This is a collation of some of the world’s railway formal inquiry reports. It includes a brief incident synopsis, along with the main causes and recommendations from each investigation.

Readers may find some of the actions and recommendations useful to their own operations.

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Key issues in this edition:

- Poor communications
- Staff/token working
- Maintenance of train registers
- Safety critical communications
- Poor regulation
- Failure to follow own company standards
- Level crossing user behaviour
- Signage at level crossings
- Inadequate staffing levels
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Australia: Collision between a road-rail vehicle and a rail motor on the Zig-Zag heritage railway, Clarence, 1 April 2011

For the full report, click here: LINK

At 13:30 (local time) on 1 April 2011, a Zig-Zag Railway (ZZR) road-rail vehicle (RRV) collided with a two-car rail motor on No 1 Viaduct, Top Road, between Clarence and Top Points stations. The RRV, which had a driver and passenger on board, was freewheeling down the hill in reverse in the single line section from Clarence towards Top Points. The rail motor was travelling empty in the opposite direction.

The rail motor driver saw the approaching RRV and applied the brakes. However, the RRV crew, who were facing the other way, did not see it. The force of the collision compacted the body of the RRV such that neither cab door would open. Its two occupants were injured and were assisted out of the vehicle and into the rail motor by the rail motor driver (who was uninjured). The force of the collision also caused a minor misalignment of the track.

The investigation established that the collision resulted from the driver of the rail motor and the driver of the RRV being unaware that they were travelling towards each other on the same track in the same section. In brief, both the driver and guard of the rail motor had made an error on a previous trip when they failed to check they had the appropriate staff/token when they departed Top Points.

The rail motor driver, acting in his capacity as Operations Manager, authorised both the rail motor and the RRV to depart Clarence with the staff/token unsecured at the other end of the section. The rail motor driver departed Top Points without relaying his intention to his guard or the RRV crew; the rail motor guard also exceeded his authority by authorising the RRV to leave a worksite and proceed to Top Points.

A number of other factors were found to have contributed to the collision, including:

- A lack of radio communications;
- Delayed notification of the accident;
- Poor maintenance of train registers;
- Passengers travelling in the rail motor driver's cab;
- The rail motor driver's fatigue; and
- The excess speed of the RRV.

Other safety issues

The collision was not notified immediately by the rail motor driver to anyone else in the ZZR. There was also a delay in the notification to the Office of Transport Safety Investigations (OTSI) and Independent Transport Safety Regulator duty officers.

The Train Register Books at the Top and Bottom Points Signal Boxes were not being maintained as required.
The management of operations was concentrated in the hands of one person on the day of the collision. The rail motor driver was also acting as the train controller as well as holding the position of Operations Manager.

There was an accepted practice of qualified workers authorising rail traffic movements without reference to the train controller.

It was accepted practice for both staffs/tokens being kept in the Lithgow end of the Rail Motor. This increased the probability that the required check, that the correct staff was at hand, was not done if the rail motor was driven from the Clarence end.

The procedure relating to the collection of staffs/tokens from signal boxes was also ambiguous.

The rail motor driver allowed two passengers to ride in the front cab on a journey from Top Points to Clarence. This may have distracted him and, to a lesser extent, the guard from checking if they had the staff/token before departing.

There was no rule about passengers travelling in the cab of the rail motor.

The rail motor driver's performance may have been degraded by fatigue.

The RRV was travelling above the posted speed restriction of 10km/h on the No.1 Viaduct.

Recommendations

- The Zig-Zag Railway Co-Operative Ltd should:
  - Review current operational procedures for the implementation of safeworking systems and ensure they are being adhered to by the Operations Manager.
  - Develop and implement an effective internal monitoring and auditing programme for testing compliance with safeworking rules and procedures.
  - Ensure the train registers are maintained and train movements are recorded correctly.
  - Review the structure and staffing of operational safety positions, with particular regard to the functions of the train controller and Operations Manager.
  - Ensure that all incidents are reported promptly within the organisation and to OTSI if the incident is a notifiable occurrence in accordance with the Rail Safety (General) Regulation 2008.

