RAIL SAFETY NEWS

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TRANSPORT SAFETY VICTORIA

DIRECTOR'S UPDATE

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Welcome to the Summer 2017 edition of Rail Safety News.

In previous updates I have reported on the status of the Service Level Agreement (SLA) between TSV and ONRSR. At the time of writing this update, the Government's decision is still pending and we will continue to provide the Victorian railways with regulatory oversight for all railway operations.

I would like to thank David James (National Manager Accreditation) for stepping into my role from March 2017 to September 2017. I have returned to the role Director Rail Safety for TSV operations and am being supported by both Ty Graham (National Accreditation) and Sabina Tepic (Manager Technical Support) as the Branch Director Vic in the national space.

TSV continues to increase its focus on safety within rail operations through an increased risk based compliance program, along with targeted project delivery. Operators can expect clear communication from our transport safety officers prior and when on site. There is ample opportunity for all parties to provide relevant information and observe activities in an appropriate manner.

The second Victorian Rail Operations Forum is scheduled for the morning of 5 June 2018, so please save the date, invitations will go out shortly. If you have any topics, ideas or are interested in presenting to your rail colleagues on any of your great safety initiatives please let me know as I will be commencing a draft agenda early in 2018.

Remember bushfire season is upon us. Please ensure bushfire preparations are well underway and if you need advice please refer to Page 11 of the Rail Safety News December 2016.

Best holiday wishes to you all from TSV and 'be safe'.

RISK MANAGEMENT

In accordance with the *Rail Safety (Local Operations) Act 2006* (Vic), duty holders are required to either eliminate or reduce risk 'so far as is reasonably practicable' (SFAIRP)

A rail transport operator's safety management system must include systems and procedures to manage risk that include the following:

- identification of any risks to safety in relation to railway operations in respect of which the operator is required to be accredited
- the comprehensive and systematic assessment of any identified risks
- specification of the controls (including audits, expertise, resources and staff) that are to be used by the operator to manage the identified risks to safety and to monitor safety in relation to those railway operations
- monitoring, reviewing and revising the adequacy of controls.

It is the responsibility of the dutyholder to undertake a risk assessment process in accordance with their procedures. Through TSV's accreditation and compliance activities, such as audits and inspections, we will ensure duty holders have followed their risk management procedures, can identify hazards and assess and control risks.

Eliminating or reducing risk SFAIRP involves weighing a risk against the options, difficulty, time and money needed to control it. This allows risks to be controlled other than through prescriptive requirements, such as TSV telling you what type of safeworking system you should have.

While this flexibility is a great advantage, it requires judgement. What is reasonably practicable is a judgement based on the facts of each particular situation. When you are unsure of the likelihood of a risk occurring or its level of harm, you should err on the side of safety. The greater the likelihood and/or degree of harm associated with a risk, the harder it is to argue that risk controls should not be implemented because of disproportionately high costs.

Your judgement of a risk can be assisted by referring to existing good industry practice that has been established by industry bodies.

For complex or new situations, more formal methods of comparing the costs of implementing and maintaining risk controls against the benefits they provide can help you arrive at your decision.

Managing risk SFAIRP in respect to rail operations involves eight key steps.

1. Identify the hazards associated with the rail operations and what incidents could occur.
2. Identify what could cause those incidents to occur.
3. Assess how bad could it be.
4. Consider how likely is it to occur.
5. Establish what is already being done to manage the risk and identify current risk control measures.
6. Decide what new actions are required to further reduce the risk SFAIRP, and who will take responsibility for putting them in place.
7. Assess how viable and effective the risk control measures are.
8. Review and update the above steps and the time intervals defined in your safety management system.

Rail operators are required to document all aspects of risk assessment, including the reasons for selecting certain control measures and rejecting others. TSV will often ask to see operators' risk registers when assessing accreditations, variations to accreditation and undertaking compliance activities.

Specific risk management requirements are contained in Schedule 2 of the Rail Safety (Local Operations) Regulations 2006 (Vic). ISO 31000, the international risk management standard, establishes principles for effective risk management and a framework for integrating the process for managing risk into an organisation. While this document is an example of good risk management practice, sole compliance with ISO 31000 is not sufficient to address the requirements of the Regulations. The legislation has specific requirements for risk management that must be met.

The best results are achieved when a team contributes to the risk assessment. We recommend multidisciplinary teams that include operations and a safety specialist. The team then conducts the assessment in accordance with the requirements stated in your safety management system. Sometimes, including a person not closely associated with the activity, area or equipment being assessed brings a 'fresh pair of eyes' to the activity. The outsider may see risks that those more familiar with the area being assessed may overlook.

You should also include in the risk assessment process:

- interfaces between tasks or areas of operations
- consideration of what happens when operating in a failure or back-up mode, or with a spare piece of equipment.

