



Rail Accident Investigation Branch

Rail Accident Investigation: Interim Report

**Track workers struck by a train at Margam,
South Wales
3 July 2019**

Report IR1/2019
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Track workers struck by a train at Margam, South Wales, 3 July 2019

Note: This interim report contains information obtained as part of the Rail Accident Investigation Branch's (RAIB's) ongoing investigation. It supplements the information published on RAIB's website on 19 July 2019. Some of the information contained in this report may be refined or changed as the investigation progresses.

The purpose of a RAIB investigation is to improve 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.

Summary

At around 09:52 hrs on Wednesday 3 July 2019, two track workers were struck and fatally injured by a passenger train at Margam East Junction on the South Wales Main Line. A third track worker came very close to being struck. These three workers, who were part of a group of six staff, were carrying out maintenance work on 9577B points. The driver had made an emergency application of the train's brakes about nine seconds before the accident and the train was travelling at about 50 mph (80 km/h) when it struck the track workers.

The RAIB's preliminary conclusion is that the accident occurred because the three track workers were working on a line that was open to traffic, without the presence of formally appointed lookouts to warn them of approaching trains. All three workers were almost certainly wearing ear defenders, because one of them was using a noisy power tool, and all had become focused with the task they were undertaking. None of them was aware that a train was approaching them until it was too late to move to a position of safety.

Working on an open line without a formally appointed lookout meant that no single individual stood apart from the work activity at the points with the sole responsibility of providing a warning when trains approached. The absence of a lookout with no involvement in the work activity removed a vital safety barrier.

The planning paperwork for the work on 9577B points indicated that the work was to start at 12:30 hrs, to coincide with the planned blockage of the up main line. However, witness evidence suggests that there was a widespread belief at the local maintenance depot that there was no need to wait for the planned line blockage in the afternoon, and a general lack of understanding as to how the planning paperwork should be interpreted.

The system of work that the COSS had proposed to implement before the work began was not adopted, and the alternative arrangements became progressively less safe as the work proceeded that morning.

These factors had created conditions that made an accident much more likely.

The investigation is continuing. This report describes the findings and conclusions so far, and outlines the areas for further investigation. These include:

- the factors and group dynamics that influenced the actions of the track workers involved;
- the planning of the work and whether it was appropriate for the location and type of work; and the way that planning paperwork was interpreted by track workers and their supervisors;
- the working practices at Port Talbot depot at the time of the accident, with a particular focus on the way that the maintenance teams at Port Talbot depot were managed and supervised;
- the management assurance arrangements that were in place to monitor and audit compliance with track safety rules, at local and national level;
- the selection, training and assessment of the track workers, particularly those with responsibility for leading groups;

- organisational culture and its impact on safety behaviours; and
- the actions of the industry to reduce the occurrences of accidents and near misses involving track workers.

We will also be carrying out tests to establish the audibility of the various warnings given immediately prior to the accident.

Introduction

- 1 At around 09:52 hrs on Wednesday 3 July 2019, two track workers were struck and fatally injured by a passenger train at Margam East Junction on the South Wales Main Line. A third track worker came very close to being struck. These three workers were part of a group of six staff, who were carrying out maintenance work on lines that were open to traffic.
- 2 The train, which was travelling from Swansea to London Paddington, was approaching Margam on the up main line at around 73 mph (117 km/h). Its driver saw three track workers walking away from him on the adjacent down main line and, beyond them, three more track workers on the line ahead of his train. He sounded the train horn and applied the emergency brakes. The track workers walking on the down line became aware of the train approaching from behind them and tried to warn their colleagues as the train passed them.

