RAIB

Rail Accident Investigation Branch

Rail Accident Report

Runaway wagon at Kineton, Warwickshire
25 May 2023

Report 04/2024
May 2024

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.

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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.

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Runaway wagon at Kineton, Warwickshire, 25 May 2023

Contents

Summary

At around 21:08 hrs on 25 May 2023, an empty wagon ran away from the Ministry of Defence (MOD) sidings located within Kineton munitions depot, Warwickshire. It travelled for about 1.5 miles (2.4 km) on a predominantly descending gradient before it came to rest as the track gradient reversed.

During the runaway, the wagon pushed through two sets of trailing hand points which were set in an opposing direction, broke through the gates at the exit to the sidings, passed over two farm crossings, and traversed a level crossing on a public road. The wagon came to rest a short distance beyond the public road level crossing. Nobody was injured during the incident.

The wagon was owned by DB Cargo and leased to Kuehne+Nagel (K+N), who was operating it on behalf of MOD.

The investigation found that the wagon ran away because it was stabled on a gradient, as a single wagon, with insufficient brake force to restrain it, and without a system to prevent it from leaving the sidings.

RAIB identified three underlying factors. The first was that MOD's contractors did not have sufficient expertise and resources to properly manage the risk of rail operations at Kineton. The second was that MOD did not provide effective safety leadership to its contractors. The final underlying factor was that the level of oversight by safety regulators meant that the lack of safety leadership within MOD rail operations was not identified and addressed.

RAIB also observed that the facilities used by DB cargo staff to carry out safety-critical maintenance activities were not well suited for the task.

RAIB has made five recommendations. The first is that MOD should review current arrangements to make sure that rail operations run on its behalf are being managed safely. The second asks MOD to work with statutory regulators and consider their regulation strategy for defence operated railways. The third recommendation aims for K+N to ensure that rail operations provided as part of the MOD contract are being managed safely. The fourth and fifth recommendations are addressed to DB Cargo and ask it to review its maintenance procedures for this wagon type and to ensure wagon brake components are scheduled for replacement at the end of their designed life.

RAIB identified one learning point, reminding shunters not to rely on handbrake indicators as the sole source of information regarding the handbrake's status.

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 and acronyms, which are explained in appendix A. Sources of evidence used in the investigation are listed in appendix B.

The incident

Summary of the incident

3 At around 21:08 hrs on 25 May 2023, an empty wagon ran away from the exchange sidings located within Kineton munitions depot, Warwickshire (figure 1). The wagon left the sidings and continued to run away in a south-west direction on a predominantly descending gradient towards the intersection with the public Banbury Road (B4086).

Figure 1: Extract from Ordnance Survey map showing location of incident at Kineton.

4 As it ran away, the wagon trailed through two sets of hand points which were set in an opposing direction for its movement, broke through the gates at the exit from the sidings, and passed over two unprotected farm crossings. A short distance later, the wagon also passed over level crossing 6, which is located on Banbury Road. This was clear of pedestrian and road traffic (figure 2). Level crossing 6 is an automatic open level crossing, locally monitored (AOCL, see paragraph 26). There were no witnesses to the wagon passing over the crossing, which is not fitted with a data recorder. However, there is no evidence to suggest that the level crossing's protection systems did not work as designed.

5 The gradient starts to level and then to rise on approach to level crossing 6 and the wagon came to rest around 65 metres beyond it. The wagon travelled a total distance of around 1.5 miles (2.4 km) during the runaway. Because the wagon ran away after the staff had left site for the day, the runaway was not discovered until staff returned to work the following day. They noticed that the wagon was missing, and that the sidings' gate appeared to be open.

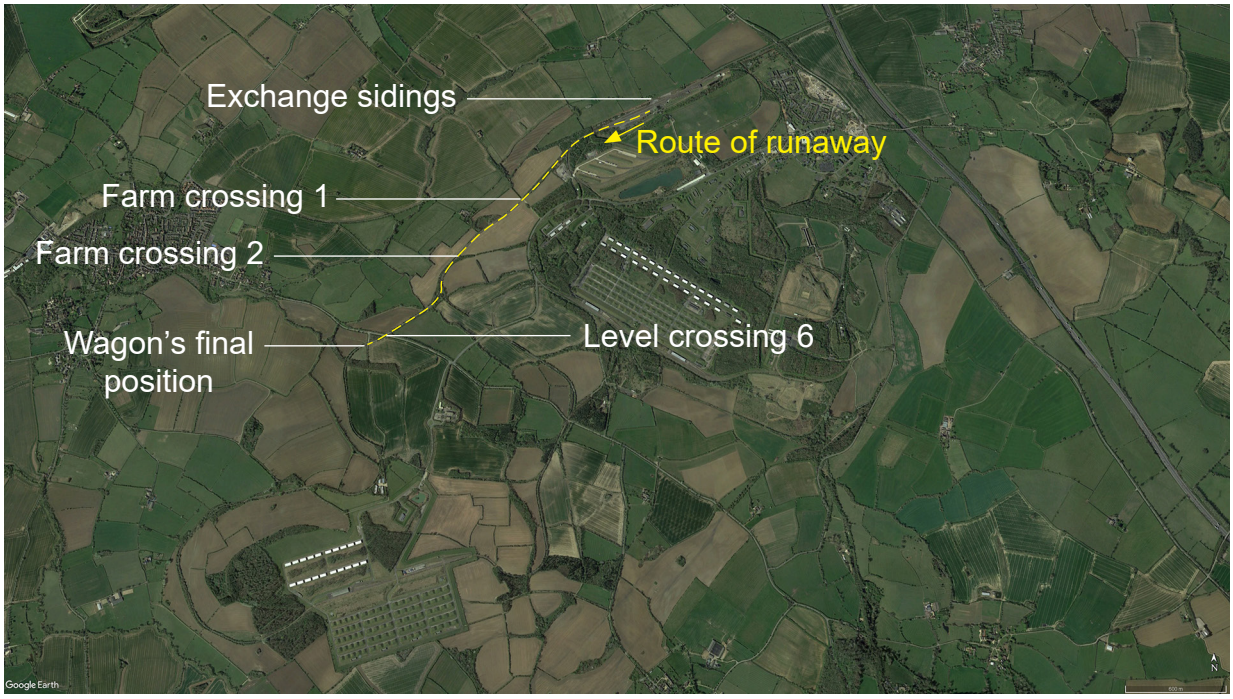

Figure 2: Annotated arial photograph showing the route of the runaway and main features (courtesy of Google Maps with RAIB annotation).

6 Nobody was injured during the incident, but damage was caused to the gate at the exit to the sidings. The wagon was recovered to the sidings on 26 May 2023 to allow for further examination.

Context

Location

7 The wagon ran away from line 13 in the exchange sidings at Kineton munitions depot (figure 3). These sidings constitute the main rail marshalling yard for the site, where locomotives come to collect rakes of wagons which have been assembled to go out on to the mainline railway.

8 The exchange sidings have 13 lines. To the north-east, the sidings have a connection to Network Rail's infrastructure at Fenny Compton. To the south-west, the sidings lead onto a predominantly single line industrial railway through the rest of the site (figure 3).

9 There are two public road level crossings which intersect the railway at Kineton, including level crossing 6, both of which are on Banbury Road. This road is the main link between the towns of Kineton and Banbury and the road speed limit is 50 mph (80 km/h) over the level crossings. A survey in 2019 by the Department for Transport led to an estimated average total daily flow of 2,457 road vehicles over the level crossing.[1]

[1] Data count was undertaken 1 mile (1.6 km) from level crossing 6, but there are no major junctions for traffic to join or leave the road between the survey site and level crossing 6. Data available: https://roadtraffic.dft.gov.uk/manualcountpoints/812177.

10 The two farm crossings which the wagon passed over before reaching level crossing 6 are not fitted with warning equipment to alert the user when a train is approaching. The crossing user needs to look out for approaching trains before deciding if it is safe to cross the railway.

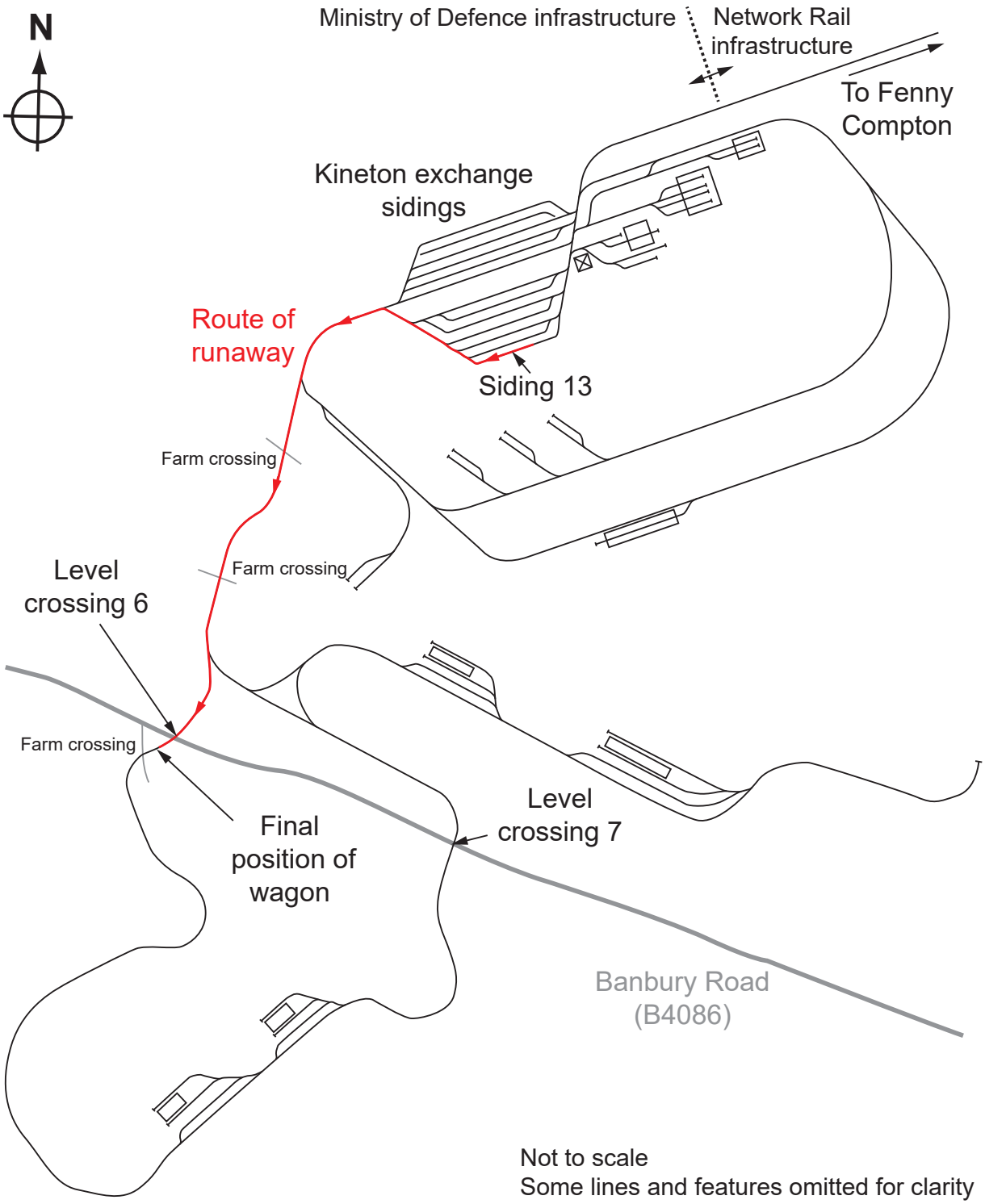

Figure 3: Diagram showing the track layout and main features of the railway at Kineton munitions depot.

11 The maximum permitted speed for rail movements across the site is 15 mph (24 km/h), reducing to 10 mph (16 km/h) over level crossings and 5 mph (8 km/h) when passing over sets of points. It is not permitted for rail vehicles to trail through points when they are not set in the correct position to reduce wear, but the points are capable of being trailed through without being damaged (paragraph 4).

12 There are no railway signals within Kineton munitions depot, but the site is fitted with permanent stop boards placed at specific locations (for example, on the approach to points). Rail movements within the site are controlled, via radio, from a building within the exchange sidings. Train movement is controlled by obtaining verbal authority to move from stop board to stop board. All movements on the Fenny Compton branch line towards the mainline railway are controlled by Network Rail from the West Midlands Signalling Centre at Saltley.