During its accreditation and compliance activities, TSV has identified some common failings in how rail transport operators demonstrate they have ensured risks have been eliminated or reduced SFAIRP. These include:

- using a standard assessment rather than an operator specific assessment
- not involving a team in the assessment, or not including employees with operations knowledge
- inappropriate use of data – 'it's never happened here before'
- no consideration of SFAIRP or further measures that could be taken – the risk might be low but what additional risk control measures are reasonably practicable
- failing to record risk controls that have been considered but rejected
- carrying out a risk assessment to support a decision that has already been made
- not identifying good practice
- not implementing the risk controls identified in the assessment
- failing to identify all modes of operation.

Managing risk and ensuring risks are eliminated or reduced SFAIRP takes time and must involve people from across your organisation. There are no short cuts and a continuing commitment to review risks, and document those reviews, throughout the life of the activity being undertaken is required.

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EXPIRY OF THE RAIL SAFETY (LOCAL OPERATIONS) REGULATIONS 2006 (VIC) IN JULY 2017

The Rail Safety (Local Operations) Regulations 2006 (Vic) **(RSLOR)** expired and were replaced by two sets of regulations on 21 July.

1. The Rail Safety (Local Operations) (Drug and Alcohol Controls) Regulations 2017 (Vic) prescribe drug and alcohol testing procedures for all Victorian rail safety workers under both the national or local schemes. These regulations remake the drug and alcohol testing provisions contained in Part 5, Division 1 of the 2006 RSLOR.
2. The Rail Safety (Local Operations) (Accreditation and Safety) Regulations 2017 (Vic) prescribe various requirements for locally regulated operators, including accreditation, safety management, health and fitness, reporting and fees. These regulations remake the remainder of the provisions in the 2006 RSLOR.

As these regulations did not go through a Regulatory Impact Statement process, they have been made as interim regulations and will expire on 21 July 2018.

There are otherwise no substantive changes to the content of the RSLOR in the two new sets of regulations.

The new regulations just separate drug and alcohol provisions from the other provisions. As the testing procedures mirror Victorian road legislation, they do not have any real impact on rail safety workers at KDR Victoria Pty Ltd (Yarra Trams) and the 10 local tourist and heritage (T&H) operators.

However, you may need to update references in your safety management system (SMS), and associated documents as numbering has changed.

OHS VERSUS RAIL SAFETY – WHAT'S COMMON WHAT'S DIFFERENT?

What's common

System of laws and requirements

Both OHS and rail safety are governed by a system of laws, regulations and guidance that sets out the responsibilities of employers and workers to ensure that safety is maintained at work.

For OHS, this system includes the *Occupational Health and Safety Act 2004* (OHS Act), the related—and recently updated—Occupational Health and Safety Regulations 2017 (OHS Regulations), and guidance and codes published by Worksafe Victoria.

For rail safety, this includes the *Rail Safety (Local Operations) Act 2006* (Vic) (RSLO), Rail Safety (Local Operations) Regulations 2006 and guidance published on the TSV website.

Aims and objects

The OHS and rail safety system of laws and requirements aims to ensure that work and railway operations respectively, are conducted safely without undue risks to health. The objects and principles of both are underpinned
by key principles including:

- a risk management approach where risks should be eliminated or, if not eliminated, reduced so far as is reasonably practicable
- managing OHS and rail safety risks is the responsibility of the person best able to control those risks
- responsibilities (duties) are defined for each person involved in work or rail operations
- consultation and cooperation with affected persons to ensure that a collaborative approach is taken to manage risks in OHS and rail safety.

Enforcement powers

Although provided by different legislation both Worksafe and TSV have powers to enforce health and safety through instruments such as improvement and prohibition notices.

What's different

One of the key differences between the sets of legislation is the accreditation regime. Accreditation is required for all rail transport operators. Under the RSLO, a rail transport operator must not carry out railway operations unless it receives accreditation from TSV (or is exempted from accreditation). This is different from requirements under the OHS Act when, unless you are operating a major hazard facility, you do not need to receive permission from the regulator prior to undertaking work.

Accreditation satisfies the regulator that the rail transport operator has adequate competence and capacity to manage risks associated with their rail operations. Thus, a rail transport operator has to demonstrate that they can effectively manage risk before they commence railway operations. This is done because the environment and hazards associated with railway operations are specific to the environment and need a higher level of regulatory oversight.

Take home messages

- Both the OHS and rail safety systems of law and requirements aim to keep people safe, whether at work or on the railway.
- Requirements under both OHS and rail safety Acts and Regulations are complementary.
- As per section 101 of the RSLO Act:
  - > complying with one doesn't automatically mean that there is compliance with another so both laws must be observed; and
  - > if there are inconsistencies between OHS and rail safety requirements, OHS requirements prevail.

EMERGENCY MANAGEMENT – TOURIST AND HERITAGE OPERATORS

Tourist and heritage rail transport operators (THRTOs) are required under both the *Rail Safety (Local Operations) Act 2006* (Vic) s52 and Rail Safety (Local Operations) (Accreditation and Safety) Regulations 2017 (Vic) reg 18 to 21 to prepare an emergency management plan.

