

Report of a Level 3 (formal) Investigation

held by the following organisation(s):

Network Rail

Wales and Western Region

Great Western Railway

into the following event

Margam East Junction, South Wales: Death of two track workers who were struck by a
Swansea to London Paddington train: 3 July 2019

SMIS reference

SMIS2317549

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A. Event summary, conclusions, recommendations and local actions

A1. Summary of the accident/incident

- A1.1. At approximately 09:52 on Wednesday 3 July 2019, two track workers were struck and fatally injured by a passenger train at Margam East Junction between Swansea and Cardiff Central stations 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 undertaking scheduled track maintenance on lines still open to trains. All track staff involved were employed by Network Rail.
- A1.2. 1L48 09:29 Swansea to London Paddington, was approaching Margam East Junction on the Up Main line at around 73 mph. Its driver saw three track workers, to his right, walking away from him on the adjacent Down Main line and, beyond them, three more track workers on the Up Main line ahead of his train. He sounded the train horn and applied the emergency brake. The track workers walking on the adjacent Down Main line became aware of the train approaching and tried to warn their colleagues as the train passed them.
- A1.3. The three track workers on the Up Main line were working on a set of points, using a petrol-engine driven tool for loosening and tightening large nuts (commonly called a nut runner). CCTV images taken from a camera at the front of the train showed that two workers were stood in the four-foot, the one using the nut runner was crouching in the six-foot for tightening and loosening bolts. The three track workers did not become aware of the train until it was very close to them. By this time the train was travelling at around 50 mph.

A2. Immediate cause

- A2.1. The immediate cause of the accident was track staff working on a line open to traffic without a safe system of work in place and, as a result, they were not warned of a train approaching them (see section G1 of this report).

A3. Behavioural cause (using fair culture flowchart)

- A3.1. The Fair Culture flowchart will not be applied to Technicians (A) or (B) who were fatally injured.
- A3.2. The Section Manager (Track) did not adequately monitor and lead compliance checks within the depot. *Contravention* (see sections G11 and H of this report).
- A3.3. The COSS did not deploy the distant lookout as he intended. *Contravention* (see sections G11 and H of this report).
- A3.4. The COSS allowed the group of six to split into smaller sub groups who became separated by distance. *Routine error different people* (see sections G11 and H of this report).
- A3.5. Technician 1 did not challenge the instruction given by the unofficial PIC to restart work on an open line without adequate protection. *Routine error different people* (see sections G11 and H of this report).

- A3.6. Technician 2 (Team Leader) decided not to work at Margam East Junction as intended by the Section Supervisor. *Contravention* (see sections G11 and H of this report).
- A3.7. Technicians 1, 3 and 4: none of the team on the day at Margam East Junction challenged any unsafe practices. *Contravention* (see sections G11 and H of this report).
- A3.8. Section Supervisor 1 did not carry out his duties as a 'Responsible Manager' correctly and had authorised (signed) the SWP as the 'Responsible Manager' without fully checking the content and before the PIC had verified the pack. The SWP was lacking in clear instruction and was generic in format. *Routine error different people* (see sections G11 and H of this report).

A4. Underlying causes

The site

- A4.1. The COSS's authority was compromised by the presence of an acting team leader who assumed the non-documented role of the Person in Charge (PIC) on site. This influenced the arrangements that the COSS implemented and made the arrangements unsafe (see section G2 of this report).
- A4.2. The acting PIC, with two technicians, who had all been instructed to remain in a position of safety by the COSS, took the decision to return to the track to complete the work on the bolts; this was without setting up a SSOW for that activity whilst the COSS was not present at the site of the work (see section G1 of this report).
- A4.3. Three staff were undoing, oiling and fastening bolts on PT9577B points without a Safe System of Work, including people specifically appointed to lookout for trains, being implemented (see section G3 of this report).
- A4.4. Those working on PT9577B points became focussed on their task and they were wearing appropriate hearing protection for use with noisy equipment (see section G5 of this report).
- A4.5. Those on site were very experienced and a closely-knit group where their familiarity with each other, the location and the tasks involved probably diluted their risk and situational awareness (see section G2 of this report).

Safe Work Pack

- A4.6. The Safe Work Pack (SWP) did not adequately specify the content of the work and how it was to be safely undertaken (see section G3 of this report).
- A4.7. The planning and content of the SWP had not involved the PIC who would deliver the work (see section G1 of this report)
- A4.8. The NR/L2/OHS/019 standard process was not followed, and the Responsible Manager authorised the pack before it had been verified by the PIC (see section G3 of this report).

- A4.9. Accountability for the Safe Work Pack (SWP) was diluted and misinterpreted by being passed from one Team Leader to another and again when the latter briefed an acting Team Leader as the PIC (see section G2 of this report).
- A4.10. The COSS for Margam East Junction challenged¹ the accuracy of the SWP and declined to undertake the role when it was issued to him at the depot handing the SWP back to the acting Team Leader for remedial action to be taken. Corrections to the SWP were not made (see section G1 of this report)
- A4.11. The COSS at Margam East Junction was not appointed until he arrived on site. He considered two lookouts were required though this decision was allegedly overruled by the person assuming the role of PIC (see section G2 of this report)
- A4.12. SWPs were routinely produced with just one lookout identified without consideration of the sighting distances or resources required (see section G1 of this report).

Management

- A4.13. The Section Manager (Track) and Section Supervisors routinely allowed short notice changes to be made to the planned work and left the organisation of the protection arrangements to those on-site, contrary to the intent of standard NR/L2/OHS/019 (see section G1 of this report).
- A4.14. The Route Assurance arrangements² did not effectively monitor and verify compliance with NR/L2/OHS/019 and GE/RT8000/HB3&7 (see section G8 of this report).
- A4.15. The way the SWPs were created locally allowed the level of the protection hierarchy to be changed without authorisation from a line manager, contrary to the intent of standard NR/L2/OHS/019 (see section G3 of this report).
- A4.16. Senior Route and middle managers were held to account by the Network Rail organisation to achieve the Route's Key Performance Indicators (KPI) and they applied insufficient attention to validate that this data represented reality (see section G12 of this report).
- A4.17. There was a lack of consideration as to the availability of alternative methods to access the track or use of other safe system of work arrangements further up the hierarchy e.g. LOWS (see sections G3 and G10 of this report).

Culture (at Port Talbot depot)

- A4.18. Habitual ways of working had normalised behaviour which was inherently non-compliant with company and group standards (see sections G2 and G12 of this report).

¹ This action is commended

² Including PAIs, Audit and Self-Assurance

Standards

A4.19. The briefing for the introduction of NR/L2/OHS/019 (version 9) was under-resourced and ineffectively implemented which led to a level of misunderstanding. Parts³ of the national 019 briefing pack were authorised to be omitted for the Wales Route briefing package. The briefing was not prescribed for delivery by a qualified trainer even though its content related to the application of safety critical rules (see section G3 of this report).

A5. Other safety related issues identified

- A5.1. There was confusion amongst the interviewees as to how parallel components in a SWP should be applied e.g. the communication practicalities as to how a distant lookout would be stood down when the COSS transitions from Lookout warning to a Site Warden protected SSOW. This issue was immediately raised by the lead interviewer with the Route and the DCP concerning arrangements locally described as 'parallel working.' (see section G3 of this report).
- A5.2. The purpose and role of the PIC in planning and implementing a SSOW was not fully understood. PICs more often delegated the COSS responsibilities than was the intent behind NR/L2/OHS/019 (see section G4 of this report).
- A5.3. Some work could be undertaken within a separated SSOW and other work using unassisted lookouts, but it was unclear what work was to be performed within each category and this was open to misinterpretation (see section G3 of this report).
- A5.4. The train driver initially gave warning using the high and low pitch warning horn but thereafter used the low pitch contrary to the requirements of GE/RT8000/TW1. There was no use of urgent short blasts (see section G6).
- A5.5. Company standards do not identify maximum distances between members of a workgroup working together before additional lookout protection or additional measures should be introduced (see section G1 of this report).
- A5.6. Technician 2, a Team Leader, handed over the PIC role to Technician (B), contrary to the Supervisor's intention. This reduced the number of staff available to set up a safe system of work and probably influenced how and what work was undertaken (see section G1 of this report).
- A5.7. The Planner had insufficient influence over how the work would be undertaken safely (see section G3 of this report).
- A5.8. The COSS and the other staff members involved had retained some of their competencies through an Annual Capability Conversation (ACC) with their line manager and had not benefitted from the way a new COSS would have non-technical skills assessed. The way competencies were reviewed and renewed for those leading others and safety on site was not within a formal training environment (see section G2).
- A5.9. There was no reference document in place to guide and prompt actions during the management of such a serious event (see section G9).

³ Authorised by the Planning and Delivering Safe Work Programme Board

A6. Actions already taken

- A6.1. A Safety Advice was issued on 12 July 2019 concerning systems of work needing a touch lookout; it required a senior line manager e.g. Infrastructure Maintenance Engineer (IME) or an equivalent or more senior manager to approve each specific work task in advance of the work taking place. The Infrastructure Maintenance Delivery Manager (IMDM) Cardiff sent an e-mail on 7 August 2019 that he had led a re-briefing on the arrangements.
- A6.2. The Network Rail, Head of Corporate Workforce Safety has commissioned a study by RSSB to evaluate the interrelationship between train warning horns, use of hearing protection and the warning arrangements for those working with powered equipment. The findings will be published separately to this investigation.
- A6.3. This accident was featured on 'Front Line Focus' episode 86.
- A6.4. An interim investigation report and briefing slides were issued across the business in September 2019.
- A6.5. In September 2019, a Track Worker Safety Task Force was formed to bring together programmes that are designed to enhance Network Rail's overall approach to trackworker safety. These include, amongst other initiatives:
- a) Safer trackside working programme – which is designing and developing new protection and warning systems using digital technology to warn colleagues of approaching trains.
 - b) Planning and delivering safe work programme – created to improve the planning of track-side work, giving clarity of who's in charge and ensuring good quality briefings are undertaken before work starts.
 - c) Near miss reduction programme – aimed at reducing the number of incidents where track workers are at risk of being struck by trains.

A7. Local actions

Behavioural causation

- A7.1. Network Rail, IMDM, Cardiff to review the behavioural causation with the COSS identified in the Fair Culture flowchart (section H) concerning the process and take appropriate action (see section A3.3, A3.4 of this report).
- A7.2. Network Rail, IMDM, Cardiff to review the behavioural causation with the Technician 1 identified in the Fair Culture flowchart (section H) concerning the process and take appropriate action (see section A3.5 of this report).
- A7.3. Network Rail, IMDM, Cardiff to review the behavioural causation with the Technician 2 identified in the Fair Culture flowchart (section H) concerning the process and take appropriate action (see section A3.6 of this report).
- A7.4. Network Rail, IMDM, Cardiff to review the behavioural causation with Technicians 1, 3 and 4 identified in the Fair Culture flowchart (section H) concerning the process and take appropriate action (see section A3.7 of this report).

- A7.5. Network Rail, IMDM, Cardiff to review the behavioural causation with Supervisor 1 identified in the Fair Culture flowchart (section H) concerning the process and take appropriate action (see section A3.8 of this report).

Training

- A7.6. Network Rail, Head of Maintenance Delivery, Wales, to conduct a training needs analysis to identify the number of employees required, subject to the hierarchy, to act as site wardens, use LOWS etc and upskill an appropriate number of staff to meet the Route's requirements (see section A4.17).

Competence

- A7.7. Network Rail, Head of Maintenance Delivery, Wales, to arrange that everyone at Port Talbot depot with COSS competence is recertified through the current COSS training programme (see sections A4.1, A4.10 and A4.11).
- A7.8. Network Rail, IMDM Cardiff to reiterate to the Port Talbot depot Track teams that when lookout warning is or becomes inadequate, the work must cease, and teams must return to a position of safety, and to check that there is consistent compliance (see section A2.1).

Planning

- A7.9. Network Rail, Head of Maintenance Delivery, Wales, to undertake a thorough review of the efficacy of the planning, verification, communication, application and adequacy of protection arrangements in relation to work undertaken by the IMDM Cardiff team and share any learning points with IMDM Shrewsbury and all other Routes (see sections A4.3, A4.6, A4.7, A4.8, A4.9, A4.12 and A4.15).

Network Rail, Head of Operations Delivery, Wales to review the line blockages that can be made available to maintenance staff to access to the Up and Down Main line at Margam Moors and East Junctions. These should be for reasonable time periods, rather than 10 to 15-minute line blocks. This review should also include a risk assessment of Panel A signaller's workload (see section A4.17).

Practices

- A7.10. Network Rail, Route Director, Wales to review the communication practicalities as to how a distant lookout is stood down when the COSS transitions from Lookout warning to a Site Warden protected SSOW and share the outcome with other Routes (see section A5.1).

Assurance

- A7.11. Network Rail, Head of Route Safety Health and Environment (HoRSHE), Wales to revise the Routes' assurance arrangements to include an adequate sample of site verification checks to determine compliance with prescribed Safe Systems of Work (see section A4.3).

- A7.12. Network Rail, Route Director, Wales to establish why the Route's assurance process did not trigger earlier action by senior managers to resolve the way in which safe systems of work were being implemented, especially when this limited the number of staff that were available to work or act as Lookout protection when, for example, track teams were separated into small groups. Outputs from this analysis should be shared with all Routes via a lessons learnt bulletin (see sections A4.2, A4.3, A4.14, A4.16 and A4.18).

A8. Recommendations

Assurance

- A8.1. Network Rail, Head of Risk Management, STE, to institute a 'Deep Dive' that includes sampled site verification of planning, verification, communication, application and adequacy of protection arrangements for work undertaken by the maintenance function.
- Intention: to examine the extent to which the shortcomings identified in Wales Route are reflected elsewhere (see section A2.1).
- A8.2. Network Rail, Chief Quality Health Safety & Environment Officer to remit the Head of Internal Audit to undertake an independent review of the effectiveness of the arrangements within NR/L2/OHS/019 v9, including its development, gap analysis, briefing, understanding, implementation and monitoring (including Planned Assurance inspections (PAIs) etc) of the arrangements.
- Intention: to test whether the standard is disproportionately onerous for those maintaining the asset etc and whether the standard is too complex, open to inappropriate interpretation or creates unnecessary administration that cannot be resourced by the end user or whether, as written, it adds value to enable compliance with statutory duties (see sections A5.1, A5.3, A5.5 and A4.19).
- A8.3. Network Rail, Chief Quality Health Safety & Environment Officer to remit a Level 3 Class Investigation to evaluate the extent in other Routes of similar latent failures or casual factors, to those found in this report.
- Intention: to identify systemic issues and make recommendations to mitigate those risks (see sections A4.1 to A4.19).
- A8.4. Network Rail, Head of Risk Management, STE, to implement a thorough review of the Self-Assurance arrangements to understand whether individuals have sufficient training, knowledge and experience/maturity⁴ to be able to accurately report deficiencies under their control.
- Intention: to review the question sets, the level of validation/verification by line managers of their subordinates and whether the KPI performance culture adversely affects safety reporting, and to implement appropriate remedial measures (see section A4.16).

⁴ Reference to Risk Management Maturity Model (RM3) Published 1 April 2019 - Note: Section Manager (Track), Port Talbot reported 100% compliance

- A8.5. Network Rail, Head of Risk Management, STE, to review and enhance the Functional Audit Programme to more thoroughly test the effectiveness of Level 1 assurance in each audited business unit.

Intention: to adapt the Functional Audit Programme process so that it becomes a more realistic test of local assurance effectiveness and is readied for organisational change through which Regions scrutinise Route safety compliance (see section A4.14).

Workforce safety

- A8.6. Network Rail, Head of Corporate Workforce Safety, subject to the findings of the work commissioned from RSSB (A6.2), to provide technical advice to the procurement team upon the appropriateness of hearing protection for track workers.

Intention: for the design of hearing protection to provide the best opportunity, if possible, to hear all current train warning horns (see section A.5.4).

- A8.7. Network Rail, Head of Corporate Workforce Safety to review whether a prescribed competency⁵ is required that includes technical and non-technical skills for the Person in Charge (PIC) given that persons acting in this role are part of the briefing arrangements and have responsibilities on site.

Intention: to reinforce effective discharge of PIC responsibilities, an issue raised by the Wales Route (see sections A2.1, A4.1 and A5.2).

- A8.8. Network Rail, Head of Corporate Workforce Safety to consider whether a maximum distance between the COSS and all members of their workgroup should be specified.

Intention: to consider whether a specified distance should be included in company or group standards (see section A5.5).

Planning

- A8.9. Network Rail, Chief Quality Health Safety & Environment Officer to review the role of the Planner and make any necessary improvements to training, skills and involvement of this role in planning safe systems of work.

Intention: to reinforce the risk controls within the NR/L3/OHS/019 process arrangements (see section A5.7).

- A8.10. Network Rail, Head of Corporate Workforce Safety to review the principle of 'parallel components' in safe system of work planning and either delete the functionality or provide effective instructions to clarify how and where it may be used.

Intention: if they are required, to make clear the description of 'parallel components' (see section A5.1).

⁵ This recommendation is made to reinforce the Track Worker Safety Task Force Group workstream on PIC competency.

Competence

- A8.11. Network Rail, Head of Training Governance & Assurance to review the process of Annual Capability Conversations (ACCs) and determine whether it is an effective tool for the evaluation of staff safety competence.

Intention: to establish whether an ACC is effective in maintaining competency and safe behaviours⁶, especially for those roles/skills that lead others, given its effectiveness is dependent upon the manager implementing it. This should be compared to the results from formal re-certification training (see section (A5.8)).

Safety culture

- A8.12. Network Rail, Chief Quality Health Safety & Environment Officer to commission with support from the Principal Health and Safety Change Specialist a review of Wales Route's safety culture, following this accident and arising from changes to the people appointed to roles.

Intention: to identify appropriate risk control measures and subsequently verify the output of any remedial actions with reference to the Risk Management Maturity Model (RM3) (see section A4.18).

Welfare

- A8.13. Network Rail, Chief Medical Officer, to create a short guide for reference during Route management of the immediate and longer-term impacts following a similar serious incident.

Intention: to act as the framework for action after a potentially traumatic event, highlighting the need to treat those involved - and all staff managing the aftermath - as individuals with differing needs and requirements, depending on their circumstances. (see section A5.9).

Driver management

- A8.14. Head of Operations, Great Western Railway, to review driver training in the appropriate use of the warning horn in response to emergencies and share the outcome of this work with other Railway Undertakings.

Intention: to help drivers react automatically to emergencies rather than having to think about the correct use of a warning horn when there is little time for decision making and in very stressful situations (see section A5.4).

⁶ Holders of COSS have their competencies reviewed under an Annual Capability Conversation (ACC). If the ACC is not conducted in the prescribed timescales, the competence is suspended in Sentinel.

B. Purpose

B1. Objectives & authority

- B1.1. The objective of this Level 3 (formal) investigation was not the allocation of blame or liability and thus the information contained should not be construed as creating any presumption of these.
- B1.2. This investigation was conducted with the objectives of:
- a) determining the facts of the accident/incident
 - b) determining the immediate and underlying causes and
 - c) making recommendations and local actions to prevent or reduce the risk of recurrence and severity of a recurrence of the accident/incident.
- B1.3. This Level 3 (formal) investigation report is for the use of persons with a direct responsibility for improving, or maintaining, railway safety.
- B1.4. The lead investigator had the authority to request information to be provided by Transport Operators involved in the incident, to interview witnesses, request technical evaluations to be conducted and obtain other information as required for the purpose of achieving this remit.
- B1.5. The lead investigator was able to request similar information from non-Transport Operators. These organisations may not, however, have been bound by the requirements of Railway Industry Standard (RIS) RIS-3119-TOM to provide this unless incorporated into contractual requirements with Transport Operators.

C. Remit

C1. General

C1.1. This remit requires a level 3 investigation to be held into the circumstances of the following accident/incident.

C1.2. Title: Death of two track workers at Margam

C1.3. Date: 3 July 2019

C1.4. Lead organisation: Network Rail, Safety Technical & Engineering

C4.2. Trade union participation in Network Rail led investigations shall be arranged by the Lead Investigator in accordance with the guidance linked above.

C5. Authority

C5.1. The lead investigator has the authority to request information to be provided by Transport Operators involved in the accident/incident, to interview witnesses, request technical evaluations to be conducted and obtain other information as required for the purpose of achieving this remit.

C5.2. The lead investigator may request similar information from non-Transport Operators. These organisations may not, however, be bound by the requirements of Rail Industry Standard RIS-3119-TOM *Rail Industry Standard for Accident and Incident Investigation* to provide this unless incorporated into contractual requirements with Transport Operators.

C6. General objectives of the investigation

C6.1. The investigation team is required to investigate the circumstances of the accident/incident, including the following:

- a) identifying the events leading up to the accident/incident;
- b) identifying the immediate and underlying causes, including:
 - i) the relevance of the 10 incident factors (guidance on these is provided in RIS-3119-TOM section 7.10⁷), and
 - ii) relevant management issues/processes;
- c) identifying the behavioural cause of any unsafe act using the fair culture flowchart;
- d) consideration of previous accidents/incidents of a similar nature, including actions taken in response to recommendations made from investigation, and the effectiveness of those actions;
- e) consideration of the findings/intelligence from relevant audit/assurance activity (guidance on this is provided in Part 2 of the Investigators' Handbook);
- f) a review of Sentinel data (e.g. eligibility to work, scanned authentications of trackside staff, etc.) (where applicable);
- g) identifying the behavioural cause of any unsafe act using the fair culture flowchart;
- h) consideration of the specific objectives listed below (as far as they are relevant).

C7. Specific objectives of the investigation

C7.1. The adequacy of the planning of the work, including:

- a) The nature of the work, its scheduling and whether it had been rescheduled or retimed;
- b) Whether sufficient time, manpower and equipment were provided for the work to be done safely;
- c) Whether there were any pressures to complete the work at a specific time (e.g. timescale for compliance, workload etc.);

⁷ Additional information is in Part 4 of the Investigators' Handbook

C7.2 The method of protection from trains, including:

- a) The planning of arrangements for track safety (Compliance with NR/L2/OHS/019 and GE/RT8000);
- b) Whether the work was planned to take advantage of any line blockages available, and the availability of line blockages at the time the work took place, including GZAM applications.
- c) The overall adequacy of the planned method of protection or warning in place at the time of the incident;
- d) Adequacy of method of protection/warning and the suitability of this protection/warning in association with the task;
- d) The adequacy with which the planned method of protection or warning was briefed and implemented on site.

C7.3 The manner in which the work was being carried out, including:

- a) Compliance with NR/L2/OHS019 and GE/RT8000;
- b) The supervisory arrangements at the site of work, including the adequacy of site supervision and control by the team leader, PIC and COSS (if different);
- c) the time of day the work was being done and the reasons for the difference to the plan;
- d) The impact of any unforeseen events, and the actions taken in response to these;
- e) The relationship the work team and other work taking place in the same area, including the safety arrangements, any changes to planned work and allocation of resources.

C7.4 The training, competence and experience of the individuals involved (PIC, COSS, Lookout, SSOW Planner and any others involved), including:

- a) Local knowledge of the site, and train operations;
- b) The individuals' training and experience in their role, and the frequency with which they carried out these duties;
- c) The adequacy, frequency and effectiveness of competence assessment;
- d) Any relevant previous safety event or personal factors.

C7.5 The continued suitability of touch lookout protection as a method of warning for approaching trains, including:

- a) The arrangements for the selection and assessment of touch lookouts;
- b) Any limits on task suitability for touch lookout;
- c) Any equipment or PPE restrictions;
- d) The use of technology to eliminate the need for touch lookouts.

C7.6 The actions taken by the train driver, including:

- a) The timing and adequacy of any audible warnings given, and actions taken;
- b) The safety critical communications related to the event.

C7.7 Actions taken in the team/depot/Delivery unit to reduce the risk of track worker injury, including:

- a) Monitoring, assuring and improving the effectiveness of Safe System of Work planning, and Safe Work Packs;
- b) Use of the hierarchy of risk control, including provision of technology;
- c) Engaging frontline staff in lessons learned from other near miss or staff injury incidents;
- d) The frequency, coverage and adequacy of supervision, planned general inspections and management safety conversations, and follow-up action.
- e) Any relevant cultural, underlying management or organisational factors that may have influenced working practices;

C8. Recommendations and local actions

C8.1. The investigation team is required to formulate recommendations and/or local actions to:

- a) prevent a recurrence of the accident/incident,
- a) reduce the likelihood or severity of a recurrence of the accident/incident.

C8.2. Recommendations should be directed to an identified post within the relevant organisation. The post holder should have been consulted on the proposed recommendation during the investigation and included in the 10-day consultation. A list of Professional Heads is available on Connect to assist with this.

A recommendation should be made to propose a change to an existing control measure (e.g. a rule, instruction, standard or process), or define a new control measure.

C9. Reporting and timescales

C9.1. The investigation shall commence as soon as possible. The lead investigator shall provide:

- a) an interim factual report within eight weeks of the incident;
- b) a draft report which is unsigned, but agreed by the investigation team members, within 12 weeks of the accident/incident; and
- c) a completed report, taking into account the comments made during the consultation period and which is signed or agreed by the investigation team members, within 16 weeks of the accident/incident.

- C9.2. The format and structure of the report shall be in accordance with the template and guidance, including the Investigators' Handbook, thereto authorised by the Corporate Investigation & Assurance Manager.
- C9.3. The lead investigator shall inform the Investigation Manager/Designated Competent Person in the following circumstances:
- a) if it is believed that the objectives of the remit (including the timescales) will not be achieved,
 - b) if, at any time, the investigation reveals a safety issue of significance such that, in the investigation team's opinion, a need exists to inform Transport Operators prior to the completion of the Level 3 (formal) investigation.