13 The track gradient falls from the Fenny Compton side of the exchange sidings towards the south-west end of the sidings. Once outside the sidings, the gradient continues to fall, before passing over a small incline and eventually starting to rise steadily approximately 250 metres on approach to level crossing 6 (figure 4).

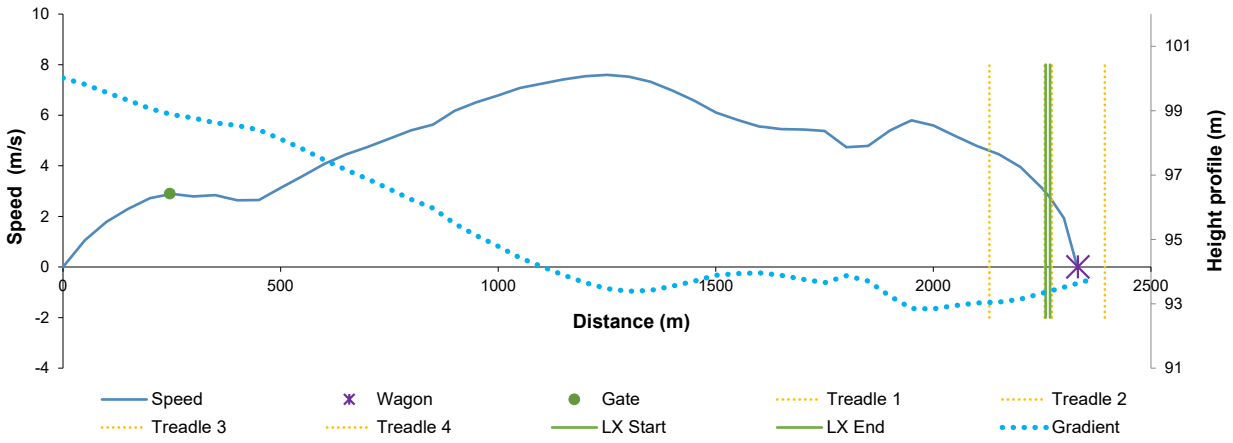

Figure 4: Gradient profile of the track traversed by the wagon during the runaway.

Organisations involved

14 The Ministry of Defence (MOD) contracts out a number of rail freight operations at various sites and no longer directly undertakes routine rail operations. Within MOD, there are several departments involved with rail operations (figure 5):

a. Strategic Command (UKStratCom) was established in 2019. Its purpose is to manage and deliver joint capabilities to support military operations. The Defence Support (DefSp) department is part of UKStratCom. DefSp owns the policy for defence railways and the defence railway rule book. DefSp also chairs the Defence Rail Policy Working Group (DRPWG) and is the department which specified rail services to be provided as a capability through the Command Acquisition and Support Plan (CASP) (see paragraph 155).

b. Defence Equipment and Support (DE&S) is an arm's length body (a type of central government organisation) which is part of MOD. DE&S negotiates and manages defence contracts on behalf of the government. The Head of Establishment (HoE) at Kineton depot reports through the DE&S chain of command. The HoE is the accountable officer for all receipt, storage, maintenance and issue of munitions on site. The Commissioning and Management Organisation (CMO) is part of DE&S and is responsible for managing the MOD contract with Leidos Europe Ltd (Leidos).

c. The Defence Infrastructure Organisation (DIO) carries out the rail infrastructure manager role on behalf of MOD. This role includes examination and maintenance of fixed rail assets, such as track and level crossings. DIO contracts out its maintenance and renewal work but still conducts some inspections. DIO is also responsible for production of MOD's permanent way (track) standards (see paragraph 72).

d. The Defence Safety Authority (DSA) was established in April 2015 following a charter issued by the Secretary of State empowering it as an independent regulator and investigator for health, safety, and environmental protection in defence. The Defence Land Safety Regulator (DLSR) is a part of DSA, and is made up of a number of regulators, including the Movement and Transport Safety Regulator (MTSR). MTSR states that it is responsible for regulating the safe operation of movement and transport, including defence railways, and for writing high-level regulations which are similar to those found in safety legislation on the mainline railway (see paragraph 54).

15 Leidos was awarded a contract by MOD in 2015 to manage many of MOD's logistics operations, including the provision of rail services (see paragraph 60). To deliver this contract Leidos engaged a number of sub-contractors.

16 Kuehne+Nagel (K+N) was contracted by Leidos to assist with delivering the storage, distribution, and rail freight movement elements of the contract. K+N's main UK business is in warehousing, road, and air freight. Although K+N runs rail services in other parts of the world, it does not run any other rail services in the UK apart from those provided to MOD. The staff undertaking shunting operations at Kineton depot are employed by K+N.

17 DB Cargo was contracted by K+N to provide wagons for transporting MOD goods. The wagons are owned and maintained by DB Cargo as part of this arrangement, with DB Cargo carrying out the role of the entity in charge of maintenance (ECM, a person or organisation responsible for the safe maintenance of a rail vehicle[2]). The staff responsible for maintaining the wagons work for DB Cargo.

18 GB Railfreight (GBRf) was also contracted by K+N to provide haulage services for pulling the DB Cargo-supplied wagons on the mainline railway.

19 All organisations freely co-operated with the investigation.

[2] https://www.orr.gov.uk/guidance-compliance/rail/health-safety/laws/rogs/entities-charge-maintenance.

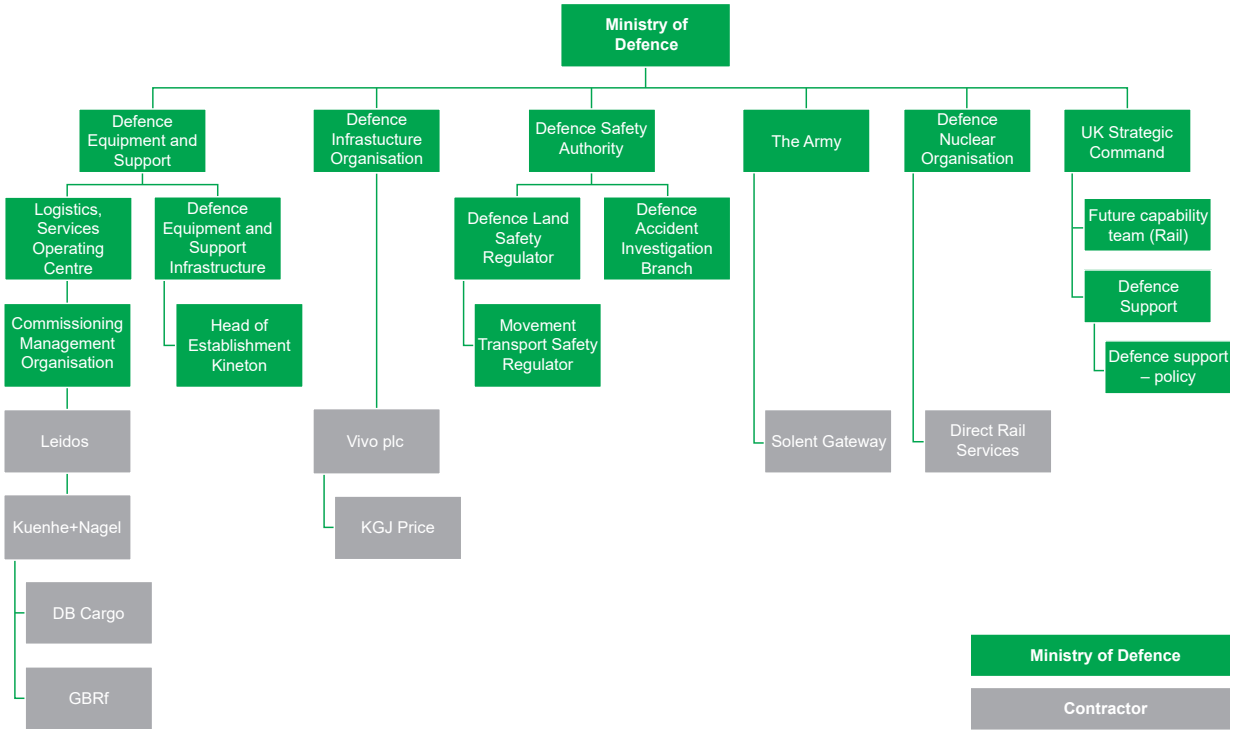

Figure 5: Organisation chart showing the relationships between different departments and companies involved in delivering defence rail. The chart shows that several contracts are managed across different MOD departments. Not all of the MOD departments listed have equivalent status within MOD.

Wagon involved

20 The wagon involved in the runaway, numbered 609053, was an FAA flatbed wagon. It was one of a fleet of 12 FAA wagons which were owned and maintained by DB Cargo but solely assigned to work on behalf of MOD, through the wagon lease agreement with K+N.

21 The FAA wagons were manufactured in 1999 by Thrall, York, for English, Welsh & Scottish Railway (EWS). EWS was bought by Deutsche Bahn in November 2007, and became DB Cargo in March 2016.

22 These wagons are intermodal rail freight vehicles capable of carrying one 40-foot (12.2 m) container and have a tare (unloaded) mass of 33.5 tonnes. Of the original 100 wagons manufactured, there are now only 30 still operational, 12 in the MOD fleet, and 18 based at Eastleigh depot which have been converted to carry cable for Network Rail. The Eastleigh fleet is owned and operated by DB Cargo on behalf of Network Rail.

23 The wagon's maintenance regime requires it to have a visual inspection and brake test (VIBT) annually. The purpose of the VIBT is to ensure that the wagon is in a serviceable condition and that its brakes are functioning correctly. The wagon involved had its VIBT on 3 May 2023, three weeks before the incident. When a VIBT is due, the relevant wagons are moved to DB Cargo's facility at Carlisle Kingmoor, Cumbria. For heavier maintenance such as a mechanical brake overhaul (MBO) or an air brake overhaul (ABO) the wagons are moved to DB Cargo's facility in Stoke-on-Trent, Staffordshire. The wagons are not subject to planned preventative maintenance (PPM) and do not undergo routine maintenance at Kineton depot.

24 The periodicity of an FAA wagon's MBO is mileage-based. MBOs are required to be completed every 600,000 miles. The wagon's previous MBO was completed on 11 March 2010. Following the wagon's runaway, it was returned to DB Cargo's facility at Carlisle Kingmoor for repairs, where it was noted that the wagon had a recorded lifetime of 721,864 miles.

25 The periodicity of an FAA wagon's ABO is time-based. ABOs are required to be completed every 16 years. The last ABO on wagon 609053 took place on 2 June 2017, 18 years after its construction. The late completion of the ABO is not relevant to this incident.

Rail equipment involved

26 Level crossing 6 is an AOCL type of crossing, which protects road traffic with wig-wag traffic signals (figure 6). Depending on the time of day, floodlights and an audible warning may also be used to warn road users of the approaching train.[3]

Figure 6: Level crossing 6 approached from the east. The wagon moved over the crossing from right to left (courtesy of Google Street View).

27 The wig-wag signals are triggered by a rail vehicle's wheel engaging a strike-in treadle as it approaches the crossing (figure 7). The level crossing system proves, through electrical relays, that the wig-wags are operating correctly and then displays a white light to indicate this to train drivers, allowing them to take the decision that it is safe to pass over the crossing.

28 There is a whistle board located adjacent to the strike-in treadle. This is an instruction to train drivers to sound their horn which may give road traffic additional warning that a train is approaching. However, in the event of a wagon runaway this additional protection is circumvented.

[3] In addition to wig-wag signals an audible alarm is sounded between 06:30 and 23:00 hrs and floodlights illuminate the crossing between 20:00 and 06:30 hrs.

Figure 7: Level crossing 6 strike-in treadle when approached from the exchange sidings.

Staff involved

29 The K+N traffic controller is responsible for authorising rail movements through the site at Kineton depot and producing the work list for the shunters, advising them which wagons to put together to form a rake. The traffic controller involved in this incident had 39 years' experience on MOD railways, 25 of which were in this role. The traffic controller was in date with their competencies, having completed their most recent practical assessment on 21 October 2021.

