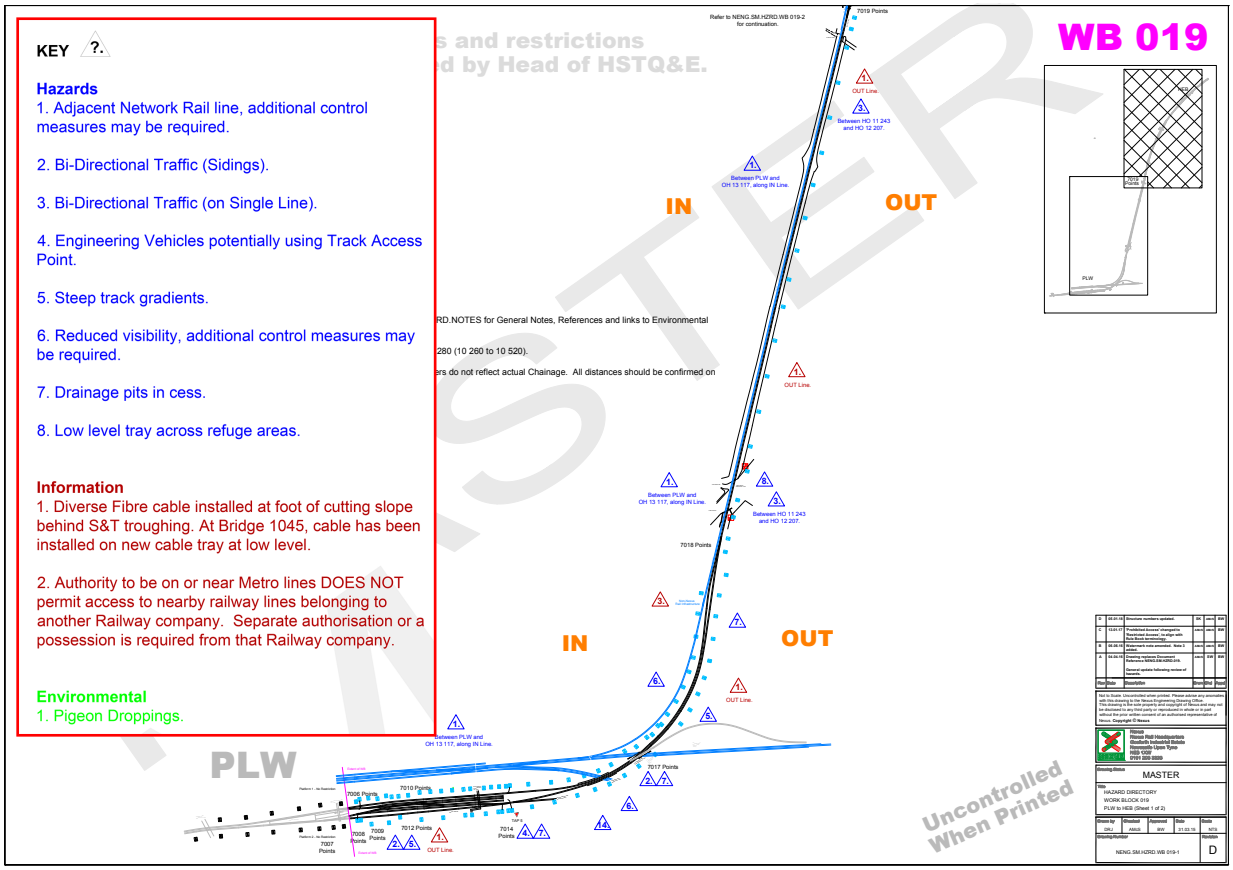

Figure 7: The section of the hazard directory which covers Pelaw North Junction

53 Site-specific hazards for Pelaw North Junction which are listed in the hazard directory include:

- 'Steep track gradients'; and
- 'Reduced visibility; additional control measures may be required'.

54 The hazard directory is an on-line document and therefore access to the Nexus Rail computer system is necessary in order to view its contents. Mobile staff, such as the two track workers involved in the near miss at Pelaw North Junction, are not provided with any means to directly access the contents of the hazard directory.

