Worldwide FI Summary

July 2013

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:

- Locomotive maintenance and inspection
- Point maintenance and inspection
- Misinterpretation of standards
- RRV design (wiring)
- Operator errors
- Engineering safety management systems
- Train dispatch, platform-train interface
- Corporate memory (level crossings)
- Signaller errors
- For the lessons from Aldershot, click here
Published 3 July

**Australia: Locomotive wheel failure near Fisher, SA, 28 May 2011**

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

On 28 May 2011, a freight train was travelling from Melbourne to Perth when one of its locomotives experienced a catastrophic wheel failure near Fisher, South Australia. The locomotive did not derail but sections of the broken wheel damaged a traction motor and other associated components. The train travelled about 1,976 metres after the wheel failed and caused some sleeper damage and four rail breaks.

There were no reported injuries.

The Australian Transportation Safety Bureau (ATSB) found that a fatigue crack had initiated at a small indentation on the inside of the wheel rim and then radiated towards the flange and tread regions before the wheel completely failed. The rate of growth of the fatigue crack was influenced by high in-service mechanical loading of the wheel. Inspection and measurement after the incident revealed that the locomotive wheel had sufficient rim, tread and flange thickness and was not worn beyond its service life, however it was likely the crack was present at a previous visual inspection and was not detected.

As a result of the accident, the locomotive owner and maintenance provider advised that they have implemented a revised program for more regular wheel re-profiling of the wheels on all locomotives in this class to remove surface stressors in the wheel rim.

The locomotive maintenance programme has also been enhanced to include a focus on visual inspections to detect impact damage to wheels and scheduled ultrasonic testing of locomotive wheels after mid-life is carried out when they are machined to detect cracks that may not be visible to the naked eye.

Operators of locomotives that are exposed to high in-service mechanical loadings should be aware of the potential for wheel failure due to fatigue cracking and ensure inspection and maintenance programs include techniques for detecting and assessing wheel defects with the potential to lead to fatigue cracks.

**Safety message**

- Operators of locomotives that are exposed to high in-service mechanical loadings should be aware of the potential for wheel failure due to fatigue cracking and ensure inspection and maintenance programmes include techniques for detecting and assessing wheel defects with the potential to lead to fatigue cracks.

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**UK: Freight train derailment at Shrewsbury, 7 July 2012**

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

At around 14:13, the leading bogie of the 16th wagon of a freight derailed as it passed over a set of points at the north end of Shrewsbury station whilst travelling at 14 mph. The bogie ran derailed for 65 metres causing significant track damage in the process before the train was brought to a stop. There were no injuries as a result of the derailment but the wagon suffered damage.

RAIB found the immediate cause of the derailment to be that the points were unsafe to negotiate because of wear and damage. The degradation of the points since the last detailed inspection had not been prevented by the maintenance regime nor had it been identified by the inspection regime.

The inspection regime in place at Shrewsbury at the time of the derailment was inconsistent with the risk-based approach intended by Network Rail’s standard aimed at preventing derailment on points.
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Shrewsbury maintenance delivery unit misinterpreted the intent of this standard, when it was modified in 2008, and ceased regular detailed inspections of the points (this misinterpretation may not have been limited to the Shrewsbury delivery unit). Instead, the inspection regime at Shrewsbury relied solely on a weekly visual inspection by a patroller and a 13-weekly visual inspection by a supervisor. Neither of these inspections triggered the need for a detailed inspection which could have revealed the degradation and the need for remedial actions.

RAIB has listed the following learning point:

- When developing standards which require specific competence for staff undertaking safety critical functions, it is important that corresponding training and assessment modules are provided.

Recommendations

- Network Rail should identify the maintenance delivery units which have not correctly adopted the risk-based approach to inspection of points intended by TRK/053 and mandated by TRK/001. It should then re-brief these maintenance delivery units on the requirement in TRK/001 and undertake follow up compliance monitoring activities to confirm that each maintenance delivery unit has adopted an appropriate regime, that all points have been the subject of a risk assessment and that all high-risk points are the subject of regular periodic TRK/053 detailed inspections.

