2.2

rail industry
safety report

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1. introduction

The *Rail Safety Act 2002* requires the Independent Transport Safety and Reliability Regulator (ITSRR) to submit an annual *Rail Industry Safety Report* to the NSW Minister for Transport.

This *Rail Industry Safety Report* summarises rail safety incidents on the NSW rail network in 2005–06. The statistical summaries are based on the incident categorisation of the national rail incident classification scheme, ON–S1.

The ON–S1 scheme was introduced in NSW in 2005 as part of a nationally standardised reporting framework to ensure consistency in the classification and analysis of rail safety information between state, territory and federal rail safety regulators.

rail safety statistics

Section 64 of the *Rail Safety Act 2002* requires accredited railway organisations[1] to notify ITSRR of safety–related rail occurrences on the NSW rail network.

For the purpose of national reporting, these "notifiable occurrences" are classified into specific rail incident categories as defined in the national incident classification scheme, ON–S1.

The 2005–06 year was the first full year in which many NSW rail operators began to report and classify incidents according to the ON-S1 scheme. Statistics reported herein for 2005–06 (and back to 2004[2]) are based on incident notifications from all operators, not just major operators as in previous Annual Reports. Hence, compared to previous Reports, the statistics for recent years cover a larger number of accredited organisations and a greater range of operations such as light rail and tourist and heritage.

The inclusion in this Annual Report of additional notifications for only part of the historical incident record complicates comparison of incident counts over time — a higher incident count in recent years may simply reflect the larger pool of operators reporting since 2004. This will not affect serious incidents which have always been reported via the major operators.[3] However many of the additional reports are from smaller operators and involve incidents on isolated lines or in yards which may not have been captured historically.

informing safety management

Rail incident statistics (on their own) provide a relatively blunt indication of safety performance because they only flag problems that have progressed to the point of an adverse outcome such as injury or damage.

In order to prevent serious incidents such as collisions and derailments, safety performance monitoring must include measures of the safety–related factors that can lead to such incidents. This helps to ensure that safety deficiencies are flagged before they progress to the point of an adverse outcome. Such measures are referred to as lead indicators because they predict emerging safety issues. They include such things as organisational, procedural and behavioural factors that can directly or indirectly contribute to incidents.

ITSRR uses a variety of safety information, in addition to incident statistics, to measure safety performance and guide regulatory activity. These include findings from accident investigations and safety risk modelling to identify hazardous events and contributing factors relevant to NSW railways. A large part of ITSRR's regulatory activity comprises safety audits and compliance inspections. These include monitoring of lead indicators to help determine if operators have the capacity, competency and systems to identify and manage safety risks relevant to their operations.

1. Accreditation is described further in ITSRR's corporate report and the Transport Industry Overview. **2.** ITSRR is partway through a process of sourcing and validating historical incident notifications from smaller operators, many of which exist as hardcopy. At the time of writing, small operator notifications back to the start of 2004 have been classified and uploaded to the ITSRR rail incident database. **3.** In cases where an incident is reported via major operators as well as via additional sources the incident is only counted once for the purpose of summary statistics.

2. rail-related injury

2.1 fatality

For the third successive year there were no multiple fatality train incidents on the NSW rail network. Thirty six fatalities were reported in separate incidents during 2005–06. The majority (31) were trespasser and suicide fatalities.

The number of fatalities was higher than 2004–05[4] (26) but remains consistent with a longer–term decreasing trend over the last decade (Figure 1). The increase was due largely to a change in trespasser and suicide fatalities (31 in 2005–06 compared to 23 in 2004–05). These types of incidents are beyond the direct control of rail operators.

Passenger, employee and public fatalities are summarised in Table 1. There was one passenger and one public fatality in 2005–06 which was at, or close to, the lowest level recorded over the last decade (Figure 1). The public fatality resulted from a train colliding with a road vehicle at a level crossing and is the subject of an investigation by the Australian Transport Safety Bureau (ATSB).

Three employees were killed in 2005–06 which is consistent with the historical record. These fatalities occurred in separate incidents and all involved persons being struck by a train. Two of the incidents are being investigated by the Office of Transport Safety Investigations (OTSI) (Table 1).

Table 1. Fatalities on the NSW Rail Network — July 2005 to June 2006*

Date	Category	Location	Description
4 July 2005	Collision with person	Zig Zag	Rail volunteer fell from a rock ledge onto tracks and was run over by a train
21 February 2006	Collision with person	Revesby (Sydney)	Passenger train struck and fatally injured a person who stumbled from a platform seat and fell in front of train
15 April 2006	Collision with person	Ariah Park	Rail volunteer for a heritage passenger service was fatally injured when crushed between the buffers of the locomotive and wagon†
22 May 2006	Collision with person	Baan Baa	During ballasting operations an employee was fatally injured when struck by wagon of ballast train†
5 June 2006	Collision with road vehicle at level crossing	Albury	Country passenger train struck a road vehicle at a level crossing, killing the driver of the road vehicle§

* Excludes trespasser fatality and suicide.
† Subject of an investigation by NSW Office of Transport Safety Investigations.
§ Subject of an investigation by the Australian Transport Safety Bureau.

4. Figures quoted for previous years may differ from those reported elsewhere due to data validation

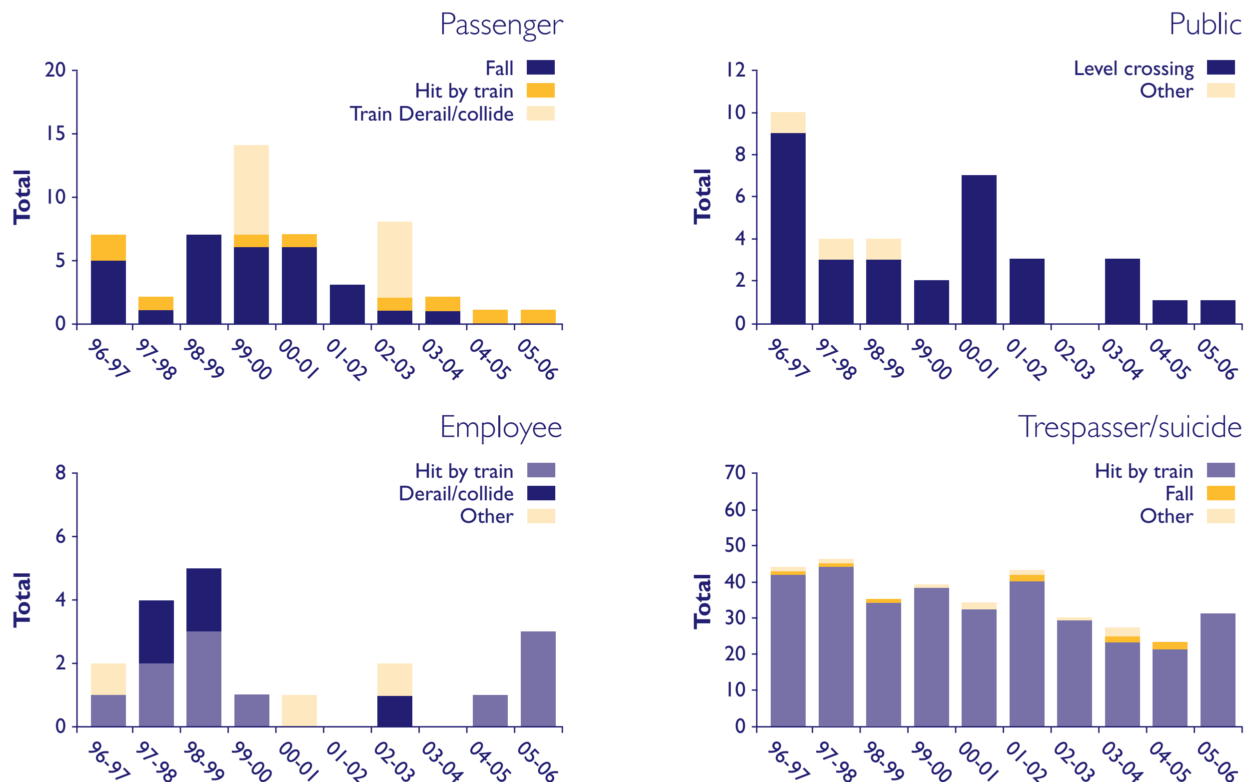

Figure 1. Fatal Injuries on the NSW Rail Network — 1996–97 to 2005–06

2.2 injury

Serious injury — July 2005 to June 2006

Serious injury statistics in this section are based on a provisional reclassification of reported injury data to align it as closely as possible with the injury severity grading of the national incident classification scheme, ON–S1.[5]

The largest number of serious injuries in 2005–06 was associated with passengers (403) (Figure 2). Most injuries (90%) were the result of falls on railway property, for example, between platform and train or down stairs.[6] Risk modelling elsewhere has shown that passenger falls are one of the greatest contributors to overall safety risk on railways, reflecting the large number of passengers moving on or about railway premises. In NSW there were approximately 280 million passenger journeys in 2005–06.