30 The K+N leading shunter, responsible for the shunting operation, had 20 years' experience in this role at Kineton depot. The leading shunter was in date with their competencies, having completed their most recent practical assessment on 16 November 2021.

31 The K+N shunter, responsible for assisting with the shunting operation, had 46 years' experience in this role at Kineton depot. The shunter was in date with their competencies, having completed their most recent practical assessment on 15 November 2021.

External circumstances

32 When the wagon was stabled it was daylight, overcast, with a 7 mph (11 km/h) northerly wind. As the wagon ran away civil twilight had just begun, with a 7 mph (11 km/h) easterly wind. Environmental conditions did not play a part in this incident.

The sequence of events

Events preceding the incident

33 As a result of an MOD request on 25 May 2023, K+N staff moved three FAA wagons to a wagon loading area within Kineton depot in preparation for a planned movement of freight by rail. These wagons were to be loaded before being moved to a secure area and collected on 29 May 2023.

34 To decide which wagons to select, the K+N traffic controller consulted a DB Cargo produced informal VIBT tracker (dated 10 May 2023 but holding incorrect data, see paragraph 79) and noted that the VIBT for wagon 609053 was showing four days overdue. The traffic controller calculated that the wagon was now 19 days overdue for this maintenance.

35 From experience, the traffic controller knew that a wagon could only go a maximum of 28 days overdue maintenance before being automatically banned from movement on the mainline rail network by a system called Total Operations Processing System (TOPS).[4] Believing that the wagon could consequently be recalled for maintenance by DB Cargo, the traffic controller decided not to use wagon 609053. The traffic controller then instructed the shunters not to use this wagon when they produced the job sheet (which listed which types of wagons to marshal).

36 The two shunters booked on duty at around 07:00 hrs on 25 May 2023 and planned their work for the day. They left the shed on their shunting locomotive at 07:54 hrs and completed one other rail movement in the yard before turning their attention to the task of assembling the rake of FAA wagons.

37 When they arrived on line 12, where the FAA wagons were normally stabled, they found a rake of several wagons. Wagon 609053 was at the south-west end of the yard, the direction in which they needed to go to travel to the loading area. Because they had been instructed not to use wagon 609053, they made the decision to uncouple this wagon from the rake and move it out of the way onto the adjacent line 13. To do this, they coupled the wagon to their shunting locomotive, both mechanically and pneumatically.

38 Once on line 13, the shunters uncoupled the wagon from the locomotive and operated its handbrake control wheel, with the intention of applying the handbrake, at about 08:15 hrs. They then returned to line 12 to collect the three FAA wagons they needed and departed the exchange sidings towards the stabling area at 08:37 hrs.

39 The staff completed other duties during the rest of the day before booking off at around 16:00 hrs.

[4] TOPS is a computer system, widely used by the rail industry, that contains information on train services and rail vehicles. For vehicles that are authorised to run on the mainline railway network, it contains information about their location, destination, load, brake force and maintenance status. It can be used to place restrictions on the rail vehicles which form a train, with these restrictions applied either automatically or manually by users.

Events during the incident

40 At around 21:08 hrs, the wagon started rolling away. Before leaving the exchange sidings it trailed through two sets of manually operated points (paragraph 11).

41 At 21:10 hrs, wagon 609053 was captured on closed-circuit television (CCTV) breaking through the closed gates of the sidings and heading towards level crossing 6. Analysis of CCTV images shows that the wagon was traveling at around 6.5 mph (10.5 km/h) at this point. Subsequently, the wagon passed over two unprotected farm crossings before reaching level crossing 6 and came to a stop shortly afterwards.

42 RAIB calculated that as the wagon ran away, it reached a top speed of around 17 mph (27.4 km/h) before the speed started to reduce as the track gradient levelled and rose. It encountered the level crossing strike-in treadle while travelling at around 10 mph (16 km/h) and moved over the crossing at around 6.7 mph (10.8 km/h). As the permitted line speed over the crossing was 10 mph (16 km/h) the amount of time the wig-wag warning was displayed to road users would not have been reduced from that seen during normal operations.

43 Because there is no data logger fitted to level crossing 6, and no witnesses have come forward to report seeing an unaccompanied wagon pass over the crossing, the exact time the wagon passed over the crossing remains unknown. RAIB's calculations suggest that this would have occurred at around 21:17 hrs.

44 The wagon came to rest with its centre about 65 metres beyond level crossing 6, and around 49 metres on the approach to level crossing 13, another unprotected farm crossing.

Events following the incident

45 On 26 May 2023, K+N operational staff resumed work at Kineton depot at around 07:00 hrs. The shunters left the shed on their shunting locomotive at 07:36 hrs and moved a vehicle onto line 9. In the process of doing so, they observed that the exchange sidings gates appeared to be open.

46 On further inspection they discovered that the gates had been damaged and realised that wagon 609053 was missing. After obtaining permission from the traffic controller, the shunters removed the broken-down gates from the line and continued out of the yard onboard their shunting locomotive, looking for the missing wagon.

47 The shunters reached the first diverging junction and took the route towards level crossing 6, as directed by the points.

48 The shunters noted that, as they passed over level crossing 6, it operated as normal. The wagon was discovered just beyond the crossing. On immediate inspection, the shunters found the wagon's handbrake indicators to be in the 'on' position. The wagon was then secured with scotches (wedge-shaped pieces of timber) while awaiting the arrival of RAIB.

Background information

Relevant legislation and regulatory environment

49 The regulatory environment in which defence railways operate is complicated and there are some specific disapplications in law with regards to railways operated on behalf of the Secretary of State for Defence.

50 The primary piece of legislation relating to the safety of railway operations in the UK is the Railways and Other Guided Transport Systems (Safety) Regulations, 2006 (ROGS).[5] Under ROGS, all persons who are maintaining non-mainline infrastructure or operating vehicles on a transport system are required to maintain a safety management system and hold a safety certificate. In Great Britain, these certificates are issued by the safety authority for railways, the Office of Rail and Road (ORR).

51 There are, however, some exclusions to this rule which are relevant to Kineton depot. Firstly, if no part of the transport system has a maximum permitted speed of over 40 km/h, as is the case at Kineton, then it is not required to have a safety certificate.

52 Secondly, a rail guided system within a military establishment is specifically excluded from the requirement to have a safety management system which complies with ROGS. Such a system is also not required to have a safety certificate. ROGS defines a military establishment as:

> *'an establishment intended for use for naval, military or air force purposes or for the purposes of the department of the Secretary of State responsible for defence'.*

These exclusions to ROGS would also apply to MOD contractors operating within the boundaries of a military establishment, such as Kineton depot.

53 Once rail vehicles exit military establishments and enter the mainline rail network, then their operation and the operators responsible for them (such as GBRf) are covered by the provisions of ROGS. RAIB has been unable to establish definitively if level crossing 6 is considered as being within a military establishment within the definition given in ROGS. While the crossing is situated on MOD-owned railway infrastructure, and surrounded by agricultural fields owned by MOD, the wagon broke through closed gates before reaching it and it is a crossing with a public road.

54 Despite ROGS not applying to MOD railways, the Secretary of State for Defence's policy on safety and environmental protection requires MOD to comply with or meet equivalent standards to those laid out in legislation. As such, MTSR has produced a suite of regulations which serve to replace ROGS in a military context. These regulations have been reviewed by ORR as part of their routine inspections.

[5] https://www.legislation.gov.uk/uksi/2006/599/contents.

55 MOD is not excluded from the scope of The Health and Safety at Work Act 1974 (HSWA).[6] The Health and Safety (Enforcing Authority for Railways and Other Guided Transport Systems) Regulations 2006 (as amended)[7] made ORR the health and safety enforcing authority for the operation of railways, tramways and other systems of guided transport. This means that ORR is the enforcing authority on railways for safety legislation such as HSWA. This includes railways lying within military establishments.

MOD duty holder arrangements

56 In the wider railway context, a 'duty holder' is normally considered to be a company[8] with a responsibility for implementing a specific requirement of safety legislation, rather than a specific individual within that company. In this context MOD is the duty holder for its railway activities under HSWA and other safety legislation.

57 In MOD, the term 'duty holder' is used differently to identify internal safety responsibilities. DSA's publication, 'Implementation of Defence Policy for Health, Safety and Environmental Protection (Chapter 3, Duty Holding)', version 1.1 dated May 2018, explains how duty holding works within MOD. Under this policy, duty holding relates to a specific individual who is responsible for a defined risk-to-life military activity, and the associated standards and publications. These activities are wide ranging and include activities such as parachuting, scuba-diving and bridge building. Following, but not in response to, the incident at Kineton, MOD replaced its policy with 'joint service publication 815 (JSP 815), 'Supervision, Contracting and Control Activities', version 1 dated June 2023.

58 The DSA policy relevant at the time of the accident stated that:

> *'Duty Holding shall be applied by Service Chiefs, Top Level Budget Holders (TLBH) and Chief Executives (CEs) of Executive Agencies to military activities undertaken within their Areas of Responsibility:*
>
> *a) which present a justified, credible and reasonably foreseeable Risk to Life (RtL); and*
>
> *b) where the Duty of Care and other statutory arrangements are considered inadequate for managing the risk; or*
>
> *c) where the Department has mandated its application through regulation.'*

59 Although the MOD's rail policy and rule book, joint service publication 790 (JSP 790) 'Defence Rail Regulations',[9] version 3.3 dated April 2016, requires the appointment of MOD duty holders for rail, none were in place at the time of the incident at Kineton. The guidance to JSP 790 required the publication to be reviewed annually, but this had not happened since 2016.

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[6] https://www.legislation.gov.uk/ukpga/1974/37/contents.

[7] https://www.legislation.gov.uk/uksi/2006/557/contents.

[8] Or self-employed person.

[9] MOD's railway rule book is contained in Part 2 Annex G of JSP 790.

The rail delivery contract

60 In 2006, MOD undertook an internal review looking at the way it procured and acquired equipment for defence. The review, titled 'Enabling acquisition change, an examination of the Ministry of Defence's ability to undertake through-life capability management', recommended the amalgamation of the Defence Procurement Agency (DPA) and the Defence Logistics Organisation (DLO) to create DE&S. The newly formed DE&S was tasked with reductions in headcount and spending.

61 The logistics commodities and services transformation (LCST) contract was part of the identified solution to achieve these reductions. The LCST contract was awarded in 2015 to Leidos (paragraph 15) and moved many previously in-house logistics and warehousing services from MOD into the private sector.

62 In the LCST contract, MOD wrote a statement of requirements for rail provision. This was:

'3.5 Deliver the requirement for all key sites to be rail served,

3.6 Where required by the authority in respect of any authority site act as an agent of the authority for agreeing network track access agreements and any other agreements that may be necessary with Network Rail,

3.7 Deliver rail services within designated authority sites, including the provision of rolling stock and locomotives that meet the requirement to transport explosives in accordance with the law,

3.8 Provide rolling stock for training purposes on request.'

63 Leidos produced a service delivery plan, provided to MOD when the contract was awarded. This plan is a very large document which briefly touches on how Leidos intended to run rail services, and which explains its rail delivery strategy at a very high level. In this document, Leidos explained to MOD that its intention was to move away from using rail to transport munitions. Leidos stated to RAIB that its intention at the time was not to move away from rail for commercial reasons and that the documented decision in the service delivery plan was based on munitions security. There are other commodities which also move by rail as part of the LCST contract. The service delivery plan is revised annually and the intention to move away from rail remained in the revision current at the time of the incident. However, Leidos stated that they are now moving back towards rail to increase the environmental sustainability of their operation.

64 In accordance with their declared strategy, Leidos engaged a specialist in road and air freight operations, K+N, to deliver storage, distribution and freight operations (paragraph 16). As an element of rail operation remained in the contract, K+N recruited a team of people who could manage the rail operation on its behalf.

65 The LCST contract does not include all the rail services being operated on behalf of the Secretary of State for Defence. Army Command, and the Defence Nuclear Organisation both have contracted rail services with other operators which do not fall under the remit of the LCST contract.

Analysis

Identification of the immediate cause

66 The wagon ran away because it was stabled on a gradient with no effective means of restraint.

67 The starting position of the wagon before the runaway is known because a witness, who stabled the wagon on line 13 on the morning of the runaway, noticed that a handle used for raising spigots (which help retain a container to the deck of the wagon) was broken off and on the side of the track. The witness picked up this handle and placed it against the midpoint of the wagon and established that this was the wagon that the handle belonged to, before dropping the spigot handle back on the ground in line with the middle of the wagon. The failure of this piece of equipment did not play a part in the subsequent runaway. The end point of the runaway is known because the wagon was secured with scotch blocks after the runaway and remained in place awaiting RAIB's arrival.