- Network Rail should rewrite TRK/053, its supporting Track Engineering Form and associated training and competence assessment material to:
  
  o Remove inconsistency between them (eg TRK/053 and TEF/3029);
  o Align the competence requirements for supervisors in TRK/053 and TRK/001 and define how supervisors must gain and retain this competence in areas where all detailed inspections are undertaken by others;
  o Make clear that a routine measurement (currently using a TGP8 gauge) to identify wear is mandatory; and
  o Mandate that the routine measurement should be repeated for points in both normal and reverse positions.

- Network Rail should determine if it is possible for supervisors to properly and reliably identify wear and damage and to use the TGP8 gauge without removing the grease and accumulated residue. Network Rail should also consider the risks associated with removing and re-applying the grease against the risks associated with a lack of detection of wear or damage. Depending on the outcome of this study, Network Rail should incorporate the findings into a future rewrite of TRK/053.

- Freightliner should confirm that, where disparities are identified between working practices and the requirements of the maintenance instructions, it has arrangements in place to ensure that risks are adequately managed in the interim until the discrepancy is resolved.

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**UK: Buffer stop collision at Bradford Interchange, 25 March 2012**

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

At around 06:50, a machine operator was in the process of removing a road-rail dumper from the railway close to Bradford Interchange. As it was being lowered onto its road wheels, it ran away for 380 metres down a gradient towards the station.
The operator, who was on the dumper, was unable to stop it and jumped clear before it collided with the buffer stops in Platform 1. The operator received minor injuries, and the dumper and buffer stop sustained some damage.

RAIB’s investigation identified that the dumper was not in a fully braked state when being removed from the track. This was due to a combination of operator error, a wiring irregularity within a control circuit, and the underlying design of the same control circuit, which prevented the operator from recovering the situation once the runaway had begun.

RAIB also lists the following learning point:

- RRV owners should be mindful of the requirement of RIS-1530-PLT¹ issue 4 (section 5.8.5), to minimise the possibility of unintentional switch or control operation. They should consider whether RRVs converted before this requirement was mandated need to be improved in this respect.

Recommendations

- Quattro should review, and amend, its procedure for the management of modifications to on-track plant, such that any future modifications which could affect the safety of RRVs follow the principles of engineering change management, whether the work is done by third parties or in-house. As a minimum the review should identify, and action, the changes required to existing procedures to ensure that:

  - Modifications that have the potential to affect the safety of operation are risk assessed, and any residual risk or newly introduced risk is suitably mitigated by design measures or inclusion within inspection, testing and maintenance procedures;
  - Safety critical design work on RRVs is checked and subject to independent verification;
  - Safety critical design work on RRVs is fully and accurately documented;
  - Systems that are critical to safe operation are formally tested to a documented specification during the initial commissioning, or subsequent modification, to verify that they are operating correctly in all modes of operation, including checking the protection against all credible faults; and
  - The access to safety critical systems, such as the rail axle interlocking circuit and its override, are reviewed and suitable restrictions are applied.

- Quattro should review and improve its existing systems for the management of staff that are engaged in the maintenance, inspection and operation of road-rail vehicles. As a minimum the review should identify the most effective means of:

  - Creating sufficient working documents for installation, test, inspection, maintenance and operation of safety critical systems on Quattro's RRVs;
  - Providing appropriate warning labels informing staff of the precautions to take when overriding safety critical systems on RRVs;
  - Improving management systems to ensure that:
    - All technical staff and machine operators are fully trained in the specific operations of safety critical systems on each type of RRV that they inspect, maintain and/or operate, and the safety measures
    - To take when it is necessary to override them;
    - Controls are in place to ensure that only competent persons are able to override safety critical systems;

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¹ Rail Industry Standard for Engineering Acceptance of On-Track Plant and Associated Equipment.

