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:

- Crossing user behaviour
- Management of railway boundary
- Mapping of railway tunnels
- Developments around railway tunnels
- MEWP use
- Maintenance procedures (error)
- SPAD – degraded operations
- Signal sighting
- Lack of train protection/warning systems
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Summary

Published 14 February

Australia: Collision at Pettavel Road level crossing, Mount Moriac, Victoria, 7 September 2013

For the full report, click here.

At around 09:25 (local time) on 7 September 2013, a V/Line passenger train struck a road vehicle towing a trailer over Pettavel Road (passive) level crossing in Mount Moriac, Victoria. Five passengers, the train driver and guard sustained minor injuries. The road vehicle driver was unhurt, although his trailer was destroyed and around 75 metres of track was damaged.

The Australian Transport Safety Bureau (ATSB) found that the road vehicle driver did not come to a stand at the crossing’s stop sign and proceeded onto the interface as the train was approaching.

The investigation also found that the location of the crossing warning signs was not in accordance with the relevant Australian standard (though these non-compliances were not contributory to the accident).

Action taken

V/Line has made a submission to the Railway Crossing Project Delivery (RCPD) Committee to consider the upgrade of Pettavel Road level crossing from passive to active warning protection devices.

The Surf Coast Shire Council has relocated the signage to comply with the requirements of the standard. Back to top

Published 16 February

Australia: Level crossing collision in Inverleigh, Victoria, 21 August 2013

For the full report, click here.

At around 10:09 (local time) on 21 August 2013, a passenger train – the Melbourne–Adelaide ‘Overland’ – struck a road vehicle at Mahers Road level crossing, in Inverleigh, Victoria. The road vehicle’s sole occupant was seriously injured. The locomotive crew suffered from shock, but none of the train’s 103 passengers were hurt.

The ATSB’s investigation found that the driver of the road vehicle was travelling along a maintenance access track adjacent to the railway – in the same direction as the train – before he turned into Mahers Road. As a result, he was provided with no warning of its approach.

The investigation also found that, at some time in the past, the railway property boundary fence had been removed, thereby providing local vehicle access along said railway maintenance track. As a result, over time and with regular use, the false perception that the maintenance track was part of Gallagher Road was created and reinforced. Since the maintenance access track was not a public road, neither the Australian Rail Track Corporation (ARTC) nor the local council had identified a need to provide traffic control.

Action taken

The ARTC and the local council have advised that they will work together to isolate the rail corridor from Gallagher Road.

The Golden Plains Shire Council has also updated its Road Management Plan and intends to revise its Register of Public Roads for the purpose of clarifying the status of roads currently classed as ‘unmade’. The revision will result in public roads currently classed as ‘unmade’ being removed from the register. The council will jointly work with the ARTC to isolate the rail reserve from the road reservation.

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On the morning of Friday 8 March 2013, a train driver reported that flood water was flowing from the roof of a railway tunnel north of Old Street station, near central London. The driver of an out-of-service passenger train was asked to examine the tunnel at low speed and check for damage. The driver stopped short of the water flow and reported that two large drills (augers) had come through the tunnel wall and were fouling the line ahead.

The augers were being used for boring piles from a construction site about 13 metres above the top of the tunnel. The operators of the piling rig were unaware that they were working above an operational railway tunnel. Its position was not shown on the site plan, or on any map available to either the developer or the local planning authority. As a consequence, Network Rail was not consulted during the planning application stage and was unaware of the construction activity.

RAIB has determined that approximately half of the piles required for the new development would have intersected with the tunnel had they been constructed.

RAIB also note that Network Rail, unlike London Underground, did not have any pro-active arrangements to identify developments which could affect the railway.

RAIB observed that publicly available maps often omit underground railways in urban areas, or show the lines at incorrect positions. This could lead to misinterpretation of where tunnels are located and a potential risk to infrastructure.

Learning points

RAIB has identified the following learning points for the construction industry:

- On this occasion, land ownership documentation provided the primary protection for the railway tunnels in the vicinity of the proposed piling works. There were no surface indications of the tunnel alignment. Clients and design teams should be aware of the importance of understanding and disseminating the significance of all information shown on land ownership records.

- Desk study investigations should not assume that all railway tunnels are shown on Ordnance Survey mapping, and should always consider the need to approach rail infrastructure owners in urban areas with underground railway systems.

Action taken

Since this incident, Network Rail’s Town & Country planning team has provided detailed tunnel survey data for the Moorgate tunnels to the Local Authorities which deal with planning applications which could affect the tunnels.

RAIB has written to the Law Society and the Council for Licensed Conveyancers, seeking their assistance in disseminating details of this incident to solicitors as an illustration of a dangerous occurrence which followed an organisation acquiring land without a full understanding of land ownership issues.

