RAIB

Rail Accident Investigation Branch

Rail Accident Report

Runaway and derailment of wagons at Toton, Nottinghamshire
17 January 2021

Report 09/2021
December 2021

This investigation was carried out in accordance with:

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

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Website: www.gov.uk/raib

This report is published by the Rail Accident Investigation Branch, Department for Transport.

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.

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 RAIB has described a factor as being linked to cause and the term is unqualified, this means that RAIB has satisfied itself that the evidence supports both the presence of the factor and its direct relevance to the causation of the accident or incident that is being investigated. However, where RAIB is less confident about the existence of a factor, or its role in the causation of the accident or incident, RAIB will qualify its findings by use of words such as 'probable' or 'possible', as appropriate. Where there is more than one potential explanation 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 or incident but are associated with the underlying management arrangements or organisational issues (such as working culture). Where necessary, words such as '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 accident or incident 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 RAIB, expressed with the sole purpose of improving railway safety.

Any information about casualties is based on figures provided to RAIB from various sources. Considerations of personal privacy may mean that not all of the actual effects of the event are recorded in the report. RAIB recognises that sudden unexpected events can have both short- and long-term consequences for the physical and/or mental health of people who were involved, both directly and indirectly, in what happened.

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.

This page is intentionally left blank

Runaway and derailment of wagons at Toton, Nottinghamshire, 17 January 2021

Contents

Preface 3
Summary 7
Introduction 8
Definitions 8
The accident 9
Summary of the accident 9
Context 12
The sequence of events 16
Analysis 21
Identification of the immediate cause 21
Identification of causal factors 22
Identification of underlying factors 27
Factor affecting the severity of consequences 30
Summary of conclusions 36
Immediate cause 36
Causal factors 36
Underlying factors 36
Factor affecting the severity of consequences 36
Previous RAIB recommendation relevant to this investigation 37
Actions reported as already taken or in progress relevant to this report 38
Recommendations and learning points 39
Recommendations 39
Learning points 40
Appendices 41
Appendix A - Glossary of abbreviations and acronyms 41
Appendix B - Investigation details 42

This page is intentionally left blank

Summary

At 04:42 hrs on 17 January 2021, a rake of 22 wagons, 21 of which were loaded, ran away from Old Bank sidings at Toton, Nottinghamshire. As it ran away, the rake passed a red signal, which generated an alarm that alerted the signaller. The rake passed a second red signal and, a short distance later, the leading four wagons derailed at the end of the run-out rails associated with a set of trap points. The trap points worked as intended to derail the unauthorised movement. The leading two derailed wagons stopped foul of the adjacent running line, although no trains were nearby when the derailment occurred. The rake of wagons travelled a total distance of about 0.6 miles (1.0 km) during the runaway.

RAIB's investigation found that the rake of wagons ran away because no one had secured it with either handbrakes or scotches after it was stabled in Old Bank sidings the previous evening. This meant that the wagons were only being held by air trapped in their brake systems, which subsequently leaked away. The wagons were free to move because the incoming train they were part of had not been secured before its locomotive was uncoupled and because there was miscommunication between the ground staff on duty about who would secure the train. An underlying factor was that staff at Old Bank sidings were routinely leaving trains unsecured for short periods of time, but this was not identified by DB Cargo's safety assurance activities. A second underlying factor was that DB Cargo had no clear process in place that defined the tasks required when trains arrived, and no process to provide confirmation that these tasks had been carried out. The consequences of the runaway were made potentially worse because the leading two wagons fouled the adjacent running line after derailing at the trap points. RAIB found that Network Rail's risk assessment processes for both new and existing trap points only considered mitigations that were not applicable to uncontrolled runaway vehicles. These assessments also did not consider that runaway vehicles, once derailed, could travel as far as they did in this accident.

RAIB has made four recommendations. The first is that DB Cargo should establish the extent to which vehicles are being left unsecured in its yards and sidings, and identify and address the possible reasons for this. The second recommendation is that DB Cargo should review and improve its processes for trains arriving at its yards and sidings so it is clear when tasks should be undertaken, who is responsible for them and how their completion is communicated. The third recommendation is that DB Cargo should review its current arrangements for supervising, monitoring and auditing safety in its yards and sidings. The fourth recommendation calls on Network Rail to revise its risk assessment process for trap points, so that it considers the risk of an adjacent running line becoming fouled when uncontrolled vehicles run away.

RAIB also identified two learning points. The first reminds drivers and staff carrying out ground staff duties of the importance of securing vehicles prior to detaching locomotives. The second is a reminder that the primary purpose of trap points located on the exit from sidings, or on the exit of a goods line which connects to sidings, is to protect running lines from runaway vehicles.

Introduction

Definitions

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

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

The accident

Summary of the accident

3 At 04:42 hrs on 17 January 2021, a rake of 22 wagons, 21 of which were loaded, ran away from Old Bank sidings at Toton, Nottinghamshire (figure 1).

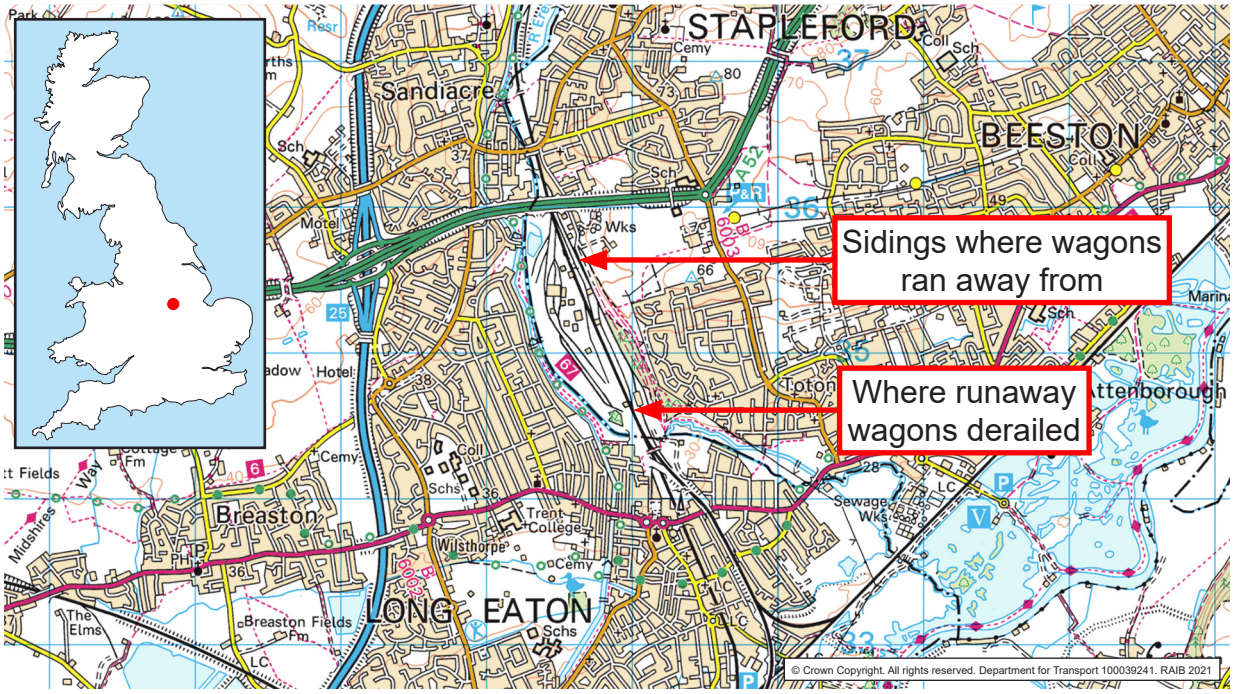

Figure 1: Extract from Ordnance Survey map showing location of accident

4 After exiting Old Bank sidings, the rake passed a signal displaying a red aspect, which generated an alarm on a signaller's workstation.[1] This alerted the signaller, who could see that track sections[2] along the line leading away from the sidings were being occupied (figure 2).

5 The rake then passed a second signal displaying a red aspect and, a short distance later, the leading four wagons derailed at the end of the run-out rails associated with a set of trap points. The trap points worked as intended to derail the unauthorised movement (figure 3). The leading two derailed wagons stopped foul of the adjacent running line (figure 4), although no trains were nearby when the derailment occurred. The rake of wagons travelled a total distance of about 0.6 miles (1.0 km) during the runaway.

[1] A desk with the signalling in the area being controlled shown on a series of monitors, and a trackerball and keyboard provided to operate the signalling functions.

[2] A length of track with fixed boundaries between which the train detection system provides information about its clear or occupied status.