68 A level survey was completed by RAIB across the route of the runaway. This showed that the location where the wagon had been stabled on line 13 had a significant gradient which descended to the south-west and in the direction of Banbury Road.

Identification of causal factors

69 The runaway occurred due to a combination of the following causal factors:

a. The wagon was stabled on a gradient (paragraph 70).

b. The wagon was stabled as a single wagon (paragraph 77).

c. There was insufficient brake force to restrain the wagon (paragraph 81).

d. There was no system in place to prevent runaway vehicles from leaving the exchange sidings (paragraph 124).

Each of these factors is now considered in turn.

The track gradient

70 The wagon was stabled on a gradient.

71 Following this incident, RAIB undertook a level survey of the site at Kineton depot to understand the track gradient. This survey recorded an average gradient of 1 in 318 over the 50 metres of track either side of the midpoint of the wagon at the location where the wagon was stabled.

72 DIO standard, 'Permanent Way Design and Maintenance Standards', issue 5 dated September 2017, states that sidings should be level wherever possible and, in any case, to have a gradient no steeper than 1 in 500.

73 The exchange sidings at Kineton depot were re-laid in the winter of 2010 to 2011. Survey work carried out before the re-lay showed that, over the length of the straight track section along line 13, there was originally an average gradient of 1 in 414. The project management plan provided by the contractors explained that they planned to excavate underneath the existing railway to allow for the installation of a 1 in 500 gradient.

74 The design proposed for line 13 included a 1 in 500 gradient on the majority of the straight track section. At the south-western end of this section, the design gradient increased to 1 in 200, with a gradual transition between the gradients over a 20-metre section. The as-built survey records submitted to MOD following the re-laying showed that this section of track had been constructed broadly in line with these designed gradients. At the location where the wagon had been stabled, RAIB's survey measured a 1 in 442 gradient at the rear end of the wagon, and a 1 in 254 gradient at the front end of the wagon. This suggests that the wagon was stabled on the 20-metre transition between gradients.

75 There were no documents within the re-lay pack which explained who approved the installation of a section of track with a non-compliant gradient, or if this was risk assessed (see paragraph 131). Although the information on the gradients which resulted from the re-lay was in MOD's possession following the survey, evidence shows that this information was not actively used to manage safety (see paragraph 135).

76 Based on the wagon's condition at the time of the runaway, RAIB estimated that the shallowest gradient on which the wagon would be expected to start to run away is around 1 in 365. This means that, had the sidings been to MOD standard, or at the 1 in 414 average gradient that they were before they were re-laid, the wagon would not have been expected to run away.

Stabling single wagons

77 The wagon was stabled as a single wagon.

78 There is no restriction on stabling a wagon by itself either on defence railways or on the mainline rail network. However, when a wagon is stabled by itself, and in the absence of additional mitigations (see paragraph 124), the handbrake becomes a potential single point of failure in the retention of the wagon.

79 Wagon 609053 was stabled by itself on line 13 in the exchange sidings because it had been incorrectly identified as needing a VIBT (paragraphs 35 to 37). The traffic controller relied on an informally produced VIBT tracker which wrongly showed that wagon 609053 was overdue its VIBT by four days as of 10 May 2023.[10] The wagon's VIBT had in fact been completed on 3 May 2023, and the maintenance for this wagon was not overdue. The informal VIBT tracker, however, had not been updated following the inspection.

80 Witness accounts vary but it was reported to RAIB that, before 2015, the traffic controller had access to the wagon maintenance records using TOPS. Before rail operations were outsourced (paragraph 61), a decision was taken by MOD to remove access to TOPS. RAIB has been unable to determine the reasons for this decision, although one witness reported this may have been to save money.

[10] Although the traffic controller was using the VIBT tracker dated 10 May 2023, a further copy of the tracker was sent to the traffic controller at 06:42 hrs on the morning of the incident, also containing the error.

The brake force applied to the wagon

81 There was insufficient brake force to restrain the wagon.

82 The wagon was able to run away because the braking forces applied to the wheels were insufficient to prevent the wagon from starting to run away on the prevailing track gradient where it had been stabled.

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

a. Effective handbrake operation was reliant on a single handbrake cable that if broken meant the system provided no brake force while indicating that the handbrake was on (paragraph 84).

b. The handbrake cable was mechanically overloaded, leading to its failure (paragraph 88).

c. The failure of the handbrake cable was unknown (paragraph 112).

Each of these factors is now considered in turn.

Handbrake design

84 Effective handbrake operation was reliant on a single handbrake cable that if broken meant the system provided no brake force while indicating that the handbrake was on.

85 The FAA wagon's handbrake is applied by turning a control wheel on the outside of the wagon. This control wheel transmits a turning force down to a threaded bar which runs longitudinally down the centre of the wagon. The handbrake indicator on the side of the wagon takes a feed from this threaded bar and indicates only the position to which the control wheel has been turned. The handbrake indicator does not confirm the application of the brake blocks on the wheels. The turning force from the central bar is then translated, through a series of pivots, into a pulling force acting on a pair of Bowden cables (known as handbrake cables). These cables act together to pull on another pivot to push the brake blocks onto the wheels (figure 8). This brake block force is only applied to two wheels.

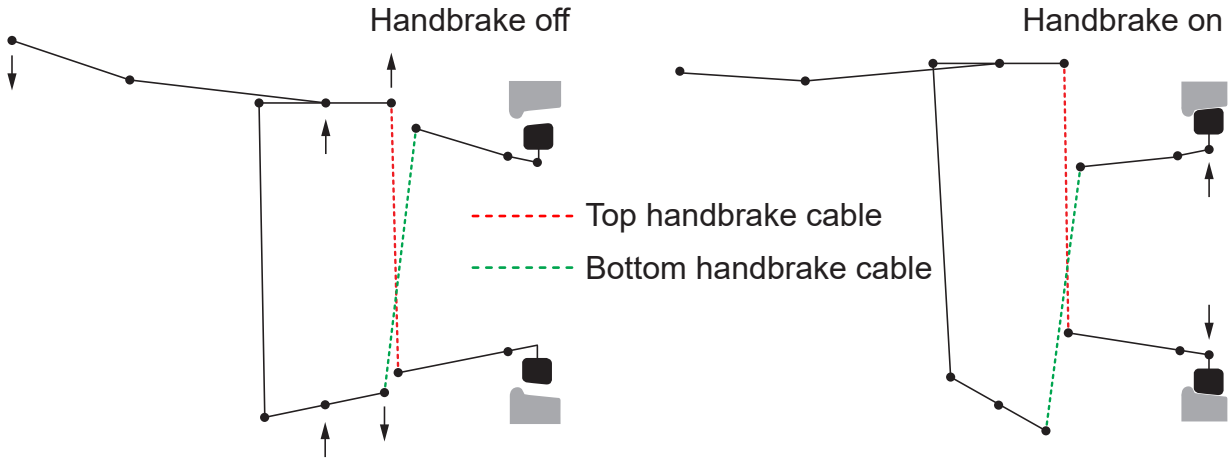

Figure 8: Handbrake moving from a 'brake off' to 'brake on' position with the handbrake cable intact.

86 Because the cables need to work together, if one of the cables fails or becomes disconnected then the handbrake will cease to apply any force to either of the brake blocks. In this condition, however, the handbrake indicator will still show that the handbrake has been applied (figure 9).

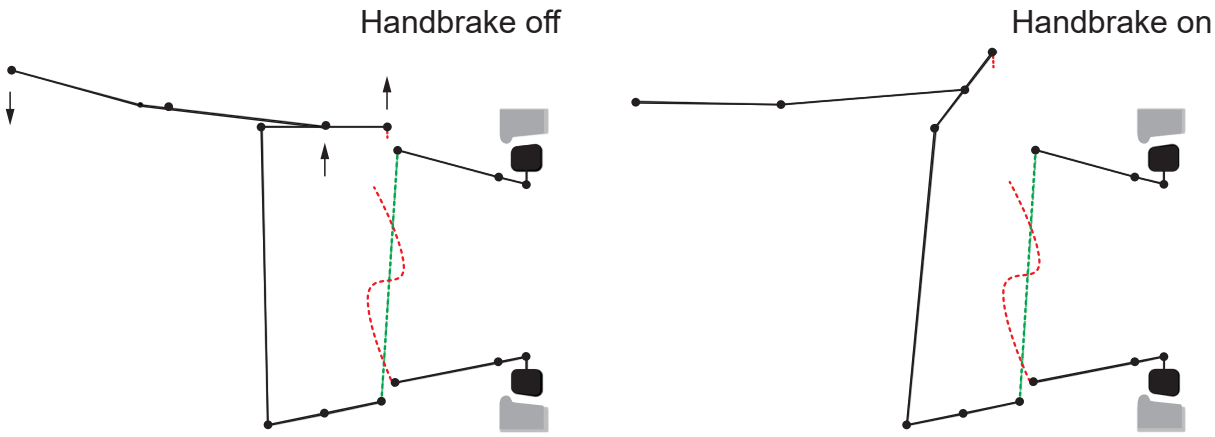

Figure 9: Handbrake moving from a 'brake off' to 'brake on' position with the handbrake cable snapped.

87 The resistance to runaway of the single wagon on the prevailing gradient was entirely dependent on the integrity of a single handbrake cable. The handbrake design meant that a broken cable resulted in no brake force being applied to the wheels, while the indication provided to the operators suggested that there was.

The overloading of the handbrake cable

88 The handbrake cable was mechanically overloaded, leading to its failure.

89 When the wagon was inspected after the runaway, one of its handbrake cables was found to have snapped, rendering the handbrake system ineffective. RAIB commissioned a metallurgical examination of the snapped cable. This found that the fracture faces of the wire strands demonstrated characteristic cup and cone shapes, indicative of an overload failure (figure 10). The examination concluded that the cable had failed due to repeated mechanical overload, rather than through fatigue.

Figure 10: Fracture faces on the snapped handbrake cable.

90 Following this incident, DB Cargo examined the entire FAA wagon fleet and found that of the 12 wagons leased to K+N, 8 had frayed handbrake cables (the outer strands were broken while the inner strands were still intact).

91 RAIB commissioned tests of an undamaged example of a handbrake cable, which pulled it to destruction. This showed the same progressive failure mechanism as the partly damaged cables found on other wagons. The outer cable strands snap first, followed by a sequential failure of the other strands before ultimate failure.

92 RAIB calculated that, with the handbrake fully applied, the handbrake cable carries a theoretical tensile load of around 2.3 kN, against a rated design load of 16.59 kN. During RAIB tests, an undamaged section of handbrake cable, recovered from the incident wagon, withstood 18.3 kN of tensile force before full failure. This indicates that an undamaged cable can withstand the rated design load, which is higher by some margin than the cable load when the handbrake is fully applied.

93 RAIB has determined that three factors probably worked together to sufficiently and progressively overload the cable. These are that:

- The cable's design used an approach to steel cable termination which created stress concentrations.
- The use of an incorrect method of handbrake operation increased the amount of force put into the cable.
- The cable had never been replaced.

Cable design

94 The FAA wagons were designed and manufactured by Thrall, with the first wagons entering service in 1998 and 1999. At the time, Thrall bought in Y33 bogies from Tatravagonka in Slovakia which came with Bowden type handbrake cables. The handbrake cables were specified according to a 1977 Czechoslovakian engineering standard. The cable's core was made up of one central strand, surrounded by concentric rings of 5, 11, and then 17 strands (figure 13), referred to as a 5x11x17 cable. The original design application was as a handbrake cable in cars.

95 To maximise the strength offered by a cable at its termination point, it should be looped back on itself at the ends and then either secured by using U-bolts or spliced back into itself. On the FAA wagons, however, the handbrake cable was crimped into a termination piece that has helical internal fluting (figure 11).

96 This termination arrangement introduces stress concentration factors into the cable. Close to the termination, the tensile force carried by the cable needs to pass through the outer strands into the termination piece, leaving an uneven distribution of stresses through the cross-section. RAIB has calculated that, close to the termination, the outer strands of the cable experienced up to three times the amount of stress than they would experience if the force was uniformly distributed through the cross-section.

