RAIB

Rail Accident Investigation Branch

Rail Accident Report

Detrainment of passengers onto electrically live track near Peckham Rye station
7 November 2017

Report 16/2018
October 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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Detrainment of passengers onto electrically live track near Peckham Rye station, 7 November 2017

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Summary

At 18:46 hrs on Tuesday 7 November 2017, a London Overground service from Dalston Junction to Battersea Park, operated by Arriva Rail London, came to a stand shortly before reaching Peckham Rye station. A faulty component on the train had caused the brakes to apply, and the driver was unable to release them. There were about 450 passengers on the train.

The train driver spoke over the railway radio system to the service controller, train technicians, and the signaller. Following these conversations he began, with the assistance of a member of staff from Peckham Rye station, to evacuate the passengers from the train via the door at the right-hand side of the driver's cab at the front of the train. This involved passengers climbing down vertical steps to ground level, very close to the live electric conductor rail (third rail) and walking along the side of the line for about 30 metres to Peckham Rye station.

Soon afterwards, an operations manager from Govia Thameslink Rail, which manages Peckham Rye station, contacted the member of station staff and realised where they were and what was happening. The operations manager immediately instructed the driver to stop the evacuation, and requested that he contact the signaller and his company's controller for further instructions. The driver, after further advice from control room based train technicians, isolated various train safety systems, and found that he was eventually able to release the brakes and move the train forward into Peckham Rye station, arriving at about 19:44 hrs. It was then possible for all the remaining passengers to leave the train normally, and it proceeded, empty, to the depot at New Cross Gate. No-one was hurt in the incident.

The incident occurred because the driver initiated the detrainment of passengers without the traction current being switched off. He did this because he was given instructions by control room staff who had misunderstood the actual location of the stranded train. The train driver and the signaller did not reach a clear understanding about the actions that were required to safely detrain the passengers. The delay caused unrest among the passengers on the train and contributed to stress and task overload of the driver, which affected his decision making. The driver's experience and skills did not enable him to cope with these demands, and Network Rail did not effectively implement its own procedures for managing an incident involving a stranded train.

Underlying factors were that Arriva Rail London strategic command and Network Rail signalling staff were not adequately prepared to manage the incident, and the railway industry standards and procedures relating to stranded trains place little emphasis on the need for practical training for those involved. The RAIB also observed that there were a number of deficiencies in the training and briefing of staff and in the ARL control room arrangements.

The RAIB has made three recommendations, directed to Arriva Rail London and Network Rail, intended to improve the response of the railway industry to train failures and other abnormal events, and has identified three learning points relating to the importance of following the correct procedures when preparing to evacuate passengers from trains, ensuring that communications are properly understood, and passing on the details of incidents promptly and effectively.

Introduction

Key definitions

1 Metric units are used in this report, except when it is normal railway practice to give speeds and locations in imperial units. Where appropriate the equivalent metric value is also given.

2 Abbreviations and acronyms are listed in Appendix A. Sources of evidence used in the investigation are listed in Appendix B.

The incident

Summary of the incident

3 At 18:46 hrs on Tuesday 7 November 2017, a London Overground service from Dalston Junction to Battersea Park, a train operated by Arriva Rail London (ARL), came to a stand shortly before reaching Peckham Rye station (figure 1). A faulty component on the train had caused the brakes to apply, and the driver was unable to release them. There were about 450 passengers on the train.

4 The train driver, who was the only member of railway staff on the train, spoke over the railway radio[1] system with a service controller, train technicians, and the signaller. Following these conversations he began, with the assistance of a member of station staff from Peckham Rye station, to evacuate the passengers from the train via the door at the right-hand side of the driver's cab at the front of the train. This involved passengers climbing down vertical steps to ground level, very close to the live conductor rail[2] (third rail) and walking along the side of the line for about 30 metres to Peckham Rye station.

5 Soon afterwards, an operations manager from Govia Thameslink Railway (GTR), which manages Peckham Rye station, contacted the member of station staff and realised that he was at the side of the electrically energised track assisting in the evacuation. Around 80 passengers had already left the train by this route. The operations manager immediately instructed staff to stop the evacuation, and requested that the train driver contact the signaller and his company's controller for further instructions. The driver, with further advice from the control room based train technicians, then isolated various safety systems. He was eventually able to release the brakes and move the train forward into Peckham Rye station, arriving at about 19:44 hrs. It was then possible for all the remaining passengers to leave the train normally, and it proceeded, empty, to the depot at New Cross Gate. Although no-one was hurt in the incident, the close proximity of the energised conductor rail to the evacuating passengers posed a significant risk of serious harm.

Context

Location

6 The train came to a stand on the Down South London line, approximately 30 metres away from the east end of platform one on the approach to Peckham Rye station. This part of the station consists of an island platform situated between the Up and Down South London lines (figures 2 and 3).

[1] All trains are fitted with a radio system known as Global System for Mobile Communications: Railway (GSMR).

[2] The term conductor rail, used for the remainder of the report is referred to as Conductor Rail Equipment (CRE) within the rule book module GE/RT8000/HB17 DC Electrified Lines.

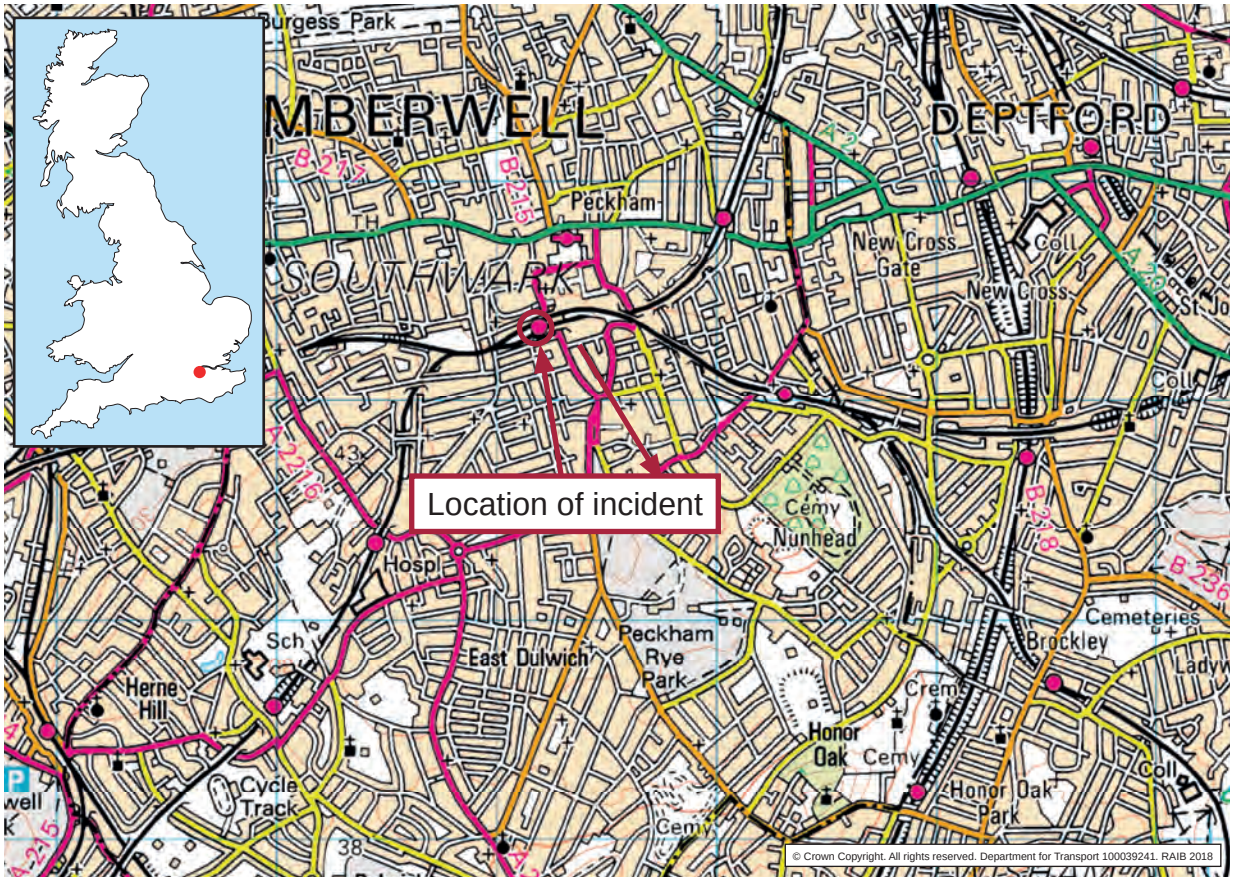

Figure 1: Extract from Ordnance Survey map showing Peckham Rye station

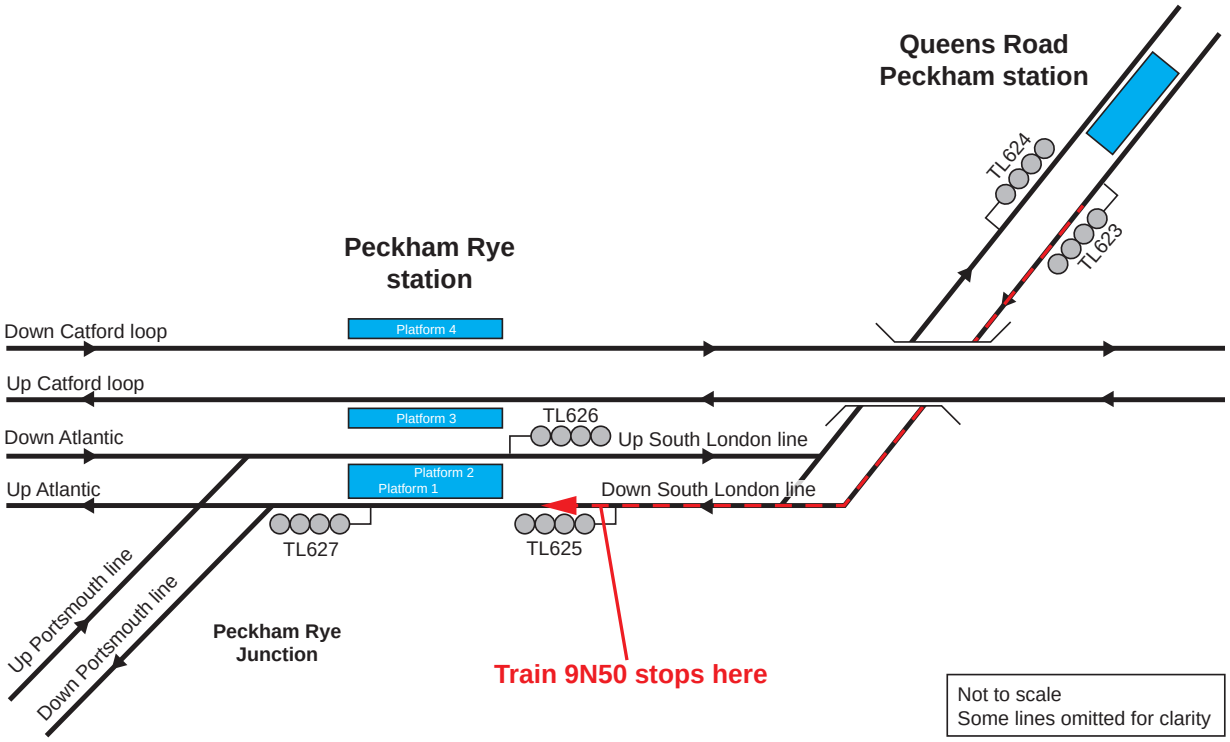

Figure 2: Track layout showing the location of the incident

Figure 3: Peckham Rye station, with the South London line platforms bottom left (image courtesy of Network Rail)

Organisations involved

7 Network Rail owns and operates the railway infrastructure. The signalling in the area is operated by signallers based in the Route Operations Centre (ROC) at Three Bridges, Sussex. In the same building, but on a different floor, is the Sussex Route Control Centre (SRCC), which includes staff from Network Rail and some train operators, including GTR. ARL has one member of staff located in the SRCC, but they were not involved in the incident (figure 4).