There were four passenger injuries associated with strikes by trains. In three cases a passenger fell between the platform and a moving train. The fourth incident involved a passenger falling from the platform into the path of an approaching train (Table 2).

The number of employee serious injuries (25) was much lower than that of passengers. However, the injury rate (as a proportion of total employees, 22,300) was higher. More than half of employee injuries (14) were associated with assault or falls. The remaining 11 injuries are summarised in Table 2.

Approximately 10% of all passenger and employee serious injuries in 2005–06 were the result of assault. Historically, assaults were not reported as railway occurrences. Determining the current rate of assault is also difficult because some assault incidents are not reported at all or are reported directly to police.

The NSW Bureau of Crime Statistics and Research collects data on criminal incidents on railway premises including trains, railway stations and carparks. This data shows that the majority (80%) of assaults on railway premises occur on stations. There has been a significant decrease in these assaults between 2002 and 2006.

5. For the purpose of this report, an injury is classified as Serious if the injured person is taken to hospital. This is a more inclusive criterion compared to that of ON–S1, which is based on hospital admission. Typically, there is insufficient information supplied in incident notifications to determine whether or not a person taken to hospital was actually admitted. **6.** A small number of slip trip and fall injuries are the result of falls on railway property with a health–related cause e.g. person faints and is injured in subsequent fall.

Table 2.	Serious injuries on the NSW Rail Network — July 2005 to June 2006*

Date	Location	Description
20 July 2005	Blacktown	Passenger kicked out a window of passenger train causing open wound to leg. Passenger taken to hospital
9 August 2005	Blacktown	Passenger stumbled into side of departing passenger train and fell between platform and train. Passenger taken to hospital
31 August 2005	Dubbo	Motor cycle crashed on running line at level crossing. Rider taken to hospital. No trains involved although track machines in section at time
10 September 2005	Lewisham	Seat fire in Run 41-E extinguished by the fire brigade. Train guard suffered smoke inhalation and taken to hospital
9 October 2005	Leura	Passenger fell between train and platform and was struck by passenger train. Passenger taken to hospital
24 November 2005	Town Hall	Embers from earlier track work ignited dust in air conditioning ducting. NSW Fire Brigade ordered evacuation. Several transit officers taken to hospital with smoke inhalation
25 February 2006	Port Waratah	Low speed collision between train and coal wagons in a siding due to communication breakdown between shunter and locomotive driver. Two employees taken to hospital
6 April 2006	Denman	Freight train collided with road vehicle at level crossing. Occupant of road vehicle sustained minor head injuries and taken to hospital
29 April 2006	Junee	Track worker caught between spot tamper machine and a flat top welding trolley. Worker taken to hospital
17 May 2006	Miranda	Passenger train struck and injured a passenger who fell out of wheelchair and off platform. Passenger taken to hospital
23 May 2006	Sutherland	Freight train struck passenger who was on platform and came into contact with wagon on train. Passenger taken to hospital
7 June 2006	Morisset	Gantry crane from track laying machine toppled and fell onto main line then rolled before coming to rest. Two rail workers inside crane taken to hospital
18 June 2006	Bondi Junction	Station evacuated due to smoke and toxic fumes caused by rail grinder. Two employees taken to hospital
23 June 2006	Berry	Passenger train struck road vehicle which entered crossing after warning signals had been activated. Passenger in road vehicle taken to hospital

* Injury classified as serious if person taken to hospital. Excludes assault, trespasser injury, attempted suicide and falls.

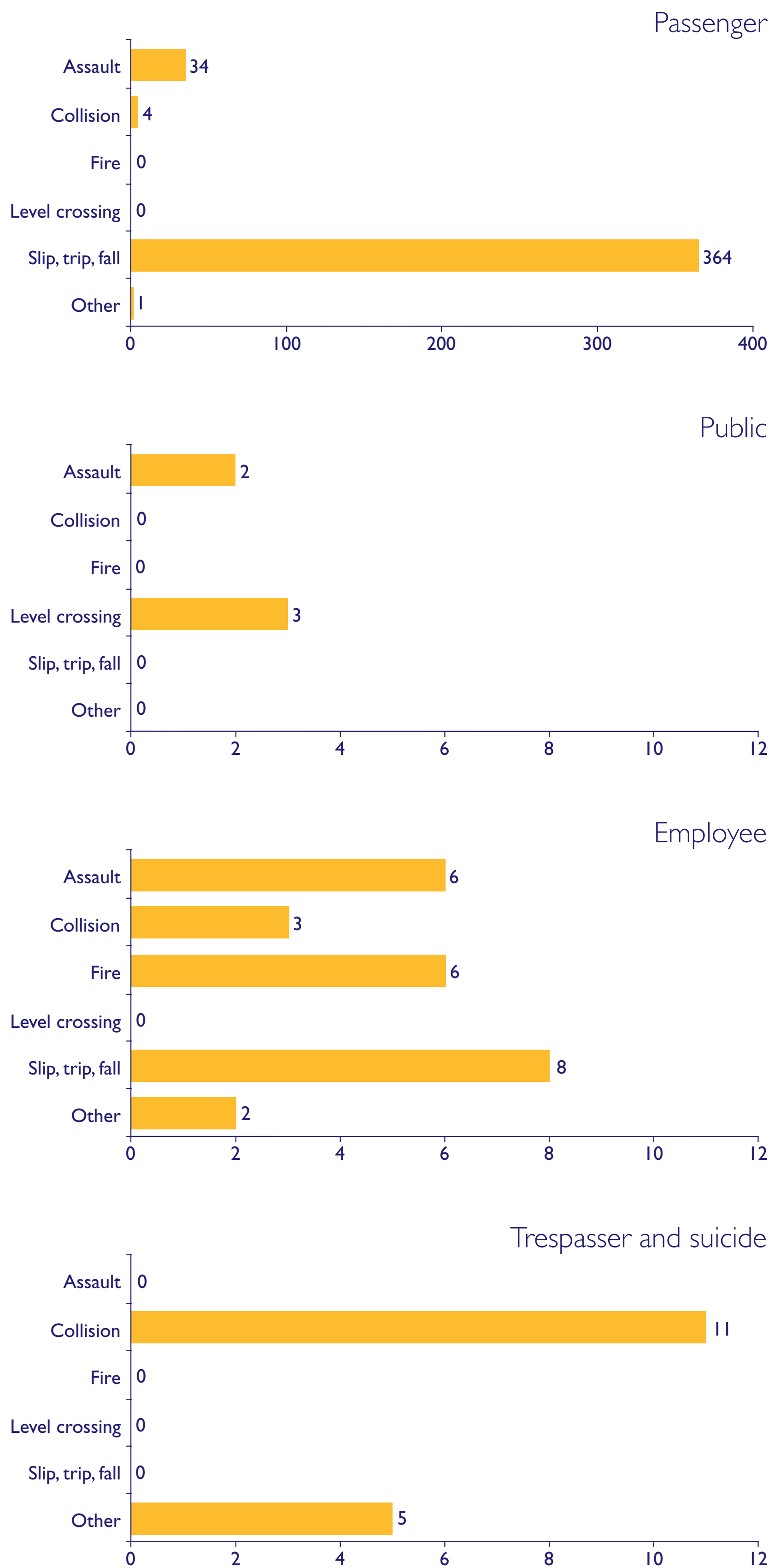

Figure 2. Serious injuries on the NSW Rail Network — July 2005 to June 2006

Injury classified as serious if incident report refers to person taken to hospital.

Injury — historical record

The historical injury data for NSW has been classified and graded according to significantly different criteria to those specified in ON–S1. Therefore, to provide a valid basis for comparison over time, the historical injury record of Figure 3 considers all injuries, irrespective of severity. Data has been reviewed to exclude, as best as possible, injuries not on railway property and non–injury casualties (e.g. heart attack) both of which tended to be reported historically.

Passenger and employee injuries associated with train accidents such as derailment have decreased over time. The count for 2005–06 was at, or close to, the lowest level of the last decade. Assault–related injuries increased in 2005–06 but these were not generally reported historically. An increase in the number of fall–related injuries corresponds with an increase in the reporting of all fall–related incidents since 2003.

