



Rail Accident Investigation Branch

Rail Accident Report



Fatal accident at Tyseley depot 14 December 2019

Report 09/2020
v2 - March 2022

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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v1	07/10/2020	n/a	Initial issue
v2	28/03/2022	130	Addition of new footnote 16

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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Fatal accident at Tyseley depot

14 December 2019

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Summary

At around 20:00 hrs on Saturday 14 December 2019, a train driver became trapped between two trains in the yard at Tyseley maintenance depot, Birmingham. The driver received fatal injuries as a result.

The driver became trapped because he was passing between two closely-spaced trains when one of the trains was moved towards the other as part of a coupling operation. The driver had not used a safe route when he was walking within the yard, and almost certainly did not expect that the trains would move as he passed between them. Another driver, who was attempting to couple the trains, was unaware that anyone else was close to them. He did not sound a warning prior to coupling because local instructions did not require this.

RAIB's investigation identified that the depot operator, West Midlands Trains, had not adequately considered the risks faced by drivers on depots. The investigation also found that Tyseley depot is operating at or beyond its capacity at night and that West Midlands Trains' management assurance processes had not promoted safe working practices.

RAIB has made two recommendations as a result of the investigation, both addressed to West Midlands Trains. The first recommendation is that West Midlands Trains ensures that effective assessments are carried out of the risks to those walking and working in depots, yards and sidings and that suitable measures are in place to control these risks. The second recommendation is that West Midlands Trains reviews its safety assurance processes to ensure that unsafe working practices within the company can be effectively identified and their causes addressed.

The investigation has also identified six learning points for the railway industry:

- the first two learning points warn duty holders and railway staff of the dangers of being in close proximity to railway vehicles
- the third learning point reminds duty holders that authorised walking routes must be made known to staff
- the fourth learning point reminds duty holders of the importance of assessing the capacity of depots relative to the operational demands placed on them to ensure that they can be operated safely
- the fifth learning point is that results from brake tests and other safety critical examinations are routinely checked and understood by competent staff
- the sixth learning point covers the importance of screening staff members involved in accidents for the presence of drugs or alcohol in accordance with the relevant procedures.

Introduction

Key definitions

- 1 Metric units are used in this report, except when it is normal railway practice to give speeds and locations in imperial units. Where appropriate the equivalent metric value is also given.
- 2 The report contains abbreviations and acronyms. These are explained in Appendix A. Urgent Safety Advice issued by RAIB during the investigation is contained in Appendix B.

The accident

Summary of the accident

- 3 At around 20:00 hrs on Saturday 14 December 2019 at Tyseley traction maintenance depot, Birmingham (figure 1), a train driver (referred to as Driver A in this report) was passing between two closely spaced trains. As he was doing so, one train was moved towards the other as part of a coupling operation being undertaken by a second driver (referred to as Driver B).
- 4 Driver A received fatal injuries as a result of becoming trapped between the trains. Other railway staff involved in the accident and its aftermath suffered considerable emotional trauma.

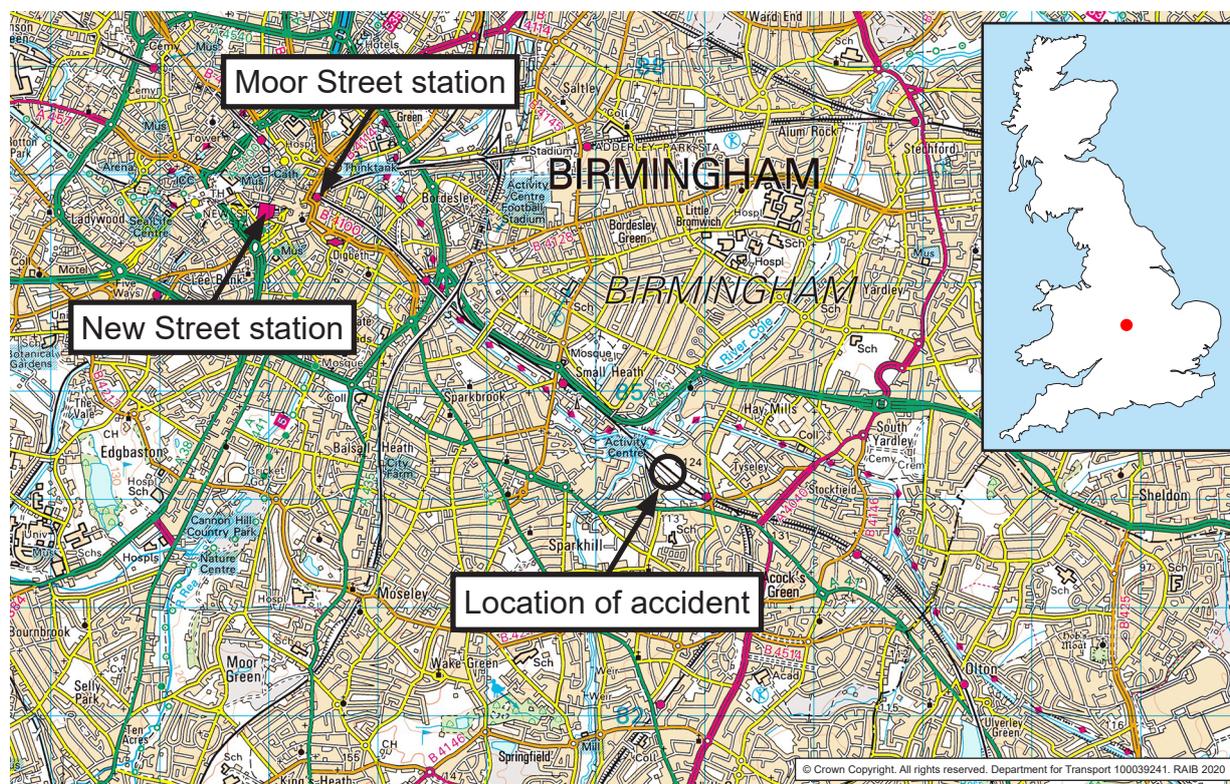


Figure 1: Extract from Ordnance Survey map showing location of the accident

Context

Location

- 5 Tyseley traction maintenance depot is located approximately 3 miles (4.8 km) to the south-east of Birmingham city centre (figure 1). The depot is adjacent to the main line railway which runs from Birmingham Moor Street station towards Solihull and on to London. Tyseley depot is used for the maintenance and servicing of diesel multiple unit (DMU) passenger trains. The depot is a large complex which comprises three main areas (figure 2):
 - the carriage sidings, the area in which the accident occurred
 - the factory, a large building used for the maintenance and overhaul of DMUs

- Tyseley Locomotive Works, a privately-owned facility used for the restoration and operation of heritage vehicles.

The carriage sidings and the factory area are managed by West Midlands Trains (WMT). The locomotive works are managed and operated separately from the remainder of the depot and played no part in the accident.

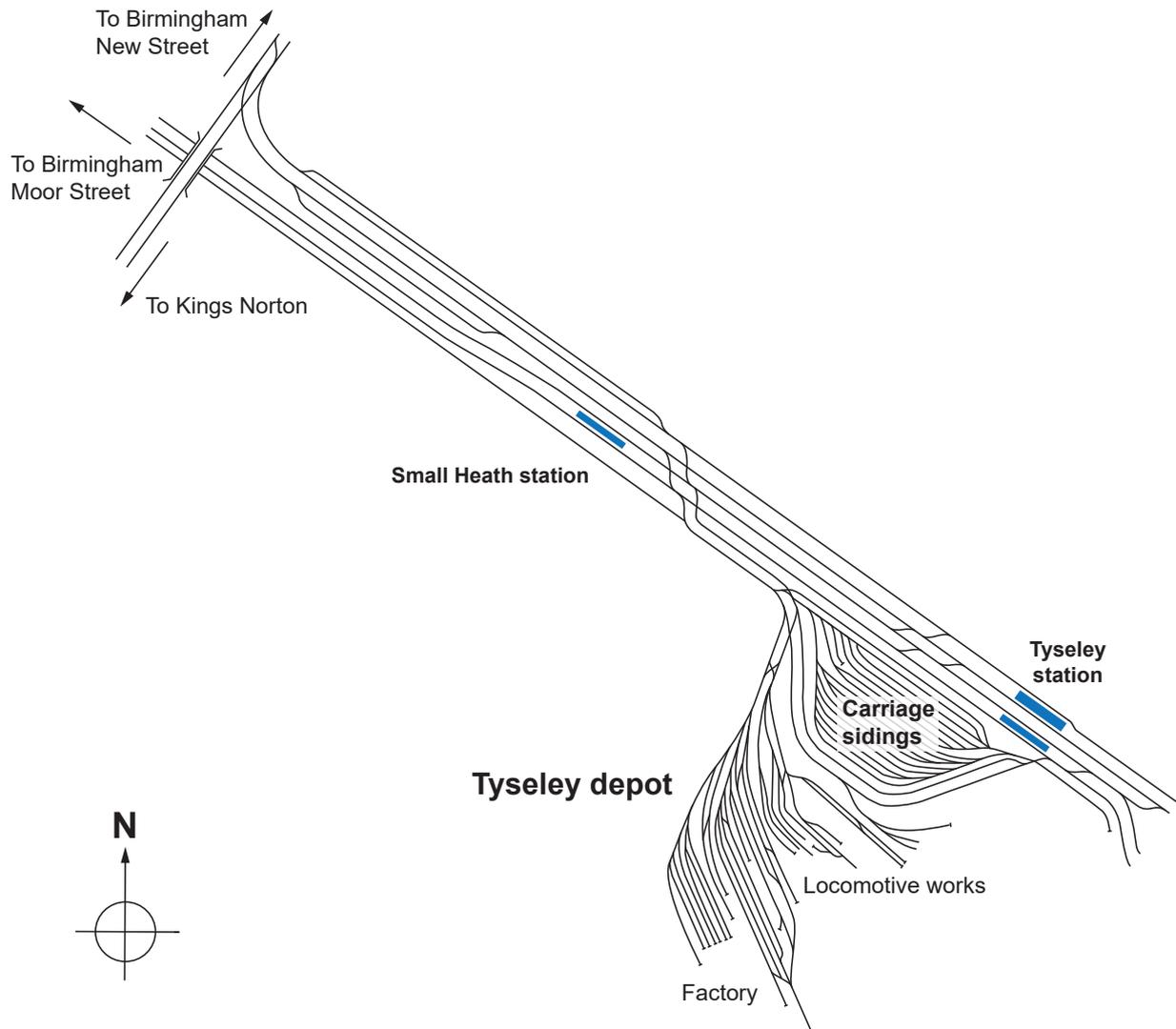


Figure 2: Schematic diagram of railway lines in the Tyseley area and the different sections of the Tyseley depot site

- 6 The carriage sidings at Tyseley depot consist of 15 parallel tracks (figure 3). These are numbered 1 to 15, with number 1 siding being closest to the main railway line. The sidings may be accessed from either end of the depot. Trains may enter or leave the depot at either its north (Birmingham) or south end.