55 In order to overcome the lack of direct access afforded to mobile staff, the NIM is required[12] to provide site-specific information from the hazard directory to the WSC. In the case of the near miss at Pelaw North Junction, the NIM did not provide this information, due to an oversight. However the WSC, who required this information to compile an effective safe system of work, did not correct the oversight by requesting the information from the NIM.

56 The local conditions at Pelaw North Junction, specifically the track curvature restricting the view of approaching trains (paragraph 50), meant that the WSC could not have established an effective safe system of work with just one lookout.

57 The WSC should have assessed the hazards at Pelaw North Junction, and identified that he could not create an effective safe system of work with a single lookout (at this location, a minimum of three lookouts are required to the meet the required sighting distances). The WSC should have then contacted the NIM. A number of options existed to rectify the situation:

- arrange for the passage of trains to be stopped whilst the work was carried out ('Control of line', paragraph 43); or
- defer the work until train services had ceased for the day; or
- the WSC could have requested the NIM to arrange for additional lookouts to be provided. In this case, these additional lookouts could have been provided by the team working nearby at Bill Quay Junction (paragraph 38).

58 Unlike the WSC, the NIM was not trained to assess the requirements of a safe system of work at a specific location. The NIM would only be expected to provide further lookouts if requested by a WSC. The NIM had no information (beyond that currently in the hazard directory) to determine how many lookouts would be required at a specific location to create a safe system of work.

Self-created pressure

59 Witness evidence suggests that the WSC was under some self-created pressure to resolve the fault with the track circuit. He was aware of the critical nature of 'RM' track circuit at Pelaw North Junction and although the equipment was operating normally at the time of the incident, the WSC knew that a further failure would have been extremely disruptive to the operation of the Metro system.

60 It is possible that this self-created pressure may have led him to prioritise the technical fault-finding work over the need to create an effective safe system of work.

[12] By Work Instruction WI001 'Incident Scenario' version 1.0 dated 18/8/2013.

Work site controller safety brief

61 Handbook TH3 requires that, prior to work commencing, the WSC compiles a WSC safety brief form. The contents of this form are then briefed by the WSC to the work group. Each member of the work group must sign the form to confirm their understanding of its contents. The information on this form[13] includes:

- location of the work;
- access/egress points to/from the railway;
- protection (from trains) method to be used; and
- other hazards on site.

This safety brief form constitutes the primary documentation of the safe system of work to be used during a work activity.

62 The WSC completed a safety brief form before going onto the line at Pelaw North Junction. Figure 8 shows the front of the completed form. The WSC completed the form as 'Systemwide', meaning the form could have been used to brief a SSoW for work at any location on the Metro system. As such, the form contained very little detail on local hazards at Pelaw North Junction. The reverse side of the form asks the WSC to declare if the hazard directory has been consulted. He had pre-answered 'No'. It is possible that pre-filling of the form in this way detracted from a full consideration of the local conditions on site and may have contributed to the implementation of an unsafe system of work. The use of 'system-wide' safety brief forms was not specifically prohibited by handbook TH3. Supervisory and management staff were aware that these forms were being used in this manner.

63 The design of the WSC safety brief form and the lack of assistance it provides a WSC in setting up a safe system of work is discussed further at paragraph 71.

The actions of the lookout

64 **The lookout did not, in accordance with the rule book, provide a warning when he lost visibility of the outbound track.**

65 Nexus handbook TH2[14] defines the duties of a lookout. These include:

- remaining alert and carefully watching for approaching trains; and
- giving a warning and telling the WSC if the view becomes blocked.

The handbook also states that a lookout must not allow themselves to become distracted.

66 These lookout duties are included in the training and assessment modules used by Nexus Rail when developing the competency of their lookouts.

67 The lookout's actions immediately prior to the incident suggest that he lost situational awareness and his perception of hazards from moving trains. Possible reasons for this include a lack of experience and distraction by interest in the technical work being carried out by the WSC.

[13] The form includes a number of fields which are only relevant to 'control of line' situations; this matter is discussed further at paragraph 71.

[14] Nexus 'Duties of a Site Warden and Lookouts, handbook TH2', version 1.0, created April 2015.