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- Depot staff and operators have access to information for the installation, test, inspection and maintenance tasks they are undertaking on safety critical systems; and
- Any unexpected behaviour of an RRV is reported and results in an investigation by a person competent to do so to fully discover the cause of the fault and that it is rectified appropriately before use.

  o Establishing monitoring systems to check that staff are correctly applying the inspection and maintenance procedures, and are competent to do so, including:

    - Enhanced surveillance and regular audits; and
    - Checks that staff are familiar with, and have access to, documentation that is relevant to the safety critical tasks they are undertaking.

  o Checking that the RRVs supplied for use on rail are fully operational and compliant with Quattro’s own maintenance documents (these should include physical equipment checks at their depots and on worksites).

- Network Rail should review the adequacy of existing measures to prevent RRV runaways of RRVs that are not yet fitted with direct rail wheel braking and implement necessary improvements. This review should consider reinforcing procedures, briefing and training associated with the safe operation of RRVs. Priority should be the prevention of RRV runaways, but consideration should also be given to the means of regaining control should a runaway occur.

- Network Rail should review the processes for audits of engineering safety management systems and the competence of technical staff that it conducts, or requires others to conduct, on rail plant suppliers. The objective of the review is to identify ways of improving the focus on engineering safety management and the quality of the end products. The findings of this review should be implemented and documented in revised management processes. In addition, Network Rail should take steps to improve the extent to which plant suppliers’ own audits are directed in a similar manner.

- Network Rail should:

  o a) Brief all suppliers of RRVs on the scope of the engineering acceptance process, and the importance of submitting accurate, vehicle-specific information to VABs when seeking acceptance of modifications to RRVs; and;
  o b) Clarify with all suppliers of RRVs, and vehicle acceptance bodies, the extent to which reliance on ‘first-of-class’ approval is appropriate when modifications are made to a number of different vehicles that fulfil the same functional requirement but are significantly different in their design.

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Published 25 July

UK: Platform-train interface accident at London Charing Cross, 24 November 2012

For the full report, click here.

At 22:26, a member of the public fell between a train and the edge of Platform 3. The train began to move a few seconds after she fell; she came into contact with the wheels and suffered life-changing injuries. The train stopped after moving about 43 metres.
The train had been dispatched by a member of staff on the platform, who operated an indicator which told the train driver when it was safe to start. The person approached the train after this indicator had been operated, and the dispatcher had no means of alerting the driver to what had happened. The train was stopped by a passenger on board, who operated the emergency communication handle. The person who was injured fell into the gap between the platform and the train bodyside at a point between sets of train doors.

RAIB made no recommendations, but provided the following learning point:

- RAIB notes that the railway industry is currently considering its response to the recommendations made in the investigation into the fatal accident at James Street, Liverpool on 22 October 2011. The investigation into the accident at Charing Cross has highlighted the risk associated with particular aspects of the train dispatch process, and the RAIB believes that the following points should be addressed by the industry in its response to the James Street recommendations:
  - the possibility of providing a warning to people on the platform that a train is about to move;
  - a review of the standards relating to the clearance between trains and platforms;
  - the practicability of adding gap fillers at platforms used only by trains travelling at low speed;
  - the possibility of providing means for platform staff to remove the RA indication after it has been given, possibly also causing the signal at the end of the platform to revert to red, or giving some other indication of an emergency to the train driver; and
  - the potential for using enhanced radio systems (such as GSM-R) to provide a means for platform staff to send an ‘emergency stop’ message to drivers.

RAIB says it will be writing to the ORR ‘to draw its attention to these learning points as the ORR is already monitoring the railway industry’s response to the recommendations made by the RAIB in its James Street investigation’.

For the full report, click **here**.

At around 07:38, a motorist used the telephone at Lindridge Farm UWC to ask the signaller at Network Rail’s East Midlands Control Centre for authorisation to cross the railway.

The signaller checked the indications on his workstation, observed that a train had already passed over the crossing, and gave permission to cross. The motorist opened the near gate, crossed the railway line on foot, and while opening the far gate saw a train approaching. The motorist called the signaller back to report what had happened.