C10. Authorisation by Investigation Manager/Designated Competent Person (DCP)

Allan Spence	Signature:	Agreement held on file
Interim Chief QHSE Officer and Designated Competent Person Network Rail, STE	Date:	July 2019
	Issue No.:	1

D2. Description of the train(s) and rail vehicles involved

- D2.1. Class 800 (Nos.800001–036) is a type of bi-mode five-car multiple unit designed and produced by Hitachi for use in the United Kingdom on the Great Western Main Line. They use electric motors for traction, but in addition to operating on track with overhead electric lines, have diesel generators to enable them to operate on unelectrified track.
- D2.2. The class 800 units are part of the Intercity Express Programme (IEP) a Hitachi/Department for Transport agreement. The train is part of the Hitachi AT300 product family. The Responsible Undertaking, Great Western Railway (GWR), have branded the class 800 as Intercity Express Trains (IET).
- D2.3. Vehicle no.800021 was the leading vehicle and 184 passengers were being conveyed upon the train.

D3. Description of the infrastructure and equipment involved

- D3.1. Facing east and looking from Up Main line towards PT9577B points, towards Pyle, Bridgend, Cardiff and London the line to the immediate left of the Up Main line is the up-Relief line. To the immediate right is the Down Main line and beyond this line, separated by shrubs and trees, is the Ogmore Vale line (OVE).

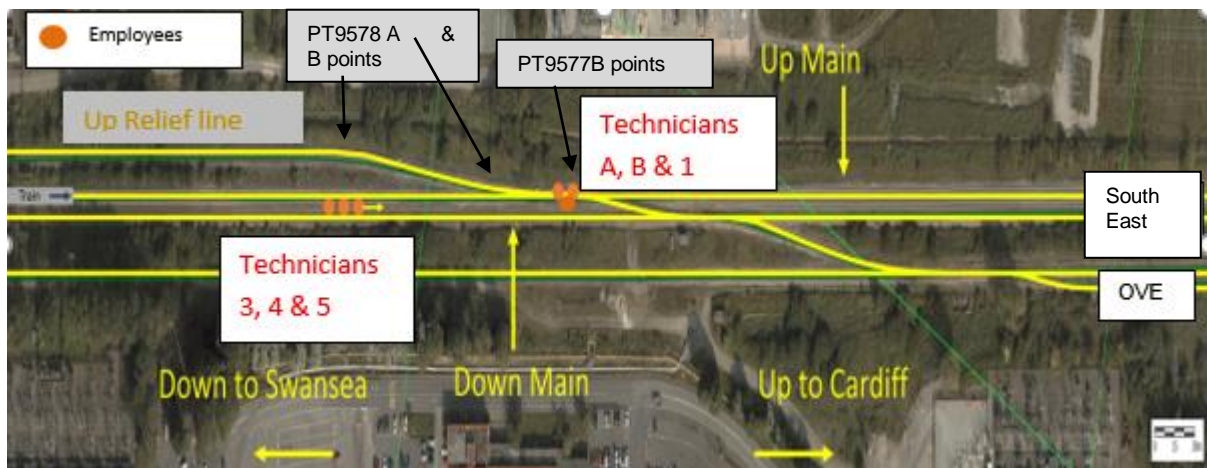


Fig. 2

- D3.2. Train movements are controlled by a signaller under the track circuit block arrangements operating Panel A located in Port Talbot Signalling Centre. Overhead line (25 kV) is not installed at this location.
- D3.3. The Infrastructure Maintainer is Network Rail.

D4. People involved

- D4.1. Technician (A), Fatally Injured Person, employed by Network Rail and based at Port Talbot.
- D4.2. Technician (B), Fatally Injured Person, employed by Network Rail and based at Port Talbot.
- D4.3. Technician (1) employed by Network Rail and based at Port Talbot.

- D4.4. Team Leader Technician (2) employed by Network Rail and based at Port Talbot.
- D4.5. Technician (3) employed by Network Rail and based at Port Talbot.
- D4.6. Technician (4) employed by Network Rail and based at Port Talbot.
- D4.7. Technician (5) (COSS) employed by Network Rail and based at Port Talbot.
- D4.8. Section Supervisor 1 employed by Network Rail and based at Port Talbot.
- D4.9. Section Supervisor 2 employed by Network Rail and based at Port Talbot.
- D4.10. Planner employed by Network Rail and based at Port Talbot.
- D4.11. Section Manager (Track) employed by Network Rail and based at Port Talbot.
- D4.12. Project Manager employed by Network Rail and based at Cardiff.
- D4.13. Track Maintenance Engineer 1 employed by Network Rail and based at Cardiff.
- D4.14. Track Maintenance Engineer 2 employed by Network Rail and based at Cardiff.
- D4.15. Infrastructure Maintenance Engineer employed by Network Rail and based at Cardiff.
- D4.16. Infrastructure Maintenance Delivery Manager employed by Network Rail and based at Cardiff.
- D4.17. Head of Maintenance Delivery employed by Network Rail and based at Cardiff.
- D4.18. Route Managing Director employed by Network Rail and based at Cardiff.
- D4.19. Former HORSHE, previously employed by Network Rail and based at Cardiff.

E. Sequence of events

- E1.1. The 3 July 2019 was a bright sunny day⁸ with the daytime temperature reaching circa 20 degrees Celsius. Maintenance work was planned on the Up and Down Main line between Margam East and Margam Moors Junctions (ELR:SWM2).
- E1.2. A group of 13 track staff booked on duty between 07:00 and 07:30 at Port Talbot Depot.
- E1.3. This team split into two groups, one group consisted of seven staff, including a COSS, and they worked as planned within a line blockage between signal numbers PT3047 and PT3049 on the Down Main line at Margam Moors Junction between 08:00 and 11:00. (This line blockage was given up at circa 10:00).
- E1.4. However, another group of six staff proceeded to a worksite on the Up Main line adjacent to Margam East Junction (arriving at 08:08). It was intended that this section of the line would be included within a line block later that day (between 12:30 and 15:30) from Margam East Junction (200 m 31 ch) to 199 m 31 ch. It was noted that one of their vehicles, a Ford Transit pick-up, had crossed the open Ogmere Vale Extension (OVE) line and was parked, contrary to GE/RT8000, between the OVE and Down Main lines.
- E1.5. Although the Safe Work Pack (SWP) showed that the work was to be undertaken between 12:30 and 15:30, this group started work at 08:00 with the lines open to trains. The COSS for this group documented that a distant and site lookout would be appointed.
- E1.6. The COSS calculated that 30 seconds warning time of the approach of trains would need to be given by a distant lookout warning located approximately 640 yards from the work site to be able to view trains at 1320 yards from the site of work. The COSS believed that this would allow the team working on PT9577B points to reach a position of safety before a train, travelling at the line speed of 90 mph, would reach their location. A distant lookout was not deployed.
- E1.7. CCTV footage from at train passing at approximately 09:28 on the Up Main line shows two groups working approximately 100 yards apart. The investigation has found no evidence of there being separate safe systems of work in place for the two groups.

⁸ Note. This had no effect on the accident

E1.8. Thereafter, the COSS and two others, one of which was identified as a Lookout in the SWP, walked away from the other three team members to undertake work on Insulated Rail Joints (IRJs). They walked towards the Up Relief line where they inspected two IRJs and then onto the Down⁹ Main line where they worked on two IRJs. They subsequently walked in the four-foot of the Down Main line back towards the first group of staff located some 150 – 170 yards away on the adjacent Up Main line. The latter group were involved in work to free, lubricate and re-tighten crossing bolts on PT9577B points. There was no safe system of work in place for those working on PT9577B points.

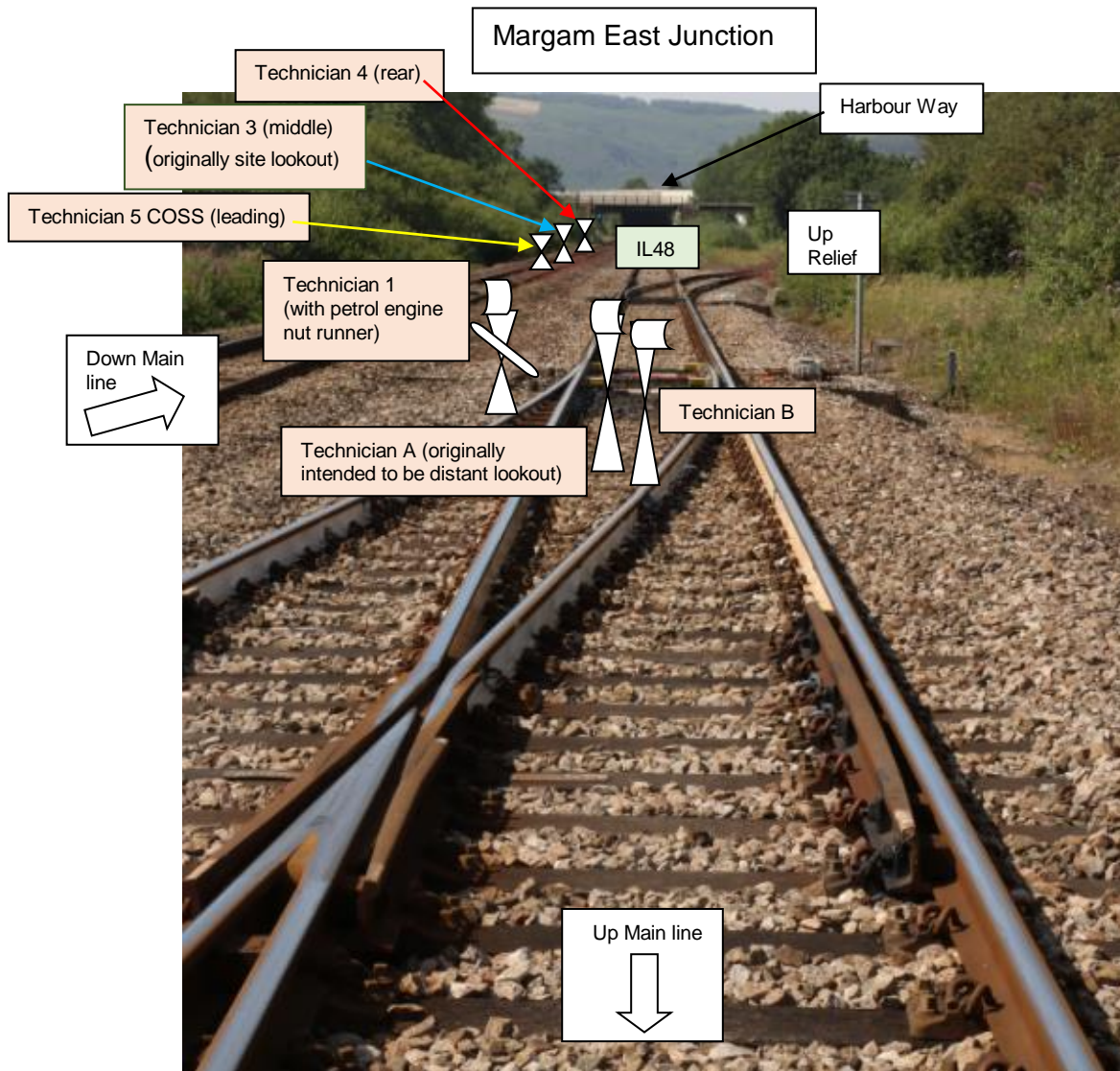


Fig.3 A simple representation of the site immediately prior to the accident - Technicians A, B and 1 were all wearing ear defenders

⁹ Initial statements suggested work was on the Up Main line, latterly amended (see section F9) to include remedial work following track circuit fault on the Down Main line

E1.9. 1L48, 09:29 Swansea to London Paddington, running on the Up Main line, passed under an overbridge (Harbour Way) at circa 70 mph on approach to the workgroup at PT9577B points. The train passed the three staff walking on the Down Main line at 09:51:39. The other three working on PT9577B points were unaware of the approaching train.

	Booked		Actual		Applicable Timetable
	arr	dep	arr	dep	
SWANSEA		09:29		09:28A	1 EARLY U LINE
SSEA LPEJ		09:30H		09:30A	RT TIME
NEATH	09:39H	09:41	09:39A	09:40A	1 EARLY M LINE
PTTALBTPW	09:47H	09:49	09:46A	09:48A	1 EARLY M LINE
MARGAMMJN		09:53			
STORMY		09:56			
BRIDGEND	10:01	10:02H			
PONTYCLUN		10:11			
LECKWTHNJ		10:19			
CARDIFCEN	10:22H	10:26			

Fig.4 - An extract of TRUST timings for 1L48

- E1.10. The train arrived at the group working on PT9577B points some eight seconds after passing the group on the Down Main line. The driver had given an audible warning of the train's approach using its horn and applied the emergency brake, which reduced the speed of the train to approximately 50 mph by the time it struck two members of the track team, causing fatal injuries.
- E1.11. Technicians (A) and (B) of the Port Talbot track team had been stood in the four-foot of the Up Main line. Technician 1 was crouching down to use portable equipment. At the time of the accident the latter had just re-fastened a bolt adjacent to the six-foot rail at PT9577B points. Technicians (A) and (B) were fatally injured. Technician 1 was not physically injured but was in shock.
- E1.12. An emergency call was received by the signaller operating Port Talbot panel A from the driver of the train involved. The driver stated that the train had probably struck three track workers on the Up Main line at Margam East Junction between Port Talbot Parkway and Pyle stations. Two members of the team that had been walking on the Down Main line administered first aid as the signaller was simultaneously contacted to stop all train movements and to call the emergency services to the site, along with maintenance and operational staff.
- E1.13. Paramedics quickly arrived and were conducted to site by steel works personnel and by a member of the team. The paramedics made every effort to save both members of the Port Talbot track team, but they were pronounced dead at the scene of the accident.
- E1.14. The Rail Accident Investigation Branch (RAIB) and the Office of Rail and Road (ORR) were informed of the circumstances and attended the site to conduct their preliminary investigations. Network Rail Route and Great Western Railway staff were called to site to conduct a safe evacuation of 184 passengers from 1L48. This involved clearing an egress route to enable evacuation of the passengers to replacement bus services.

F. Summary of evidence

F1. Works order print

- F1.1. There were various activities identified in works order reports assigned to Port Talbot Track Team B in the Margam area. Their work had various timescales to reach completion.

Work at Margam East Junction around the time (6 days) of the accident included:

- F1.2. Resetting sleeper spacing and squareness between 200 m 440 yards and 200 m 1540 yards on the Up main line.
- F1.3. Work was planned between 3 and 8 July on PT9577B points using small plant. This included work on a timber bearer using hand tools. There was a work item for 9 July 2019 to lubricate the slide chairs on PT9577B points along with the adjacent PT9578A turnout points and PT9578B acting as trap points. There was also work on 9 July 2019 to lift and pack an adjustment switch by 8 July 2019 at 200 m 35 ch.

F2. The 'gang plan'

- F2.1. The 'gang plan' set out what work was to be assigned each day over several weeks.

Down Main line

- F2.2. On Wednesday 3 July 2019 work between 199 m 59 ch and 199 m 69 ch consisted of work to pack an area of 30 yards which was to be undertaken between 08:00 and 09:30.
- F2.3. Between 09:30 and 11:00 a line blockage was to be taken between signal no. PT3047 and PT3049 for packing to the crossing nose and attention to the crossing with work to oil bolts in PT9566B points, a connection to the South Wales Main line, although the OVE dual mileage of 2 m 46 ch is used in the plan.

Up Main line

- F2.4. The gang plan for the work on the Up Main line does not indicate during what hours this work will take place or indicate, as for the Down Main line, the nature of the protection arrangements.
- F2.5. Work is shown as to manually box in ballast between 199 m 60 ch and 199 m 30 ch with 80 yards of vegetation removal on the Up Main/Up Relief between 200 m 40 ch and 200 m 50 ch.
- F2.6. Work is shown between 200 m 41 ch and 200 m 28 ch is shown as maintenance to PT9577B points and 30 yards of packing.

F3. NR/L2/OHS/019 v9 Safety of people at work on or near the line

Context

- F3.1. The most recent update to this company standard was 3 July 2017 with full implementation by 23 September 2017. This introduced the deployment of a Person in Charge (PIC) on site who had been involved in planning the work including the task risk assessment. The person must hold COSS competency. This role is normally delivered at Port Talbot by the Team Leader or an equivalent person.
- F3.2. This standard also specifies a Responsible Manager, e.g. Section Manager or Section Supervisor, as the person accountable for the appointment of the PIC. The Responsible Manager must authorise the SWP.
- F3.3. The creation of a SWP containing the relevant elements is explained in section F4. This requires collaboration between the Responsible Manager, Planner, PIC and any person with technical expertise concerning the location and/or tasks involved.
- F3.4. The PIC (or separate COSS if it is necessary to delegate that task) must verify the suitability and fitness of the SWP one shift in advance of the work taking place. The Responsible Manager authorising the SWP cannot be the same person verifying the SWP.
- F3.5. The Planner must be competent in safe system of work planning and work with the Responsible Manager and PIC for advice/guidance.

Explanatory note. The PIC is accountable for the work but may delegate the task of applying the safe system of work to a separate COSS if necessary.

- F3.6. Deviation from an authorised SWP to a system lower down the risk control hierarchy must be authorised beforehand by the Responsible Manager.

F4. Record of arrangements and briefing form – RT9909, Line blockage form – NR3180. GZAC Work Schedule, Risk control briefing and PIC acceptance - NR/L2/OHS/019/F01.2 for a.m. 3 July 2019 at Margam Moors Junction

The SSOW document

- F4.1. The RT9909 showed that the nature of the work was to pack a crossing between 198 m 59 ch and 198 m 69 ch. (Reference No.6307995) The Safe System of Work pack showed work was to be undertaken over a three-hour period from 08:00 until 11:00 on 3 July 2019.
- F4.2. The RT9909 showed this work was to be undertaken with the Down Main line blocked between the protecting signals PT3047 and PT3049. This line blockage was due to be given up allowing four trains to pass through the site of work between 08:00 and 09:30. Any work that continued while the trains passed would have to revert to a lookout warning system. The Up Main line remained open to trains.

- F4.3. Both Up and Down Main lines can be operated bi-directionally, and one lookout was allocated for the work activity outlined above. The COSS was expected to supplement the lookout protection as necessary.
- F4.4. In the Risks and Controls section to be applied by the PIC, a Cobra or a Hilti tamping hammer is shown to be in use which can emit circa 101 dBA where hearing protection was shown to be required. Despite that, no touch lookout was specifically resourced or tasked on site.

The Planner and verification

- F4.5. The Planner had completed the 'SSOWP – Pre-Assessment' course on 23 October 2017 and 'Safe System of Work Planner' course on 16 November 2017. The competence was valid until 15 November 2020.
- F4.6. The COSS/PIC and a supervisor had countersigned the relevant sections of the RT9909 document.

F5. Record of arrangements and briefing form – RT9909, Line blockage form – NR3180. GZAC Work Schedule, Risk control briefing and PIC acceptance - NR/L2/OHS/019/F01.2 for p.m. 3 July 2019 at Margam East Junction

- F5.1. The work for the afternoon 3 July 2019 was similarly documented. This showed that there would be a line blockage, reference no. 630996, between 12:30 and 15:30 on the Up Main line and Up Relief line between 199 m 30 ch and 200 m 50 ch (from protecting signals PT3052/3358 to PT3048) to box in ballast, vegetation works and attention to PT9577 points. The RT9909 also indicated that the line was blocked but could be opened to trains.
- F5.2. A handwritten note from the Section Supervisor 1 shows: box in ballast between 199 m 60 ch to 199 m 30 ch S&C maintenance 9577B points 200 m 28 ch and 200 m 41 ch and vegetation works on the Up Main/Relief between 200 m 40 ch and 200 m 50 ch. There is no reference to the time that this work was to take place.
- F5.3. The SWP shows that this work is to be undertaken in the afternoon rather than 08:30 to 12:30 and this was an issue that caused the appointed COSS to initially refuse to take on these duties (discussed later). Planning the same times (12:30 to 15:30) for the two different systems of work implies the PIC (or COSS) was allowed to switch at any time between lookout warning and line blockage working without seeking Responsible Manager authorisation. It eroded the effectiveness of the intended rigour of planning the safest system of work available. In contrast, if the pack had specified separate times for the two systems, the planned and authorised arrangements could have been sequentially switched between two safe systems of work at the planned time.
- F5.4. There is however, no evidence that work was planned to take place between 08:30 and 12:30 at Margam East Junction. Therefore, there was no SSOW for 08:30 to 12:30.

- F5.5. The team arrived on site near to PT9577B points at Margam East Junction at 08:08 following a joint briefing at the depot with the seven members of the other team that went to work in the line blockage on the Down Main line some 1.25 miles to the west of their location.
- F5.6. The extent of activity towards or beyond the six-foot rail is not documented and the resources required cannot be readily identified. With just one line blocked, work into the six-foot area would be outside the protected area and would require a separate line blockage of the other line.
- F5.7. The COSS for the Margam East Junction team of six staff annotated the section of the RT9909 for a 'lookout – Calculating required Warning Time and Sighting Distances'. The COSS showed that some 1320 yards was required to provide 30 seconds warning of the approach of trains for those working on PT9577B points. He documented that both a distant and a site lookout would be required.
- F5.8. A person unfastening and fastening bolts in the six-foot rail and switch had to be in the six-foot. Therefore, they would also need to be protected from (or warned of) the approach of trains on the Down Main line. The line blockage of the Down Main line at Margam Moor Junction for the other team was given up allowing four trains to pass, demonstrating that trains ran on the Down Main line. There was less than 6' 6" clearance between the person using the nut runner and that line which was open to trains at Margam East Junction.
- F5.9. Using the noisy nut runner while wearing hearing protection would require an additional touch lookout to be appointed to physically warn those involved of any warning given by the site lookout. This was not part of the pre-planning and was not deployed on site. More than three staff were needed to undertake this activity with the Down Main line open and scope for trains to run towards the team from the OVE line or over the Up Relief/Goods line.
- F5.10. These arrangements did not provide a timely warning of the approach of trains. Technician B had not signed any documentation to show he was the PIC but acted as such. He also said he would act as the (sole) lookout for the group working on PT9577B points but was carrying no lookout equipment.

F6. 'Parallel working'

Principles

- F6.1. The Route had developed a way of working that is locally called 'parallel working'¹⁰ which provided options to work protected in a line blockage or with lookout warning. In effect this created a contingency option allowing the PIC to choose which system to use.
- F6.2. The SSOW planning system is able to create a parallel component for work to be undertaken. A parallel component is essentially an additional safe system with the same time and geographical limits.

¹⁰ This is not specified in Network Rail's standards

It can legitimately be used where more than one SSOW is required for the work at a location. e.g. part of the task at a location is to be carried out using a protection arrangement and part of the task needs a warning arrangement to be implemented.

- F6.3. The design of the SSOW planning system intends that where there are different components:
- a) only one safe system may be implemented by the COSS at any one time. i.e. two parallel components are valid and available for use during the same start and finishing time set, but only one can be used at a time.
 - b) If for instance two parallel components were created, one for the use of lookout warning and one for use of 'separated' Site Warden protection, the COSS implements one of these safe systems. If the COSS later needs to change to the other parallel system, they must stand the whole work group down (including lookouts) to re-brief the group and implement and test the second system.
- F6.4. The investigation team have been unable to find any company instructions about the use of parallel components.
- F6.5. When one line is blocked to create a position of safety while the other line remains open, only one component of unassisted lookout warning would be created with one line showing blocked and one line open on the form. This is a different concept to the locally-developed 'parallel working' arrangements.

Margam East Junction

The local depot arrangements that should have been applied:

- F6.6. The Up Main line was open to trains. If the work had to be done with Lookout warning, the COSS should have deployed both site and distant lookouts and tested the system.
- F6.7. With the nut runner in use, an additional touch lookout should have been appointed on site.
- F6.8. Since the work involved staff being in the six-foot, additional lookout protection for the Down Main line was required as well. In addition, trains could have approached on the Up Relief from Port Talbot or on the OVE line from Margam Moors Junction.
- F6.9. If it was necessary to work at Margam East Junction before the line blockage(s) were available, there should have been sequential components in the SWP; one component for 08:30 -12:30 and another for 12:30 -15:30.
- F6.10. With the locally developed arrangements, the transition between working using unassisted lookouts and site wardens meant that the distant lookout would not know whether the workgroup was working under their warnings or if a site warden was in operation (if not re-briefed about the changed system). The distant lookout would not know whether to try to stop an approaching train if they did not receive an acknowledgement from the site lookout.

Note: a re-briefing was undertaken later in July 2019 by the IMDM Cardiff to reiterate the correct arrangements.

F7. Technician 1 (Track Inspection) - part of the team directly involved in the accident.

Note: Full notes from all interviews are held on file.

- F7.1. Technician No.1 was interviewed and the investigation panel noted the following salient points:
- a) Technician (B) told Technician 5 that he would be the COSS that day.
 - b) Technician (B) gave Technician 5 the COSS form on arrival at the site of work. There were about three separate briefs and the team was told the location, nature of the work, tasks etc.
 - c) While Technician 4, Technician (B), and Technician 5 (COSS) were having a conversation, Technician (A) and Technician 1 started to cross the tracks and were wearing ear defenders and gloves. The latter technicians started work with Technician 3 as the lookout.
 - d) This group started work on the Up line, six-foot rail and then the cess rail. Technician 4 and Technician 5 (COSS) were together. Technician (B) then told the group to have a break.
 - e) Technician (B) told Technician 4 and Technician 5 (COSS) to take Technician 3 with them to undertake another job (This group were walking along the Down Main when the accident occurred). Technician 1 was still under the tree line in the shade and chatting. The three others left.
 - f) Technician (B) then said to Technicians 1 and (A): “come on, let’s get on with it.”
 - g) This group were working on the six-foot rail. Technician (B) said he would keep an eye out for trains. Technician 1 assumed that Technician (A) was assisting because Technician (A) was holding up the bolts with his foot. Technician 1 stated that “one bolt was really difficult to get off. It just kept spinning. It had seized, turning slowly. I was putting more pressure on it and it came half way.”
 - h) Technician 1 turned off the nut runner, and Technician (B) suggested putting oil on it. Technician 1 stated that he “looked back down, put on oil and tightened up, then took my finger off the trigger”. Technician 1 stood up, and looked at Technician (A). He saw them both laying on the floor about 5 metres away. He didn’t smell the brakes or see the train coming.
 - i) He added: “it was not unusual for the team to split up and was always that way. There may be a need to change ways of working, possibly just little things.”
 - j) Technician 1 was not sure that he wanted to be the COSS for large groups.
 - k) Prior to this accident Technician 1 had not reported anything as being unsafe. He commented: “safe work was just a statement which could be ignored; it was like a tick box; people brush over it; people should be more vocal; learnt behaviours are passed on to new workers”.
 - l) Technicians (A) and (B) involved in this accident were wearing ear defenders.