97 While the introduction of stress concentration factors was a factor in the failure of the cable, this alone was insufficient to take the stress in the outer strands of the cable over the yield strength of the steel material from which the cable was made.

Figure 11: Termination piece which was crimped onto the handbrake cable to allow it to connect to the pivots.

The method of handbrake operation

98 When the shunters stabled wagon 609053 on line 13 (paragraph 38), they applied the handbrake while the wagon's air brake was still applied. This is known as brake compounding. Brake compounding is unadvisable for a number of reasons, including:

i. As the assistance from the air brake system subsides (either due to the brakes being released or as the air leaks away), the brake block force does not reduce to the levels associated with a non-compounded application. This means that the resulting brake block force is being held by the handbrake cable alone, forcing it to carry more load than expected.

ii. Because the handbrake is being applied in addition to the air brake, shunters are unable to satisfy themselves that the brake block is being applied to the wheel by the handbrake, because the brake block has already been applied by the air brake. This means that a shunter is entirely reliant on the handbrake indicator which, in the case of these wagons, only shows that the handbrake control wheel has been turned (paragraph 85).

iii. In the event of a failure of the handbrake system, the air brake will hold the wagon in place until the air leaks away. This will mask the failure, which may only manifest itself hours later, possibly when there is then no opportunity for intervention by staff.

99 To quantify the effects of compounding the brakes, RAIB tested some other FAA wagons. This showed that compounding of the handbrake with the air brake increases the forces on the handbrake cable by around 50%, versus a normal handbrake application.

100 When providing instruction on applying brakes on uncoupled rolling stock, JSP 790, which serves as MOD's railway rule book, states that:

> *'The shunter must ensure that sufficient wagon brakes are applied before draining the wagon air brake system of air to allow the wagon to be loaded. If the air brake system is not drained, damage may occur to the brake compensating valve*[11] *resulting in failure of the brake system.'*

By instructing shunters to apply the wagon's brakes before draining the wagon's air brake system, JSP 790 is effectively advising shunters to compound the brakes. While the air brake system may need to be vented before loading, the handbrakes should not be applied until air has been vented from the brake cylinders.

101 K+N's management team was unaware of the risks involved with compounding handbrakes and therefore did not have a procedure in place to mitigate the risks associated with this method of operation and did not train their staff about the risks involved in this practice.

102 Mainline freight operating companies (FOCs), in contrast, have been aware of the risks involved in brake compounding for many years. The current operating rules contained in the Rule Book Module GERT8000-TW4 'Preparation and working of freight trains', issue 1.1 dated February 2023 state:

> *'Unless it is authorised in your train operating company's instructions, you must not operate handbrakes after the automatic brake has been applied. This is because:*
>
> - *there could be excessive strain on the brake gear when the automatic brake is released'.*

103 Mainline freight operators also train their staff not to compound handbrakes with air brakes. Witness evidence from DB Cargo staff was that, although they had on occasion discovered wagons with compounded brakes at Carlisle Kingmoor (a Network Rail owned yard used by several different FOCs), they were aware of the dangers of compounding the brakes. This awareness of the need to avoid compounding may explain the lower prevalence of damaged cables discovered within the DB Cargo operated FAA fleet; of the 18 FAA wagons operated by DB Cargo for Network Rail, 4 were found to have frayed handbrake cables, compared with 8 out of the 12 FAA wagons leased to K+N (paragraph 90).

104 RAIB also approached Direct Rail Services (DRS) which operates wagons on behalf of MOD with similar handbrake cables to FAA wagons. DRS advised RAIB that, on the FNA-D and KXA-C type wagons, a message has been painted on the side of the wagons advising shunters not to compound handbrakes with air brakes.

[11] Also known as load weigh valve.

Cable not replaced

105 Following the incident, DB Cargo reviewed its maintenance records to establish the history of the handbrake cable fitted to wagon 609053. DB Cargo was unable to find any records that it had ever been replaced. The cable was also constructed to the original specification; it is therefore likely that the cable was original as built and so around 23 years old at the time of the incident.

106 The detailed examination of the snapped cable by the metallurgist identified areas of wear damage to the strands, including areas remote from the location of failure, which in their opinion, are indicative that the service life of the cable had been exceeded (figure 12). These areas of wear took the form of indentations on the steel core strands where they had been pressing against one another over the repeated application of high tensile force in the cable. RAIB calculated that these indentations could increase the localised stresses in the affected strands by up to 100% (dependent on the depth of the indentation).

Figure 12: Deformation of the individual cable strands caused by the cable crushing itself due to high tensile loads.

107 A new cable had not been installed on the wagon as there was no time or mileage-based plan to replace the handbrake cables on these FAA wagons. The original manufacturers of FAA wagons recommended that a mechanical brake overhaul took place every 300,000 miles. In 2009, DB Cargo engaged Engineering Support Group (ESG) to undertake analysis of the components which made up the mechanical brake, with a view to extending this mileage interval.

108 The ESG report recommended that the interval between mechanical brake overhauls could be extended to 600,000 miles, due to the low wear level found on the mechanical components. However, the handbrake cable was not a component included in the scope of this work, as ESG had not been asked to consider the handbrake cable.

109 The resulting maintenance instructions were then left with no defined interval for routine replacement of a handbrake cable. These cables were only replaced if they were discovered to be fraying or snapped, and only examined annually during the VIBT (see paragraph 115).

110 Had the cable been replaced during the wagon's service life, it is likely that a more modern cable design would have been used in its place. This is because the original cable make-up (5x11x17) is not available to purchase in the UK, leading to DB Cargo specifying a replacement design of cable. Although the cable to the new design has the same nominal diameter as the original cable (5 mm), it is manufactured to a diameter of 5.12 mm, whereas the original cable was manufactured to a diameter of 4.75 mm. Overall, this means that a modern cable has a 19% larger cross-sectional area than an original cable (16.77 mm^2 for a modern cable compared to 14.09 mm^2 for the original cable, figure 13). As well as having a larger cross-sectional area, a modern cable is manufactured of a higher strength steel than the original cable (approximately 55% stronger than the original cable).

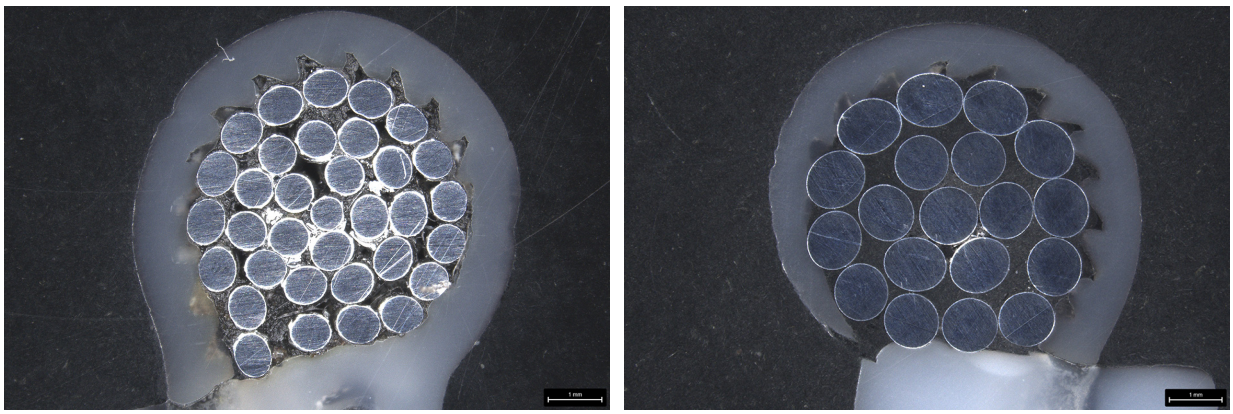

Figure 13: Original equipment manufacturer's cable (left), compared to a cable of more modern design (right).

111 The combination of the increased cross-sectional area and the higher-strength steel means that a new cable would be more likely to be able to resist the additional forces introduced by the incorrect method of handbrake operation and the design.

The lack of knowledge of the handbrake cable failure

112 The failure of the handbrake cable was unknown.

113 Due to the uncertainty around when the handbrake cable finally failed, two possibilities exist for how the runaway began. Firstly, it is possible that the cable failed after the handbrake had been applied earlier that morning. However, it is also possible that the cable was already snapped at the time the wagon was stabled. In either case, the runaway began when the air from the brake cylinders leaked to such a degree that the air-applied brake block force was insufficient to hold the wagon and the cable had snapped.

114 Although RAIB has been unable to precisely determine when the handbrake cable finally snapped, it has concluded that it was almost certainly damaged at the time of the last VIBT, which took place three weeks before the incident. This is based on the existence of frayed cables on other wagons and on the consultant's metallurgical report, which concluded that the failure sequence took place over weeks or months. The VIBT instructions require handbrake cables to be replaced if they are found to be frayed. The VIBT examination recorded that the mechanical brake was inspected, but it is not clear who inspected it and who completed the inspection form. Due to the elapsed time between the inspection and the runaway, the maintenance operatives were unable to recall who had completed this particular inspection.

115 Witnesses working for DB Cargo who were responsible for the maintenance of the FAA wagons leased by K+N told RAIB that, during a VIBT examination, they always inspect the handbrake cable with the handbrake in the 'off' position. The inner part of the handbrake cable (the part which frayed and then snapped) is designed to move within a fixed housing (figure 14). With the handbrake in the off position, the fixed housing hides this part of the cable and thus renders the inspection ineffective.

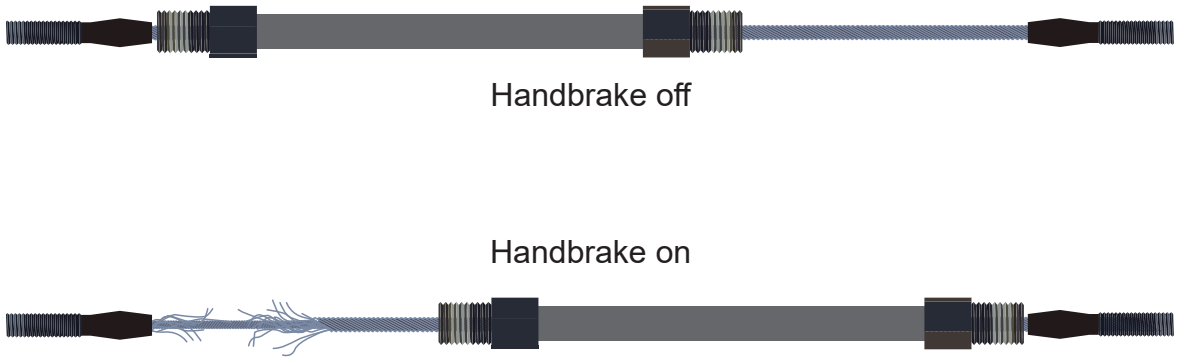

Figure 14: Diagram showing how the part of the cable which was damaged was within the housing during the inspection.

116 In contrast to the practice adopted during VIBTs, DB Cargo's wagon maintenance instructions for FAA wagons require that the handbrake cable is inspected with the handbrake in the 'on' position to secure the vehicle against inadvertent movement. Although not the intent of this requirement, examining the handbrake cable with the handbrake on would have made the damaged area of the inner cable visible.

117 The wagon maintenance instruction does not explain the importance of inspecting the handbrake cable in its entirety which would require the inspection to take place in both the on and off positions.

118 During the final application of the handbrake, after the wagon was moved to line 13, the shunter who applied the handbrake did not notice any difference in the amount of force that needed to be applied to put the handbrake on. It is possible that this was because the cable was still partially intact at this time and that it snapped as force gradually transferred from the air brake onto the handbrake system.

119 It is also possible that the cable was already snapped, and that the shunter did not notice any difference from the force normally required to apply the handbrake. A reconstruction showed that, with the air brake not applied, the force required to turn the handbrake control wheel when the handbrake cable is snapped is significantly less than with an intact cable. However, with the brakes compounded, it is likely that the difference in the amount of force required to turn the handbrake control wheel would have been less significant as the brake blocks are already pressed against the wheels. Because the shunters involved were routinely compounding the brakes, it is likely the shunter was accustomed to the level of force required to make a compounded handbrake application and therefore less likely to notice a change in the amount of force required to turn the handbrake control wheel.