THRTOs, particularly those operating in high risk environments, require robust incident management systems. The systems ensure a fast, effective and sustained response to significant incidents impacting their people, patrons, property or operations.

These systems should accommodate all possible scenarios, be well rehearsed and robustly tested. They should aim to deliver the appropriate structure and forward planning to ensure that any ramifications to the organisation, its people and the community it serves are minimised so far as is reasonably practicable.

For a THRTO's emergency management program to be effective it must integrate with preparations from local authorities, regulators and combat agencies. It should be aligned with best practice guidelines established by Emergency Management Victoria/ Australia (EMV/A).

A THRTO must carry out a risk assessment of its operations that considers individual hazards and multiple hazards that may occur simultaneously. Once the THRTO has established its risks, hazards and controls it should then establish an Emergency/Incident Management Plan (EMP). The plan includes strategies that can be implemented quickly and efficiently in the event of an incident occurring. The plan must be established in consultation with combat agencies (fire services, medical responders, State Emergency Services and police), regulators (ESV, TSV) and local utility suppliers (gas, electricity and water).

A robust and effective EMP should not sit and gather dust. Once established the THRTO should distribute it to local combat agencies, regulators and relevant local authorities. The EMP should be tested by the THRTO at a desk top level to ensure the incident response structure works efficiently and its response teams are practised in the process.

Further testing of the EMP should be conducted through dynamic full scale scenario exercises that involve multiple agency response.

A THRTO should conduct a review after any incident or after a test of its EMP to ensure that the plan is continuously improved. This will ensure that any detrimental impact on its operations is reduced so far as is reasonably practicable.

Emergency Management Victoria provides an Emergency Management Manual Victoria (EMMV) on its website (emv.vic.gov.au/policies/emmv) which contains policy and planning documents for emergency management in Victoria. This manual also provides details about the roles different organisations play in managing the emergency.

The rail safety regulators provide advice on their websites for emergency management that may assist THRTOs in preparing their EMPs.

MANAGING THE INTRODUCTION OF NEW HERITAGE ROLLING STOCK – TSV's EXPECTATIONS.

TSV works to ensure the legislative regime for tourist and heritage railways is proportionate to the potential risks on those systems.

TSV concentrates its effort in higher risk areas, normally only undertaking inspections in response to incidents or as part of a compliance program. Areas considered to be at a higher risk for heritage operations are level crossings, infrastructure and rolling-stock maintenance. Our officers work with the industry in these areas and encourage continual improvement of existing standards where reasonably practicable.

Vehicles operated by tourist and heritage railways are not exempt from rail safety legislation. Along with those that design, commission, construct, manufacture, maintain, modify or repair rolling stock, operators have safety duties under the *Rail Safety (Local Operations) Act 2006* (Vic) (RSLOA). Additionally, under the Rail Safety (Local Operations) (Accreditation and Safety) Regulations 2017 (Vic), an operator is required to have procedures for ensuring any risks associated with a proposed change are appropriately managed. This includes when an operator is introducing new rolling stock.

TSV considers that technical criteria should be set for the introduction of any vehicles, and that it is appropriate to:

a) base the design on the type previously operated if it has a proven safety record

b) where practicable, comply with current standards to address risks which are no longer tolerable on a modern railway.

A heritage vehicle may have remained in regular service for a long time and have a continuous service history. There may therefore be a collective body of knowledge and experience held by the owner, and this information can support safe operation in regular service.

Compliance with current standards for existing heritage rail vehicles can be difficult to demonstrate, because a vehicle will have been approved for service under the prevailing conditions of the time it was built.

However, as time moves on, it is feasible that a heritage operator's rail vehicles would have become equipped with more modern technology to meet safety duties and to respond to findings from investigations. This may include such things as the use of modern materials, introduction of communications equipment, new bearings, improved structural and bogie suspension arrangements, alternative power sources. These improvements should have been documented to allow consideration for any future rolling-stock procurements.

Heritage passenger vehicles, while similar in configuration to the vehicles of commercial operators, could be expected to include features which are not compliant with current standards. Specific issues include a lower standard of crashworthiness of coach body shells and the use of manual door locks on exterior doors.

However, to support safe operation, compliance with current standards may be necessary:

- to address a specific aspect of technical compatibility, for example, compliance with braking curves to fit signalling distances
- where it is considered to be desirable and reasonably practicable[1].

TSV recognises that current standards may not offer the most efficient basis for a set of engineering requirements for heritage rail vehicles.

However, they can provide a useful reference set of requirements against which to judge suitability for safe operation. For example, it may be reasonable to require aspects of the vehicle interior to be compatible with current standards.

It is incumbent on an operator to determine where the vehicle varies from current standards and justify why it may not be reasonably practicable to meet that standard. In many cases it may be reasonable to meet the current standard.

Use of modern materials, components and manufacturing techniques can significantly improve the overall integrity of a heritage rail vehicle. They provide an opportunity to make the heritage fleet safer, and possibly cheaper, to maintain.