Public injuries from level crossing incidents also decreased in 2005–06 and are at, or close to, their lowest level for the last decade. Incidents in which members of the public were hit by trains are associated with trams striking pedestrians on the Sydney light rail system.[7]

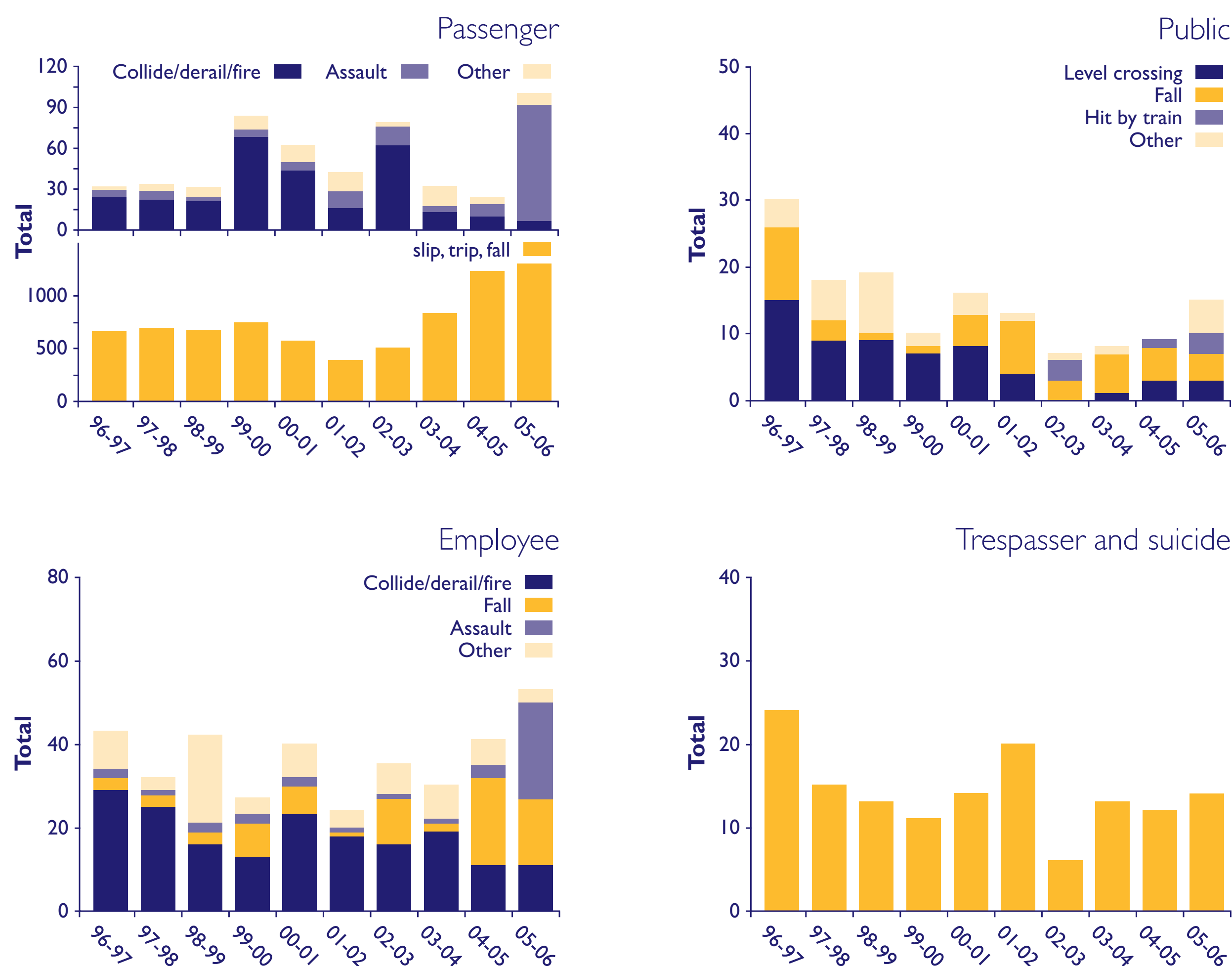

Figure 3. Serious injuries on the NSW Rail Network — July 2005 to June 2006

Includes all reports of injury, irrespective of severity.

7. The historic record of rail safety occurrences for the Sydney light rail system starts in 2002-03.

3. key rail safety occurrences

This section summarises statistics for four ON–S1 occurrence categories; train collision, train derailment, fire and level crossings. A subset of incidents within each of these categories represent high–risk railway incidents, that is, they have potential to cause multiple injuries and fatalities.

3.1 train collision

While a large number of collisions are reported to ITSRR each year, most are minor incidents with limited potential for a catastrophic outcome. For example, over 400 Collision with Missile incidents were reported in 2005–06 (Figure 4) with most (95%) involving stones thrown at trains. Other frequent, but less severe, incidents included collisions with obstructions (mainly vandalism and overhanging/fallen trees) and with animals (mainly livestock).

The number of train to person collisions in 2005–06 (26) was the lowest recorded over the last 10 years. Ten of these incidents resulted in a fatality. Six of the ten fatalities arose from injuries to trespassers. The other four fatalities were summarised previously (Table 1).

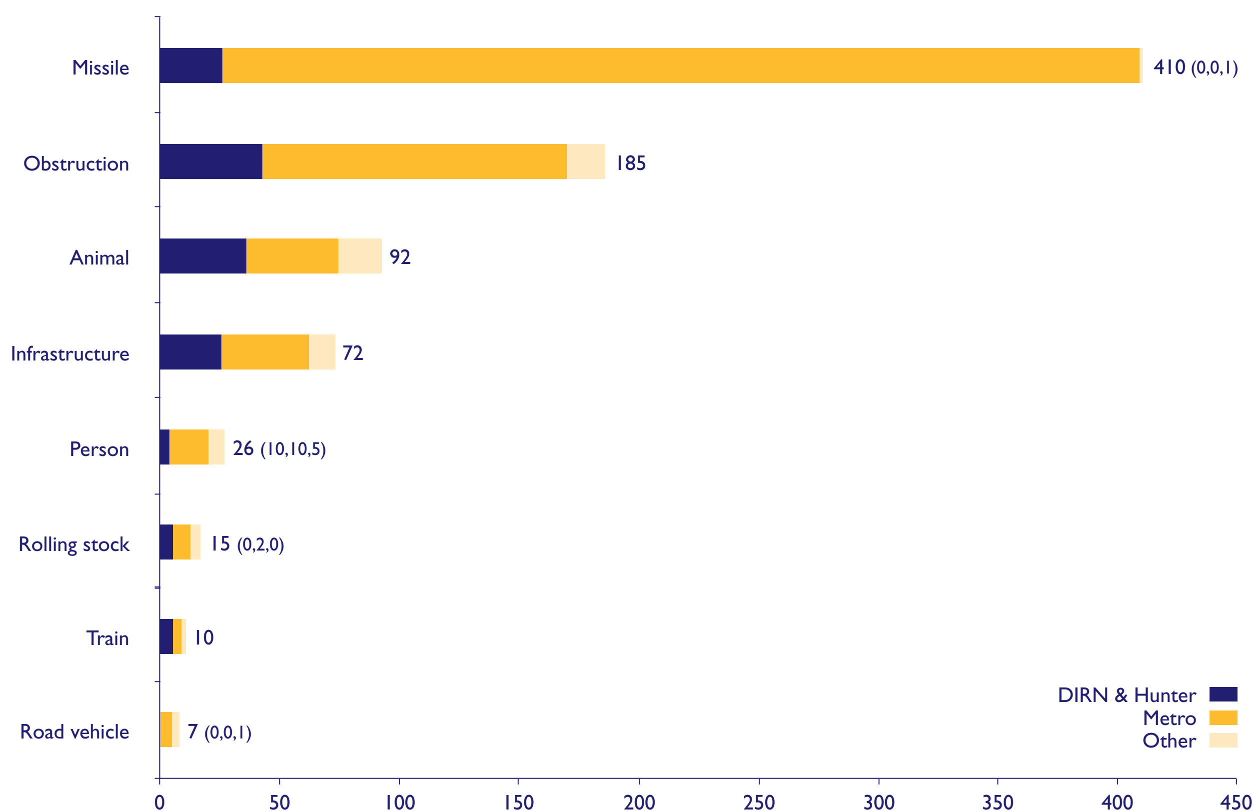

Figure 4. Train collisions on the NSW Rail Network[8] — July 2005 to June 2006

In brackets are number of fatalities, serious injuries and minor injures respectively.
Train to Person collisions exclude incidents classified as suspected/attempted suicide and incidents at level crossings.

8. The allocation of incidents to network type (e.g. DIRN, Metro.) is based on the incident location as supplied in the incident notification. The statistics for each network type may include incidents in yards etc. adjoining the running lines of each network. "Other" includes the Country Regional Network.