APPENDIX C

Work Site Controller Safety Brief

Date:	21/02/18	Zone(s)	1 - 6	Traffic Circular Number	270
WSC Name	[redacted]	Signature	[redacted]	Day/Night	DAY

Description of Works being undertaken

Signals Maintenance and faults

Location of worksite

Systemwide

Details of other works either side

-

Details of Access/Egress to site & On Tracking Points

Stations and official access points

Details of combined Work Site (to be filled in by the level 1 WSC)

Who is the level 2 WSC?					
Contact Number					
Details of additional protection SSOW/RFLs /WSMB					
I am happy that all staff working within my worksite have been fully briefed and both parties have reached a clear understanding on how the staff will be protected in my worksite.					
Signed Level 1 WSC		Time access granted		Time access cancelled	
If the level 2 has to leave site authority passes to the PICOB (record times below)					
Time PICOB Informed		Time access cancelled			

Details of Protection (Service Trains Running)

Level of Protection	1		
Are lookouts in use?	YES	Name of Lookouts	
Are RFLs in place?	NO	Location of RFLs	
Are Worksite MB in place?	NO	Location of Worksite MB	
Name of the person placing out protection lights			
Are protecting signals being used?	NO	Protecting signals Numbers	

Details of Protection (Service Trains not Running)

Level of Protection			
Are RFLs in place		Location of RFLs	
Are Worksite MB in place		Location of Worksite MBs	
Name of the person(s) placing out protection lights			

Details of Overhead Line Isolation

In Line	LIVE
Out Line	LIVE

Figure 8: The safety brief form prepared by the WSC prior to the incident

68 The lookout had gained a Nexus Rail personal track safety competence in July 2015, during the early stages of his apprenticeship. This competence allows an individual to access the operational railway. He gained his lookout certificate of competence in August 2017; this was the first time he had held this competence. He subsequently gained the WSC competence in December 2017.

69 Nexus Rail does not have a post-qualification competence development process. This means that newly qualified staff are expected to be able to work safely and take responsibility for the safety of others at sites anywhere on the network, without supervision, from the time they obtain their first certificate of competence.

70 The lookout stated that he could not remember why he lost situational awareness. However, he was aware of the technical work being undertaken by the WSC. CCTV evidence from the rear of train 127 shows the lookout was looking in the direction of the WSC, working on the track, just prior to the incident. The lookout was an assistant signalling technician and it is therefore possible that his interest in the WSC's work arose from a desire to learn.

Identification of underlying factor

71 **There were deficiencies in the procedures used by Nexus Rail to enable staff to establish safe systems of work when required by unplanned inspections or fault rectification.**

72 The WSC safety brief form is the key document used by WSCs for the assessment and documentation of the risks likely to be encountered when working at a specific location on or around the operational railway.

73 The effective identification and mitigation of risks are the key elements in the development of a safe system of work. The risks to which track workers are exposed vary from location to location, but usually the greatest risk is from moving trains.

74 The use of lookout protection generally carries a higher level of risk than using 'control of line' arrangements to separate the work from moving trains. This is because the safety of staff working on the railway is highly dependent on the appointed lookouts remaining vigilant, maintaining adequate sighting of trains, and providing timely warnings of approaching trains to their colleagues. The estimation of sighting distances and the positioning of lookouts is critical to an effective safe system of work when using this form of protection.

75 However, the WSC safety brief form does not require any recorded assessment of lookout sighting distances, or where they should be positioned when carrying out their duties. The form includes considerable detail about the various protection methods used when staff are working without trains operating; however, none of this detail is relevant to, or provides assistance to, a WSC when working with lookout protection.

76 The tolerated use of 'systemwide' WSC safety brief forms (paragraph 62) further undermined the effectiveness of these documents in supporting the creation of effective safe systems of work.

Observations

Hazard directory

77 Mobile staff, who by the nature of their work may have to attend a site without any pre-planned safe system of work, do not have direct electronic access to the Nexus hazard directory. This is an on-line document requiring computer access. Although in this incident the information in the hazard directory was available to the WSC if he had asked the NIM for it (paragraph 55), the lack of ready access to the hazard directory could affect safety in other circumstances.