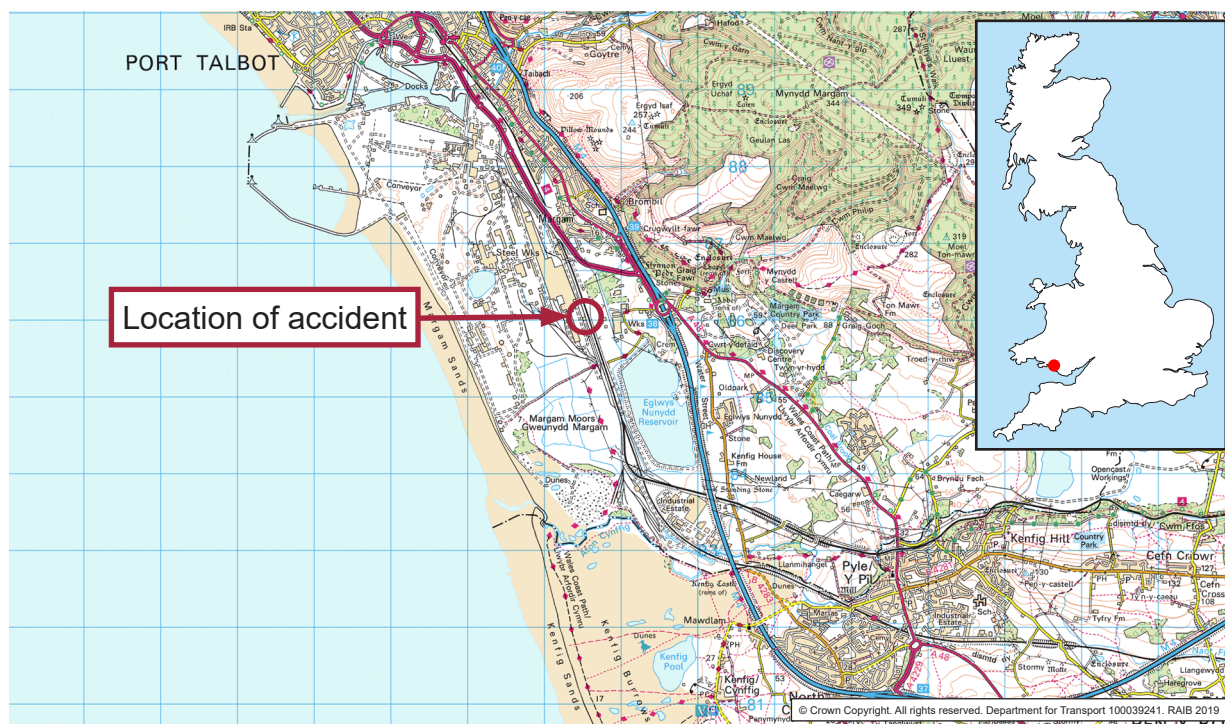


Figure 1: Extract from Ordnance Survey map showing location of accident

- 3 The three track workers on the up main line were working on a set of points, using a powered impact wrench for loosening and tightening large nuts. Consequently, all three of the workers were almost certainly wearing ear defenders. CCTV images taken from a camera at the front of the train and witness evidence indicate that the workers did not become aware of the train until less than one second before it reached them. By this time, although it was braking, it was still travelling at around 50 mph (80 km/h).

The RAIB's role and the context of this interim report

- 4 The RAIB is responsible for conducting independent investigations into railway accidents in the UK. The purpose of its investigations is to improve safety by establishing the causes of accidents and making recommendations to reduce the likelihood of similar occurrences in the future, or to mitigate their consequences.
- 5 The RAIB is not a prosecuting body; its investigations are focused solely on safety improvement and do not apportion blame or liability. The police and the Office of Rail and Road investigate any contraventions of the law that may have occurred. None of their statutory duties are changed by the RAIB investigation.
- 6 The RAIB's investigation is running independently of those of the British Transport Police, the Office of Rail and Road, and the railway industry. However, all investigating agencies, and the industry, work in cooperation with each other.
- 7 This interim report builds upon the information already provided on the RAIB's [website](#). A final report will be published on completion of the investigation. All RAIB investigation reports are available on the website.
- 8 At any stage in its investigations the RAIB may also issue urgent safety advice and make recommendations to such persons as is appropriate in the circumstances.

Background information

- Information about the systems used in the railway industry for protecting people working on the track, and explanations of technical terms used in this report, appear in the Appendix.