Organisations involved

- 7 The infrastructure at Tyseley depot is owned by Network Rail. Network Rail also employs the signaller at Tyseley No.1 signal box.



Figure 3: The carriage sidings at Tyseley depot. Locations pertinent to the accident are indicated

- 8 Tyseley depot is leased from Network Rail by WMT, which is the depot operator. WMT has been the train operating company responsible for local train services in the West Midlands since December 2017 under the brand name 'West Midlands Railway'. WMT is also responsible for operating some train services to London under the brand name 'London Northwestern Railway'.
- 9 WMT employs all the staff directly involved in the accident and is also the operator of all the trains involved.
- 10 All parties freely co-operated with the investigation.

Trains involved

- 11 The trains involved in the accident were both Class 172 DMUs (figure 4). The design and maintenance of the trains played no part in the accident.

Staff involved

- 12 Driver A started railway employment in 1985. He had been working as a train driver for WMT and previous train operators since 1997. He typically drove trains on the Birmingham Cross-City line, but he also drove to other destinations served by WMT. Driver A was based at Birmingham New Street station.
- 13 Driver B started railway employment in 1974 and has been working as a train driver since 1979. Since around 2000, he had been restricted to driving trains within Tyseley depot (paragraph 98) and was permanently based at the depot as a result.

External circumstances

- 14 Evidence from CCTV, witnesses and local weather station data confirms that it was raining very heavily at the time. The weather conditions may have been a factor in the accident (paragraph 79).



Figure 4: A Class 172 DMU

- 15 Although it was a dark winter evening, the carriage sidings at Tyseley depot are well-lit and there was no evidence to suggest that depot lighting conditions played any part in the accident.
- 16 The investigation found that the authorised walking routes¹ (AWRs, see paragraph 45) in the depot are maintained in generally good order. These walking routes are marked and are clearly distinguishable from the surrounding ground. RAIB did not find any evidence to suggest that the condition of these walking routes played any part in the accident.
- 17 The accident occurred in the period immediately before Christmas 2019. Birmingham city centre was busy with seasonal crowds and this caused some road traffic congestion on the day of the accident. This may have been a factor in the accident (paragraph 78).

¹ A designated safe pedestrian route provided for railway staff to go to and from their place of work*. This and other definitions marked with an asterisk have been taken from 'Ellis's British Railway Engineering Encyclopaedia' © Iain Ellis <http://iainellis.com/>.

The sequence of events

Events preceding the accident

- 18 Driver A started work on the day of the accident at 14:48 hrs, when he booked on at the WMT traincrew facility at Birmingham New Street station. He then drove trains to Lichfield, Bromsgrove and Four Oaks, before returning to Birmingham New Street for a planned break at 18:48 hrs. This was seven minutes later than planned, due to a delay in the journey to Four Oaks. Apart from this short delay, Driver A's working day up until his break appears to have been normal and uneventful.
- 19 Witness evidence indicates that Driver A spent his break in the traincrew facility at Birmingham New Street station. A colleague who spoke with Driver A as he left to resume driving found him to be in good spirits and his usual self.
- 20 Driver A's first planned work after the break was to drive train reporting number 5H76 from Birmingham New Street to Tyseley depot. This was an empty train formed of a two-car Class 170 DMU, number 170501. It was scheduled to leave Birmingham New Street station at 19:39 hrs, but departed at 19:43 hrs.
- 21 Driver B started work on the day of the accident at 19:00 hrs at Tyseley depot. He booked-on by telephoning the Duty Train Crew Manager at Birmingham New Street. This is the normal method of booking-on for drivers permanently allocated to driving trains at Tyseley.
- 22 At 19:43 hrs, Driver B boarded a train which was stabled on number 14 siding within the fuel pit area (paragraph 35, figure 3). He moved this train via the south end of the depot and left it stabled on number 3 siding.

Events during the accident

- 23 At 19:58 hrs, depot CCTV shows Driver B crossing from number 3 siding to number 15 siding north of the fuel pit area and towards where two three-car Class 172 DMUs were stabled. Of these two DMUs, unit 172343 was at the northern end of the siding, with unit 172344 positioned just to the south. Although the units were close together, they were not coupled to each other and there was a small gap between them.
- 24 Driver B decided to couple the two trains together (paragraph 100). At 19:59 hrs, depot CCTV shows him climbing into the southern cab of unit 172343. He then started the engines on the unit in preparation for coupling.
- 25 At around the same time as Driver B started the engines, Driver A brought train 5H76 to a stand at a stop board on number 13 siding (paragraph 37). Train 5H76 was originally scheduled to arrive at 19:53 hrs but had been slightly delayed awaiting the acceptance of a preceding train onto the depot.
- 26 After train 5H76 came to a stand, depot CCTV shows Driver A leaving its cab from the non-driver's side cab door. He can then be seen walking across number 14 siding towards number 15 siding and in the direction of the gap between the two Class 172 units which were about to be coupled by Driver B. At approximately 20:00 hrs, Driver A moved into the gap between unit 172344 and unit 172343.

- 27 Shortly after Driver A moved into this gap, Driver B attempted to couple the two trains by moving unit 172343 towards unit 172344. He found, however, that the units would not couple together. After approximately ten seconds Driver B attempted to couple the units for a second time but was still unable to do so.
- 28 Following the second failed attempt at coupling, Driver B opened the cab door of unit 172343 and climbed down to investigate. He looked into the gap between the two trains and found that Driver A was trapped between their gangways (paragraph 34) and facing towards unit 172343. Driver B immediately returned to unit 172343 and reversed it a short distance to release Driver A. Driver B then called the depot's Operations Team Leader and advised him of the accident. The Operations Team Leader called the emergency services and summoned a first aider from the depot factory area.
- 29 Driver A was attended to by the first aider until the arrival of the ambulance service.

Events following the accident

- 30 WMT on-call managers arrived at the depot from approximately 20:30 hrs to ensure the welfare of the staff who had been involved in the accident and its immediate aftermath. The depot was closed to train movements until approximately 23:00 hrs on the night of the accident.

Analysis

Background information

Class 172 DMUs and their coupling arrangements

- 31 WMT operate three types of Class 172 DMU. Both units involved in the accident were of the Class 172/3 type. These are three-car units, provided with through gangways. They also have a door at each side of the driver's cab to allow for crew access.
- 32 Class 172 units are fitted with BSI autocouplers.² These allow compatible units to be coupled together by a driver without the need for intervention from staff on the ground. Key components of the BSI autocoupler are shown in figure 5. The upper and lower guide horns ensure the alignment of the couplers as they come together. The uncoupling lever is part of the system which mechanically locks the trains together when they are coupled.

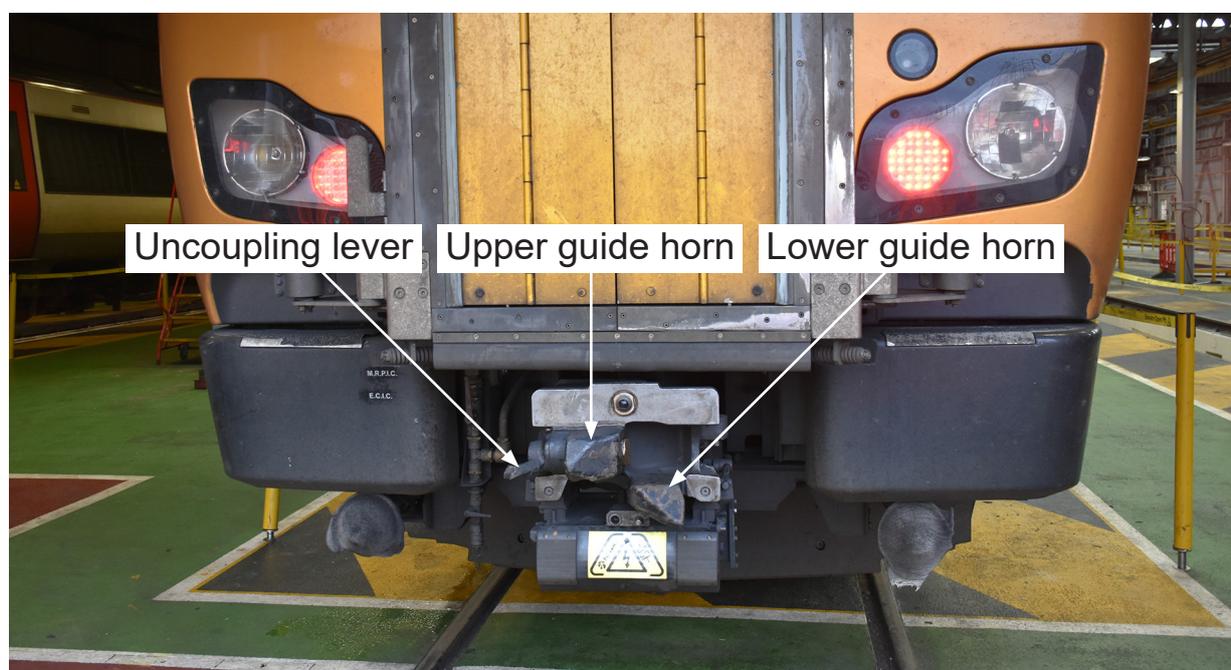


Figure 5: BSI autocoupler fitted to Class 172 unit

- 33 Although BSI autocouplers are generally reliable, units sometimes fail to couple correctly, generally due to misalignment between the autocouplers. In this event, drivers are trained to make a second attempt and to investigate the cause only if this also fails.
- 34 The gangway on a Class 172/3 unit is mounted immediately above the autocoupler. Gangways are pressed together by springs when the trains are coupled, and folding doors are then opened to allow passage between the units.