Note: Technician 1 was also wearing ear defenders.

F8. Technician 2 (Team Leader) who asked Technician (B) to lead the group involved in the accident at Margam East

F8.1. Technician 2 (Team Leader) was interviewed and the following salient points were noted by the investigation team:

- a) Another team leader had signed the pack [refers to SWP Validation Form F01.1 as Person in Charge on 2 July 2019]. It was decided that patrollers which were Technician (B) and Technician 1, Technician (A) and Technician 3 would work together at Margam East Junction. Technician 2 and the others would go to Margam Moors Junction. Technician (A) had a flatbed truck and regularly collected Technician 3 on the way to work hence they were put together.
- b) Section Supervisor 1 mentioned that possible IRJs might need trimming as there had been a fault the previous day. Technician 2 was given the documentation that another team leader had signed and in turn then looked for Technician (B).
- c) Technician 2 briefed Technician (B) for 20 minutes. The technician that signed the documents was on his left and Section Supervisor on his right, though towards the end of the brief it was only Technician 2 and Technician (B). Technician (B) was handed the paperwork and reassured about the work during the two-way conversation.

Explanatory note: Technician (B) had been acting Team Leader for the patrollers for 10 years and Margam East was part of the section of line that he regularly patrolled. Four members of the group were part of the patrolling team and two members were from the maintenance team. Although briefed, Technician (B) was not formally appointed as the PIC.

- d) Technician 2's work was at Margam Moors Junction with a blockage of the Down Main line between 08:00 – 09:30. Technician 2 completed the forms for the work at Margam Moors Junction as PIC. He organised the work and delegated Technician 7 as the COSS to organise the safe system of work for that line blockage.
- e) Technician 2 explained that his briefing was mainly about work content. This involved red zone in the morning then green zone at 12:30. The lookouts are not detailed, and these are arranged on site for the red zone.
- f) The track teams had raised concerns about the PIC not being on site and had been told that the person who verifies does not need to be on site. It was thought this was right.
- g) There was a concern over parallel working. Technician 2 stated that he would have ideally briefed about the red zone only, then the green later. A single briefing being given for two different safe systems of work had been brought up in a safety hour discussion. Those leading the briefings considered this to be OK, though there should be two briefings given at different times of the day.

h) After the event, Technician 2 believed that Technician (A) had been the distant lookout, though the team were not working together. Technician 2 would, (had he been the COSS at Margam East Junction) have had two lookouts in place.

i) Technician 2 stated that he had not found himself in a situation where the gang was split into two groups.

Note: Supervisor 1's hand-written note directed Technician 2 to be the PIC at Margam East Junction. Given Technician 2's comments above, this might have affected the outcome of this event.

j) Technician (B) had been really proud of his 'patch'. Technician (B) was accepted as a third team leader and had acted in this capacity since 2013.

k) There had been a few 'run ins' in the office. They were meant well as people were passionate; there is no pressure from supervisors. "Conversations are two-way, and things have got better."

l) Since the accident, Technician 2 had read the standard and found they had not been following it. All forms were verified 24 hours previously but the person that verified the forms had not been the person who carried out the work.

m) The Project Manager who had briefed out the 019 changes had not been able to answer many questions. A day or a two-day course every two years would be an improvement. The PIC role should be certified like a COSS because everyone has a different version of how it works.

F8.2. A further interview

a) Concerns about 019 were raised in the depot safety hour and the Workforce Health and Safety Advisor joined the team in Port Talbot to talk about it. Technician 2 missed the discussion because he was on leave, although other members of the team were content with this further explanation.

b) Technician 2 was one of two Team Leaders at Margam Moors Junction, though not the COSS or PIC. Technician 6 would have led the job, so Technician 2 wouldn't have taken over as PIC, being there as extra support 'on the tools'. Since the accident it has all been looked into and the way things are done has changed.

c) It had been a warm day and hard work, so the idea was that the younger men were to work at the Margam Moors Junction site. Named staff or competencies of staff who were to go to each site were not specified.

d) Technician 2 had given the SWP to Technician (B) though did not stand with him when he went through it and had not been aware of the COSS's concerns. Technician (B) was competent and would have been trusted to deal with it. The SWP was signed and would have been taken as fit for purpose.

e) Technician 2 had not seen or used LOWS or TOWS equipment at all during his time on the railway.

- f) Technician 2 had not noticed that the Responsible Manager had signed the SWP before Technician 6, though considered this often happened.
- g) The Supervisor produces hand written notes all the time, though they are taken 'with a pinch of salt' as they could be a combination of planned or unplanned work. On one occasion the work specified had not been on the App and when this was noticed it had been very difficult to catch up. The notes are used where a fault may have come in because it may only take an hour if work is being undertaken nearby.
- h) It was only when Technician 2 read the note that he realised he should have been at Margam East and not at Margam Moors Junction. He handed the SWP, which had the note with it, to Technician (B).
Note: Technician 2 was therefore aware that he should have been the PIC at Margam East Junction but disregarded the Supervisor's hand written note.
- i) There had been a lot of resistance from the Supervisors and Section Manager (Track) to allowing the Team Leaders to get involved in planning. The person who reviewed the SWPs was not always the PIC involved in the work, but anyone deemed competent. COSS forms had been signed by different people, though audits had not raised this as an issue.
- j) Arrangements had changed since the accident. As a Team Leader, Technician 2 was more involved and sat in the office with the planners. Packs are examined now in much more detail and there is no longer a regime where anyone could sign them. Task Risk controls are also now included, even if these are already known by those undertaking the work.
- k) Supervisor 2 might have thought that Technician 2 was going to Margam East Junction, though it was not known whether Supervisor 2 or 1 had discussed this. Technician 2's name was not on any of the SWPs (equally, it did not show Technician (B) who he loosely appointed), nor was he expressly told that he was to go to Margam East Junction.
- l) Since returning to work Technician 2 was now with another colleague, working some of the 'best few weeks'; all the work arrangements are being properly documented. He had previously threatened to get the Track Maintenance Engineer (TME) involved over the arrangements that were in place by the local management/supervisory team.
- m) A list of PICs is now published. Access is more limited because more work is undertaken within a green zone. The backlog of work was building up; the management team would not have accepted this prior to the accident.
- n) Since the accident, a pack had been created with the wrong access and this – in Technician 2's view - could have caused another accident. The Section Manager (Track) had said to merely change the access point. Technician 2 stated that he was not keen for it to go back to how it was and asserted the need for him to get involved with the planning. This resulted in an exchange of views, with Technician 2 subsequently contacting the TME. The decision was made immediately to stand down all work for around two weeks.

- o) From that moment the PIC process was undertaken correctly and an acting Section Manager (Track) appointed. There remains a concern within the teams that everything would slip back to how it was.

F9. Technician 3 - part of the group of three staff walking on the Down Main line at the time of the accident (originally the site lookout when the team worked as a group of six)

F9.1. Technician 3 was interviewed, and the following salient points were noted by the investigation team:

- a) The Team Leaders had confirmed who was going to which location, who was the COSS and what the jobs were. The teams are split up - providing there is enough manpower - and on the day, they were broadly split into two groups of six staff. (In fact, seven staff at Margam Moor Junction and six at Margam East Junction).
- b) There was a briefing by the COSS on arrival at Margam East Junction. The COSS assigned Technicians 1 and 3 as lookouts, and their brief took place at the access point. The COSS then briefed the rest of the team. After a further 5 -10 minutes the lookouts went to site.
- c) Technician (B) and Technician 1, accompanied by Technician (A), "did one stretch of the joints". Technician 4 and the COSS, accompanied by Technician 3, subsequently left the others to carry out IRJ trimming. Technician 3 took on his role as the lookout for the group of three staff (himself, Technician 4 and Technician 5 (COSS)). After finishing trimming, they walked back on the Down Main line facing traffic.
- d) Technician 3 was surprised to see the three other members of the team in the four-foot on the Up Main line. He could hear the train approaching and started to blow his horn; he and colleagues ran a little towards Technicians (A), (B) and 1 and shouted to alert them, though all their heads were down.
- e) The COSS would probably have said to those involved in the accident to stay in the cess and not to go back on the track, as they wouldn't have had a lookout.
- f) No strange background noises had been noticed and, even though ear defenders were being worn by the team involved, no one had been officially appointed as a touch lookout. There was no need to get the job done quickly.
- g) The COSS had not discussed the sighting distance with Technician 3. The latter was not sure what had been put down in his pack, though it would not be something he would look through.
- h) The team at Margam East Junction should not have split up; the three told to stay in the CESS should have stayed there. It did not take six to do the job, though to do it safely there weren't enough men.

F9.2. A further interview

- a) Technician 2 had told people where they were going and had briefed Technician (B); neither of the Supervisors were present when this briefing had taken place.

- b) The team was to work with lookouts until 12:30 at which time a line blockage would be taken. The work on the IRJs was shown on the 'App' and other work was listed on a handwritten note.
- c) When work first started there was adequate sighting but neither the COSS nor Technician (B) had deployed a distant lookout. Technician 2 had worked this way previously and no issues had been raised.
- d) Technicians (A), (B) and 1 were told to stand down. Technician 3 could hear this - although he was some 22 yards away - and saw the three staff go into the cess.
- e) When Technician 3, the COSS and Technician 4 were to work on IRJs, hearing protection was not being worn. They did not hear the nut runner being operated.
- f) When Supervisors attend the worksites, they would be on site at weekends and usually in the early morning.
- g) On the day of the accident the two groups at Margam East Junction were some distant apart, which was something Technician 3 had not seen previously.
- h) Technician 3 had not been briefed on the 019 processes and did not think it was necessary because he had undertaken the role of a PIC "mostly as a COSS".

F10. Technician 4 - with the team on the Down Main line when the accident occurred

F10.1. Technician 4 was interviewed, and the following salient points were noted by the investigation team:

- a) Technician (B) had stated that Technician 3 would be the lookout, and the COSS gave the team a briefing. He added that the COSS had the grinder; Technician (A) was going to oil components.
- b) Technician (B) instructed the team to look out for their own safety on the Down but to keep an eye on Technician 3 - the lookout - on the Up Main line.
- c) When Technician 4 went to the Down side and looked up, he saw Technician (B) in the four-foot and wondered why they were there. At this point an express train came from under the bridge blowing its horn. Technician 3 (Lookout) started blowing his horn and shouting. He had thought the other three were going to stay in the cess and that they were not planning to work on the line.
- d) The work group had been split up on previous occasions, but the two groups would never have been far from each other. If it was a small job the team would be split, but they always had a lookout.
- e) The team worked red zone in the morning and intended to work green zone in the afternoon. This was common practice because it was hard to book line blockages.

- f) Technician 4 had not been given a briefing on the sighting distances (Note: he had swapped roles with Technician 3 and acted as lookout) because Technician (B) knew the area from being the patroller there. Technician 4 knew that because the line speed was 90 mph, approximately 20 seconds warning was needed. Technician (B) patrolled every Tuesday, and Technician (A) would be the Lookout.
- g) Technician 4 sometimes asked for Touch Lookouts to be appointed, but they were not always qualified or had the proper equipment.
- h) There were two people in charge at Margam East Junction, the COSS (Technician 5) and Technician (B). Technician 4 did not know what was agreed. If Technician 5 was in charge, it was always still Technician (B) 'calling the shots'.
- i) What was happening on paper was not happening in reality.

F10.2. A further interview

- a) Technician (B) was always the PIC when the patrollers worked together as a track team.
- b) Teams receive a hand-written note for work to be undertaken though it is not uncommon for this and the 'App' to be different. It was also common for changed work to sit under 'AOB' rather than the relevant section.
- c) Working at Port Talbot, Technician 4 had previously declined to be the PIC when only one Lookout was allocated.
- d) Technician (B) was working as the PIC and directed Technician 4 and the COSS to trim some IRJs on the Up Main towards Port Talbot. Technician 3 was to act as lookout.
- e) It was expected that Technicians (A), (B) and 1 would have remained in a position of safety.
- f) Technician 4 believed that they all saw the team working on PT9577B points at the same time when they started to walk back and were surprised that they were working without a Lookout in place.

F11. Technician 5 - the COSS

F11.1. Technician 5 was interviewed, and the following salient points were noted by the investigation team:

- a) Technician (B) had approached Technician 5 and said, "It's your turn" and handed him the COSS pack. Technician (B) told him that it was green zone from 12:30.
- b) Technician 5 had told Technician (B) that "that was no good" and handed the COSS pack back to him. Technician 5's view was that it was no good going to Margam East Junction and waiting there for a blockage of the line at 12:30, and because of this suggested that the pack was wrong.

- c) On arrival at site, Technician (B) came over to Technician 5 and jokingly said, 'You're not getting away with this' and handed the COSS sheet back to him. Technician (B) would tend to hand COSS responsibility to whoever could do it. The work was to be undertaken with lookouts.
- d) Technician 5 occasionally looked at the work during the day before, though would get to work to find that the content had changed.
- e) There would sometimes be more than one job on the form. When Technician 5 started completing the form, he thought something was wrong. He would normally add names to it and start working out figures for sighting, etc. He started but noticed there were two types of protection on the front of the document. Technician 5 had already ticked it believing it was red zone; he had not realised it was red zone in the morning and green zone in the afternoon. When he realised this, he went to find the other page to start filling it in. Technician 5 believed that they should be on two separate forms to avoid confusion.
- f) Technician 5 asked Technician 3 to be the touch lookout and Technician (A) to be the distant lookout. He asked if someone could run Technician (A) to another access point for his distant lookout duties but Technician (B) stated that not much was being done and that one lookout would be enough.
- g) Technician 5 was not happy with this arrangement as noisy machinery would be used even though the jobs were small. They had, however, worked there before with one lookout. He knew there was good sighting, so agreed and suggested that they tested these arrangements and if they worked, activities could continue.
- h) Technician 5 had told Technician (B) to make sure they stayed in a place of safety until the COSS and Technicians 3 and 4 returned; Technician (B) agreed.
- i) After work on the IRJs had finished, Technician 5 looked along the Down Main line to check for trains and saw that Technicians (A), (B) and 1 had gone back across track. Technician (B) had been 'too keen' to make improvements to 'his' stretch of line on the day.
- j) COSS responsibilities were generally shared around those who were competent. Technician 5 could not remember anyone else challenging the Safe System of Work and that everyone else seemed quite happy.
- k) Technician 5 stated he had not received a briefing on the 019 forms since they were introduced.

F11.2. A further Interview

- a) Technician 5 had previously signed the SWP as the PIC, though it was an area where he was not confident about the implications. He had not been involved in planning the work on 3 July 2019.
- b) Either Technicians 2 or 7 had assigned Technician (B) as the PIC.

- c) Technician 5 confirmed that he had told Technician (B) - who was leading the group - and Technicians (A) and 1 to stand in a position of safety. This was because grinding work on further IRJs towards Cardiff needed completing and this work required Technician 3 to act as their lookout.
- d) It was only when they started to walk back towards Technicians (A), (B) and 1 that they saw them in the four-foot and were approximately 110 yards away from them. Up to that point, this group had not had any cause to look back towards their colleagues. Especially as the lookout had been focussed on trains approaching them on the Up Main line.

F12. Technician 6 - signed the PIC section of the SWP

F12.1. Technician 6 was interviewed, and the following salient points were noted by the investigation team:

- a) Technician 6 briefed Technician 2 and gave him the COSS pack.
- b) He and Technician 2 had walked out of the office and briefed Technician (B) on the COSS pack and the work that had to be done (section F8.1 refers).
- c) Technician 6 briefed Technician (B) as the latter was acting as the team leader. The teams sometimes split up if there was a lot of work. The younger men would do all the heavy lifting and the older men would do the easier work. This happened sometimes. If it did, Technician (B) would act as the team leader. There was a COSS pack, and a risk assessment was undertaken to see if any more lookouts were needed. There were six staff to be split up into two groups of three; they all had experience of splitting up before.
- d) It was not uncommon for SWPs to be challenged by the group involved and if this happened the office would always print another copy.
- e) Technician 6 had not carried out parallel working before joining the team at Port Talbot and initially found it confusing, though now felt 'comfortable' with it. It was still confusing to have lookouts in a green zone.
- f) Parallel working had not been discussed with the trades unions and little was known about it outside the group at Port Talbot.

F12.2. *A further interview*

- a) When Technician 6 had arrived back at the depot on 2 July (the day before the accident), he had been asked to verify the SWPs 'to make sure they were safe to use.' There wasn't anything he noticed as being wrong or different to normal. He had not been involved in the planning of the work nor briefed. He just signed the packs, which was common practice.
- b) One lookout had been allocated to the work at Margam East Junction. The planners had not been out on site before and this decision was circumspect. It would be down to the COSS to decide on the day about the number and positioning of lookouts.

- c) Technician 2 had a conversation with Supervisor 2 on 2 July and it was agreed at that time who would be going where [note: this differs to Technician 2's statement), though Technician 6 was not involved in this conversation.
- d) Technician 6 confirmed Technician 2's statement that 'the office' did not assign him or Technician 2 to go to Margam East Junction. He added that it was only agreed where the patrollers would go. He confirmed that Technician 2 briefed Technician (B) though he was unaware who had appointed Technician (B) to lead the team.
- e) If the patrolmen and maintenance team split, Technician (B) would 'act up'. This would happen every time, dependent on skillsets and competencies, when the teams split up.
- f) Staff would not be afraid to challenge issues with SWPs; Technician 6 did not understand why the SWP for Margam East Junction had not been challenged. As a COSS, he would keep everyone together in one group and would have used one touch and one distant lookout.
- g) The team received a brief from a Project Manager on the updated 019 in 2017 and had asked questions. The Project Manager replied, "don't shoot the messenger". Technician 6 commented: "if those delivering the briefing could not answer questions, how could the team be expected to work to 019?" Briefing was one day, and implementation expected the following day.
- h) The team did not feel confident with the 019 standard because there remained unanswered questions. This had been raised during a Safety Hour, though it would turn into an argument because the Section Manager (Track) and two Supervisors took these things personally.
- i) The culture in the depot has now changed, though there was concern about when management returns. Change is required or there would be arguments.

F13. Technician 7 – the COSS at Margam Moors Junction

F13.1. Technician 7 was interviewed, and the following salient points were noted by the investigation team:

- a) Technician 7 only knew when he got to site that he was going to be COSS; he had not seen the SWP or been part of the planning. This had occurred more recently and was not the way it should be arranged. He had signed that he was happy and agreed with the pack for green zone only for the morning.
- b) It was common to split up a gang into smaller groups as at Margam East Junction, though there should always be a lookout; that was normal and common practice. There would normally be two separate lookouts arranged on the job. The distance between the groups would normally be approximately 20-30 yards.
- c) Technician 7 commented that parallel working is wrong; it does not have all the required information and it is confusing. Many people have raised issues with the method, but nothing has changed.

F14. Section Supervisor 1

F14.1. Section Supervisor 1 was interviewed, and the following salient points were noted by the investigation team:

- a) There were two 'Track Chargemen'¹¹ on duty that day, Technician 2 and Technician (A) were assigned to these roles.
- b) With regards to safety, some paperwork had not been completed but Section Supervisor 1 had not seen anything that was unsafe. The work safe procedure has not been used for some time.
- c) Working safely was always discussed before the teams go out on site and it was believed they go 'above and beyond' every day.
- d) If the work group changed the work, the Section Supervisor would not know. That would be down to the 'Track Chargeman' to manage. The information given prior to going to site would have been correct.
- e) The work group would not have been planned to split into two groups.
- f) Section Supervisor 1 did not know that teams split up and realised what had happened after speaking to Technician 1 involved in the accident.
- g) Section Supervisor 1 stated that Technician (B) would have acted as a team leader though he was not performing that role at the time of the incident. The Supervisor thought the 'Track Chargeman' (Technician 2) would be with this group. *Note: that Technician 2 stated that the Section Supervisor was present for part of the briefing with Technician (B) where the latter was asked to lead the Margam East Junction team.*
- h) Technician (2) gave the briefing to Technician (B) to work at Margam East Junction and this was a factor in Technician (B) (as the acting Team Leader of the patrollers) being an unofficial PIC. Had the Supervisor been present for the whole of the briefing between Technician 2 and Technician (B) then he could have stopped these changes being made.
- i) The PIC role has no competency which was thought unsatisfactory. It could be argued that there is no difference between PIC and COSS.

F14.2. A further interview

- a) The assistant to the planner had been trained as a planner for more than four years. It was confirmed that there had been one SWP for Margam East Junction that contained both red and green zone working.
- b) Section Supervisors planned 'manpower' for the work. The planner would allocate the lookouts required and would ask for advice if there was anything difficult. The PIC would review the work, query any issues with the work or safe system of work, and adapt the plan for last minute changes such as illness.

¹¹ Former title for a Team Leader

- c) Technician 2 (Team Leader) had been allocated as the PIC on 2 July 2019 and Technician 6 asked Technician 2 to review the packs as PIC. Supervisors did not need to know if a PIC had been changed but would expect to know if there were issues. The name of the COSS only became known following the accident. As far as was known, Technician (B) was a gang member and not the PIC.
- d) The team can get details of the work via the 'app' but as best practice this is supplemented with a hand-written note.
- e) The SWP was authorised by the PIC on 2 July 2019. The Section Supervisor had earlier signed the SWP as the Responsible Manager on 28 June 2019, contrary to the requirements of NR/L2/OHS/019. This was claimed as a workload issue.
- f) It had not been the Supervisor's decision for the group at Margam East Junction to split into two groups of three. He was not concerned that Technician 2 had passed the PIC role to Technician (B). The supervisor would, however, have expected to have been informed about this change of role.
- g) Supervisor 1 was not aware that the COSS had raised an issue with the SWP and was satisfied that adequate resources were available to apply appropriate protection. This work had been planned by Supervisor 2. Supervisor 1 would have done the same.

F15. Section Supervisor (2)

F15.1. Section Supervisor (2) was interviewed, and the following salient points were noted by the investigation team:

- a) The team usually discusses Safe System of Work Packs the day before, or a couple of days before the work is due. Those involved will then run back through it on the day that it is to be undertaken.
- b) There had not been any need for the team to split into two groups. The COSS is usually decided on the day before work is undertaken.
- c) A parallel SWP would be described as an area that could be red/green zone working at different points during the work. In the case of Margam East Junction, the 'possession' was booked for later during the day.
- d) The Section Supervisors' workload was too high, and this had been fed back over the last 10-15 years. Historically there were 21 posts in the depot, but now there were now only 16.
- e) Three or four SWPs are produced per day. The Section Supervisor undertakes the self-assurance with additional checks made by the Route assurance team.
- f) When the new 019 packs were introduced, there was a briefing session delivered by a Project Manager, though the depot was then left to get on with it. There were no issues raised by Track teams concerning the SWPs; any issues raised would be logged and given a reference number.

F15.2. A further interview

- a) Parallel working had not been properly briefed to the team. Nonetheless, parallel working had been used at Port Talbot for many years.
- b) The Section Supervisor, as the Responsible Manager, arranges for a PIC - on the day before work is to take place - to make appropriate alterations and verify that the SWP is suitable for the activity planned. However, the Section Supervisor and the Team Leader assist the planner by going through the pack too.
- c) The data shown on the 'App,' as referred to by the Section Supervisor, did not contain the same data as his handwritten note or the SWP. The 'App' showed oiling of the slide chairs on points such as PT9577A and B at Margam East Junction but not vegetation works, boxing in or ballast shoulder improvements.
- d) The planner normally assigned one lookout and it was up to the COSS to supplement this on the day.
- e) Section Supervisor 1 had stated that he did not know that Technician 2 had allocated Technician (B) as the PIC. Section Supervisor 2 believed that Section Supervisor 1 would have probably assigned the work on the IRJs, but Section Supervisor 1 did not say this and cited that these should be 'routinely checked'.
- f) Allocation of the COSS 'could happen' on the day.
- g) Two lookouts would be required to work red zone on the Up Main line at Margam East Junction.
- h) A time of 12:30 to 15:30 was shown on the SWP because only one time could be shown, and the hours of the line block were used. The planner did not create a morning and a separate afternoon SWP because they had to be careful not to create too much paperwork.

F16. Section Planner

F16.1. The Section Planner was interviewed, and the following salient points were noted by the investigation team:

- a) The work was to arrange meetings, Ellipse data entry, work orders, safe system work packs and work with the TME.
- b) There was a good understanding of the work, but checks were made with line management and the Section Supervisors. The work did not vary, and track walks with the TME had been carried out.
- c) Technician (B) would always read the packs that were produced.
- d) The process for putting the pack together was outlined; the Section Supervisors allocate the staff required. Three packs were completed for 3 July 2019. There are usually multiple packs for a location. The Section Supervisor allocates lookouts. The COSS would assess the situation and make the final decision.

- e) There are parallel packs where there is both red and green working. There is flexibility, but the aim is always work towards green working and to set up a work system based on this. A parallel pack is created when requested by the Section Supervisor.

F16.2. A further interview

- a) The use of computer systems was part of the training package. A 'Gang Plan' was received from Supervisor 2. The planner is told the mileages of the work, whether the work is within a red or green zone and how many staff are allocated to the work.
- b) Planning of the work is split between the Planner and the Team Leader assigned to assist.
- c) A time of 12:30 was input because that what was provided. Despite nut running being in operation (which would require someone to stand in the six-foot and a need to lookout for trains on the Down Main line too), the Planner reasoned the COSS would be expected to assess the situation and the six staff could set up a red zone with lookouts. The fact the team were nut running was known about; green and red zone working had been requested for that afternoon.
- d) Technicians 2 and 6 normally verify the packs as the PIC. The Section Supervisors sign the packs as the Responsible Manager prior to the PIC receiving the pack. It was common practice for the Supervisors to provide a hand-written list of works prior to the teams going on site.