Position of safety when trains pass on an adjacent line

78 CCTV evidence from train 127 (paragraph 32) showed that the track workers were not in a position of safety when train 127 passed their location. Remaining on the track when a train passes on an adjacent line contravenes the rule book. Rule 10.7 of Nexus handbook TH1 states 'Never stand on one track whilst a train is passing on another, or stand in the space between the running lines, always go to a place of safety'.

79 This non-compliance is not considered causal to the near miss that occurred moments later. When train 127 passed the track workers, they were unaware of the approach of train 124 on the outbound line. Therefore, even if the track workers had moved to a position of safety when train 127 passed, it is likely that the WSC would have come back into the four foot of the outbound line immediately to continue his inspection.

Method of estimating sighting distance on curves

80 The RAIB observed that it is common practice amongst Nexus Rail track workers to estimate sighting distances, by counting the number of visible overhead line electrification structures. Nexus handbook TH3 requires that a sighting distance of 350 metres is required when working with lookouts (paragraph 43). On straight track, these structures are typically 50 metres apart. 350 metres equates to the distance between eight structures.

81 However, this method of sighting distance estimation could lead to an over-estimation of the available sighting distance on curved sections of track[15]. At Pelaw North Junction, looking towards Bill Quay Junction, measurements taken by the RAIB indicated that the sighting distance achieved using the 'counting overhead line structures' method was only 197 metres (measured line-of-sight) from the location of the incident.

82 This over-estimation of the sighting distance in the circumstances of the near miss was not causal because it was the inbound train which obscured the visibility of the outbound train. However, in different circumstances, such over-estimation of the available sighting distance could lead to serious consequences.

Management of prescription medication

83 On the day before the near miss, one of the track workers involved advised his supervisor, in accordance with the Nexus Drugs & Alcohol policy[16], that he had been prescribed medication. The supervisor passed the details of the medication to Nexus' occupational health advisor.

[15] Overhead line structures have to be much closer together on curved track than on straight track due to the need to maintain the overhead line position in relation to the track position.

[16] Document ref HR002, dated 9/11/11.

84 The advice received from the occupational health advisor was that the track worker should not carry out any safety critical work for two weeks from starting the course of medication. This was due to the risk of side effects.

85 The supervisor and his manager determined that a risk assessment would be carried out, taking into account the occupational health advice. They concluded that the track worker could be allowed to carry out safety critical work, provided he was accompanied at all times while he was on or near the line.

86 The Nexus Drugs & Alcohol policy does not include any provision for the use of a risk assessment technique to over-rule the advice of an occupational health provider. However, this practice had been taking place for a number of years, and had originally been sanctioned by the Human Resources department within Nexus Rail. Nexus Rail were unable to provide evidence of a management procedure which provided documentation for, or guidance on, such risk assessments.

87 The track worker who was taking the medication has confirmed to the RAIB that he was not suffering from any side-effects from the medication at the time of the incident.

Evidence preservation and reporting of the incident to the RAIB

88 Nexus did not make arrangements for the preservation of all relevant items of evidence. In particular, the following items were lost due to files being over-written on the storage media[17] and were not available to either the RAIB investigation or Nexus's own investigation:

- some CCTV files from the two trains involved in the incident; and
- data recorder files from the trains involved.

89 As these items are recorded on-board the trains, the files would have to be secured by train maintainer, NEMOL. No such request to NEMOL was made by Nexus Rail.

90 The incident was not notified to the RAIB until 7 March 2018, two weeks after it took place. This was due to continuing uncertainty within Nexus about the severity of the incident. This uncertainty led to a failure of internal communication between Nexus Rail and NEMOL.

91 The Railways (Accident Investigation and Reporting) Regulations 2005 provides classifications for accidents and incidents on UK railways. The incident at Pelaw North Junction falls within the definition of a schedule 1(9) incident, which is defined as 'An accident or incident which under slightly different circumstances might have led to a death, serious injury, extensive damage to rolling stock, infrastructure or the environment'. A schedule 1(9) incident must be reported immediately by telephone to the RAIB.