RAIB has also written to the following organisations representing companies and individuals who regularly undertake desk studies asking that they advise their members that some railway tunnels in urban areas are not shown on current or historic Ordnance Survey maps, and to provide a case study illustrating the importance of understanding the significance of obstructions found in boreholes:
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- The Association of Geotechnical and Geoenvironmental Specialists;
- The British Geotechnical Association;
- The Engineering Group of the Geological Society; and
- The Ground Forum as the ‘umbrella’ body for the ground engineering sector.

Recommendations

- Railway Infrastructure Managers with tunnels and associated subterranean structures which are under urban areas and not shown on Ordnance Survey mapping should implement a process to publish information concerning those areas of land that are in reasonable proximity to this infrastructure. They should then take all reasonable steps to publicise this information, and to ensure that it is available to those providing the legal and ground engineering professions with significant numbers of searches relating to property in Great Britain.

- Railway Infrastructure Managers with tunnels and associated subterranean structures which are under urban areas and not shown on Ordnance Survey mapping should provide Local Planning Authorities with the information needed for these authorities to identify when a planning application has the potential to affect this infrastructure.

- Railway Infrastructure Managers should review, and where appropriate, revise existing arrangements for identifying infrastructure development which could affect tunnels and associated subterranean structures in urban areas. Where not already done, this should include pro-actively searching for planning applications and undertaking visual inspections of the ground surface above tunnels.

- The British Standards Institution should amend British Standard 5930:1999+A2:2010 ‘Code of practice for site investigations’ to make clear:
  - That tunnels used by underground railways and associated subterranean structures may not be shown on Ordnance Survey mapping; and
  - That rail infrastructure owners should be contacted during desk studies and utility searches where appropriate.

- The Department for Communities and Local Government should introduce a process to ensure that Railway Infrastructure Managers are made aware of all planning applications in the vicinity of railway infrastructure. This process should at least meet the intent of the statutory consultation process.

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Published 24 February

UK: Fatal collision at Athelney AHB crossing, near Taunton, 21 March 2013

For the full report, click here.

At around 06:23 on Thursday 21 March 2013, a car drove around the barriers of Athelney AHB crossing, near Taunton. This took the car into the path of a train that was approaching at high speed. The motorist was killed in the resulting collision.

The motorist drove around the barriers without waiting for a train to pass and the barriers to re-open. The level crossing was closed to road traffic for longer than normal before the arrival of the train, because of earlier engineering work that had affected its automatic operation. The motorist may have believed that the crossing had failed with the barriers in the closed position, or that the approaching train had been delayed. He did not contact the signaller by telephone before he drove around the barriers.
Although not causal to the accident on 21 March 2013, RAIB observes that:

- The road markings are not consistent with Network Rail’s ground plan for Athelney level crossing or the ORR’s level crossing guidance.

- The emergency call to the signaller, made by the driver of the train after the collision, was incorrectly routed by the GSM-R radio system.

- There was no data logging facility at Athelney level crossing or Exeter signal box; this would have facilitated the investigation into the accident and could have provided operational benefits.

**Action taken**

Network Rail’s internal investigation into the accident has recommended that its Western Route should consider modifying the strike-in treadles at affected crossings to prevent crossing controls from becoming ‘out of synchronisation’. Western Route advised in June 2013 that it was in the process of fitting directional strike-in treadles to the eight AHBs within its area that have independent treadle and track circuit operation.

Network Rail Telecoms also has reconfigured the GSM-R system so that emergency calls from Athelney are routed to Exeter and Westbury signal boxes.

Network Rail’s Western Route has issued instructions to signallers at Exeter and Gloucester signal boxes on how to reset crossing controls which have become ‘out of synchronisation’. This requires the signaller not to clear routes over an AHB until:

- A train has been occupying the approach track circuit for 30 seconds; or
- The signaller has sent ‘contact signaller’ using the GSM-R and the driver has responded; or
- The signaller has received ‘train waiting at signal’ from the protecting signal.

Network Rail’s Western Route has clarified its policy such that all crossings with signalling equipment controlling them should be equipped with event loggers. Where there is either no logger or one that is not fully functioning, the Route has provided funding to do this.

**Recommendations**

- Network Rail should introduce measures to reduce the risk from extended operating times of automatic crossings caused by operation of a strike-in treadle by a train travelling away from the level crossing. This might include issuing suitable operating instructions to signallers for those crossings that might be affected or the installation of directional treadles. An engineered solution should be installed where reasonably practicable.

- Network Rail, in conjunction with RSSB, should review past and current research into level crossing signage and emergency communication with signallers and consider means of improving the presentation of public emergency telephones for non-emergency use at automatic level crossings. This might include changes to signage or to the location of telephones, and should take account of Rule 34 of the Highway Code.