F17. Section Manager (Track)

F17.1. The Section Manager (Track) was interviewed, and the following salient points were noted by the investigation team:

- a) Staff had no issues with bringing up anything that they believed was unsafe. Technician (B) was 'notorious' for highlighting anything unsafe in the Safe System of Work Packs.
- b) The Section Manager's team stated that they do not ever feel under pressure to complete their work. They have worked in this way for many years, with a six-person patrol unit. Sometimes they would split into two groups of three to cover more mileage; there has always been a little bit of rivalry between groups to complete their work.
- c) A 6-week gang plan is created to give early notice of work to the planner, although this is always subject to change. At around two weeks out, a more accurate plan for the day-to-day maintenance is available.
- d) Safe System of Work Packs are usually sorted for the week in the Plan-Do-Review (PDR) meetings. These are not given out too early as staff may lose them.
- e) The SWP for the work at Margam East Junction had parallel working in it as there needed to be a 'possession' booked at some point during the day.

- f) The Section Manager did not see the SSOWP before the day of the accident and saw it when the BTP produced it. It had been authorised by Section Supervisor 1 and the PIC would usually 'authorise' it before the shift; it would then be communicated to the ganger.

F17.2. A further interview

- a) There had been little direction over 019 and there was uncertainty as to how it should work in practice.
- b) There is a lot of ancillary work to the Section Manager's core role. PAIs and 1-1s had to be delegated. Focus was on machinery being operated correctly and staff competence through 'Assessment in the Line'.
- c) Self-Assurance arrangements, although necessary, took up time for little benefit.
- d) The SWPs were managed by Supervisor 1 and 2 with the Team Leader supporting the Planner. Supervisor 2 does most of the planning along with the Team Leader assigned to help the Planner.
- e) The SWP for the 3 July 2019 would have been completed two weeks earlier but the aim is to get the packs completed six weeks before the task. Although the Section Manager is involved, HR Direct and OH Assist issues take up a lot of time.
- f) A different PIC was named on the advance copy of the paperwork to the one assigned on the day, and that was also different to the SWP. This was unusual; the Section Manager had not been aware that the PIC had changed. Two lookouts would have been expected to be used.
- g) Pee Wee had its limitations and TOWS¹² had been disconnected at Margam.
- h) Although the SWP software defaults to one lookout, more than one lookout should have been assigned by the COSS.
- i) Supervisors provided a handwritten note to explain the specific tasks, which vans and how many people are required etc.

F18. Track Maintenance Engineer 1 (TME)

F18.1. TME 1 was interviewed, and the following salient points were noted by the investigation team:

- a) Port Talbot depot appeared to be efficient and were on top of planning and jobs. Llanelli was also good. It was believed Whitland depot was where focus was required.
- b) To make sure people understand how to safely undertake site activities, more training should be given including a theory test, on-site mentoring and validation by an assessor.

¹² Note -TOWS is not installed at Margam

- c) Staff from Milton Keynes come and brief; they are there an hour and then leave, and there is the possibility that still no one understands.
- d) Perhaps a pack should be made with learning records, a summary of what was discussed, and this pack kept and reviewed to learn from the mistakes that have occurred.
- e) Train horns on the IET are extremely quiet.
- f) The role of the PIC has been questioned because it is not supported with a formal competency yet it is effectively a safety role.

F19. Former Track Maintenance Engineer 2 (TME)

F19.1. TME 2 was interviewed, and the following salient points were noted by the investigation team:

- a) The Supervisors are strong in that area. They were always 'into' the planning processes. As TME, he would sit down during a PDR with the Supervisor's Planner; he found that the Section Manager was very experienced.
- b) In most areas there were a lot of grievances, but in Port Talbot there were none; everyone appeared to have a good relationship. The depot had two of the most experienced supervisors in Wales and one of the most experienced Section Managers.
- c) TME 2 knew one of the Team Leaders, who was very passionate, aspired to become a Supervisor and was engaged in the planning side of things.

F20. Temporary Infrastructure Maintenance Engineer (IME)

F20.1. The temporary IME was interviewed, and the following salient points were noted by the investigation team:

- a) The NR/L2/OHS/019 training was delivered by a Network Rail trainer and staff were training for most of the day, finishing at about 14:00 or 15:00. The briefings were challenged because they were not very detailed. There was a Q & A session with Planners and Section Managers and the challenges were laid out. There were concerns that the update to 019 meant that there was more paperwork required for the SWP packs. This was not ideal, though it worked. Gold standard posters were displayed in the office which showed a matrix of the main steps in the process.
- b) In business at that time, nothing concerning 019 flagged up as a big issue.
- c) There had been Level 1 assurance in place for many years to test the selection of the right level of protection. There were different levels of assurance paperwork though it's not confirmed that the right detail was being applied.
- d) The temporary IME was encouraged to visit depots and discuss any problems, which was good. But this probably did not happen enough.

- e) The temporary IME and his team had regular conversations about safety. There would be a morning conference call where all the engineers dialled in. There would be safety alerts which would encourage discussion points such as faults, issues, backlog and access. Challenges for the next day and resources in place would be discussed. There would be open conversations during depot visits. The temporary IME was visible and visited Port Talbot, Swansea and Whitland weekly or fortnightly.
- f) Parallel working is complicated and needed to be specified rather than giving a choice to those on site; if it is not understood there can be an issue.
- g) The IME did not know if parallel working was unique to Port Talbot, nor why unassisted lookouts were used.

F21. Infrastructure Maintenance Delivery Manager (IMDM)

F21.1. The IMDM was interviewed, and the following salient points were noted by the investigation team:

- a) A problem with 019 had been getting the PIC in a depot to review and verify the SWP; this would influence the required resources. This issue had not been identified as the standard was being rolled out.
- b) The Self-Assurance process was 'like marking your own homework' and it could almost be a tick box exercise. Self-Assurance checks had been completed appropriate to the IMDM role; one PAI per week and regular 1-1s had been undertaken. An external audit showed Port Talbot depot in a positive light; an action plan was produced, and remedial actions had been recorded.
- c) Having only been at Cardiff for four months, it was believed that staff behaviours were wrong, and this was a thing that kept him awake at night.
- d) The red/green zone KPI was no longer measured. There had been four irregularities within line blockages. Nationally there had been problems gaining access through line blockages as fewer signallers had larger areas to manage, which in turn impacted the number of line blockages that could be taken by a signaller. There had been a couple of CIRAS reports concerning line blockages.
- e) Site visits were undertaken once per month alongside Self-Assurance checks.
- f) The IMDM had not heard the term 'parallel pack', though Section Managers use these to gain access to somewhere to work in a green zone.
- g) The Worksafe procedure had been invoked on a couple of occasions.
- h) The Section Manager and Supervisors were unfortunately - by the nature of their work - "tied to a desk", when they should ideally be supporting those on site. There appeared to be a disconnect between the organisation and front-line staff's work. This created tension with the Head Of Maintenance Delivery and those above because there remained a lack of understanding within the industry.

F22. Wales Route, Head of Maintenance Delivery

F22.1. The Head of Maintenance Delivery (HOMD) was interviewed, and the following salient points were noted by the investigation team:

- a) There had been an increase of eight in the number of planning posts; this was better than the current position in other Routes.
- b) There was an annual plan which described the volume of work required and a tool to assess the resources needed to aid productivity. Planners had the capacity to manage the volume of work, though there was a limitation on their capacity and training in core skills.
- c) The HOMD had concerns that there were differences between the work shown on the 'app' and the supplementary hand-written note; he had been informed as the investigation evolved. It was believed that everyone was clear on 019, including the Supervisors. The PIC would be provided the day before the maintenance work; it was expected that assurance checks would highlight any issues.
- d) The HOMD did not get any guidance as to how 019 should be implemented.
- e) Four visits to depots are carried out every month.
- f) It was a concern that FFCCTV footage had been viewed which showed maintenance teams working between Swansea and Cardiff, revealing that the teams were not working within planned green zones.
- g) The HOMD currently did not have level of insight with regard to methods of work employed by the depots. A mechanism is needed to be able to understand what is actually happening on site.
- h) The decision to visit a location was driven, for example, by a lost time injury which was the focus of the last meeting. Locations like Machynlleth, Whitland and Llandudno would also be visited. The HOMD could not recall when Port Talbot depot was last visited.
- i) Focus had been lost on the potential use of alternative warning systems, though there had been close calls involving this type of equipment. The Worksafe Procedure was rarely used.
- j) There is a weakness within the industry in the meaningful analysis of information to make informed decisions. Self-Assurance outputs at Port Talbot indicate that the process has not been effective. An assurance process is being trialled in North Wales and would be rolled out at a future date.

F23. Project Manager, Wales (delivery of briefing arrangements for NR/L2/OHS/019 v9)

F23.1. The Project Manager was interviewed, and the following salient points were noted by the investigation team:

- a) The Project Manager had been asked to 'rescue the '019 project,' because it was obvious that it was in trouble; he was told to get involved because of his track background.

- b) When changes to NR/L2/OHS019 v9 were complete, each Route was assigned the task of briefing their employees - which included the introduction of the PIC role - on how to plan and deliver work. It was the first time that changes to 019 were delivered as an awareness briefing as it was to impact on 95% of the workforce. The Wales Route Executive team asked people within the Route about how this could be achieved. The briefing was delivered in collaboration between management and the Trades Unions.
- c) Wales Route created an abridged version of the prescribed NR/L2/OHS/019 v9 briefing package. Its use was “authorised by the 019 Programme Board”. A four-hour technical briefing and one hour of videos was substituted with a one hour briefing session and 40 minutes of videos.
- d) The Project Manager did not receive any training to be able to brief the changes to the standard, being left to read the standard and look for additional information on Safety Central.
- e) The briefing role was described as: “Going to visit and tell them what the standard changes were, what was coming into play but not to spoon feed them.” There was an expectation that staff would “go away, read and understand the standard and if they didn’t to come back to me”. The Project Manager made a disclaimer at the beginning of each briefing and stated that those present had a legal requirement to read the standard themselves. It had been two and a half years since the launch and he had not been asked any questions by those briefed.
- f) The briefing was supposed to have been a ‘cascaded safety’ briefing, though the Project Manager ended up delivering most of the 78 briefings in the Route, for consistency. Support came from the WHSEAs. Amended briefings took approximately two hours. They used material from Safety Central.
- g) Self-Assurance was used to check that individuals had been briefed. There were 85 red, green and amber questions devised by the Programme Board and if 85 could be scored then a Route was compliant, but most Routes had to put in temporary arrangements to mitigate risk.

F24. Former acting HORSHE Wales Route, now with Great Western Railway

- F24.1. The former acting HORSHE was interviewed, and the following salient points were noted by the investigation team:
- a) There had been a HORSHE in the Route for approximately 3 or 4 years but following that HORSHE’s move to another Route there had been a seconded replacement who was then permanently appointed for circa 9 months. When that person moved on to a project role, he was seconded into the role in 2017 for three months, which was later extended to one year. Another person was seconded thereafter.

- b) The Head of Human Resources for the Route would not allow permanent appointments to be made pending reorganisation; expected changes included the potential for a Director of Safety to be appointed. The argument was that the Director would want to appoint the HORSHE. Two years later a Director of Safety role had still not been created.
- c) The findings of the 'Home Safe Plan' review – which had focussed on unsafe acts over a 5-year period and highlighted cultural issues - did not appear to have been followed through to completion.
- d) An audit had been undertaken at Shrewsbury Delivery Unit which identified that there was - for example - a maintenance backlog, yet the KPI measure was green. He added there had been other similar issues with the incorrect reporting of KPIs.

F25. Route Managing Director, Wales

F25.1. The Route Managing Director (RMD) was interviewed, and the following salient points were noted by the investigation team:

- a) Joining the organisation as Chief Operating Officer, he soon became interim RMD but was not allowed to recruit into permanent posts and had to second people into roles. This advice from HR was because of pending reorganisations, and latterly because of the 100-day plan and its associated reorganisation. Important posts - for example the Head of Safety - were covered by secondments or temporary appointments.
- b) The RMD spoke about Visualisation Boards and outlined that near misses were not discussed with more senior HQ managers. Any item shown as red was not supported by more senior managers. For example, the KPI for close calls was green for the Wales Route which was well received, though there been a serious near miss and that was not discussed by senior managers until the RMD raised it. People were very afraid of having a red KPI shown against their name.
- c) The changes to 019 meant that additional resources were needed to bring the PIC into the planning process. There had been no steer on this from the 019 Programme Board. There were question marks about the process.
- d) The revised 019 standard could have been better deployed. The RMD had been told by a staff member it was not a surprise that those employees had had an accident; it was unclear if their line managers knew anything about their practices.
- e) It was believed that the practices employed at Margam East Junction were not confined to the Wales Route.
- f) Wales Route was trialling taking full blocks and doing more work within a blockade; this trial was going well.
- g) LOWS/TOWS/SATWS were not used very well; their use could improve. Not enough was being done nationally in this area.
- h) There was a concern that staff were not reporting all near misses.

- i) There was a gap in the development of leadership within the depots, but this would take time to resolve.
- j) There was concern about the ORR investigation into the Margam accident starting in the New Year with more interviews of the staff involved.
- k) The Route coped well with the aftermath of the incident and provided as much support as those involved needed; it was acknowledged it was not right all the time. There is no manual to deal with such an event as this.

F26. On Train Data Recorder (OTDR)

F26.1. The OTDR showed:

F26.2. Train departed Port Talbot station (202 m 59 ch) on time at 09:49 and accelerated to a speed of 72.324 mph. The train travelled between Port Talbot and Margam East Junction without incident.

F26.3. The driver noted that there were staff on or near the line and the 1st warning of the train's approach was given using the low to high tone when the train was travelling at a speed of 70.626 mph. The speed of the train increased slightly to 72.324 mph. Nonetheless the 1st warning was given at circa 201 m 14 ch, some 1386 yards (63 ch) from point of impact.

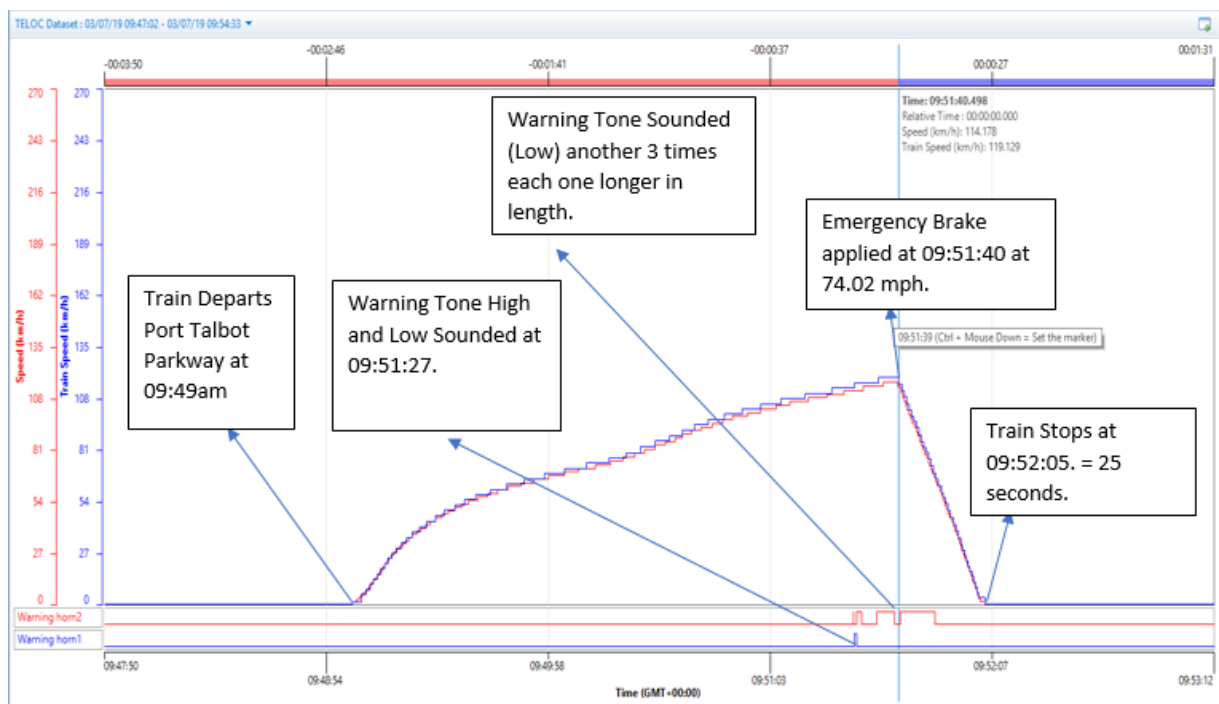


Fig. 5

F26.4. The train travelled 460 yards (20.937 ch) from the initial operation of the warning horn to the application of the emergency brake 13 seconds later.

- F26.5. A second warning was given for a period of five seconds using the low tone between 09:51:34 and 09:51:39 while the train was travelling at a speed of 72.325 mph.
- F26.6. A third warning was given by again using the low tone for 11 seconds between 09:51:40 and 09:51:51. The track workers were struck by the train at 09:51:51.
- F26.7. The driver had applied the emergency brake 11 seconds before impact, at 09:51:40 and stopped 14 seconds later at 09:52:05, some 25 seconds following the initial application of the brake.

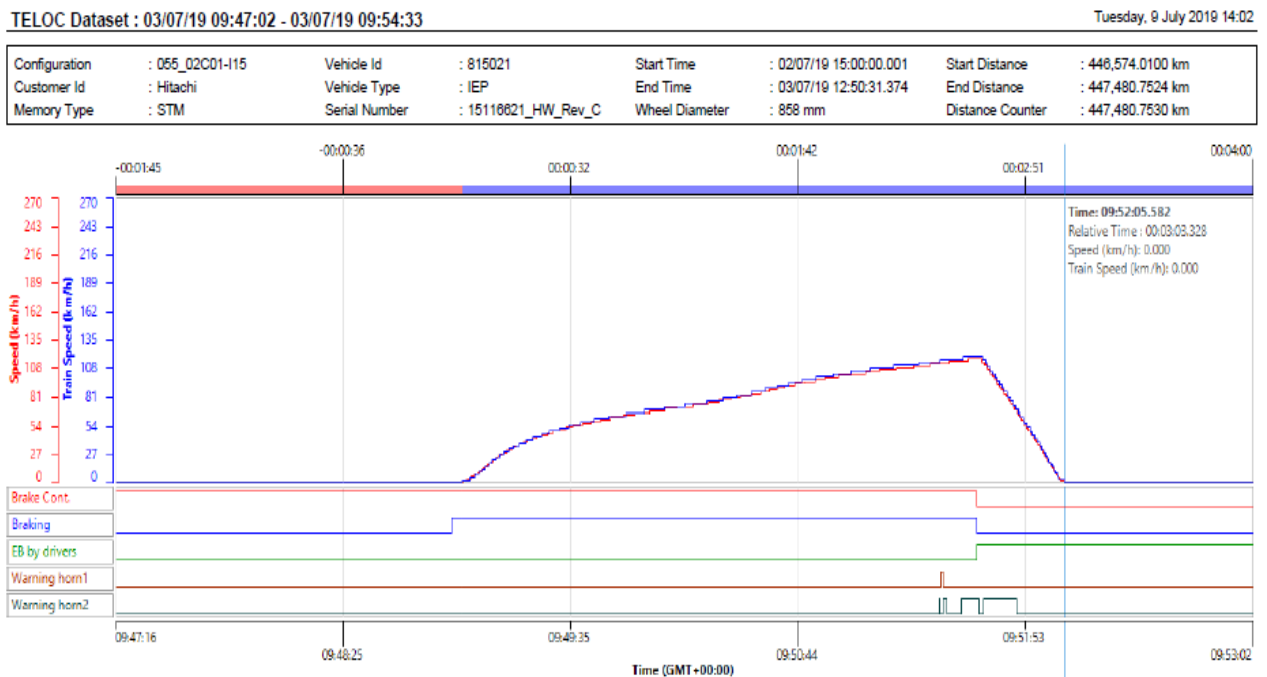


Fig. 6

- F26.8. The speed of the train was 72.32 mph when the emergency brake was applied, and this reduced to 42.958 mph when the track workers were struck by the train. This was an average speed of 57.64 mph which equated to 311.9 yards (285.34 m (14.18 ch)) from when the emergency brake was applied to point of impact. The train travelled 883.08 yards (40.44 ch) within this timeframe.

F27. Bow Tie

- F27.1. The Safe System of Work Bow Tie identified several threats and controls, and key areas are:
- Inappropriate protection or warning systems in this case applied by the COSS although influenced at a critical point by Technician (B).
 - Individuals' acts or omissions, for example Technician (B) in saying that a distant lookout was unnecessary.
 - Inadequate resources (staffing), for example, to provide adequate track staff and appropriate lookout protection.

- d) Failure to apply a plan, for example, the unofficial cancellation of planned work - removal of vegetation and attention to the Up Main line ballast shoulder - to allow unplanned work to be introduced e.g. use of a nut runner and attention to IRJs.

G. Factors discussed

G1. Arrangements

The Planner

- G1.1. In principle, the arrangement applied at Margam East Junction on the morning of 3 July 2019 was to undertake work that could be achieved in a lookout warning system, and for more involved work to be undertaken that afternoon when the Up Main line was to be blocked to trains.
- G1.2. It was found that the Planner created a dual line block and lookout warning pack. The SWPs for work on 3 July 2019 at Margam Moors and East Junctions were created on 28 June 2019.
- G1.3. One of the packs was a copy, or fourth version, of an earlier line blockage. It was copied from a document dated 21 June 2019 which was rejected at 10:05 because the protecting signals were wrong. This document did not contain the correct lookout requirements.
- G1.4. On 28 June 2019, a SWP was created by the planner at 08:08, who also indicated in the system that it was verified at 08:09; the SSOWP system submitted the line blockage request into the Green Zone Access Management (GZAM) system at 08:10. The line blockage application was then processed by the Green Zone Access Controller (GZAC) in 25 minutes. The PIC did not sign to verify the SWP until 2 July 2019 even though the Section Supervisor signed to authorise the SWP on 28 June 2019.
- G1.5. The other pack was also created 28 June 2019 at 11:22 and was indicated as being verified by the same PIC at 12:06 and authorised by the Responsible Manager at 12:07. It was sent to the GZAC at 12:11. This process took less than one hour. In the investigation team's view, it was difficult to understand how the steps could have been applied so quickly if done thoroughly. The investigation team considered that an appropriate level of scrutiny by the Responsible Manager was not applied to this process.
- G1.6. The Planner stated that she was aware that a nut runner would be used although Supervisor 1, who dealt with the work on 2 July 2019, denied any knowledge of this activity. Section Supervisor 2 stated that lookout working could be used for loosening and tightening bolts, but this work should have been completed within a blockage; protecting all those working on the bolts with a line blockage would have required both Up and Down Main lines to be blocked at the same time. Supervisor 2 stated that the SWP, that he signed, covered the whole day but it was clearly timed from 12:30 to 15:30 where either system of work could be utilised.
- G1.7. The Planner confirmed that six employees¹³ were assigned to Margam East Junction where there was a line block from 12:30 and she expected the COSS to decide how to deploy lookouts.

¹³ Note: Supervisor 1 had assigned Technician 2 as the PIC, so seven staff should have been at Margam East

Safe Work Packs were routinely produced with just one lookout identified without consideration of the sighting distances or resources required.

- G1.8. The Section Supervisors took no interest in the protection arrangements. The Planner and Supervisors freely admitted it was left to the Planner, who normally allocated one lookout at Margam East Junction. And similarly, at other sites. The investigation team found that these arrangements were non-compliant with the prescribed processes.

Team Leader/PIC involvement in the process

The planning and content of the SWP had not involved the PIC who would deliver the work

- G1.9. The PIC must be a competent COSS and the Section Supervisors and Planner suggested that there is no difference between a PIC who does not hold a formal competence and a COSS. The Supervisors outlined that the 'Ganger' (Team Leader) is responsible for the physical work and the COSS deals with the safe system of work. In the investigation team's view, there was a mindset that the PIC signature was just a formality, and the detailed arrangements were led by the Team Leaders, which included the appointment of the PIC and any rescheduling of the work on site. The Team Leader would appoint the COSS either at the Depot or on-site. The investigation team found that the PIC was not involved in the planning of the work.
- G1.10. The difficulty presented to a Team Leader was resolving the conflict between resourcing the work or lookout protection. A distant lookout¹⁴ was not assigned or resourced at the planning stage. Unassisted lookout protection was not pre-planned. In the case of Margam East Junction, the protecting signal on the Up Relief was listed as part of the line block, yet there was no guidance to the COSS for trains approaching on the Down Main or from the OVE line when the team were working with a lookout.

Section Supervisors

- G1.11. The Section Supervisors allowed one of two Team Leaders (Technicians 2 and 6) to verify all the SWPs as PIC, but neither of the Team Leaders was involved with planning or doing the work at Margam Moors or East Junctions.
- G1.12. It was clear that the Section Supervisors had divorced themselves from the arrangements. Section Supervisor 1 stated that he did not need to know whether a PIC or a COSS had been changed.

¹⁴ Note. A single lookout was shown e.g. a site lookout, but other lookouts would be required

- G1.13. Section Supervisor 1 was non-committal that he directed Technician 6 (Team Leader) who signed the PIC section of the SWP to brief Technician 2, in the belief that the latter would be directing the work at Margam East Junction.
- G1.14. Section Supervisor 2 explained that the supervisors are under-resourced and there is pressure to maintain the track. He added that they have over the years developed and used parallel working yet he did not believe that it had been properly briefed to employees. The Supervisor did not cite that any positive action had been applied to remedy this situation.