² A device which simultaneously couples two rail vehicles together mechanically, electrically and pneumatically. BSI stands for 'Bergische Stahl Industrie', the original designer and supplier of this type of coupler.

Control of train movements

- 35 Sidings 13, 14 and 15 serve an area of the depot known as the fuel pit (figure 3). In this area, trains are refuelled, water tanks replenished, and toilet systems emptied. Basic maintenance checks are also carried out on trains in this part of the depot. Once work is completed on a train in the fuel pit area, it will be moved, normally via the south end of the depot yard, onto one of the other carriage sidings (numbers 2 – 12) for cleaning and preparing for entry into service. If further maintenance or repair work is required, the train concerned will be moved to the factory building instead.
- 36 Most trains arrive at Tyseley depot from the north (Birmingham) end. Their approach to the depot on Network Rail infrastructure is controlled by Tyseley No.1 signal box. When a train is expected to enter the depot, the signaller in this box will contact the depot's North End Shunter. This individual is employed by WMT and takes responsibility for the trains as they enter the depot area. The shunter works under the supervision of the depot's Operations Team Leader.
- 37 Almost all trains arriving at the depot pass through the fuel pit. Trains arriving onto numbers 13, 14 or 15 sidings are directed by the North End Shunter along one of these sidings using manually operated points. Once on these sidings, drivers are required to stop their trains at stop boards (figure 6) located to the north of the fuel pit. This is to ensure that trains enter the fuel pit in a controlled way. The boards are positioned to ensure that trains stabled on sidings 13, 14 or 15 do not interfere with movements on other sidings. Once stabled, only the designated person³ for the fuel pit can authorise a driver to bring a train into that area. In the event that the designated person does not immediately authorise an arriving train to proceed beyond the stop board, then the driver of an arriving train will normally stable their train adjacent to the stop board, and then leave the train cab. The area north of the stop boards, including that where the accident occurred, remains under the control of depot operations staff.
- 38 Train movements around the depot are documented by two procedures. These are:
- Procedure TS-SP-10 'Depot Protection', Issue 5, April 2018. This covers how trains are moved into and within protected areas such as the fuel pit and the factory.
 - Procedure LM-DOI-TS-001 'Tyseley depot operating instructions', Issue 2, August 2015. This covers the movement of trains outside protected areas, including the area where the accident occurred.

Competency management process for train drivers

- 39 WMT trains and assesses drivers on a number of different areas of professional knowledge. In summary, these are:
- How to drive specific types of trains ('traction knowledge'), including an understanding of each type's technical systems and fault handling.

³ A 'designated person' is an individual trained and authorised to carry out a specific task. In this case, the designated person is a member of the maintenance staff at Tyseley depot who is authorised to instruct drivers to proceed past the stop boards and bring trains onto the fuel pit itself.



Figure 6: View looking south towards the fuel pit. Number 15 siding is on the right and a 'stop board' is indicated

- The routes on which a driver will operate ('route knowledge'). This includes signal locations, stopping points at stations and locations which pose hazards (such as low adhesion sites).
 - The parts of the railway Rule Book (GE/RT8000) applicable to train drivers.
 - Personal track safety, including how drivers are expected to keep themselves safe within areas such as sidings or maintenance depots or where they need to leave a train other than at a station.⁴
- 40 WMT manages and verifies the competence of its train drivers by means of procedure OPS33 'Competence management of senior conductors, train dispatch staff, shunters and drivers', issue 3 of which was published in November 2018.
- 41 For experienced drivers this procedure uses a competence management process that operates on a two-year cycle. During each cycle, a driver will be subject to:
- Three formal driving assessments (FDA) which involve an assessor travelling with a driver and providing feedback to them on their performance during the assessment
 - Three on-train data recorder (OTDR) assessments, where the assessor will download the OTDR from a train following a journey, assess the data against various parameters and later provide feedback to the driver.

⁴ Such an action may be required to investigate a train fault, or in the event of an emergency.

- 42 The OPS33 competence management system contains modules that cover different topics. Over the course of the two-year cycle, drivers demonstrate competency in all the required modules. Modules within OPS33 relevant to the accident include:
- module 2.1a – use of correct walking routes within depots
 - module 2.2a – shunting moves to be authorised
 - module 2.2c – process for coupling DMUs.
- 43 The nature of FDA and OTDR assessments means that it is unlikely that a driver will be assessed on every type of traction and on every route which they are deemed competent to operate. Therefore, at the end of each two-year cycle, a driver will undergo an additional summary assessment and re-certification day. This permits a driver's manager to review the FDA and OTDR assessments already undertaken and to identify any gaps in assessment or areas of possible weakness. Drivers are then required to answer written questions which assess their knowledge of these areas.
- 44 The written assessment also examines a driver's knowledge of the Rule Book and personal track safety. This assessment included verification of a driver's knowledge of the AWRs (paragraph 45) in and around locations which a driver may visit, including depots. The personal track safety competence used by WMT was based solely on issue 6 of Module G1 of the railway Rule Book, issued in September 2015⁵ (paragraph 88). This module is applicable to staff such as train drivers, signallers and platform staff. It is not used by individuals whose duties may require them to regularly work on the track.

Authorised Walking Routes

- 45 Tyseley depot, in common with most railway locations, has a network of defined AWRs. These routes provide safe walkways for staff to use when carrying out their duties. The network of AWRs at Tyseley depot and the process for informing staff of their locations is discussed further at paragraph 67.

Identification of the immediate cause

46 Driver A was trapped between two closely spaced trains when one of the trains was moved towards the other.

- 47 Witness and CCTV evidence shows that Driver A became trapped between the two trains as a result of unit 172343 being moved while Driver A was passing through the gap between it and unit 172344.
- 48 Analysis undertaken by RAIB indicates that Driver A was almost certainly positioned between the release levers and upper guide horns of the two autocouplers when he became trapped.

⁵ GE/RT 8000 Rule Book Module G1 'General safety responsibilities and personal track safety for non-track workers', Issue 6, September 2015.

- 49 CCTV shows that approximately three seconds elapsed between Driver A moving between the two Class 172 units and the first movement of 172343 (paragraph 27). It is probable that the size of the initial gap between the units (paragraph 81) meant that he had to turn to face one of the units to get through the gap between the trains. This accords with Driver B's account of the position of Driver A when he was discovered (paragraph 28) and is also supported by the location of the injuries that he sustained (paragraph 48).
- 50 CCTV shows that Driver A was carrying his work issued backpack on his right shoulder as he crossed the sidings. After this accident, this backpack was found to have a large tear in it, with the size of the tear suggesting that the damage was probably sustained at the time of the accident. It is possible that the backpack snagged on a part of one of the units and that this delayed or obstructed Driver A as he passed through the gap. It is also possible, however, that the damage to the backpack was caused when unit 172343 was moved to release Driver A after the accident (paragraph 28).

Identification of causal factors

- 51 The accident occurred due to a combination of the following factors:
- Driver A moved between the two trains (paragraph 52)
 - Driver B moved a train when Driver A was in close proximity to it (paragraph 97).

Each of these factors is now considered in turn.

The actions of Driver A

52 Driver A moved between the two trains.

- 53 Driver A was a very experienced train driver (paragraph 12). He predominantly drove trains on the mainline network, although his duties required him to bring trains to and from Tyseley depot from time to time. Witness evidence indicated that Driver A was well-known to depot operations staff at Tyseley and analysis of his roster indicates that he had worked trains at this depot on three occasions during December 2019 prior to the accident. Driver A's route knowledge (paragraph 39) did not cover the entirety of the depot. This meant that he was permitted to bring trains onto the depot from the north end up to, but not beyond, a signal located to the south of the fuel pit area.
- 54 In March 2017 Driver A was suspended from driving following an incident when a train which he was driving passed a signal at danger by one coach length. He was placed on a competence development plan (CDP) and returned to driving trains in November 2017. The CDP meant that his driving was subject to additional checks beyond those in WMT's standard two-yearly competence management cycle (paragraph 40). He received a total of 17 assessments between November 2017 and the date of the accident. Except for a minor speeding incident, none of these assessments raised any concerns or identified any unsafe behaviours on the part of Driver A. His manager stated that he had responded well to the CDP, and that the additional assessments required did not appear to be causing Driver A any concerns.