8 Peckham Rye station is managed by GTR, whose staff were on duty in the booking office, and agency staff (contracted to GTR) were on duty at the ticket barriers. The GTR on-call duty station manager was in an office at Peckham Rye station.

9 ARL is part of the Arriva UK Trains Division, and operates London Overground services under a contract awarded by Transport for London (TfL) which commenced in November 2016. ARL employs the train driver, and the controllers and other associated staff who are located in a control room (referred to by ARL as the strategic command, the term which is used in the remainder of this report) at Swiss Cottage, London. The strategic command is responsible for the running of ARL train services, passenger information, logging incidents, overseeing delay attribution, and managing incidents and disruption in conjunction with Network Rail (figure 4).

10 Bombardier Transportation Limited (Bombardier) manages and maintains the fleet of trains of the type involved in the incident (class 378) under a train service agreement with TfL. ARL carries out the day-to-day management of this contract under an agency agreement. The fleet is maintained at New Cross Gate depot. In-service support technicians (ISSTs) are co-located within the ARL strategic command to provide technical assistance to train drivers, ARL controllers and incident response managers when a fault occurs on a train.

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

Train involved

12 The train involved was 9N50[3], the 18:21 hrs Dalston Junction to Battersea Park service, formed of electric multiple unit 378141. This unit, built by Bombardier in Derby, entered service in 2009 as a four-carriage train, and was extended to five carriages in 2014. It has seating for 270 passengers, and is designed to accommodate up to 570 people standing.

Rail equipment/systems involved

13 The signalling on the South London lines is controlled from the Network Rail ROC at Three Bridges (figures 5 and 6). The lines are electrified using a 750 V direct current (DC) conductor rail (commonly known as the third rail), controlled by staff in Network Rail's Electrical Control Room (ECR) in Lewisham.

Staff involved

Train driver

14 The train driver joined London Overground as a trainee driver in 2008, during the period (from 2007 to 2016) when the concession was operated by London Overground Rail Operations Ltd (LOROL), and he was passed competent to drive class 378 trains on their introduction in 2009. He moved from the North London Line to the East London Line route in January 2010 in preparation for the opening of that service later in the same year. Since 2012 he has also driven over the South London Line route. He was transferred to ARL in 2016 when the concession changed hands.

Signaller

15 The signaller joined the railway in 2000, working at London Bridge signal box. As part of a signalling relocation project, he was transferred to the ROC at Three Bridges in 2015 (figure 4).

Strategic Commander

16 The ARL strategic commander joined the railway in 1997, working in commercial positions until 2012, when he was appointed as a customer service delivery manager with LOROL. He was appointed as a train service controller and later became a line controller on the West Anglia line. In March 2017 he was appointed to a new role as ARL strategic commander (figure 4).

Train Service Controller (TSC)

17 The train service controller (TSC) joined the railway in 2000 and was appointed as a line controller with Silverlink Trains in 2007. The London suburban routes in the Silverlink franchise became part of the LOROL concession from 2008, and he worked in this role until 2012 when he became senior control room manager within the LOROL control room. In April 2017 he was appointed as a strategic commander within the ARL strategic command. On the day of the incident he was covering a vacancy on the control room roster for a train service controller, a lower grade than his substantive role. He is referred to as the TSC for the remainder of this report (figure 4).

[3] An alphanumeric code, known as the train reporting number, is allocated to every train operating on Network Rail's infrastructure.

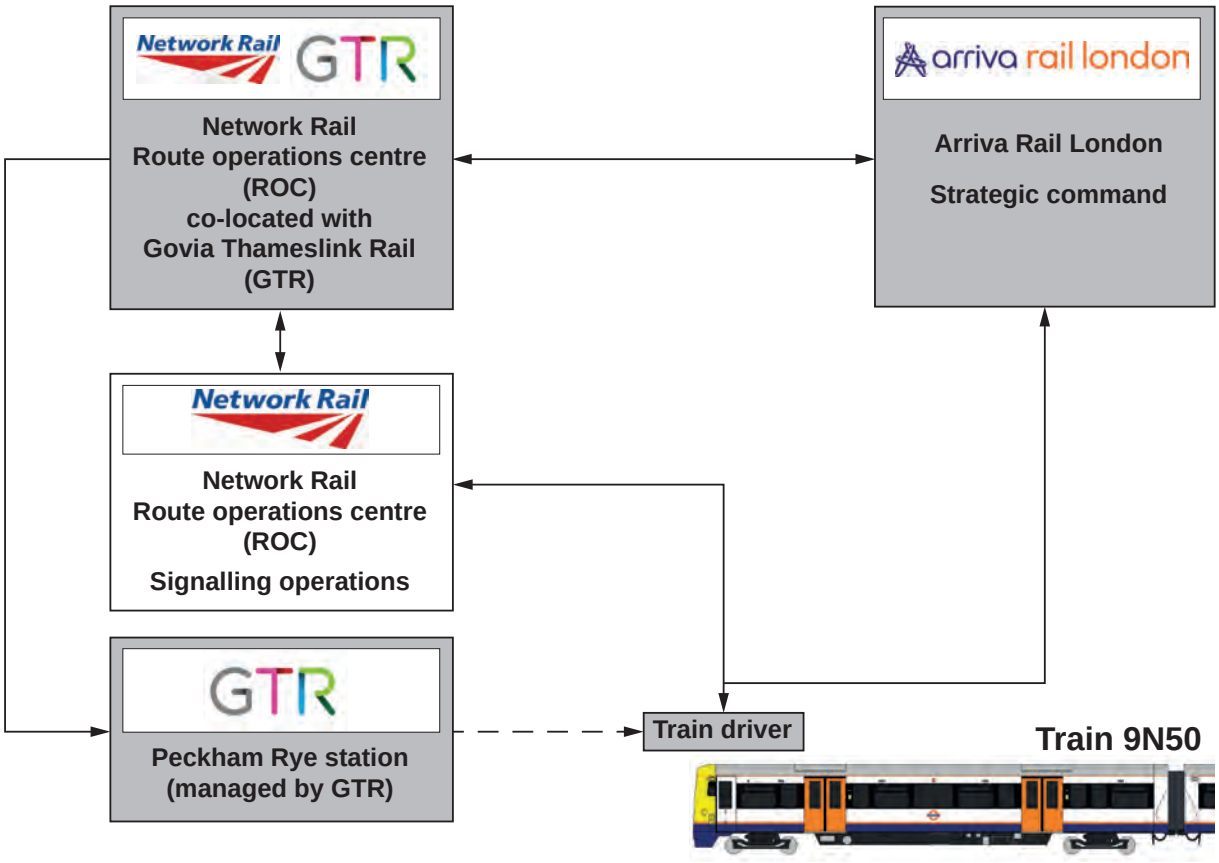

Figure 4: diagram showing the roles and organisations involved in the incident

Figure 5: Sussex Route Control Centre (SRCC), route control desks

Figure 6: Route Operations Centre, signalling operations floor

Incident Response Controller (IRC)

18 The incident response controller (IRC) joined the railway in 1989, and moved to work in control rooms in 2001. He later became a controller with LOROL on the West Anglia route, and in June 2017 he was appointed to a new position of IRC within the ARL strategic command. He is referred to as the IRC for the remainder of this report (figure 4).

Strategic Command Development Manager (SCDM)

19 The strategic command development manager (SCDM) joined Silverlink Trains in 2000 and undertook a variety of posts within the control room, later becoming the control room shift manager. In November 2016, he was asked to review, propose recommendations to improve and, if necessary, restructure the ARL control room (later renamed strategic command). In April 2017 he became the SCDM, a new role within ARL. He is referred to as the SCDM for the remainder of this report (figure 4).

In Service Support Technician 1 (ISST1)

20 The technician had fifteen years' experience in the motor trade before he joined Bombardier in 2014. He spent a year working at New Cross Gate depot as a service technician on the class 378 trains, carrying out maintenance work, and preparing trains for service. In June 2016, he moved to the ARL strategic command (figure 4).

In Service Support Technician 2 (ISST2)

21 The technician trained as a vehicle mechanic with the British Army, finishing in 2013. He joined Bombardier in January 2014, based at New Cross Gate depot, before moving to the ARL strategic command in June 2016 (figure 4).

External circumstances

22 It was cold (approximately 6° C), dark, and damp making the already uneven underfoot conditions potentially slippery.

The sequence of events

Events preceding the incident

23 On the day of the incident the train driver booked on duty at 12:12 hrs and was due to work until 20:40 hrs. He took his meal break at Surrey Quays station from 16:46 hrs to 17:56 hrs, and then took charge of train 9M47 from Surrey Quays to Dalston Junction. This unit then formed train 9N50, due to leave Dalston Junction at 18:21 hrs, and call at all stations to Battersea Park[4].

24 After an uneventful journey from Dalston Junction, train 9N50 departed Queens Road Peckham station on time at 18:44 hrs, with a cautionary aspect (double yellow) displayed at signal TL 623 (figure 2). The train driver selected half power and accelerated up to 25 mph (40 km/h) at which point he shut off power and allowed the train to coast. At 18:45 hrs, as the train approached signal TL 625, which was displaying a single yellow aspect, the driver acknowledged the AWS[5] warning for the signal.

25 At 18:45:37 hrs, after passing signal TL 625, and approaching Peckham Rye station, the driver started to apply the brakes in anticipation of stopping at the station. Four seconds later the emergency brakes were applied, although the driver had not initiated this. The train came to a stand approximately 30 metres short of the east end of platform one at Peckham Rye station at 18:46 hrs. The driver reviewed the controls and information displays in front of him, but as no alarms were displayed on the train management system screen, he could not tell why the emergency brakes had applied. The train driver contacted his employer's control (the ARL strategic command) to seek technical assistance.

26 At 18:50 hrs the train service controller (TSC) responsible for the South London lines received the call from the train driver. The train driver declared that his train had experienced a total loss of power, reporting that it had come to a stand '*coming into Peckham Rye station'*, on the down South London line, and that he was unable to release the brakes. Within a short time, the TSC passed the call to his colleague, the incident response controller (IRC), allowing the TSC to go back to his normal duties.