The number of train to train collisions in 2005–06 (10) is consistent with the historical record (Figure 5). No injuries were reported for any of these incidents. Seven incidents involved shunting or low speed collisions of track machines. The other three incidents comprised swinging doors on freight trains striking trains passing in the opposite direction.

All train to rolling stock collisions in 2005–06 (15) involved low speed shunting or runaways in yards. One incident resulted in two people being taken to hospital for treatment (Table 2). Three of the seven incidents of trains colliding with road vehicles involved trams on the Sydney light rail system.

The effect of additional incident reports from small operators is apparent in the historical record of both rolling stock and infrastructure collisions (Figure 5). The majority of these incidents occurred in yards and were less likely to be reported via the managers of the three major networks.

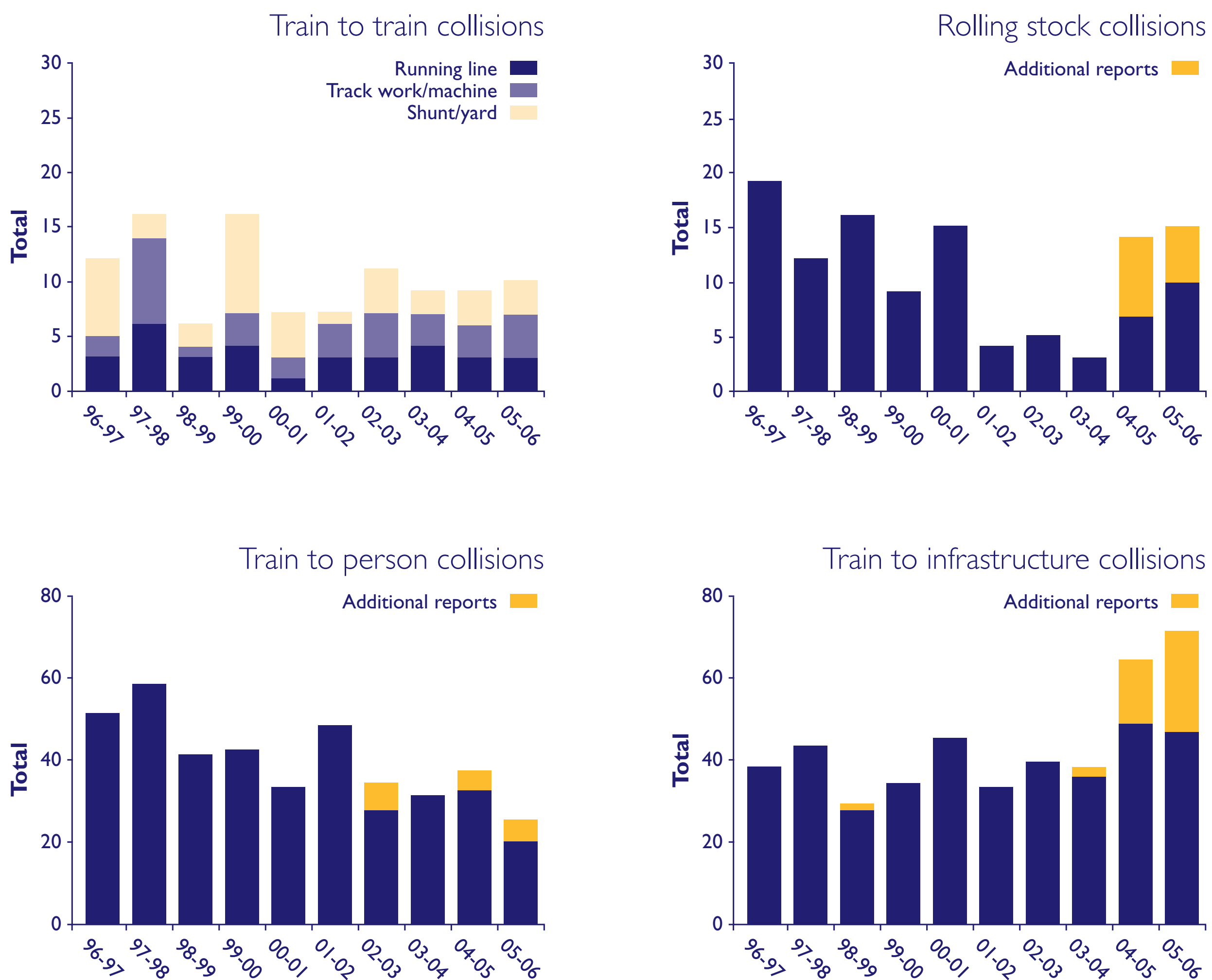

Figure 5. Train collisions on the NSW Rail Network — 1996–97 to 2005–06

"Additional Reports" refers to incidents reported directly by small operators (available for recent years).
Train to person collisions do not include incidents classified as suspected / attempted suicide or incidents at level crossings

3.2 train derailment

Forty three running line derailments were reported to ITSRR in 2005–06 (Figure 6). This is down from 65 in 2004–05 but consistent with the longer term count for these types of incidents. No injuries were reported for any of these incidents.

Two of the 43 running line derailments involved passenger trains in service. One incident involved the derailment of a carriage as part of a tourist train on an isolated line. The second was the derailment of an XPT passenger service at Harden as a result of a broken axle. The latter incident is the subject of an investigation by the Australian Trasnport Safety Bureau (ATSB).

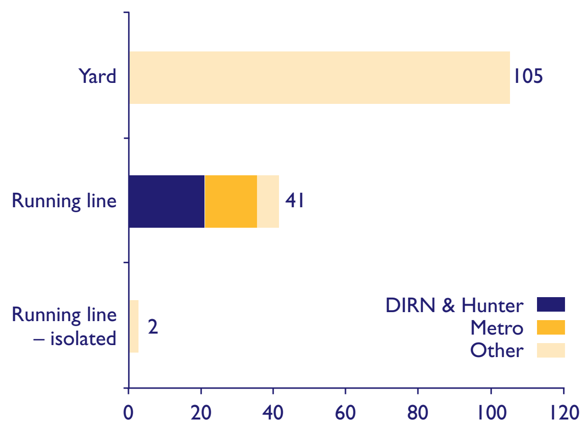

Figure 6. Derailments on the NSW Rail Network — July 2005 to June 2006

No injuries reported for any incident

Almost all remaining running line derailments involved either freight trains or track machines. A Pacific National freight train derailment on the Defined Interstate Rail Network (DIRN) (Yerong Creek) is the subject of an investigation by the ATSB. A Pacific National derailment on the DIRN between Conoble and Ivanhoe is the subject of an investigation by Office of Transport Safety Investigations (OTSI).

All running line derailments on the metropolitan network involved track machines or freight trains. A derailment of an Interail freight train at Lidcombe is the subject of an investigation by OTSI.

There were 105 yard derailments in 2005–06 which is less than that for 2004–05 (119) and consistent with a long–term decrease over the last 10 years (Figure 7). The majority of these incidents occurred wholly within yards. However, a small number of yard derailments were actually track machines derailing on sections of running line closed for track maintenance. No injuries were reported for any of these incidents.