120 RAIB also considered whether a shunter could notice a change in the number of turns required to fully apply the handbrake. During the reconstruction, the wagon handbrake was turned from the fully off position to the fully on position in 10 ¾ turns. The top handbrake cable was then disconnected, to simulate it snapping, and only another half turn was able to be achieved before the handbrake indicator bottomed out on the housing, preventing further movement (figure 15). DB Cargo's maintenance standard would pass a handbrake as fit for service if it fully applies using between 8 and 12 turns, indicating that this test would still pass a handbrake as fit even where the cable had snapped.

Figure 15: Handbrake indicator from an FAA wagon.

121 RAIB discussed the issue of compounding brakes and reliance on handbrake indicators with the Rail Freight Operators' Group (RFOG). This is a cross-industry group facilitated by the Rail Safety and Standards Board (RSSB)[12] which acts as a forum for FOCs to discuss operational safety issues, and to share safety intelligence. The group felt that reliance on handbrake indicators was inappropriate, because the indicators do not necessarily prove that the brake blocks are pressed against the wheels. The FOCs in attendance also confirmed their understanding of the risk of brake compounding and explained that they train their staff not to do this. K+N is not invited to attend RFOG because it is not a recognised FOC.

122 The runaway did not occur for over 12 hours, following the stabling of the wagon. By that time, all the rail staff at Kineton depot had finished work for the day and left site. The delayed start of the runaway was due to the slow leaking of air from the brake cylinders, which had not been vented during the stabling process (paragraph 98). Had the handbrake cable already snapped when the wagon was stabled, releasing the air brake would have revealed that there was a problem with the handbrake.

123 In addition, had the handbrake cable been intact at the time the handbrake was applied, venting the brake cylinders would have prevented any subsequent transfer of additional force onto the cable as the air leaked from the cylinders, potentially making a subsequent failure less likely.

Mitigations to control the risk of runaway vehicles

124 There was no system in place to prevent runaway rail vehicles from leaving the exchange sidings.

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

a. MOD, as the infrastructure manager, did not have an engineered solution in place to prevent a runaway vehicle from leaving the exchange sidings (paragraph 126).

b. K+N, as the operator, did not have an operational procedure in place to prevent a runaway vehicle leaving the exchange sidings (paragraph 132).

Each of these factors is now considered in turn.

Infrastructure based mitigations

126 MOD, as the infrastructure manager, did not have an engineered solution in place to prevent a runaway vehicle from leaving the exchange sidings.

127 MOD's track standard (paragraph 72) allows for the installation of wheel stops (a hinged metal bracket attached to the rail and designed to stop a slow-moving rail vehicle) where a risk from unauthorised train movements within a railway yard exists. The standard says that the requirement for wheel stops should be determined by risk assessment of the protection methods at each site.

[12] The Rail Safety and Standards Board (RSSB) is a not-for-profit company owned and funded by major stakeholders in the railway industry, and which provides support and facilitation for a wide range of cross-industry safety activities.

128 The standard also mandates that the assessment of the risk of unauthorised train movements towards the mainline rail network should be carried out. There is no requirement in the standard to consider the risk that unauthorised train movements present to level crossings users, or to those who may be working on MOD infrastructure.

129 DIO carries out the rail infrastructure manager role on behalf of MOD (paragraph 14). DIO stated that it currently maintains and inspects the infrastructure via the Future Defence Infrastructure Services (FDIS) contract. Work is undertaken by a specialist railway contractor.

130 DIO stated that while it did risk assess public level crossings on its infrastructure on an annual basis, an overall site risk assessment for each depot is not undertaken. DIO stated that some information relevant to safety is included in the track safety certificate issued for each depot. RAIB found that the track safety certificate for Kineton depot recorded that there is an outbound rising gradient towards the mainline connection to Network Rail at Fenny Compton. This may suggest that the focus was on the risk exported to the mainline rail network by runaway events.

131 There is no evidence that DIO completed a risk assessment to understand the hazards involved with unauthorised vehicle movements within Kineton depot, nor any evidence that any engineered solutions, such as wheel stops, were considered by DIO to control the risks associated with runaway vehicles. DIO stated that it had managed such risks at other sites in collaboration with DE&S and K+N. This had led to buffer stops, wheel stops and derailers being installed at the depots concerned.

Procedural based mitigations

132 K+N, as the operator, did not have an operational procedure to prevent a runaway vehicle leaving the exchange sidings.

133 If a wagon is stabled alone, restraint is reliant on that wagon's handbrake unless additional means of restraint are provided. MOD does not have a detailed procedure in its rule book to instruct operators of wagons on how to secure them. JSP 790, the defence rail regulations, states that shunters should ensure that '*enough*' brakes and/or scotches have been applied. Scotches were not routinely used at Kineton depot, as the shunters relied on handbrakes.

134 Other operational procedures to mitigate the risk associated with a runaway vehicle could include pull-tests, stabling wagons in multiple configurations (i.e. two or more wagons attached together), or maintaining points in the position required to guide vehicles away from the exit.[13]

135 There was no evidence that any of these operational mitigations were introduced by K+N and there was no assessment by them of the runaway risks present at Kineton depot. K+N managers told RAIB that they had not assessed the risk of a rail vehicle running away from the exchange sidings at Kineton depot because they believed that the area was flat or within the 1 in 500 gradient which the MOD standard requires and therefore incorrectly believed that there was no risk of a runaway.

[13] At this location it would not be possible to set points against this wagon due to the track layout.

136 RAIB found evidence that K+N operational staff were, however, aware of the actual gradient running through the sidings (which was steeper than MOD requirements, paragraph 68). This suggests that the information concerning the gradient at Kineton depot had not reached K+N's management team from the operational level.

137 K+N managers stated that they had been unsuccessfully trying to establish the gradient of all relevant MOD sites for a number of years from DIO, who were responsible for managing the railway infrastructure at Kineton (paragraph 14). DIO stated to RAIB that there were a number of ways that a request for such information could be made, but that they had no record of receiving such a request since the DIO staff responsible for Kineton changed over in 2021.

138 K+N provided evidence to RAIB that, at other sites where they were aware of a gradient, they had taken operational measures to mitigate the risk of a runaway rail vehicle. One such example was the MOD depot at Ludgershall where K+N had access to a gradient profile. As a consequence of this, K+N operational procedures at Ludgershall depot contained restrictions around the stabling of wagons, which were designed to control that risk. The same K+N managers oversee Ludgershall and Kineton depots, so it is likely that similar mitigations would have been introduced had they also been aware of the gradients present at Kineton depot.

Identification of underlying factors

Contractor capability

139 MOD's contractors did not have the expertise and the required resources to effectively manage the full range of risks associated with railway operations at Kineton depot.

Kuehne+Nagel

140 RAIB's investigation identified three important knowledge gaps within the railway management team at K+N. These were the lack of understanding of the risks involved in compounding wagon brakes (paragraph 98), the over-reliance on the wagon handbrake indicators (paragraph 121), and the lack of management awareness of the gradient at Kineton (paragraph 136). The K+N rail management team consisted of four people, working the equivalent of three full-time jobs, covering five depots nationally.

141 This was a small organisational structure with limited scope, which may have inherently been more vulnerable to such knowledge gaps, due to its small size. In addition, RAIB also found evidence that the K+N team responsible for MOD rail operations was not aware of practices in the wider rail freight sector, and reliant instead upon their existing experience and knowledge gained with other forms of rail operations that they were more familiar with, such as heritage railways.

142 The knowledge gaps which existed were not identified by K+N before the runaway because there was a lack of qualified internal oversight of the rail delivery operation. This lack of oversight had existed for a number of years and had twice been identified as an issue by external auditors.

143 In 2015, when K+N took over MOD rail services, it commissioned Victa Railfreight Ltd (Victa Railfreight) to complete a due diligence report. The report found that:

> *'Whilst operations at the various locations appear to be performed in a safe manner, this is largely down to the experienced staff rather than any properly structured safety regime. A number of actions have been taken by the current LCS Management team that appear not to have included full consideration of the consequences on the organisation. Urgent action is required to ensure that these omissions are quickly reviewed with a view to putting a suitable structure in place to provide a demonstrably safe operation going forward.'*

144 In 2020, a second external audit undertaken by Victa Railfreight advised K+N that:

> *'The assessor believes it to be appropriate to draw attention to the following key 'good practice' principles from mainline railways legislation:*
>
> - *Having a clearly identified and responsible duty holder.*
> - *Having a clearly identified and responsible entity in charge of maintenance (ECM) responsible for ensuring a safe system of maintenance is in place.*
> - *Co-operation and liaison between actors.*
> - *Having in place risk assessment and an adequate safety management system.*
> - *Having in place an effective monitoring and feedback system.'*

145 The 2020 audit also identified that the lack of a rail governance structure and a project team for rail within MOD created significant problems to the K+N operation and that these items should be resolved urgently.

146 Attempts were made by K+N in June 2022 to resolve the lack of effective oversight, by engaging a corporate health and safety manager with mainline railway experience. However, this person had been intermittently absent since their engagement due to ill health.

147 The organisational experience which K+N possesses from its non-UK rail operations was not used to help the team who look after the MOD contract. In April 2023, K+N appointed an internal auditor to assess its rail operation, but this person was not a specialist in rail and therefore was reportedly being briefed in railway operations by the people that they were auditing. This meant that the internal audit reports were focused on document management rather than determining if the method of work correctly controlled the risks introduced by the operation.

Leidos

148 Leidos, the prime MOD contractor, stated that they had access to the audits commissioned by K+N and that they would escalate any relevant findings to MOD via their contractual governance framework. Leidos also stated that they would conduct further audits on a risk-basis, based on the findings and observations of their own experienced and qualified staff.

149 Leidos, however, did not have any staff who were qualified or experienced in rail operations, making it difficult for them to understand if the operation was being managed effectively. As a result, it had not undertaken any direct assurance activities on K+N's rail operations for MOD, nor was there any such work planned.

150 Although Leidos staff had access to relevant MOD documents (either directly or indirectly), Leidos and its sub-contractors had not been formally provided with all the documents required to safely run the MOD rail operation. For example, the DSA-produced defence rail regulations and the JSP 790 rule book had not been formally provided to Leidos. This was because they were not referenced in schedule 3 of the LCST contract (paragraph 61) which identified relevant documentation.

Safety Leadership

151 MOD did not provide effective safety leadership to its contractors as a result of ineffective governance arrangements, an unclear command structure and a lack of relevant expertise.

152 In 2002, a British soldier was killed during railway operations after contacting overhead line equipment during a rail transit move. Around the same time, a second British soldier was seriously injured in similar circumstances. In response to this, the Defence Rail Executive was formed under the Defence Logistic Organisation. As part of the changes stemming from these two accidents, MOD introduced a head of rail position, who was also the MOD duty holder for rail.

153 In 2010, the 'Strategic Defence and Security Review'[14] looked at what the military of the future may be required to do. In the following years, decisions were made to reduce or remove various capabilities, including all defence owned rail operations.

154 Around 2013, the MOD head of rail position changed from a military lead to a civilian lead. Around this time, the role of MOD duty holder for rail (as defined in MOD standards) disappeared, despite this being a requirement of the defence rail policy contained in JSP 790 (paragraph 59). The timing of the loss of the duty holder role aligns with the outsourcing of defence rail to the private sector.

155 As well as being a requirement of defence rail policy, the requirement for there to be an MOD duty holder for rail operations was also captured in the CASP (paragraph 14). The CASP was the method in which DE&S agreed with their internal customer (in this case UKStratCom, paragraph 14) how they would deliver products or services.

156 The CASP for rail operation, updated in January 2023, stated that:

> *'JSP790 defence rail regulations is the MOD regulations and sets out the required governance structure to provide assured safe operation of rail assets. To discharge the requirements of JSP790 requires a lead user, an operating duty holder, a delivery duty holder and a project team… Developing an appropriately* [qualified and experienced] [delivery team] *will allow the necessary governance structures to be developed, resourced and implemented to ensure that ongoing defence rail operations were appropriately governed.'*

[14] HM Government, 'Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review', HMSO, 2010 https://assets.publishing.service.gov.uk/media/5a78da21ed915d0422065d95/strategic-defence-security-review.pdf.

157 The loss of the MOD duty holder for rail left MOD without someone in this role for a period of around eight years before the incident at Kineton depot. This was not compliant to MOD's own requirement in JSP 790.