27 The IRC, having received brief details of the call from the TSC, checked the ARL train information management system on his control room monitor (figure 7) and observed that train 9N50 was shown on the screen as being at Peckham Rye station. The train was occupying the track circuit which includes the track in the platform at Peckham Rye, giving it the appearance of having reached the station. The IRC therefore assumed that the train was either fully or partially in the station platform. The IRC did not obtain any further details from the train driver, and immediately transferred the call to the Bombardier technician (ISST1) to work with the train driver to identify and rectify the train fault.

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[4] These services normally run as far as Clapham Junction, but on the day of the incident some trains were terminating at Battersea Park station because of a track problem at Factory Junction (near Wandsworth Road).

[5] The Automatic Warning System (AWS) provides the train driver with an audible and visual warning of the aspect of the approaching signal (clear or cautionary). If the train driver fails to respond to the warning by pressing a button, the emergency brakes on the train will apply.

Figure 7: The ARL train information system screen

28 The IRC then monitored the early stages of the call between the driver and ISST1, but he later switched his attention to the TSC, who was now dealing with a radio fault on another train at Dalston Junction station.

29 While this was occurring, at 18:54 hrs the signaller at Three Bridges ROC reported to his Signalling Shift Manager (SSM) that train 9N50 had now been at a stand for nine minutes, and he had not had any contact from the train driver. The signaller had already set the route ahead for train 9N50, so blocking other routes across Peckham Rye junction (located immediately west of the station), and causing other trains to be held at red signals[6].

30 At the same time, the ARL strategic commander, who had become aware that the TSC and IRC were dealing with a stationary train, contacted a Network Rail train running controller in the SRCC and queried whether there had been a loss of power in the vicinity of train 9N50. The train running controller, who had now been advised by the SSM that train 9N50 had been stationary for ten minutes, stated that there had been no loss of power, and enquired why the signaller had not had any contact from the train driver.

31 The train running controller asked the strategic commander to urgently speak to the driver and advise him to call the signaller immediately. At this time (18:55 hrs), the driver was still in conversation with ISST1, who was talking the driver through a fault finding flow chart and check list, to attempt to identify the fault.

[6] Trains 2J88 and 2D23 were trapped on the Up Portsmouth line approaching the junction, and train 2J93 was trapped behind train 9N50.

32 During this conversation, the train driver again advised ISST1 that he could not release the brakes and had no door interlock light[7] illuminated. This information prompted ISST1 to request the train driver to *'recycle the doors*' on the train (ie to open and re-close the doors). The train driver questioned ISST1's advice, reporting that he could not do that as passengers were on board, and the train was not in the platform.

Figure 8: Image from train 9N50 forward facing camera (FFCCTV) showing the location of the train involved in the incident, and view towards Peckham Rye station

33 Because the door interlock light was not illuminated, ISST1 told the train driver to leave the cab, and walk back through the train to check the doors and see if any passenger communication alarms had been pulled. ISST1 presumed that either the IRC and/or the TSC (he stated that at the time he was not sure which one) had listened, via conference call, to the train driver reporting that his train was not in the station platform.

34 Between 18:54 hrs and 18:58 hrs, Network Rail's train running controller again tried to contact the train driver via the radio[8]. However, the train driver was unable to respond because he was now walking back through the train. Train 9N50 had now been stationary for fifteen minutes, and although the train driver had made announcements to the passengers, he received considerable criticism about the delay to the service as he walked through the train.

[7] The door interlock of the train is an illuminated light or indication provided in the train driver's cab that indicates the train's doors are closed and locked, and that the train driver is able to take traction power.

[8] The use of the GSM-R to contact the train driver over the public address system on the train was considered by the controller, but not undertaken.

35 At 18:59 hrs, the train driver returned to his cab, called ARL strategic command, and reported that no passenger communication alarms had been activated and none of the train doors had been opened. He again tried to start the train, but was still unable to release the brakes. The train driver was then instructed by a controller at ARL strategic command (there is conflicting evidence as to which one) to contact the signaller, detrain the passengers and take the train out of service to Battersea Park station, and then back to New Cross Gate depot.

36 At 19:00 hrs, the train driver contacted the signaller and relayed the instructions he had been given. During the conversation with the signaller, the train driver reported that he was '*not in the station and the train is 20 yards from the platform'* and repeated the instructions that had been given to him. The signaller asked how the train driver was going to detrain the passengers. The train driver explained that he would detrain passengers '*from the front door, from the driver's door'* (he was referring to the side door in the cab). The signaller then told the train driver to contact him again when '*you're ready to move'.* The signaller stated that he believed that the train driver had understood this to mean that he should call the signaller back when he was ready to start the evacuation of passengers (paragraph 49). The train driver confirmed he would call back but did not repeat back any of the other instructions given to him.

37 Between 19:00 and 19:05 hrs, a GTR duty operations manager, co-located with Network Rail controllers who were involved in the incident in the SRCC, became aware of the problem with the train and contacted a member of GTR (agency) staff working at the ticket barriers of Peckham Rye station. The manager asked the member of staff to go upstairs to platform one, meet the driver of train 9N50, and ask him to contact the signaller as soon as possible. The member of staff went upstairs and waited on the platform for the train to arrive. The GTR on-call duty manager, responsible for station staff and managing station incidents, who was located in an office at Peckham Rye station, was not contacted (see paragraph 121).

38 After speaking to the signaller, the train driver called ARL strategic command and confirmed he had now spoken to the signaller. The IRC instructed the train driver to '*detrain, use the TIS, detrain passengers*' (as he still presumed the train was in the station) and take the train empty to Battersea Park station. The train driver, on hearing this instruction replied '*TIS?*' and *'detrain?*' and was initially confused by the terminology used by the controller. The controller was in fact referring to what he knew as the Traction Interlock Switch[9], which is labelled 'Door Traction Interlock' in the cab of the class 378 trains.

39 As a result of the train driver's questions the IRC explained what he meant by TIS and repeated his instructions, which the train driver did not challenge.

[9] Trains with powered sliding doors incorporate a safety system which prevents traction power being applied if the doors are not closed and locked. The Traction Interlock Switch can be used to override this system, to enable the train to be moved if the doors cannot be closed for any reason. This should not be done with passengers on board.

Events during the incident

40 At 19:09 hrs, the train driver made an announcement requesting passengers to walk forward towards the front of the train, as the train was to be evacuated and taken out of service. The train driver opened the cab side door, climbed down from the train and began to assist passengers down the steps onto the side of the railway. This required the passengers, some of whom were carrying hand luggage, to hold onto the side handrails as they climbed down the vertical steps to track level. The bottom step was only 300 mm (less than one foot) from the energised conductor rail. Having reached track level, the passengers then began to walk the short distance to the station (see figures 11 and 12).

41 As this was taking place, the GTR duty operations manager at the SRCC contacted the member of agency staff who was still standing at the west end of the platform, waiting for the train to arrive there. The manager asked (at 19:10 hrs) if the member of agency staff had now met and spoken with the train driver. The member of staff reported that he had not, as the train had still not arrived at the platform. The GTR duty operations manager finished the call and then spoke across the room to the Network Rail train running controller, to update him about the situation.

42 The train running controller then called ARL strategic command, and spoke to the TSC, telling him that the train driver had now made contact with the signaller and that detrainment was about to take place. The train running controller was under the impression, based on conversations in the SRCC, that the train driver was going to detrain passengers from the front cab onto the platform, and he told the TSC that this would take some time.

43 The member of agency station staff, standing on the platform awaiting the arrival of the train, observed passengers walking from the track side up the ramp at the far end of the platform. Although not qualified to do so, he went down the ramp onto the track to assist them.

44 At 19:17 hrs, the GTR duty operations manager phoned the member of agency staff again as he felt uneasy about the situation, and the apparent lack of information from train 9N50 which by now had been stationary for 32 minutes. The member of agency staff reported that he could see the train, which was '*approximately thirty feet*' (actually 30 metres) from Peckham Rye station, and he was now trackside, assisting passengers walking next to the railway. The GTR duty operations manager told the member of agency staff to pass his phone to the train driver, and then instructed the driver to stop the evacuation immediately and to contact the signaller straight away. The GTR duty operations manager repeated this instruction in a louder voice, to make other controllers on the floor of the SRCC aware of what was taking place at Peckham Rye station.

45 This prompted the train running controller to contact the ARL TSC (19:18 hrs) to report that the train was not, as originally reported, fully or partially in the platform, and that the correct location of the train was '*some thirty yards'* away from the station. The train running controller added that the train driver was using the evacuation steps at the front of the driver's cab, to detrain passengers onto the line. The RAIB has been unable to identify who supplied the incorrect information that the train driver had deployed the evacuation steps[10].

Events following the incident

46 The evacuation was stopped at around 19:20 hrs. Passengers who had been climbing down the steps of the cab, were told to get back into the train, and the train driver returned to the cab. Passengers who were already on the trackside walked to the station followed by the member of GTR agency staff.

47 The ARL IRC contacted his opposite number in the SRCC to report that the train driver had deployed the evacuation steps, and enquired if an isolation of the traction current had been requested. The Network Rail incident controller reported that no isolation had been requested, and confirmed the train had come to a stand '*thirty feet'* away from the station and that passengers had been detrained onto the live line. The incident controller reported that a Network Rail mobile operations manager had now been requested to attend the incident.

48 As this occurred, Network Rail's route control manager contacted the ARL TSC, reporting that the staff in the signalling centre and SRCC had had no idea that the train was not in the platform. The ARL TSC confirmed that ARL had also been blind to this fact, and advised that a fitter and driver manager would be asked to attend Peckham Rye station to relieve the train driver involved in the incident.

49 At 19:21 hrs, the train driver contacted the signaller, reporting that he had been instructed to stop the evacuation as the line was live. The signaller stated '*yes it was*' and advised the train driver to *'do whatever you need to isolate, to get the train moving, just do it*' believing that the train driver understood this instruction to mean isolation of the equipment on the train, and not the live conductor rail. The signaller did not clarify or confirm what the situation was with passengers that had been detrained, as he believed everyone was back on the platform. No-one asked for an isolation of the conductor rail, or a line blockage to stop trains on adjacent lines, at any point during the incident.

50 At 19:22 hrs, the train driver contacted the ARL TSC to report that he had now spoken to the signaller and that the evacuation had been stopped. The TSC challenged the train driver about the evacuation, and the evacuation steps being deployed onto the live line. The train driver reported that he had not used the evacuation steps, and asked the TSC if he could now operate the traction interlock switch and move the train into the platform. The train driver, having obtained this authority, operated the traction interlock switch, but still could not release the brakes.

[10] The class 378 train has emergency steps which fold out from the forward central door of the cab onto the space between the two running rails. After they have been used, it is necessary for a fitter to stow them back into the train before it can be moved.

51 At about the same time the GTR duty operations manager contacted the member of agency staff at Peckham Rye station, who reported that he, and approximately 30 passengers were now safely back on the platform (CCTV evidence showed that in fact over 80 passengers had been detrained). The member of staff reported that the conditions at the time of the evacuation had been dark and damp, which made the underfoot conditions slippery. He confirmed that the passengers who had been evacuated included both elderly people and children.