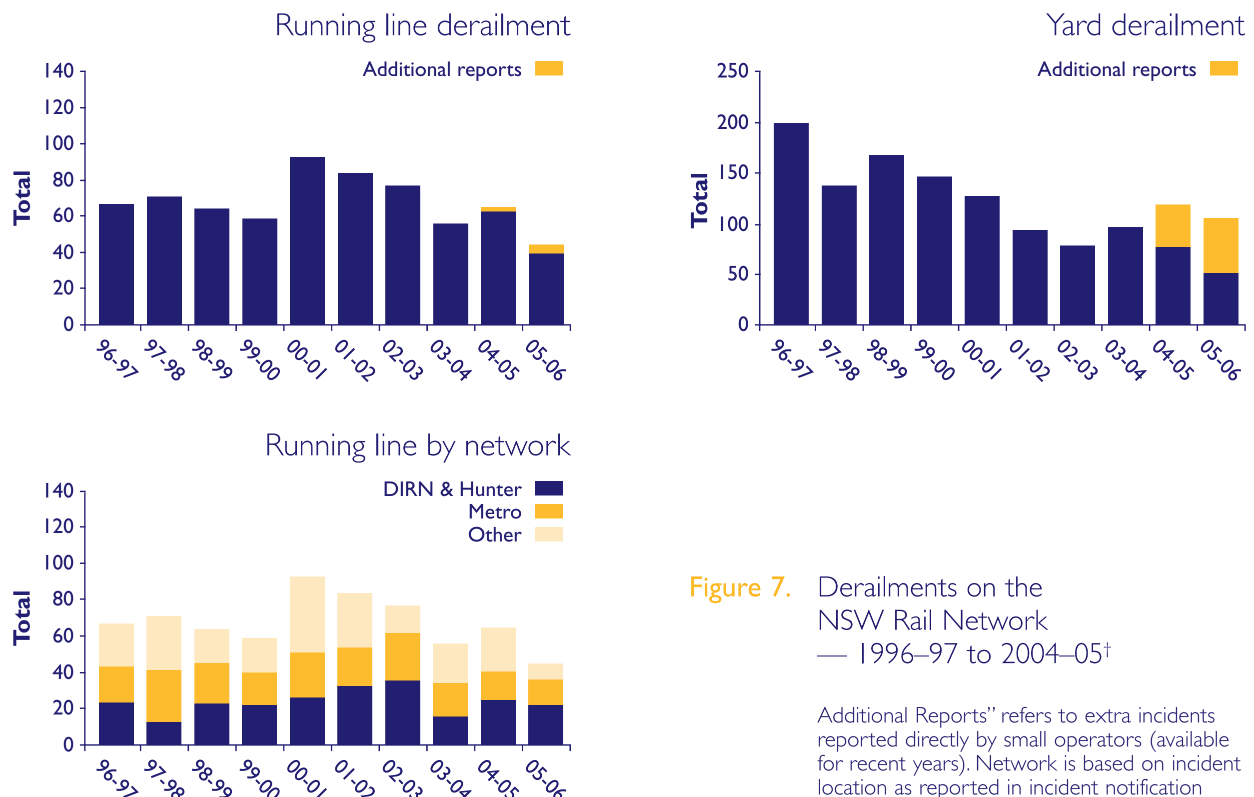

Figure 7. Derailments on the NSW Rail Network — 1996–97 to 2004–05†

Additional Reports" refers to extra incidents reported directly by small operators (available for recent years). Network is based on incident location as reported in incident notification

3.3 fire

Under the national incident classification scheme line–side, station and train fires are all reported under a single category *Fire*. There were 294 reports of fires on or affecting the NSW rail network in 2005–06.

A breakdown of incidents (Figure 8) shows approximately 60% were off–train fires comprising line–side fires (such as grass fires, sleepers) and small fires on stations. There were a variety of causes of off–train fires including arson, trackwork (e.g. sparks from track grinding) and faulty rolling stock (e.g. sparks from sticking brakes). Two relatively serious incidents involved fires at large rail stations in Sydney. Both were associated with track work and resulted in employees taken to hospital suffering smoke inhalation (Table 2).

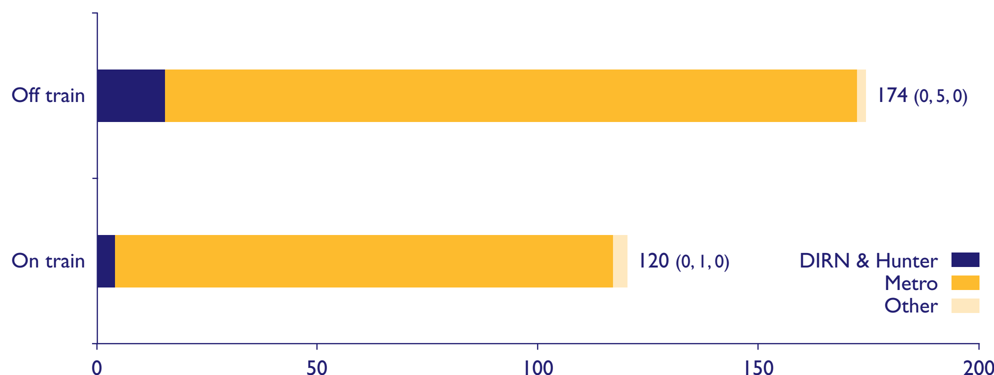

Figure 8. Fires on the NSW Rail Network — July 2005 to June 2006
In brackets are number of fatalities, serious injuries and minor injures respectively

A total of 120 on–train fires were reported to ITSRR in 2005–06, up from 84 in 2004–05 and consistent with an increasing trend in this type of incident over the last 10 years (Figure 9). One person was admitted to hospital as summarised previously in Table 2.

Most on–train fires occurred on passenger trains in the Sydney metropolitan area (120). Approximately 80% of these fires were vandalism–related incidents typically involving paper fires on trains or attempted lighting of seats. The increase in fires coincides with a general increase in vandalism–related incidents across the metropolitan network over the same period.

Eleven of the 120 on–train fires occurred on freight trains. All were associated with locomotive equipment faults. No injuries were reported for any of these incidents.

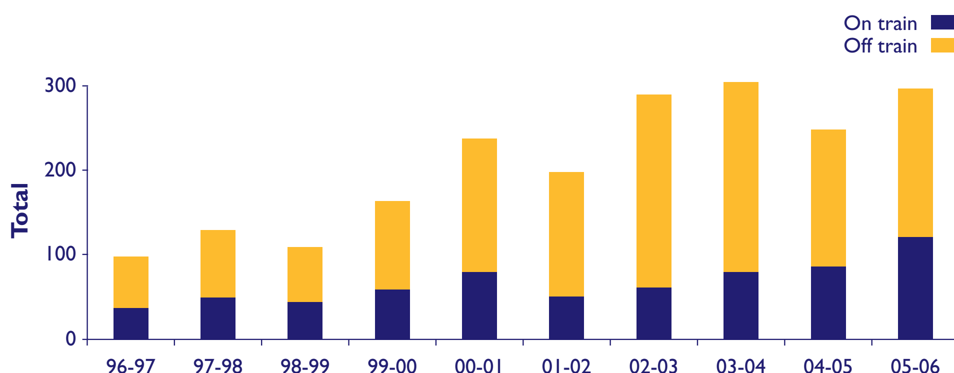

Figure 9. Fires on the NSW Rail Network — 1996–97 to 2005–06

3.4 level crossings

There are more than 3,800 level crossings in NSW and most are located in regional areas. They represent the main point of interaction between rail and road and pose a high risk for serious collisions between trains and road vehicles.

The number of collisions at level crossings is at, or close to, the lowest level observed over the last 10 years (Figure 11).

There were nine collisions between trains and road vehicles in 2005–06 (Figure 10). This is lower than the count for 2004–05 (11) and consistent with a longer term decrease in these types of incidents (Figure 11). One incident (Albury) resulted in the death of the driver of the road motor vehicle and is the subject of an investigation by the ATSB.

For the second consecutive year there were no incidents involving a pedestrian being struck by a train at a level crossing.[9]

A contributing factor to the decrease in the number of serious collisions at level crossings is the removal of a number of crossings and the upgrading of others. Over 20 level crossings have been closed in NSW over the past few years and major upgrades were undertaken at four level crossings in 2004–05.[10]

The other major level crossing incident subcategory under ON–S1[11] is that of equipment failure (83 in 2005–06). A breakdown of equipment failures by network is shown Figure 10. In 2005–06 the majority of incidents (67) were at crossings on the metropolitan network. Historically, (Figure 11) the number of reported incidents on the Defined Interstate Rail Network (DIRN) and "Other" locations was similar to or exceeded that for the metropolitan network. However, the number of reported incidents on the DIRN and Country Regional Network dropped sharply in 2004–05.