- 55 In June 2018, Driver A had his biennial assessment and re-certification day (paragraph 43). This included questions intended to verify his knowledge of routes associated with Tyseley depot. He was also assessed against WMT's personal track safety competence (paragraph 44). Driver A achieved a 100% score for all these assessments.
- 56 The night of the accident was Driver A's second shift following a day off. His rostered hours on the day of the accident were 14:48 to 23:59 hrs. Analysis of his roster by RAIB, and witness evidence, indicate that it is unlikely that fatigue played any significant role in his actions at the time of the accident.
- 57 Driver A's last medical assessment was on 24 September 2019. This did not identify any medical conditions or prescribed medication which might be relevant to the accident. There is also no evidence that Driver A was distracted due to using a mobile telephone or other portable device or by any issues outside his work. Post-mortem tests showed that Driver A did not have any alcohol or drugs in his body at the time of the accident.
- 58 RAIB has concluded that Driver A passed between the trains because:
- a) he did not use an AWR to cross the yard (paragraph 59)
 - b) it is almost certain that Driver A did not expect either of the trains to move as he passed between them (paragraph 80).

Each of these is now considered in turn.

Use of a safe route

59 Driver A did not use an AWR to cross the yard.

- 60 After bringing train 5H76 onto Tyseley depot, Driver A's next scheduled activity was to be conveyed by taxi back to Birmingham New Street. He would then pick up his next train, which was due to depart from there at 21:01 hrs. The taxi was arranged by WMT as part of the driver's work diagram and it arrived at the standard pick-up location used by drivers for such journeys at 19:57 hrs.
- 61 This pick-up location (figure 7) is some way from the carriage sidings at Tyseley and Driver A could have taken a number of possible routes to reach it. All of them involved first crossing the yard to reach the stairs (figure 8), which provided the only passage from the carriage sidings to the pick-up location.
- 62 Three possible routes (figures 8a and 8b) were available to Driver A to cross the yard from the location on number 13 siding where he stabled train 5H76 to the top of the stairs. These were:
- the route which Driver A attempted to take (figure 8b) and which would have involved walking 135 metres to the top of the stairs. This route required the driver to pass between the two units involved in the accident before he could join an AWR
 - a second, slightly shorter route, of 130 metres which mainly comprised AWRs. This route was not available to Driver A because the southern-most coach of unit 172344 was obstructing the authorised walking route where it crossed number 15 siding
 - a third route of 200 metres, which used only those AWRs which were not obstructed at the time of the accident. This route predominantly used an AWR between numbers 12 and 13 sidings.

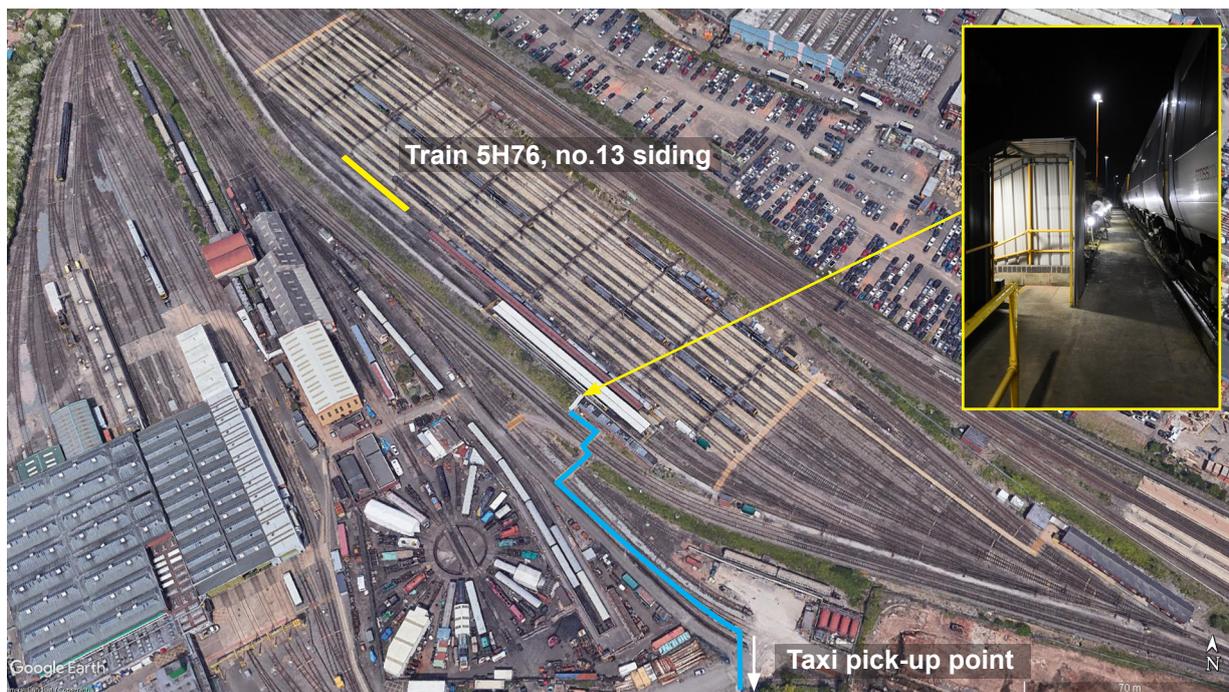


Figure 7: Tyseley depot carriage sidings, showing the location of train 5H76, and the route from the fuel pit to the taxi pick-up location

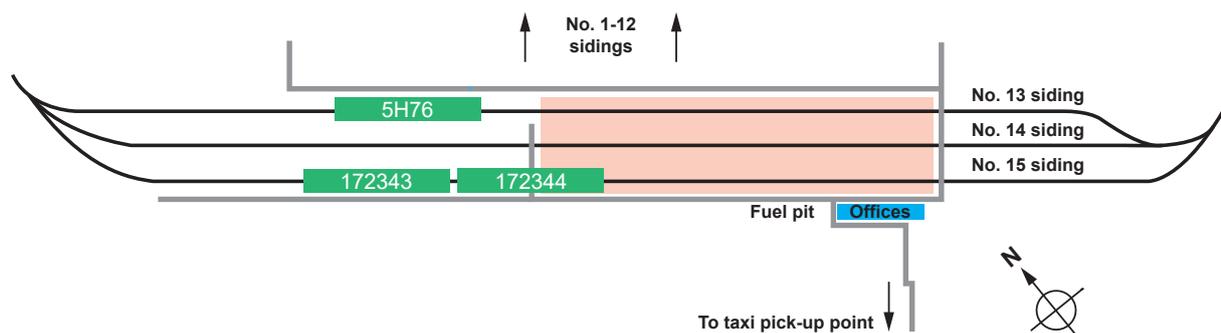


Figure 8a: AWRs in the vicinity of the stabled location of train 5H76

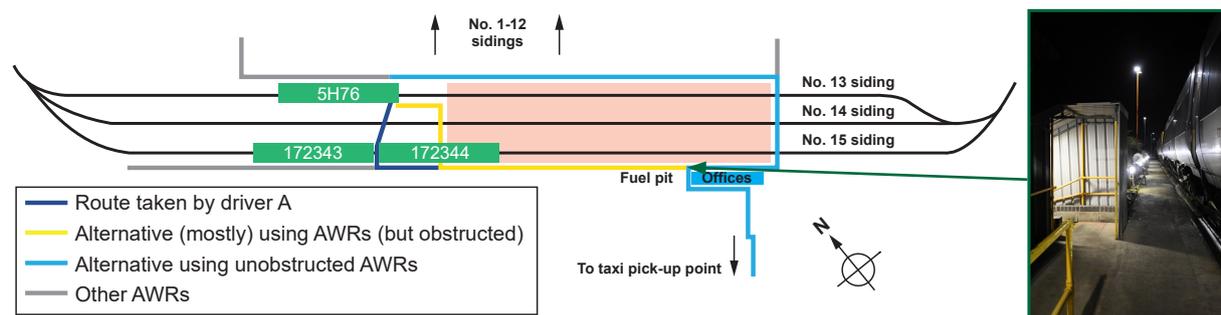


Figure 8b: The various possible routes available to Driver A between his train (5H76) and the top of the stairs leading to the taxi pick-up location

63 RAIB has identified several reasons why Driver A may have decided to use the first of these routes:

- he may have chosen it because the second, most direct, route was blocked by a train
- he may have been unaware of the location of the AWRs in the depot

- he may have been subject to other factors which influenced his decision.

Each of these is now considered in turn.

The most direct route was blocked

64 Unit 172344 (paragraph 23) arrived at Tyseley depot at approximately 19:15 hrs on the night of the accident. The North End Shunter directed the train onto number 15 siding. However, because another unit was already occupying the fuel pit, unit 172344 was stabled in a way that meant it obstructed the AWR which crossed number 15 siding (figures 8a and 9). Although a gap remained between unit 172344 and this other train, there is an inspection pit⁶ immediately to the south of the obstructed AWR which would have prevented Driver A from crossing there.



Figure 9: Trains positioned as at the time of the accident during the RAIB reconstruction. The obstructed walking route across number 15 siding is indicated.

- 65 Witness evidence indicated that trains were regularly stabled with only narrow gaps between them on number 15 siding. This was because of the need to avoid fouling the entrance to the sidings and to maximise depot capacity, which was often constrained (paragraph 119). Witness evidence also indicated that the obstruction of the authorised walking route across number 15 siding by trains was a regular occurrence. The depot operations manual (paragraph 38) did not prohibit this practice or provide any guidance about the need to keep authorised walking routes clear.
- 66 As he brought train 5H76 onto the depot and left the cab, Driver A would have had a clear view of the trains stabled on number 15 siding (figure 10), and he would have been able to see that a train was blocking his most direct route to the stairs. It is probably the case that his subsequent choice of route across the yard to the stairs was influenced by this knowledge.

⁶ An inspection pit is used by maintenance staff to access the underside of vehicles.



Figure 10: CCTV still from camera mounted on the rear of a train stabled on number 14 siding within the fuel pit area. View is looking towards the north. Driver A is indicated, along with his train (5H76) stabled on number 13 siding.

