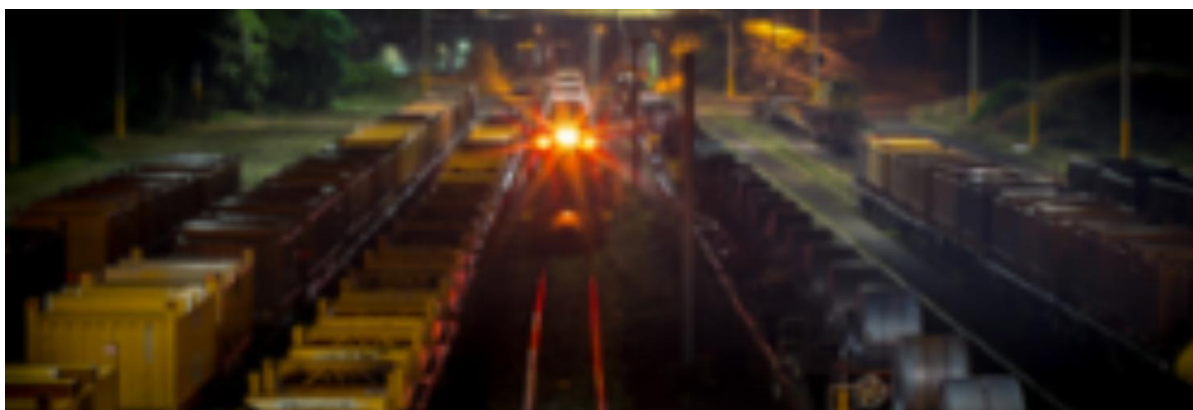


Safety Message: Train to train collisions - risks, causes & controls

ONRSR is reminding rail transport operators about a range of risks, causes and controls associated with train to train collisions. Under Rail Safety National Law, "the ONRSR" comprises the National Rail Safety Regulator, Dr Natalie Pelham, and non-executive members, Trish White and Julie-Anne Schafer. These appointments are made by the South Australian Transport Minister on the unanimous recommendation of the responsible ministers. © **Office of the National Rail Safety Regulator** (ONRSR) 2026



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A train to train collision can occur on the running line or within yards and sidings, with the potential severity of a collision on a running line greater due to increased speeds, traffic density and passenger loads.

These collisions can occur when there is a breakdown in the implemented safe working system or failure of signalling control systems. Safe working systems are the primary control in preventing train to train collisions by ensuring safe train separation. Example safeworking systems include remote controlled signalling, electric staff and manual train order working.

Train to train collisions are typically characterised as either head to head collisions, head to rear collisions or side swiping collisions. ONRSR's investigations into train to train collisions have identified causes and contributing factors across the four areas listed below. Whilst examples

are provided, these are not exhaustive given the range of operational environments within the Australian rail industry.

CAUSES AND CONTRIBUTING FACTORS

1. Individual factors

- (e.g. fatigue, driver/operator error, distraction and/or miscommunication)

2. Organisational factors

- (e.g. inadequate procedures, rules, training, culture, leadership, controls or use of controls, interface with third party operators)

3. Technological or equipment factors

- (e.g. rolling stock braking performance, signalling system failures, incorrect positioning of track clearances/points)

4. Environmental factors

- (e.g. weather conditions, signal sighting, track gradient)

CONTROLS

While not an exhaustive list, ONRSR is aware of the following controls that are available and have been used in railways both in Australia and overseas. rail transport operators (RTO) should note that there are safety and operational benefits and detriments associated with each control. Operators must consider a range of factors, including the likelihood of the hazard and the degree of harm, to determine what controls are reasonably practicable to implement – see the ONRSR Guideline – Meaning of duty to ensure safety so far as is reasonably practicable SFAIRP for more information.

1. Engineering:

- **Signalling systems** use interlockings to prevent unsafe movements and thus train to train collisions. Fixed block colour light signal

systems are the most common technology deployed, with in-cab signalling and moving block systems being recently introduced to Australia.

- **Signalling principles** provide the design requirements that define how the signalling system operates safely. These should be documented by the RTO in its safety management system. There are many features to be considered, examples include:
 - signal positioning to protect junctions from conflicting train movements
 - flank protection to prevent side swiping collisions
 - braking overlaps to provide a safety margin to protect against head to rear collisions
- **Rolling stock systems** are deployed on trains to minimise the risk of train-train collisions. Examples include automatic train protection, braking systems, driver vigilance and deadman's controls.

2. Administrative:

- Typical administrative controls cover railway operations associated with both infrastructure and rolling stock. Examples include network rules, driver competence, maintenance regimes, and fitness for work processes.
- Recently, train simulators have been used by some RTOs to support driver training for new rolling stock fleets. These are useful tools for drivers to gain experience in both normal and abnormal working conditions.
- Engineering / signalling controls are preferred wherever reasonably practicable, and where administrative controls are used they must be documented in the RTO's safety management system.

This information is provided as guidance only.

A comprehensive collection of ONRSR Safety Messages is available to view [here](#). © Office of the National Rail Safety Regulator (ONRSR) 2026