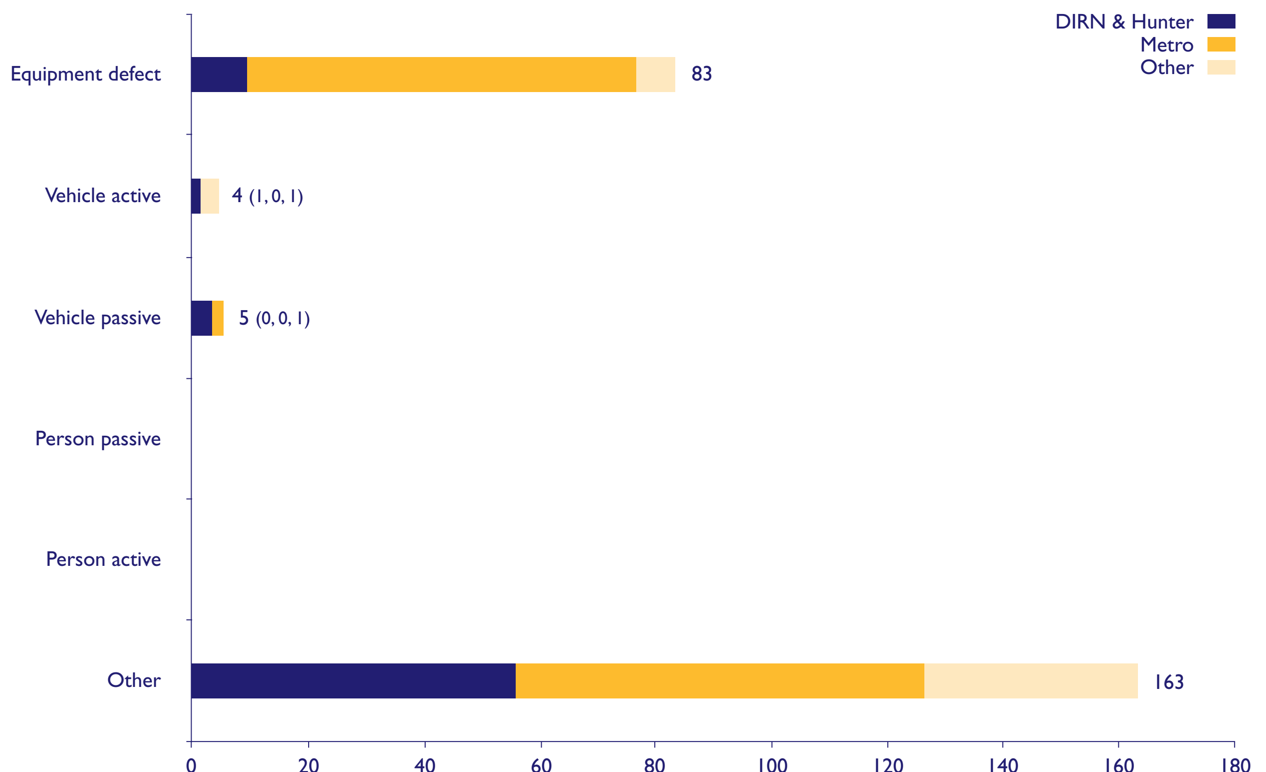

Figure 10. Level crossing incidents on the NSW Rail Network — July 2005 to June 2006.
In brackets are number of fatalities, serious injuries and minor injures respectively

9. Excludes suspected cases of suicide. **10.** NSW Level Crossing Strategy Council (www.levelcrossings.nsw.gov.au). **11.** Active Crossing: movement of pedestrians and road vehicles actively controlled by devices such as flashing lights, bells or other audible devices, gates and barriers. Passive crossing: movement of pedestrians and road vehicles controlled by signs or devices which rely on a pedestrian or driver of road vehicle to detect the approach of a train by direct observation.

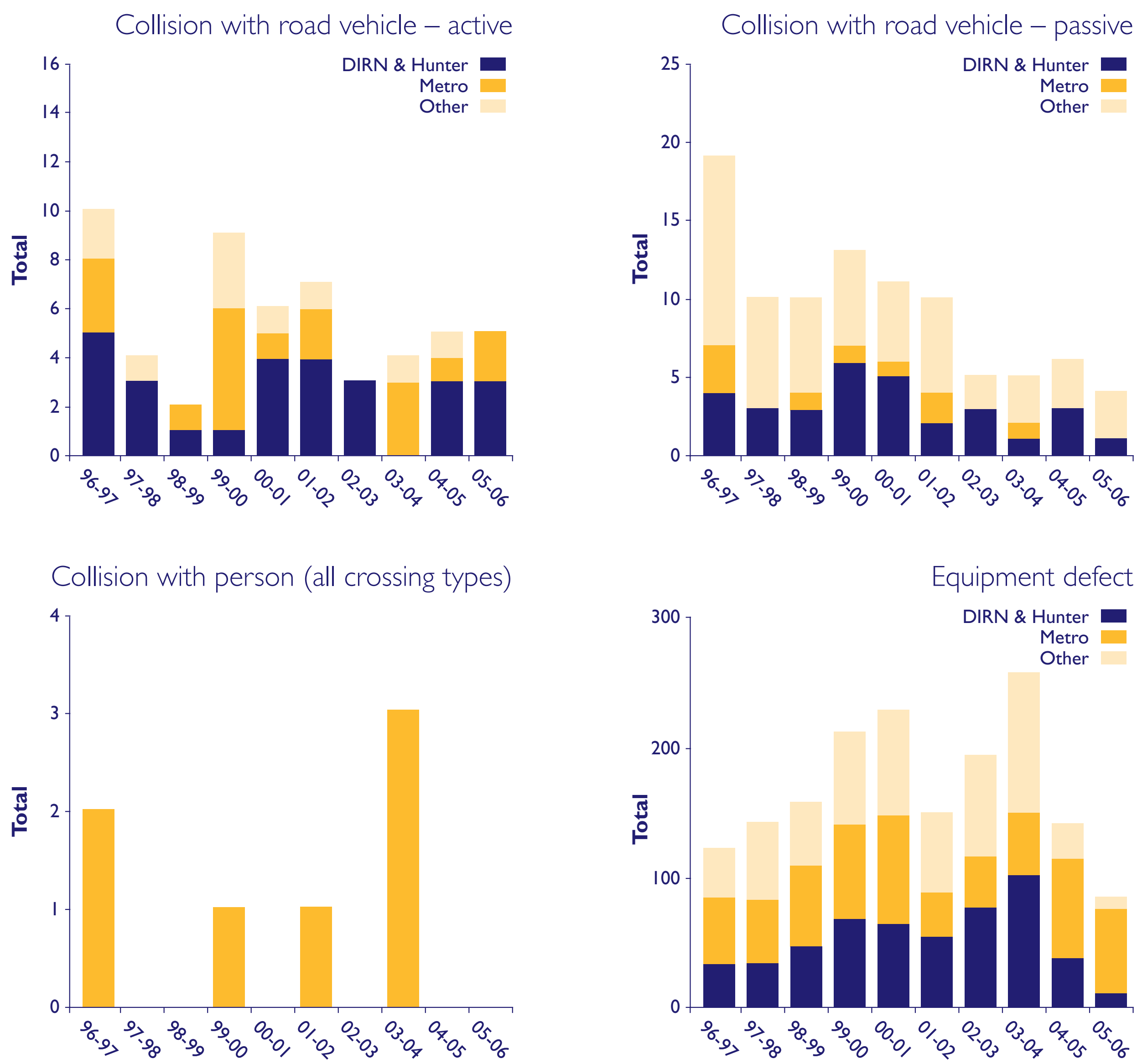

Figure 11. Level crossing incidents on the NSW Rail Network — 1996–97 to 2005–06[12]

12. Excludes generic category "Other".

Table 3. Level crossing collisions in NSW – July 2005 to June 2006

Date	Crossing Type	Location	Description
16 August 2005	Active	Aberdeen	Car rolled into wagon of freight train. No injuries reported
21 October 2005	Passive	Yanco	High-rail* driver collided with semi-trailer. No injuries reported
4 February 2006	Active	Lochinvar	Train struck police car in pursuit of a stolen vehicle. Two police officers jumped clear
6 April 2006	Passive	Denman	Freight train collided with car. Occupant of road vehicle sustained minor head injuries
4 May 2006	Passive	Wellington	Passenger train struck road vehicle. No injuries reported
15 May 2006	Active	Sandown	During shunting movement in Shell siding, freight train collided with a road vehicle. No injuries reported
31 May 2006	Passive	Bogan Gate	Freight train struck semi trailer. No injuries reported
5 June 2006	Active	Albury	Country passenger train struck road vehicle. Driver of motor vehicle deceased†
23 June 2006	Active	Berry	Passenger train collided with road vehicle which entered the crossing after warning signals activated. Passenger of road vehicle taken to hospital

* High-rail - A vehicle capable of running on road and rail. Generally these are standard road vehicles which have been fitted with a pair of flanged rail wheels on the front and rear (Australasian Railway Association website)

† Subject of an investigation by the Australian Transport Safety Bureau

4. precursor rail safety occurences

Most of the rail safety incidents reported to ITSRR each year do not result in an adverse outcome such as injury or damage. Many of these incidents are *precursor events* — an event which could, under specific circumstances, lead to a serious incident. This section summarises four of the main precursor event categories.

Assessing the current level of precursor events in relation to historical data is difficult because the historical record of precursor events is particularly sensitive to changes in reporting practice and definition. By their nature, precursor events are often indirectly related to serious incidents and their importance as contributing factors to accidents has only emerged over time through findings from accident investigation and modelling of safety risks.

4.1 proceed authority irregularities

In NSW there are five different systems used to manage the movement of rail traffic in a way that ensures adequate separation of trains and prevents conflicting movement.[13] An integral part of each of these systems is a means to authorise the movement of a train from one section of track to another.