Awareness of the AWRs around Tyseley depot

- 67 Maps showing the AWRs at Tyseley depot (paragraph 45) were displayed in notice cases at the depot itself and in information provided to drivers at the WMT traincrew facility at Birmingham New Street (figure 11). However, the maps provided at the depot and at Birmingham New Street were different to each other. WMT advised RAIB that it was the map on display at Birmingham New Street which contained incorrect information, but it was unclear to managers at WMT how this error had occurred, or what the process was at the time of the accident for agreeing the AWRs at the depot.
- 68 Driver A was familiar with Tyseley depot (paragraph 53) and his FDA assessments (paragraph 41) included a section in which the assessor was required to verify his knowledge of the AWRs encountered during the assessment. However, none of the FDA assessments of Driver A during the two-year cycle preceding the accident included Tyseley depot or any other maintenance depots. WMT managers stated that the assessment of a driver's knowledge of AWRs during an FDA would typically cover the walk from the Birmingham New Street driver's facility, through the public area of the station, and onto the platform to the train. This meant that a driver's knowledge of depot AWRs was normally only verified during the biennial assessment and re-certification day (paragraph 43).

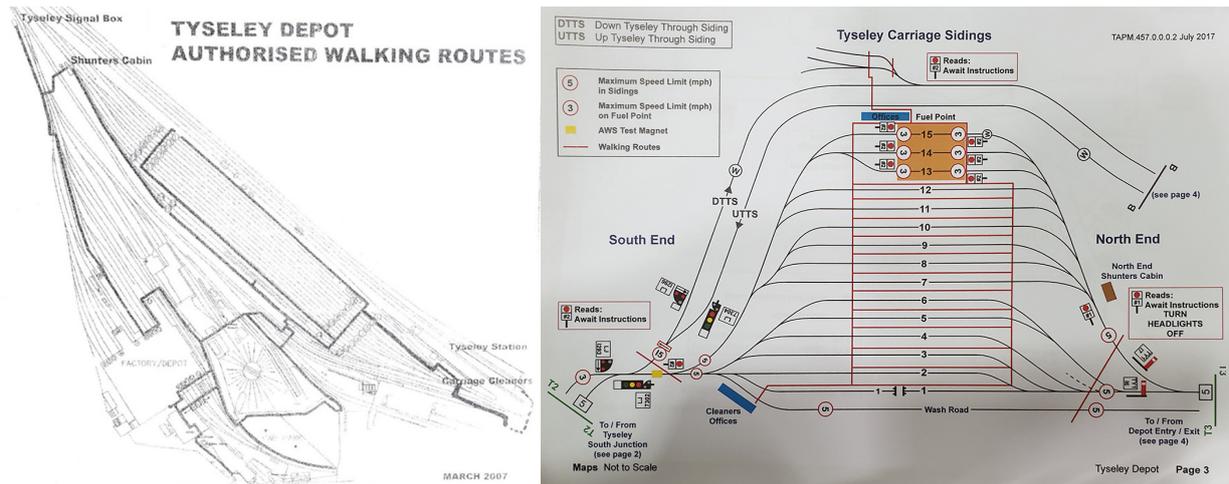


Figure 11: Maps showing the AWR maps as displayed at Tyseley (left) and at Birmingham New Street (right)

- 69 RAIB found that, while the biennial assessment and re-certification day included questions about Tyseley depot and the railway lines leading to the depot, no questions were asked about the actions drivers should take once they had alighted from their trains at the depot. Although the biennial assessment day included a generic question about authorised walking routes, it included no specific questions about the AWRs around Tyseley depot (although there was a specific question about an AWR at another depot operated by WMT in Birmingham).
- 70 RAIB has therefore concluded that WMT's competence management system did not adequately establish if drivers were familiar with the AWRs around Tyseley depot. While Driver A was familiar with the depot (paragraph 53), it is possible that he lacked knowledge of some of the AWRs around the depot and that this influenced his decision as to the route to take across the yard.
- 71 Although not causal to the accident, RAIB noted that the path Driver B used to reach number 15 siding (paragraph 23) also did not involve the use of an AWR.

Other factors

Leaving by the non-driver's side cab door

- 72 Driver A chose to leave train 5H76 by the non-driver's side cab door. Had he left the train by the driver's side door, he would have got down onto a wide and well-marked AWR which runs between numbers 12 and 13 sidings (paragraph 62). It is possible in this event that he would have continued to follow this walking route and crossed over the yard to reach the stairs via the south end of the fuel pit. This would have avoided him attempting to pass through the gap between the trains on number 15 siding.
- 73 There is no requirement that drivers should use a specific door when leaving trains. Observations by RAIB suggest that many drivers prefer to use the non-driver's side to enter or leave this type of train, as this avoids the obstruction presented by the fixed driver's seat (figure 12).



Figure 12: Class 170 cab, viewed looking in from non-driver's side

The layout of the AWRs

- 74 Most trains arriving at Tyseley depot use numbers 13, 14 or 15 sidings with many being stabled at the stop boards (paragraph 37). This means that drivers will often alight from trains in this area. Despite this, at the time of the accident, AWRs only existed between numbers 12 and 13 sidings, and to the west of number 15 siding. No AWR existed between 13 and 14 sidings, or between 14 and 15 sidings (figure 6).
- 75 This lack of AWRs may also have influenced Driver A's choice of route because he got down from the train into an area (between number 13 and 14 sidings) where no AWR was provided. Had an AWR existed at this location, then it is possible that Driver A might have chosen to follow a different route across the yard.

Perceived time pressure

- 76 Driver A brought his train onto Tyseley depot at 19:59 hrs, 6 minutes behind schedule (paragraph 25). He knew that he had to meet a taxi and travel back to central Birmingham in time for his next train to depart at 21:01 hrs (paragraph 60). The taxi journey was a pre-planned and routine operation that was set out on his diagram card.⁷

⁷ The diagram card is a document provided to drivers on a daily basis which sets out their day's activities. It will include details of the trains to be driven, rest periods, and (as in this case) any operations such as taxi journeys required to transport drivers from one location to the location of the next activity.

- 77 On the night of the accident, the taxi was already waiting for Driver A (paragraph 60). However, there was evidence that taxis would always wait for their planned driver pick-up, regardless of how late a train driver might be to reach them, and RAIB found no evidence of concerns from other train drivers that taxis would not wait to collect them if they were late.
- 78 The roads in central Birmingham were very busy on the night of the accident (paragraph 17) and it is probably the case that Driver A would have been aware of this. The road journey from the depot to Birmingham New Street station typically takes 15 to 20 minutes, but other drivers reported that journeys on the night were taking up to 45 minutes due to the congested roads. However, neither WMT's control logs nor the records held by the taxi company WMT used to transport drivers show any issues with drivers failing to meet their next planned turns of duty because of these extended times. Despite this, it remains possible that Driver A's knowledge of the road congestion and extended journey times to Birmingham New Street created a time pressure on him. This in turn may have influenced his choice of route across the yard.

Heavy rain

- 79 It was raining very heavily at the time of the accident (paragraph 14). Driver A left train 5H76 at a location where there was no protection from the weather, and it is possible that his decision as to which route to take was influenced by a desire to find shelter as quickly as possible. RAIB considers it is more likely in this case that Driver A would have used the third route available to him (paragraph 62) as this was covered by shelters and largely protected from the weather. However, it remains possible that the driver was unaware of this route and the shelter that it offered (paragraph 70) and that the heavy rain consequently affected his decision making.

Passing between the two trains

80 It is almost certain that Driver A did not expect either of the trains to move as he passed between them.

- 81 RAIB carried out a reconstruction of the accident at Tyseley depot. Using CCTV images from the night of the accident as a reference, trains of the type involved in the accident were positioned in the same locations (figure 13). From this reconstruction, RAIB determined that the gap between the gangways of the units prior to the first coupling movement was approximately 540 mm and that the gap between the horns on the autocouplers (paragraph 32) was approximately 350 mm (the coupler horns are offset when two trains face each other).

Driver A's awareness of Driver B's actions

- 82 CCTV evidence suggests that Driver A may have been able to see Driver B crossing the yard towards number 15 siding (paragraph 23) as he drove train 5H76 into the yard. However, RAIB considers it unlikely that Driver A would have seen Driver B climb into the cab of unit 172343. This is because Driver A's attention is more likely to have been focused on the required stopping point for his train, and because he would not have had a clear line-of-sight to the location of Driver B as he boarded.



Figure 13: Trains on number 15 siding as positioned during the RAIB reconstruction. Inset shows the gap between the two Class 172 units

83 The reconstruction (which was carried out in daylight), showed that it was very unlikely that Driver A would have been able to see Driver B in the cab of unit 172343 after Driver A left train 5H76. Driver A's visibility of Driver B would probably have been further reduced on the night of the accident, because of the weather conditions and because the interior light in the cab of unit 172343 was not on at the time of the accident.

Indications available to Driver A of the imminent train movement

84 Driver B had to start the engines on unit 172343 before he was able to move the train (paragraph 24). A comparison of OTDR data from unit 172343 and CCTV images of the yard indicates that Driver A was still in the cab of his train when this occurred. Driver A would therefore probably have been unable to hear the engines starting on the other unit.

85 Driver B did not sound the train horn on unit 172343 before he attempted to couple the trains together. While depot operating instructions (paragraph 38) require that drivers use a 'single short soft blast' on the horn before carrying out certain movements on the depot, such as entering the factory building, they did not require a similar measure prior to the coupling movement that Driver B was undertaking.

86 Witnesses told RAIB that there was a general reluctance to use train horns before movements at Tyseley depot, because of a perception that a 'noise abatement order' was in place. However, RAIB has confirmed that no such order exists for the depot.