Location

- Margam East Junction is on the main line between Swansea and London. The accident occurred at a set of points in the up main line at 200 miles 31 chains from London Paddington, 2.3 miles (3.8 km) east of Port Talbot station and about 30 miles (48 km) west of Cardiff (figure 1). Although the descriptions in this report refer to east and west, reflecting the general direction of the railway route, in the area where the accident took place the tracks run on a north-west to south-east alignment.
- The points involved, numbered 9577B, form part of a crossover between the up and down main lines (figure 2). The crossover forms part of the route between the up relief line, which is on the north-east side of the main lines and terminates at Margam East Junction, and the up and down Ogmore Vale Extension (OVE) lines, which are on the south-west side of the main lines and give access to a number of freight destinations including Margam Abbey (Port Talbot) steelworks.
- The maximum permitted speed for trains on the up and down main lines is 90 mph (145 km/h). Signalling in the area is controlled from Port Talbot signal box.

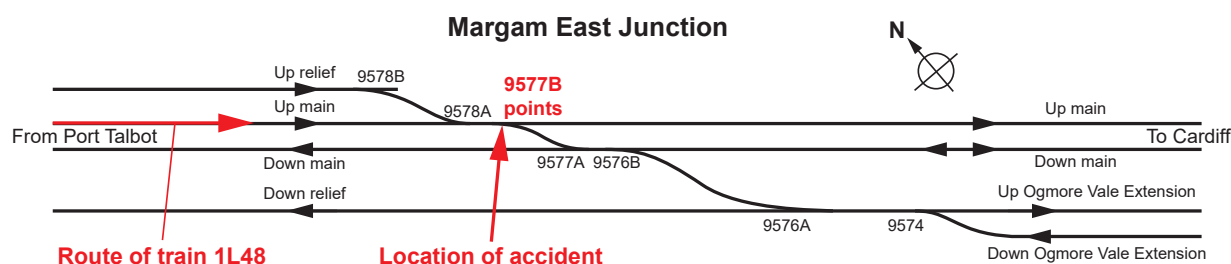


Figure 2: Track layout

Organisations involved

- Network Rail owns, operates and maintains the infrastructure in the area, and employed all the track workers.
- First Greater Western Ltd (trading as Great Western Railway (GWR)) operated the train involved in the accident, and employed the driver and other train crew.
- Network Rail and GWR are freely co-operating with the investigation.

Train involved

- The train involved, reporting number 1L48, formed the 09:29 hrs service from Swansea to London Paddington. It consisted of two 5-car, class 800 bi-mode multiple units, with unit 800 021 leading. There were 184 passengers on board.

Staff involved

- 17 There were six track workers in the group, three of whom were working at the points when the accident occurred. All six were full-time Network Rail employees based at Port Talbot depot.
- 18 Track worker 1 (TW1) had been nominated to act as person in charge (PIC) of the group by a team leader (paragraph 31). He had over 40 years' railway experience, and for the last six years he had been an acting team leader at Port Talbot depot.
- 19 Track worker 2 (TW2) was a track technician who had over 40 years' railway experience.
- 20 Track worker 3 (TW3) was a track technician with around 20 years' experience.
- 21 Track worker 4 (TW4) had been appointed as Controller of Site Safety (COSS) for the group on the day of the accident. He was a track technician with over 30 years' experience.
- 22 Track worker 5 (TW5) was nominated to act as the site lookout. He was a track technician with around 15 years' experience.
- 23 Track worker 6 (TW6) was a track technician with around 40 years' experience.
- 24 The train driver had been a driver since 1988 and had been passed as competent to drive class 800 bi-mode multiple units in December 2017. He began his duties on the day of the accident at 06:43 hrs, driving a train from Bristol Temple Meads to Swansea, where it arrived at 08:58 hrs. He then departed from Swansea driving train 1L48 at 09:29 hrs.

External circumstances

- 25 The weather at the time of the accident was bright and sunny, with good visibility. The wind was very light (around 5 mph (8 km/h)), and the temperature was around 20° C, as recorded by nearby weather stations.
- 26 The sun was shining from about 50 degrees to the left of the direction of travel of the train, and would not have affected the track workers' visibility of the train, or the driver's visibility of the track workers.