For the Sydney metropolitan area, the surrounding inter–urban network and the majority of the DIRN, the authority to proceed is given by a signal indication. For much of the Country Regional Network and the western section of the DIRN, an authority to proceed is given via possession of some form of token (e.g. metal rod or staff) or the issue of a written or verbal authority.

Signals Passed at Danger (SPAD)

The national incident classification scheme has five SPAD subcategories. The two most important subcategories in terms of collision risk are *Driver Misjudged and Completely Missed While Running*. Typically, the information provided in an initial incident notification is not sufficient to determine the exact circumstances leading to each SPAD[14] or the correct ON–S1 subcategory. For this reason, the two SPAD subcategories are combined as *Driver Error* in Figures 12 and 13.

There were 202 SPADs involving driver error in 2005–06 (Figure 12). Gauging current performance in relation to the historical record (Figure 13) is difficult because the historical SPAD incident record is affected by changes in reporting definitions and practices. For example, the sharp rise in the number of SPADs from 2003–04 (Figure 13) coincided with a change in the method of assessing and reporting by RailCorp.[15] The number of SPADs in NSW for 2005–06 was consistent with the annual count since the change in SPAD reporting.

The number of SPADs (alone) provides little indication of the actual risk posed by incidents of this type. This is because the actual risk of collision following a SPAD depends on many factors including whether the signal is equipped with engineering defences which automatically stop a train passing a red signal, whether the train travelled into another section and whether that section was occupied. Of the 295 incidents reported by RailCorp in 2004–05, none were assessed as severe.[16]

The other principle type of SPAD reported on the NSW network is *Restored as Train Approached* (Figure 12). These incidents involve a signal indication changing from proceed to stop as a train approaches, with insufficient time given to the driver to stop the train.

Restored as Train Approached SPADs are associated with signaller error or irregularities in maintenance procedures. They are not considered a significant contributor to train to train collisions as the route ahead of the signal will be set for the train. However, they still pose a safety hazard because rapid deceleration associated with emergency braking may cause load shifts on freight trains or falls on passenger trains.

13. There is another series of systems to authorise train movements at times when the normal systems of Safeworking are not available. **14.** ITSRR is working with accredited operators to ensure that classification of SPADs is updated to reflect the findings of subsequent SPAD investigations. **15.** Information drawn from Railcorp Annual Report 2003–04. **16.** Information drawn from RailCorp Annual Report 2004–05.

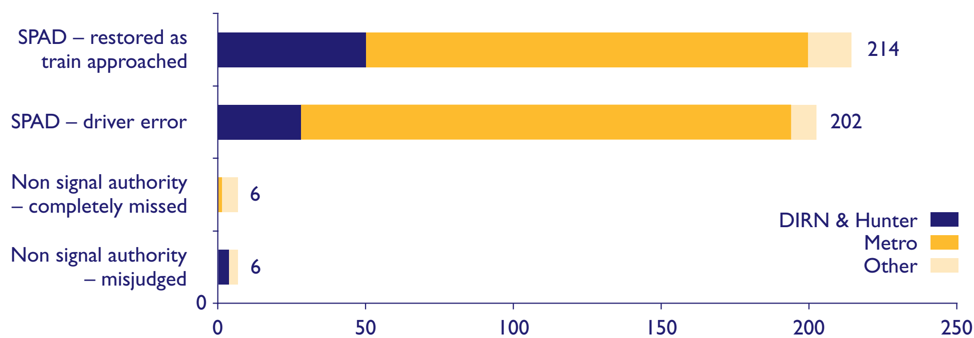

Figure 12. Signals Passed at Danger and proceed authority exceedance on the NSW Rail Network — July 2005 to June 2006.
Incidents reported by all operators

Proceed authority exceeded

There were 12 reports of train drivers exceeding the limit of their authorised movement under non–signalled systems of Safeworking. Six of these were classified as Completely Missed and six as Driver Misjudged which is consistent with the historical record (Figure 13).

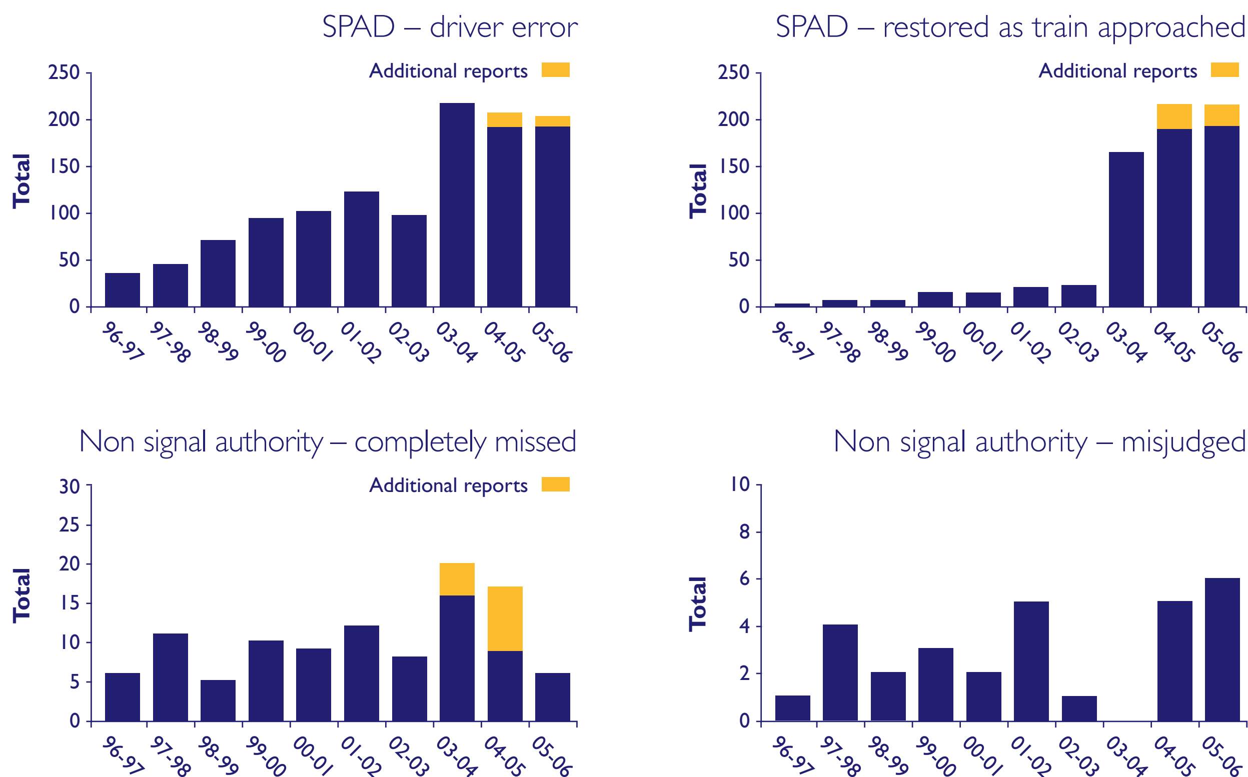

Figure 13. Signals Passed at Danger and proceed authority exceedance on the NSW Rail Network — 1996–97 to 2005–06.
"Additional Reports" refers to incidents reported directly by small operators (available for recent years)

4.2 signal and track irregularities

Signal irregularities

There are two subcategories of signal irregularity under the national classification scheme — *Wrong Side Failure and Other*. *Wrong Side Failure* is the higher risk subcategory, comprising faults which result in the signal displaying a less restrictive aspect than required, for example, showing a "proceed" indication when a "stop" is required. There were four signal wrong side failures on the NSW network in 2005–06 (Figure 14) which is close to the lowest observed over the last 10 years.

The historical record of *Signal Irregularity–Other* has been affected by changes in reporting practices (Figure 15). The number of reported incidents approximately doubled in 2003–04, at the same time as the aforementioned jump in SPAD related incidents (Figure 13).