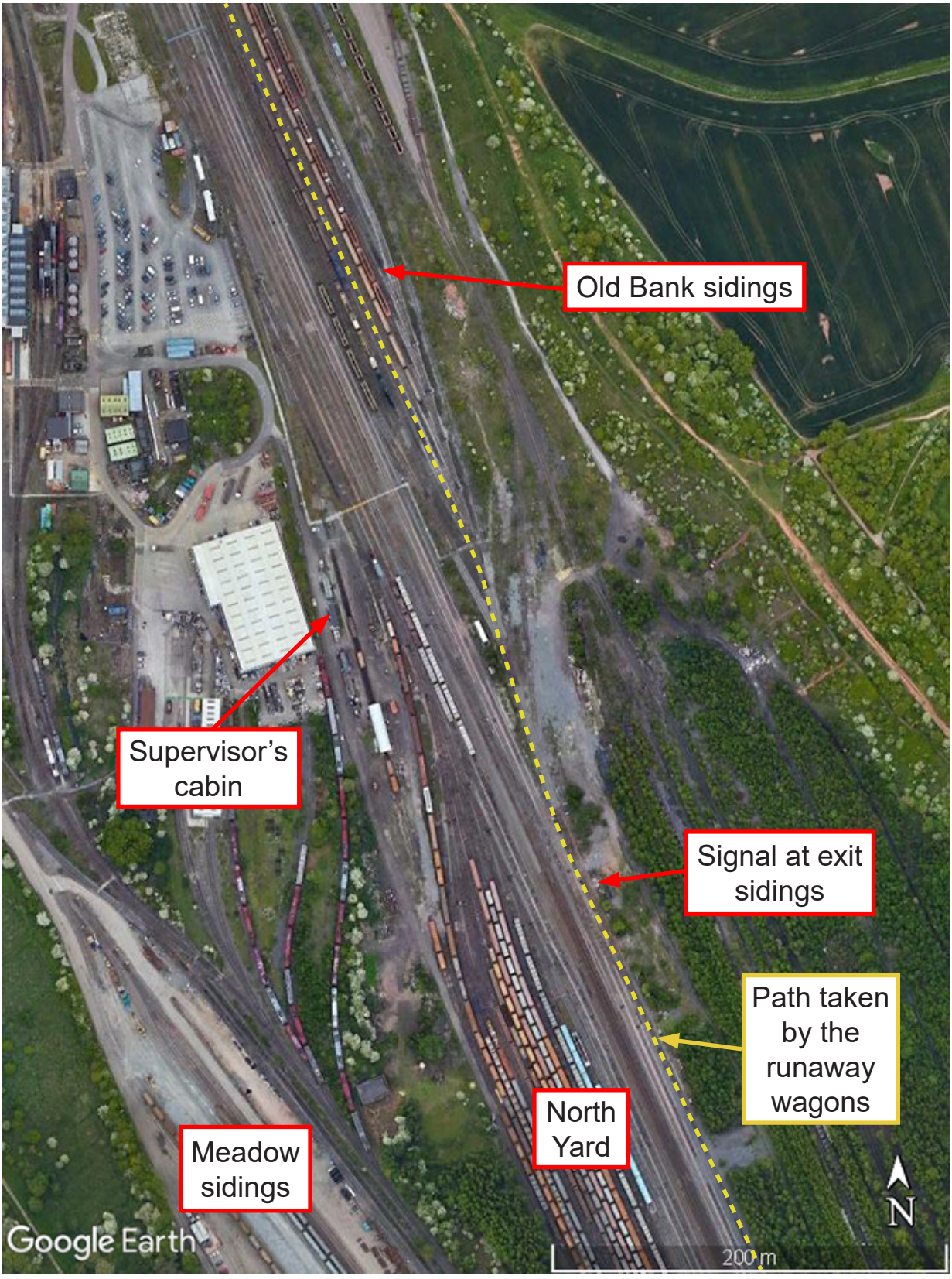

Figure 2: Google Earth view of the path taken by the runaway wagons out of Old Bank sidings

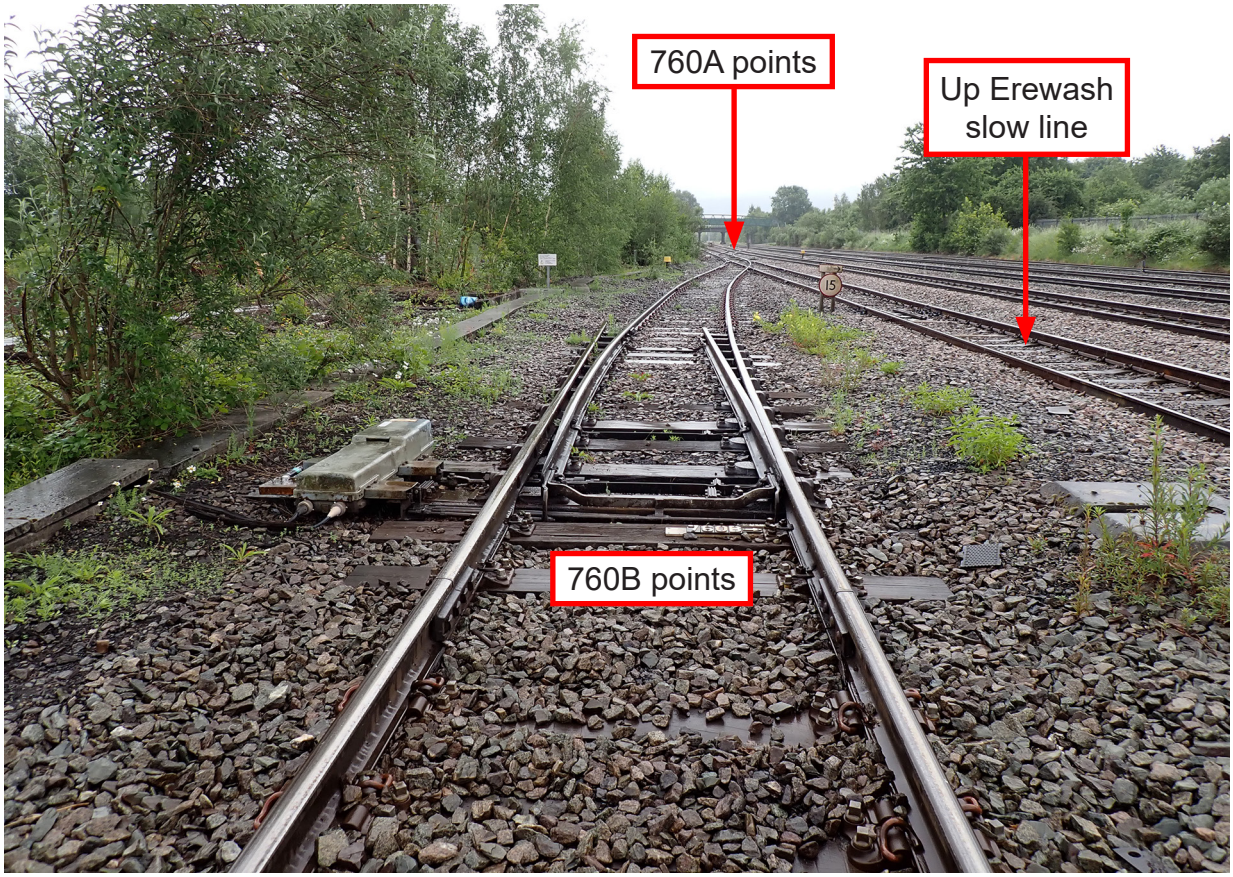

Figure 3: The trap points

Figure 4: The derailed wagons (courtesy of DB Cargo)

6 The derailed wagons sustained some damage during the derailment and were uncoupled from the rest of the rake, which was pulled back into Old Bank sidings on 17 January. The derailed wagons were subsequently recovered by 13:30 hrs on 19 January. Track and signalling equipment where the wagons ran derailed also sustained damage. Repairs to this infrastructure were completed by 09:00 hrs on 21 January.

Context

Location

7 Old Bank sidings at Toton are located on the Erewash Valley line, which runs from Clay Cross South Junction (near Chesterfield) to Trent East Junction (figure 5). The sidings are part of Network Rail's East Midlands Route[3] which is within its Eastern Region.[4] As well as Old Bank sidings, Toton is also the location of the North Yard and Meadow sidings (figure 6). There is also a large depot at Toton for stabling and maintaining locomotives.

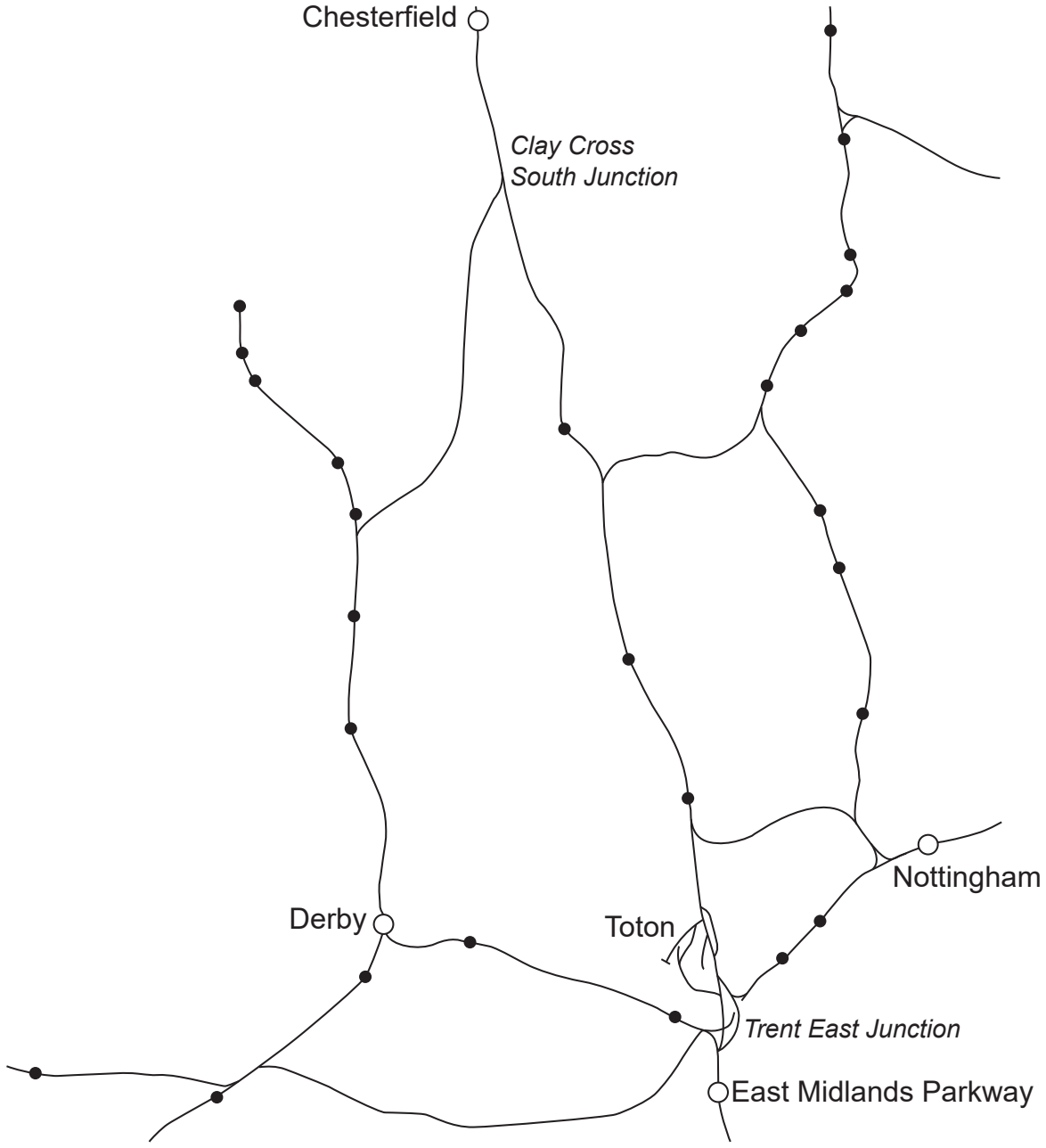

Figure 5: Location of Toton

[3] Part of Network Rail's organisation which manages, operates and maintains the railway from London St Pancras to Chesterfield and a number of routes that branch off main lines to Northamptonshire, Rutland, Leicestershire, Derbyshire, Nottinghamshire and Lincolnshire (but does not include the East Coast main line).

[4] Part of Network Rail's organisation which supports four of its routes: Anglia, East Coast, East Midlands and North & East.

