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:

- Worksite length
- Poor reporting
- Knowledge management
- Management inexperience and lack of support
- Crew distraction (mobile telephones)
- Lack of train control system
- Flooding
- Inadequate risk assessment
Published 8 August

**UK: Collision between a stoneblower and a ballast regulator near Arley, 10 August 2012**

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

At around 04:21, a stoneblower, collided with a stationary engineering machine at approximately 22 mph. A member of staff on the stoneblower was treated in hospital for a minor injury. The stoneblower was badly damaged and deemed to be beyond economic repair.

The investigation found that when the stoneblower driver sighted the stationary machine he was driving too fast to avoid a collision. The driver’s speed was probably influenced by a number of factors which led him to expect that the line was clear. It is also possible that the driver was distracted immediately prior to the collision which caused him to be driving faster than he realised.

If planned arrangements for the engineering work had been followed the collision would not have occurred.

An underlying cause of this accident is the tendency of long worksites, in the absence of controls to keep engineering trains (including machines) apart, to increase the risk of collision.

Although not a factor in this accident, it is observed that, for driving at night, the 40 mph maximum speed of travel permitted in engineering worksites is incompatible with the braking and headlight capabilities of the type of engineering machine involved in the collision. The report observes a number of non-compliances with railway industry rules and company procedures during the management of the engineering work. There is also an observation on the difficulties of maintaining the necessary discipline in the driving cab, where mobile telephones are used for communications, to avoid distracting the driver.

**Recommendations**

- Network Rail should:
  - Review potential systems of work, and/or technical solutions, for reducing the risk of collision between trains when travelling to and from their sites of work. This review should include consideration of the following options:
    - Greater use of the signalling system during engineering work for controlling the movement of trains;
    - Means for detecting the position of trains when normal signalling is suspended; and
    - Planning arrangements for engineering work that address the issue of simultaneous movements of trains travelling to and from their sites of work and which minimise the potential for such moves to bring trains in close proximity.
  - Review (in consultation with RSSB as appropriate) permitted train speeds applying to movements in sections of line that are closed to normal traffic for engineering work, taking account of human factors affecting a driver’s ability to judge the distance they can see to be clear, the stopping distance that can be achieved by their train’s braking performance, the limitations of headlight illumination in darkness and a driver’s route knowledge.
  - Seek an understanding of the reasons for, and scale of, local unauthorised deviations from possession plans, the effectiveness of the planning process to avoid such changes, as well as the
suitability of procedures and managerial arrangements for identifying, and subsequently reviewing, unauthorised changes.

The measures identified to further reduce the risk of collisions during engineering work should then be implemented in accordance with a timebound programme.

- Network Rail should:
  
  o Review the equipment and protocols used by those managing possessions for communicating with train drivers to ensure that:
    
    ▪ Drivers are provided with all the information they need to carry out movements safely. The review should consider the use of a standardised format so that any missing information can be readily identified and queried by the driver. In addition to information such as the authorised maximum speed of travel and the driver’s treatment of signal aspects, the format could also include confirmation that there are no vehicles obstructing the line to the driver’s authorised stopping point.
    ▪ Communications with drivers are made in a manner which does not risk distracting the driver from the driving task.

  o Network Rail should define when it may be necessary and appropriate to use competent persons as intermediaries when communicating instructions on vehicle movements to drivers. It should then further consider the formal competencies and non-technical skills required of a competent person and the means by which their competency and non-technical skills may be assured. Consideration should also be given to the practicalities of relaying instructions to drivers in ways that do not risk distracting drivers from their driving task.

Any resulting actions should be implemented as soon as possible.

- Network Rail should review why the measures taken to implement Recommendation 2 from RAIB report 01/2011 to achieve improved management surveillance and supervision at Saltley Infrastructure Maintenance Delivery Unit, did not detect or prevent unauthorised changes being made to a plan of work and instances of non-compliance with its company standards for possession management. It should then implement any measures identified to bring about a sustained behavioural change.

Published 15 August

**UK: Partial failure of structure within Balcombe Tunnel, 23 September 2011**

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

Early on the morning of Friday 23 September 2011, the crew of an engineering train passing through Balcombe Tunnel saw that part of a large steel structure mounted in the roof of the tunnel, spanning over both railway tracks, was sagging down. An emergency inspection found that on one side of the structure, three supports had become detached from the tunnel lining leaving a 12 metre length partially supported.

The structure, one of six within the tunnel, was intended to catch water dripping from the tunnel roof. It was supported by anchor studs fixed with polyester resin into holes drilled in the tunnel’s brick lining. Within the tunnel, 18 studs (5%) were found to be missing and a further five studs were loose. RAIB’s
investigation has found that this connection was inadequate because the resin was not compatible with the tunnel brickwork and may have been adversely affected by shrinkage and the damp conditions in the tunnel. It is probable that the resin was selected using inadequate technical data and probable that insufficient resin was placed around some studs.

Although some railway staff were aware that studs had fallen from the structure on more than one occasion since 2008, this did not result in appropriate risk mitigation. This was because of inadequacies in the reporting of these events and because there was insufficient support for a member of railway staff who was managing some aspects of the tunnel maintenance but had limited experience. Inadequate access for tunnel examinations due to conflicting demands on the limited available access is considered to be an underlying factor.

RAIB has identified three learning points from this incident: the need to consider the adequacy of information contained in manufacturer’s data sheets; the need to maintain awareness of published information; and the benefit of marking significant tunnel defects such that they are visible from track level.

**Recommendations**

- Network Rail should, where failure could result in risk, identify where polyester resin anchors have been used to support structures (including overhead electrification and signalling equipment), and develop an appropriate regime to detect loose fixings including tactile testing where appropriate.