RAIB found the immediate cause of the incident to be that the signaller believed the train had already passed the level crossing when he gave the motorist permission to cross because his workstation view showed the level crossing in the wrong place. This error had been present on the workstation view from the time it was commissioned on 3 January 2012 as part of a project to transfer control of the railway from Leicester signal box to the East Midlands Control Centre.

This project had redrawn a signalling plan for the Leicester area and introduced an error; a track circuit was incorrectly named. This error was not noticed and was copied into a scheme plan, which was subsequently used to check the design of the signaller’s workstation views. During these design checks, the level crossing was moved to the wrong track section on the view, so that it corresponded with the error on the scheme plan. The error on the view was not identified during testing so the signaller’s workstation was commissioned with the level crossing shown in the wrong place.
RAIB observes that:

- The signaller did not report the incident straight away;
- The workstation had been commissioned with two other UWCs shown in the wrong place; and
- The other two level crossings had also previously been shown in the wrong place on the signaller’s panel at Leicester signal box prior to the transfer of control to the EMCC.

RAIB also identified the following learning point:

- Signallers must be aware of the need to report any allegations made by members of the public straight away, even if they are unsure as to what has happened or the allegation conflicts with the information shown on their display. Prompt reporting and investigation of any such allegations are vital to discovering any latent problems within the signalling system.

Recommendations

- Network Rail should revise its project management processes and company standards to require that signalling re-control projects (i.e. projects transferring the control of signalling from one location to another when the interlocking, trackside signalling equipment and infrastructure are unchanged) identify the signalling source records that are needed for the design, checking and testing of these works. These projects should then be required to include activities within their scope of work to obtain these signalling source records, including correlating, updating or producing records as necessary.

- Network Rail should, in consultation with its principal signalling contractors, review the ways of detecting and addressing incorrect track circuit names for all types of signalling or scheme plan production. The review should consider what manual or automatic methods can be used by designers and checkers. The findings of the review should then be implemented by means of a time bound programme for changes to the tools and mandated design processes that cover this activity.

- Network Rail should revise its design processes so as to specifically require that the position of fixed infrastructure, shown on any new signaller’s display being installed by a project, is correlated to its position as shown on the existing signaller’s display that is being replaced. This work should be carried out by staff that are qualified as competent to do correlation, and when a discrepancy is found between the new and existing signaller displays, they should record it and investigate the reason for it. Such an investigation should include a check of the accuracy of associated records, such as signalling or scheme plans, and result in the necessary corrections being made to the design or to the records to resolve the discrepancy.

- Network Rail should revise the controls for managing deferred test logs so that:
  - The person calling for the deferral of a test log is required to assess the risk to the safety, design and functionality of the signalling system by not closing the test log, record the outcome of their assessment and state any mitigation measures that need to be put in place before the signalling system can be commissioned; and
  - The tester responsible for commissioning the signalling system is required to review the assessment, agree to the deferral of the test log and to check that the suggested mitigation measures are in place, before allowing the signalling system to be commissioned.

- Network Rail should have procedures in place that require the signaller’s display to be updated in a controlled manner when telephones are being fitted at a level crossing for the first time. The requirements should also include what steps must be taken to record the change to the level crossing in the signalling source records.
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SPECIAL FEATURE – Aldershot, Ontario

Canada: Derailment at Aldershot, Ontario, 26 February 2012

For the full report, click here.

At around 15:30 (local time) on 26 February 2012, passenger train VIA 92 derailed near Burlington, Ontario.

After a booked stop at Aldershot, the train had switched tracks, passing through a 15-mph crossover at 67 mph. Subsequently, the locomotive and all five coaches left the rails, the former rolling before striking a building, spilling some 4,300 litres of fuel in the process.

The three crew members were killed and 44 passengers and a further member of staff were injured.

The majority of injuries were sustained by people being ejected or falling out of a seat, being struck by another person, or being struck by one of various items that came loose and moved freely within the coach. Seat restraints are not provided for locomotives or passenger coaches nor are they required by regulation. However, the Transportation Safety Board of Canada (TSBC), which investigated the accident, analysed RSSB’s 2007 research on passenger containment, and accepted the findings that the use of 2- and 3-point belts ‘was likely to increase the severity of injuries to unacceptable levels, particularly to the neck area’.