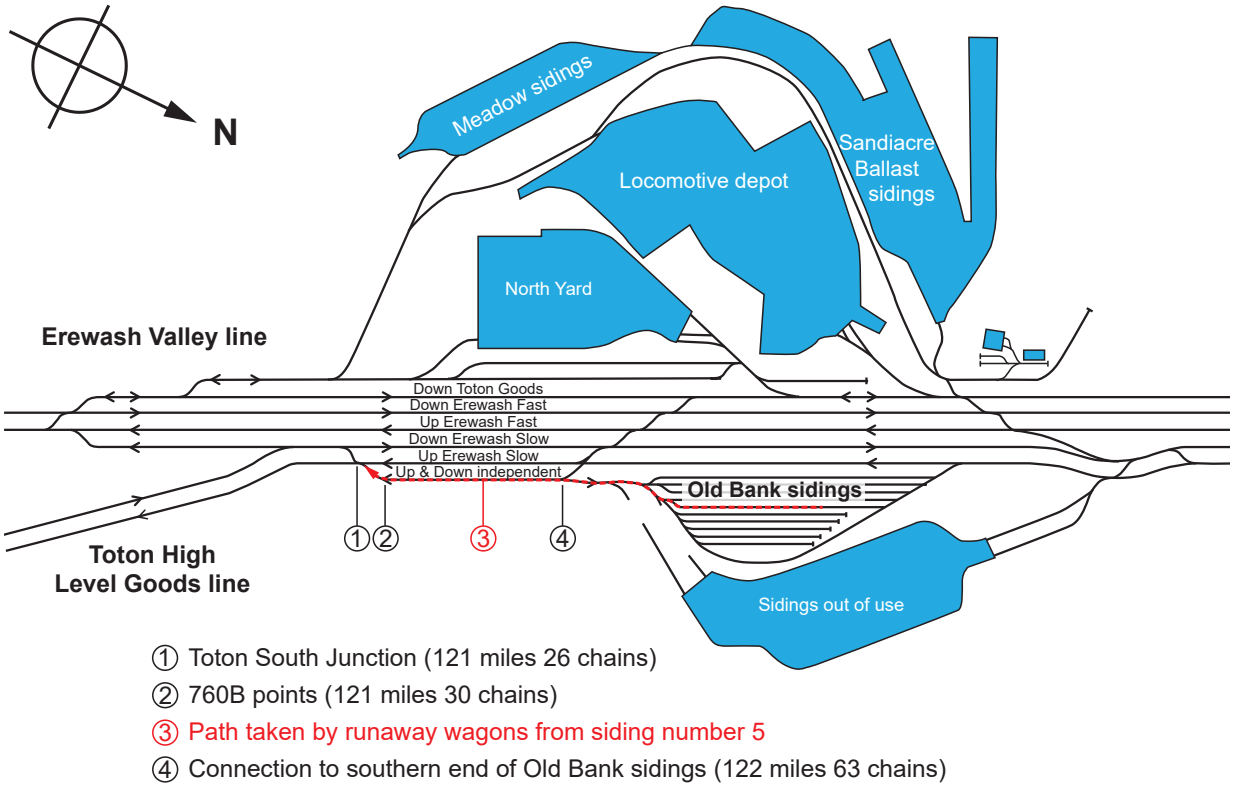

Figure 6: Track layout at Toton

8 The southern end of Old Bank sidings joins the up and down independent line at 122 miles 63 chains[5] (from a zero reference at London St Pancras), at the boundary where ownership of the infrastructure changes from DB Cargo to Network Rail. At 121 miles 30 chains, the up and down independent line joins the up Erewash slow line at Toton South Junction. The trap points that derailed the wagons, reference number 760B, were located here (figure 6).

9 The track is on a gradient falling from Old Bank sidings towards Toton South Junction. Network Rail data sources state the average gradient between the sidings and the junction is 1 in 418, and a gradient of 1 in 415 is marked on a gradient post close to where Old Bank sidings join the up and down independent line.

10 Signalling in this area is only provided on Network Rail's infrastructure. It detects whether trains are absent or not in each track section using axle counters[6] and is controlled by a signaller from the Erewash workstation in the East Midlands Control Centre (EMCC) in Derby. There is no signalling or train detection within Old Bank sidings. The railway in this area is not electrified.

[5] A unit of length equal to 66 feet or 22 yards (around 20 metres).

[6] A system that detects the absence of a train by counting the individual axles of a train in at one end of a section of track and out at the other end.

Organisations involved

11 Network Rail owns, operates and maintains the railway infrastructure that passes through the Toton area. It employs the signaller at EMCC and the mobile operations manager who was sent to the site after the wagons had run away. Mobile operations managers provide Network Rail's first-line response to incidents that affect the operation of the railway.

12 DB Cargo owns, operates and maintains the freight yards, sidings and locomotive depot at Toton. It owned the rake of wagons that ran away and operated the train that brought the wagons into Old Bank sidings on 16 January. It employed the drivers of that train and the staff responsible for shunting, stabling and preparing trains in the yards and sidings at Toton.

13 Both organisations freely co-operated with the investigation.

Train involved

14 The train that ran away was a rake of 22 wagons. It had arrived at Toton on the evening of 16 January as train reporting number 6G02,[7] the 17:07 hrs engineering train[8] from Peterborough to Toton. Train 6G02 was hauled by a class 66 diesel-electric locomotive. This was detached from the train after it arrived at Old Bank sidings, and was then taken to the locomotive depot.

15 The rake comprised 21 type MCA and MDA bogied (four-axle) open box wagons, and a single type OCA two-axle open box wagon, which was at the southern end of the rake. All the wagons were loaded with ballast spoil except for the OCA wagon, which was empty. Documentation for train 6G02 reported the total weight of the rake was 1869 tonnes.

Staff involved

16 No one was on duty at Toton when the wagons ran away in the early hours of 17 January. However, three DB Cargo ground staff[9] were on duty at Toton when train 6G02 arrived the previous evening. These were a trainee supervisor, a mentor supervisor and a ground staff member.

17 The trainee supervisor was the person in charge (PIC) when train 6G02 arrived. As the PIC, he was responsible for allowing the train to enter Old Bank sidings and for managing any subsequent actions that needed to be carried out on that train. He had been employed by DB Cargo for two years and four months and had spent the first two years training and then working as a qualified member of ground staff at Toton. He had spent the previous four months training to become a ground staff supervisor while retaining his competencies to carry out ground staff duties.

18 The mentor supervisor was on duty that evening to mentor the trainee supervisor and to carry out the duties of the PIC or ground staff, as required. He started working for British Rail in 1989 and for the past ten years had worked for DB Cargo as a supervisor, based at Toton.

---

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

[8] A train comprised of wagons or specialised vehicles that are used to repair, maintain or replace the track and other railway infrastructure.

[9] Staff who can shunt and stable trains and wagons. They can also carry out visual inspections and pre-departure tests on a train prior to it travelling on the main line railway network.

19 The ground staff member worked under the instructions of the PIC. He had been employed with DB Cargo since March 2020, so had about ten months of experience in that role. He usually worked at Toton.

20 The DB Cargo train driver who drove train 6G02 from Peterborough was relieved by a second DB Cargo driver just as the train was about to enter Old Bank sidings. This second driver was accompanied by a trainee driver when he took over the train. Both the second driver and the trainee driver were rostered to work at Toton on the evening of 16 January to shunt locomotives and trains as required by the PIC.

External circumstances

21 It was dark when train 6G02 arrived on the evening of 16 January and when the wagons ran away early the next morning. Witness accounts and data from local weather stations[10] show that it was dry throughout the evening and early morning. These weather stations reported that the air temperature in the area fell from about 8°C to 6°C between 16:00 and 23:00 hrs, when the three DB Cargo ground staff were on duty at Toton.

[10] Data was obtained from three local weather stations that were located between 1.5 miles (2.4 km) and 2.8 miles (4.5 km) away.

The sequence of events

Events preceding the accident

22 The ground staff member booked on for duty at 12:01 hrs on 16 January. He spent the afternoon carrying out various shunting movements and preparing trains in both Old Bank sidings and North Yard. At 16:01 hrs the trainee supervisor and mentor supervisor both booked on for duty. After completing a handover from the previous PIC, who was booking off, the trainee supervisor took over as PIC and began planning the work activities for that evening. The mentor supervisor worked alongside the trainee supervisor to help plan the work and prepare the paperwork for trains that were due to depart from Toton later that evening.

23 At 18:16 hrs, train 6G02 departed from Peterborough. It was running 69 minutes late.

24 At about 18:45 hrs, the trainee supervisor instructed the ground staff member to go over to Old Bank sidings to prepare a train for departure. This was the first of six trains that were due to depart from Toton that evening. The ground staff member completed this task and the train departed from Old Bank sidings at 19:39 hrs. The ground staff member then walked back to the supervisor's cabin, which was located near the North Yard (figure 2).

25 At about 19:40 hrs, train 6G02 was approaching Toton. The signaller called the trainee supervisor to tell him the train would soon be arriving on the up and down independent line. The trainee supervisor gave the signaller permission to route the train up to the stop board at the southern entrance of Old Bank sidings. At the same time, the trainee supervisor was aware that train 0D40 was arriving in the North Yard. This train comprised two locomotives that were to be placed on engineering trains that were departing from Toton that evening.

26 From about 19:45 to 19:50 hrs, the trainee supervisor, mentor supervisor and ground staff member were together in the supervisor's cabin. The trainee supervisor verbally instructed the mentor supervisor to meet train 0D40 in the North Yard. He asked the mentor supervisor to uncouple the two locomotives, put one on a train in the North Yard and send the other over to Old Bank sidings for a train which was departing later. The trainee supervisor asked the mentor supervisor to then secure train 6G02 in Old Bank sidings, as he knew that the mentor supervisor would need to visit Old Bank sidings after dealing with the two locomotives, to prepare two trains that were due to depart later that evening. The trainee supervisor then verbally instructed the ground staff member to prepare the three trains that were departing from the North Yard that evening.

27 After giving these instructions, the trainee supervisor began other tasks, such as dealing with telephone calls to and from the signaller. He was also giving face to face briefings to the train drivers who were arriving to take the trains departing from Toton that evening. This included providing a detailed briefing to one driver who was unsure about a shunt move. While the trainee supervisor was busy dealing with these tasks, the mentor supervisor and the ground staff member briefly discussed the tasks they had been given, before leaving the cabin.

28 Having left the supervisor's cabin, the mentor supervisor met train 0D40 and split and shunted its locomotives in accordance with the instructions from the trainee supervisor. The ground staff member also left the supervisor's cabin after collecting a set of radios and went to the North Yard, where he met up with the driver of the first train due to depart from the yard. He prepared the train and checked it as it departed. He remained working in the North Yard for the rest of the evening, during which time he prepared and checked another two departing trains. This was again in accordance with the trainee supervisor's instructions.