87 It is probable that, had Driver B been required to sound the train horn before moving unit 172343 and done so, Driver A would have been alerted that a movement was going to take place. Depending on timing, this would almost certainly have led to him deciding not to pass between the two trains, or possibly allowed him to move clear had he already moved into the gap.

Applicability of Rules

88 Driver A had his biennial assessment and re-certification day in June 2018 (paragraph 43). This included an assessment of his knowledge of personal track safety for which Driver A achieved a 100% score. The WMT personal track safety training and competency assessment was based solely on module G1 of GE/RT8000 (paragraph 44) which contained no warnings about the dangers of crossing between closely stabled trains.

89 Historically, the railway Rule Book included an explicit warning about the dangers of going between closely spaced trains. The Rule Book issued in 1972, as reprinted and reissued in June 1988 contained rule B3.1.4.k which stated '*When on or near the line, an employee must not go under any stationary vehicle or cross the line within 50 feet (or 15 metres) of stationary vehicles unless there is clearly no possibility of them moving.*'

90 From around 1987, British Rail required that staff, including train drivers, whose duties required them to work on or around railway lines held a personal track safety competence. Various documentation was developed to support this competence.

91 Rule B3.1.4.k was removed from the Rule Book in 1995, because it was considered that the rule was duplicated by the personal track safety competence and the documentation developed in support of it.

92 Railway Group standard GO/RT 3353⁸ confirmed the requirement for staff to hold a personal track safety competence in 1995. Each railway duty holder (for example, track maintenance companies or train operating companies) then developed its own documentation in support of this competence, based on the requirements of GO/RT3353. This standard was superseded by GE/RT 8067⁹ in 2002. Both GO/RT3353 and GE/RT8067 required the necessary knowledge of 'moving and stationary vehicles' to be assessed as part of the requirements to establish competence in personal track safety.

93 GE/RT8067 was withdrawn without replacement in 2007, because the contents did not relate to interfaces between railway duty holders and were felt to be duplicated by broader legal requirements. This removed the last reference in either Railway Group standards or the Rule Book concerning the dangers of crossing tracks between vehicles standing close together.

94 Driver A was a very experienced train driver (paragraph 12) and is likely to have been aware of the risk involved in passing between vehicles. However, RAIB has concluded that WMT's reliance on module G1 as the sole source of personal track safety training and competency assessment meant that its competence management system did not adequately establish if drivers were aware of the risk of passing between or close to the end of stationary rail vehicles and the correct actions to take to address this risk.

⁸ GO/RT 3353 '*Personal Track Safety*', Issue 1, April 1995.

⁹ GO/RT 8067 '*Personal Track Safety*', Issue 1, October 2002.

- 95 The Rule Book (GE/RT8000) is managed by RSSB.¹⁰ RSSB standards (including the Rule Book) are governed by the Railway Group Standards Code RGSC01¹¹ and the Standards Manual RGSC02.¹² These governing documents state that such standards (including GE/RT8000) apply to the ‘mainline railway’. RGSC01 states that ‘Mainline Railway has the meaning given to it in the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS)’. As the definition given in ROGS excludes maintenance depots, the requirements of GE/RT8000 are not applicable to Tyseley or other depots.
- 96 During the course of this investigation, RAIB became aware that a number of duty holders in addition to WMT held the view that GE/RT8000 applied within maintenance depots and that the use of GE/RT8000 module G1 was sufficient to train and assess drivers in personal track safety. For these reasons, RAIB issued and published Urgent Safety Advice on this topic on 3 March 2020 (Appendix B).

The actions of Driver B

97 Driver B moved a train when Driver A was in close proximity to it.

- 98 Driver B was also a very experienced train driver (paragraph 13). Since 2000, he has only driven trains within Tyseley depot. He held the necessary competency certifications for this role and his competency assessments were up-to-date at the time of the accident. None of his recent assessments had indicated any concerns about his competence or behaviours although he had been subject to a minor safety report concerning the wearing of personal protective equipment. His last medical assessment was on 15 January 2019, and this did not identify anything of relevance to the accident.
- 99 The night of the accident was Driver B’s fourth night shift following two days off. His rostered hours of duty were from 19:00 hrs to 05:00 hrs the next morning. Analysis of his roster by RAIB and witness evidence indicates that it is unlikely that fatigue played any significant role in his actions at the time of the accident. There is also no evidence that Driver B was distracted by using a mobile telephone or other portable device or by any issues outside his work.
- 100 Driver B stated that he was crossing the yard after earlier moving a train to number 3 siding (paragraph 23) when he noticed that the two trains on number 15 siding were standing closely together but were not coupled. Driver B was aware that it would be necessary to move these trains together from their current location onto the fuel pit later in the night. He was also aware that the depot would become much busier as the evening progressed, so he decided to couple the two trains together to save work doing it later.

¹⁰ 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 activities. The company is registered as ‘Rail Safety and Standards Board’, but trades as ‘RSSB’.

¹¹ Railway Group Standards Code issue 4, June 2013.

¹² Standards Manual issue 3, June 2013.

Visibility from the train cab

101 Driver B was unaware of the presence of Driver A when he decided to move the train.

102 The RAIB reconstruction of the accident (paragraph 81) showed that Driver B would have been unable to see Driver A as the latter crossed from number 13 siding towards the gap between the two stabled trains. This is because a control panel in the Class 172 DMU cab (figure 14) would have obscured Driver B's view out of the cab in the relevant direction.



Figure 14: Views from Class 172 DMU cab, taken during the RAIB reconstruction. A train representing 5H76, from which Driver A alighted, is indicated. This train was positioned on number 13 siding.

103 The reconstruction showed that it was possible to see an individual standing directly in front of a Class 172 DMU from the cab of the unit, but only if the person occupying the cab was standing up and leaning as far forward as possible. There is no requirement for these actions to be carried out prior to coupling and CCTV evidence shows that Driver B did neither of these things as Driver A passed directly in front of the train.

104 Driver B had been aware of the approach of train 5H76 in the distance as he crossed the yard towards number 15 siding. However, he had no reason to expect that Driver A or anyone else would attempt to cross in front of unit 172343 as he moved it. While Driver B made a brief visual check of the autocouplers prior to climbing into the cab, there was no requirement for him to carry out a check of the surrounding area before moving the train.

105 Because shunters are not required when coupling operations involve the use of autocouplers (paragraph 32), there was also no-one else in the vicinity who could have warned Driver B that Driver A was close by, prior to the movement taking place.

Identification of underlying factors and probable underlying factors

WMT's organisation and risk assessment processes

106 WMT had not adequately considered the hazards faced by drivers when on depots. This was probably due to the way different parts of the organisation interacted.

107 WMT's organisation contains a number of functional areas, each of which reports to a director. These directors report to the WMT Managing Director. Two of these functional areas, known as the Traincrew and the Fleet organisations, are relevant to this investigation.

108 The Traincrew organisation is responsible for the provision of train drivers and senior conductors to operate WMT's train service. It is responsible for all train drivers, including those permanently based within maintenance depots.

109 The Fleet organisation is responsible for the maintenance and cleaning of the trains used to operate WMT's train service. The organisation also provides these services to other train operators¹³ who use WMT's depots. WMT operates maintenance depots at Tyseley, Soho, Worcester, Shrewsbury, Bletchley and Camden, with each location having a depot manager.

Risk assessments carried out by the WMT Traincrew organisation

110 The Traincrew organisation carried out several risk assessments covering various aspects of train driving.

111 A 'Route Risk Assessment' covering Tyseley depot and its surrounding area was completed in July 2014. This covered topics such as signals which were at risk of being passed at danger, areas of possible low adhesion and possible distractions to drivers. This assessment did not consider the hazards faced by drivers once they had left their trains and were moving on foot around Tyseley depot.

112 A 'Risk Assessment for Train Driving' was undertaken in June 2016. This assessed the general task of train driving, and the hazards faced by train drivers. However, the document did not consider any hazards relating to drivers working or walking within maintenance depots.

113 A 'Drivers Task Analysis' document was compiled in August 2006. This acted as a cross-reference between identified areas of knowledge required by train drivers, and the competence management system. This document referred to drivers being competent in personal track safety, and to drivers using authorised walking routes, but it gave no other consideration to how drivers would work or walk within maintenance depots.

Risk assessment carried out by the WMT Fleet organisation

114 A risk assessment was undertaken by the Fleet organisation to cover activities within Tyseley depot. The version of this risk assessment current at the time of the accident was completed in February 2018.

¹³ In the case of Tyseley depot, Cross Country Trains and, to a lesser extent, Chiltern Railways.

- 115 The stated scope of this document was '*All depot employees, Contractors & Visitors*'. The individuals responsible for completing this risk assessment stated that they believed that this included drivers who were on the depot. However, no evidence was provided to indicate how the contents of this risk assessment were to be made available to the Traincrew organisation or to individual train drivers. The Traincrew organisation advised RAIB that it had no knowledge of the document.
- 116 The risk assessment completed by the Fleet organisation considered both entrapment between trains and being struck by a moving train as hazards. While there was evidence that staff within the Fleet organisation received training and briefings in accordance with the risk controls assigned to these hazards, the nature of the controls suggest that they were intended only for depot staff (such as maintainers and train cleaners) and not train drivers. It is also of note that the risk assessment referenced the depot protection procedure (covering protected areas) but not the depot operating instructions (covering the rest of the depot) (paragraph 38). This further indicates that drivers were not considered to be within its scope.
- 117 In summary, RAIB has found no evidence that WMT had undertaken any assessment of the hazards faced by train drivers when they were walking or working within maintenance depots, even though the presence of train drivers within such depots is a routine and regular part of their duties.
- 118 Witness evidence obtained during the investigation indicated that there was friction between the Fleet and the Traincrew organisations and that this could cause delays in the implementation of even minor changes. RAIB considers that it is this lack of effective inter-working between the functions that probably led to the absence of adequate hazard identification and the assessment and mitigation of the risks to drivers on depots.