The Section Manager (Track) and Section Supervisors routinely allowed short notice changes to be made to the planned work and left the organisation of the protection arrangements to those on site, contrary to the intent of standard NR/L2/OHS/019.

- G1.15. On 2 July 2019 Section Supervisor 2 allocated the work for 3 July 2019. Supervisor 1 believed that the work at Margam East Junction in the morning, was cutting vegetation and ballast (probably shoulder) work. Although it used unassisted lookout warning, the team was in his view near to the cess. In the investigation team's view, different work was undertaken because the work plan was flexible.
- G1.16. It is accepted within NR/L2/OHS/019 (referred to as 019) that in certain instances such as illness, personnel undertaking PIC or COSS roles will need to be changed but not, as had become normal at Port Talbot, as a routine. This intent of the standard is for continuity in leading the planning and execution of activities on site.

The COSS

- G1.17. At Port Talbot on 3 July 2019, the nominated PIC, informally handed over to an acting Team Leader (Technician (B)) who did not sign documentation to indicate he was becoming the PIC. Therefore, the COSS believed that he had to sign the SWP as both the COSS and the PIC. He and the rest of the team at Margam East Junction knew that the COSS was not the PIC.
- G1.18. This COSS stated that he was not present when NR/L2/OHS/019 v9 was introduced, although records indicate that he was briefed by a Team Leader located with the Planner, where the briefing took circa 35 – 55 minutes.

Note: The Project Manager reported that the Route had been authorised by the 'Programme Board' to run the 40-minute media session and one-hour technical briefing. The Team Leader had reduced this briefing further.

- G1.19. The Planner and Section Supervisors were fully aware that staff were to work from circa 08:00 until 12:30 without an appropriate SWP. Their actions were intended to reduce paperwork.

The COSS for Margam East Junction challenged the accuracy of the Safe Work Pack (SWP) and declined to undertake the role when it was issued to him at the depot. He handed the SWP back to the acting Team Leader for remedial action to be taken. Corrections to the SWP were not made.

G1.20. The Team Leader (Technician (B)) went to see someone about it, but it could not be ascertained who he spoke to. On arrival at Margam East Junction, the COSS was again asked to use the SWP pack provided for that afternoon. None of the other four trained COSSs within the team spoke up and therefore, others would have done the same.

Accountability

G1.21. It appeared to the investigation team that the aim of those involved in the process was to try and make a complex system work. The Section Supervisor 1 signed the SWP before the PIC, so he was not signing-off the whole process. Similarly, the Planner regarded it as being down to those on site to sort it all out. Arguably, from a PIC perspective, if the SWP had already been signed-off by his line manager, as the responsible manager, it is unlikely that there would be the same level of scrutiny as would be applied if that signature was not already on the SWP. With it being carried out approximately 30 minutes before the end of a PICs turn of duty on the previous day, the level of focus was not put into the plan that was commensurate with the tasks and risks on site.

G1.22. It was a late decision by Section Supervisor 1 for the team to work on IRJs on the Down Main line following a track circuit failure on 2 July 2019.

G1.23. The Supervisors considered work on IRJs to be routine cyclical maintenance tasks. The Supervisors left those on site to take appropriate action and this was not included in the planning details within the SWP. Likewise, work on releasing and oiling crossing bolts (with a member of staff stood in the six-foot while the Down Main line remained open for trains) was also viewed as routine maintenance. Although, the decision to do this work was Technician (B)'s, it had not been documented in the SWP.

G1.24. The Supervisor provided a hand-written note allocating a Team Leader to lead the Margam Moors Junction team and likewise Technician 2 to lead the Margam East Junction team. It was not the Supervisor's intention that Team Leader (Technician 2) should hand over the PIC role to Technician (B). Had Technician 2 been on site, there was a possibility that a distant lookout would have been appointed, in turn affecting what work was undertaken and how it was done.

G1.25. The work that was undertaken between 08:30 and 09:56 was not pre-planned but was arguably routine cyclical activity for which a SWP was not created. Some stages of the work required more than three lookouts to be able to work safely with the line open trains and using noisy equipment. This was not part of the pre-planning. There was a general belief, given both lookout and line blockage systems were in the pack, that work could commence outside the time periods shown on the SWP.

This risk was exacerbated when the authority of the COSS (Technician 5) was undermined by the presence of a more experienced and assertive member of staff on site (section F11 refers). This COSS may not have had, in the investigation team's view, sufficiently developed non-technical skills to be able to cope with this situation. It is noted that non-technical skills are now incorporated into COSS training.

The work groups' dynamics

- G1.26. A COSS and their work group should stay together, so that they can remain in contact with each other and so that the COSS is able to give them clear instructions.
- G1.27. The COSS and Technician 4 worked towards Margam Moors Junction, initially 20 yards then 66 to 120 yards apart from where Technicians (A), (B) and 1 were stood, and Technician 3, in the group's view, acted as lookout for both groups. Although, the latter stated that the COSS and technician 4 were looking out for themselves.

Note: Company Standards do not identify the maximum distance between members of a workgroup working together before additional lookout protection or additional measures should be introduced.

- G1.28. The COSS and Technician 4 needed Technician 3 to lookout to undertake further grinding of IRJs towards Pyle and Cardiff as directed by Technician (B), who was regarded by all as the PIC. To paraphrase one Technician, he was "the person who calls the shots." The COSS told Technician (B), with (A) and 1 stood nearby, to remain in a position of safety because they did not have a lookout. It must be noted it was not Section Supervisor 2's intention that the group at Margam East Junction should split into two groups.
- G1.29. The Lookout, Technician 3, was focussed on trains travelling over the Up Main line for the COSS and Technician 4 that were some 150 - 170 yards from where Technicians (B), (A) and 1 stood in the cess. The latter group subsequently began to work on PT9577B points. It is possible that Technician (B) decided to work on the points, given he said he would lookout for his two colleagues.

The immediate cause of the accident was track staff working on a line that was open to traffic without a safe system of work in place and, as a result, they were not warned of a train approaching them.

- G1.30. Arguably, this was not dissimilar to the arrangements applied earlier (from FFCCTV at 09:24) when Technician 3 stood next to Technicians (B), (A) and 1, where Technician 3 was used as the lookout by the COSS and Technician 4 when they were working towards Margam Moors Junction.

Technician (B), the acting PIC, with two technicians, who had all been instructed to remain in a position of safety by the COSS, took the decision to return to the track to complete the work on the bolts without setting up a SSOW for that activity, whilst the COSS was not present at the site of the work.

- G1.31. The question remains whether the COSS knew or suspected that Technician (B) with two colleagues would undertake maintenance work on the crossing bolts. Although he told Technician (B) to remain in a place of safety.

- G1.32. The investigation team also noted that the COSS was undertaking IRJ grinding and alternated this role with a colleague. When directly involved in that work, there is concern how he could effectively supervise the team?
- G1.33. It was routine for teams to split up and two other members of the group were also qualified as COSSs; they did not raise an issue and would probably have done the same.
- G1.34. In the local culture, (see section G2) the longest serving members of the team were treated with great respect and, from interviews, acted as mentors to younger staff.
- G1.35. The investigation team were concerned that the COSSs at both Margam Moors and Margam East Junctions were assigned to this task when they arrived on site. This gave neither party an opportunity to think and check in advance about the safety arrangements for the day.
- G1.36. The question remains whether the COSS and colleagues heard the nut runner being used or saw Technicians (A), (B) and 1 on the open line before the train approached the group, and if they did, why did they not warn Technicians (A), (B) and 1 to return to a position of safety. The COSS, Technicians 3 and 4 all stated that they were unaware of their colleague's intent to work on up PT9577B points and that the train was adjacent to them before they noticed Technicians (A), (B) and 1 working on the points.

G2. Culture

- G2.1. The Margam area retains many villages, some extended, with a strong community spirit, which meant that employees knew each other and, in some cases, their family members not employed in the rail industry.
- G2.2. Many employees had worked in the area and for Network Rail and its predecessors over a range of 25 to over 40 years' service.
- G2.3. The investigation team noted that those employees with long service records were respected for their acquired technical knowledge and experience. This meant that, irrespective of grade or training, it was assumed those individuals instinctively knew what the best approach was to deal with day-to-day maintenance issues.

Those on site were very experienced and a closely-knit group where their familiarity with each other, the location and the tasks involved probably diluted their risk and situational awareness.

- G2.4. The teams, according to those interviewed, tended to migrate into teams of younger and older team members. For example, the younger employees undertook the heavy lifting work.
- G2.5. Although a commendable arrangement for looking after the health of older colleagues, this meant that new ideas and improvements, where changes to the arrangements have been made to, for example, NR/L2/OHS/019 were not fully appreciated. It also meant that there was, in the investigation team's view, a ceiling on new learning. In effect, the rules and arrangements had gradually become misinterpreted over time and old ways of working prevailed.

- G2.6. Moreover, those interviewed believed that they were compliant, working safely in their own way and doing a great job. There was a consensus about the way things were done and their view was underpinned by having an experienced team, favourable measurement against KPIs and no evidence of near misses or accidents. The team were confident that they would get the work done in a professional manner. This perhaps led to overconfidence and a culture that delivered work 'their way.'
- G2.7. The investigation team identified that the behaviours at Margam East Junction were inconsistent with the desired safety culture. The investigation team found competency assessments undertaken by different line managers through ACCs were variable and dependent upon the manager undertaking them. This could, in the investigation team's view, have an adverse effect on behaviours.
- G2.8. The investigation team COSS and other competences retained through assessment by the line manager in an ACC, contrasting that with the new COSS training programme which assesses an individual's non-technical skills (Section F11 refers). They concluded some types of competences should be refreshed and tested within a training environment, such as those roles/skills¹⁵ which involve leading others. This is to ensure competences and skills training are consistent, reinforcing positive behaviours that are part of an effective safety culture.
- G2.9. The investigation team hypothesised that any challenge 'to the way things were done' from a junior to a long serving team member would be dismissed. Furthermore, this was in a close-knit community, where there are connections both within and outside work and this may well curtail the impact of any dissent from established customs and practices.
- G2.10. From the interviews, it was clear that some long-standing ways of working, e.g. looking up every five seconds while carrying out an involved task, had not entirely disappeared. But some habits had become the norm, for example, a touch lookout not always being fully trained. Similarly, Technician (B) was not fully equipped to undertake a lookout role.

Accountability for the Safe Work Pack (SWP) was diluted and misinterpreted by being passed from one Team Leader to another, and again when the latter briefed an acting Team Leader as the PIC.

- G2.11. The Section Manager (Track) planned the work and dealt with the Self-Assurance, while the Section Supervisors were a link to the Team Leaders. Management supervisory roles were hands-off. For example, briefing was delegated to a Team Leader who was expected to be the PIC and who could then reassign, without reference to a supervisor, an acting Team Leader as PIC. The SWP provided flexibility on site which was exacerbated by Management supervisors leaving it to the Team Leaders and staff to sort out the detail.

¹⁵ Technician 5 (COSS) and Technician (B), the non-documented PIC (a role requiring COSS competency) were last re-certified under ACC.

- G2.12. It was clear that the Section Manager (Track), Section Supervisors and Planner took the view that safety responsibility for the work rested with the Team Leader as the PIC validating the SWP even though it did not contain all the work that was to be undertaken (discussed earlier). The nominal allocation of one Lookout was left to be supplemented by the COSS on site if required. This methodology did not fully consider what resources were required to deliver the work and provide adequate protection. There was, in the investigation team's view, limited teamworking.
- G2.13. This meant that the dominant person on site, who may not necessarily have been the PIC or COSS, would have a supervisory status in the minds of the team. They would organise what work was done and how it was to be protected, which may not have been the intention of the Management supervisory team.

The COSS at Margam East Junction was not appointed until he arrived on site. He considered two lookouts were required, but this decision was overruled by the person assuming the role of PIC

- G2.14. Arguably, it was not intended that the group of six at Margam East Junction should split into two subgroups, although this had become the norm and had not been challenged by the line managers.
- G2.15. At Margam East Junction, Technician 5 (COSS) appeared, from interview, to be a mild character. He was told by Technician (B), the Team Leader, to undertake the role of the COSS when the team arrived on-site, even though Technician 5 had previously challenged the SWP when the group were at the depot. When Technician 5 (COSS) wanted to introduce a distant lookout, he stated that he was told by Technician (B) that there was "no need"¹⁶ for a distant lookout. No one within the group challenged Technician (B)'s decision.

The COSS's authority was compromised by the presence of an acting team leader who assumed the non-documented role of the Person in Charge (PIC) on site. This influenced the arrangements that the COSS implemented and made the arrangements unsafe.

- G2.16. Irrespective of the decision to not have a Distant Lookout in place, Technicians (B), (A) and 1 were told to stand down (cease work) by the COSS while the latter and Technicians 3 and 4 walked towards Harbour Way road bridge to inspect and work on IRJs. The three staff led by Technician (B) returned to the track and, although they held COSS competences, did not formally appoint lookouts. (See G1.32).
- G2.17. The local practice of routinely delegating operational safety to a COSS separate from the PIC, undermined the principle of the most senior person on site being in charge of safety. While allowed in the company standard, sub-delegation had become the norm.

¹⁶ This cannot be corroborated

G3. NR/L2/OHS/019 and Planning and Delivering Safe Work

Background

- G3.1. The investigation team noted that prior to 2017 there had been an attempt to introduce significant and complex changes to safe systems of work for Network Rail's maintenance staff under the Planning and Delivering Safe Work (PDSW) programme.
- G3.2. This included the introduction of a Safe Work Leader concept. Unfortunately, this role and associated changes were not universally supported by stakeholders. Changes to NR/L2/OHS/019 were made in version 9 to implement core parts of PDSW.
- G3.3. The briefing for the changes to NR/L2/OHS/019 version 9 should have taken approximately 4.5 hours. This was seen as a challenge to maintenance team resources (i.e. over ½ day's work lost per person) when they still needed to maintain the infrastructure and train performance.
- G3.4. Wales Route were authorised by the PDSW Programme Board to paraphrase the prescribed briefing package, and this meant that the purpose and role of the PIC in planning and delivery was not fully understood. The supporting video had been filmed while drafting the standard. This may not have added the clarity required for a shortened briefing.
- G3.5. Staff being briefed raised detailed technical questions which overwhelmed the Project Manager (Wales) delivering the briefing; this caused those asking the questions to apply previously learnt knowledge to their perceived issues.
- G3.6. While introducing the role of PIC, the new standard did not introduce any new competences and essentially pulled together and reinforced existing standards, processes and Rule Book requirements. There was no change to the Rule Book. The briefing was therefore deemed not to require competent trainers. The Project Manager (Wales) was not a qualified trainer. But in retrospect, he felt that the use of a competent trainer would have improved the delivery of the briefing.
- G3.7. Evidence provided by Trades Union observers from 2017, showed there were issues, in the Trades Unions' view, with the content and consistency¹⁷ of briefings for the introduction of NR/L2/OHS/019 v9. Moreover, issues were raised by the Trades Unions over the resources available at Route level to be able to deliver the changes specified within NR/L2/OHS/019 v9.
- G3.8. The investigation team found that a term used within the SSOWPS planning software, relating to the creation of a 'Parallel SSOW component' had in Wales Route entered everyday language and was known to staff at Port Talbot depot as 'Parallel Working.'

¹⁷ In the Wales Route virtually all briefings were delivered by the Project Manager (Wales), but using an abridged version created other issues

- G3.9. 'Parallel Working' became interpreted as a legitimate method of working by local staff, involving changing between warning and protection within one SWP. Neither GERT8000 or NR/L2/OHS/019 v9 refer to Parallel Working.
- G3.10. The investigation team believe that the transition between one SSOW and another, in particular the transition from using a Site Warden in separated protection to the same person being a Lookout, caused short cuts, creating a hybridised method of working such that both Distant Lookouts and Site Wardens could be in position at the same time. This was exacerbated with the addition of a Distant Lookout.
- G3.11. There are, in the investigation team's view, communication impracticalities within this developed method of working, particularly how a Distant Lookout is stood down when the COSS changes the SSOW from Lookout warning to a Site Warden.
- G3.12. The options in the standard and planning system probably caused those delivering the work to apply, with good intention, hybridised ways of working to complete the prescribed documentation and PIC verification, and to undertake infrastructure maintenance without causing delays to trains.

The briefing for the introduction of NR/L2/OHS/019 (v9) was under-resourced and ineffectively implemented which led to a level of misunderstanding. Parts of the national 019 briefing pack were authorised to be omitted for the Wales Route briefing package. The briefing was not prescribed for delivery by a qualified trainer even though its content related to the application of safety critical rules.

- G3.13. Therefore, the investigation team recommends an independent review into current levels and content of monitoring, and the effectiveness of the assurance arrangements (including planned assurance inspections) to understand compliance with GE/RT8000, NR/L2/OHS/019 and the implementation of SSOWs.

The intent at Margam East Junction

- G3.14. The intention of the planned SSOW components was for some of the work items at Margam East Junction to be undertaken using a Separated SSOW with a line blockage of one line (and a Site Warden). But some of the work items (that required persons to be in the six-foot) would be undertaken using an unassisted Lookout warning SSOW. This was because the frequency of rail traffic and other works in the area prevented both (all) lines being blocked together.
- G3.15. Using parallel components in SSOWPS allowed both separated protection and unassisted Lookout SSOWs to be planned and for the COSS to set up the required SSOW for the relevant work item at that location and time period. GERT8000 requires one SSOW to be suspended by the COSS before the other planned SSOW component could be implemented.
- G3.16. The SWP lacked clarity and did not cover work activities to be undertaken between 08:30 – 12:30, and no "sequential" working SSOW component was created and added into the SWP for the work to be undertaken that morning.

The way the SWPs were created allowed the level of the hierarchy to be changed without authorisation from a line manager, contrary to the intent of standard NR/L2/OHS/019

- G3.17. Assisted warning (e.g. LOWS) could have been selected, but the Route had decided not to use Lookout assistance solutions.
- G3.18. The Supervisor's handwritten note of work items did not assign items to a particular planned SSOW component. Some work items could be undertaken within the planned separated SSOW and some items could only be done using the unassisted Lookout SSOW (i.e. when workers needed to be in the six-foot).
- G3.19. The creation of parallel components to allow both SSOWs systems to be implemented (to cater for the necessary work items) at different stages during the shift at the location is acceptable and a reason that parallel component functions were established in, and have been used since, 2012.
- G3.20. The decision as to which work item should be undertaken in the particular SSOW component would have been decided on site by the PIC and implemented by the COSS, as it was not detailed in the SWP.
- G3.21. The itemised work content for the groups' shift was ambiguous when read alongside the 'App' and the extra handwritten note. It was unclear to those doing the work how it should be interpreted.
- G3.22. The investigation team concluded:

- a) It appeared, judging by the handwriting, the Responsible Manager (Section Supervisor) had part completed the Lookout warning section of the SWP (more than was stated in his interview). The Responsible Manager should appoint the PIC and then the Responsible Manager should authorise the pack after the PIC had verified its suitability.
- b) In addition to the Responsible Manager non-compliantly pre-authorising the SWP before the PIC had verified it, it also appears the delegated COSS non-compliantly signed/endorsed the PIC verification whilst on site.

Note: If there is a delegated COSS, their endorsement needs to be part of the PIC verification stage (at least a shift in advance) and undertaken prior to the PIC signing to verify the pack. The Responsible Manager should have appointed the PIC, who should in turn have requested the delegated COSS to endorse the SWP before the PIC verified it. The Responsible Manager authorisation should have been the last step before the SWP was issued to the planned PIC to implement on site.

- c) It was noted that a line blockage with additional detonator protection was shown in the plan. While the work planned did not affect the safety of the line, additional protection should be considered and planned wherever possible in accordance with GERT8000. However, it is not considered that detonator protection would have been implemented that afternoon with the personnel available.

The NR/L2/OHS/019 process was not followed, and the Responsible Manager authorised the pack before it had been verified by the PIC

- d) The planned work content involved de-vegetation in the up cess (lineside Buddleia) and adding ballast to the shoulder. The work arranged by the team on site at PT9577B points involved the removal of one bolt at a time, oiling and replacing it. None of this work would affect the safety of the running line.

The Safe Work Pack (SWP) did not adequately specify the content of the work and how it was to be safely undertaken

- e) There was no Protection Controller arrangement in place to communicate and share protection between the teams at Margam Moors and Margam East Junctions.

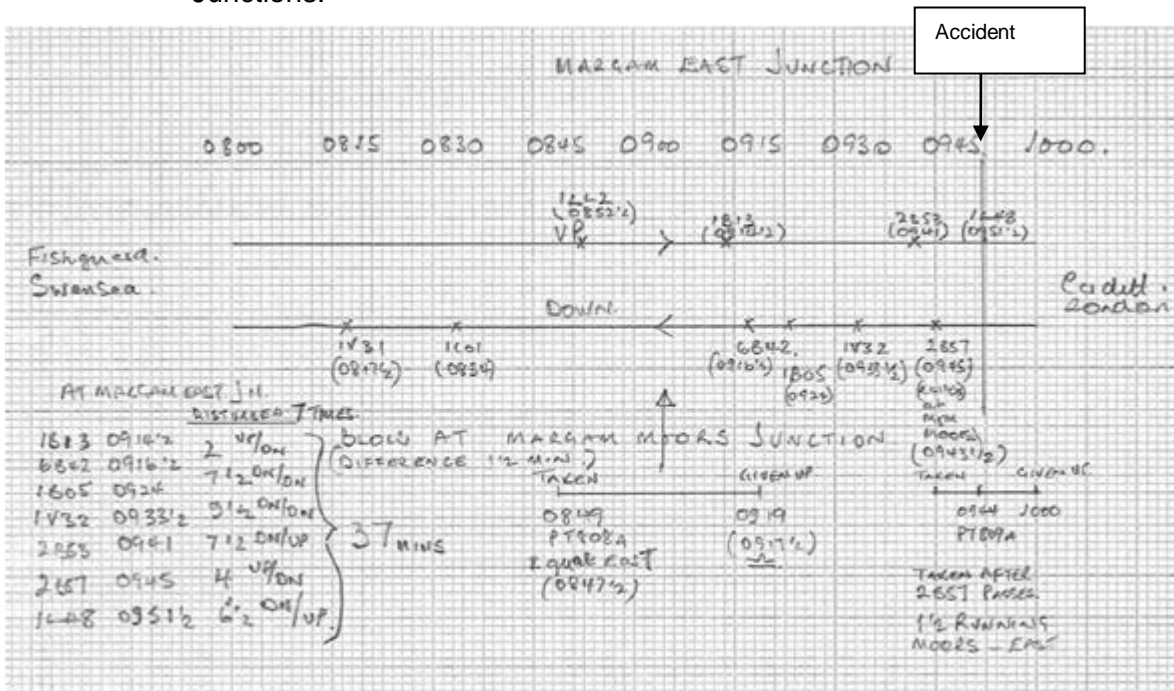


Fig. 7 Outline of the timings of trains at Margam East Junction

- f) The team had separated into two groups of three by 09:14. The diagram above shows train movements on the up and down line and how these train movements would have affected those working at Margam East Junction, for example, with Technician 1 stood in the six-foot working on the Up Main line but within 6' 6" of trains on the Down Main line. They would have had to respond to a train passing either on the Up or Down Main line on average every six minutes in the 37-minute period between 09:14½ and 09:51½. This could have created an environment where, with their collective experience, they had become excessively tolerant of the risk.
- g) The COSS should have received documentation in advance of being on site. He received the documentation that morning which meant that the COSS was at a disadvantage. He would have had to try to go through the SWP and understand it before briefing its content and offering an opportunity for any challenges to be made to the arrangements by those on site.

- h) Furthermore, this gave little time for the COSS to consider the transitional risks when he was to later change from a Lookout to a line blockage system of working.

G3.23. The investigation team considered that these arrangements should have been pre-planned, given their complexity.

The three staff were undoing, oiling and fastening bolts on PT9577B points without a Safe System of Work, including people specifically appointed to lookout for trains, being implemented.

G3.24. The SWP for Margam east Junction included a calculated 30 seconds required warning time. Those working on PT9577B points would need to lookout in both directions.

G3.25. Calculating the required warning time would include:

- a) 10 seconds to be in a position of safety (POS).
- b) +5 seconds because the site Lookout needs to look in two directions.
- c) +5 seconds for each distant Lookout (i.e.+10 if a Down distant Lookout is also required).
- d) = 25 seconds before adding the time it takes to down tools to move to a position of safety.

G3.26. From the calculated 30 seconds, that leaves 5 seconds for:

- a) the site Lookout to warn the touch lookout (who would also need to wear hearing protection as they would be close to the noisy work);
- b) the touch Lookout to touch each of the workers involved to alert them to stop work;
- c) the workers to stop what they are doing, clear all tools from the track and move to a POS.

If a distant Lookout was not necessary on the Down Main line, the touch warnings and move to safety would have just 10 seconds.

G3.27. Adding complication, the Up Relief was not shown as being protected by the points being normalised at Port Talbot Parkway station or reminder appliances applied by the signaller operating panel A. Likewise, the arrangements for movements from the OVE line were not documented.

G3.28. This would mean that there was another direction for the site lookout to look and would add at least another 5 seconds.

G3.29. It is likely that another COSS would have considered 40 - 45 seconds for the SSOW, but this would need sighting distance of 1 m to 1 m 220 yards sighting on the Up Main line.

G3.30. The resources required could amount to: three site and distant lookouts and at least one touch lookout. With six staff in the group, the work could not be delivered.

- G3.31. The best solution for 'nut running', which was routine work, would be to wait for the gap in train service and block both lines.
- G3.32. It was discussed that both Up and Down Main lines could be taken under one authority number and this would be deemed as one block to provide protection on both lines.
- G3.33. However, this would require a suitable gap in the train service to be available and Fig 7 indicates this is not a practical solution around the time of the accident. The work would have to be planned and applied for as a double block because line blockages cannot be combined under the same authority number after publication to the signaller.
- G3.34. The investigation found no evidence of planning work in relation to line blockage availability. The process used by the Route involved a planner applying for a block and planning checking the blocking points were appropriate for the work. The plan would be approved if the number of line blocks allowed is in line with signaller's workload assessment¹⁸.
- G3.35. A planner would not check the train service to identify the most suitable time of day for taking a line blockage. Longer periods which might involve work at night. A local action will be raised on the Head of Operations Delivery, Wales concerning this issue. Note: this is also part of the Track Worker Safety Task Force workplan.