29 At 19:53 hrs, not long after the others had left the supervisor's cabin, the trainee supervisor answered a call from the driver of train 6G02, which was now at the stop board at the entrance to Old Bank sidings. During this call the driver stated that he would be unable to take the locomotive to the depot after it had been uncoupled from the train, as this would take his working hours beyond those rostered. The trainee supervisor gave the driver permission to pass the stop board and move the train as far as the foot crossing at the southern end of the sidings. The trainee supervisor then arranged for another driver and a trainee driver that were available to him at Toton (paragraph 20) to go to Old Bank sidings to relieve the incoming driver. The driver and trainee met the train at the foot crossing at around 19:55 hrs.

30 Shortly after this, the driver and trainee got into the cab of the locomotive. The driver called the trainee supervisor to confirm which siding the train was to go into. The trainee supervisor confirmed that the train was to go into siding number five, and he also told the driver to uncouple the locomotive and then take it over to the locomotive depot. The driver was aware that the train should not be left unsecured, so he questioned who would secure it if he did this. The trainee supervisor said that the mentor supervisor would soon be coming over to Old Bank sidings to secure the train at its southern end.

31 By around 20:10 hrs, the locomotive had been uncoupled from the train. It departed to go to the depot a few minutes later, leaving the rake of wagons in the siding. After leaving the locomotive at the depot at about 20:30 hrs, the two drivers walked back to the supervisor's cabin. By the time they got there, no one was in the cabin, so they went to the mess room to await further instructions.

32 As well as managing the arrival of trains 6G02 and 0D40, the trainee supervisor was also expecting train 6X37 to arrive. The trainee supervisor had tasked himself with going out to split this train and shunt it into the Meadow sidings (figure 6), which would take about 90 minutes. He left the supervisor's cabin to do this at about 20:35 hrs.

33 Shortly afterwards, and having completed shunting the locomotives from train 0D40, the mentor supervisor went back to the supervisor's cabin. As the trainee supervisor had left to shunt train 6X37, the mentor supervisor took over the role of PIC and collected the paperwork for two trains that were due to depart from Old Bank sidings that evening. He then went to Old Bank sidings to prepare these trains and to check each one as it departed.

34 By 22:00 hrs, all the trains that were due to leave from Toton that evening had departed, and the ground staff started to return to the supervisor's cabin. The trainee supervisor was the last person to arrive at the supervisor's cabin at around 22:30 hrs, after completing the shunting of train 6X37. While the mentor supervisor checked that all the departing trains were correctly recorded on a rail industry computer system and completed some administrative tasks, the ground staff member and drivers left. The trainee and mentor supervisors held a brief discussion about what had happened that night, with the focus on when the outgoing trains had departed. Both then left, leaving the depot unstaffed, as intended, from around 23:00 hrs.

Events during the accident

35 Around 8.5 hours after being left in siding number five, the rake of wagons from train 6G02 began to slowly roll out of the southern end of Old Bank sidings, which are on a falling gradient (paragraph 9). At 04:42:41 hrs on 17 January, the signalling equipment for the Erewash workstation at EMCC recorded that the leading end of the rake had passed onto Network Rail's infrastructure and occupied track section RNA on the up and down independent line (figure 7). As it did this, the rake passed signal TC4584, the exit signal from the southern end of Old Bank sidings, which was displaying a stop aspect. This caused an alarm to sound on the workstation, which gained the attention of the signaller.

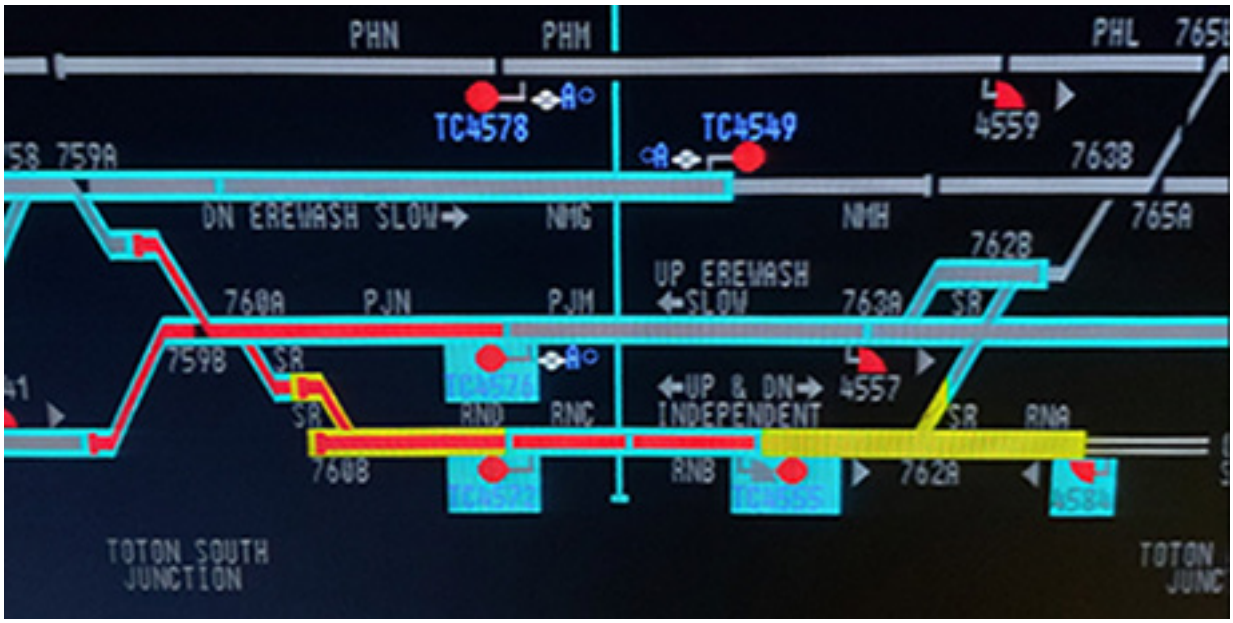

Figure 7: Photograph of part of the screen on the Erewash workstation at EMCC (courtesy of Network Rail)

36 At 04:43:12 hrs, the leading end of the rake occupied the next track section, RNB, on the up and down independent line. The rake's average speed over track section RNA was 5.0 mph (8.0 km/h) (figure 8). The rake occupied the next track section, RNC, at 04:44:20 hrs. The rake's average speed over track section RNB was 6.5 mph (10.5 km/h).

37 At 04:45:29 hrs, the leading end of the rake occupied track section RND after passing signal TC4572, which was also displaying a stop aspect. This caused another alarm to sound on the Erewash workstation. The rake's average speed over track section RNC was 7.6 mph (12.2 km/h).

Figure 8: Track sections on the up and down independent line

38 The rake then continued for a short distance before it derailed on the run-out rails of 760B trap points. The rake eventually came to a stop with the leading two wagons obstructing the up Erewash slow line at Toton South Junction. Track section PJN on the up Erewash slow line showed as occupied at 04:45:59 hrs, due to the wheels of the derailed wagons damaging axle counter equipment.

Events following the accident

39 The signaller was initially unsure about what had happened to cause the track sections to be shown as occupied on the workstation. At 04:53 hrs, staff at EMCC reported to Network Rail Route Control that there had been multiple axle counter failures. In response to this, Route Control asked a mobile operations manager to go to Toton. The mobile operations manager reported back from Toton at 05:40 hrs that a rake of wagons had run away and that four of the wagons had derailed.

Analysis

Identification of the immediate cause

40 Four wagons derailed on 760B trap points after a rake of wagons ran away from Old Bank sidings.

41 The rake of wagons was left in siding number five within Old Bank sidings the previous evening, at about 20:10 hrs, after arriving as part of train 6G02 (paragraph 30). Once the train was fully accommodated within the siding and had stopped, its drivers reduced the pressure in the brake pipe[11] to zero, which fully applied the automatic air brake on each wagon. The drivers then uncoupled the locomotive from the rake of wagons and took it to the locomotive depot.

42 Over the next 8.5 hours, air slowly leaked away from the braking system on each wagon, thereby releasing their brakes. Once the brakes had released on enough wagons, the weight of the rake overcame the remaining braking force and it began to slowly roll out of the siding, to the south, on the falling gradient. It is common for air to leak away from a wagon's braking system over time and for brakes to release in this way, which is why wagons must be secured with either handbrakes or scotches when left stabled.

43 Maintenance specifications for wagons include annual checks that measure the rate at which air leaks from a wagon's braking system, usually from its brake cylinders. These specifications vary for different types of wagon, but typically require that air should not leak from the brake cylinders at rates of greater than 0.14 to 0.2 bar in five minutes. When the automatic air brake is fully applied on a wagon, the pressure in its brake cylinders is typically between 3.5 and 3.7 bars. These maintenance limits for the rate of air leakage from brake cylinders mean the automatic air brake should remain applied for a minimum of about 1.5 hours, when not supplied with air by a locomotive coupled to the train.

44 Logs recorded by signalling equipment showed each track section along the up and down independent line was occupied in sequence by the rake. The logs also showed that 760B trap points were set in the normal position, to perform their intended function, which was to derail any unauthorised movements that passed beyond signal TC4572 at the end of the up and down independent line. Once it had derailed on the trap points, the leading wagon travelled for about 75 metres beyond the toes of the trap points before it stopped. In all, four wagons derailed on the trap points.

[11] A pipe running the length of a train that controls, and sometimes supplies, the train's air brakes. A reduction in brake pipe air pressure applies the brakes.

Identification of causal factors

45 The rake of wagons ran away as no one secured it after it was stabled in Old Bank sidings.

46 DB Cargo had a 'common safe system of work' document that defined how it managed train movements into, out of and within Old Bank sidings. It also included details about how trains should be secured within the sidings. DB Cargo was responsible for the contents of this document as it was the site owner and principal operator at the sidings, although its contents were agreed with the other freight operating companies that used the sidings. All DB Cargo employees undertaking rail freight operations at Old Bank sidings were issued with the document and were required to familiarise themselves with its contents, and their knowledge of it was assessed before they could work at this location.

47 The requirements in the common safe system of work for Old Bank sidings were complementary to those within:

- GE/RT8000 The Rule Book
- GO/RT3056 'Working manual for rail staff – freight train operations' ('the white pages') and GO/RT3053 'Working manual for rail staff handling and carriage of dangerous goods' ('the pink pages')[12]
- DB Cargo's company specific supplementary operating instructions. These deal with additional rules for particular wagons types, trains or locations.

48 The common safe system of work document stated that the PIC at Old Bank sidings would be the DB Cargo supervisor who was on duty at the time and that the PIC would control and authorise all train movements.

49 When a train that was destined for Old Bank sidings was approaching Toton, the signaller at EMCC would call the PIC to obtain permission to route the train up to the stop board at the entrance to the sidings (figure 9).