52 While the incident was developing, GTR's on-call area station manager was on duty in an office at Peckham Rye station. He was unaware of the incident until a member of station staff told him that something unusual was taking place 'upstairs'. He went up to the platform at about 19:25 hrs to find that the evacuation had already been stopped, and the agency station staff member was in the act of returning to the platform.

53 Between 19:27 hrs and 19:34 hrs, the train driver had a conversation with ISST2, who had just taken over the ISST role for the night shift. The train driver reported that he had operated the traction interlock switch, but could not release the brakes. ISST2 started to go through the same flow chart as his day shift colleague (ISST1), and instructed the train driver to go to the rear cab and check the doors.

54 The train driver did not challenge this instruction and walked back through the train again (19:34 hrs to 19:39 hrs). The remaining passengers, having seen others detrained, were now angry and frustrated, and the train driver suffered verbal abuse.

55 On returning to the front cab, the train driver called ISST2 and confirmed that the doors in the rear cab were secure. He was then asked to operate all of the isolation switches in the front cab. After completing this, the train driver reported that he was now able to release the brakes, enabling him to move the train forward (as explained in paragraph 76, it was not the operation of the isolation switches that allowed the train to move; a faulty relay was now functioning correctly again, probably because it had cooled down). At 19:40 hrs, the train driver was given permission by the IRC to proceed into Peckham Rye platform and detrain the passengers. The train driver subsequently contacted the signaller to confirm that he could move the train.

56 At 19:44 hrs, the train arrived in the platform and the remaining passengers alighted, using the side doors in the normal way, some 59 minutes after the train had first stopped. A relief driver and driver manager arrived a short time later, followed at 19:49 hrs by a Network Rail mobile operations manager and officers from British Transport Police. The train driver was breathalysed, and was found not to be under the influence of alcohol.

57 At 20:18 hrs, the train was driven, out of service, to Battersea Park station and the line was reopened.

Key facts and analysis

Background information

Rail industry standards and guidance

Incident command and control

58 Module M1 of the railway rule book (GE/RT8000-M1, section 6.1) states that evacuation of a train should only be carried out if absolutely necessary. Module M1 also states that it is the responsibility of the driver to ask the signaller to protect the lines involved, and to ask for the electric current to be switched off if necessary.

59 As a result of the investigation and recommendations from the incident between Dock Junction and Kentish Town in 2011 (paragraph 142), Network Rail and train operating companies reviewed their respective procedures and drafted a joint guidance note 'Meeting the needs of passengers when trains are stranded' (ATOC NR/GN SP01). The current issue of this guidance note (version three) was published in June 2014 and is jointly owned by Network Rail and the Rail Delivery Group (RDG).

60 The railway industry has issued a number of standards and guidance documents relating to the strategic management of incidents (such as Network Rail (National emergency plan NR/L2/OPS/250), RSSB (Incident response planning and management, RIS-3118-TOM) and RDG/Network Rail jointly (Meeting the needs of passengers when trains are stranded, ATOC NR/GN SP01)). These define high level requirements for emergency planning and the principles of emergency response. In addition, Network Rail has issued a national operating procedure entitled 'Managing stranded trains and train evacuation' (NOP 4.15: issue 1, dated September 2017). This covers the required actions by route operations controllers and the train operating company prior to starting an evacuation and reflects the principles outlined in the joint Network Rail / RDG guidance. National operating procedure 4.15 establishes the principle that evacuation onto the track is a last resort due to the associated inherent risks, and should be a cooperative venture between Network Rail and the relevant train operating companies. The procedures to be followed in such cases are outlined in figure 9.

61 Taken together the rail industry documents establish a number of important principles:

- the need to stop all trains on adjoining lines and isolate traction current conductor rails;
- the responsibility of a driver to report the fact that his/her train is stranded to the signaller in the first instance;
- the responsibility of the signaller to alert the Route Control of a stranded train, and through it the train operator concerned;
- the need for the decision to evacuate to be made jointly by Network Rail's route operations controller and the train operating company involved;
- the need to assess the risks and put in place proper safeguards before starting an evacuation;

- the importance of providing staff to support the train crew when evacuating passengers onto and along the track;
- giving consideration to the safest route and supporting those with mobility problems and the elderly; and
- the need to appoint an Incident Response Controller to be responsible for the overall management of the response, including key decision making.

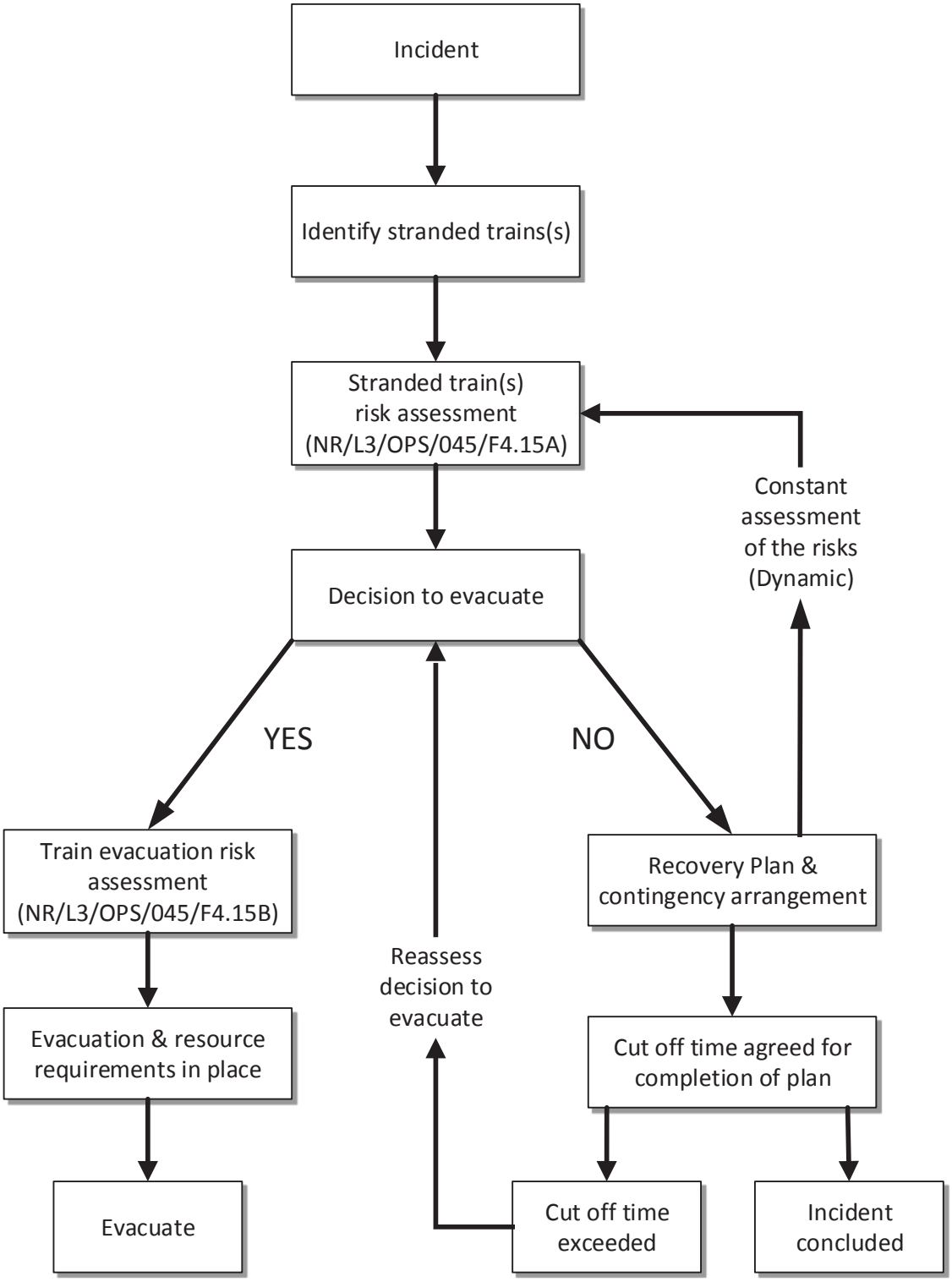

Figure 9: Railway industry procedure following an incident which results in a single train or multiple trains being stranded (diagram courtesy of Network Rail, ref. NOP 4.15 fig 1)

62 The response to an incident will normally be led by a Network Rail Incident Controller, but it is the joint responsibility of Network Rail and the train operators involved to ensure that whoever is appointed is provided with the information necessary to make informed decisions which take due consideration of the needs of stranded passengers.

ARL Incident control

63 As part of the bidding process for the concession agreement, ARL committed to the restructuring of the command and control process. The concession for operating the London Overground network passed from LOROL to ARL in November 2016. After being awarded the concession, ARL lost a number of operational and engineering staff through retirement and redundancy (including managers overseeing the control room function). To complete its commitment, ARL asked a control room shift manager to review its current command and control centre, and the incident management processes in use. This review was carried out between November 2016 and March 2017 and concluded that a re-organisation of the control room was necessary to make it more effective in managing incidents and delay attribution, to separate incident response from train service control, and to align the structure of the ARL control room with the structure of the SRCC.

64 The proposal to restructure the control room (to be renamed as strategic command) and introduce new roles and responsibilities was accepted by ARL management in May 2017, and the shift manager who had carried out the review was appointed as the new strategic command development manager (SCDM). The role of line controller was renamed train service controller (TSC) and a new role of incident response controller (IRC) was introduced. A role for a strategic commander with new responsibilities to act as strategic or 'Gold' commander during an incident, and a new post of head of strategic command were also introduced.

65 From May 2017, the SCDM started the process of recruiting new staff, but the promotion of existing staff, combined with staff sickness, resulted in the control room roster having a number of vacancies. The vacancies on the roster affected the SCDM's ability to implement the competency management process, train new staff and develop new incident response processes, all of which resulted in additional pressures being placed upon the SCDM. Control room staff had not previously been given operations or rules training. ARL agreed a plan for the operations trainers to support training of control room staff in this area, but this was not provided prior to the strategic command going live in October 2017.

Identification of the immediate cause

66 **The passengers were detrained onto a line in close proximity to a live conductor rail because the train driver initiated the detrainment without the traction current being turned off.**

67 The train driver, following the instructions he had been given by the IRC, began to detrain passengers without taking any steps to have the third rail traction supply switched off. About 80 passengers got out of the train, on the instructions of the driver, before the detrainment was stopped.

Identification of causal factors

68 The train driver began to detrain the passengers in unsafe conditions due to a combination of the following causal factors:

a. The train became immobilised due to a technical fault which was not identified and remedied quickly (paragraphs 69 to 77).

b. The train driver initiated the detrainment onto the track because he was given instructions by ARL strategic command who had misunderstood the actual location of the stranded train (paragraphs 78 to 82).

c. The defect on the train and the lack of coordination between ARL and Network Rail resulted in a delay, which caused unrest among the passengers on the train, and contributed to stress and task overload of the train driver, whose experience and skills did not enable him to cope with the situation (paragraphs 83 to 92).

d. The train driver and the signaller did not reach a clear understanding about the actions that were required to safely detrain the passengers. This causal factor arose because the quality of the communications between the driver and the signaller was such that neither driver nor signaller realised that an unsafe detrainment was about to take place (paragraphs 93 to 101).

e. Network Rail did not effectively implement its own procedures for managing an incident involving a stranded train (paragraphs 102 to 105).