G4. The Railway Group Standard GERT8000/HB

HB7 Duties of the COSS

- G4.1. A COSS must be competent and wear an armband or badge with the word COSS in white letters on a blue background.
- G4.2. Lookout warning can be utilised (discussed earlier) but only when "there is no realistic alternative safe system of work that can be used" (HB7 section 4.8 1st bullet point). It can only be used when "the warning time will be enough for everyone in the group to stop work and then reach the position of safety at least 10 seconds before any train arrives." (HB7 4.8 final bullet point).
- G4.3. The investigation team took the view that Technician 1 stood in the 6' with the petrol-engine driven nut runner would have been exposed to trains while the adjacent line was open. Without formal Protection Controller arrangements in place with colleagues at Margam Moors Junction, they should have regarded the Down Main line to be open. There was no evidence of arrangements being in place for the COSS at Margam Moor Junction to tell the COSS Margam East Junction when the line was blocked or open.
- G4.4. The investigation team also believed that the Lookout arrangements were inadequate for the grinding work on the IRJs undertaken by the COSS, with Technicians 3 and 4, which would involve work on the six-foot rail.

¹⁸ This is dependent on traffic gaps on a double line, automatic signal areas, CCTV level crossings, junctions etc

- G4.5. The COSS (HB7 part 4 paraphrased) must stay with their group so that the COSS is able to personally observe and advise everyone until work is completed or the group is no longer near the line.
- G4.6. No proximity criteria are defined, however the wording of GE/RT8000 implies that the COSS should remain close enough to communicate clearly with the whole group. When relying on warnings from a lookout, the responsibilities of the COSS include positioning the lookout(s) so that any approaching train can be seen, and adequate warnings are provided to the entire work group.
- G4.7. Although the six employees at Margam East became separated into two groups of three, the COSS believed that Technicians (A), (B) and 1 would stand down while he and two colleagues attended to the IRJs. Indeed, Technician (B), directing the work, apparently commented that the COSS and two colleagues should have finished the IRJs by 10:00 and this, in the minds of Technicians 3, 4 and the COSS, potentially underpinned their belief that Technicians (A), (B) and 1 would not be working.
- G4.8. Witness statements indicate that Technician (B), leading the group, was asked by the COSS to remain in the cess. This was supported by those with the COSS. The latter group were surprised that Technicians (A), (B) and 1 were in the four-foot of the Up Main line, to the point of saying: "Why didn't they go for a cup of tea?" It is reported that Technician (B) had said in words to the effect of: "Let's get on with it" after the COSS and Technicians 3 and 4 had left them.

HB3 Duties of the Lookout and Site Warden

- G4.9. The lookout must wear an armlet or badge with the word 'Lookout' in red letters on a white background. The lookout must warn the group of approaching trains as directed by the COSS. The lookout must not allow themselves to become distracted.
- G4.10. The COSS tells the site or distant lookout from which direction trains will approach, how warning is to be given and where the position of safety is. The Rule Book requires lookouts to remain in position, stay alert and carefully watch for approaching trains.
- G4.11. At Margam East Junction, Technician (A) had originally been appointed as the distant lookout but did not take up this role, nor did he act as the site lookout at the time of the accident. Instead, he was preventing a nut from turning with his foot while Technician 1 used the petrol-engine driven nut runner to tighten the bolt. Technician (B) was unofficially acting as the site lookout.
- G4.12. GE/RT8000/HB7, states that a lookout must not take part in the work. Technician (B) gave advice on how to free a seized nut and told Technician 1 to apply oil to it to be able to tighten the bolt. He was distracted from looking out while overseeing this activity.
- G4.13. In the investigation team's view, a distant lookout should have been positioned at circa 640 – 680 yards from the site of work to observe trains approaching around the curve from the direction of Pyle station (discussed earlier).

- G4.14. In the investigation team's view, had Technician (B) seen the train at circa 640 yards sighting distance (circa Harbour Way overbridge), even with the reduction of the train's speed, it is estimated that the train would have covered that distance in circa 18 seconds. To react to the Technician B's warning and get to a position of safety from the six-foot, Technician 1, carrying a petrol-powered nut runner, would have probably found it difficult to reach a position safety at least 10 seconds before a train passed their position.
- G4.15. Those working on site rely on the site Lookout to warn of the approach of trains. The touch Lookout is a separate person who watches the site lookout. When the site Lookout starts to warn those on site, the touch Lookout touches those that are using or are next to noisy equipment or tools. This is to provide adequate warning of a train's approach and informs those present to move into a position of safety. At Port Talbot depot, it was reported that the touch Lookout was not always a qualified Lookout, nor did they carry the prescribed Lookout equipment for that role. They used a 'touch person' to undertake the role of touch Lookout but also used the site Lookout to undertake both roles. A touch Lookout was not appointed at Margam East Junction.

G5. Audibility of the train horn

- G5.1. The investigation team noted that the audible warning of a trains' approach is not part of safety arrangements for those working on or near the line. Three members of the track team working at PT9577B points had, according to witness evidence, Peltor Optime 111 neckband ear defenders with them. These are used with equipment such as Cobra or Hilti nut runners that can emit circa 101 dBA when power is applied.
- G5.2. Warning horn data supplied by Hitachi for the class 800/901 IEP indicated that the high tone range is between 115 dB and 120 dB and not less than 101 dB in low mode.

The attention of those working on PT9577B points became focussed on their task and they were wearing appropriate hearing protection for use with noisy equipment.

- G5.3. In the investigation team's view, the track workers did not respond to any horn warning because they were concentrating on the task. It is likely that the train horn would have been masked by the machinery noise at the work site whether or not the people were wearing hearing protection.
- G5.4. The class 800 data indicated a sound pressure level of approximately 115 -120 dB(A), when recorded at a position 5 metres in front of the train. This is a requirement of Railway Group Standard GM/RT2482 – Audibility requirements for trains. The equivalent measurements for both low and soft volume tones were approximately 101-106 dB(A).
- G5.5. Prior to 2005, Railway Group Standards required the sound pressure at 5 metres to be between 120 dB(A) and 125 dB(A) for trains with a maximum speed of up to 100 mph. After a revision of the standards in 2007, the sound pressure of a warning horn, measured at 5 metres, was required, for new trains, to be between 101 dB(A) and 106 dB(A).

- G5.6. The investigation team concluded that the low volume horn was compliant, when tested at 5 m with the requirements of the current standard for warning horns on new trains (but see use below ref GE/RT8000/TW1).
- G5.7. However, it is possible that at a position 100 metres ahead of a train e.g. when the horn was sounded, after passing the first group on the Down Main line and in relation to the position of those stood at PT9577B points, that the sound could have been in the higher 60s to low 70s dB(A.) The datasheet for the petrol powered nut runner used at site indicates that it produces a noise level of circa 87 dB(A) at a distance of approximately 1 metre when idling, increasing to over 100 dB(A) when working at high power.

Note: Network Rail has commissioned a study by RSSB to evaluate the interrelationship between train warning horns, use of hearing protection and the warning arrangements for those working with powered equipment. These findings will be published separately to this investigation.

G6. Railway Group Standard GERT8000/TW1

- G6.1. GE/RT8000/TW1 – ‘Preparation and movement of trains: General’ - is explicit on the requirements for using the horn when personnel are on or about the line. It states in section 10.2
- a) “You must sound the horn to warn anyone who is on or near the line on which you are travelling.”
 - b) “Give a series of short, urgent danger warnings to anyone who is on or dangerously near the line who does not: acknowledge your warning by raising one arm above the head or appear to move clear out of the way of the train.”
 - c) In addition, it describes that to give a warning to anyone on or near a running line, the driver should use high and low tones and the loud setting if available.
 - d) Furthermore, a driver must give a series of urgent short warnings on the train horn to alert anyone that has not acknowledged an initial warning or moved clear of their train.
- G6.2. It must be noted that both low and high tones were available when the train travelled at speeds between 72.3 and 42.9 mph, but these are louder when the train speed rises above 104 mph.
- G6.3. The OTDR shows that the driver initially gave warning using the high and low tone but thereafter used the low tone as follows:
- a) The driver sounded the warning horn at 09:51:27 using the soft/low and high tones, first for 0.6 seconds and immediately afterwards for 1.1 seconds.
 - b) At 09:51 34 and circa 440 yards from PT9577B points, he sounded the horn again for 4.9 seconds.
 - c) He placed the brake into emergency at 09:51:39 at approximately 285 yards from the group and sounded the warning horn again at 09:51.36 for seven seconds.

- d) The train speed had reduced to 51 mph upon reaching the workgroup.
- G6.4. In the investigation team's view, it was unclear whether a series of short warnings, rather than continuous sounding of the train horn, might have resulted in the track workers becoming aware of the train earlier.
- G6.5. However, the investigation team believed, given the number of investigations citing the use of warning horns, that it would be appropriate to institute training that will help the driver to react automatically, rather than having to think about the correct use of a warning horn when there is little time for decision making and in very stressful situations.

G7. Safety Management Intelligence System (SMIS)

- G7.1. The SHE Analysis & Reporting team reviewed data over the past two years of any reports of the maintenance team being involved in a near miss with trains on the Up or Down Main line between Cardiff and Swansea. There were no events recorded.
- G7.2. The infrastructure is less complex than other routes which can be a factor, but there is some concern that the Port Talbot Section Supervisor 1, in the context of workload, commented that close calls did not always receive the attention that they needed.
- G7.3. FFCCTV from trains operating on the route between Swansea and Cardiff showed that there were other worksites where the warning systems employed were contrary to prescribed standards. This issue will be dealt with by an action within G8.

G8. Assurance

- G8.1. Risks are identified, and controls documented within company standards. The effectiveness of these controls is considered using leading and lagging indicators. Level 1 assurance is undertaken by the Route teams and includes Self-Assurance checks and Planned Assurance Inspections. The investigation found evidence that the Level 1 assurance was unduly focussed on forms being completed and ineffective in identifying inconsistency between paper records and on-site realities.
- G8.2. A review of the Self-Assurance held in CMO P4 2019/20 completed by the Section Manager (Track) did not identify any key factors.
- G8.3. The Self-Assurance regime did not identify weaknesses in the SWPs, for example the limited content of work within them. The Functional Audit Programme (FAP) audit is targeted towards issues that are seen to be the higher risks, including those identified within Self-Assurance regime e.g. through non-compliance. The Self-Assurance regime had not raised an issue at Port Talbot depot. It is unlikely that when the audit, e.g. in 2014, was completed there were enough SWPs to take an informed view. Under 019 version 8, SWPs were destroyed within weeks after the event. Therefore, the investigation team believe that a 'Deep Dive' in this area should be undertaken with an appropriate level of verification, tailored to the findings.

- G8.4. The FAP Level 2 assurance is wide ranging, covering discipline topics as well as management systems compliance. Audits were undertaken by the FAP team and published in 2014 and 2017. The latter audit for the IMDM Cardiff, which included Port Talbot depot, made observations on the actions from self-assurance becoming part of the visualisation board. In terms of management systems, 'high' rated non-compliances were raised against the storage and calibration of small plant, environmental management and storage of detonators. The track access arrangements were not part of this audit and no other issues were raised in relation to walk out reports and the application of safe systems of work.
- G8.5. The audit report published in 2014 sampled several areas. The RT9909 and associated documentation, when reviewed alongside the corresponding WAIF or Work Order, had incomplete or inconsistent information across a range of disciplines. Although the Track team were not part of this audit, signalling and telecoms, electrification and plant, and off-track functions were reviewed. There were no issues raised that directly linked to the accident on 3 July 2019.
- G8.6. A Deep Dive by the FAP team that includes sampled site verification and focusses upon the planning, verification, communication, application and adequacy of protection arrangements in relation to work undertaken by maintenance teams in sampled Routes should examine whether there is wider non-compliance.

The FAP did not effectively review the effectiveness of the Wales Route's Level 1 assurance. The effectiveness of the suite of audits forming the FAP should be reviewed to enhance its effectiveness in testing the effectiveness of Level 1 assurance

- G8.7 Self-Assurance report for period 3, 2019/20 showed no specific issues.

2.2. I have checked 100% of SWPs returned with changes or errors for which I am responsible. I have recorded the total number of these packs and any actions raised to prevent recurrence.

Yes

Comment: Nil Packs with errors

2.3. *All SWPs checked returned without amendment (10% sample check) show that the Person In Charge, Planner and Responsible Manager have all been involved in the planning. This is evidenced by the F01.1, F01.2 and RT9909 form is checked to confirm that:

1. Verification has been signed by a/the PIC and endorsed if necessary by the COSS;
2. Authorisation has been signed by the Responsible Manager;
3. Acceptance signed by the PIC carrying out the work
4. The COSS has signed the RT9909*

2.2. I have checked 100% of SWPs returned with changes or errors for which I am responsible. I have recorded the total number of these packs and any actions raised to prevent recurrence.

Yes

- G8.8. The investigation team considered that planning both Lookout warning and line blockage protection, and putting this into a single SWP, was locally authorised and therefore this would not raise an issue under the Self-Assurance arrangements. Putting both systems into one document reduced the amount 'paperwork' e.g. one instead of two packs.

- G8.9. The investigation team concluded, that this arrangement left the COSS to supplement the Lookout protection on site if resource was available rather than it being properly pre-planned. In the investigation team's view, this created a dilemma between having the maximum number of staff available to deliver manual work and having the prescribed (GE/RT8000) Lookout protection in place.
- G8.10. Without a FAP auditor going to site to verify the efficacy of the Lookout arrangements, it could not be readily established in a conventional audit, that the appropriate arrangements were put in place. One Technician described it as "the paperwork did not match reality". This is an area, in the investigation team's view, that needed to be more effectively sampled within the assurance regime.

The Route Assurance arrangements did not effectively monitor and verify compliance with NR/L2/OHS/019 and GE/RT8000/HB3&7

- G8.11. The investigation team considered that the Section Manager (Track) had not used a structured approach to his evidence gathering from 1-1s, team meetings and planned assurance inspections to have enough data to accurately measure safety performance and actions needed before completing the prescribed Self-Assurance held in CMO. The problem could be linked to workload for the Section Manager (Track), impacting his ability to create and deliver actions assigned. The Section Manager (Track) and Supervisors stated during interview that they would have liked to have spent more time on site.
- G8.12. The investigation team noted that two people appointed to the HORSHE role had both moved on within short timescales. This had been the key factor in weakening the assurance regime. Likewise, the policy to appoint interim or secondments into key roles because of reorganisation has affected the communication and assurance regime. The current RMD, HORSHE, IME and TME have had little time to identify and introduce remedial measures.

G9. Management of the incident consequences

- G9.1. The investigation team felt events following the accident were managed well, though noted that BTP officers had started speaking to some of those involved whilst in road vehicles facing in the direction of the incident site. All affected railway agencies and emergency services worked together in dealing with all the staff affected on site. Network Rail Route and Great Western Railway staff conducted a safe evacuation of the 184 passengers from 1L48. This involved clearing an egress route to enable evacuation of passengers to replacement bus services.
- G9.2. The Rail Accident Investigation Branch (RAIB) and the Office of Rail and Road (ORR) were informed of the circumstances and attended the site to conduct their own preliminary investigations.
- G9.3. The Route appointed a single point of contact (SPOC) to deal with all potential inquiries, questions, requests and arrangements for the months following the accident. The investigation team acknowledged that this appointment had generally worked well.

- G9.4. Wales Route Occupational Health, Human Resources and other related teams were quick to put in place a package of measures which provided support, counselling, assistance and chain of care for all those involved, including the families. The investigation team noted that the implementation of these had also worked well, though after having been in place for some months the effectiveness of these measures began to weaken.
- G9.5. It was reasoned that in these circumstances one size does not 'fit all' and a more bespoke framework plan that could be referred to in these kinds of circumstances might have been beneficial. During interview the RMD had stated that it was difficult to know where support for the Route had come from; there was no manual giving guidance on dealing with an event of this severity. Some of those people dealing with situations post-event would have had access to material, footage and statements that none of them probably wanted to have. Even a simple 'one-pager' as part of the Emergency Planning Process would have been better than nothing.
- G9.6. The investigation team opined that whilst the Route had managed post-incident elements satisfactorily there was certainly potential for the creation of a short document that would act as a crucial guide and reference during similar circumstances. This could act as the framework for actions to be taken post-event, highlighting the need to treat those involved - and all staff managing the aftermath - as individuals with different needs and requirements.

G10. A sample of similar events

Ynys Hir, Ceredigion, 2 April 2019

- G10.1. At 11:58, a track worker narrowly avoided being struck by a train at Ynys Hir, near Dovey Junction station. The track worker was one of a group of eight that had just completed oiling fishplates on the single line that runs towards Aberystwyth. The work group became separated as they were walking back to an access point. The line was open to traffic and a lookout had been appointed to provide the group with a warning of approaching trains while working and walking on the railway.
- G10.2. The train involved was 1J09, Shrewsbury to Aberystwyth. It was travelling at close to line speed. The driver sounded the horn on sighting the first two members of the work group. They were already in a position of safety and acknowledged the warning. Around 10 seconds later, the driver observed another track worker walking in the four-foot with his back to the train. The driver again sounded the warning horn. The track worker did not hear the horn until the driver had also applied the emergency brake and the train was virtually upon him when he moved clear.
- G10.3. By this time, the other five members of the work group had reached the access point and were leaving the railway. No-one was injured, but the driver and some members of the work group were badly shaken.
- G10.4. This incident occurred because the work group became separated and the COSS could no longer ensure that the safe system of work functioned correctly.

- G10.5. The planned work at Ynys Hir was organised by Network Rail's depot at Machynlleth. A team leader and a track worker from the Network Rail depot were allocated, and six contract staff from Ganymede Solutions were hired to assist. The planner at the Machynlleth depot obtained approval to implement a safe system of work based on warnings from a single lookout. Network Rail's team leader was appointed as the COSS responsible for managing the safe system of work. He was also the PIC (Person in Charge).
- G10.6. The work group began to separate as they walked back towards the access point; the lookout and the five other Ganymede Solutions staff walking ahead of the Network Rail team leader and track worker. The group walked in the four-foot because they found that the underfoot conditions were difficult in the cess.
- G10.7. At around 11:45 the work group got off the track when the lookout warned them of a train travelling towards Dovey Junction. On returning to the track they started to separate further. The Network Rail team leader has stated that he tried to call to those ahead but was unable to get their attention. There was a train waiting in the passing loop at Dovey Junction station, but the lookout was not expecting there to be another train for around 45 minutes and may not have been regularly looking back.
- G10.8. The Network Rail team leader sighted 1J09. He and his colleague moved to a position of safety. By now, the Ganymede Solutions staff were reported to be around "150 yards" ahead. The team leader recalled shouting at them to get off the track. He also used his whistle, but he couldn't make himself heard. The six Ganymede Solutions staff carried on walking, their backs to the approaching train.
- G10.9. The driver of train 1J09 saw the Network Rail team leader and track worker at 11:57:38 and sounded two blasts on the train horn; they both raised their arms to acknowledge this. Around 10 seconds later the driver saw the track worker in the four-foot. The driver again sounded two blasts on the horn, and immediately started to reduce traction power. The track worker did not hear the train horn. The lookout and the four other Ganymede Solutions staff then saw the train as they turned to leave the track at the access point. One of them, appreciating the imminent danger, shouted "one on" and the lookout made arm gestures for the track worker to move out of the way. There was no evidence to suggest that the lookout had seen 1J09 before this.
- G10.10. The driver reacted to the lack of acknowledgement from the track worker by continuously sounding the train horn and applying the emergency brake. The track worker reported hearing the horn when the train was just a few feet away and immediately moved clear.
- G10.11. The similarity with Margam East Junction is that the COSS is to stay with their work group while they are on or near the line, so that they can observe and advise everyone.
- G10.12. Ganymede Solutions staff were directly upwind of both the Network Rail team leader and the approaching train when they were walking back towards the access point. This possibly explains why, having become separated, the team leader was unable to make himself heard by the work group. It also may explain why the track worker did not hear the horn of train 1J09 until late.

G10.13. The Rule Book requires drivers to use the train horn to give a series of short urgent warnings when those on the railway do not immediately acknowledge or move clear. Although far from certain, it is possible that a series of short warnings, rather than continuous sounding of the train horn, might have resulted in the track worker becoming aware of train 1J09 earlier. As with Margam East Junction, the driver was faced with a situation, that he could not control, and the driver's response was, as in this case, not an instinctive reaction to use short sharp blasts and the loud setting. A recommendation will be raised on this point.

Peterborough, 20 July 2018 – published June 2019

G10.14. At approximately 10:52 on 20 July 2018, a track worker, who was acting as a site lookout for another track worker carrying out an inspection, narrowly avoided being struck by a train near Peterborough station. The train involved had just passed through the station and was travelling at 102 mph when its driver saw the lookout standing on the same line ahead. The driver immediately sounded the train's warning horn and applied the brakes. The lookout responded to the train's horn and moved out of its path about 2.5 seconds before the train reached him.

G10.15. The site lookout was distracted and was not adequately observing his distant lookout or looking for approaching trains. He had also chosen to stand on an open line when it was not necessary to do so. The track worker carrying out the inspection, who was also the COSS and responsible for the safety of all the staff involved in the work, was not monitoring the unsafe actions of the lookout at the time of the incident. The distant lookout had left his position before the train arrived because he thought he had been stood down. Another distant lookout who was visible to the site lookout was from a different team and was looking out for trains coming in the opposite direction.

G10.16. The way in which the work was planned defaulted to using the least preferred safe system of work in the hierarchy within NR/L2/OHS/019 for managing the safety of people at work on or near the line. Furthermore, the current rules for communication when lookouts are used were found by the RAIB to be impractical, leading to a disregard for the rules and the use of unofficial and uncontrolled practices. These two factors were the underlying causes of this incident

G10.17. The RAIB made five recommendations addressed to Network Rail relating to the following areas:

- i) a rule change so that site lookouts default to standing in a position of safety unless this is not practicable to implement the safe system of work.
- ii) Investigating the common but unofficial use of flag signals by lookouts to communicate, finding ways to improve and control this communication, implementing changes and monitoring the effectiveness of the changes that are made.
- iii) clarifying to track workers the actions they should take when more than one group wants to work with lookouts in the same place.
- iv) continuing the ongoing work of the Network Rail Route involved to reduce the use of lookouts for cyclic maintenance tasks.

- v) reducing the number of cyclic maintenance tasks that are undertaken using lookouts across all of Network Rail's infrastructure.
- G10.18. Network Rail should increase engagement of all maintenance sections across the London North Eastern and East Midlands Route, with the Route's 'Safe and Effective Working' project, so that as many of its cyclic maintenance tasks as possible are undertaken in planned possessions.'
- G10.19. At Margam East Junction, 'parallel working' had defaulted to using the least preferred 'safe system of work' in the hierarchy defined within Network Rail's company standard NR/L2/OHS/019.
- G10.20. Peterborough recommendation 5 describes significantly reducing the number of routine work activities that are undertaken at the lowest level of the hierarchy for safe systems of work in Network Rail company standard NR/L2/OHS/019.
- G10.21. The RAIB outlined that Network Rail should:
- a) reduce the number of cyclic maintenance tasks that are undertaken with lookout warning by establishing improved planning processes to substantially decrease the reliance on lookout warning, by enabling more pre-planned activities to take place in planned possessions, or using line blockages protection systems; and
 - b) implement effective arrangements for the monitoring, audit and review of these revised planning processes.
- G10.22. These are directly relevant to the Margam East Junction investigation.
- G10.23. The Peterborough investigation also identified three learning points. Numbers 1 and 3 are relevant:
- (1) The importance of early use of the train's horn by drivers to give an urgent warning, which probably averted an accident in this case. The Margam investigation raises a recommendation concerning use of the warning horn.
 - (3) The briefing of lookouts on where to stand while carrying out their duties and staff responsible for the safety of the work group not becoming distracted by the work activities, to the extent that they are no longer observing their work group. At Margam the team became separated to allow the COSS to lead two others in IRJ grinding work.

Class Investigation issued July 2017

- G10.24. This report described the RAIB's investigation into the safety of track workers where the normal running of trains had not been stopped to allow engineering work to be carried out.
- G10.25. At that time, Network Rail had implemented a major track safety initiative known as 'Planning and Delivering Safe Work' (PDSW) to address several the safety issues. Revisions had been made to NR/L2/OHS/019, although the RAIB did not evaluate the effectiveness of these initiatives.

G10.26. The RAIB commented that the recording of near miss incidents was dependent on staff reporting those events and it was not possible to quantify the extent of under-reporting. The SM(Track) based at Port Talbot, stated that the local Supervisory team were under-resourced to deal with issues raised. Moreover, FFCCTV data from trains that ran in the time window that the team was at Margam East Junction, between 08:15 and 09:50, showed that there were several groups working on or near the line between Swansea and Cardiff stations where their SSOW was non-compliant.

There was a lack of consideration about the availability of alternative periods to access the track or other safe system of work arrangements e.g. LOWS

G10.27. Network Rail had identified that the highest number of near misses occur with warning SSOWs using unassisted lookouts. In the Wales Route this investigation team found that systems such as LOWS were not provided. Their concern was that LOWS is still vulnerable to a single point failure by one person. The RAIB found that it was not possible to determine whether the use of LOWS achieved a significant reduction in risk compared with the use of unassisted Lookout protection.