50 Once the train had arrived at the stop board, the driver would call the PIC. The PIC would tell the driver which number siding to take the train into and would then give the driver permission to pass the stop board and enter the sidings. The PIC would sometimes arrange for a member of ground staff to be present to meet the train and change the points ahead of the train so that it could go straight into the required siding. If ground staff were not present, the driver was responsible for stopping the train and changing the points ahead of the train as required when moving into the sidings.

51 For trains coming into the sidings from the south, drivers were required to stop the train with its rear wagon just clear of the fouling point[13] at the southern end of the siding. Ground staff could use radio to assist drivers in ensuring their trains were in the correct position to do this. Alternatively, if fitted, drivers could use a distance counter fitted within the cab of the locomotive to determine where to stop.

---

[12] In March 2021, both GO/RT3056 and GO/RT3053 and their associated guidance documents were withdrawn. Most instructions for staff were transferred into a new Rule Book module, GE/RT8000-TW4, 'Preparation and working of freight trains'. Company requirements or guidance notes were transferred to a new Rail Industry Standard, RIS-3781-TOM, 'Requirements for the operation of freight trains and the conveyance of dangerous goods by any train'. The remaining instructions and information were transferred into other Rule Book modules.

[13] The place where a vehicle standing on a converging line would come into contact with a vehicle passing on the other line.

Figure 9: The stop board at the southern entrance to Old Bank sidings

52 Once the train was fully accommodated within the required siding, the common safe system of work called for the first three vehicles at the southern end of the sidings to be secured using scotches on the downhill side. It also called for the leading end of the first vehicle to also be scotched in both directions (figure 10). Securing the train in this way, with or without a locomotive attached to it, was also in accordance with requirements in the Rule Book, GO/RT3056 and DB Cargo's supplementary operating instructions (paragraph 47). While ground staff are trained to secure the train in this way, the common safe system of work did not state who was responsible for securing the train (see paragraph 86).

53 In addition to these requirements in the common safe system of work, a DB Cargo supplementary operating instruction describes the task of uncoupling a locomotive in detailed steps. Both the common safe system of work and supplementary operating instruction supported the rules for uncoupling a locomotive from its train that were contained in part E of GO/RT3056, which was at issue 5.1 at the time of the accident. Section 5.4 of GO/RT3056 stated:

'Uncoupling a Locomotive. The following procedure must be carried out before a locomotive is uncoupled.

- *Unless local instructions state otherwise, the driver must apply the straight air brake on the locomotive and then release the automatic brake on the train.*
- *After checking that the automatic brake has been released the shunter or other nominated person must ensure that all buffers are not compressed.*
- *Handbrakes must then be applied in accordance with local instructions before the locomotive is uncoupled.'*

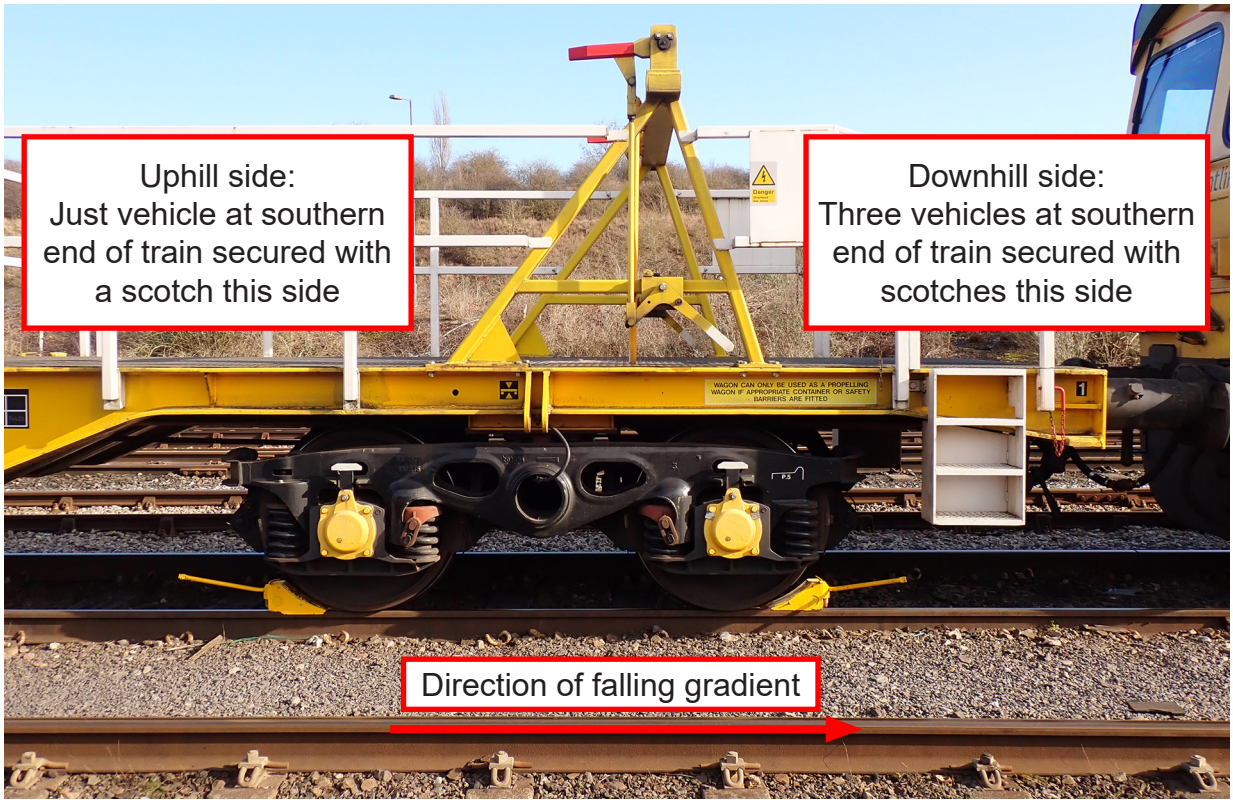

Figure 10: How vehicles should be secured in Old Bank sidings (courtesy of DB Cargo)

54 All of DB Cargo's supervisors and ground staff were briefed on this rule during the training they received to become a member of ground staff. Trainees would then sit a theoretical examination to test their rules knowledge before going out to work in yards and sidings.

55 The only time that a locomotive could be uncoupled from its train, and the train left unsecured for a short period of time, was when the 'driver-only run round' rules in GO/RT3056 were applied. These rules required an enhanced brake continuity test during train preparation, which included an additional check of the application and release of the brakes on the vehicle next to the locomotive. The train preparer would then give the driver a signed enhanced air brake continuity test slip which confirmed this additional check had taken place. This slip allowed the driver to detach the locomotive from its train, run round the train, and couple up to the other end, without the need to secure the train while doing this. These rules could only be used at locations where they were specifically permitted. In addition, there had to be more than ten wagons in the train and the run round operation needed to be completed with an hour.

56 The common safe system of work did not permit the use of driver-only run round rules at Old Bank sidings. This meant that all trains within the sidings should have been secured in line with the requirements of the common safe system of work (paragraph 52) and GO/RT3056 (paragraph 53). They should not have been left unsecured for any period of time.

57 Witness evidence from the three DB Cargo staff who were on duty on the evening of 16 January showed that none of them had secured the wagons on train 6G02 as required by the common safe system of work and GO/RT3056 when train 6G02 was stabled in siding number five.

58 The wagons were not secured in the manner required by the relevant rules and procedures due to a combination of the following factors:

a. The train was not secured before its locomotive was uncoupled from the wagons (paragraph 59).

b. There was miscommunication between the yard staff on duty about who would secure the train after its arrival at Old Bank sidings (paragraph 66).

Each of these factors is now considered in turn.

Securing of the train

59 The train was not secured before its locomotive was uncoupled from the wagons.

60 After taking over train 6G02 on its arrival at Old Bank sidings, the driver called the trainee supervisor to ask who would secure the train (paragraph 30). The trainee supervisor said that the mentor supervisor would soon be coming over to secure the train at its southern end, so the driver and accompanying trainee driver could detach the locomotive and take it over to the depot before the wagons were secured.

61 The driver and trainee driver carried out the trainee supervisor's instructions. Once the locomotive was uncoupled, the trainee driver called the trainee supervisor to say they were ready to take the locomotive out of the siding. The trainee supervisor, who was now aware that the locomotive was uncoupled and the train was unsecured, called the signaller to arrange for the locomotive to be signalled from Old Bank sidings to the depot.

62 The trainee supervisor had asked the driver to uncouple the locomotive from the train before it was secured with scotches because he thought this would be a more efficient way of working, given that no one was immediately available to meet and secure train 6G02 when it arrived. Although he could have told the incoming main line driver of the train from Peterborough to take the train into the siding, shut the locomotive down and secure the train, he would have then needed to arrange for the locomotive to be uncoupled and taken to the depot later in the evening by someone else. This was because the main line driver had run out of rostered hours (paragraph 29). Using the driver that he had available in the depot to move the train up into the siding and then take the locomotive to the depot straight away avoided this issue. He also knew that the mentor supervisor would soon be going to Old Bank sidings and that he had already given instructions to him to secure the train once he got there.

63 It is likely that the trainee supervisor had developed the belief that it was accepted practice to leave trains unsecured for up to an hour, because this was permitted by the driver-only run round rules in GO/RT3056 (paragraph 55). However, these rules did not apply to train 6G02 because the common safe system of work did not permit the driver-only run round rules to be applied at Old Bank sidings. The train had also not been issued with a signed enhanced air brake continuity test slip when it was prepared prior to its departure from Peterborough (paragraph 55).

64 The trainee supervisor's belief that trains could be left unsecured for up to an hour had previously been noticed when he was working as a ground staff member. During a post-qualification assessment (see paragraph 84), the trainee supervisor had left a train unsecured for a short period of time. Records show that the assessor had accepted this action and noted that it was within the rules to do this. However, in contrast to the beliefs of both the trainee supervisor and the assessor, leaving trains in this manner was not permitted anywhere at Toton. Records also showed that the assessor suggested to the trainee supervisor that he should always leave trains secured due to the ever-changing workload in the yard.

65 The assessor's comments suggest that this misunderstanding of the application of the driver-only run round rules was more widespread than just the trainee supervisor. This was confirmed by DB Cargo's internal investigation report into this accident, which stated that there were routine violations of the driver-only run round rules by some DB Cargo staff at Toton, who were allowing trains to be left unsecured for short periods of time.

Miscommunication

66 There was miscommunication between the yard staff on duty about who would secure the train after its arrival at Old Bank sidings.