Declared to ERA 6 February

Finland: Freight train collision near Nurmes Yard, 2 February 2011

At 11:55 (local time) on 2 February 2011, a light locomotive collided head-on with a freight train at the entry to Nurmes Yard.

Both the engine driver and traffic controller in the light locomotive were injured. Having jumped from the locomotive into the snow, the driver of the freight train was uninjured. Both locomotives sustained major damage.

En route from Lieksa to Nurmes, the freight train stopped at the Nurmes Yard entry signal, which was at danger.
Due to an insulation fault in the track circuit, and despite speaking to the driver, the signaller believed that the freight was already in the yard. He therefore used emergency commands to release the train’s route, reset the axle counting system and set the block between Nurmes and Lieksa to normal. He then changed the traffic direction to that running from Nurmes to Lieksa and assigned the exit route to a locomotive leaving Nurmes.

Receiving exit permission from the traffic controller, this second locomotive collided with the freight train, which was still standing at the entry signal.

The immediate cause of the accident was the cancellation of interlockings, which allowed both trains to use the same track. The insulation fault, inadequate train location information and inadequate communication all contributed to the accident.

**Recommendations**

- Traffic control personnel should undergo regular training and drills on identifying hazards related to error situations and the application of predefined safe procedures.

- Safety management should have a particular focus on punctuality and consistency of communication and on the accurate location of trains.

- It should be a prerequisite for the emergency release of all axle counting sections, that the last axles counted at an axle counting point must be axles exiting the section.

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**Declared to ERA 12 February**

*Ireland: Level crossing collision at Morrough, County Galway, 14 February 2011*

For the full report, click here: [LINK](#)

At approximately 12:00 on 14 February 2011, a waste collection vehicle crew, who regularly used the Morrough level crossing to collect waste from the adjacent private residence (Murrough House) opened the crossing gates and passed over the interface. They left the gates open while they collected waste, a task that usually took only a few minutes.

At approximately 12:13, a car approached the level crossing whilst the gates were still open. The car slowly drove onto the interface as a Heuston–Galway service was approaching. On seeing the car, the train driver sounded the horn twice and applied the emergency brake. The train struck the car as its driver was attempting to reverse back on to the road. Both occupants of the car were treated for their injuries at the local hospital and released later the same day.

The RAIU found the immediate cause of the accident to be that:

- The car stopped at the level crossing in a position that encroached into the path of the approaching train, and was then struck by the train while attempting to reverse off the interface.

The contributory factors were deemed to be as follows:

- The crossing gates, which provide a barrier to the railway, were open when the car arrived at the interface;

- The signage was not successful in communicating to the car driver that he was approaching a level crossing, nor in conveying any of the dangers associated with level crossings;

- There were no warning signs on the approach to the level crossing to alert the car driver that he was approaching a crossing.

The underlying factors were:
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- Iarnród Éireann (IÉ) did not comply with its own internal standard for the certification of changes to infrastructure on the network;
- IÉ independently developed the new style signage, without proper consultation with the Railway Safety Commission or other parties;
- The Railway Safety Commission adopted an informal approach to the oversight of IÉ’s signage design.

Recommendations

- IÉ should review the suitability of the signage at user-worked crossings on public and private roads, ensuring that human factors issues are identified and addressed.
- IÉ should liaise with local authorities where private road level crossings can be accessed from a public road to ensure there is advance warning to road users.
- IÉ should ensure that it adopts its own standards in relation to design changes to any plant, equipment, infrastructure or operations that have the potential to affect safety.
- The Railway Safety Commission should ensure that they adopt a formal approach to submissions made by IÉ in relation to design changes to any plant, equipment, infrastructure or operations that has the potential to affect safety.