Heritage rail vehicles can be expected to have a distinctive risk profile compared with those of a commercial operator. The risk profile would need to take into account:

- full train loads during special events
- an older demographic for general operations and a younger demographic for school excursions
- passengers who do not frequently travel by train and may be unfamiliar with rail safety and operating practices
- catering facilities that may pose additional fire hazards.

An operator would be expected to procure design records if intending to introduce a new heritage rail vehicle into the fleet. Current vehicle condition and repairs made throughout its life should also be taken into account to ensure any alterations to the original design do not inadvertently introduce an undesirable effect that could compromise safety.

A heritage operator procuring new heritage vehicles should also take into account:

- the risk of introducing repair or maintenance techniques used for the current fleet to the new vehicles which are inappropriate
- sourcing used parts from the old fleet, for example, from a donor vehicle, and installing them on the new vehicles without ensuring their integrity
- inadvertently applying wear or condemning limits to the new vehicles that are only applicable to the old fleet, or vice versa
- the degree of assurance offered by the supplier of components for the new vehicles.

Before new vehicles are introduced, TSV may request records including:

- material quality certificates
- test records (non-destructive testing and/or metallurgical)
- records for critical activities, such as welding
- final inspection/completion 'sign off' sheets
- technical manuals and documented maintenance plans
- records for retraining of personnel.

Specific component requirements

Some components are more critical than others, and compliance with recognised standards is therefore more critical for some components to support safe operation. For example, wheelsets and bogies are one of the principal safety critical features of a rail vehicle, with the risk of a significant incident such as derailment arising from failure of such components.

All heritage vehicles in passenger operation should be fitted with a brake that is continuous and engages if the train becomes divided or if the train pipe is ruptured. Trains must be capable of complying with a specified braking curve that takes account of system braking requirements set by signal sighting and operational speed. Driver and technical familiarisation with any new braking systems is also an important factor. A parking brake feature so that a rake of rail vehicles can be safely stabled temporarily on a running line during normal or abnormal operations is also considered essential, with the operator expected to specify and test against requirements.

The operator should also have considered requirements for emergency and recovery and demonstrate that these have been met by the new vehicle.

The use of new wooden-bodied passenger vehicles is considered unacceptable, except where they are the only vehicle that operates on the infrastructure, there are no railway crossings and control measures have been introduced to manage the risk of fire.

The doors on a new heritage vehicle shall take into account evacuation that may include a higher proportion than normal of persons with reduced mobility. Risks associated with falls from new rolling-stock owing to children being able to open doors or fall through openings should also be reduced so far as is reasonably practicable.

TSV considers it reasonably practicable that new vehicles are fitted with laminated or toughened glass, or that there are other risk controls to manage window breaks. While it is reasonable for heritage operators to manage the infrastructure gauge and kinematic profile to allow people to take photos from moving rolling-stock, it is not considered reasonable that construction of rolling stock allows passengers to purposefully extend limbs from carriages.

New vehicle interior designs and modifications should meet applicable standards where reasonably practicable. They should also have instructional and warning signs for passengers that may travel by rail infrequently and must have appropriate emergency and safety signs fitted.

Vehicles operating in hours of darkness should be provided with emergency lighting in the event of loss of primary lighting, and be capable of communicating train emergency and safety procedures to passengers. The fire performance of materials in new heritage vehicles should also be considered against contemporary standards.

Personnel undertaking rebuilds or new constructions of heritage rolling-stock should have the competence to undertake the tasks assigned to them and be competent in the application of the operator's management of change requirements.

[1] For further information on the concept of 'So Far As Is Reasonably Practicable', please refer to the Office of National Rail Safety guideline at onrsr.com.au/news-and-events/news-stories/so-far-as-is-reasonably-practicable-sfairp

Overview of a process for introducing new vehicles

The safe introduction of new heritage rolling stock requires a combination of

- compliance with technical requirements in legislation or mandated in the operator's safety management system (SMS)
- suitable and sufficient risk assessment to demonstrate that such vehicles are suitable for safe operation is also required.

The risk assessment process should comply with that in the operator's SMS. Where the process is not sufficient to consider the introduction of new rolling-stock, it should be revised before the project is started.

A process for validation of proven historic design is suggested to confirm suitability for safe operation. The operator should be aware of current rolling-stock standards in order to determine what changes are reasonably practicable.

It is expected that an independent safety assessment would be commissioned to oversee the construction of new heritage rolling-stock.

Early engagement of an independent safety assessor is needed to ensure an agreed assessment process covers as much of the life cycle of the vehicle as possible.

Introduction of new rolling-stock should be supported by requirements in the operator's SMS for inspection, auditing, testing and acceptance. When construction or restoration of a heritage vehicle is complete, the management of change process is expected to include a vehicle acceptance sign-off that attests that the vehicle meets the specification. A process to manage any residual risks that have not been closed through the management of change process may also be required.