The TSBC published its full report on the accident in June 2013. Its key findings are as follows:

- ‘The rail industry relies on administrative defences to ensure crews follow signals. These defences alone are inadequate for situations where the train crew misperceives, misinterprets or does not follow a signal indication.’
- ‘The absence of valuable information from in-cab voice and video recorders leaves unanswered questions and represents a lost opportunity to mitigate potentially serious crew resource management issues in the industry.’
- ‘Many locomotives may be susceptible to cab structural, fuel tank and truck securement failure during derailments because there is no Canadian requirement to upgrade crashworthiness when locomotives are

The run of events

On its approach to Aldershot station, VIA 92 encountered signal 364T2, which displayed a ‘Clear to Limited’ aspect, meaning the train could proceed at linespeed but approach the next signal no faster than 45 mph. That next signal, 348T2, was showing ‘Clear to Slow’, meaning the train could proceed at linespeed, but approach the signal after that (334T2) no faster than 15 mph. Before VIA 92 got to signal 334T2, it made its regular stop at Aldershot station. It would normally then be routed through on Track 2. On this occasion – in accordance with standard practice, but unknown to the crew – the signaller planned to route the train around an S&T worksite, using a 15-mph crossover.

At 15:23, VIA 92 departed Aldershot on Track 2. Two minutes later, while travelling at around 65 mph, it passed signal 334T2, which displayed ‘Slow to Limited’. This meant the train was required to proceed no faster than 15 mph past the signal and through the crossover before it could power up to 45 mph. However, VIA 92 continued to accelerate.

Though train horns were banned in the area, the crew began sounding the horn repeatedly when they saw the S&T gang. Shortly after, the locomotive entered the crossover at 67 mph, derailed, flipped to its side, slid down the embankment and collided with a building abutment.

The crew were thrown to the driver’s side of the cab, into an area compromised by the collapse of the lightweight cab roof. All three were killed.
The absence of any attempt to slow the train indicates that the crew expected to continue at linespeed. Therefore, it is likely that they misread signal 334T2. The TSBC also considered that the crew might not have seen it at all, but discounted this idea for the following reasons:

- There were three people in the cab, each of whom would have had to miss the signal completely.
- The VIA crew members were well rested, familiar with the territory and had only worked just over two hours on this trip.
- When stopped at Aldershot, the signal gantry was directly in front of the train, with no obstructions.
- On the approach to signal 334T2, the signal indications were in clear view for at least two minutes and the saliency of its flashing lights would have been difficult to miss or ignore.
- Finally, because of the interruption immediately prior to the accident – the station stop – there was not sufficient time for the crew to fall asleep.

These factors mean that, for the TBSC, 'it is unlikely that vigilance was significantly reduced immediately before the accident'. Consequently, 'it is much more likely that the signal was observed but misinterpreted.'

In-cab voice/video recorders and forward-facing video cameras

However, the TSBC notes that '[t]he dynamics and interaction between the three crew members of VIA 92 could not be accurately determined because there was no in-cab voice recording.'

While 'the benefits of voice recordings to safety investigations have long been demonstrated,' say the TSBC, 'the addition of video recorders is the next logical step', as such technology would allow better understanding of the events leading to an accident, including how the crew communicated, what took place in the cab and whether existing defences are robust enough.

Therefore, the Board has recommended that the Department of Transport require that all controlling locomotives in main line operation be equipped with in-cab video cameras.

In response, VIA Rail has said it supports the use of in-cab voice and video recording as an integrated process of its Safety Management System. To this end, the company – with the support of its drivers’ union (Teamsters Canada) – has started to work towards the introduction of voice recording devices inside its locomotives. This is expected to be completed by June 2014. Once complete, say VIA Rail, ‘we will review with our union partners the feasibility of installing inward-facing video cameras’. The Rail Association of Canada supports this move.