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Published 15 February

**UK: Tamper driver struck by train at Torworth, 8 January 2011**

For the full report, click here: [LINK](#)

At around 23:55 on Saturday 8 January 2011, a tamper driver walking to a tamper in a work site on the East Coast Main Line was dealt a glancing blow by a 100-mph passenger train. The tamper driver took evasive action when alerted by the train’s horn. He suffered minor injuries.

RAIB found the immediate cause of the accident was that the tamper driver was walking in the path of the train as it approached on the Down Main line.

The causal factors were as follows:

- The tamper driver went on an operational railway and then walked in the four-foot in contravention of the Rule Book and his PTS training.
- The tamper driver assumed that the down main line was under possession.
- The tamper driver may have been unsettled by events leading up to his arrival at Torworth level crossing which could have affected his decision making.¹
- The tamper driver did not have the information he needed to safely access his tamper.

RAIB identified the following underlying factors:

¹ For example, the tamper driver reported experiencing a number of difficulties at his hotel. There was a problem with his booking and he had to make a number of telephone calls to sort it out. There was a noisy wedding party at the hotel and he was unable to get as much sleep before his shift as he had planned, managing only two hours. Also, he was delayed when leaving the hotel because food he had ordered for his night shift had not been prepared and he had to wait for it.
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- Engineering train drivers and on-track machines crews often access work sites on foot without having received a safety briefing and this is not prevented by the Rule Book.
- AmeyCOLAS did not have sufficient trained on-track machines staff available to avoid a local shortage of staff and did not have a system in place for identifying and providing the information a driver or operator of an on-track machine from another system required for working out of area.
- There was a level of informality and lack of co-ordination in the ameyCOLAS organisational arrangements for the work of tamper staff.

A factor that mitigated the consequences of the event was the train driver's discretionary use of the train horn.

Additional observations

Although not directly linked to the accident on 8 January 2011, RAIB observes that:

- For train drivers and on-track machines staff, reporting to a site access controller (SAC) was seen as both impracticable and irrelevant to their work activity.
- The safety provisions of the Rule Book are not always sufficient to protect those entering a work site.

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

AmeyCOLAS is actively enforcing the instruction to its staff to sign in with a SAC and will take disciplinary action for non-compliance. This requirement has been briefed out to all staff during special safety events which were held following the accident.

AmeyCOLAS also reports it has provided a ‘script’ for its SACs to ensure that they deliver necessary information to persons reporting to sign in. This is designed to address misunderstandings regarding the role and function of the SAC. The script details what has to be said by the SAC on a list of topics, which include general safety arrangements, exclusion zones around plant movements and hazardous activities, along with welfare, first aid and emergency arrangements.

Since the accident, crews of AmeyCOLAS on-track machines (OTMs) have reportedly been provided with contact details for key on-site staff as part of their ‘work orders’ which are sent out with the weekly roster. These enable staff accessing a work site on foot to make contact with either the engineering supervisor (ES) or their controller of site safety (COSS) to obtain a safety briefing prior to going on to the track.

Network Rail has agreed and documented a process for train drivers, ground crew and OTM operators entering work sites to receive a safety briefing. The agreement has been reached with freight operating companies who provide haulage for Network Rail’s engineering trains, and with track renewals contractors who operate or work with OTMs. The process, which takes the form of a flowchart, was issued on 27 June 2011 by means of an email from Network Rail to its contractors. Recipients were requested to distribute the flowchart within their organisations.

The process is for train drivers, ground crew and OTM operators entering a worksite via a SAC to receive their safety briefing there. If entering a worksite via a remote location, persons will be provided in advance with the contact details for the ES (or a nominated briefer) so that they can seek a safety briefing before accessing the track. Train crews entering a work site on a train are now provided with a safety briefing by the ES (or a nominated briefer) at the entrance to the work site.