67 Train 6G02 arrived just after the trainee supervisor had told the mentor supervisor to meet train 0D40 and the ground staff member to prepare trains in the North Yard. This meant that no one was immediately available to meet and secure train 6G02 when it arrived. The trainee supervisor had instructed the mentor supervisor to secure train 6G02 once he had finished shunting train 0D40 (paragraph 26). Just after giving out these instructions, the trainee supervisor began dealing with other tasks (paragraph 27).

68 The mentor supervisor agreed that the trainee supervisor had told him to deal with train 0D40 and then to secure train 6G02. However, the mentor supervisor said that the ground staff member, who he thought did not have a task to complete, asked the mentor supervisor if he wanted him to do the task for him. The mentor supervisor agreed to this, believing that the ground staff member was offering to secure train 6G02 while he shunted train 0D40. The mentor supervisor said he thought the trainee supervisor was aware of this change in tasking. Although, later on, the mentor supervisor went to Old Bank sidings to prepare two trains ready for departure, he did not secure or check train 6G02 as he thought that the ground staff member had already secured it.

69 The ground staff member, however, stated he knew nothing about train 6G02 arriving and that he was unaware of it all night. The ground staff member said the offer he had made to the mentor supervisor to undertake a task for the mentor supervisor actually related to train 0D40, as one of the locomotives from this train would join another train that the ground staff member would be preparing later that evening. The ground staff member said the mentor supervisor responded that he would undertake the task.

70 The conversations about who would secure train 6G02 took place face-to-face in the supervisor's cabin. They were informal in nature and none of the messages between the staff were repeated back to confirm understanding. Consequently, the staff involved did not reach a clear understanding about who was going to secure train 6G02. Although the mentor supervisor thought the trainee supervisor had overheard his conversation with the ground staff member, the trainee supervisor stated that he was not aware of any proposed change to the instructions that he had given out. It is likely that he did not hear what was said by the other staff in the cabin as he was busy with other tasks (paragraph 67).

Identification of underlying factors

Trains left unsecured

71 Staff leaving trains unsecured for short periods of time was not identified by DB Cargo's safety assurance activities.

72 Some DB Cargo staff at Toton were incorrectly applying elements of the driver-only run round rules and this was resulting in trains being left unsecured for short periods (paragraph 65). However, neither the incorrect application of the rules nor the leaving of trains unsecured was identified by DB Cargo's safety assurance activities.

73 The driver-only run round rules were first published in GO/RT3056 in December 2003. From December 2003 to March 2020 there were 32 incidents recorded on rail industry databases and systems involving wagons running away. Of these 32 events, 17 (53%) of the runaway events were related to operations by ground staff, of which 10 were caused by ground staff leaving vehicles unsecured at some point. Six occurred when the vehicles were being shunted and four when the vehicles were left stabled. None of these incidents happened while a run round movement was taking place, and there is insufficient data to determine how many of the events were caused by the incorrect application of driver-only run round rules. This means it is not possible to say whether the incorrect application of these rules was also an issue across other locations managed by DB Cargo and the wider rail industry.

74 Since this accident, a collision and derailment involving runaway wagons happened at Peak Forest on 24 July 2021. While a locomotive was running round the five wagons it was shunting, DB Cargo ground staff left the wagons with no handbrakes applied and relied on the automatic air brakes on the wagons to hold them in place. However, the automatic air brakes on the wagons were isolated, so the wagons ran away and collided with the locomotive, derailing one wagon. This was a further case of ground staff not correctly applying the rules in Rule Book module GE/RT8000-TW4 (formerly GO/RT3056, see paragraph 47) by leaving a train unsecured for a short period of time, as the ground staff should have applied the handbrakes on the wagons to secure them before uncoupling the locomotive.

DB Cargo safety assurance

75 Some of DB Cargo's safety assurance activities for its ground staff are carried out by the service delivery manager (SDM) or the safety assurance manager (SAM). The SDM is part of the local production management team for an area, so is responsible for the day-to-day delivery of DB Cargo's train services and the performance of its staff. The SAM works alongside the SDM and is focused on managing staff competence, being the lead for staff safety matters, briefing staff on key documents and processes, and carrying out investigations. At Toton, either the SDM or the SAM was required to carry out safety tours every three months. These safety tours were wide ranging and covered subjects such as site security, workplace welfare, work equipment and road vehicle movements within the site. They also included looking at how rail movements and train preparation activities were being carried out. The SDM or SAM conducting the safety tour was expected to observe the actions of staff throughout the visit.

76 The last safety tour at Toton prior to this accident took place on 12 January 2021 and was carried out by a SAM. The SAM recorded that this safety tour took place while carrying out staff assessments, with no other train movements observed, but that all trains were seen to be scotched correctly. Many of the records for previous safety tours going back to 2017 also noted that trains were scotched correctly. None identified any issues with trains being left unsecured.

77 As part of the company's safety assurance activities, the contract delivery manager (CDM), who manages the SDMs, was required to carry out a monthly health check for the sites they were responsible for. This check was an office-based review and followed a proforma. It was primarily focused on staff competence, checking that competence assessments for new and existing staff had taken place and that future assessments were planned. While it provided an overview of the sites and could be used to monitor specific issues, it did not look specifically at staff behaviour or compliance with rules, other than considering the status of those staff who were already subject to a competence development or corrective action plan.

78 Safety assurance activities were also carried out by DB Cargo's safety department. The safety department is separate from the production department and has a nationwide remit, covering about 280 DB Cargo sites and depots. These locations can range from complex locations such as Toton with many train movements each day, to a single branch line or siding that might be visited by a train less than once a week. The safety department, headed by the head of safety, employs a national operations safety manager who manages four safety and compliance managers (SCMs). The role of the SCM is to support, advise and guide local production managers, such as the SDM and SAM. The SCM role also includes carrying out safety assurance site visits.

79 DB Cargo staff recorded safety incidents and events on a safety reporting system. All members of staff had access to the system to raise safety issues or hazards. Incidents and accidents were also recorded on the system. Using trends in the data gathered in this reporting system, DB Cargo's senior management team agreed a plan for the safety assurance site visits by the SCMs. Each SCM carried out about four of these site visits every year. This 'risk-based' plan was intended to make best use of the resources available to do safety tours or visits. The plan was shared so that local managers were aware in advance that a visit would be taking place.

80 A SCM might attend a selected site several times over a short period of time to ensure any potential areas of concern were addressed. Any wider learning from these visits could also be shared within DB Cargo to alert others to the issues that were found or to embed the learning into DB Cargo's processes. Toton was not identified as a higher risk location by this process or as a location that had any issues that required a visit by a SCM, so no visits had taken place there, or were planned to do so, prior to the accident.

81 Since 2018 the DB Cargo safety department had also worked with other departments to increase the visibility of compliance, by providing a weekly report on the topic to management teams and heads of departments. The safety department also created a compliance audit check that was intended to be completed throughout 2020. These checks were not completed as planned during 2020 due to the COVID-19 pandemic but were instead started later in the year.

82 DB Cargo had also begun to implement the Office of Rail and Road's (ORR) risk management maturity model (RM3) across its business. RM3 can be used to assess an organisation's ability to achieve excellence in controlling health and safety risks and it included an assessment of an organisation's proactive monitoring arrangements. DB Cargo had completed RM3 assessments for two areas prior to the accident, although neither area included Toton. DB Cargo is planning to fully embed RM3 assessment throughout its business by the end of 2022.

83 Although DB Cargo had a number of mechanisms in place to identify safety issues, none of these activities successfully detected the routine misapplication of the driver-only run round rules at Toton. This is probably because the mechanisms adopted by DB Cargo provided only limited opportunities to identify when staff were not following specific rules or instructions correctly.

84 The only other occasion when DB Cargo's ground staff were formally observed while working was when their competence was being assessed. DB Cargo required that newly qualified ground staff followed a post-qualification assessment process, in which these staff were subject to ten assessments in a two-year period. Once ground staff had completed their post-qualification assessments, their competency assessment regime changed to three practical assessments, normally eight to twelve months apart, and one theory assessment over a three-year period. In addition, qualified staff were met by their manager twice a year while performing their duties (referred to as a 'safety and fitness encounter'). During an encounter, the manager would observe the member of staff carrying out their job, could question them to assess their knowledge, and might also check the equipment they were using. Afterwards, the member of staff was given a score that judged their fitness to carry out their role which was recorded by DB Cargo. Overall, this meant that the number of opportunities for a manager to observe the behaviour of individual ground staff, and to correct any misunderstandings or misapplication of rules, decreased after two years in the role. It is also of note that the post-qualification assessment of the trainee supervisor did not detect his misapplication of the driver-only run round rule (paragraph 64).

Arriving trains

85 DB Cargo had no clear process in place that defined the tasks required for an arriving train and which then obtained feedback confirming that these tasks had been carried out.

86 The common safe system of work for Old Bank sidings provided a description of how to secure a train and stated which wheels on the train needed to be scotched and on what side (figure 10). However, the common safe system of work did not state when a train should be secured or who was responsible for doing it. Ground staff who were tasked with securing an arriving train were also not required to tell their supervisor afterwards that they had secured the train and supervisors were not required to seek positive confirmation from ground staff that this had been done.

87 However, the DB Cargo ground staff at Toton did have a local process in place to record the tasks that they had completed for departing trains. Each departing train was listed on a whiteboard in the supervisor's cabin and there were columns for each task that needed to be completed for departing trains (figure 11). These tasks included checking there was a tail lamp on the rear of the train, that the train's rolling stock inspection had taken place, and that train preparation and brake test activities had been completed. The tasks for each train were marked off when they were completed, with staff initialling the key activities that they had done. It was therefore possible to identify that a task had been completed and who had completed it. There was no equivalent whiteboard, or other process, in place at Toton for supervisors to track the tasks that needed to be carried out for an arriving train. Had there been an effective arrivals process in place, it is likely that the unsecured train would have been detected and the train secured.

Factor affecting the severity of consequences

88 Once derailed by the trap points, the leading two wagons stopped foul of the adjacent running line.

89 The runaway wagons derailed on 760B trap points as intended. The run-out rails at the trap points derailed left-hand wheels (in the direction of travel) of the leading four wagons into the cess[14] and right-hand wheels into the space between the rails of the up and down independent line. Beyond 760B trap points, the up and down independent line curved to the right to join the up Erewash slow line at 760A points (figure 3).

90 As the derailed wagons continued forward, the derailed right-hand wheels struck the cess side rail. This rail guided the wheels around the curve and towards 760A points and the adjacent running line. Impact marks on 760A points show where the wheels on the leading two wagons struck them (figure 12). The leading two wagons then stopped foul of the adjacent line.

[14] The area along the edge of the outermost railway track(s).