- If the RSSB research into improving the presentation of public emergency telephones for non-emergency use at automatic level crossings identifies that reasonably practicable improvements can be made, the ORR should incorporate these into the level crossing guidance it publishes.
Network Rail Western Route should modify the location of the pedestrian stop lines at Athelney level crossing as required to make these conform to the current guidance published by the ORR.

France: Collision between passenger train and MEWP at Lachapelle-Auzac, 4 July 2012

At 08:43 (local time) on 4 July 2012, a passenger train struck a Mobile Elevated Work Platform (MEWP) near Lachapelle-Auzac. One staff member sustained minor injuries.

The MEWP was being used by a catenary maintenance team. The Engineering Supervisor (ES) had decided to work on a line which was open to traffic.

The investigation found that the team had not been working within SNCF’s safety rules. Poor communications between the ES and the signaller also led the former wrongly to assume that both lines were blocked.

Recommendations

- SNCF should review the requirements for undertaking safe, unscheduled maintenance work with the least impact on rail traffic.
- SNCF should re-brief track workers on the vital need to comply with all safety measures (including those involving the closure and protection of lines).
- SNCF should ensure all communications between signallers and maintenance staff are registered.

The Netherlands: SPAD and collision near Amsterdam Sloterdijk, 21 April 2012

At 18:22 (local time) on 21 April 2012, two passenger trains collided head-on between Amsterdam Centraal and Amsterdam Sloterdijk. The two trains involved were a six-car sprinter unit travelling from Rotterdam Central Station to Uitgeest and a six-car, double-decker inter-city train, travelling from Den Helder to Nijmegen.

The accident resulted in one fatality, 24 major injuries and 165 minor injuries. It also gave rise to considerable public unrest.

The investigation found that the collision occurred because the driver of the sprinter passed a signal at danger. The driver was distracted and believed the signal to have been at caution (yellow). He had not received a warning at the previous signal that the next one would be red as there was no AWS-type device installed. The report also notes that the signal was located on a curve, which implies possible sighting issues.

However, drivers were experiencing more red signals than normal that day, as engineering works was under way, but no trains had been cancelled to allow for the associated loss of paths. A freight train also deviated from the timetable without ProRail checking whether this would cause problems further on. As a consequence of these two circumstances, the signal ahead of the sprinter was red.
Regarding train crashworthiness, the investigation notes that NSR ‘restricted itself to the concrete minimum technical requirements laid down by law’. It therefore ‘failed to further implement its statutory duty of care’. Furthermore, the Minister of Infrastructure and the Environment ‘has not incorporated the enhanced insights into interior crashworthiness in the passenger train admission requirements, and the Environmental and Transport Inspectorate ‘has not called NS to account in respect of its statutory duty of care for train crashworthiness’.

Recommendations

- The operator should ensure conflict-free scheduling, applying as a minimum requirement consistent compliance with the infrastructure manager’s planning standards. In addition, the operator should perform systematic risk analyses to formulate measures – exceeding those set out in the planning standards – to ensure the safest possible schedule.

- The infrastructure manager should ensure that rail traffic is kept free of conflict during both scheduling and rail operations. This includes reviewing whether the schedule provided by the operator meets the planning standards, as well as identifying and resolving conflicts arising during rail operations in a reliable manner.

- The Minister of, and State Secretary for, Infrastructure and the Environment should focus on continuously reducing the number of conflicts during the actual operation of the timetable.

- The operator should prevent train drivers from passing red signals that they have failed to notice by:
  - Implementing a system that issues a warning immediately when a train approaches or passes a red signal; and
  - Employing more specific procedures in respect of a train driver’s conduct after passing a yellow signal.

- The infrastructure manager should ensure that measures are in place:
  - That warn signallers if a train passes a signal at danger;
  - To promptly return signals to red for approaching or overtaking trains if a SPAD has occurred.

- The operator should incorporate rolling stock crashworthiness in its safety management system, such that it is taken into account when considering the purchase or modification of trains, and to ensure that reasonably practicable improvements regarding safety will be implemented.

- The Minister of, and State Secretary for, Infrastructure and the Environment should incorporate the knowledge that is now available on interior crashworthiness in the passenger train admission requirements. At the same time, the further implementation of European regulations in this area should be expedited. The Minister of, and State Secretary for, Infrastructure and the Environment should also ensure that re-ordered trains meet the requirements for newly built trains prevailing at the time the order is placed.

- The rolling stock manufacturer should perform an additional investigation (in respect of both the train structure and the interior) and incorporate the lessons learned from this accident into future train designs.