The capacity of Tyseley depot

119 The high intensity of Tyseley depot's operation at night, relative to its capacity, is a probable underlying factor.

- 120 A timetable change in May 2019 increased the number of rail vehicles berthed overnight at Tyseley depot by approximately 15%. This also had the effect of concentrating the arrival of most trains onto the depot into the period between 23:30 hrs and 00:30 hrs. Staff members reported to RAIB that they felt under increased time pressure due to this change. Concerns were also expressed by staff about the availability of depot drivers at busy times.
- 121 RAIB noted that the practice of stabling three 3-car units on number 15 siding which led to the blocking of an authorised walking route (paragraph 65) was a result of the requirement to fill depot sidings as far as possible, and that this in turn was due to the large number of trains coming onto the depot. RAIB also noted that Driver B's decision to couple the two units was made because he thought it would save work later in the night, when the depot would be much busier (paragraph 100).
- 122 Although the accident occurred at a time when the depot was not particularly busy, it is probable that both decisions were informed by the underlying concerns of staff regarding depot capacity, time pressure and workload.

WMT's management assurance process

123 WMT's management assurance processes had not led to widespread compliance with the depot's safety rules. This is a probable underlying factor.

- 124 Witness and other evidence examined by RAIB indicate that the actions of Driver A (non-use of AWRs (paragraph 59) and crossing between closely spaced trains (paragraph 80)) and by Driver B (non-use of AWRs (paragraph 71)) were not considered by WMT staff to be unusual. This was supported by CCTV evidence which showed another driver crossing between two trains in the same manner as Driver A did during the accident. Members of the Fleet organisation based at Tyseley depot also reported to RAIB that there was a reluctance by staff within the organisation to raise reports when drivers were seen to not be following the safety rules. This appeared to be a result, at least in part, of the existing poor relationship between the Fleet and the Traincrew organisations (paragraph 118).
- 125 RAIB has examined how WMT undertook management assurance of activities at the depot. This considered why the processes used did not ensure that safe procedures were being routinely followed or detect the existence of a culture at the depot which considered this to be normal and tolerable.
- 126 Both the Traincrew and Fleet organisations had management assurance processes in place which applied to the depot. This included a monthly check by the Traincrew organisation that the information provided to drivers and other staff was correct and appropriate. Although RAIB was able to confirm that this process (OPS17 'Safety Checks and Managing Safety Critical Information', issue 6 of which was published in April 2018) was being carried out at both Birmingham New Street and Tyseley before the accident, the process did not detect that incorrect information was provided at Birmingham New Street regarding authorised walking routes (paragraph 67).
- 127 The Traincrew organisation also monitored shunting activities at depots operated by WMT on a monthly basis, in accordance with procedure OPS25 'Monitoring of Shunting Activities', issue 3, which was published in November 2017. The checks for Tyseley depot were carried by the Driver Manager based at the depot and were primarily focused on the actions of drivers, rather than staff working for the Fleet organisation. The nature of these checks meant that they more frequently reviewed the actions of depot-based drivers, such as Driver B, rather than those of mainline drivers, such as Driver A. It was therefore unlikely that these checks would identify non-compliant actions on the part of mainline drivers.
- 128 The Traincrew organisation carried out audits of activities at Tyseley depot in accordance with procedure OPS30 'Safety Checks and Internal Audits', issue 2, which was published in April 2018.¹⁴ The last of these audits was undertaken in February 2019. This audit only considered if other operational standards had been implemented and did not directly scrutinise the actions exhibited by staff.

¹⁴ OPS30 was subsequently up-issued to issue 3 in March 2019, after the last of the checks at Tyseley had been carried out.

- 129 The Fleet organisation also undertook inspection activities around the depot. These included an inspection by a supervisor or manager of the yard where the accident occurred, at least daily. However, evidence shows that these inspections tended to focus on the physical condition of the area (for example, tidiness and condition of equipment) rather than staff actions.
- 130 There was evidence that external audits and safety tours by members of WMT senior management were also carried out at the depot. On 30 July 2019, the WMT Safety, Security & Environment Director undertook a safety tour of the depot. The report from this tour noted a 'minority of staff and contractors observed using desire lines¹⁵ in the yard area rather than using designated safe walkways'. The report required depot management to undertake an action to 'identify designated safe walkways in the plan'. There is no evidence that effective action was taken following this report.¹⁶
- 131 In summary, WMT was undertaking various inspection, audit and safety assurance activities relating to Tyseley depot. Most of these activities were not effective at detecting the extent of non-compliance with the safety rules which was taking place at the depot. They also did not address the underlying attitudes which tolerated it. In addition, while a safety tour undertaken by a director did identify unsafe action relating to the use of the AWRs, this did not result in effective measures being taken to address this behaviour.

Observations

Authorisation of the coupling operation

132 Driver B did not seek authorisation before coupling the trains.

- 133 The depot operating instructions (paragraph 38) require all trains movements on the depot to be authorised by the Operations Team Leader or by a shunter. On the night of the accident, Driver B had not been asked to couple the two trains on number 15 siding, nor did he seek authorisation for the movement before carrying it out.
- 134 Although this lack of authorisation prior to the movement represents a non-compliance with the depot operating instructions, the depot was not particularly busy at the time of the accident, and permission for the movement would most likely have been readily granted had Driver B sought it; there was no reason for it to be withheld. RAIB therefore considers that this non-compliance was not causal to the accident.

Post-accident brake testing of the Class 172 units

135 The values recorded during post-accident brake testing were not compliant to the vehicle maintenance instructions. Despite this, the units were released back into service.

- 136 Immediately after the accident, the brakes were tested on both units 172343 and 172344. Following this testing, WMT was satisfied that the units had no defects and they were therefore released back into service.

¹⁵ A 'desire line' is an informal route created when pedestrians use an unauthorised path between two points.

¹⁶ During the inquest into Driver A's death (held in March 2022), evidence came to light which showed that the reference to 'yard area' pertained to a road area of the depot rather to the rail yard. The principles of staff using safe walkways are applicable equally to both rail and road areas of the depot.

- 137 RAIB obtained the test records and noted that the values recorded for brake cylinder air pressures did not comply with the requirements of the relevant vehicle maintenance instructions. This discrepancy had not been noted by WMT prior to the trains being returned into service. It was also apparent that the two units had been tested prior to being fuelled or having their water tanks replenished. This was contrary to normal practice because brake cylinder air pressures are in part affected by the vehicle weight. This divergence from normal practice appears to have been the result of the disruption to normal working which followed the accident.
- 138 WMT subsequently arranged for the two units to be re-tested when fully fuelled and watered. This showed that the brakes were operating within the parameters defined in the vehicle maintenance instructions.

Post-accident testing of Driver B for drugs and alcohol

139 Driver B was not tested for the presence of drugs and alcohol in accordance with WMT procedures.

- 140 Following the accident, Driver B was tested for the presence of alcohol by the British Transport Police. This test showed no alcohol was present. However, while there is no evidence to indicate that Driver B was impaired by alcohol or drugs at the time of the accident, RAIB observes that WMT did not arrange for him to be tested for the presence of these substances following the accident.
- 141 WMT advised RAIB that this lack of testing was due to the driver not being available until approximately 02:00 hrs on the morning after the accident, and because of concern for the driver's welfare. Nonetheless, the lack of testing was contrary to WMT's processes for the management of operational incidents. The importance of such testing has been previously discussed in RAIB's report into an accident at Elstree and Borehamwood ([RAIB report 03/2019](#)).

Previous occurrences of a similar character

- 142 RAIB has previously investigated several accidents where members of railway staff have been injured or killed while working in yards, depots or sidings. Two investigations which have particular relevance to the accident at Tyseley depot are detailed below.
- 143 On 21 May 2012, a volunteer train guard was fatally injured after becoming trapped between two coaches at Grosmont station on the North Yorkshire Moors Railway ([RAIB report 23/2012](#)). A coach had just been uncoupled from a train when the steam locomotive reversing it away changed its direction. Although the driver applied the brakes, there was insufficient distance to stop and avoid trapping the guard, who had moved back between the vehicles to complete the uncoupling operations. The RAIB investigation report, and an associated urgent safety advice issued on 1 June 2012 (see pages 26 and 27 of [RAIB report 23/2012](#)) warned that staff carrying out shunting duties should not go between vehicles until these are a safe distance apart, are at a stand, secured and the shunter has reached a clear understanding with the driver about what they are doing and an assurance that the vehicles will not be moved.

144 On Tuesday 4 September 2018, a train arriving at Dollands Moor freight yard struck a small petrol-powered buggy which was stationary on a level crossing ([RAIB report 05/2019](#)). The train driver only became aware of the buggy shortly before the accident and was unable to stop in time to avoid a collision. A shunter sitting in the buggy attempted to jump clear at the last moment but suffered life-changing injuries. The RAIB investigation report identified that DB Cargo's safety management of work activities within the Dollands Moor yard was inadequate.

Summary of conclusions

Immediate cause

145 Driver A was trapped between two closely spaced trains when one of the trains was moved towards the other (paragraph 46).

Causal factors

146 The causal factors were:

- a) Driver A moved between the two trains (paragraph 52).

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

- i. Driver A did not use an AWR to cross the yard (paragraph 59, **Recommendations 1 and 2, Learning points 1, 2 and 3**).
- ii. It is almost certain that Driver A did not expect either of the trains to move as he passed between them (paragraph 80, **Recommendations 1 and 2, Learning points 1 and 2**).

- b) Driver B moved a train when Driver A was in close proximity to it (paragraph 97).