Each of these factors is now considered in turn.

Train immobilisation

69 **The train became immobilised due to a technical fault which was not identified and remedied quickly.**

70 The failure of the train was caused by a defective component, a relay (an electrically activated switch) in the front cab, which changed its state as a result of overheating. The function of the relay was to monitor the active status of the driving cab, so when it changed state the train's systems detected that the cab was no longer active, and shut off the traction power and applied the brakes. The train driver reviewed the controls and displays in the cab, but as no warning symbols or description of the fault were visible on the train's computer management screen, the driver could not establish why the brakes had applied. The lack of a fault indication in the cab was another result of the train systems reacting to the cab being no longer active.

71 The ARL company standard SQE 20.30 'Train driving competence criteria and guidance' (version 3 January 2016) section 6,'Identifying and responding to train faults' states that if a train driver is unable to rectify a fault within two minutes, or if an isolation of a safety system is required, the driver must report the status of the train to the signaller immediately.

72 Although the relevant railway rule book modules also state that a train driver in these circumstances must contact the signaller, the driver of train 9N50 decided to contact his control room, thinking that this would resolve the situation more quickly. His call was passed from the TSC to the IRC and then to a Bombardier technician, who started to take the train driver through a flow chart and check list used for fault diagnosis. The recordings of this conversation suggest that the train driver was becoming engrossed in the situation, and both he and the technician became increasingly frustrated, as the technician's instructions to the train driver to carry out the various checks and tests did not result in an alarm, warning icon or description of the fault appearing on the screen of the train's management system.

73 During the conversation, the technician appeared to be uncertain about how to identify the fault, until the train driver noticed that the door interlock light was not illuminated. This light would be expected to be illuminated in an active cab with all the train's side doors closed. The technician then advised the driver to walk back through the train and check the doors and passenger communication alarms.

74 This instruction further prolonged the situation, and probably distracted the train driver, further delaying his contacting the signaller to report the out-of-course event. When the train driver returned to the cab, he found that the train brakes could still not be released. The driver was then instructed by the technician and ARL controllers to isolate the traction interlock by operating the switch, detrain the passengers and take the train out of service after he had contacted the signaller.

75 After the detrainment was stopped, the train driver returned to the cab and spoke to a different technician (ISST2). The train driver reported he was still unable to release the brakes, and he was then requested to check if the doors within the rear cab of the train were closed and report back.

76 On returning to the front cab, the train driver reported that both rear cab doors were secure and he was then instructed to isolate all of the switches on the isolation panel in the cab (including vigilance, passenger communication alarm, driver reminder appliance and AWS/TPWS). After doing this, the train driver found that he was then able to release the brakes. However, subsequent analysis of the fault condition by Bombardier has established that the ability to release the brakes at that time (19:40 hrs) was not related to the operation of the isolation switches, but was possible because, by that time, the 'cab active' relay had cooled sufficiently to return to normal operation.

77 Previous faults involving overheating relays were known about and subject to ongoing analysis by Bombardier. However, both technicians were unaware of this. Had they had some awareness or knowledge of the relay fault, it might have helped the technicians to manage the fault finding process and prompt a discussion with the IRC on the various options to manage the incident at a much earlier stage.

Initiation of the detrainment

78 **The train driver initiated the detrainment onto the track because he was given instructions by ARL strategic command who had misunderstood the actual location of the stranded train.**

79 When the train driver first contacted ARL strategic command, the call was taken by the TSC. ARL's strategic command procedures say that, depending upon the circumstances of the report, the TSC is required to spend up to two or three minutes trying to resolve the matter. If this cannot be done, the call should be passed to the IRC who will manage the technical fault in collaboration with an ISST. The ARL procedures require that the TSC should brief the details of the call to the IRC when transferring it. The acting TSC, covering a vacancy on the roster, was an experienced member of staff who would normally perform the role of a strategic commander. As such, his mind-set defaulted into his normal role, and believing that he would not be able to resolve the issue in the allotted time, he passed on the call very quickly and did not brief the details to the IRC. The information provided by the train driver on what had happened, and specifically where the train was now located, was missed.

80 As a result of this misunderstanding, the train driver later received instructions to detrain the passengers and take the train out of service from ARL strategic command. Both ARL and Network Rail control room staff did not have a clear understanding about the circumstances of the incident, and prior to the detrainment being stopped, they all believed, wrongly, that the train was fully or partially in the platform, because the information they had about its position was similar to that displayed on ARL's control system (figure 7 and paragraph 27).

81 The train driver reported the location of the train on two separate occasions to ARL strategic command. The train driver believed he had been clear and accurate in his description of where the train was standing, and he was unaware that ARL staff had misunderstood or missed the information he had provided.

82 When the train driver contacted the strategic command again after speaking to the signaller, the IRC instructed him to detrain the passengers. The train driver assumed that the controller was aware of the risks in asking him to detrain in his current location, and he did not challenge the instructions.

Effect of the delay in taking action

83 **The defect on the train and the lack of coordination between ARL and Network Rail resulted in a delay which caused unrest among the passengers on the train, and contributed to stress and task overload of the driver. The driver's experience and skills did not enable him to cope with these demands.**

84 ARL's procedures for faults on trains state that, in the first instance, the train driver should use the touchscreen of the train's computer management system, and follow screen prompts and use the information supplied to resolve the fault. If any delay is likely, the train driver must report the status of the train to the signaller immediately. The ARL 'Fault solving and assistance guide' SQE 20.19 (and flowcharts) outlines the aims and actions required to quickly overcome the most common faults that occur on class 378 trains, and the actions a train driver would need to take if they cannot get the train on the move quickly. If the fault cannot be rectified without delay, or an isolation of a safety system is required, the train driver must, after following the instructions of the signaller, report the train's status to the strategic command at the next convenient location. If the train driver is unsure how to deal with the fault, they should contact ARL strategic command immediately after contacting the signaller.

85 Although the IRC had not been fully briefed (paragraph 79), he quickly realised that the call related to a failed train. Rather than confirm or clarify any details, he immediately transferred the call to the Bombardier technician (ISST1) to deal with.

86 The IRC is required to monitor the call between the train driver and the ISST to identify and decide if ARL's defective on-train equipment process or stranded train policy needs to be invoked (prior to October 2017, the TSC would have undertaken this duty). While the ISST was speaking to the train driver, the IRC became distracted by another call the TSC was now dealing with, and did not monitor the call further.

87 Technician ISST1 was unclear who was actually monitoring the conference call with the train driver, as he had not been briefed on the roles and responsibilities within the new structure of the strategic command. ISST1 therefore assumed that one or both of the TSC and IRC were aware of the situation, and continued to offer guidance and instruction to the train driver.

88 The fault which caused the train to stop, and the efforts of the train driver and the ISST to diagnose what had gone wrong, resulted in a delay which caused unrest among passengers on the train. This resulted in the train driver being subjected to criticism as he checked the doors throughout the train and increased the stress that he was already under. On his return to the cab he contacted strategic command and was instructed by both the IRC and ISST1 to isolate the traction interlock switch, using terminology he did not initially understand. Witness evidence indicates that the belief that his colleagues were starting to feel he lacked competence compounded the driver's stress, and affected his self-confidence in dealing with the situation.

89 When the train driver did contact the signaller, he was rebuked for not making contact earlier, because the signaller had become frustrated by the absence of information, and the consequent delays to other trains. The lack of support and guidance offered to the train driver at this stage did nothing to help boost his confidence, and it is evident that by this point his stress levels had affected his communication skills and his ability to manage the incident.

90 In 2014, as a result of an incident while he was driving a train (an activation of the train protection and warning system (TPWS)) the driver had been placed on a competence development plan with the objectives of changing his driving technique, and improving his safety communication skills. In September 2015 and October 2016, the train driver attended communications competence training, which included training on good communication in scenarios which included planned and unplanned evacuation. Although the train driver's competency records show that he had received classroom based training on the ARL company processes for dealing with incidents and evacuation, his only practical training in evacuation procedures had taken place during his initial training in 2008 (ie nine years previously).

91 The railway industry's training of new drivers relies heavily on practical experience, normally involving at least 200 hours driving under the supervision of a driver instructor. This is unlikely to include any instance of a train failure, an emergency or other out-of-course event similar to the incident at Peckham Rye. Experience of such events, and training in how to respond to them, can be provided by using various simulation methods. Training using simulators is included in the ongoing competence management arrangements of most train operating companies, and although it offers particular advantages in being able to recreate situations that would otherwise not be encountered frequently in real-world driving, this type of training may not include the type of situation encountered at Peckham Rye. Rarely do drivers get practical experience of the skills needed in such situations, such as dealing with instructions, making performance focused communications and public address announcements, and dealing with the demands of distressed passengers. This also means that train operators do not test and observe how a train driver reacts to working under stressful and out of course conditions.

92 The driver's limited experience of out-of-course events, and lack of practical training on what to do in such situations, combined with the number of tasks and demands on him during the incident, affected his ability to cope with the situation. Evidence from witnesses, CCTV and voice recordings show that the train driver became overloaded, and consistent with the effects of stress on human performance and decision making, he became focused on the single task of evacuating the train, to the exclusion of other considerations[11]. This meant that he did not consider the actions that he needed to carry out to comply with the rule book (see paragraph 101), including the request for the traction current to be switched off on the lines around the train, and blocking the adjacent line to stop the movement of trains to reduce the risks in the area around the train.

[11] Young, M. S., Brookhuis, K. A., Wickens, C. D., & Hancock, P. A. (2015). State of science: mental workload in ergonomics. Ergonomics, 58(1), 1-17.

Train driver / signaller communication

93 **The train driver and the signaller did not reach a clear understanding about the actions that were required to safely detrain the passengers.**

94 When passengers need to leave a train which has stopped away from a station platform, it is necessary both to make arrangements for getting the people off the train safely, and to keep them informed about what is happening and how long the evacuation process is expected to take.

95 The railway industry guidance note 'Meeting the needs of passengers when trains are stranded' (ATOC NR/GN SP01 Issue 3 June 2014, see paragraph 59) states that Network Rail should ensure that its signallers are alert to the need to recognise when a train becomes, or is anticipated to become stranded and report the facts to Route Control accordingly. Likewise, train operators should also ensure that their train drivers are similarly alert to such circumstances and highlight the possibility of their train remaining stranded when communicating with a signaller. The guidance does not provide details of how the command and control structures should be implemented as an incident develops. Network Rail's document NOP 4.15 (paragraph 60) includes details of the decision procedure (see figure 9).

96 Internal guidance produced by ARL[12] says that if the train cannot be moved and an evacuation is required, the train driver must contact the signaller and then ARL strategic command. The train driver should also establish a safe method of evacuation with the signaller, and identify if additional support is required for passengers with special needs.

97 ARL's competence criteria for train drivers[13] also says that a train driver, having set up a safe system of evacuation, should gain authority from the signaller to commence the evacuation.