Furthermore, the absence of a forward-facing colour video camera in the leading locomotive prevented the verification of the correct functioning of the signalling system. However, the TSBC notes that, as of April 2012, all 53 of VIA Rail's GM F40PH-2D class locomotives were equipped with forward-facing video cameras. The remaining 21 are expected to be equipped by July 2013.

At present, about half the entire Canadian locomotive fleet is so equipped, with plans to increase their use. The Board has encouraged the Canadian rail industry to move forward with this initiative.
Factors contributing to signal misinterpretation:

Additional crew member in cab

Operating with a third crew member has been a long-standing Canadian rail industry practice and has proven to be an effective training tool. In these situations, the responsibility of rules compliance is equally shared among all crew members in the cab.

When operating in Centralized Traffic Control (CTC) territory, crew members within physical hearing range must communicate to each other, in a clear and audible manner, the signal indication by name. If prompt action is not taken to comply with the requirements of each signal indication affecting their movement, crew members must remind one another of such requirements. If no action is then taken, other crew members must take immediate action to ensure the safety of the movement, including stopping it in emergency if required. ‘This mitigates the risk from an operating crew missing a signal or misinterpreting its aspect.’

However, the TSBC note that the presence of a third crew member does not necessarily reduce the risk from misinterpretation. For example, if the third crew member is seated in the middle seat, his/her forward vision can be impeded by the post between the two front windows. Furthermore, with a third crew member, there may be a propensity for more conversation, which can lead to distraction. There can also be a tendency to rely on the other crew members to comply with the rules.

Additional train control defences for CTC

VIA Rail has reported 10 occasions since 2005 where a train entered a crossover or siding switch too fast. On two, a derailment occurred when the train was travelling at four times the permitted speed.

Similarly, the TSBC has conducted five investigations where the misperception and/or misinterpretation of signals by crews has been a causal or contributing factor. While overspeeding can result from crew members forgetting/not recognizing that they are in an area protected by a slow order, it can also be caused by misinterpreting a signal indication restricting train speed.

The TSBC notes that, while a train protection system ‘to reduce the consequences of inevitable human errors in signalled territory has been on the safety radar for years’, the Canadian railway industry and regulator have yet to take the necessary steps.

Since 2007, the Board has conducted a number of investigations where signal identification and response were contributing factors in the accident. It therefore remains concerned that, ‘without additional backup physical fail-safe defences to help ensure that signal indications are consistently recognized and followed, there remains a risk of another serious train collision or derailment’.

Other factors:

Railway medical assessments

The TSBC notes that while the driver and trainee were fit, the in-charge locomotive engineer (ICLE) had taken a combination of drugs to treat a mood disorder, had ingested oxycodone and had probably likely consumed alcohol at least 12 hours prior to the accident. Given this combination, ‘he may also have suffered from fatigue due to disturbed sleep and may have experienced some drowsiness and performance impairments’.

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2 CTC uses interconnected track circuits and signals (that is, controlled, advance, and intermediate signals) to control train movements via a series of progressive trackside signal indications that require train crews to take action based on the signal displayed. It does not provide any form of automatic train protection.
While it was not possible to quantify the degree to which the ICLE’s symptoms were present or the effect they had on performance, both his mental health condition and the prescribed medications ‘would have benefitted from close monitoring’ by VIA Rail. However, ‘neither the treatment nor the condition were being followed by VIA because they had not been reported to the company or declared in periodic medicals’.

Learning point

‘In order to ensure a complete assessment of an operator’s health and any potential risk that may pose when working in a safety-critical position, it is imperative that physicians responsible for assessing medical fitness are provided with a complete and accurate employee medical history.’

Several TSBC reports have identified situations where an operator had not reported a significant medical condition during a periodic medical review. While a physical examination is part of these reviews, most rely on the validity and completeness of the information documented in the periodic medical assessments. Without an indication that a medical condition may be present, it is unlikely that a company physician will seek additional information from a family doctor.