A finalised engineering condition report, together with the records of independent assessment, should form part of the technical file or equivalent record of the rolling stock. The amount of TSV oversight would be determined by the risk profile of the project. Relevant factors will include complexity, novelty and competence and capacity of the operator.

When the introduction of the new rolling-stock is part of an application for variation of accreditation, a mutually agreed staged approach is likely to offer the lowest risk path to success. Advice on whether the introduction of new rolling-stock requires an application for variation to accreditation or a notification of change should be sought from TSV at the earliest opportunity.

The above guidance can only offer an outline of the process for introducing new heritage rolling-stock. Experience of operating the process has shown the value and importance of discussing with TSV at the earliest opportunity any project which is likely to involve the introduction of new vehicles. This then allows the identification of any particular requirements to be addressed in a timely manner.

ROAD RAIL VEHICLE OPERATIONS – LESSONS LEARNT FROM A NATIONAL PROJECT

Between 2015 and 2017 the Office of the National Rail Safety Regulator (ONRSR) embarked on a national project for the safe operation of road rail vehicles (RRVs).

The project sampled operations by a number of major rail infrastructure managers (RIMs). Its scope did not include tourist and heritage (T&H) operators, however the lessons learnt are transferable.

The project was triggered by a number of safety incidents involving RRVs. It broadly focussed on the general operation of RRVs, defect reporting and maintenance/repair processes, operator competencies and the management of risks associated with the operation of RRVs.

The use of RRVs is common practice amongst T&H operators who have a requirement to maintain and repair track infrastructure under their control. In most cases RRVs owned by the T&H operators are procured from larger rail organisations and are usually near the end of their asset life cycle. When acquiring machines from other rail organisations, T&H operators should endeavor to obtain all relevant service history and any modification data or changes applicable to the RRV. In certain cases, these changes may not have been optimised for the tasks to be carried out, or specified to a level that would ensure an acceptable degree of safety.

This can pose a safety risk for T&H operators and consideration should be given to these factors when procuring RRVs that have been disposed of by other rail operators.

The results of the inspections concluded that each RIM had common and consistent issues with the operation of RRVs. These included:

- failure to comply with RRV operating procedures and work instructions
- lack of operator knowledge in relation to local operational risks
- substandard defect reporting systems and delays with repairs and maintenance
- inadequate acceptance of industry standards
- inconsistencies when completing pre-start operational checklists
- loss of evidentiary data for maintenance, inspections and repairs
- no process for ascertaining the functionality of components
- lack of engineering testing certificates for components such as rail guidance system attachments, stub axels, wheels and braking systems.

T&H operators who use RRVs should take note of the above findings in order to improve safety outcomes. There are some useful industry publications available to operators, such as RISSB Rolling Stock Standard – AS7502 Road Rail Vehicles, that provide a comprehensive overview of all aspects of RRV operations.

MANAGEMENT OF CHANGE – INTRODUCTION OF PLASTIC RAILWAY SLEEPERS

Rail transport operators often introduce changes to their railway operations.

The December 2016 edition of Rail Safety News included an article on "Change Management – Guidance on Systematic Approach". It outlined a structured approach to managing change.

The June 2017 edition of Rail Safety News included a follow up article outlining how this approach may be applied to upgrading an existing level crossing project.

It is understood that considerable work has been undertaken to develop and test plastic railway sleepers, as a potential alternative to timber sleepers. This article outlines how this change management approach may be applied to the introduction of plastic railway sleepers into a rail transport operator's track.

Step 1: Establish the context of change

When considering the introduction of plastic railway sleepers it is important that the change is defined within the context of the organisation's existing rail operations.

It is suggested that specific questions be considered and answered.

1. What is the scope of work?
2. What are the project's major stages?
3. What are the benefits associated with this change?
4. What are the legislative and safety management system compliance requirements?

Rail transport operators should consider whether:

- to conduct a trial of plastic sleepers on a short section of track,
- install some plastic sleepers in a section of track (for example replacement of one sleeper in three)
- replace all existing sleepers with plastic sleepers in a section of track.

A key question to be considered is what impact this proposed change will have on the rail transport operator's existing track inspection and maintenance regime.

Step 2: Consult stakeholders or parties affected by the change

There is a duty under the law to consult with all of the affected parties. Consultation provides the opportunity for organisations and individuals who may be affected by this proposed change to consider the introduction of plastic railway sleepers from their perspective. This engagement may result in the identification of additional risks to safety that need to be considered by the rail transport operator.

It is suggested that the following questions be considered and answered:

5. What are the functional areas of the organisation that will be affected by the change?
6. How will the change impact staff roles and responsibilities?
7. How will the change impact staff training requirements?
8. Are there any external stakeholders (such as asset owners or funding providers) who need to be consulted regarding this proposed change?

Staff responsible for track inspection and maintenance will be affected by this proposed change; their feedback will be particularly important for the rail transport operator to consider.

Step 3: Conduct a risk assessment

There are risks to safety associated with the introduction of plastic railway sleepers.