98 Witness evidence and voice recordings show that both signallers and controllers at the Three Bridges ROC had previous experience of ARL train drivers contacting their own control room before speaking to the signaller. Although this was alleged to have been a regular occurrence, the RAIB was unable to identify if it had been formally raised with ARL managers. By the time the train driver eventually made contact, the signaller, who had personal experience of this issue, had become frustrated because of the delay and the absence of any information about the status of train 9N50. Several other trains were trapped in the area, some of which could move off only when the signaller could confirm that 9N50 was not about to move forward and occupy the junction.

[12] 'Fault solving and assistance guide' SQE 20.19 (April 2014) Section 5 Stranded trains and evacuation.

[13] SQE 20.30 Train driving competence criteria and guidance (version 3 January 2016) Section 7 Responding to out of course events (train evacuation).

99 The signaller's communication with the train driver was reactive, waiting for the train driver to ask for action to be taken, rather than being proactive in offering guidance, help and support (paragraph 89). The train driver advised the signaller that he was twenty yards from the platform, and repeated the instructions that had been given to him by ARL control. The signaller told the train driver to contact him again when he was 'ready to move'. The signaller stated that he believed that the train driver understood this to mean when he was ready to start the evacuation and assumed the train driver would call him back before beginning the evacuation. The signaller also understood that it was the train driver's responsibility to ask for signal protection for affected lines, and for the electrical current to be switched off before a controlled evacuation, as required by the railway rule book[14] (module M1 section 6.3). Since these arrangements would have needed to be have been implemented by the signaller himself, it is unclear why he did not prompt the train driver, or suggest to him that protection should be established before the start of a controlled evacuation.

100 Although the RAIB cannot confirm what the train driver understood from the signaller's instruction, it is possible that the signaller had also misunderstood the details that had been provided by the train driver, and that his instruction may have related to the driver calling back when the train was ready to move and travel to Battersea Park station, and not when the driver was ready to start the evacuation of the passengers. Current training encourages the signaller to take the 'lead' during any communication and to view any conversation with another member of staff (such as track workers or train drivers) as a 'contract' between the two parties[15] with decisions and actions that need to be taken being clearly understood.

101 The nature of their communication led to the train driver and the signaller not having a clear understanding of what was about to take place, or who was going to take the actions (switching off the live conductor rail and stopping train movements on the adjacent line) that were required for a safe evacuation of the train. It is the responsibility of the train driver to ask the signaller for these actions to be taken, and the signaller would then contact the electrical control operator to arrange an emergency switch-off of the conductor rail. Rule book module G1, section 5.3, makes clear that in conversations between signallers and train drivers, the signaller should always take the lead.

Network Rail's management of the incident

102 **Network Rail did not effectively implement its own procedures for managing an incident involving a stranded train.**

103 Network Rail's standards and operational plans describe the arrangements to provide an effective response to incidents involving a stranded train and other emergencies on or affecting their infrastructure (paragraphs 60 to 62). The procedures are based on the principle that the management of a stranded train is a co-operative activity between Network Rail and the train operator.

[14] Railway Group Standard GE/RT8000, various modules as noted in text.

[15] Rail Safety Standards Board projects T700: Developing options for further formalisation of communications within the rail industry and T1078: Developing training for safety critical communications.

104 Despite these processes the situation was not effectively managed. Examples of non-compliance with documented processes and principles include:

- The signaller was not notified that the train was stranded before the decision had already been made by ARL strategic command to detrain the passengers (which the train driver interpreted as an instruction to evacuate the train in its current position);
- Even after the signaller became aware of the planned evacuation no effective command of the incident was established to oversee the arrangements needed to carry out the evacuation in safety;
- The driver was offered neither advice about the need to protect the site nor support to establish safe conditions to enable safe evacuation; and
- Network Rail neither communicated with ARL strategic command to confirm which organisation was leading in the management of the incident nor established an Incident Response Commander.

105 Witness evidence suggests that the signalling staff involved in the management of the incident were unfamiliar with the processes and had been given little opportunity to practise how such situations should be managed (see paragraphs 107 and 108).

Identification of underlying factors

Network Rail

106 **Network Rail signalling staff were not adequately prepared to manage the incident.**

107 The signaller involved in the incident at Peckham Rye was aware of the rule book requirements relating to the evacuation of trains. However, he was not aware of the wider processes covering the management of stranded trains and had no recollection of practical training in the management of incidents of this type.

108 Opportunities for signalling staff to practice the management of incidents involving stranded trains are limited. Such incidents are relatively rare, and the signaller involved in this incident had never been personally involved in a train evacuation. He had witnessed colleagues dealing with only one such incident in the seventeen years he had been working in signal boxes and signalling centres.

Arriva Rail London

109 ARL strategic command were not adequately prepared to manage the incident, which led to prolonged delays, a confused response to resolving the situation and a failure to understand that the events were developing into a dangerous incident.

110 The restructuring of the ARL strategic command between April and October 2017 had led to changes in existing roles and the introduction of new roles. From May 2017, the strategic command development manager had started training staff. Witness evidence shows that the training was focused on individual training needs, rather than coordinated training through simulation or table top exercises with the object of equipping staff with the necessary skills to work as a team[16], both in normal working and when coordinating incident response with external partners (Network Rail signalling staff and route control).

Figure 10: The position of the various roles within the ARL strategic command

111 The investigation also found that the environment of the control room and the equipment used by the control room staff were not conducive to optimising communications and mitigating distraction (figure 10). The RAIB observed that the control room was cramped and that multiple telephone conversations took place at the same time, making it potentially difficult for staff to concentrate.

112 The ARL strategic command uses a computer system to record ongoing events and decisions. It is not a 'live' command and control system: the controllers, when receiving information, routinely write down their notes and later add the text to the 'live' log. The strategic commander cannot see the actions and decisions that have been taken by any member of staff until the 'save' button is pressed. The Bombardier technicians who work within the control room only have viewing rights to the system, and therefore have no ability to input information, advice or decisions they have made. Had information and decisions been recorded during the developing incident, it may have provided ARL with some contingency, as information was being lost and decisions not being properly shared or communicated.

[16] Salas, E., Cannon-Bowers, J. A., & Johnston, J. H. (1997). How can you turn a team of experts into an expert team: Emerging training strategies. Naturalistic decision making, 1, 359-370.

113 In July 2017 the head of strategic command was appointed, and during August 2017 she audited the revised control room processes. This audit identified deficiencies and proposed recommendations relating to the following areas:

- competency assessment and training plans for staff were not up to date;
- provision of the rule book as a reference source for control room staff was inadequate;
- ergonomic assessments and work place risk assessments within the control room had not taken place;
- management of fatigue and assessment of voice communications was not strictly applied as strategic command staff were not considered to be safety critical grades;
- there was evidence that control room staff involved in incidents had little or no involvement in subsequent investigations to identify causal factors and recommendations from incidents; and
- the large number of responsibilities that had been allocated to the SCDM.

Implementation of all the recommendations was due to be completed between Nov 2017 and May 2018; after the incident at Peckham Rye station. The new strategic command structure was implemented in October 2017, a month before the incident and before all of the recommendations had been addressed.

114 Evidence indicates that some of the deficiencies that were identified during the audit were still evident during the incident, and that there were also problems in the following areas:

- The Strategic Commander lacked experience and sufficient non-technical skills, and so he did not want to challenge his more experienced colleagues to establish a strategic solution. As a result he did not take the lead within the control room in coordinating the incident response with Network Rail; and
- The Bombardier technicians (ISST1 and ISST2) had not been included within the training programme prior to the new strategic command structure being implemented. Both technicians were unclear about what their position and role was within the structure of the new control room. Their lack of training and experience affected their ability to speak up and challenge others when misinformation was shared and assumptions about the location of the train were reported.

115 Voice recordings and witness evidence show that the strategic command did not use communication protocols in compliance with the rule book and the company's SQE 20.37 policy during the incident. Communications, both internally and with outside parties, were of a familiar and relaxed nature with no evidence of the phonetic alphabet, repeat back or confirming information being used, and with inappropriate language and humour occurring during some conversations. Witness evidence indicates that the quality of the communications within the strategic command was also affected by the noisy environment, and that poor equipment led to the IRC being distracted and missing information that was being provided to both him and ISST1. Some of these factors were also evident after the incident when inspectors from the Office of Rail and Road (ORR) visited the ARL strategic command in January 2018 (paragraph 148).

Practising and testing of procedures

116 **The standards and guidance relating to stranded trains place little emphasis on the need for practical training for those involved.**

117 The investigation identified that the various rail industry standards and guidance notes have been briefed to all organisations, but there is little emphasis in the standards and guidance on ensuring procedures are practised and tested, either internally or with the counterparts, on a regular basis. The practising and testing of procedures involving out-of-course events can ensure that corporate memory is not lost, and develop skills in communication and effective decision making.

Factors affecting the severity of consequences

118 The detrainment on to the track side with passengers climbing down the steps and stepping over the live conductor rail and then walking on uneven underfoot conditions, in a dark and damp environment adjacent to the live rail, could have resulted in an injury or fatality. The desire of passengers to share information via social media was also potentially dangerous, as video evidence shows that at least one passenger, after leaving the train, was oblivious to the risk and crossed the live rail to obtain a better image.

119 The perseverance of a GTR manager in questioning what was happening prevented more than 370 passengers being de-trained onto an electrically live line.

The risk to detraining passengers

120 When the passengers were evacuated the conductor rail was directly underneath the cab steps that they climbed down. The adjacent line was about five metres away from the line the train was standing on, behind some bushes (figure 3). Four trains passed on this line while the detrainment was taking place.

Observation

Competence and co-ordination of station staff

121 GTR sub-contracts agency staff to undertake general and ticket revenue duties on the stations it manages. As agency staff are not expected to go trackside under any circumstances, GTR's induction training for agency staff does not provide personal track safety training or awareness of trackside risks. The staff member involved in this incident was therefore not conscious of the risks of going on or near the track, and, believing the passengers and train driver needed assistance, he went to help, without knowing which rail was the conductor rail or realising that the traction current was not switched off. RAIB's inquiries have established that no-one appears to have considered contacting the duty station manager, who was in an office at Peckham Rye station (paragraph 52), and would have been in a position to coordinate the arrangements and ensure safety before the evacuation took place.