The process also provides guidance on what action an individual or their company should take in the event of them not receiving a sufficient briefing. For example, if a person does not have the contact details of the ES, Network Rail’s Asset Management Control Centre holds key contact details for each worksite and can provide these on request to train crews’ control centres.
Individual freight operating companies report that they have issued operating notices or instructions to their own employees to advise them of the process and the actions they are required to take to obtain a safety briefing.

Network Rail is monitoring the operation of the process to reinforce compliance. It has also set up a mechanism for contractors to report instances of non-compliance with the process by train locomotive drivers so that Network Rail can take these up with the haulier through contractual means.

**Recommendations**

- Network Rail and its contractors who operate trains in engineering possessions should jointly review the means by which engineering train drivers and on-track machine crews (and associated ground staff) can best be provided with sufficient information relating to both railway and construction risk before walking to, or entering, a work site. This review should address:
  - The validation, and incorporation in a suitable safety standard, of arrangements agreed between Network Rail and its haulage suppliers and contractors operating on-track machines, relating to the provision of a safety briefing before entering a work site;
  - The preparation of explanatory briefing material and additional training on the procedures to be followed to obtain safety briefings;
  - Explicit consideration of the risks associated with access to site, including safety briefing issues, at an appropriate stage in the planning process for engineering activities; and
  - The need for clarification or amendment of the relevant rules and procedures relating to walking to trains and on-track machines when these are in possessions and work sites.

The outcome of this review, and any appropriate additional measures identified, should then be implemented by Network Rail and a procedure put in place to monitor their effectiveness.

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**Declared to ERA 17 February**

**Poland:** *Wagon runaway incident leading to fatality at Strzelce Krajeńskie, 26 July 2011*

At 22:10 (local time) on 26 July 2011, a rake of seven coal wagons ran away downhill from an unloading point towards Strzelce Krajeńskie station. The wagons picked up speed and struck the station building with sufficient force to kill the two occupants of the flat therein, along with another person who was standing nearby.

The runaway had occurred as the wagons were being unloaded.

The resulting investigation report concluded that the accident had been caused by the uncoupling of the wagons from the locomotive by unauthorized persons and subsequent shunting in an unauthorized manner. The brakes had also been loosened, the train had been marshalled incorrectly and unloading had begun by unauthorized persons without the participation of the train crew. The report added that the train had been left unattended by its crew and that the location of the unloading point on a gradient exacerbated the incident.

At the root, the investigator concluded that there were underlying problems with the safety management system and staff training/competence programmes at the yard.

**Recommendations**

- Infrastructure managers should verify that designated loading/unloading points comply with the appropriate standards.
UK: Two incidents involving track workers between Clapham Junction and Earlsfield 8 March 2011

At around 06:00 on Tuesday 8 March 2011, two gangs of Network Rail track maintenance staff were involved in incidents with trains between Clapham Junction and Earlsfield stations. The gangs were setting up an emergency speed restriction after the discovery of a rail defect earlier that morning. The work was being carried out following the late handback of an engineering possession. There were no casualties, and only minor disruption to train services following the incidents.

Both the COSSs believed that they had adequate protection from trains but, in both cases, the signaller was unaware of their presence and signalled a train along the Down Main Fast line while staff were still working on the track.

The first gang was unexpectedly passed by a train and the second experienced a near miss with a following train. There were no casualties.

The first train did not stop. The second train came to a stand at 4 miles 76 chains, following an emergency brake application, at 06:10. It was subsequently moved and the Down Main Fast line reopened to traffic at 07:14.

The staff involved did not follow the rules for setting up safe and appropriate systems of work. This was due to a combination of factors, including excessive workload, the pressure to complete the work, fatigue and/or tiredness, the complexity of the rules, the absence of checking of the arrangements by a third party, the ineffectiveness of Network Rail’s competence management process and a shortage of staff.