The sequence of events

(for a summary of the rules that apply to working on the track, see Appendix)

Events preceding the accident

- 27 Network Rail's track maintenance process requires staff to carry out both regular maintenance tasks and remedial work in response to reported faults. On 27 June the planner at Port Talbot depot created a 'safe work pack' (SWP) for work that was to take place on 3 July at Margam East Junction. This listed the planned work activities as vegetation clearance, boxing-in ballast¹, and maintenance of 9577 points. It identified two parallel safe systems of work. The first of these, designated 'Working', stated that work on the up main line was to be protected by blockages of that line that were planned to take place between 12:30 hrs and 15:30 hrs (an associated request for a line blockage with the signaller at Port Talbot had been arranged). The other system of work, designated 'Parallel', indicated that work could take place on both main lines, with warning provided by lookouts, between 12:30 and 15:30 hrs.
- 28 A different SWP was also created on 27 June for work on 3 July. This related to another site of work on the down main line near 9550 crossover, approximately 1.6 miles (2.5 km) from Margam East Junction in the direction of Cardiff (see paragraph 37). It had also identified two parallel safe systems of work. The first of these, designated 'Working', stated that work on the down main line was to be protected by blockages of that line that were planned to take place between 08:00 and 09:30 hrs. The other system of work, designated 'Parallel', indicated that work could take place on both main lines with warning provided by lookout between 08:00 and 09:30 hrs.
- 29 On 28 June, one of the local supervisors checked the SWPs for both sites and signed them off as 'authorised'. On 2 July one of the two permanent team leaders at the depot reviewed both SWPs, and signed them off as 'verified'.
- 30 On the morning of 3 July, maintenance staff arrived at the depot between 07:00 hrs and 07:30 hrs. One of the depot supervisors spoke to the two permanent team leaders about the work to be done at Margam East Junction that day. As well as the tasks listed in the SWP, there was also an emerging need to investigate and attend to insulated rail joints² (IRJs) in the area following a report of a failure of a track circuit on 1 July. This additional task was not specified in the SWP.

¹ Boxing-in ballast is the task of adding ballast in-between the sleepers and to the sleeper ends to retain the track's stability.

² Insulated rail joints are used to separate sections of rail from each other electrically, for signalling purposes. Rail wear, damage and contamination can lead to the insulation becoming ineffective. This can usually be rectified relatively easily by maintenance staff.

- 31 Witness evidence indicates that although one of the permanent team leaders (TL1) had already signed the SWP for the work at Margam East Junction, the supervisor passed the SWP for this work to the other permanent team leader (TL2), because he thought that TL2 would be on site acting as PIC. However, TL2 was intending to work at the other site (see paragraph 28) and so he passed the SWP to TW1, an acting team leader, nominating him as the PIC, and both permanent team leaders then briefed him about the work. TW1 then nominated TW4 as the controller of site safety (COSS) for the work at Margam East junction and gave him the SWP. TW4 reviewed the pack and had found that the first opportunity for a line blockage would be at 12:30 hrs. Noting that the SWP did not cover the work that was proposed to be done during the morning, he gave the pack back to TW1.
- 32 A group of six people (TW1-6) left the depot around 08:00 hrs and arrived at an access point near Margam around ten minutes later. On arrival at site, TW1 gave the SWP back to TW4 and indicated that they would be working under lookout warning that morning and that he wanted TW4 to be COSS and to complete the paperwork. TW4 did not raise his earlier concern about the plan, and while the group had breakfast, TW4 filled in the various forms in the SWP, signing the forms as both COSS and PIC. He also signed the form to indicate that the work had been completed.
- 33 The COSS (TW4) briefed the group and scanned their Sentinel³ cards, and nominated two of them, TW2 and TW5, to act as lookouts during the work; TW2 as a distant lookout, and TW5 as site lookout. Both lookouts signed the SWP, indicating that they accepted these roles. Uncorroborated witness evidence indicates that TW1 decided that a distant lookout was not necessary, and the COSS agreed. However, RAIB's measurements and calculations show that working without a distant lookout, at the points and at the IRJs, did not provide sufficient warning of approaching trains for the group to be able to reach a position of safety at least ten seconds before it arrived, as required by the railway Rule Book (see paragraph 52 and Appendix).
- 34 Around 08:50 hrs the six track workers split into two groups. One group, consisting of TW4 and TW6, started the additional task on the IRJs on the down main, up main and down relief crossover lines. The other group, consisting of TW1, TW2, TW3 and TW5, went to work on 9577B points (figure 3). TW5 stood clear of the line and acted as site lookout, with one of the others watching him and acting as touch lookout for the person with the power tool. During this period the two groups were around 100 metres apart, with TW4 and TW6 being the Cardiff side of 9577B points. TW4 and TW6 took it in turns to work while the other observed the nominated lookout TW5, who was with the other group at the points, for warning of approaching trains on the up main line.
- 35 At around 09:30 hrs the two groups came together again and had a break of about ten minutes. Uncorroborated witness evidence indicates that there was a discussion between TW1 and TW4 about the work. Following this discussion, the team then split again, this time into two groups of three. The site lookout (TW5) went with the COSS to continue working on the IRJs towards Port Talbot on the up relief and up main lines.