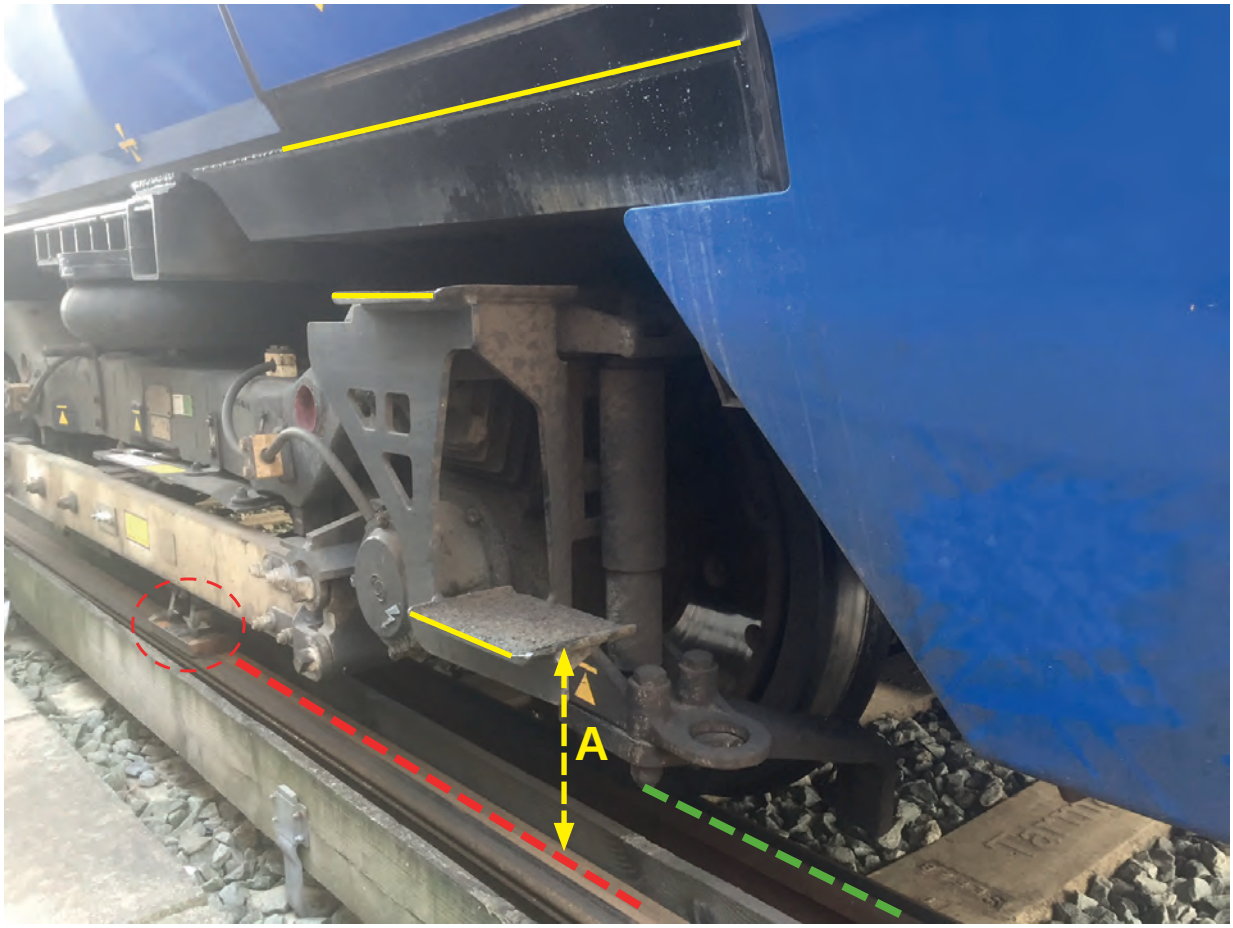

Figure 11: Reconstruction showing the position of the steps from the train cab to the track side (yellow line), running rail (green line) and current collector shoe and energised live rail (red dotted line). The distance from the bottom step to the live conductor rail (A) is approximately 300 mm (image courtesy of Arriva Rail London). The wooden guard boarding shown in this photograph was not present at the location of the incident (see figure 12).

Figure 12: Reconstruction showing the position of train 9N50 relative to Peckham Rye station and the detrainment route (image courtesy of Arriva Rail London)

Other occurrences of a similar character

122 A number of recent incidents have demonstrated the importance of drivers and signallers reaching a clear understanding when communicating safety critical information.

Gospel Oak, 29 April 2013 (LOROL internal investigation)

123 As a result of a technical fault, a LOROL train stopped just short of Gospel Oak station. The train driver contacted LOROL control who instructed the train driver to carry out a detrainment of passengers. Assuming they had the necessary authority, the train driver and conductor started to detrain passengers without contacting the signaller. The detrainment was only stopped when another member of LOROL staff asked if the train driver had actually spoken to the signaller. It was at this point that the train driver realised no permission had been granted. There were no injuries reported. The event does not appear to have been notified to the RAIB at the time. In its own investigation into the event LOROL made recommendations covering a review of the relevant company procedures, the importance of adhering to communication protocols, and reminding drivers to contact the signaller. All these recommendations were reported to have been implemented with the train driver involved in the incident being briefed during training in 2014.

Bethnal Green, 8 April 2018 (RAIB safety digest 04/2018)

124 At about 21:52 hrs on 8 April 2018 an Arriva Rail London (ARL) passenger service from London Liverpool Street to Chingford, passed a signal at Bethnal Green which was displaying a red aspect. The train driver applied the emergency brake, three seconds before an automatic brake application was triggered by the train protection and warning system (TPWS), and the train passed the signal by an estimated two metres. The signaller contacted the train driver to obtain the necessary information, and asked him to contact his control room. The train driver contacted the ARL strategic command, and spoke to a train service controller (TSC), as the incident response controller (IRC) was busy dealing with another incident. After enquiring into the train driver's welfare, the TSC instructed the train driver to continue to Hackney Downs station, detrain the passengers and then call control back.

125 The train driver took this explicit instruction literally, and rather than contact the signaller to obtain the necessary authority to move forward, he started the train and travelled towards Bethnal Green North Junction. The signaller noticed that the train was moving and sent an emergency radio message to stop all train movements in the Bethnal Green area. The train driver stopped just short of the junction, over which another train had passed a short time before.

126 The evidence showed that prior to speaking to the train driver the TSC had previously had a conversation with ARL's on-call manager, and they had both agreed that the TSC should instruct the train driver to proceed to Hackney Downs. When the train driver contacted the TSC, the TSC repeated this instruction to the train driver without realising that his choice of words could be open to misinterpretation. On terminating the call with the train driver the TSC realised his error, but was unsure as to what to do as the instruction had already been given.

127 The safety digest reinforced the following safety lessons:

- train drivers and controllers should remember that only signallers can authorise train movements, in accordance with the railway rule book, and instructions from any other person should never be interpreted as an authority to move; and
- signallers and controllers should be aware that train drivers who have been stopped out of course, for whatever reason, may be subject to high levels of stress, and that special care should be taken to ensure that train drivers correctly understand what is required of them in such circumstances.

Kyle Beck, 3 August 2016 (RAIB safety digest 07/2016)

128 At 14:04 hrs on Wednesday 3 August 2016, the driver of train 1E13, an Inverness to London King's Cross passenger service operated by Virgin Trains East Coast, had to take evasive action and lie down next to his train to avoid being struck by a train that was passing on the adjacent line at approximately 105 mph (169 km/h).

129 The train driver had asked a trainee signaller if he had been granted the line blockage. The trainee signaller replied that he would call the driver back, without positively stating that the line blockage had not been granted. The driver did not repeat back the fact that he needed to wait for the signaller to call him back. It is possible that the driver may not have heard what the trainee signaller said or that he had misunderstood what he was being told. As a result, the train driver and the trainee signaller did not reach a clear understanding about stopping trains on the adjacent lines, and the driver subsequently alighted from the driving cab of his train, incorrectly believing it was safe to do so. The driver was unhurt.

Stafford, 2 March 2018 (RAIB safety digest 03/2018)

130 On Friday 2 March 2018, the driver of a Manchester to London Euston passenger service operated by Virgin Trains, had stopped his train at Stafford to attend to a fault. The train driver contacted the signaller. During subsequent conversations, the signaller and driver did not come to clear understanding on which lines would be blocked and clear of trains to allow him to inspect his the train. At about 14:36 hrs, while on the track and working on his train, he saw a train approaching at speed on the adjacent northbound line and had to take evasive action, lying down on the track next to his train, to avoid being struck. The driver was not injured but was badly shaken by the incident.

Lewisham, 2 March 2018 (currently under investigation)

131 At about 17:30 hrs on Friday 2 March 2018, a delayed Southeastern service from London Charing Cross to Dartford encountered difficulty while attempting to depart from Lewisham station, as a result of the extreme weather conditions causing ice to form on the conductor rail.

132 The train in rear of this one, another delayed Southeastern service from London Charing Cross to Dartford, was held at a red signal on the approach to Lewisham station.

133 Another train from London Charing Cross to Orpington, was also held at a red signal on the incline between Tanners Hill junction and Lewisham Vale junction. This train was 12 coaches long and its rear coaches had blocked the fast lines at Tanners Hill junction. This resulted in a number of trains being stopped.

134 The stranded trains resulted in an incident lasting over five hours, after one train driver reported that some passengers had opened the doors and were getting out onto the live track. The incident is currently subject to an RAIB investigation (https://www.gov.uk/government/news/stranding-of-trains-and-self-detrainments-at-lewisham).

Summary of conclusions

Immediate cause

135 The passengers were detrained onto a line in close proximity to a live conductor rail because the train driver initiated the detrainment without the traction current being turned off.

Causal factors

136 The causal factors were:

a. The train became immobilised due to a technical fault which was not identified, remedied or acted upon within a reasonable time (paragraphs 69 to 77, **Recommendation 1**).

b. The train driver initiated the detrainment onto the track because he was given instructions by ARL strategic command who had misunderstood the actual location of the stranded train (paragraphs 78 to 82, **Recommendations 1 and 2, Learning point 2,** see paragraphs 149(g), (h), (i) and (j)).

c. The defect on the train and the lack of coordination between ARL and Network Rail resulted in a delay, which caused unrest among the passengers on the train, and contributed to stress and task overload of the train driver, whose experience and skills did not enable him to cope with the situation (paragraphs 83 to 92, **Recommendation 1,** see paragraphs 149 (a) and (b), **Learning point 1**).

d. The train driver and the signaller did not reach a clear understanding about the actions that were required to safely detrain the passengers. This causal factor arose because the quality of the communications between the driver and the signaller was such that neither driver nor signaller realised that an unsafe detrainment was about to take place (paragraphs 93 to 101, **Recommendation 1**, see paragraphs 146(a), 149 (a) and (b) and **Learning point 2**).

e. Network Rail did not effectively implement its own procedures for managing an incident involving a stranded train (paragraphs 102 to 105, **Recommendation 3, Learning point 3**).

Underlying factors

137 The following underlying factors were identified:

a. Network Rail signalling staff were not adequately prepared to manage the incident (paragraphs 107 and 108, **Recommendation 3, Learning point 3**).

b. ARL strategic command were not adequately prepared to manage the incident, which led to prolonged delays, confused response to resolving the situation and a failure to understand that the events were developing into a dangerous incident (paragraphs 109 to 115, **Recommendations 2 and 3**, see paragraphs 148, 149 (f) and (i)).

c. The standards and guidance relating to stranded trains place little emphasis on the need for practical training for those involved (paragraph 117, **Recommendations 2 and 3**, see paragraph 146(b)).

Factors affecting the severity of consequences

138 The uncontrolled and hazardous environment, combined with passengers using social media to share information, could have led to a fatality occurring (paragraph 118, no recommendation).

139 The perseverance and actions of a GTR manager in questioning what was happening prevented more than three hundred passengers being de-trained onto a live line (paragraph 119, no recommendation).

Additional observation

140 Although not linked to the causes of the events on 7 November 2017, the RAIB observes that GTR induction training of agency staff does not provide personal track safety training or awareness of trackside risks (paragraph 121, no recommendation, see paragraph 154).