Governance

158 On 6 April 2022, K+N wrote to MOD to raise the issues of lack of rail governance and the absence of a rail project team. In its letter, K+N contended that they had been raising these issues since 2018 without significant progress and felt it would be compelled to report the matter to ORR.

159 In response to these concerns, in September 2022, MOD reintroduced the DRPWG chaired by UKStratCom (paragraph 14). K+N felt that the reintroduction of the DRPWG addressed their concerns around governance, so it withdrew its complaint to MOD and no report was made to ORR. The DRPWG had not met since 2014, before the start of the LCST contract, despite JSP 790 mandating that it should meet half yearly.

160 JSP 790 defines the purpose of the DRPWG meeting as being to provide defence rail safety assurance, with the aim to review and confirm rail operating and safety assurance policy, to set standards and to give advice where needed.

161 The first of these reconvened meetings was held in September 2022, and the group held five meetings until January 2023 when the DRPWG again stopped meeting. This was due to the resignation of UKStratCom's project manager. Witness evidence suggests that the project manager left the role due to frustration in being unable to make any progress in improving defence operated rail services.

162 RAIB has reviewed the minutes of these five meetings of the DRPWG, and it is clear from these that this meeting was being used to try and decide how rail was going to be managed, understand the risks, and set the strategy for how rail should operate. K+N attended these meetings and their contribution to the discussion was recorded in the minutes. When this group was not meeting, as was the case from 2014 to September 2022 and after January 2023, there was effectively no structure in place that exercised any governance function over defence rail operations as a whole.

163 The output of these meetings was the production of a risk register which recorded four risks and the perceived consequences. These risks included risk-to-life and/or property, and reputational damage to MOD due to their contracted rail services not being managed to their satisfaction. The areas of concern were:

- lack of an MOD duty holder for rail
- lack of contractor governance
- an outdated version of the MOD rule book still being in use instead of JSP 790
- lack of a defence central desk to receive and promulgate rail safety notices.

164 The DRPWG attempted to appoint an MOD duty holder for rail within UKStratCom in January 2023. This was ultimately unsuccessful because the individual approached, the senior responsible owner for rail (SRO, sometimes referred to as the senior responsible officer), was '*uncomfortable*' with taking on this responsibility (see paragraph 166).

165 The group met once more following the runaway at Kineton depot, in June 2023, before the resignation of the group's chair brought another stop to the meetings. There has been no further progress in appointing a duty holder for rail (under MOD's duty holder construct).

Unclear command structure

166 The CASP stated that UKStratCom had a role to play in the management of rail as the SRO was a senior officer within UKStratCom. SRO is a term used across government and signifies that the holder has a clear authority and is responsible for ensuring that a project or programme meets its objectives and realises the expected benefits. However, the view within UKStratCom was that, while they were policy owners, they were not in a position to take command of the execution of their policy.

167 Email exchanges in early May 2023 between DE&S, UKStratCom and MTSR show that the absence of a clearly defined and effective organisation to manage MOD rail operations was well known within these organisations. Despite this, no effective changes were made to address this issue.

Lack of expertise

168 Before rail was outsourced, MOD used to run a three-month course to upskill military officers and some senior civil service managers before they took command of the section responsible for rail operation. This course involved visits to mainline operating locations and ensured that there was rail operations experience within the military to support its rail operation. This course was cancelled as part of the removal of rail operations as a military capability (paragraph 153).

169 In 2015, the LCST contract was awarded to Leidos and MOD lost the last of its directly employed rail operations staff. Since then, DE&S contract managers have been managing the delivery of rail services through the mechanisms in the LCST contract. However, DE&S's management of rail services did not extend to checking and auditing what the ultimate operator of MOD rail services, K+N, was doing in practice. DE&S stated this was because it did not have anyone with sufficient rail experience to do so.

170 During the summer of 2022, DE&S was audited by MTSR, and this audit included a site visit to Kineton depot. This audit found that in all areas, apart from rail operations, the arrangements and audit process were well managed. The audit went on to note that rail operation and management was the number one safety concern for the DE&S senior team. This concern stemmed from the fact that they had identified that there was no process for rail assurance, nor a rail delivery team. The MTSR audit team also identified issues with DE&S staff not following their own processes and an apparent lack of knowledge of regulations and standards outside of the DE&S domain. Furthermore, MTSR raised concerns about the relevant knowledge of those within DE&S who were meant to carry out inspection activities.

171 MTSR auditors did not directly observe the K+N operation themselves, because they did not have anyone proficient in rail operation to carry out this inspection (see paragraph 175).

172 Despite these findings, no effective action was taken to rectify these deficiencies.

Safety regulation

173 The level of oversight by safety regulators meant that the lack of safety leadership within MOD rail operations was not identified and addressed.

174 While MTSR acted as MOD's internal regulator for railways (paragraph 14), ORR remained the enforcing authority for health and safety legislation (paragraph 55).

Internal regulation

175 MTSR did not have any staff qualified or experienced in either railway operations or railway engineering (paragraph 171), although they did have some staff with experience as rail load supervisors. This qualification allows individuals to manage the loading of rail wagons from elevated platforms but would not give wider operational experience of the rail industry. The lack of skills, knowledge and experience within MTSR meant that it was unlikely to have been able to effectively discharge the duties as MOD's safety regulator for railways, by carrying out effective inspections (paragraph 170).

176 During this investigation, RAIB spoke to witnesses from MTSR who believed that they would not be allowed to speak to K+N directly as this may incur a bill for consultancy fees. The perception that MTSR was in some way restricted in how it could engage with an MOD contractor may have further affected its ability to effectively regulate MOD rail operations.

177 Despite these issues, MTSR had identified problems with the informality of MOD rail management as far back as 2014. An MTSR stakeholder committee meeting in May 2014 identified that, since the management of MOD track was handed over to DIO in May 2013, there had been no formal management arrangements put in place to inspect and maintain the infrastructure. There is no evidence that this finding generated any further rail-related inspection work or other regulatory action on behalf of MTSR.

178 DIO stated to RAIB as part of this investigation that they did not agree with the assertion made by the MTSR stakeholder committee meeting that there had been no formal management arrangements put in place. DIO stated that it had worked with DE&S and K+N to risk manage the inspection and maintenance of the rail infrastructure and that it had maintained and inspected the permanent way infrastructure throughout this timeframe through contractors, in order to meet the requirements of DIO standard, 'Permanent Way Design and Maintenance Standards', issue 5 dated September 2017.

External regulation

179 In general, ORR takes a risk-based approach to the delivery of its duties as an enforcing authority. Proactive inspections are arranged to companies and sites which are assessed to be higher risk operations. ORR viewed MOD's rail operations as comparable to activities at a dock or factory (in as much as it is an operation which may export risk onto the mainline rail network), and therefore a lower risk.

180 Mainline freight operators and Network Rail interact with ORR in a number of ways. These include the granting of safety certificates and authorisations, inspections (which may look at specific locations or topics), routine liaison and as a consequence of safety data trends, complaints, incidents and accidents. ORR's priorities as a safety regulator are set out within documents known as Strategic Risk Chapters.[15] For example, DB Cargo is subject to this framework both as a mainline FOC and as an ECM for wagon maintenance (paragraph 17).

181 However, because ORR had assessed that MOD rail operations presented a comparatively low risk, they had assigned one inspector a maximum of three days per year to look at the entirety of MOD's rail operations. This inspector maintained a watching brief on MOD rail sites and had been doing so since 2018. However, there is no evidence to suggest that the shortcomings in organisational structure, command, expertise and resources which have been identified in this investigation had come to ORR's attention as a result of its work as the enforcing authority for health and safety on MOD operated railways.

Observations

Vehicle inspection facilities

182 DB Cargo's facilities at Carlisle Kingmoor are not well-suited for carrying out safety-critical wagon maintenance tasks, such as VIBTs.

183 When the FAA wagons are due their VIBT examination (paragraph 23) they are taken to DB Cargo's facilities at Carlisle Kingmoor. This location only has basic facilities for carrying out safety-critical inspections. The staff who complete these inspections work from a van and carry out the inspection of the braking equipment, including the handbrake cable, by crawling between the rails under a wagon placed on a siding line.

184 The absence of a maintenance pit creates cramped and poorly lit conditions for this activity which means it is not easy to properly inspect the underside of the wagon. These inspections are also carried out in all weather conditions.

185 There is a functional maintenance pit at Kineton depot, where these wagons are based, but this was not used for any wagon maintenance.

186 On this occasion, the sub-optimal nature of the facilities for carrying out the VIBT did not cause this incident. This is because the cable that snapped was only being inspected in a state in which the damage would not have been visible even in better conditions (paragraph 115). However, it is possible that, in other circumstances, safety-critical inspections may not be as effective as they should be due to the environmental conditions in which they are being carried out.

[15] https://www.orr.gov.uk/guidance-compliance/rail/health-safety/strategy/our-strategic-risk-chapters.

Summary of conclusions

Immediate cause

187 The wagon ran away because it was stabled on a gradient with no effective means of restraint (paragraph 66).

Causal factors

188 The causal factors were:

a. The wagon was stabled on a gradient (paragraph 70, **Recommendations 1 and 3**).

b. The wagon was stabled as a single wagon (paragraph 77, **Recommendation 3**).

c. There was insufficient brake force to restrain the wagon (paragraph 81, **Recommendations 1, 3, 4 and 5**). This causal factor arose due to a combination of the following:

   i. Effective handbrake operation was reliant on a single handbrake cable that if broken meant the system provided no brake force while indicating that the handbrake was on (paragraph 84, **Recommendation 1 and 3**).

   ii. The handbrake cable was mechanically overloaded, leading to failure (paragraph 88, **Recommendation 3**).

   iii. The failure of the handbrake cable was unknown (paragraph 112, **Recommendations 4 and 5**).

d. There was no system in place to prevent runaway rail vehicles from leaving the exchange sidings (paragraph 124, **Recommendations 1 and 3**). This causal factor arose due to a combination of the following:

   i. MOD, as the infrastructure manager, did not have an engineered solution to prevent a runaway vehicle from leaving the exchange sidings (paragraph 126, **Recommendation 1**).

   ii. K+N, as the operator, did not have an operational procedure to prevent a runaway vehicle leaving the exchange sidings (paragraph 132, **Recommendation 3**).

Underlying factors

189 The underlying factors were:

a. MOD's contractors did not have the expertise and the required resources to effectively manage the full range of risks associated with railway operations at Kineton depot (paragraph 139, **Recommendation 3**).

b. MOD did not provide effective safety leadership to its contractors as a result of ineffective governance arrangements, an unclear command structure and a lack of relevant expertise (paragraph 151, **Recommendation 1**).

c. The level of oversight by safety regulators meant that the lack of safety leadership within MOD rail operations was not identified and addressed (paragraph 173, **Recommendation 2**).

Additional observations

190 Although not linked to the incident on 25 May 2023, RAIB observes that:

a. DB Cargo's facilities at Carlisle Kingmoor are not well-suited for carrying out safety-critical wagon maintenance tasks such as VIBTs (paragraph 182, **Recommendation 5**).

Previous recommendations relevant to this investigation

191 The following recommendations have relevance to this investigation.

Royal Air Force Nimrod accident

192 On 2 September 2006, a Nimrod aircraft (reference XV230) operated by the Royal Air Force sustained an in-flight fire during mid-air refuelling and subsequently crashed during operations over Afghanistan. All 14 crew members on board were killed during the accident.

193 The review into the accident[16] (sometimes known as the Haddon-Cave review) was published in 2009. It identified numerous technical and organisational factors which led to the accident. This review was instrumental in changing how MOD manages safety within its duty holder construct, and ultimately led to the creation of DSA.

194 In particular, the review observed that one of the factors which contributed towards the accident was the outsourcing of defence activities to industry. The review concluded that MOD must act as an intelligent customer, by asking appropriate questions of its contractors to ensure safety. The review suggested that there are risks involved in contracting out capability to the degree that there is nobody remaining within the organisation who is suitably qualified and experienced to ensure that MOD is getting what it ordered.

195 The review also observed that another organisational factor was the ineffective oversight of service delivery by internal MOD regulators.