- Changes in structural integrity and stability of the track (under load, hot/cold conditions) over time. This may include the risk of gauge widening.
- Changes in plastic railway sleeper performance following a bush fire.
- Change in fire risk - do plastic railway sleepers combust?
- Material degradation due to exposure to sunlight (UV radiation), oil or other chemical substances.
- OH&S manual handling risks associated with the weight of plastic railway sleepers.

Rail transport operators should assess and consider how different these risks are compared with the risks associated with timber sleepers. To provide a balanced argument, it is suggested that rail transport operators should also consider the risks associated with not introducing plastic railway sleepers.

The risk assessment should include consideration of a wide range of controls to manage the risks to safety associated with the introduction of plastic railway sleepers. These controls may include:

- Comparing the specifications for plastic sleepers with those for timber sleepers. Do plastic railway sleepers offer better or worse performance characteristics?
- Using experience gained in other jurisdictions where plastic railway sleepers are in use to support decision making.
- Considering development work and the results of testing undertaken by the Institute of Rail Technology at Monash University. This work may validate the performance characteristics of the plastic railway sleepers.
- Ensuring changes to track inspection and maintenance regimes for sleeper performance are more closely monitored and knowledge and experience with this product built up.
- Trialling, or progressively introducing, plastic railway sleepers to build up knowledge and experience with this product.
- Reviewing and updating the sleeper installation procedure (which may include mechanical insertion techniques).
- Training of track maintenance staff.

It is suggested that the following questions be considered and answered:

9. Have hazards been identified for all stages of the asset life, that is, acquisition, construction, operation, maintenance and decommissioning of the plastic railway sleepers?
10. Have hazards associated with environment, heritage, planning and hazardous materials been incorporated into the risk assessment?

Finally, it is important that the risk assessment should be conducted in accordance with the rail transport operator's safety management system.

Step 4: Review safety management system

The rail transport operator's safety management system may need to be reviewed as part of the introduction of plastic railway sleepers. This would include documenting any of the risk controls that have been identified in step 3 and agreeing to the details of the implementation. For example, if the sleeper installation procedure requires updating or the track inspection regime is to be modified, these changes should be documented and integrated into the safety management system.

It is suggested that the following questions be considered and answered:

11. Have changes to staff roles and responsibilities been captured by updating staff position descriptions?
12. Do emergency and contingency plans need to be updated?

Step 5: Manage the implementation

A formal project management process can help to ensure the successful introduction of plastic railway sleepers into the track. A project management plan should define the objective of the project and consider the implementation schedule, methodology for delivering the project, financial and material resources required, standards/quality to be achieved, risk management (including OH&S risks) and contingencies. These dimensions of the project management plan are interactive – a change in one dimension may affect others.

Step 6: Monitor and review the change outcome

The project is complete, the plastic railway sleepers have been installed and trains are now operating on the refurbished track. This is the time that the safety performance of the plastic railway sleepers should be assessed.

The rail transport operator should be closely monitoring compliance with the track inspection and maintenance procedures which may have been updated as part of managing this change. Any unexpected changes in track condition should be documented and reported as soon as they become evident.

Other risk controls identified during the risk assessment process should be audited for effectiveness, including training of track maintenance staff.

If rail transport operators have any questions or concerns regarding the management of change, they are encouraged to re-read previous Rail Safety News articles or discuss these concerns with TSV.

PASSENGER SAFETY ON AND AROUND ROLLING STOCK

Passenger safety features prominently in the safety management system of tourist and heritage (T&H) rolling stock operators (RSO), and this reflects the level of importance attached to safety.

After all, the major aspect of any RSO is the movement of passengers and/or goods. In the case of T&H operators, the largest proportion of services delivered is passenger movement for recreational purposes.

Passenger safety within the scope of this article involves the prevention of passenger injury or death on and around T&H rolling stock. Safety occurrence outcomes can range from catastrophic accidents leading to death, to incidents that result in injuries from slips, trips and falls (STF). This article focuses on enhancing passenger safety and comfort by controlling the risks.

T&H operators use popular iconic Victorian era trains to carry passengers, including tourists, children and the elderly, on leisure activities through the countryside. Although most T&H operators are closed-line infrastructure managers, century old infrastructure and rolling stock are in use. This introduces unique risks to T&H operation that may not exist in other sectors of the railway industry.

Within the T&H operational environment, risks exist on and around the rolling stock and in the interface zones with roads (level crossings) and pedestrian crossings. Rolling stock includes century-old locomotives and road rail vehicles (RRVs).

Existing/emerging risks

STFs are common problems on trams and suburban passenger services and occur as a result of many contributing factors. Some of the contributing factors include passenger/driver behaviours, rolling stock dynamics (jerk rates, acceleration/deceleration and braking), infrastructure degradations, saloon interior ergonomics, and road users (at interfaces).

Some of the contributing factors listed above can also affect T&H operations - in particular, road users and rolling stock dynamics.