³ The Sentinel system is used by the railway industry to record and monitor the competence and fitness of staff who work on or near the track. Each person must carry an identifying smart card which provides access to the database on which this information is held, so that their competences can be checked before the start of work.



Figure 3: FFCCTV image looking towards Port Talbot from a train on the down main line at approximately 09:24 hrs, showing the two groups working on the open up main line approximately 100 metres apart

- 36 TW4, TW5 and TW6 walked towards Port Talbot in the cess of the up main line and onto the up relief line. The other group, consisting of TW1, TW2 and TW3, went back to working on 9577B points, loosening, oiling and retightening bolts using the impact wrench.

Other work in the area

- 37 On the same morning, the other group of track workers from Port Talbot depot, including the two permanent team leaders (TL1 and TL2), was working on the down main line around 1.6 miles (2.5 km) south-east of the site of the accident, in the direction of Cardiff. They were packing the ballast under a rail crossing, under the protection of a series of planned line blockages on the down main line. The line blockages taken were from 08:51 hrs to 09:19 hrs, and then again from 09:44 hrs to 10:00 hrs, when the work ceased due to the accident. The main lines between the two sites of work are straight, and the two groups were, distantly, in sight of one another.

Events during the accident

- 38 The COSS (TW4) and the other track worker (TW6), with site lookout warning provided by TW5, inspected a pair of IRJs on the up relief line and then inspected and undertook remedial work on a pair of IRJs on the up main line. These were situated about 170 metres from 9577B points in the direction of Port Talbot. Carrying out maintenance work on IRJs with the affected line open to traffic is contrary to the process defined in Network Rail's Track Work Information Sheet, which states that such work must be carried out during a possession.

39 When they had completed their work on the IRJs, the COSS (TW4), the lookout (TW5) and the other track worker (TW6) crossed from the up main line to the down main line and walked back along the down main line towards the access point. They were walking facing the direction of traffic on that line, and therefore had no need to look out for trains approaching from behind them on the other line. Train 1L48 approached from behind them on the up main line travelling towards Cardiff. At this time they could see the other three track workers about 100 metres ahead, and they have stated that they were surprised to see them working on 9577B points on the up main line with a train so close (figures 4 and 5).