- Network Rail should implement procedures to prevent the use of polyester resin anchors in circumstances where dampness or shrinkage may affect the safe performance of an asset.

- Network Rail should review, and if necessary amend its processes, such that designers of structures are required to positively confirm the compatibility of materials with their intended application and environment, including fixing metallic structures to masonry, if the application is safety critical.

- Network Rail should review and, if necessary, modify the management arrangements that are now in place to provide an appropriate engineering response when structure defects are reported. This should include assessing the risk in the period prior to rectification, the means to verify that work requested has been carried out, and whether the reported defect is an indication of a wider problem.

- Network Rail should undertake a comprehensive review and, if necessary, implement a time-bound plan to modify its levels of staffing and competency requirements so that all technical tasks associated with the management of structures are performed or checked in a timely manner by sufficiently qualified and experienced staff.

- Network Rail should revise its arrangements for the briefing of staff or contractors who are sent to investigate reported defects, so that all relevant available information is provided, and correct any deficiencies found in those arrangements.

- Network Rail should review, and if necessary amend, its processes to include adequate safeguards such that sufficient track access is provided for the examination needs of all structures in a manner commensurate with the risk they pose to railway safety.

- Network Rail should clarify arrangements, including its relationship with its contractors, for examining structures which are within tunnels, but are not fully encompassed by the normal tunnel management regime.
Network Rail should review, and if necessary improve, arrangements for recording, storing and retrieving data so that all relevant information is readily available to staff undertaking the examination, evaluation and maintenance of structures.

Published 20 August

**US: Freight train collision at Westville, Indiana, 6 January 2012**

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

At 13:18 (local time) on 6 January 2013, a westbound CSX Transportation freight passed a signal at danger at 40 mph and struck the rear of a stationary westbound CSX freight near Westville, Indiana. Derailed wagons fouled the adjacent line, where they were struck by another CSX Transportation freight service (see photo).

In total 25 wagons and five locomotives derailed. One driver and conductor were taken to a local hospital with minor injuries.

The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was the failure of the crew to maintain vigilant attention to wayside signals, communicate effectively and avoid distractions from prohibited text messaging and comply with the speed restrictions required by the signals.

The lack of a positive train control system was deemed to be a contributory factor.

**Action taken**

- As a result of this accident, in April 2012 the Federal Railroad Administration (FRA) conducted a regulatory audit of the CSX Chicago Division programme of operational tests and inspections required by local standards. This audit was performed on the CSX rules compliance programme that was effective January 10, 2010. The FRA did not cite the CSX for any violations identified during the audit; however, it did recommend that the CSX improve several areas of its programme. None of the FRA inspection reports issued to the CSX required a response for remedial actions taken.

- Following this accident, the CSX conducted a programme of system-wide safety contacts with operating crews to discuss the accident and emphasize the importance of strict compliance with signal indications. The CSX also reviewed banner-testing at 15 locations throughout the Chicago Division to make sure all locations were covered appropriately. Banner testing performance was reviewed on a weekly basis for quality. There were no banner test failures between the date of this accident and December 2012. The CSX director of Operating Rules indicated that CSX officials reviewed the FRA April 2012 audit findings and recommendations. The director reported that the FRA’s primary concern was whether the operational testing had been performed during nontraditional times, such as weekends and nights. After the CSX had reviewed its operational

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1 CSX uses *banner testing* to verify that crews are operating trains at restricted speed. The test is performed at locations where an approaching train is required to operate at restricted speed. This testing protocol involves placing a simulated obstruction on the track. To pass the test, the crew must stop their train short of the simulated obstruction without using the emergency brakes. The CSX reported that it conducted 733 banner tests (12% of all tests) on the Garrett Subdivision over the 12 months preceding the accident. Of the 733 banner tests, none were categorized as failures.

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Australia: Freight train derailment near Rot, NSW, 4 March 2012

For the full report, click here.

On 4 March 2012, a Pacific National freight train derailed after entering floodwaters that had overtopped the track near Roto in New South Wales.

The flooding had caused scouring of the track formation, compromising its capacity to support the load of the train. The lead locomotive remained on the track, but the trailing one derailed and uncoupled.

None of the crew was injured, but the flooding caused approximately 130 metres of track damage.

The Australian Transportation Safety Bureau (ATSB) determined that runoff from the heavy rain that had fallen in the catchment area adjacent to Roto on the morning of 4 March 2012 caused a flash flood event. The volume of floodwater exceeded the capacity of a drainage culvert, which resulted in water overtopping the track formation with ballast and sub-grade scouring on either side of the culvert.

The magnitude of the scouring meant that the track could not support the weight of train 7SP3 as it passed over the affected areas. The resulting deformation in the alignment of the track initiated the derailment.

The ATSB also found that the track manager’s systems and operational procedures provided limited information and guidance to assist the network control staff in identifying and assessing the potential threat to the safety of rail traffic resulting from the significant localised weather event.

Action taken

A review of applied processes, sourcing of more timely information and trialling of remote monitoring stations at selected sites has been undertaken. The Australian Rail Track Corporation (ARTC) has engaged the services of a third party (March 2013) to provide an early warning network advising ARTC representatives, including the Train Transit Manager, of the likelihood of severe weather events such as high rainfall, winds and fire. The ARTC has also commenced trials of high water level monitoring equipment at two locations in South Australia with the option of further rollout if proved successful.

However, having safely managed equally significant flood events at other locations on the ARTC network by application of the existing processes, enhancement of applicable processes will be evaluated on a cost / benefit / risk exposure basis.

Recommendations

- The ARTC should undertake further work on their systems and operational procedures that currently provide limited additional information or guidance to assist network control staff in identifying and assessing a potential threat to the serviceability of the infrastructure resulting from significant weather events.