[17] The systems fitted to Metrocars are aging, and have a limited storage capacity. Prompt action is required following incidents to ensure that critical recordings are not overwritten by subsequent data.

Summary of conclusions

Immediate cause

92 The track workers were unaware of a train approaching on the line which they were on (paragraph 46).

Causal factors

93 The causal factors were:

a) The system of work set up by the WSC did not account for all the train sighting hazards present at Pelaw North Junction (paragraph 48, **Recommendations 1, 2 and 3**).

b) The lookout did not, in accordance with the rule book, provide a warning when he lost visibility of the outbound track (paragraph 64, **Recommendation 4**, **Learning point 1**).

Underlying factor

94 There were deficiencies in the procedures used by Nexus Rail to enable staff to establish safe systems of work when required by unplanned inspections or fault rectification (paragraph 71, **Recommendation 3**).

Additional observations

95 Although not linked to the cause of the incident, the RAIB observes that:

a) The track workers did not move to a position of safety when train 127 approached on the adjacent line, as they were required to do, according to the Nexus rule book (paragraph 78, **Learning point 1**).

b) Mobile staff, who by the nature of their work, may have to attend a site without any pre-planned safe system of work, do not have direct access to the Nexus hazard directory (paragraph 77, **Recommendation 2**).

c) The method used by Nexus Rail staff to estimate sighting distances, by counting overhead electrification structures, could lead to an over-estimation of the sighting distance on curved track (paragraph 80, **Recommendation 3**).

d) The process used by Nexus Rail to manage staff who are prescribed medication was not in accordance with its documented procedures (paragraph 83, **Recommendation 5**).

e) There was a delay of two weeks in reporting the incident to the RAIB, by which time some evidence had been lost (paragraph 88, **Learning point 3**).

Previous RAIB recommendations relevant to this investigation

96 The RAIB has carried out several investigations into accidents and incidents involving track workers. The following recommendations made by the RAIB as a result of its previous investigations, have relevance to this investigation.

Class investigation into accidents and near misses involving trains and track workers outside possessions, RAIB report 07/2017, Recommendation 2

97 This report (RAIB report 07/2017) investigated several accidents and near misses involving track workers on Network Rail. Recommendation 2 is particularly relevant to the incident at Pelaw North Junction:

> *The intent of this recommendation is to improve the non-technical skills of track workers.*
>
> *Network Rail should review the effectiveness of its existing arrangements for developing the leadership, people management and risk perception abilities of staff who lead work on the track, as well as the ability of other staff to effectively challenge unsafe decisions. This review should take account of any proposed revisions to the arrangements for the safety of people working on or near the line. A time-bound plan should be prepared for any improvements to the training in non-technical skills identified by the review.*

Dangerous occurrence involving track workers, near Roydon station, Essex 16 July 2012, RAIB report 07/2013, Recommendation 1

98 This investigation (RAIB report 07/2013) identified, as a causal factor, that the counting of overhead line electrification structures as a means of estimating distances could lead to the use of a sub-standard sighting distance. Recommendation 1 is as follows:

> *The intent of this recommendation is to improve the means by which controllers of site safety assess both the required and available sighting distance at sites of work.*
>
> *Network Rail should review, and then improve as appropriate, the methods by which controllers of site safety assess both the required and the available sighting distance when at sites of work. The review should include:*
>
> - *the accuracy, availability and presentation of information concerning the available sighting distances at sites of work (particularly in those areas where sighting is limited, or too short to permit a sufficient warning from one or more lookouts);*
> - *identification of recommended methods of assessing sighting distance when on site (including the use of special equipment); and*
> - *the adequacy of existing training and assessments of competence related to the assessment of sighting.*

99 The RAIB has observed (paragraph 95c) that the current method of counting structures is not appropriate for locations on the Tyne and Wear Metro network where the structure spacing is less than the nominal 50 metres used on straight track sections.

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

100 Nexus Rail has briefed its staff to ensure that WSC safety brief forms are completed on a site-specific basis; the use of 'systemwide' forms is no longer permitted.