Figure 4: Position of workers immediately before the accident

- 40 Train 1L48 had left Port Talbot station at 09:49 hrs. The driver accelerated the train towards the line speed of 90 mph (145 km/h), and had reached about 70 mph (112 km/h) when the train passed under the A4241 (Harbour Way) bridge and the two groups of track workers came into view. The Cardiff side of the bridge is 662 metres (725 yds) from 9577B points.
- 41 The data recorder on board the train indicates that at 09:51:27 hrs the train driver sounded the warning horn, using the soft⁴ low and high tones, first for 0.6 seconds and immediately afterwards for 1.1 seconds. Seven seconds later, with the train about 400 metres away from 9577B points, the driver began sounding the horn again, continuously for 4.9 seconds. He applied the train's emergency brake at 09:51:39 hrs, when the train was about 260 metres away from the group on the track at the points, and then began to sound the horn again 2 seconds later, using the soft low tone continuously for 7 seconds. The train's speed had reduced to 51 mph (83 km/h) when it reached the group on the up line.
- 42 As the train passed him, the lookout, TW5, who was with the group walking on the down line, also began blowing the horn he was carrying. The other two track workers in the group began to shout and they all moved faster towards the three working on 9577B points (figure 5).
- 43 TW3, who was in the space between the up and down main lines, was using the impact wrench to loosen nuts, while one of the other two, who were standing between the rails of the up main line, used a brush to oil the thread of the bolt. TW3 finished tightening a nut and was about to stand up when, less than a second later, the train struck TW1 and TW2. TW3 fell backwards out of the way.

⁴ The warning horn on the class 800 trains has two settings, soft and loud. The soft setting is applied automatically when the train is travelling at less than 100 mph (160 km/h), and the loud setting above this speed. The driver is not able to change the setting. The horn also has two pitch settings, high and low, which the driver can control.



Figure 5: Image from FFCCTV from train 1L48 as it was passing the group walking on the down main line

Events following the accident

- 44 The train came to a stop 182 metres beyond the point of collision.
- 45 The driver of the train made a railway emergency call, using the GSM-R radio in the cab of the train, reporting that the train had struck some track workers. As a result, the Welsh Ambulance Service, South Wales Fire and Rescue Service, South Wales Police and British Transport Police were alerted and attended the scene. Wales Air Ambulance Service also sent rapid response road vehicles to the site.
- 46 The signaller stopped other trains from approaching the site to make it safe for the emergency responders. Network Rail and GWR also sent staff to the scene.
- 47 Subsequently, arrangements were made to allow passengers on the train to leave under the supervision of the emergency services and Network Rail staff so that they could continue their journeys by road.

Consequences

- 48 TW1 and TW2 were fatally injured. TW3 suffered from severe shock.

Findings to date

- 49 The existence of two separate SWPs, one for work near 9550 crossover in the morning, and the other for work at Margam East Junction in the afternoon, appears to suggest an intention that work at the two locations be carried out sequentially. However, witness evidence suggests that some of those involved did not interpret the paperwork in that way. There appears to have been a widespread belief that the times shown on the SWPs related only to the availability of line blockages, rather than determining when the work at each location could take place. The RAIB observes that 12 workers would have been far more resource than was needed to carry out each of the work activities that had been identified at each site.
- 50 Taken together, the two systems of work recorded in the SWP for Margam East Junction were interpreted to mean that work could be carried out on either the up or down main line with only unassisted lookout warning, with the option of taking line blockages from 12:30 hrs if needed.
- 51 The RAIB observes that the plan for the work at Margam East Junction provided no clarity on the safe system of work that should be adopted for each element of work. It provided two parallel safe systems of work, a line blockage on the up main line with a parallel safe system of work, based on unassisted lookout warning, on the down main line. However, the document could also be reasonably interpreted as also allowing work on the up main line using unassisted lookout warning. This lack of clarity and understanding may have allowed the planner, supervisors and workers to believe that they had freedom to choose the system of work the group should adopt, rather than working to the plan and the times of the planned blockages.
- 52 There was insufficient visibility of approaching trains in the area for a single site lookout to provide an adequate warning time for the work at 9577B points, in accordance with the railway's rules. The necessary warning time of 25 seconds specified by the Rule Book, and as calculated by the COSS (paragraph 33), is made up of five seconds to account for a site lookout having to look in both directions, five seconds to stop work and down tools and five seconds to move to a position of safety, plus the required minimum of ten seconds to be in a position of safety before the train arrives (see Appendix). The minimum sighting distance to provide this warning time, for a maximum permitted train speed of 90 mph, is 1050 metres (converted to 1100 yards in the Rule Book). The available sighting distance from 9577B points was around 662 metres (725 yards) (paragraph 40), limited by the Harbour Way overbridge and the curve beyond it.
- 53 Despite the limited sighting at Margam East Junction, the system of work in the SWP did not specify the need for a distant lookout.