Previous RAIB investigations

196 RAIB has made numerous recommendations that are relevant but not directly applicable because the end implementers were mainline FOCs. The issues covered in previous investigations relevant to this accident include:

- ineffective handbrakes
- compounded handbrake applications
- deficient wagon maintenance
- pull-testing stabled wagons.

197 Previous RAIB safety learning can be found in the investigation into a runaway which occurred on the night of 3 to 4 May 2010 at Ashburys in Manchester (RAIB report 07/2011). Five wagons loaded with aggregate ran away from a siding for 890 metres before two of them were derailed at trap points. The runaway was caused by ineffective handbrakes on the wagons. The investigation found deficiencies in the maintenance plan for the wagons and raised a concern about the way in which safety-related information from other industries was brought to the attention of the rail industry. RAIB recommended, among other things, that freight operators should complete a 'pull-test' to check the effectiveness of wagon handbrakes before leaving wagons unattended and reliant on a handbrake.

[16] 'The Nimrod Review - An independent review into the broader issues surrounding the loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006', 2009, Charles Haddon-Cave QC, published on behalf of HMSO. Available from https://assets.publishing.service.gov.uk/media/5a7c652640f0b62aff6c1609/1025.pdf.

198 Another source of RAIB safety learning is the investigation into a runaway which occurred on 9 March 2020 at Clitheroe, Lancashire (RAIB report 16/2020). A loaded wagon ran away from a siding for about 0.75 miles (1.2 km) before it derailed on trap points at Horrocksford Junction. The runaway was caused because the staff who stabled the wagon did not know the handbrake would not hold the wagon in place after they had applied it, as the wagon's brakes were already air-applied. Over time the air in the brake system leaked away until the air brake was released. The investigation found deficiencies in the maintenance examination of the wagon before the runaway. RAIB recommended, among other things, that GBRf should work with the owners of industrial premises that it operates trains to or within to improve the risk assessment process for runaway vehicles. The report also recommended that FOCs should review standards and company instructions, considering how the effectiveness of a handbrake is assured if it is applied at the same time as an airbrake (compounding).

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

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

199 In November 2023, K+N issued periodic operating notice (PON) 05/2023 to warn staff of the risk of compounding handbrakes. It went on to provide a process which avoids compounding handbrakes and to inform staff that the requirement to scotch stabled wagons and locomotives is now a permanent requirement (paragraph 200). The PON notes that JSP 790 and K+N air brake regulations will be updated to reflect the new arrangements in due course.

Other reported actions

200 Following the incident at Kineton, K+N released a series of PONs with the intention of reducing the risk of a runaway. PON 02/2023, issued in June 2023, was a temporary instruction to require all stabled wagons to have a wheel scotch applied at both ends. PON 04/2023, issued in August 2023, extended the requirement to use a scotch when leaving a wagon to include locomotives.

201 In August 2023, K+N commissioned Victa Railfreight to carry out an audit on its rail operation at Kineton over a three-day period. The report of this audit states that the K+N rail operation '*is being well managed in a professional and pro-active way by a competent and experienced team'*. The audit report also highlighted that the previously identified governance issues from the 2020 audit (paragraph 144) were not yet resolved and issued two 'major recommended actions'[17] (MRA) and twelve 'recommended actions'[18] (RA) to improve K+N's rail operation at Kineton depot.

202 Leidos has decided to introduce the use of people who are suitably qualified and experienced in rail to support their rail-related assurance activities going forward.

203 MOD's DE&S led the defence investigation into this runaway. Its report was finalised in November 2023 and made 17 recommendations on how to improve their contracted rail operation under 4 broad headings:

a. legislation, regulation and the rule book

b. lines of defence assurance

c. DE&S' lines of accountability

d. alignment to the defence level for rail.

204 The defence regulator, MTSR, reported to RAIB that it was considering acquiring some subject matter experts in rail operations or seeking to partner with ORR to ensure that it can carry out effective frontline assurance in the future.

[17] Victa Railfreight defines an MRA as raised in response to perceived lack of compliance with legislation, or a clear failing to meet fundamental requirements.

[18] Victa Railfreight defines an RA as raised in response to perceived deficiencies which require rectification or where existing process or documentation could be improved.

205 DIO has commissioned a level survey across the whole of the Kineton site to better understand the track gradients.

206 DB Cargo has completed a number of actions intending to reduce the likelihood of a repeat occurrence. These actions include:

a. Application of warning stickers to FAA wagons, instructing operators not to apply the handbrake at the same time as an air brake.

b. Instructing K+N and GBRf staff to operate wagons in accordance with the relevant mainline Rule Book module, which requires operators not to apply the handbrake in addition to an air brake.

c. Using an area of Carlisle Kingmoor depot with better facilities for wagon inspection, until a permanent solution is found.

d. Replacement of all handbrake cables on the FAA wagon fleet and introduction of planned replacement of the handbrake cables every four years.

e. Implementation of a requirement to inspect the FAA handbrake cables in both positions during the VIBT.

Recommendations and learning point

Recommendations

207 The following recommendations are made:[19]

1 *The intent of this recommendation is to ensure that the Ministry of Defence is safely managing the risks involved with defence rail operations.*

The Ministry of Defence should review the arrangements by which it conducts railway operations on behalf of the Secretary of State for Defence. This review should consider:

i. If there is a full understanding of the extent and type of current defence rail operations, including interfaces with contractors and parties external to the Ministry of Defence, such as the mainline railway and the Office of Rail and Road.

ii. If an appropriate organisation exists to safely manage the various elements involved in defence rail operations, including clear governance structures, roles and accountabilities and the safety assurance of relevant contractors (including appropriate escalation routes for contractors raising safety related matters).

iii. If this organisation is correctly resourced with the Ministry of Defence and its contractors, with appropriately trained and competent staff occupying key roles.

iv. If up-to-date and appropriate risk assessments are in place for all elements of defence rail operations, including the stabling of wagons on the sites where it is the infrastructure manager. These risk assessments should specifically consider the risks that defence rail operations can present to the public, Ministry of Defence staff, contractors, and the mainline railway.

v. If an appropriate safety management system, operating rule book and other supporting technical standards are in place and if these documents include the appropriate control measures needed to address risk and good practice in other parts of the rail industry.

[19] Those identified in the recommendations have a general and ongoing obligation to comply with health and safety legislation, and need to take these recommendations into account in ensuring the safety of their employees and others.

Additionally, for the purposes of regulation 12(1) of the Railways (Accident Investigation and Reporting) Regulations 2005, recommendations 1 and 2 are addressed to the Ministry of Defence and recommendations 3, 4 and 5 to the Office of Rail and Road, to enable them to carry out their 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.

vi. How safety related documents are made available to staff working for the Ministry of Defence and its contractors.

vii. How the Ministry of Defence takes account of appropriate safety learning from sources such as internal investigations and safety learning from the wider rail industry.

Following this review, the Ministry of Defence should develop a timebound plan to make any appropriate changes identified to working practices, processes and organisational structure (paragraphs 188a, 188c, 188c.i, 188d, 188d.i and 189b).

2 *The intent of this recommendation is to ensure that there is a clear understanding of the regulatory arrangements applying to railways operated on behalf of the Secretary of State for Defence.*

The Defence Safety Authority of the Ministry of Defence should agree the roles and responsibilities for safety regulation of defence operated railways with the Office of Rail and Road and any other relevant statutory safety regulators to ensure they are clearly defined.

Following this agreement, the parties involved should consider their respective regulatory strategies, ensuring that there are adequate resources in place to meet their regulatory obligations (paragraph 189c).

3 *The intent of this recommendation is to ensure that Kuehne+Nagel is managing the risks involved with its defence rail operation.*

Kuehne+Nagel should review its delivery of railway operations on behalf of the Secretary of State for Defence. This review should consider:

i. If Kuehne+Nagel fully understands the extent and type of rail operations which it undertakes for the Ministry of Defence.

ii. If an appropriate organisation exists to safely manage the various elements of defence rail operations for which Kuehne+Nagel is responsible, including clear governance structures, roles and accountabilities and safety assurance.

iii. If this organisation is correctly resourced within Kuehne+Nagel with appropriately trained and competent staff occupying key roles.

iv. If up-to-date and appropriate risk assessments are in place for all elements of Kuehne+Nagel's defence rail operations, including the stabling of wagons on sites where it is responsible for rail operations. These risk assessments should specifically consider the risks that its rail operations can present to the public, staff and the mainline railway.

v. If an appropriate safety management system, operating rules and other supporting technical standards are in place and if these documents include the appropriate control measures needed to address risk and good practice in other parts of the rail industry.

vi. How safety related documents are made available to staff working for Kuehne+Nagel.

vii. How Kuehne+Nagel takes account of appropriate safety learning from sources such as internal investigations and safety learning from the wider rail industry.

Following this review, Kuehne+Nagel should develop a timebound plan to make any appropriate changes identified to working practices, processes and organisational structure (paragraphs 188a, 188b, 188c, 188c.i, 188c.ii, 188d, 188d.ii, and 189a).

4 *The intent of this recommendation is to improve the maintenance regime applied to FAA wagons.*

DB Cargo should review the maintenance procedures relating to FAA wagons at Carlisle Kingmoor depot. This review should include:

i. A review of the effectiveness of the current arrangements for the visual inspection and brake test of FAA wagons and if they ensure that handbrake cables are appropriately inspected.

ii. Consideration as to how visual inspection and brake tests of wagons at Carlisle Kingmoor depot can be improved to make it more effective at detecting cables which may be worn and/or approaching the end of their service life. This should include the type and suitability of the facilities used for such inspections.

iii. Examining how the results of visual inspection and brake tests are recorded.

Following this review, DB Cargo should develop a timebound plan to make any appropriate changes identified to working practices, processes and facilities (paragraphs 188c, 188c.iii).

5 *The intent of this recommendation is to reduce the likelihood of a life expired safety-critical brake component being left in place on an operational wagon.*

DB Cargo should review the basis on which it determines the replacement of brake component parts fitted to wagons to ensure that those which are beyond their effective service life are identified and scheduled for replacement at appropriate intervals, considering both time-based and mileage-based intervals.

This recommendation may be applicable to other entities in charge of maintenance (paragraphs 188c, 188c.iii and 190a).

Learning point

208 RAIB has identified the following important learning point:[20]

1 Shunters are reminded that handbrake indicators should not be relied upon as the sole source of information to inform them that the brake blocks have applied to the wheels.

[20] '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

ABO	Air brake overhaul
AOCL	Automatic open crossing – locally monitored
CASP	Command Acquisition and Support Plan
CCTV	Closed-circuit television
DefSp	Defence Support
DE&S	Defence Equipment and Support
DIO	Defence Infrastructure Organisation
DLO	Defence Logistics Organisation
DLSR	Defence Land Safety Regulator
DPA	Defence Procurement Agency
DRPWG	Defence Rail Policy Working Group
DRS	Direct Rail Services
DSA	Defence Safety Authority
ECM	Entity in charge of maintenance
ESG	Engineering Support Group
EWS	English, Welsh & Scottish Railway
FDIS	Future Defence Infrastructure Services
FOC	Freight operating company
GBRf	GB Railfreight
HSWA	The Health and Safety at Work Act 1974
HoE	Head of Establishment
JSP	Joint service publication
K+N	Kuehne+Nagel
LCST	Logistics Commodities and Services Transformation
MBO	Mechanical brake overhaul
MOD	The Ministry of Defence
MTSR	Movement and Transport Safety Regulator

ORR	The Office of Rail and Road
PON	Periodic operating notice
PPM	Planned preventative maintenance
RFOG	Rail Freight Operators Group
ROGS	Railways and Other Guided Transport Systems (Safety) Regulations, 2006)
RSSB	Rail Safety and Standards Board
SRO	Senior responsible officer
TOPS	Total Operations Processing System
UKStratCom	Strategic Command
VIBT	Visual inspection and brake test

Appendix B - Investigation details

RAIB used the following sources of evidence in this investigation:

- information provided by witnesses
- closed-circuit television recordings taken from the exchange sidings gate
- site photographs and measurements
- weather reports and observations at the site
- a report commissioned by RAIB from metallurgical expert into the failure mechanism of the Bowden cable
- data from reconstructions and simulations
- documentary evidence from rules, policies, and procedures
- minutes of meetings
- RAIB-produced modelling, to show runaway dynamics and the stresses introduced to the Bowden cable
- a review of previous RAIB investigations that had relevance to this incident.

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

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