While the family doctor in this case monitored symptoms of the ICLE’s mood disorder, there was no recent request for a psychiatric report that would have provided a more definitive diagnosis. Therefore, the exact nature of the mood- and/or potential substance-related disorder could not be determined. Furthermore, railway medical assessments ‘are carried out by physicians whose role is to document the medical conditions and then to send the form to the company for assessment. The physician who conducted the ICLE’s assessment did not have a qualification in occupational health medicine.’ Although required to, ‘neither the ICLE nor the physician declared the medical conditions to VIA Rail following the periodic medical assessment.’

Summary of findings

In brief, the TBSC found the following causal and contributing factors:

- The immediate cause of the accident was the train’s excessive speed. This was consistent with the actions of a crew that had misperceived or misinterpreted the indication of 334T2 signal (in rear) as allowing them to proceed at linespeed.

- The Aldershot station stop interrupted the continuous progression of signals, which may have contributed to the crew forgetting that the previous advance signal displayed ‘Clear to Slow’.

- The frequent use of Track 2 may have influenced the misperception of 334T2 signal: in the three months before the accident, eastbound VIA 92 arrived at Aldershot 27 times. It stopped at the station 26 times (97% of the time). In addition, VIA trains are routed through the 15 mph crossover at Aldershot East less than 1% of the time in relation to all crossover moves between Aldershot and Burlington. Based on the scheduled arrivals at Aldershot and the crossover routing decisions, VIA 92 encountered a clear signal indication east of Aldershot more than 99% of the time.

- The crew’s advance knowledge of a wheelchair passenger disembarkment at Oakville may have created an expectation that they would remain on Track 2 and cross over to Track 1 near Oakville, which may in turn have reinforced the perception bias towards a permissive signal indication.

- The crew’s situational awareness was likely focused on resolving the apparent track occupancy conflict of the signal repair team working ahead on Track 2 rather than properly identifying the signal indication and complying with the requirement to reduce the speed of the train.

Summary of findings as to risk

- When the continuous progression of signals is interrupted (for example, by a station stop), the absence of a repeater signal or procedure to re-confirm the previous signal indication increases the risk from signal misinterpretation.
In the absence of training and procedures governing situations when there are three operating crew members in the cab, there is an increased risk from distraction.

The lack of Association of American Railroads (AAR) design criteria for cab corner posts for newly constructed wide-nose locomotives and design criteria for rollover protection for both wide-nose and narrow-nose locomotives increases the risk that new locomotives may be susceptible to cab structural failure during rollover derailments leading to loss of survivable volume.

The absence of a regulatory requirement to upgrade locomotive crashworthiness during a major rebuild increases the risk that rebuilt locomotives may continue to be susceptible to cab structural failure, fuel tank failure and truck securement failure during derailments.

When locations for emergency access are not clearly identified on the exterior of rolling stock, there is a risk that emergency responders may not readily recognize the access locations.

The lack of in-cab voice and video recorders and forward-facing video recorders deprives accident investigators of valuable sources of information that can enhance safety.

Identifying human factors is critical to understanding why accidents happen. When companies cannot use voice and video recordings proactively in a non-punitive way, they are deprived of opportunities to reduce risk and improve safety before an accident occurs.

The absence of complete employee medical information increases the risk that significant medical issues affecting on-the-job performance in safety-critical positions may go undetected.

Recommendations

- Major Canadian passenger and freight railways implement physical fail-safe train controls, beginning with Canada’s high-speed rail corridors.
- All controlling locomotives in main line operation should be equipped with in-cab video cameras.
- Crashworthiness standards for new locomotives apply to rebuilt passenger and freight locomotives.

Summary of learning points for the GB rail industry

The TBSC's report contains the following learning points that could be of relevance to the rail industry and may warrant consideration in the context of your company and its safety management system:

- Misinterpretation of signals and situational awareness
- Overspeeding
- Absence of repeater signals
- Unannounced re-routing
- Crew dynamics (distraction, over-reliance on colleagues)
- In-cab voice and video recording
- Forward-facing video cameras
- Crew medical assessment (including qualifications of medical assessor)
- Train crashworthiness
- Passenger and crew containment

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