- Rolling stock dynamics: Although some T&H operations involve locomotives and RRVs that travel at high speeds, the majority of T&H rolling stock operates at relatively low speeds. The acceleration, deceleration, jerk rates and braking are also generally smooth - thanks to the efforts of the seasoned drivers who provide excellent ride comfort to their patrons.

  Research findings suggest that most standing passengers can tolerate perturbation forces which result from maximum acceleration/deceleration/braking rates of up to 1m/s2, or jerk rates of 0.5m/s3, before they require support strategies to prevent STFs. Tolerance thresholds reduce accordingly with aging and disability levels.

  Majority of passengers travelling on T&H services are seated however there are operations when, on rare occasion, passengers stand. STFs can affect both seated and standing passengers; however, standing passengers are most susceptible to STF if jerk rates are high enough, even at low acceleration/deceleration levels.

  The occurrence of STFs due to the lower dynamic energies in T&H operations is low. Sudden stoppages however from rapid braking or minor collisions can result in high deceleration/jerk rates that are sufficient to cause STFs.
- Interface zones exist between T&H infrastructure (tracks) and roads/pedestrian crossings. The interaction with other road users introduces collision risks which cause STFs.
- Level-crossings are high in the risk registers of most T&H operators. Typical operating environments have supported a history of relatively high safety standards. Rapid population growth has increased the interactions between T&H rolling stock and road users, especially buses, and this increases collision risks.

  Impatience, distraction caused by electronic devices and higher societal stress levels all contribute to collision from taking chances at level crossings. Population growth multiplies this risk even further.
- Another risk to passenger safety is onboard fires and fires along rail-track corridors, both of which can cause harm to passengers. Some T&H operators use track patrols before operations on running days and fire-patrols during fire-seasons. Both strategies can reduce fire risk to passengers.
- Passenger or other human accessibility to rail tracks is a major problem for all forms of rail operations. From the perspective of collision risk to passengers and members of the public, rolling stock striking humans is an industry concern. Track accessibility by passengers can be unintentional or intentional. Control of this risk should be considered at all times.
- A major aspect of T&H operations is to preserve the heritage on the era and reflect and showcase it. To facilitate heritage-retention, saloon interior designs, seating ergonomics and styles may require deviation from contemporary safety standards.
- The style of seating may not always be to contemporary safety standards, which may impact on passengers. Various risk controls are available to the operator and may involve the use of strategies that ensure heritage-retention, while at the same time complying with contemporary safety design requirements.
- Statistical figures for T&H operations show that there has been significant increase in patronage over the past five years, including interstate and overseas visitors. A significant percentage of this includes vulnerable passengers who accompany family units for day trips. On occasion, vulnerable passengers who require the use of mobility aids also patronise T&H services. Consideration should be given to passengers with various and specific needs during phases involving saloon modification.

  Passenger management through safety information is required more now than in previous eras. T&H operations may need to consider that the current increase in population, and the growth projection, will impact on passenger safety. More services will eventually be required in response to demand. In some cases more services are already being run.
- Rolling stock and infrastructure used in T&H operations were designed using standards of bygone eras. The heritage aspect of these operations means it is not always possible to use contemporary standards and controls. A process that guarantees retention of heritage values while providing contemporary controls to risk would be the wonder solution

  This approach will ensure long-term continuity of T&H operations within an ever evolving and demanding safety assurance environment.
- It is not possible to discuss passenger safety without mentioning security. The world has changed since 9/11; our society is constantly under threat from an individual who is intent on causing harm to others. This type of threat must be considered in today's operating environments. While managing this type of threat can be expensive, any measure taken by an operator to minimise or mitigate this risk is progress in the right direction – regardless of the level of sophistication of the strategy used.
- The relatively slow speeds involved with T&H rolling stock operations suggests that the energy is low compared with regional services. Some T&H rolling stock share regional railway infrastructure and travel at higher speeds. Despite its low speed characteristics, higher consequences to passengers may emerge if derailment of T&H rolling stock were to occur within track sections abutting high embankments or bridges. As the risk associated with embankments/bridges is higher, the low speed characteristics of T&H operations should be discounted when assessing risks.

Possible solutions to risks (T&H)

The following strategies could reduce the identified risks to, and alleviate pressures on, passenger safety on/and around T&H rolling stock.

- Collaboration: The power of collaborative process can be immense. Collaboration can be with the research bodies (for innovation research), security agencies, rail safety regulator, VicTrack, and Emergency Management Victoria. While this is already happening, the level of collaboration could be ramped up so that economically viable solutions may be generated.
- Community education: More safety education/information for the safe interactions between road users, passengers and other members of the community can greatly enhance safety outcomes. Education to change driver behaviours around level crossings in communities where T&H operate is an example of this.
- Integration of scientific controls: Use heritage preserving, contemporary knowledge and methods in structured and systematic ways to develop design goals, for example, when designing or modifying existing rolling stock and infrastructure.

Use the same method to collaborate on research to create simple and economically viable options to enhance:

- level crossings
- interior ergonomics
- enhancement of SMS
- Automatic Train Protection
- child seat restraints.