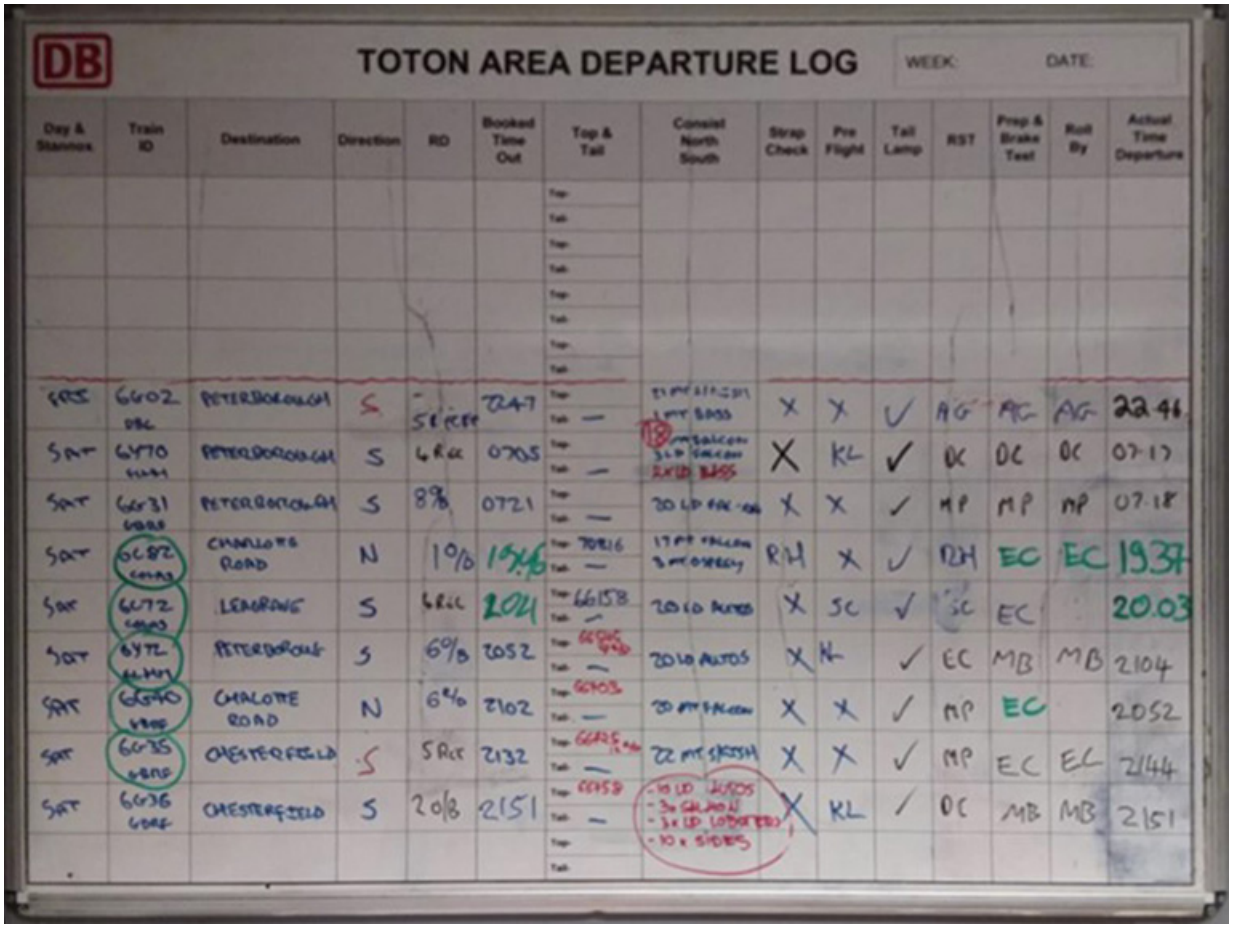

Figure 11: Whiteboard in the supervisor's cabin

Figure 12: Impact marks on 760A points

91 The leading wagon travelled 75 metres while running derailed to reach 760A points. One reason the rake of wagons had travelled this far was because all but one of the wagons were loaded. This increased the mass of the rake from 606 tonnes (unladen) to a reported 1869 tonnes (paragraph 15). Based on the speed that the rake was travelling just before it derailed (paragraph 37), it possessed about 10.8 MJ of kinetic energy. This compares to about 3.5 MJ for a rake of unladen wagons, a ratio of around 3:1. However, the wheels of laden wagons are likely to dig into ballast more deeply than empty wagons when running derailed, so the drag forces will be higher than those applied to an unladen rake. Based on the distance travelled by the wagons, and accounting for the amount of kinetic energy and likely drag forces, analysis undertaken by RAIB suggests that a rake of empty wagons is likely to have travelled about 30 metres after derailing on the trap points. This would mean its leading wagon would have stopped short of fouling the adjacent line.

Infrastructure changes

92 The track layout at Toton was last changed by phase two of the East Midlands Signalling Renewals project, which transferred control of the signalling at Toton from Trent signal box to the East Midlands Control Centre. The project also made some minor changes to the track layout, and the current track layout and signalling was commissioned by the project in December 2009.

93 The signalling scheme plan[15] for the project showed that these trap points were not new, as they were already part of the existing track layout at Toton, although they had a different identifying number when they were controlled from Trent signal box. No records were found to indicate when these trap points were first installed, but is likely that they were provided in their present form during the British Rail era to protect the main running lines from unauthorised movements out of Old Bank sidings. This is supported by the signalling scheme plan which showed that these trap points had provided the same protection for the West yard, which had long been out of use.

94 At the time that the current track layout at Toton was commissioned by the project, the continued provision of these trap points was a requirement of railway group standard GK/RT0064 ‘Provision of Overlaps, Flank Protection and Trapping’. GK/RT0064 stated that trap points shall be provided for the protection of passenger lines against sidings and any other non-running lines. While only a small number of passenger trains are routed each day via the Erewash Valley lines, these lines are also used as a diversion route for trains between Chesterfield and Derby, Nottingham or East Midlands Parkway (figure 5). This means that the up Erewash slow line is classed as a passenger line.

[15] A plan which is drawn to a scale longitudinally, that shows the proposed alterations to an existing signalling system using a colouring convention that shows unchanged items in black, new items in red and items to be removed in green. The signalling system is shown by means of standard signalling symbols as defined in Network Rail company standards.

95 GK/RT0064 was withdrawn in December 2013 but the requirements relevant to trap points were transferred into Network Rail company standard NR/L2/SIG/30009/D410 'Signalling Principles Handbook – Provision of Trapping Protection (including catch points and derailers)'. Both GK/RT0064 and NR/L2/SIG/30009/D410 noted that by providing trap points, this did not necessarily provide sufficient control of overrun[16] risk for a signal. Consequently, both required that the provision of trap points also be considered as a part of the wider overrun risk assessment process mandated by railway group standard GI/RT7006 'Prevention and Mitigation of Overruns – Risk Assessment'.

96 The overrun risk assessment included an assessment of the consequences of the trap points derailing a train. These consequences included:

- vehicles overturning
- vehicles fouling other lines
- deceleration rates that could cause injury to the occupants of the train
- vehicles impacting overhead line structures, buildings or bridge parapets
- vehicles falling down embankments or into roads, rivers, or other places.

97 At the start of 2008, the East Midlands Signalling Renewals project carried out a risk assessment for the six sets of trap points that were being commissioned during phase 2, as part of the overrun risk assessment process mandated by GI/RT7006. A project group met to undertake a separate assessment of the specific risks associated with the use of these trap points. The meeting was chaired by a Network Rail signalling risk engineer and attended by staff from Network Rail and the signalling contractor. Staff attending the meeting were drawn from signal engineering, railway operations and project management disciplines. The results of the risk assessment were recorded in a document dated April 2008.

98 The meeting completed a proforma for assessing the risks for each set of trap points. The completed proforma for 760B trap points shows that the risks associated with these trap points were considered acceptable by the meeting and that no further action was required. When the meeting considered the specific risk of a train fouling another running line after overrunning the trap points, it acknowledged there was a possibility of this happening due to the short run-out rails. However, the meeting concluded that this risk was eliminated due to trains approaching at a low speed, and the provision of train protection and warning system[17] (TPWS) at the signal on the approach to the trap points.

[16] Passing the end of a movement authority (the end of a movement authority is the point where a train is required to come to a stand on completion of a signalled movement). On lines signalled with lineside signals, the conventional terminology for an overrun is a Signal Passed At Danger (SPAD), which is when a train fails to come to a stand at a signal displaying a stop aspect.

[17] A system fitted to certain signals which will automatically apply a train's brakes if it approaches the signal at too high a speed, or fails to stop at it, when the signal is displaying a stop aspect.

99 For TPWS to eliminate or mitigate the overrun risk as described in the assessment, it required the train involved to be fitted with active TPWS equipment at its front end. TPWS equipment is only fitted to the driving cabs of rolling stock and only functions when the cab is active. The meeting did not consider what would happen if uncontrolled vehicles, such as a rake of wagons, ran away and reached the trap points. Consequently, there was no further commentary on the length of the run-out rails and no consideration was given to mitigation options, such as a sand drag to slow and stop a derailing train.

100 RAIB has found no evidence that the overrun risk assessment process for trap points followed by signalling projects takes uncontrolled vehicles running away into account. Network Rail's standards, and the railway group standards that preceded them, do not contain any clauses to trigger consideration of this risk and the agendas, check lists and proformas used by meetings to risk assess trap points do not consider uncontrolled runaway vehicles. This is a significant omission in the process since the trap points are provided 'for the protection of passenger lines against sidings', and sidings are where vehicles are left unattended and most likely to run away from if not secured correctly.

Ongoing assessments

101 Following a number of freight train derailments on trap points in 2006 and 2007 (including Brentingby Junction, RAIB report 01/2007), where the derailed train stopped foul of the adjacent running line, Network Rail commenced a programme of work in 2007 to assess the effectiveness of the trap points on its infrastructure. Network Rail scored each set of trap points based on a number of factors including how many daily train movements there were on the line leading to the trap points and the adjacent line that the trap points protected, the type of rolling stock using each line, the permissible speed on each line, whether TPWS equipment was fitted to the signal associated with the trap points, and the history of trains passing that signal when it was showing a red aspect. Each factor was scored based on its level of risk. For example, a line with a high permissible speed and many train movements over it each day scored much higher than a line with a low permissible speed and only a few daily train movements. Network Rail then combined the scores for these factors to derive an overall score for each set of trap points. When Network Rail assessed 760B trap points, the resulting score was low, and it deemed these trap points to be low risk, so no changes were needed.