101 Nexus Rail has commenced a programme to improve the non-technical skills[18] of WSCs and other staff responsible for the safety of others. This programme includes aspects such as risk perception and the ability to communicate critical information to others. This programme had commenced prior to the incident at Pelaw North Junction.

[18] The cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance. (RSSB definition, see https://www.rssb.co.uk/Library/improving-industry-performance/2016-07-non-technical-skills-integration-good-practice-guide.pdf).

Recommendations and learning points

Recommendations

102 The following recommendations are made[19]:

1 *The intent of this recommendation is to reduce the risk of track workers being struck by trains when working on lines still open to traffic, by ensuring adequate lookout protection is provided.*

Nexus Rail should identify, by means of risk assessment, and taking into consideration the lessons from this incident, locations on the Tyne and Wear Metro system where multiple lookouts are required to establish a safe system of work, and make this information available to work site controllers and in its hazard directory.

2. *The intent of this recommendation is that mobile staff have relevant safety information to hand when they set up systems for working on the track.*

Nexus Rail should provide its mobile staff, including fault finding teams, with remote access to the hazard directory to enable them to set up safe systems of work and alert them to sighting hazards.

[19] 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 and Roadl to enable it to carry out its duties under regulation 12(2) to:

(a) ensure that recommendations are duly considered and where appropriate acted upon; and

(b) report back to RAIB details of any implementation measures, or the reasons why no implementation measures are being taken.

Copies of both the regulations and the accompanying guidance notes (paragraphs 200 to 203) can be found on RAIB's website www.gov.uk/raib.

3 *The intent of this recommendation is to improve the quality of on-site risk assessments undertaken by work site controllers.*

Nexus Rail should:

a) improve the documentation it provides to its mobile staff to enable them to undertake a suitable risk assessment on site, including consideration of the need for additional lookouts; and

b) provide improved training to its work site controllers on recognising, assessing and mitigating risks in situations where work is to be carried out on lines open to train movements. The training should include use of the improved documentation from (a), the use of information derived from the implementation of Recommendation 1 of this report, the correct assessment of sighting distances on curved track and examples of locations on its network (eg Pelaw North Junction) where visibility of approaching trains can be compromised by train movements on other lines.

4 *The intent of this recommendation is to reduce the risk to track workers arising from inexperienced staff implementing unsafe systems of work.*

Nexus Rail should put into place a process to mentor and support newly qualified safety critical track staff, such as lookouts and WSCs, until they have acquired sufficient operational experience and knowledge to fully appreciate risks and are able to make safe decisions in potentially hazardous situations and changing conditions.

5 *The intent of this recommendation is to clarify and strengthen the process that Nexus Rail use to manage staff on prescription medication.*

Nexus Rail should:

a) decide upon and regularise its process for managing staff on prescription medication enquiries, including how advice from its occupational health provider should be assessed; and

b) brief the process to line managers and supervisors so that there is clarity about how it should work.

Learning points

103 The RAIB has identified the following key learning points[20]:

1 Track workers on the Tyne and Wear Metro system are reminded of the requirements of the Nexus handbook TH1 (Rule 10.7) which states 'Never stand on one track whilst a train is passing on another, or stand in the space between the running lines, always go to a place of safety'.

2 Lookouts are reminded of the importance of continually reviewing their sighting of trains and providing a warning to their colleagues immediately when the visibility of approaching trains is compromised or lost for any reason.

3 Railway industry bodies are reminded to assess near miss events promptly, so that perishable evidence such as CCTV and recorded train data is secured and where appropriate, the RAIB and ORR are notified in a timely manner.

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

Appendices

Appendix A - Glossary of abbreviations and acronyms

CCTV	Closed-circuit Television
IBJ	Insulated Block Joint
NEMOL	North East Metro Operations Ltd
NIM	Nexus Infrastructure Manager
NR	Network Rail
WSC	Work Site Controller

Appendix B - Investigation details

The RAIB used the following sources of evidence in this investigation:

- information provided by witnesses;
- available CCTV recordings taken from trains 124 and 127;
- site photographs and measurements;
- Nexus operating procedures and documentation;
- weather reports and observations at the site;
- a review of previous reported incidents; and
- a review of previous RAIB investigations that had relevance to this incident.

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