Previous recommendation that had the potential to address one or more factors identified in this report

141 The following recommendation was made by the RAIB as a result of a previous investigation and has relevance to this investigation.

Safety incident between Dock Junction and Kentish Town (RAIB report 07/2012), recommendation 1

142 At around 18:26 hrs on 26 May 2011, a First Capital Connect service from Brighton to Bedford lost traction power and became stranded between St. Pancras and Kentish Town stations. During the incident, passengers self-detrained from the carriages and began to walk trackside alongside the tunnel wall. The train driver then became aware of what the passengers were doing and stopped the train soon after it had begun to move forward. Almost three hours elapsed before the train, with its passengers still on board, was assisted into Kentish Town station.

143 The investigation found that there had been very little communication with passengers during the incident and a lack of coordination between the organisations and emergency services involved. This resulted in the following recommendation being made:

Train operating companies and Network Rail routes over which they operate, should review existing protocols, or jointly develop a new protocol, for stranded trains in accordance with the contents of ATOC / Network Rail Good Practice Guide GPG SP01 'Meeting the needs of passengers when trains are stranded'. The protocols should also consider:

- *the key findings from this investigation;*
- *the different arrangements in place for the interface between Network Rail and train operators' control functions;*
- *the different approaches to managing incidents and good practice applied in different parts of the main-line and other railway networks;*
- *the need to identify who will take the lead role in managing the incident and how key decisions will be recorded and shared between the affected organisations;*
- *the need to provide on-site support to the traincrew of such trains in managing passengers' needs;*
- *the need to provide technical support to the train crew of stranded trains, with a particular focus on means of communicating and the need for coordinating the technical and operational response to such incidents;*
- *the need to recognise when minor operational occurrences have the potential to develop into major incidents unless decisions are taken in a timely and decisive manner;*
- *the views of passenger interest groups and emergency services: and*
- *the positive and negative role that can be played by social networking sites in the management of such incidents.*

144 ORR reported to the RAIB on 30 May 2013 that the train operating companies and Network Rail had taken actions in response to this recommendation, which had all been implemented. ARL provided the RAIB with evidence that it had reviewed the recommendation from this incident in developing its own procedures in dealing with stranded train and defective on-train equipment. However, the investigation found that managers and staff involved in the Peckham Rye incident had little or no knowledge of previous incidents and recommendations from past investigations.

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

145 Bombardier has:

a. continued to monitor the failures of relays on class 378 trains;

b. reviewed the fault checklist and guidance used by its technicians, and briefed its ISSTs to follow the fault guidance process and positively confirm any proposals with the ARL incident response controller monitoring the conference call; and

c. re-issued the ISST job description in a more comprehensive format and commenced a programme of training, coaching and observing of the technicians to improve communication techniques and skills.

146 Network Rail has:

a. completed a development action plan with the signaller involved in the incident; and

b. introduced the role of senior incident officer (SIO) and the associated incident officer organisation, and undertaken a programme of refresher training for the role of rail incident commander. The roles are intended to take the strategic lead in coordinating activities within Network Rail and liaison with train operators when incidents are reported.

147 Govia Thameslink Rail (GTR) has:

a. reviewed its on-call processes to ensure on-call managers are contacted during the initial stages of an incident.

Office of Rail and Road (ORR)

148 The ORR visited the ARL control room in January 2018. A subsequent letter was sent to ARL to report observations relating to following areas:

- the environment within the control room was noisy and poor equipment was still being used, both of which may cause distraction, and the floor plan was still too small;
- poor communications (verbal / IT systems and written notes) were observed and still evident;
- a lack of coordination and awareness of the different roles within the control room was still evident; and
- that ORR considers ARL control room staff to be safety critical in respect of their roles, fatigue management and CMS (ROGS Regulation 23, 24 and 26).

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

149 Network Rail and RSSB[17] have undertaken research and training in the use of non-technical skills and safety critical communications, which highlighted the importance of clear and effective communication when working as a team to ensure both parties establish a 'contract of communication' and a mutual response to resolving an incident efficiently.

150 Network Rail provided the RAIB with evidence that it had reviewed the findings from the RSSB project (T1078) 'Improving Safety Critical Communications in the rail Industry' and the non-technical skills project and that it had incorporated the research and review of training into the company's training modules and competence standard (NR/L3/OPS/045/2.06), and assessment framework for operating signalling equipment for new and current signallers.

151 The training modules emphasise the importance of signallers undertaking the following:

a. taking the lead responsibility and improving assertiveness;

b. using clear communication and conveying information accurately;

c. taking personal responsibility in any communication;

d. being supportive and understanding the environment and situation the other party is dealing with;

e. understanding that safety communications should not be compromised by pressure of train performance;

f. understanding and developing skills in the mechanics of the communication (tone and demeanour);

g. understanding the structure of the conversation (opening, information, actions, confirmation);

h. being clear on what actions may be needed to resolve the situation; and

i. refreshing the basic fundamentals of developing listening skills, using the phonetic alphabet and repeat back.

152 As the research project and changes to Network Rail's training are relatively new, the RAIB has not yet seen evidence to show if the benefits of the enhanced training have been embedded within the company.

153 ARL has reported that it has reviewed its structure and procedures within its strategic command against specific areas that have been highlighted by this incident and subsequent audits. It is taking the following actions:

a. placed the train driver on a competence development plan (completion date June 2018);

[17] RSSB is also undertaking other research projects that may be relevant to the factors identified during the investigation (project T1142 - Developing Skills for staff with operational line management duties, project- T1154 Developing control staff competencies, to support contingency plans and service recovery, project -T1135 Developing a framework and implementation activities to empower staff to make decisions during service disruption and T1065- Identifying and developing good practice for making on-train announcements in the event of an incident.

b. briefed ARL drivers to comply with the rule book modules and always contact the signaller first when a train becomes stranded (completed);

c. reviewed its investigation process and associated SMS standards (completed);

d. reviewed the safety criticality of ARL controllers (completed);

e. recommended to Bombardier that it reviews the safety criticality of its technicians working within strategic command control room (ARL recommendation to Bombardier);

f. developed a process to map the decisions of the strategic command (completed);

g. procured new equipment (headphones) with telephone system for all ARL Strategic Command desks to optimise the quality of team work and communication and mitigate against the risk of distraction (completed);

h. reviewed its competency management process to ensure all assessments are up to date, and implemented non-technical skills and safety critical communications sampling and review process within the ARL competency management process all for ARL control room staff (completed);

i. developed a defined process in the way in which staff respond, prioritise and deal with more than one significant incident at the same time (completed);

j. reviewed the working environment of the strategic command including consideration for the expansion of current floor space (in progress); and

k. commenced a programme to modernise the control room IT systems used for strategic command to ensure decisions are recorded and become visible to all concerned in a timely manner (in progress-completion date 2019).

154 Govia Thameslink Railway has reported that it has reviewed the initial induction training provided to agency staff to incorporate an awareness of track safety if a member of agency staff is called upon to attend or assist in a controlled evacuation.

Recommendations and learning points

Recommendations

155 The following recommendations are made[18]:

1 *The intent of this recommendation is for ARL to review and improve the ability of its train drivers, and control room, to effectively deal with out-of-course scenarios which may result in a task overload of the train driver.*

Arriva Rail London should review and improve, as necessary, its training, procedures, control room environment and equipment to enable controllers and train drivers to deal effectively with out-of-course scenarios involving stranded trains. This should include consideration of the use of simulators, whether full task or part task, and table-top exercises (paragraphs 136(a), 136(b), 136(c), and 136(d)).

This recommendation may also be applicable to other train operators.

2 *The intent of this recommendation is to ensure that there are local management arrangements in place to effectively manage the controlled evacuation of stranded trains.*

Network Rail (South East route), in consultation with train operating companies as appropriate, should review the adequacy of its existing arrangements for implementing national policy and guidance for the safe evacuation of passengers from stranded trains. As a minimum the review should cover how all parties ensure that:

- all parties quickly gain a common understanding and shared situational awareness of the circumstances;
- effective incident control arrangements are established and formalised before important decisions are made, particularly those which affect the safety of passengers and staff;
- suitable protection is in place before authorising the start of any controlled evacuation;
- staff on the ground, such as train crew, are provided with appropriate support in circumstances which are difficult and / or unfamiliar; and

[18] 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 Road to enable it to carry out its duties under regulation 12(2) to:

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

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

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

- the effectiveness and use of procedures is understood and tested to ensure that all such arrangements are capable of being implemented by competent staff without undue delay.

All necessary changes or additions to existing management arrangements identified from the review should then be suitably documented, validated, implemented, and briefed (paragraphs 136(b), 137(b) and 137(c)).

3 *The intent of this recommendation is that the arrangements for dealing with stranded trains should be regularly exercised and tested.*

Network Rail (South East Route) should, in consultation with train operating companies as appropriate, establish and implement processes for regularly exercising and testing its local arrangements for implementing national policy and guidance on managing incidents involving stranded trains, including the safe evacuation of passengers, are regularly exercised and tested (paragraphs 136(c), 137(a), 137(b) and 137(c)).

This recommendation may also apply to other Network Rail routes.

Learning points

156 The RAIB has identified the following key learning points[19] from the investigation:

1 Before evacuating passengers onto the lineside, train drivers must take the required action to implement all necessary safeguards, as required by the relevant rule book modules (paragraph 136(c)).

2 The incident has shown how important it is for signallers to use their non-technical skills and take the lead responsibility in conversations with train drivers of stranded trains, so that the train driver is supported and both parties are clear about what is going to be done next (paragraphs 136(b) and 136(d)).

3 The need for signallers to ensure that Route Operations Control is informed immediately about any incident in which a train or trains become stranded (paragraphs 136(e) and 137(a)).

[19] '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

ARL	Arriva Rail London
AWS	Automatic warning system
CCTV	Closed circuit television
DC	Direct current
ECO	Electrical control operator
GTR	Govia Thameslink Rail
IRC	Incident response controller
ISST	In-service support technician
LOROL	London Overground Rail Operations Ltd
ORR	Office of Rail and Road
RAIB	Rail Accident Investigation Branch
RDG	Rail Delivery Group
ROC	Route operating centre
RSSB	Rail Safety and Standards Board
SCDM	Strategic command development manager
SRCC	Sussex route control centre
SSM	Signalling shift manager
TIS	Traction interlock switch
TPWS	Train protection and warning system
TSC	Train service controller

Appendix B - Investigation details

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

- information provided by witnesses;
- information taken from the train's on-train data recorder (OTDR);
- closed circuit television (CCTV) recordings taken from the train and the station;
- voice recordings of conversations between railway staff;
- site photographs and measurements;
- weather reports and observations at the site;
- safety management and incident management documentation (ARL and Network Rail) for managing stranded trains;
- Arriva Rail London's arrangements and processes for managing the competency and training of control room staff and train drivers, and actions taken from previous incidents;
- a review of the technical details on the Class 378, with particular regard to traction interlock faults, and how this information was shared between Bombardier and Arriva Rail London; and
- a review of previous reported incidents and previous RAIB investigations that had relevance to this incident.

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