102 Further derailments on trap points in 2015 and 2016, including one at Paddington station in 2016 (RAIB safety digest 05/2016), prompted further work by Network Rail. At Paddington, the derailed train struck and damaged an overhead line equipment mast which caused significant disruption for a prolonged period. Network Rail reassessed the potential consequences of derailing a train on its trap points. On this occasion, as well as taking vehicles fouling an adjacent running line into account, the assessment considered the possibility of the derailed train encountering other hazards. The revised assessment considered factors such as the distance the derailed train could run for before it encountered a structure, the type of structure it could encounter, whether the derailed train could affect a lineside neighbour and the type of neighbour (school, housing, industrial or other). It also considered whether the derailed train could reach a cutting, embankment or culvert. When Network Rail reassessed 760B trap points, it noted there were no structures beyond the trap points that a derailed train could collide with, and it again deemed these trap points to be low risk, so no changes were needed.

103 Both the 2007 and 2016 trap point assessments that Network Rail carried out included factors related to the role of TPWS in applying the brakes on the train after it had passed the protecting signal which was displaying a red aspect. Neither assessment considered the possibility of uncontrolled vehicles running away from where they had been stabled, the distance these vehicles could travel to reach the trap points, what speed they could attain, or how far they could travel once derailed. This accident has raised issues about the efficacy of trap points in terms of how far uncontrolled vehicles can travel once derailed by the trap points, with train weight and gradient being important factors that determine how much kinetic energy the runaway vehicles are likely to have (paragraph 91).

104 While Network Rail has company standards that cover the scheduled risk assessments required for signals being passed at danger and for collision with buffer stops, it has no similar formally documented processes or guidance for the risk assessment of trap points. It is not clear who should be responsible for carrying out any such risk assessments, how often the risk assessment should take place or what changes should trigger a reassessment. Network Rail's investigation of a train passing a red signal and derailing on trap points at Tonbridge Jubilee Sidings on 23 August 2020 noted this issue. It made a recommendation for Network Rail to review both its hazard analysis process for trap points and the site risk assessment process to manage risk to tolerable levels. Network Rail has commenced work to implement this recommendation by producing an action plan.

Summary of conclusions

Immediate cause

105 Four wagons derailed on 760B trap points after a rake of wagons ran away from Old Bank sidings (paragraph 40).

Causal factors

106 The causal factors were:

a. The rake of wagons ran away as no one had secured it after it was stabled in Old Bank sidings (paragraph 45). This causal factor arose due to a combination of the following:

i. The train was not secured before its locomotive was uncoupled from the wagons (paragraph 59, **Recommendation 1**, **Learning point 1**).

ii. There was miscommunication between the yard staff on duty about who would secure the train after its arrival at Old Bank sidings (paragraph 66, **Recommendation 2**).

Underlying factors

107 The underlying factors were:

a. Staff leaving trains unsecured for short periods of time was not identified by DB Cargo's safety assurance activities (paragraph 71, **Recommendations 1 and 3**).

b. DB Cargo had no clear process in place that defined the tasks required for an arriving train and which then obtained feedback confirming that these tasks had been carried out (paragraph 85, **Recommendation 2**).

Factor affecting the severity of consequences

108 A factor that exacerbated the consequences of the event was that once derailed by the trap points, the leading two wagons stopped foul of the adjacent running line (paragraph 88, **Recommendation 4**, **Learning point 2**).

Previous RAIB recommendation relevant to this investigation

109 The following recommendation, which was made by RAIB as a result of a previous investigation, has relevance to this investigation.

Collision between a train and utility vehicle at Dollands Moor freight yard, Kent, 4 September 2018, RAIB report 05/2019, Recommendation 2

110 This recommendation read as follows:

Recommendation 2

The intent of this recommendation is to ensure the identification and correction of any shortcomings in safety related documentation, safety audits and safety inspections. Implementation could include utilising appropriate competent staff from one location to check work undertaken at another location.

DB Cargo should review and, if necessary improve, corporate oversight and verification of safety arrangements and safety supervision at DB Cargo locations across the UK.

111 In response to this recommendation, DB Cargo reported to ORR in October 2019 that it had carried out a review of its existing corporate oversight, verification of safety arrangements and safety supervision arrangements and had concluded they were suitably robust. DB Cargo's response stated that it was committed to continuous improvement of its safety management across all leadership within the business. It also stated that DB Cargo encourages its employees and others to report incidents and has increasingly effective procedures in place to review and learn from those incidents and trends. DB Cargo said it also continues to enhance its review and monitoring of the adequacy of risk assessments, safe systems of work, training and supervision.

112 DB Cargo reported to ORR that it was also planning the future implementation of a process whereby the safety department and managers responsible for its sites would carry out reviews of other DB Cargo sites to monitor adherence to company standards and safe working practices. At the time of this accident this had not happened as progress had been delayed by the COVID-19 pandemic (paragraph 81).

113 In its submission to ORR, DB Cargo considered that the work it was carrying out demonstrated that it took a pro-active approach to enhancing its practices and safety related documentation in an efficient and effective manner. ORR agreed and concluded in February 2020 that the recommendation had been implemented.

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

114 DB Cargo has updated its common safe system of work for Old Bank sidings by adding an instruction that all vehicles being detached or attached must be physically confirmed as secured by a member of ground staff, in accordance with the agreed method in the common safe system of work, prior to any coupling or uncoupling activities taking place or the locomotive being shut down.

115 Following the accident at Peak Forest (paragraph 74), DB Cargo issued a safety alert to its staff which explained what had happened and why. All ground staff who received the safety alert were asked to confirm that they had read it and understood its contents. The safety alert briefed staff on:

- adhering to the common safe system of work at a location
- adhering to all operating instructions regarding train preparation and the securing of vehicles
- securing wagons with handbrakes or scotches (in accordance with the common safe system of work) before the locomotive is detached for shunting, positioning, run round, or stabling
- never relying on the automatic air brake as the only means of securing vehicles except in accordance with the driver-only run round rules
- only ever applying driver-only run round rules at authorised locations, which have been risk assessed for this activity, and permit wagons to be left secured only by their automatic air brake for up to an hour.

116 Since this accident, DB Cargo reported it has been focused on measures to reinforce its levels of supervision, monitoring and audit. DB Cargo stated that it has:

- planned the introduction of out-of-hours and recorded unobtrusive visits to monitor activities taking place in yards and sidings from 1 January 2022, with its managers being supported to carry out this activity
- used the RM3 methodology (paragraph 82) to improve its auditing processes
- actively promoted a culture of challenge and has encouraged all members of staff to speak up about tasks or processes, company standards, or any concerns they have, with the aim of improving its processes and helping to eliminate poor practice and non-compliances
- held workshops during 2021 for staff which aimed to establish the reasons for safety incidents and obtain ideas for improvements, focusing on behaviours and the communication and engagement between staff and managers, with the output used to plan DB Cargo's safety initiatives for 2022
- updated its accident investigation standard to enhance both investigation reporting and the ability of managers to identify trends or non-compliances, with training planned in early 2022 on this new approach
- plans to upskill the role of the SAM, and other key managerial roles which form part of DB Cargo's compliance framework, with the aim of improving the overall level of compliance monitoring.

Recommendations and learning points

Recommendations

117 The following recommendations are made:[18]

1 *The intent of this recommendation is to reduce the risk of unsecured vehicles running away.*

DB Cargo should establish the extent to which vehicles are being left unsecured in the yards and sidings which it manages or controls, and identify the possible reasons for this, including any misapplication of the rules for locomotive run-round movements in Rule Book Module TW4 'Preparation and working of freight trains'. DB Cargo should implement changes to address any issues identified (paragraphs 106a.i and 107a).

This recommendation may apply to other freight operating companies.

2 *The intent of this recommendation is to reduce the risk of vehicles running away after a train has arrived in a yard or siding.*

DB Cargo should review and improve its processes for trains arriving at its yards and sidings so it is clear when safety critical tasks should be undertaken, who is responsible for them and how their completion is communicated to others (paragraphs 106a.ii and 107b).

[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.

3 *The intent of this recommendation is to reduce the risks posed by staff not following rules or operating procedures correctly.*

DB Cargo should review its current arrangements for supervising, monitoring and auditing safety in the yards and sidings which it manages or controls. This review should determine if the arrangements are sufficient to:

- detect regular or routine non-compliance to rules and operating procedures;
- identify the extent and underlying cause of non-compliances; and
- produce appropriate corrective actions.

DB Cargo should identify and implement any improvements needed to these arrangements (paragraph 107a).

4 *The intent of this recommendation is to reduce the risk of runaway vehicles that are derailed on trap points from fouling an adjacent line.*

Network Rail should revise its risk assessment processes for both new and existing trap points so that it specifically considers the risk of an adjacent running line becoming fouled when uncontrolled vehicles run away from a siding. This should specifically consider the risks associated with derailments involving uncontrolled vehicles on trap points and the factors that influence how far the uncontrolled vehicles could travel once derailed (paragraph 108).

Learning points

118 RAIB has identified the following important learning points:[19]

1 Drivers and staff carrying out ground staff duties are reminded of the importance of securing vehicles prior to detaching locomotives. Vehicles must not be left unsecured, even for short periods, unless this is specifically authorised by local instructions (paragraph 106a.i).

2 Staff involved in assessing the risks associated with trap points are reminded that a vital function of trap points located on the exit from sidings, or on the exit of a goods line which connects to sidings, is to protect running lines from incursion by uncontrolled runaway vehicles (paragraph 108).

[19] Learning points' are intended to disseminate safety learning that is not covered by a recommendation. They are included in a report when RAIB wishes to reinforce the importance of compliance with existing safety arrangements (where 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

CDM	Contract delivery manager
EMCC	East Midlands Control Centre
ORR	Office of Rail and Road
PIC	Person in charge
RAIB	Rail Accident Investigation Branch
RM3	Risk Management Maturity Model
SAM	Safety assurance manager
SCM	Safety and compliance manager
SDM	Service delivery manager
TPWS	Train Protection and Warning System

Appendix B - Investigation details

RAIB used the following sources of evidence in this investigation:

- information provided by witnesses
- site photographs
- information data taken from the on-train data recorder fitted to the locomotive that hauled train 6G02 to Toton
- data from rail industry systems and the signalling system showing the train movements in the Toton area
- weather reports and observations at the site
- a review of previous reported events involving runaway vehicles
- competency and training records for the ground staff involved
- documentation, such as instructions and safe systems of work, for how train movements were controlled in Old Bank sidings
- Rule Book modules and standards relevant to the operation of freight trains
- documentation relevant to DB Cargo's safety assurance and safety management activities
- documents and drawings for when the track layout and signalling was last changed in the Toton area
- standards relevant to assessing the risks associated with trains overrunning signals
- a review of previous RAIB investigations that had relevance to this accident.

This report is published by the Rail Accident Investigation Branch,
Department for Transport.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Website: www.gov.uk/raib