- 54 The system of work in the SWP did not include the work on the IRJs that took place a few minutes before the accident, since this was to deal with a recently emerging fault issue. The work on the IRJs was closer to the Harbour Way overbridge. Because this work was exclusively on the up line, the lookout would only have needed to look in one direction, and so the required warning time would be 20 seconds. However, the sighting distance available was less than that from the points and was also insufficient for a site lookout alone to give an adequate warning of trains travelling at the maximum allowable line speed.
- 55 At the time of the accident, the six workers at Margam East Junction had split into two groups and there was no formally assigned lookout to provide a warning for the workers at the points. The person who had been originally nominated by the COSS to act as site lookout for the whole group was with the track workers attending to the IRJs, and so was too far away to provide a suitable warning for the track workers who were working on 9577B points.
- 56 While it is not possible to be certain whether TW1 or TW2 had taken on the role of looking out for approaching trains, the available witness evidence suggests that TW1 had taken on this role. However, it is clear that he had become involved in the work on the points. None of the group of three at the points became aware of the approach of train 1L48 until around one second before the accident.

The competence and fitness of the group members

- 57 All the members of the group had the required safety certification for carrying out the safety roles that they were assigned to. The RAIB has found no evidence that any of them were physically impaired in any way.

The audibility of the warning horns

- 58 The three track workers who were working on 9577B points at the time of the accident were almost certainly all wearing ear defenders, because they were working with a noisy impact wrench.
- 59 The combination of the noise from the impact wrench and wearing of ear defenders is likely to have meant that the three track workers at the points were unable to hear the train's warning horn, the lookout's warning horn, and the shouts of the other two track workers.

Preliminary conclusions

- 60 The accident occurred because the three track workers were working on a line that was open to traffic, and without the presence of formally appointed lookouts to warn them of approaching trains. All three workers were almost certainly wearing ear defenders, because TW3 was using a noisy power tool, as instructed. All three were focused on the task they were undertaking. None of them was aware that a train was approaching them, until it was too late to move to a position of safety.
- 61 Working on an open line without a formally appointed lookout meant that no single individual stood apart from the work activity at the points with the sole responsibility of providing a warning when trains approached. The absence of a lookout with no involvement in the work activity removed a vital safety barrier.
- 62 The planning paperwork for the work on 9577B points indicated that the work was to start at 12:30 hrs, to coincide with the planned blockage of the up main line. However, witness evidence suggests that there was a widespread belief at the local maintenance depot that there was no need to wait for the planned line blockage in the afternoon, and a general lack of understanding as to how the planning paperwork should be interpreted.
- 63 The system of work that the COSS had proposed to implement before the work began was not adopted, and the alternative arrangements became progressively less safe as the work proceeded that morning.
- 64 These factors had created conditions that made an accident much more likely.