Following the incidents, the signaller did not caution trains to travel at reduced speed (because he had not been requested to do so), although the rail defect had not been secured with emergency clamp fishplates, and the emergency speed restriction (ESR) had not been properly implemented. Four trains passed the site before the missing ESR equipment (warning and commencement boards) was reported to the signaller.

RAIB found the immediate cause to be that both gangs were working on the track (in a ‘red-zone prohibited’ area) while trains were running, without protection.

The causal factors were:

- COSS A took his gang out onto the track without setting up a safe system of work.
- COSS B took his gang out onto the track with a system of work that did not secure the safety of his staff.
- COSS A did not have a line blockage form and gave up his line blockage without remembering that COSS B was relying on it.

It is possible that the following factors were causal:

- The ES/COSS B’s decision-making may have been impaired by the demands placed on him during the night shift.
- COSS A may have been fatigued; it was the end of the first night shift of the week.
- COSS A felt under pressure to complete the work.

The following were underlying factors:
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- The rules for working in a possession, but outside a work site, are complex and were not well understood by the staff involved.
- The protection arrangements developed by both COSSs on site were not subject to any checks by a competent third party, as they were not pre-planned.
- Assessment in the line was not effective in managing the competence of COSS A and COSS B.
- The demands on the ES/COSS B were exacerbated by the workload associated with implementing a work site in third rail areas.
- The demands on the ES/COSS B were further increased by a shortage of staff at Wimbledon depot.

Additional observations
Although not linked to the cause or consequences of the two incidents on 8 March 2011, RAIB found that:

- Network Rail standard NR/L2/OHS/019 is not clear whether a line blockage can be shared between COSSs in an emergency situation.
- Standards do not specify whose responsibility it is to advise the signaller when an ESR has been set up.
- The second train also approached COSS B’s gang at linespeed because the driver did not respond to the emergency indicator.

Actions reported that address factors which otherwise would have resulted in a RAIB recommendation
Network Rail is developing an arrangement to apply short circuiting devices remotely; this is intended to speed up the process for taking and giving up isolations in third rail areas. The Thameslink Programme is currently proposing a trial installation in the London Bridge area towards the end of 2012. The Clapham Infrastructure Maintenance Delivery Manager has advised RAIB that he has requested that Wimbledon is also included as a trial site.

Resourcing levels at the Clapham maintenance delivery unit are under review by Network Rail’s Wessex Route as part of the post-implementation review process for the phase 2b/c reorganisation.

The Clapham maintenance delivery unit is taking steps to recruit to fill the vacant posts at Wimbledon track maintenance depot.

South West Trains has re-briefed its drivers of the Rule Book requirement to tell the signaller immediately of missing or defective ESR equipment, if necessary stopping the train specially.

Other reported actions
Network Rail has published issue 3 of NR/L3/MTC/SE0117, Planned General Safety Inspections and Site Surveillance, with an implementation date of 3 March 2012. This clarifies how to combine the site surveillance activities required by Assessment in the Line and planned general safety inspections.

Network Rail is changing its Assessment in the Line process (paragraph 102). As at December 2011, three phases of change are being proposed:

- A change in the review frequency, to match the expiry date of competences held (early 2012). This is intended to emphasise the importance of site surveillance by line managers.
An organisational change in mid-2012 to deliver ‘Local and Route ownership for delivery and compliance’, coupled with the replacement of work experience log books with self-declarations of work completed.

The introduction of new technology (software and hardware) in 2013, which is intended to deliver improvements in knowledge testing and the capture of work experience and site surveillance records.

Network Rail is progressing the following initiatives as part of its safety culture leadership programme, which is intended to improve the safety-related behaviours of COSSs and team leaders:

- In June 2010, it issued a new competence standard, NR/L2/CTM/223, *Managing Site Safety*, which includes behavioural indicators to be used when making assessments of competence (full compliance is due by June 2014).