G10.28. RAIB findings and with similarities with Margam

a) COSS

Handbook 7 of the Rule Book states that a COSS must stay with the group in order 'to personally observe and advise everyone.' In addition, NR/L2/OHS/019 states that a COSS must not under any circumstances permit work to continue where an adequate SSOW cannot be maintained. These requirements imply that a COSS should be continuously maintaining the SSOW, even if they are participating in the work itself. FFCCTV showed that members of the group were not together e.g. going to the flatbed truck located between two lines, the COSS and a team member working some distance from the team at PT9577B points and moving onto the Up Relief line without lookout arrangements in place.

b)

Lack of challenge / cultural issue

Network Rail's standard 'Worksafe Procedure', NR/L2/OHS/00112, states that the company does not expect staff to work in an unsafe manner to achieve results it states, 'If you can't do it safely – don't do it'. The procedure gives rail staff with concerns about the safety of an activity the right to stop work and have the situation assessed. At Margam those involved relied on the knowledge and experience of the PIC and did not support the COSS in the appointment of a distant lookout to provide an earlier warning of trains.

c) Over-familiarity

The RAIB outlined that risk perception is influenced by an individual's experience and familiarity with the hazards, as well as their perceived ability to deal with the hazards and perception of the consequences. Their behaviour is then influenced by risk tolerance, which is a characteristic willingness to accept the perceived risks. This was a common failing amongst those on site at Margam East Junction.

Shawford 24 June 2016

- G10.29. At 12:22 on 24 June 2016, a train travelling at about 85 mph narrowly missed striking a track worker near Shawford station, Hampshire. The track worker and a controller of site safety (COSS) had gone onto the line to locate a reported rail defect. The track worker was not injured but was badly shaken by the incident. After making an emergency stop, the train driver reported the incident and was fit to continue his journey.
- G10.30. The immediate cause was that the track worker had become distracted while he was standing on a line on which was open to trains. This happened because there was a breakdown in safety discipline and vigilance when the COSS and track worker went onto the infrastructure. This was a factor of the accident at Margam East Junction where the COSS and the group at PT9577B points became separated.
- G10.31. They did not implement the required safe system of work for going on or near the line at Shawford. The track worker also crossed the running line without the permission of the COSS. Likewise, at Margam East Junction, the required safe system of work was not implemented and the group at PT9577B went onto the running line without permission.
- G10.32. The track worker was distracted and stopped on an open line when crossing back. There was a similar breakdown in safety discipline and vigilance in a fatal accident at Newark North Gate. It was probable that the Shawford track worker's alertness and decision making were affected by fatigue, because he had slept in his car all week to avoid making long journeys to and from home each day. At Margam East Junction those involved were distracted by the task.
- G10.33. Although not causal to the incident, the RAIB observed that the way in which the Delivery Unit carried out safe system of work planning was not compliant with Network Rail's processes. There were recommendations concerning fatigue and learning points about reminding staff of the importance of following existing rules and procedures; how the early use of the train's horn by drivers to give an urgent warning can avert an accident if track workers on their line do not acknowledge the first horn warning. The use of the warning horn was discussed earlier.

Redhill 24 June 2014

- G10.34. At about 10:41 on 24 June 2014, a track worker was struck by a passenger train travelling at about 80 mph near Redhill. The accident occurred on a section of the main line between Brighton and London known as the Up Quarry line. He was the leader of a team of twelve people who were fitting emergency clamp plates to lengths of rail where cracks had been identified during an earlier inspection.
- G10.35. The team were working on one of the two lines at the site while trains continued to run on both lines. They were protected by lookouts, whom the controller of site safety (COSS) had positioned at the site and at some distance away on both sides of the site of work, to warn the team of the approach of a train in enough time for them to stop work and move to a position of safety before the train arrived.

- G10.36. At the time the accident occurred, the work had been in progress for about forty minutes. The other members of the team had completed their work, and the team leader was engaged in taking measurements for the lengths of replacement rail that would be required at the site. The lookouts had warned the team of the approach of a southbound train, and a short time after this had passed, and before the COSS had given permission for anyone to return to the track, the lookouts gave another warning, for a northbound train.
- G10.37. At about the time this warning was given, the team leader began to walk along the side of the line, with his back to the approaching northbound train. As he walked, he moved closer to the Up Quarry line, and the train struck him on his right shoulder and threw him down the side of the embankment. The casualty was airlifted to hospital, but he had suffered life-changing injuries.
- G10.38. The position of safety that the team were using was not adequate because there was no level place to stand, clear of the line. The team leader was unaware of the imminent danger from the approaching train.
- G10.39. The RAIB identified three learning points and made three recommendations arising from this investigation. The learning points included staff speaking up if they felt unsafe and the need for train drivers to sound a warning as they approach each group of workers who are on or near the track. At Margam East Junction, it was clear that other than the COSS none of the four others that were qualified spoke up and challenged the proposal by Technician (B) to only have one Lookout.

Bridgeway User Worked Crossing, 16 January 2014

- G10.40. At around 23:58 on 16 January 2014, a passenger train travelling between Crewe and Shrewsbury struck a welder's trolley that had been placed on the line at Bridgeway user worked crossing. The train was travelling at about 85 mph at the point of collision and stopped in just under ½ a mile. A track worker, who was on the trolley loading it with tools, jumped clear when he became aware of the approaching train a few seconds before impact. He suffered minor injuries. The train sustained significant damage to its front and to underframe equipment, the group of three staff involved (Controller of Site Safety (COSS), welder and track worker) were taken back to Shrewsbury depot some four hours after the accident.
- G10.41. The accident occurred because the trolley was placed on a line that had not been blocked to normal train operations. The COSS had blocked the opposite line on the advice of the welder, who had been misled by the presentation of information in the paperwork describing the safety arrangements for the job. However, the welder later realised that the work was on the line that had not been blocked, but he still placed his trolley on that line believing that no train would approach because of engineering work taking place elsewhere in the area.

- G10.42. The COSS was not directly supervising the workers when the trolley was placed on the line. Prior decisions made in work planning and resourcing, and the absence of relevant information in the paperwork about the location of the work, contributed to poor decision-making by the track workers on the night of the accident. As at Margam East Junction, the COSS was not with the team when an important decision was taken to start work by a member of the workforce. At Margam East Junction, although the paperwork was basic, this was not, in the investigation team's view, the driving factor that caused Technicians (A), (B) and 1 to go onto the line without a recognised safe system of work in place.
- G10.43. The RAIB identified three learning points and made three recommendations, all to Network Rail. The learning points related to competence management practices and briefings at Shrewsbury Maintenance Delivery Unit, and the importance of staff relying on their own safe systems of work rather than making assumptions about work taking place elsewhere. It was noted that the team at Margam East Junction non-compliantly assumed that the Down Main line was safe because there was a blockage of the line at Margam Moors Junction. They did not describe how they would be warned of any changes such as allowing four trains to run past their site of work.
- G10.44. The recommendations focused on the presentation of information in the paperwork describing the safety arrangements for the job and factors affecting planning decisions which could also be linked with the arrangements in place at Margam East Junction.

Stoats Nest Junction, 12 June 2011

- G10.45. At 05:28 on 12 June 2011, 1U11, Gatwick Airport to London Victoria, travelling at about 60 mph, struck a member of staff at Stoats Nest Junction on the main line between London and Brighton, about one mile south of Purley station. The person who was struck was one of a team of ten people carrying out maintenance work on the track, and he was seriously injured.
- G10.46. The track worker who was struck did not move to a position of safety and remained in the path of the train as it passed the site of the work. Although one of the lines at the site had been returned to use shortly before the accident, having been closed as part of a possession, work continued near that line and no measures were put in place to protect personnel from the passage of trains on that line.
- G10.47. No safe system of work was put in place to protect staff from train movements on the up slow line, after that line had been returned to traffic.
- G10.48. The COSS was not present at the site when the up slow line was returned to traffic. The track workers did not hear any warning from the train as it approached.
- G10.49. The authority of the COSS was confused and undermined by the presence of more senior management on site. This adversely affected the implementation and maintenance of a safe system of work. Again, there were similarities with the accident at Margam East Junction, the COSSs authority being undermined and the location of the COSS in relation to the team.

Washwood Heath, 6 March 2010

G10.50. The RAIB's report recommendation 3 raised that Network Rail should extend the work it is undertaking to improve the methods and criteria used when selecting staff to undertake safety leadership roles to include consideration of the training and assessment of those staff who are already qualified in those roles. This was a key issue where Technician (B) influenced the decision making of the COSS at Margam East Junction where the COSS did not have the non-technical skills or assertiveness, in the investigation team's view, to set up a safe system of work that he believed was appropriate for the circumstances that prevailed.

G11. Fair Culture

G11.1. *A summary of the unsafe acts:*

Section Manager Track

G11.2. The Section Manager (Track) did not adequately monitor and lead compliance checks within the depot.

COSS

G11.3. The COSS allowed the group of six to split into smaller sub groups who became separated by distance.

Technician 1

G11.4. Technician 1 did not challenge the instruction given by the unofficial PIC to restart work on an open line without adequate protection

Team Leader 2 appointed Technician (B) as an unofficial PIC

G11.5. Team Leader 2 decided not to work at Margam East Junction as intended by Section Supervisor.

Technicians 3, 4 and 5 (COSS)

G11.6. None of the team on the day at Margam East Junction challenged any unsafe practices.

Supervisor 1

G11.7. Section Supervisor 1 did not carry out his duties as a 'responsible manager' correctly and had authorised (signed) the SWP as the 'responsible manager' without fully checking the content and before the PIC had verified the pack. The SWP was not fit for purpose.

G12. Systemic non-compliance?

Network Rail's analysis of a random sample of SWPs

G12.1. A random sample of 14 SWPs was initially analysed by the investigation team; these represented work that was undertaken between 17 April and 1 May 2019 by the track team based at Port Talbot.

G12.2. Non-compliances:

Like Margam East Junction

- a) The SWPs were signed by Supervisor 1 or 2 as the Responsible Manger soon after the plan was created (usually on the same day).
- b) A member of the gang was subsequently appointed as the PIC.
- c) A lookout was used for two work groups.
- d) The SWP did not cover the hours that were worked on site.
- e) There was no evidence of a distant lookout being appointed.
- f) A duplicate SWP created 18 March was updated and used 18 April 2019 (like Margam East Junction).

Other

- g) When a Protection Controller (PC) was appointed there was no evidence of a COSS signing in.
- h) A COSS and PC using the same Site Warden.
- i) A PC/COSS signed in with another PC.
- j) SWP dated 23 April was used on 24 April 2019.
- k) Tippex had been used on sighting distances.
- l) One SWP showed that additional detonator protection was required e.g. that work affected the safety of the line, but which was downgraded, detonators not being required.

G12.3. The individuals involved in this range of non-compliances consisted of Supervisor 1 and 2, Technician (B), Technician 2, Technician 3, Technician 5, and Technician 6 and three others that were not involved with the events that occurred at Margam East Junction on 3 July 2019.

RAIB - Preliminary SSOWPs Analysis

G12.4. RAIB reviewed 637 packs covering a 3-month period from April to July 2019. Several packs from the week of the accident were also included.

G12.5. Out of the 637 packs 367 were for cyclic work and 11 were for repeated work. Therefore 259 non-cyclic work packs were reviewed.

G12.6. The 259 packs consisted of 17 piles of paperwork, each supposedly a weekly bundle. There was week 1 to 13, 16, 17 and 2 miscellaneous piles. Aside from the miscellaneous piles each pile had its own check sheet, showing how many packs were produced each week and how many were returned to the depot.

G12.7. A high-level review of the Port Talbot SSOWPs was undertaken by the Network Rail investigation team which found that 64% were with protection, 30% were with warnings and 6% were dual packs. This was for the period April – July 2019.

Findings

G12.8. 127 out of 259 or 49% of packs were authorised before they were verified.

- G12.9. 87 out of 259 (33.5%) simply said 'Your PIC' –where a PIC was not allocated.
- G12.10. 20 out of 259 were 'Parallel Working' which meant that 7.7% of packs had two safe systems authorised within one SWP.
- G12.11. 53 out of 259 or 20.4% of packs were implemented differently to how they were planned with regard to lookouts.
- G12.12. 45 out of 259 or 17.3% of packs had the wrong PIC typewritten on the front page.
- G12.13. 44 out of 259 or 16.9% of packs had different PICs on the front and back.
- G12.14. 46 out of 259 or 17.7% of packs were verified on the same day they were created.

Conclusion

There was evidence of systemic non-compliance by some of those involved in the accident that occurred on 3 July 2019. There was inadequate validation of compliance with the planning (019) arrangements and Rule Book protection arrangements applied on site. Clearly any process-system that does not validate compliance will deteriorate.

Habitual ways of working had normalised behaviour which was inherently non-compliant with company and group standards

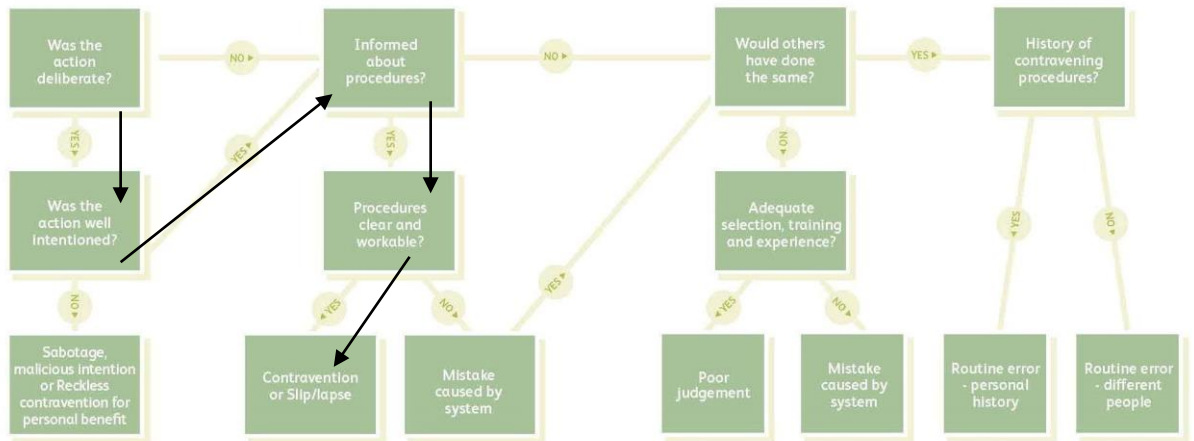
- G12.15. Most of those involved were very experienced employees familiar with the location and what work was required. In the investigation team's view, those involved had become resilient to risk.
- G12.16. A major problem was access to the line which was limited to how many line blockages could be undertaken at any one time. But in the case of a two-line railway between Margam Moors and East Junctions it was logical to block the Down line and later the Up line. This was based upon the delivery of the train plan and not radically increasing the signaller's workload, especially if a policy was adopted of giving and taking up blocks in a short space of time to allow trains to pass. The risk was that the signaller could be overworked and not maintain a signal at danger.
- G12.17. This meant that access opportunities for planned maintenance were at a premium; and diverting resources to attend to dynamic failures meant there was a risk of an increase in backlog repairs which could cause speed restrictions to be applied.
- G12.18. This drove a culture of developing workarounds both in planning and maximising the numbers of people available to work on the track at the expense of adequate lookout protection and safe systems of work.
- G12.19. The organisation was, according to witnesses, not supportive of train delays or an increase in backlog maintenance. Reporting was not conducive to managers stating what could and could not be achieved and this affected what was reported under the Self-Assurance regime. There was insufficient intrusive audit and on-site validation within the Route/Region assurance systems.

Senior Route managers and middle managers were held to account by the Network Rail organisation to achieve the Route's Key Performance Indicators (KPI) and they applied insufficient attention to validate that this data represented reality.

G12.20. Although safety was covered at Route Visualisation, the KPIs assigned were not adequately verified by level 1 assurance of what was happening on site, reviewing SSOWP to identify hybrid systems of work, use of unannounced site visits, cab rides or FFCCTV etc.

H. Behavioural cause

H1. Section Manager (Track)

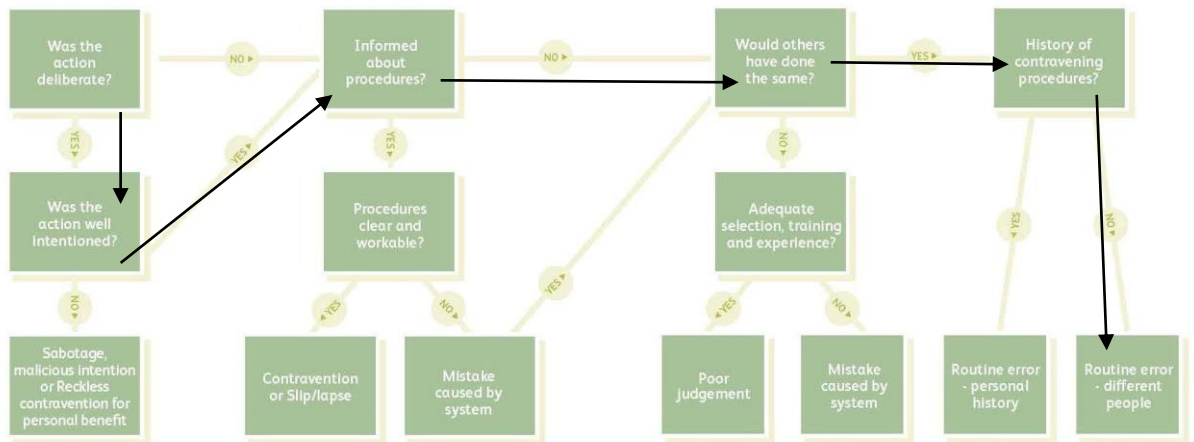


Unsafe act:	The Section Manager (Track) did not adequately monitor and lead compliance checks within the depot.
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	Y/N	Rationale
Deliberate harm: Contravention		
Was the action deliberate?	Yes	<p>The Section Manager had - to varying degrees - entrusted the management of the depot teams to the Section Supervisors and Team Leaders. (Technician 2 or 6 verifying the packs as the PIC).</p> <p>The changes to 019 v9, had - in his and the supervisors' - view created more paperwork which had impacted upon resources through the requirement for a Team Leader to sign the SWP as the PIC.</p> <p>The Section Manager had attempted, along with his Supervisors, to reduce multiple packs into a single SWP that contained options to work red or green zone, without downgrading the SWP and the requirement for an authority number.</p> <p>There were various anomalies in many of the SWPs that were examined, with compliance issues in relation to both 019 and the Rule Book. There was evidence that SWP checks had been undertaken by both supervisors and the SM. However, these appeared to be superficial checks of the form rather than a more in-depth analysis of how the pack had been used and if it had been planned correctly. The SM had signed off the associated Self-Assurance section in CMO as 100% compliant.</p>
Was the action well intentioned?	Yes	The SM was probably influenced by the fact that, in general, the team at Port Talbot depot was very experienced and he had longstanding relationships with many of them. This familiarity possibly

		influenced his belief that his team were compliant enough. Evidence of SWPs checks by the SM seemed to focus on the completion of the form rather than compliance with 019 or the Rule Book. This probably led the SM to believe that by correcting these errors compliance was in place. With the Line Managers Self-Assurance Questionnaire being reported as 100% compliant and so failing to thoroughly verify the process against actual outputs meant that compliance with 019 and GE/RT9000 HB3&7 was allowed to deteriorate.
Foresight:		
Informed about procedures?	Yes	The SM was aware of what responsibility his role carried and the various processes that should be followed.
Procedures clear and workable?	Yes	The procedures within NR/L2/OHS/019 are clear as to how the plan and SWP should be developed. These processes were not being applied fully and had become an accepted way of working. Routine work was not documented because it was something that should be done anyway, and in turn other work was not documented because it evolved from unforeseen maintenance or equipment failures. The SWP contained work such as vegetation clearance which in the event was not done, though did <u>not</u> contain nut running or IRJ inspection and repairs. These discrepancies should have been identified and highlighted in the SM's Self-Assurance checks.

H2. Section Supervisor 1

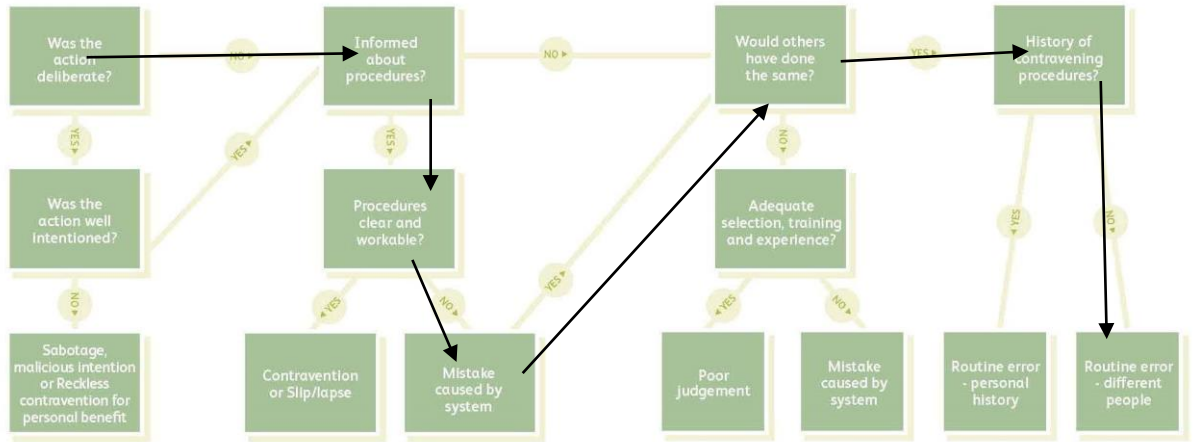


Unsafe act:	Section Supervisor 1 did not carry out his duties as a 'responsible manager' correctly and had authorised (signed) the SWP as the 'responsible manager' without fully checking the content and before the PIC had verified the pack. The SWP was not fit for purpose.
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	Y/N	Rationale
Deliberate harm: Routine error different people		
Was the action deliberate?	Yes	The section supervisor (SS) had developed a system where he would sign the packs created by the planner almost as soon as they had been printed, this had become common practice and was based on his belief that the planners knew what they were doing.
Was the action well intentioned?	Yes	The SS had done this to save time and provide a pack that allowed the teams to work both red and green zone and with generic information that allowed a degree of flexibility in the work planned and the actual work to be completed. This was evidenced from the existence of a handwritten note that detailed work to be completed, with additional tasks. Had the SS fully understood the requirements of 019 and his responsibility as a 'responsible manager' he may have read the pack more thoroughly and considered the work at the point of him receiving it. He may also have involved the PIC to verify the pack before authorising it. The actions of the SS were not unique to this particular date and had become a way of working that up to the date of the incident had given only positive results and become an accepted practice within the depot. This had not been picked up through self-assurance or from FAP/Internal audits.
Foresight:		
Informed about procedures?	No	The SS had attended a briefing on 019 and the changes to the standard. A SS should have received a four-and-a-half-hour technical briefing and should have taken the time to read and understand what changes were required. The

		Wales Route decided to provide only the one hour briefing with the media films (forty minutes) and this was sanctioned by the 019-programme board. Essentially the changes between version 8 and 9 where the onus on the PIC to be involved in the planning of the work and for the responsible manager to agree that what was planned was suitable.
Procedures clear and workable?	Yes	The procedures as dictated within NR/L2/OHS/019 are clear how the plan and SWP should be developed. The aforementioned processes were not being applied. Routine work was not documented because it was something that should be done anyway, and other work was not documented because it evolved from unforeseen maintenance or equipment failures. The SWP contained work such as vegetation clearance (which was not done) But did not contain nut running or IRJ inspection and repairs.
Substitution:		
Would others have done the same	Yes	SS2, the section manager, and two team leaders had all acted in a similar manner to SS1, in the same circumstances
Personal history:		
History of contravening procedures	No	SS 1 had not been subject to any investigation into his safety behaviours or conduct during his time at Port Talbot. Evidence suggested that safety hours were being completed regularly and there was evidence of some close calls being raised but there was no evidence of behaviours or unsafe working practices being picked up on.