RAIB's further investigation work

- 65 Our investigation into this accident involves a detailed review of the factors that influenced the attitudes, behaviours and actions of those immediately involved, including:
- a review of the group's dynamics and how these influenced the actions of the track workers involved;
 - an assessment of the working practices at Port Talbot depot at the time of the accident with a particular focus on the way that the maintenance teams at Port Talbot depot were managed and supervised;
 - an examination of the arrangements that were in place to monitor compliance with track safety rules;
 - a review of the selection, training and assessment of the track workers, particularly those with responsibility for leading groups; and
 - an examination of the organisational culture and its impact on safety behaviours.
- 66 We will continue to examine the suitability of the planned system of work, how this was understood by those involved, and any alternatives that might reasonably have been adopted. This will include a review of the use of the function in the safe system of work planning system that enables the planning of two separate but linked systems of work on parallel tracks, and how this is understood by Network Rail's staff.
- 67 We will review Network Rail's policies that related to enabling sufficient track access for maintenance activities, and minimising the need for work activities on lines that are still open to traffic.
- 68 We will examine the extent of management knowledge of the informal and non-compliant systems of work that appear to have become established, and how widespread these were at Port Talbot and elsewhere. We are also investigating the arrangements for management assurance of compliance with Network Rail's safety procedures, and for auditing the value and effectiveness of the management systems, at local, route and national level.
- 69 The RAIB will examine the actions of the industry to reduce the occurrences of accidents and near misses involving track workers in the years leading up to the accident. This will include the efficacy of steps that were taken as part of the Planning and Delivering Safe Work (PDSW) initiative, recent modifications to Network Rail's standard governing track worker safety (NR/L2/OHS/019), and the approach taken to developing and assessing the capabilities of those tasked with safety leadership roles on or near the line.
- 70 The RAIB will evaluate the warnings provided by train 1L48 and carry out tests to establish the sound pressure levels produced by the train's warning horn in all of its possible settings, including those used on its approach to 9577B points. It will then evaluate the likely audibility of warnings provided to the group of three, including consideration of the attenuation of the sounds when wearing ear defenders.

- 71 We will also consider the findings of previous RAIB investigations into track worker accidents and near misses on Network Rail infrastructure, and of the actions taken in response to previous RAIB recommendations.
- 72 We will aim to identify safety learning points and, where appropriate, make recommendations to improve safety and prevent a recurrence.

Appendix: work on the track - definitions

For the protection of staff working on the track from moving trains, the rail industry's preferred approach is to arrange for all train movements to be stopped while the work is taking place, an arrangement known as an engineering possession or **line blockage**, depending on the circumstances. However, if this is not reasonably practicable, work may have to be done while trains are running. In this situation, the workers need sufficient warning of the approach of trains for them to be able to stop work and move clear of the track, so that they are in a place of safety for at least ten seconds before the train arrives. This requirement, along with others summarised in this appendix, can be found in the various modules and handbooks which make up the railway Rule Book (GE/RT8000 series), published by RSSB.

The warning of approaching trains can be given by fixed or portable automatic systems, activated by the trains themselves. These give visual and audible warnings at the site of the work, which may be supplemented by a touch lookout if the work is noisy. If such systems are not available, **unassisted lookout working** may be used. The **lookout** stands in a defined place where they will not be distracted, and watches for approaching trains. When a train comes into view, the lookout uses a whistle or horn to warn the members of the work group, who must immediately move to the designated position of safety. If a work group is using noisy tools or machinery, each member of the group must be warned by a **touch lookout** (and in some cases by shutting off power to the tools).

The **Controller of Site Safety** (COSS) is responsible for arranging and implementing the safe system of work to protect the group from moving trains. If the adopted system is unassisted lookout working, the COSS will appoint the necessary lookout(s). The COSS uses a table of speeds and sighting distances to calculate the necessary warning time and check that it can be achieved at the location of the work. If the available sighting distance for a lookout at the location of the work (the **site lookout**) is insufficient, because of the curvature of the track or other obstruction, a **distant lookout**, positioned far enough away from the site to be able to give an earlier warning of approaching trains, can be used to relay the warning to the site lookout. The distant lookout uses a blue and white chequered flag to signal to the site lookout.

The lookouts should be appointed solely to that duty, and must not take any part in the work. After members of a work group have moved to the position of safety in response to the lookout's warning, they must not return to the track until told to do so by the COSS. Whoever is appointed as COSS must remain with the work group for the duration of the work.

The role of **person in charge** (PIC) was introduced in 2017, and is defined in Network Rail's standard NR/L2/OHS/019 'Safety of people at work on or near the line' as

'A person involved in the planning and who is on site where the work is being undertaken and has the overall accountability of supervising and overseeing works. This person will normally be the team leader (or equivalent) and hold COSS competence to make sure planned controls are put in place to keep persons safe from trains, activity and site risks.'

While the PIC has to hold the competence of a COSS, they may appoint someone else as COSS for the work, provided that person is also suitably qualified.

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