T&H services add immense cultural, heritage, educational and economic values to our communities. The continued operations of T&H services which incorporate contemporary safety standards are already actively integrated into the T&H sector of the rail industry.

The commitment, diligence and sacrifices of the individuals who support T&H are to be commended. However, the competing goals of long-term safety assurance versus cost of risk control strategies, within a continuously evolving safety compliance environment, could exert heavy financial burden upon operators.

TRAM STATS

In response to a rising trend in incident data, Transport Safety Victoria (TSV) identified the need to undertake a review of passenger falls across Yarra Trams fleet in collaboration with KDR.

Passenger falls are a complex problem with many interacting causes and contributing factors.

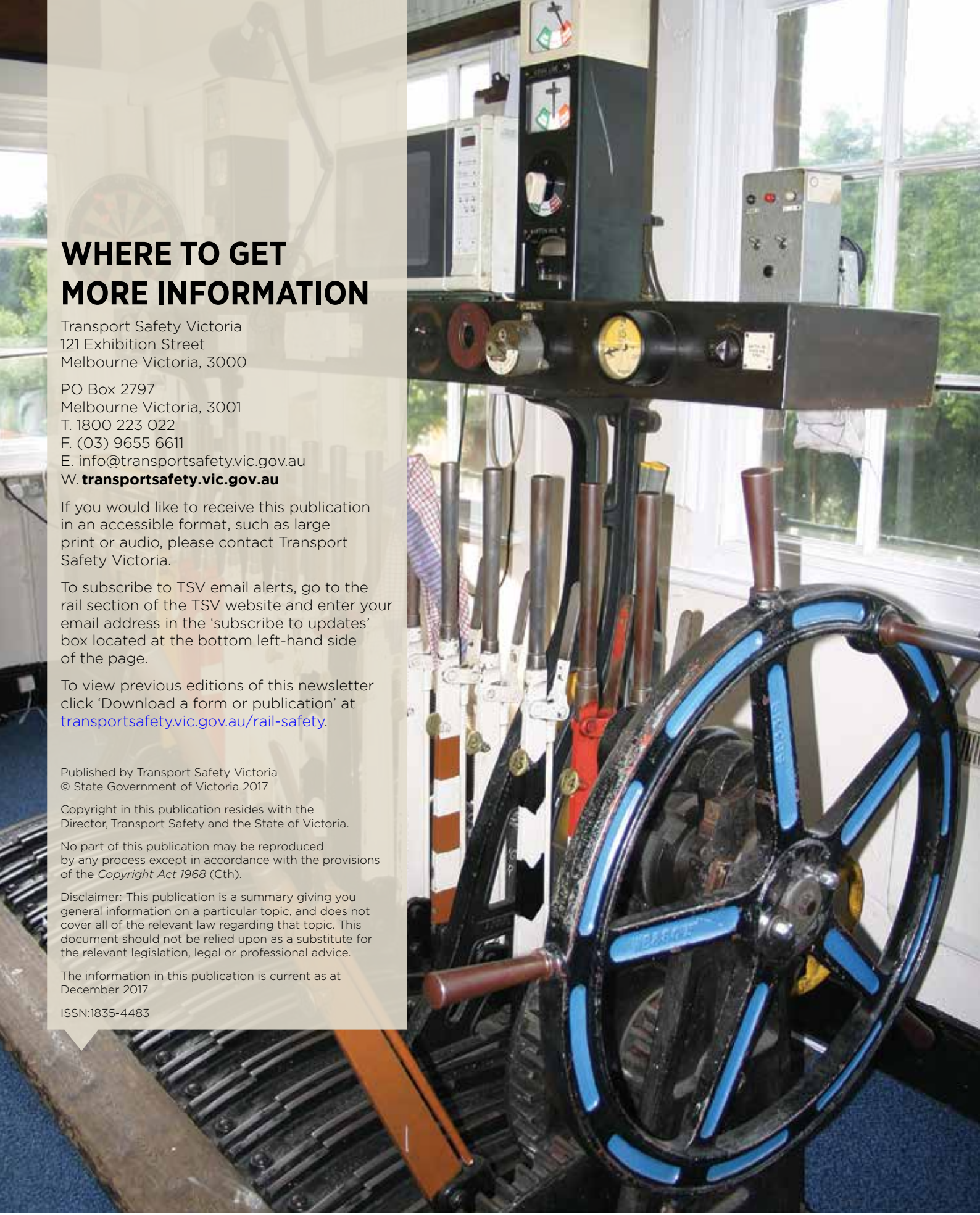
Systemic factors that impact on falls risk include, but are not limited to, time pressures, population growth and congestion, lack of separation between trams and road users and ticketing requirements.

The results of the review have raised a number of recommendations which are currently being presented to KDR.

Potential initiatives to address falls span various organisations and can only be implemented through a coordinated response.

TSV will continue to actively engage with stakeholders to assist in the identification and management of the risks associated with passenger falls.

The quarterly and annual statistical reports are available at transportsafety.vic.gov.au



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