H3. Technician 1

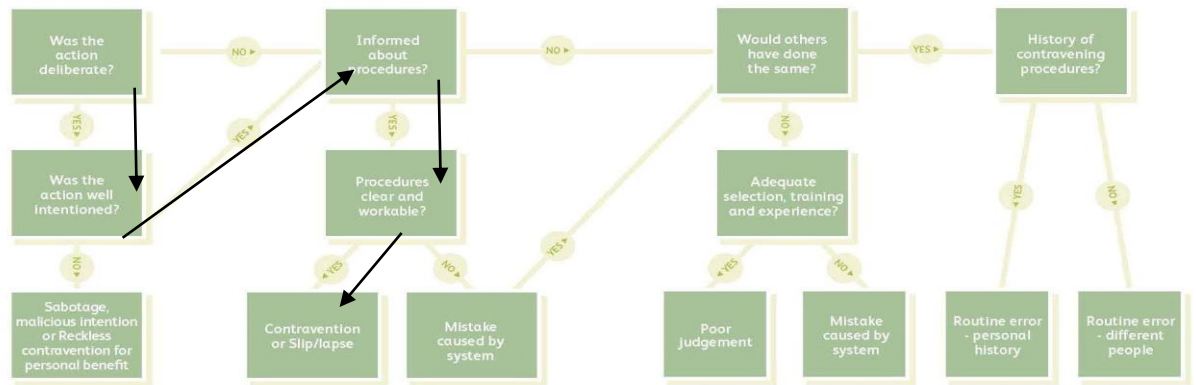


Unsafe act:	Technician 1 did not challenge the instruction given by the unofficial PIC to restart work on an open line without adequate protection
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	Y/N	Rationale
Deliberate harm: Routine error different people		
Was the action deliberate?	No	<p>Technician 1 was an experienced railway technician but considered himself quite junior in light of the “older guys” he worked with.</p> <p>Technician 1 described these relationships as being like “father figures” whom he looked up to and wanted to please. His understanding of the intention at the time, was to finish the last remaining bolt before having a tea break with the rest of the team.</p> <p>The investigation team agreed that Technician 1, did not think or consciously consider that this was putting himself - and the team were putting themselves in danger.</p> <p>The investigation team believed Technician 1 would have done what he was asked because of the ways of working that he had become so accustomed to. He trusted the decisions made by his peers and whilst all those involved knew working on the railway had risk associated they had become so familiar with the location that their risk perception was much lower.</p>
Foresight:		
Informed about procedures?	Yes	<p>Technician 1 was aware of the rule book requirements and of the 019 standard that had been re-briefed during 2017. Although there has been some debate around the effectiveness of this briefing, adherence to the rule book is the prevailing way of working at this point. Training and competency records confirmed that Technician 1 held all the relevant competency and held a COSS competence. ACC records were assessed and there had been no significant issues with this</p>

		individual in terms of his training and competency or his understanding of the rule book requirements.
Procedures clear and workable?	No	The importance of the rule book retained by Technician 1 had eroded through the custom and practice on site, where rules were being habitually worked around with a belief that these practices were in fact safe and compliant with the rules. The Safe Work Pack SWP for the day had not been planned with sufficient detail or resource and was supplemented with a hand-written note, which differed from the verbal communications the previous day and on the morning of July 3rd. The PIC was not on site and had delegated this duty on the morning. The packs were signed and authorised before the PIC had verified the pack. The COSS was not appointed until that morning none of the above had been involved in the planning of the work. The protection arrangements were generic and the resource insufficient. This was evidenced through a review of numerous SWP from Port Talbot. The investigation team concluded that on many occasions the SWP's were not compliant to the 019 standard and as such led to teams making it work.
Substitution:		
Would others have done the same?	Yes	<p>The investigation team concluded that a technician in a similar situation would have likely done the same given the strong working relationships and the lack of detailed and clear SWP's along with supervision and depot management that to all intents and purpose were working in a similar non-compliant fashion that was born out of a desire to get the work done and return positive KPIs. Over time this led to finding local ways of working that by the positive outcome enforced the belief that this was in fact compliant in 'their way'</p> <p>The investigation team did agree that in some cases a technician may have refused to work or put themselves in danger in this way and would have tried to establish some form of safe system to work with. However, there was no evidence of the work safe procedure ever being invoked at Port Talbot or that unsafe practice was being challenged.</p>
History of contravening procedures	No	Technician 1 had not been subject to any investigation into his safety behaviours or conduct during his time at Port Talbot. Evidence suggested that safety hours were being completed regularly and there was evidence of some close calls being raised but there was no evidence of behaviours or unsafe working practices being picked up on.

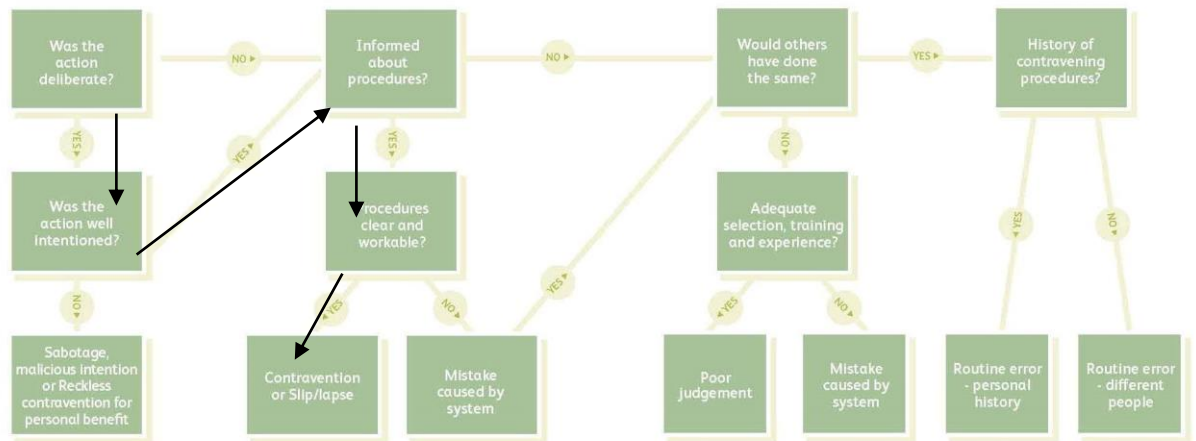
H4. Technician 2



Unsafe act:	Team Leader decided not to work at Margam East Junction as intended by Section Supervisor
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	Y/N	Rationale
Deliberate harm: Contravention		
Was the action deliberate?	Yes	The TL was intended to be the PIC, (albeit they had not verified the pack as the PIC this was done by the other TL the previous day) and be part of the team of seven at Margam East that morning. However, the TL decided that they would go to Diesel depot instead and work 'on the tools' as an extra pair of hands. This was done without the agreement of SS1 who believed the TL had gone to his intended site.
Was the action well intended?	Yes	The TL had thought he could provide an additional pair of hands at the other site where the work was more involved. Had the TL fully understood the work and reviewed the pack for Margam East he may have realised that he was in fact needed. And his attendance would have given the COSS a sufficient number of staff to work in that location with only red zone protection. He would also have assumed the role of PIC instead of delegating this to a technician.
Foresight:		
Informed about procedures?	Yes	The investigation team reviewed the evidence and believe that the TL would have likely been aware that he should have been the PIC at Margam East.
Procedures clear and workable?	Yes	The procedures although not necessarily in line with laid down standards were well known amongst depot staff and they were used to working in this way.

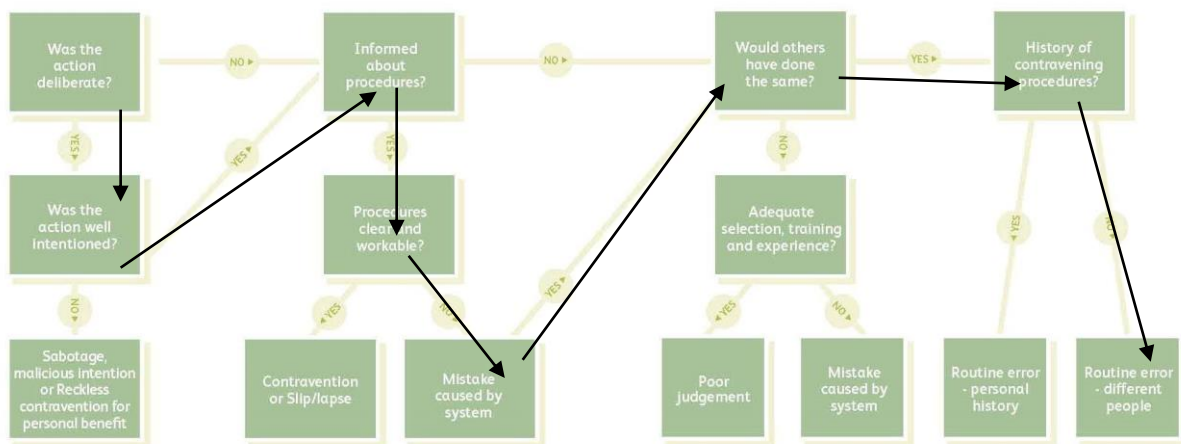
H5. The COSS



Unsafe act:	The COSS did not deploy the distant lookout as he intended.
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	Y/N	Rationale
Deliberate harm: Contravention		
Was the action deliberate?	Yes	The COSS had completed the paperwork and had intended to use a site and distant lookout, both of which had been appointed and signed the Safe Work Pack (SWP)
Was the action well intended	Yes	. The COSS had intended to deploy a distant lookout and had asked a member of the team to "run him round" to the access point however uncorroborated witness evidence suggests that the unofficial PIC is understood to have said the distant lookout wasn't needed. The COSS being quite mild in his character may have been influenced by the unofficial PIC and so tested and agreed to using only one site lookout. This was probably also influenced by the relatively easy tasks, familiarity with one another and their perception of risk.
Foresight:		
Informed about procedures?	Yes	The COSS knew about the 019 standard, the rule book and the requirements of a COSS.
Procedures clear and workable?	Yes	The COSS had completed the sighting distance section of the SWP and so was aware that in this location the use of a distant lookout was required.

H6. The COSS

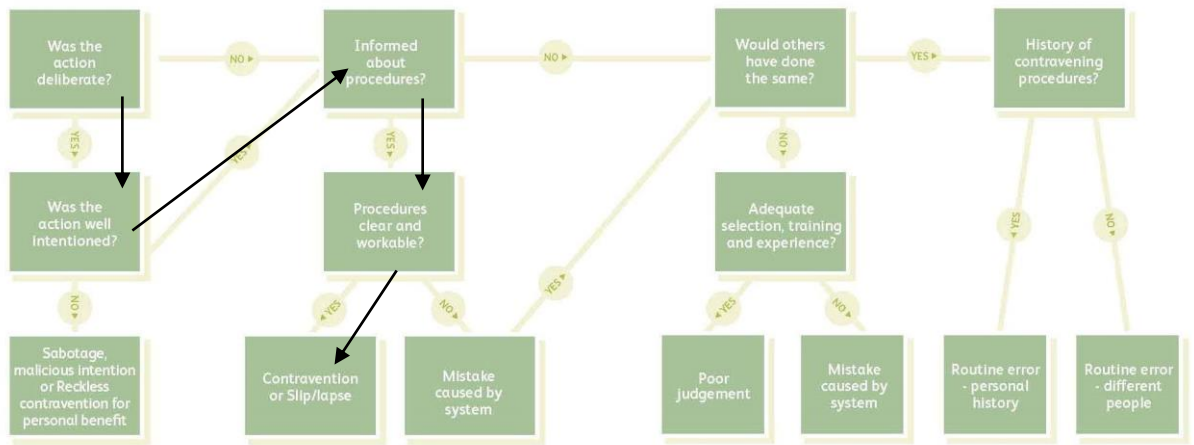


Unsafe act:	The COSS allowed the group of six to split into smaller sub groups who became separated by distance.
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	Y/N	Rationale
Deliberate harm: Routine error different people		
Was the action deliberate?	Yes	The COSS was used to larger work groups splitting or being split into smaller sub groups and so splitting the jobs had become a normal practice when larger groups were working together and completing several smaller jobs/tasks
Was the action well intentioned?	Yes	The COSS had been appointed on the morning of the shift and had received a SWP which gave generic tasks to be completed along with an additional handwritten note from Supervisor 1, information from my work APP and verbal communication from the unofficial PIC as to what work was being carried out. The COSS was taking work direction from the unofficial PIC regarding the work and agreed the protection arrangements with the unofficial PIC who was also acting as Team Leader. Witness evidence suggested that when larger groups were working together it was not unusual for them to split up and this way of working appeared to have become customary and served the purpose of getting the work done
Foresight:		
Informed about procedures?	Yes	The COSS knew about the 019 standard, the rule book and the requirements of a COSS
Procedures clear and workable?	No	The COSS had not received a briefing on the 019 standard and his understanding of the process had not been tested and confirmed. The 019 SWP was not fit for purpose on the day and had not been given to the COSS until that morning, which gave him little opportunity to review it before work was due to start. The pack had been pre-signed by the responsible manager before the PIC had verified it. The PIC was also not on site. The SWP did not contain all the work planned for that day, this was provided on a handwritten note and verbally via the unofficial PIC
Substitution:		

Would others have done the same?	Yes	It is probable that some of the staff at Port Talbot depot would have done the same because of the ways of working that had become the cultural norm.
Personal history:		
History of contravening procedures?	No	The COSS had not been subject to any investigation into his safety behaviours or conduct during his time at Port Talbot. Evidence suggested that safety hours were being completed regularly and there was evidence of some close calls being raised but there was no evidence of behaviours or unsafe working practices being picked up on.

H7. Technician 1, 3, 4



Unsafe act:	None of the team on the day at Margam East Junction challenged any unsafe practices.
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	Y/N	Rationale
Deliberate harm: Contravention		
Was the action deliberate?	No	The investigation team concluded that the team on the day would not have raised unsafe working practices that were occurring. This was due to these working methods being so ingrained within this depot
Foresight:		
Informed about procedures?	Yes	The group of six were used to working with one another and had worked together in the depot for many years. Witness evidence and CCTV footage on the day would suggest that the ways of working had not been isolated to July 3rd and had been custom and practice for a significant period.
Procedures clear and workable?	Yes	The work safe procedure is very clear and would have understood by all the team.

I. Incident factor causal analysis

Underlying cause No. (from section A4)	Incident Factors	Person
	Level 1	
A4.9	Verbal communication	Supervisor 1, 2 Technician 2 and 6
	Fatigue, health and wellbeing¹⁹	
A4.2, A4.3, A4.14, A4.15	Processes and procedure documents	Technician (B), (A), 1, former HORSHE, SM, STE
A4.6, A4.7, A4.8, A4.10, A4.13, A4.19	Written information on the day	Planner, Technician 6, (B), Supervisor 1 SM
	Competence management	
A4.17	Infrastructure, vehicles, equipment and clothing	HOM
A4.4, A4.18	The person's environment	Technician (B), (A), 1, IMDM
	Workload (real or perceived) and resourcing	
A4.1, A4.11, A4.12	Teamworking and leadership	Technician (B), Planner, Supervisor 1, 2
A4.5, A4.16	Risk management	Technician (B), (A), 1, 3, 4, 5, HOM

Ref to RIS-3119-TOM section H7.10 which provides guidance on the completion of this table

The 10 Incident Factors is in part 4 of the Investigation Handbook

¹⁹ Fatigue see RIS-3119-TOM section H9 which provides guidance

J3. DCP's signature

J3.1. The Investigation Manager/Designated Competent Person (DCP) confirms that the investigation had been properly conducted and the requirements of the remit have been met.

Allan Spence
Head of Corporate Passenger &
Public Safety and
Designated Competent Person,
Network Rail, STE

Signature:

Date:

K. Appendices

K1. Safe Work Pack²⁰ - timeline

ROLE	DATE	TIME	ACTION TAKEN	WHAT SHOULD HAVE HAPPENED
Planner	27/06/19	0808	Created SWP and routinely showed 1 lookout without reference to a PIC. Line Block 630996 1230 – 1530 between 199 m 30 ch – 200 50 ch to box in ballast, vegetation works and attention to PT9577 points. Not all work was shown	This should have included more detail.
Planner	27/06/19	0809	Planner immediately entered that the SWP had been verified by Responsible Manager (RM)	The RM should verify the SWP after the PIC
Responsible Manager			RM allowed routine sign off by Planner	RM should authorise the SWP once the PIC has verified it
Planner	27/06/19	0810	To GZAC	More time would be needed to reach this stage
Planner	27/06/19	Circa 0835	Process completed SWP – work at East Junction between 1230 – 1530 only	SWP should cover work 0830-1230 and 1230-1530
PIC verification by Technician 6	02/07/19	Circa 1530	Verified the SWP at the end his shift on the previous afternoon (to the work taking place at circa 0800 the following day)	The PIC should receive the SWP with adequate opportunity to consider the protection arrangements and resources required More time should have been given to review and provide SWP in advance of the work to the actual PIC and COSS (019). The Supervisor intended Technician 2 to be the PIC
Supervisor	03/07/19	Circa 0730	Supervisor provided a handwritten note which contained more detail on the work at Moors and East Junction but also additional IRJ work at East Junction more specifically box in ballast 199m 30 ch – 199m 60ch, maintenance 9577B points and vegetation works Up Main/Up Relief line 200m 40 ch – 200m 50 ch. There was no reference to the time that these works would take place.	SWP should have been reissued to cover the times of the work and work content
Technician 6 and 2 briefing	03/07/19	Circa 0730	Briefed the teams for Moors and East Junction and Technician 2 appointed undocumented Technician B as PIC at East Junction	Technician 2 should have been PIC at East Junction The SWP should have been received a shift in advance
Technician B	03/07/19	Circa 0750	Appointed Technician 5 as COSS, the latter refused the role because the SWP did not cover work at East Junction from 0830	Correct action by COSS
Technician B	03/07/19	Circa 0755	Goes to see someone about the SWP. This cannot be verified. And then went to site at East Junction with the team	SWP should have been returned to the RM/Planner and corrected

²⁰ Outline

Technician B	03/07/19	0810	Re-appointed Technician 5 as the COSS on site	Work should not have commenced. The SWP did not show work from 0830 (and note the work undertaken was not listed in the SWP).
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K2. Train services times at or passing Pyle circa ±5½ mins at Margam East junction (arrows donate Up line trains)

WTT	1220	1220	London Paddington	1B20	GW	Swansea	1222	1222
WTT	pass		Canton Sidings	FRGT	ZZ	Baglan Bay (Colas)	1247	1247
WTT	1248	1247	Swansea	1L62	GW	London Paddington	1249	1249
WTT	1313	1312	Manchester Piccadilly	1V38	AW	Carmarthen	1314	1314
WTT	1313	1313	Milford Haven	1W16	AW	Manchester Piccadilly	1314	1314
WTT	1321	1321	London Paddington	1B25	GW	Swansea	1323	1323
WTT	pass		Baglan Bay (Colas)	FRGT	ZZ	Canton Sidings	1327	1327
WTT	1348	1347	Swansea	1L66	GW	London Paddington	1349	1349
WTT	1350	1350	Cardiff Central	2B65	AW	Swansea	1350	1351
STP	pass		Robeston Sdgs	FRGT	ZZ	Alexandra Dock Jn. T.C.	1356	(Q)
WTT	1412	1412	Carmarthen	1W64	AW	Manchester Piccadilly	1413	1413
WTT	1418	1417	Manchester Piccadilly	1V39	AW	Milford Haven	1418	1418
VAR	1423	1422	London Paddington	1B28	GW	Swansea	1424	1424
WTT	1443	1442	Fishguard Harbour	1B97	AW	Cardiff Central	1443	1443
WTT	1448	1447	Swansea	1L71	GW	London Paddington	1449	1449
WTT	1512	1512	Milford Haven	1W66	AW	Manchester Piccadilly	1513	1513
WTT	1514	1513	Manchester Piccadilly	1V40	AW	Carmarthen	1515	1515
WTT	1521	1521	London Paddington	1B35	GW	Swansea	1523	1523
WTT	pass		Neath Abbey Wharf Gbrf	URL	FRGT	ZZ	Pengam Reception Sdgs Gbrf	1529% 1529

L2. General

L2.1. The following sections show the feedback obtained during the 10-day consultation period and the investigation team's response

L3. Feedback from Network Rail (Summarised)

Section	Comment	Response
F	I wonder if it would be worth presenting the information on the safe work pack as a time line ALONGSIDE what should have occurred and then a third about actions	Covers F1 to F5 and other evidence in G therefore an Appendix added in K
A	I do wonder if the report needs a few more headings. I don't think the conclusions are very clearly brought out at present	Headings and grouping of conclusions included in A7 and A8 to make them clear
A5.3	First sentence unclear	Amended and appropriately referenced

A5.8	<p>The COSS and the other staff members involved had retained some of their competencies through an Annual Capability Conversation (ACC) with their line manager and had not benefitted from the way a new COSS would have non-technical skills assessed. The way competencies were reviewed and renewed for those leading others and safety on site was not within a formal training environment. This adversely impacted the effectiveness of only assigning competencies to those with appropriate skills and behaviours (see section G2).” This particular sentence as written, is not supported by clear evidence within the report, even though it may be correct.</p>	<p>A5.8 The first sentences will be retained and G2 will be cross referenced to F11.1.g, h for clarity</p> <p>Agreed. This sentence will be deleted</p>
Footnote 6	<p>This statement is incorrect. Holders of COSS and PTS do have these competences reviewed via the ACC process. If the ACC is not conducted within time, the competence is suspended within Sentinel.</p>	Amended
A8.9	<p>Suggest this recommendation goes to Head of Training.</p> <p>Amend Recommendation Network Rail, Head NR Training, to review the process of Annual Capability Conversations (ACCs) and determine whether it is an effective tool for the evaluation of staff competence</p>	<p>Agreed</p> <p>This will be amended as suggested but the intention is retained for clarity.</p>

F12.e	<p>Parallel working had not been discussed with the trades unions and little was known about it outside the group at Port Talbot. This is a concept locally through misinterpretation by management and was the wider concerns from team leaders and technicians through safety hours at Port Talbot and was informed that this is allowed, Thus allowing staff to understand that by having both red and green zone In one pack they could choose. There was written evidence at the investigation that those concerns were discussed around parallel working and it was confirmed that this process is within the 019 standard and allowed</p>	<p>This was narrative not stated by Technician 6</p> <p>There is a Briefing Record 3 August 2017 that documented that another brief of “019” was requested by those present which did not include Technician 6 at that meeting. Although Technician 2, who was present when this was requested, shows reference F8.2.a, that another briefing was given.</p> <p>Discussion is contained in G3</p>
G3	<p>The report is defensive about how 019V9 was introduced and the briefing. We know many did not like this, so I won't disagree, however my view is the report is not balanced at present in terms of input from the business. My view is that there were good / reasonable materials produced in conjunction with NR training with good allocation of time to do it and commitments to do it. The exploration of what occurred and the reasons for not doing the briefs needs more balanced. Either change or (sic) we should get input from NR training or adjust how this is portrayed as it sets a tome for all other standard changes.</p>	<p>Evidence was provided, and this discussion was led by a member of the team that wrote the standard and was involved in the roll out arrangements with the training team. The observer was in a position to compare the content of the briefing to the intent within v 9.</p> <p>To provide balance and without altering other paragraphs G3.2 – 9 is amended</p>

G12	There's a few statements, particularly in conclusion (G12.15 onwards) that may need wordsmithing unless you identified conclusive evidence to prove otherwise of course.	G12.15 Self-Assurance did not reveal any issues. No validation evident FFCCTV indicated issues there were issues (F22) and use of FFCCTV and cab rides is to be rolled out as an assurance/validation arrangement by the Task Force. G12.16 The Non-use or inadequate provision of lookouts suggested resilience to risk. G12.17, G12.18 are statements of fact. G12.19 A work around e.g. Distant lookout used on track work. G12.20 See F25 Any item in shown as red was not supported by more senior managers.
G12	I know the visualisation process does consider the underlying reasons why an indicator is red and has an action plan on these to show recovery. Also think statement is misleading as Safety performance numbers were numerous, top of the vis board and discussed first and usually longest. Also, behind this, other meetings do take place and the route did receive and review other sources of information on safety beyond visualisation.	F21 The red/green zone KPI was no longer measured. F25 People were afraid of having a red KPI shown against them. Noted but not offered as evidence to questions raised.
G12	So, unless there is evidence to the contrary, recommend a more passive style, like the 'findings suggest or indicate that there may have been' or 'whilst safety was covered at route visualisation, the KPIs assigned did not directly consider level 1 assurance for trackworker SWOP's' or other...evidence?	G12.21 Possibly true as written but rewording. Although safety was covered at Route Visualisation, the KPIs assigned were not adequately verified by level 1 assurance of what was happening on site, reviewing SSOWP to identify hybrid systems of work, use of unannounced site visits, cab rides, FFCCTV etc.

General	The report is thorough. I would recommend an independent reviewer to check for plain English and readability (that hasn't read it before - doesn't need to be a technical expert) to help others understand it.	This has report been separately reviewed.
General	Can the recommendations be checked/corrected for job titles in the new organisation? I.e. it is Wales route Director not Wales Route Managing Director	Checked – given titles are being changed during transition
A	there are a lot of local actions and recommendations. Is there a way to consolidate where possible? I.e. when the Cardiff IMDM has a local action. Could these be captured together? Therefore, none can be closed until they are all done	Agreed local actions have been consolidated – but this cannot be done with recommendations
A	There is a recommendation regarding level 1 Self-Assurance; but with regard to level 2 audit - do we explore enough about the adequacy of the arrangements in place at the time? I.e. the FAP to identify 'how' work is being done? Could it have done, should it do? Is it a recommendation for a review and also design of level 2 going forward and where/how it is done?	There are a number of recommendations under assurance – the narrative amended in G for clarity concerning this issue

A8.6	The competency review should look at technical; non-technical skills and behaviours and attitudes and any resultant actions will look at evaluating competency in practice”	Will add that includes technical and non-technical skills
A8.10	The review should cover influencing factors during personnel change and development and interim posts- and the impact on behaviours (e.g. do people not start new things; only look short term). Any finding should link to remedial actions and should indicate when and how these actions will be triggered pro-actively in the future	Will add with support of the Principal Health and Safety Change Specialist

L4. Feedback from First Great Western (Summarised)

Section	Comment	Response
A8.3	For the recommendation – what does success measure this look like? The use of the horn is covered in the rules training and assessed during simulator events and their automatic judgements are assessed. Is this not just a local action to brief this specific driver?	A successful response would be compliance with GERT8000 Evidence presented does not support that the actions taken were unique to this driver (see below)

Section	Comment	Response
G6.5	<p>Did the investigation identify that this was a common causal factor that given the same situation all drivers would have reacted the same because there was a lack of training or competence? Or was it just this specific driver, that faced with a stressful situation used the horn as an automatic response but in the heat of the moment selected the low tone instead of the high. I would be more concerned if the driver had not sounded the horn at all</p>	<p>A8.3, G6.5 is supported in G10 by the RAIB's Peterborough and Network Rail's Ynys Hi, Ceredigion reports which show there was inconsistent use of the locomotive horn in stressful situations. And is identified under other safety related issues</p> <p>The output of remedial actions taken by GWR to comply with GERT8000 should be shared with other RUs</p> <p>A recommendation is made for inclusion in GWR's recommendations review arrangements</p>
A8.12	<p>Reference the GWR action if this is not unique to this driver following other incidents this needs to be stated and referenced as to where these conclusions are made.</p> <p>In regards the recommendation, the Head of Operations can confirm already that we are compliant to the rule book and train and assess this during assessments. What is the Head of Operations supposed to tell other RUs?"</p>	<p>Further to above.</p> <p>Expertise on GERT8000 TW1 concerning this investigation is provided by the RU where the issue is wider than this event</p> <p>RIS-3350-TOM advice would normally be provided by GWR as the subject experts for RU issues</p> <p>Perhaps GORT3350 form 1 to alert other RUs as per the RIS</p> <p>"If there has been a possible failing of internal training or development processes"....."this should be clearly indicated, together with any mitigating measures taken to reduce the risk or recurrence."</p>