This causal factor arose because Driver B was unaware of the presence of Driver A when he decided to move the train (paragraph 101).

Underlying factors

147 The underlying factors were:

- a) WMT had not adequately considered the hazards faced by drivers when on depots. This was probably due to the way different parts of the organisation interacted (paragraph 106, **Recommendation 1**).
- b) The high intensity of Tyseley depot's operation at night, relative to its capacity, is a probable underlying factor (paragraph 119, **Recommendation 1, Learning point 4**).
- c) WMT's management assurance processes had not led to widespread compliance with the depot's safety rules. This is a probable underlying factor (paragraph 123, **Recommendation 2**).

Additional observations

148 Although not directly linked to the cause of the accident, RAIB observed that:

- a) Driver B did not seek authorisation before coupling the trains (paragraph 132, **Recommendations 1 and 2**).
- b) The values recorded during post-accident brake testing were not compliant to the vehicle maintenance instructions (paragraph 135, **Learning point 5**).

- c) Driver B was not tested for the presence of drugs and alcohol in accordance with WMT procedures (paragraph 139, **Learning point 6**).

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

149 Following the accident, WMT developed an action plan to address issues related to this accident. This plan has been devised jointly between the Fleet and the Traincrew organisations. As part of the delivery of the plan, many of the issues relevant to the accident are in the process of being reviewed and addressed. These include:

- changes to depot risk assessments, with both the assessment process and the assessments themselves being reviewed and changed where necessary
- changes to the assessment of drivers on personal track safety, including the addition of a question about safely passing close to stabled trains
- changes, reflecting other outputs from the action plan, to the competence management process OPS33
- changes to the depot operations procedure and the depot protection procedures to mandate the use of the train horn before coupling and other similar movements
- improvements to the infrastructure at Tyseley depot, including new illuminated walkways provided in the area where the accident took place (figure 15).

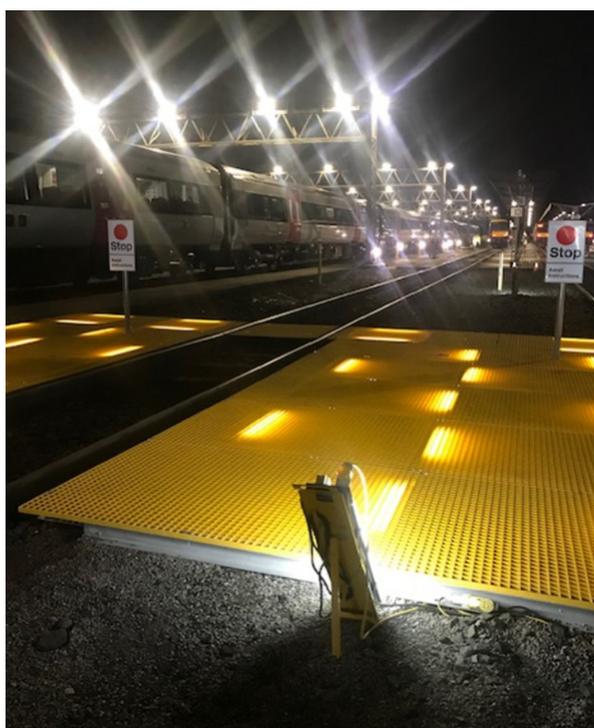


Figure 15: Illuminated walkway, provided since the accident in the area in which the accident took place. Photo courtesy WMT

150 A cross-function safety day was also held at Tyseley depot on 6 February 2020. This was led by WMT directors and identified cross-functional cultural issues. WMT used the output of this safety day to inform the development of the action plan.

Recommendations and learning points

Recommendations

151 The following recommendations are made:¹⁷

- 1 *The intent of this recommendation is that West Midlands Trains reduces the risk to train drivers and other staff when walking and working in depots, yards and sidings, including those working across functions within WMT or for other companies.*

As part of its ongoing revision of risk assessments at Tyseley depot, West Midlands Trains should identify hazards and assess the risk to train drivers and other persons when they are walking and working in depots, yards and sidings for which it is responsible. The output from this assessment should be used to ensure that suitable measures are in place to mitigate risks and that any measures adopted will be appropriate for staff working for other functions within West Midlands Trains and for persons working for other duty holders.

West Midlands Trains should also develop and implement processes to ensure that risk assessments are reviewed whenever significant changes are made in depot operations, such as following timetable changes.

This recommendation may also apply to other duty holders who are responsible for depots, yards and sidings (paragraph 146a, paragraph 147a and b, paragraph 148a).

¹⁷ Those identified in the recommendations have a general and ongoing obligation to comply with health and safety legislation, and need to take these recommendations into account in ensuring the safety of their employees and others.

Additionally, for the purposes of regulation 12(1) of the Railways (Accident Investigation and Reporting) Regulations 2005, these recommendations are addressed to the Office of Rail and Road to enable it to carry out its duties under regulation 12(2) to:

- (a) ensure that recommendations are duly considered and where appropriate acted upon; and
- (b) report back to RAIB details of any implementation measures, or the reasons why no implementation measures are being taken.

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

- 2 *The intent of this recommendation is to ensure that West Midlands Trains understands the behaviours of its staff and how these impact on safety performance.*

West Midlands Trains should review its safety assurance processes to ensure that it can effectively identify and understand the reasons for unsafe working practices within the company and address their causes, including the effects of organisational culture on safety. This review should consider relevant law, guidance and good practice from other industries that may be applicable.

West Midlands Trains should produce an updated safety assurance process based on the findings of this review (paragraph 146a, paragraph 147c, paragraph 148a).

Learning points

152 RAIB has identified the following learning points:¹⁸

- 1 Duty holders are reminded of the need to ensure that staff required to walk and work in depots, yards, sidings and engineering work sites are aware of the risk of passing between or close to the end of stationary rail vehicles, and that suitable measures are in place to control this risk (such as training and local procedures) (paragraph 146a).
- 2 Railway staff required to work or visit locations such as maintenance depots, yards, sidings and engineering work sites are reminded that stationary trains or vehicles may move without warning. Stationary trains or rail vehicles may also be hiding a train approaching on another line. Staff should apply their training and the requirements of local procedures (paragraph 146a).
- 3 Duty holders responsible for the operation of depots and sidings are reminded of the importance of ensuring that the locations of authorised walking routes are made known to staff (paragraph 146a).
- 4 It is important that duty holders responsible for depots and sidings carry out assessments of the capacity of such facilities, relative to the operational demands placed on them, to ensure that they can be operated safely. Such assessments should be reviewed when changes are made, such as timetable amendments or physical change to the location. An objective of the assessment is to ensure that authorised walking routes are not routinely obstructed (paragraph 147b).

¹⁸ '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.

- 5 It is important that train operators and maintainers have arrangements in place to ensure that the results from brake tests and similar safety critical maintenance activities are routinely examined and understood by competent staff, with follow up actions undertaken as necessary (paragraph 148b).
- 6 Duty holders are reminded of the need to arrange for staff involved in accidents to be tested for the presence of drugs or alcohol in line with relevant procedures. These tests are likely to be important evidence for any subsequent investigation (paragraph 148c).

Appendices

Appendix A - Glossary of abbreviations and acronyms

AWR	Authorised Walking Route
BSI	Bergische Stahl Industrie
CCTV	Closed Circuit Television
CDP	Competence Development Plan
DMU	Diesel Multiple Unit
FDA	Formal Driving Assessment
OTDR	On-Train Data Recorder
WMT	West Midlands Trains

Appendix B - Urgent Safety Advice

Urgent safety advice 01/2020: Passing between or close to the end of stationary rail vehicles in depots, yards and sidings

Published 3 March 2020

1. Safety issue

Suitable measures may not be in place to control the risk of train drivers and other operational staff passing between or close to the end of stationary rail vehicles when walking and working in depots, yards and sidings.

2. Safety advice

Duty holders are advised to ensure that all staff required to walk and work in depots, yards and sidings are aware of the risk of passing between or close to the end of stationary rail vehicles, and that suitable measures are in place to control this risk (such as training and local procedures).

Duty holders should also be aware that using the GE/RT 8000 Rule Book as the only basis of track safety training for train drivers and other operational staff is inappropriate because:

- the provisions of the Rule Book with respect to personal track safety are not applicable when working away from the mainline railway (such as in most depots, yards and sidings).
- the Rule Book contains no rules, regulations or instructions relating to passing between or close to the end of stationary rail vehicles.

3. Issued to:

The employers of train drivers and other operational staff whose duties may take them close to stabled rail vehicles when walking and working in depots, yards and sidings.

4. Background

At around 20:00 hrs on 14 December 2019, a train driver suffered fatal injuries while passing between two trains at Tyseley traction maintenance depot, Birmingham.

Prior to the accident occurring, the driver involved had brought an empty train into the depot. Once this train had been shut-down, the driver alighted from its cab and crossed the depot yard. This consists of a number of sidings, one of which had two stationary trains positioned closely together on it. The driver tried to pass between these trains as he crossed the yard. A later reconstruction undertaken by the RAIB suggests that there was a gap of approximately 540 mm between the gangway ends of these trains.

A second driver was in the cab of one of the trains, next to the gap. As the first driver was passing between the trains, this second driver attempted to couple them together, trapping the first driver. The RAIB's reconstruction showed that the second driver would not have been able to see the first driver as he crossed the yard and entered the gap between the trains.

Based on evidence obtained as part of this investigation, the RAIB believes that some transport undertakings are using GE/RT 8000 Rule Book Module G1 'General safety responsibilities and personal track safety for non-track workers' as the only basis for establishing the competence of train drivers in personal track safety. This means that the safety arrangements used by train drivers may not effectively control the risks to which they are exposed when walking or working in depots, yards and sidings.

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