- It is providing linked *Managing Site Safety* training for approximately 2,800 team leaders, with the following aims:
  - To raise awareness and understanding amongst team leaders about their roles as leaders of site safety;
  - To develop new ways of thinking and behaving in the role; and
  - To plan for, deliver and review safe and effective working environments and work practices by applying safety leadership behaviours and competencies.

- It is producing a training DVD to highlight the different safety responsibilities of COSSs and team leaders.

- It is carrying out work as part of the Quality COSS project, including:
  - The introduction of behavioural pre-requisites to encourage line managers to appoint individuals who have the appropriate capabilities to the role; and
  - Changes to COSS training and assessment which will see more focus on the non-technical skills and behavioural elements of being a COSS.

Wessex Route is planning to implement an initiative known as ‘Take Time’ with the Wimbledon mobile operations managers in early 2012. This approach has been found to be effective in reducing risk in the Australian mining industry, and is similar to a concept known as ‘Stop, Think, Act, Review’, which is used in the UK nuclear industry. If successful, it is intended to introduce this approach, which involves the use of situational risk assessments, more widely.

RAIB has written to Network Rail to draw its attention to the non-compliant perception held by some ultrasonic rail testing staff, that they do not need to contact the signaller immediately upon discovery of a serious rail defect, where this is found in a possession.

**Recommendations**

- Network Rail should review and, if necessary, revise the arrangements for unplanned / emergency work to reduce the potential for:
  - Confusion when attempting to apply the rules for working in a possession but outside a work site; and
  - Confusion when sharing line blockages.
Options for consideration should include:

- Simplification of the rules, and / or improved COSS training, relating to working in a possession but outside a work site;

- Means to control the risk associated with a COSS planning the system of work in unfamiliar and complex situations (such as restricting the definition of an 'emergency situation' or by introducing additional checks on the proposed system of work);

- A review of the risk of shared line blockages for unplanned works and the identification of alternative approaches; and

- Adoption of situational risk assessments to inform decision making in unfamiliar and complex situations (such as the 'Take Time' process being trialled by the Wessex Route).

- Network Rail should develop a set of proposals for managing the pressures related to train performance on those responsible for setting up protection arrangements for access to the railway in unplanned and / or emergency situations. This might include (but should not be limited to):

  - Improving the mutual understanding of the challenges faced by shift leaders in maintenance delivery units and incident controllers at route control centres, for example by providing regular experience of working in each others' environments;

  - A suitable briefing to remind trackside staff, as well as route controllers, that trackside staff themselves should decide the most appropriate protection arrangements for carrying out emergency work; and

  - The provision of clear protocols on communication and co-ordination arrangements in situations where pressure may arise particularly where performance may conflict with safety.

- Network Rail should review the workload of Track Section Managers, to determine whether it is reasonable, taking account of the changes which are due to be introduced in 2012 as part of the 'Assessment in the Line Review Project'. This review should include the requirement to manage technical, managerial and administrative tasks; specific attention should be given to the work associated with the management of staff competence and on-site surveillance. If this review identifies that the workload of the role is unreasonable following the proposed changes, practical steps should be taken to restructure responsibilities to improve the delivery of safety-related activities.

- Network Rail should review the adequacy of training and assessment of track maintenance staff to deliver practical competence, particularly in skills or situations which are encountered infrequently. Where necessary, improvements should be made to enhance current processes. Consideration should be given to:

  - The extent to which it is appropriate to have detailed and complex rules for responding to infrequently-encountered situations;

  - Methods of providing experience in situations which an individual may encounter infrequently;

  - Identifying methods of assessment for situations which it is unlikely a line manager would normally be able to observe;
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- Reassessing safety-critical competences when there are significant changes in an individual’s work pattern, e.g., changing from day patrolling to planned maintenance work on permanent night shifts; and

- Reinforcing the need for regular face-to-face reviews of staff performance and competence by line managers.

- Network Rail should amend its company standards to clarify who is responsible for informing the signaller that the equipment for an emergency speed restriction has been set up, and that it is no longer necessary to caution trains.

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