There were 67 *Signal Irregularity–Other* incidents reported in 2005–06 which is consistent with the recent historical record. These comprise a range of faults that do not lead to a wrong side failure. These are generally low risk incidents as long as that systems and procedures governing train movements at times of signal failure are adequate.[17]

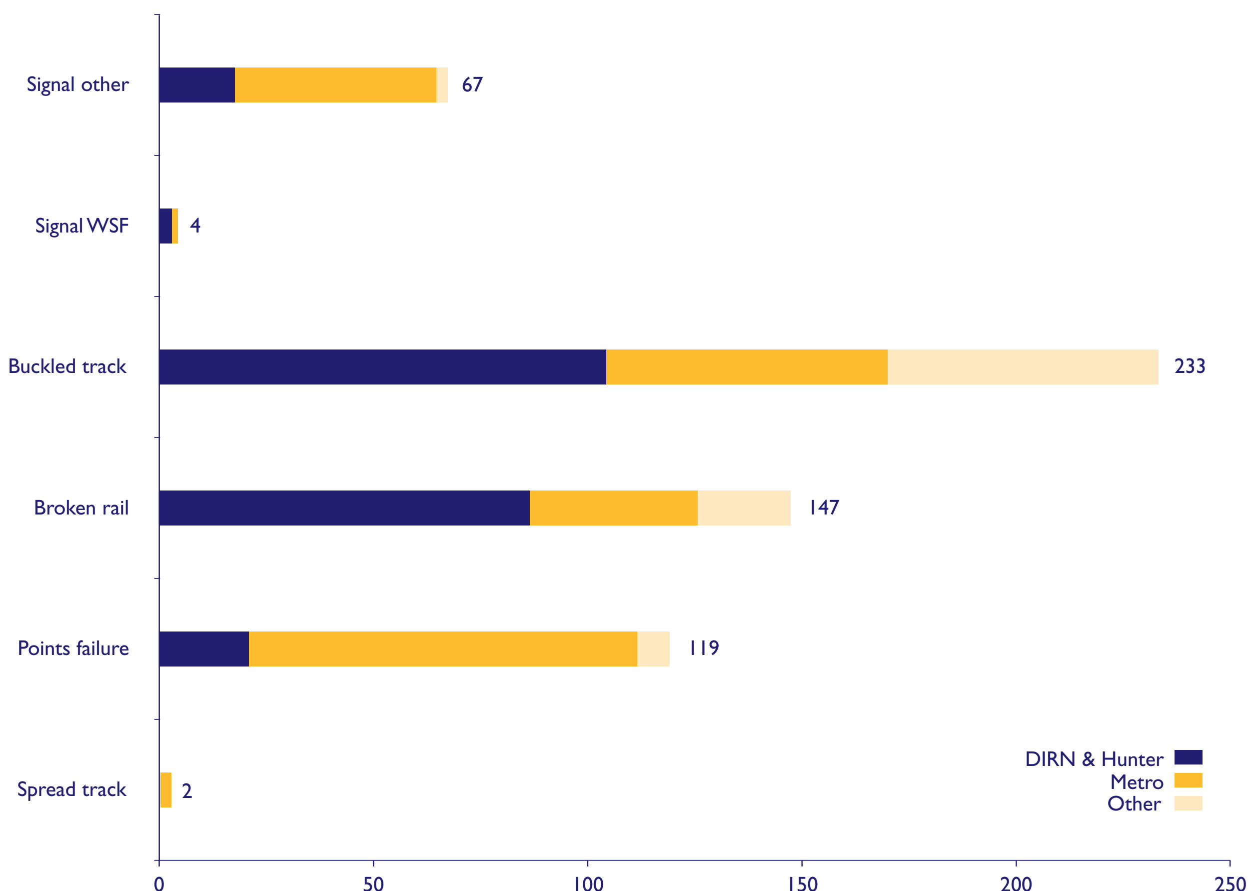

Figure 14. Track and signal irregularities on the NSW Rail Network — July 2005 to June 2006.
Signal WSF is Signal Wrong Side Failure. Buckled Track includes misalignments.

17. The Glenbrook Rail Accident was attributed, in part, to deficiencies in procedure and training related to movement of trains following a signal failure.

2.2 rail industry safety report

Track irregularities[18]

Track condition is an important indicator of rail safety because track–related defects may lead to more serious incidents, for example, a broken rail causing a train derailment.

The largest number of track irregularities in 2005–06 was associated with buckled track (Figure 14). This subcategory encompasses a range of defects including rail misalignment, other track geometry defects and a range of irregularities reported by train drivers, whether actual faults are found or not. There were 233 buckled track incidents in 2005–06 which is consistent with the recent historical record (Figure 15). The incident rate (per track kilometre) was comparable between the three networks.

There were 147 broken rails reported in 2005–06. This was lower than 2004–05 (168) and consistent with a decrease since a peak in 2001–02 (Figure 15). The majority of broken rails occurred on the Defined Interstate Rail Network (DIRN) and the incident rate (broken rail per track kilometre) was higher on the DIRN compared to other networks.[19]

The subcategory *Points Irregularity* covers a range of defects including misaligned or broken components as well as damage caused by external agents. The number of point failures in 2005–06 was the highest on record (Figure 15) but was associated with an extremely large number of reported defects on the Sydney metropolitan network in March (28 defects) and April 2006 (23 defects).

There were only two reports of spread track in 2005–06 (Figure 14). These incidents involve rails spreading beyond a tolerable limit and are generally associated with deteriorating timber sleepers. This type of defect may only become apparent when a train passing over the affected track forces the rails apart. There were more than 100 other incidents in ITSRR's database which make reference to spread track. In the majority of cases the spread track was a contributing factor to a derailment.

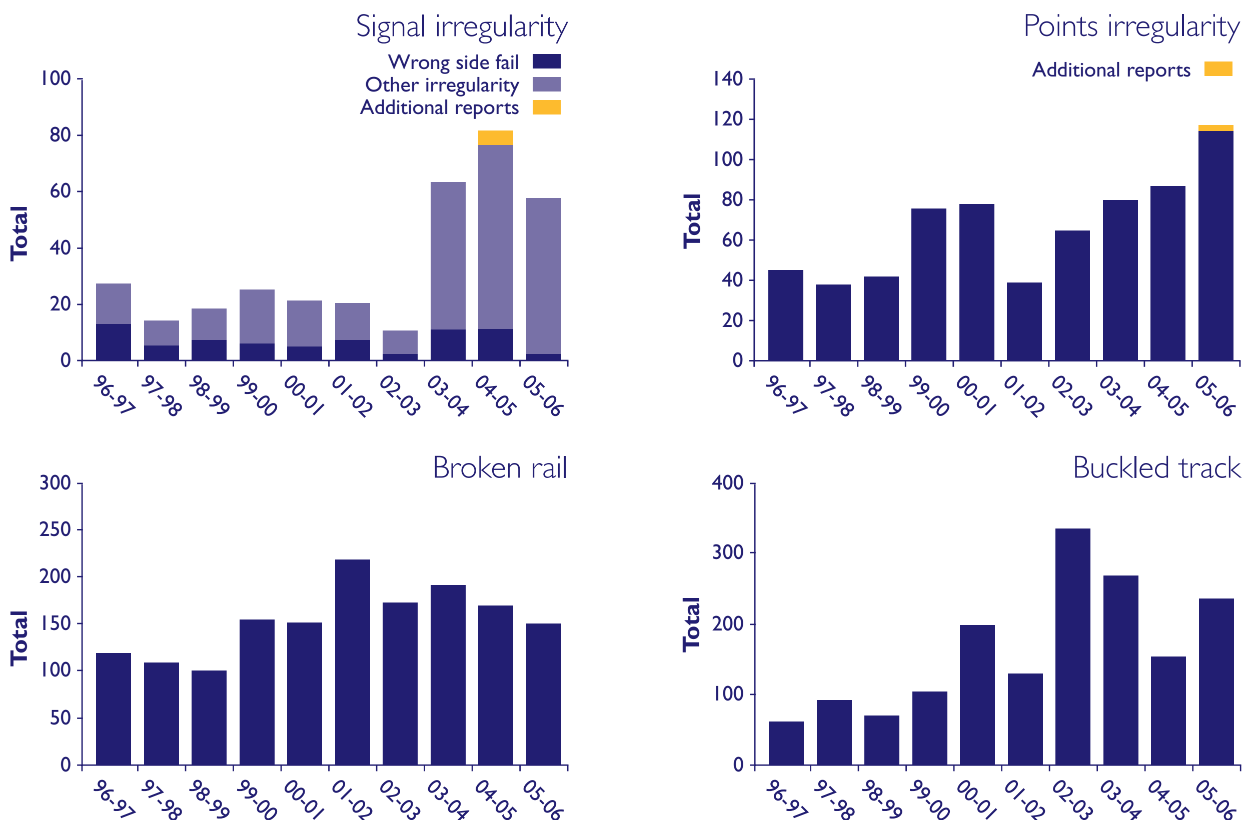

Figure 15. Track and signal irregularities on the NSW Rail Network — 1996–97 to 2005–06.

Buckled Track includes misalignments. "Additional Reports" refers to incidents reported directly by small operators (available for recent years)

18. The statistics for track irregularities have changed from those reported previously because these incidents now include all reports of track irregularities, not just those leading to the imposition of a speed limit or other operating restriction. **19.** The allocation of each incident to a network is based on the location name as supplied in the incident notification. The location name does not always correspond to the exact location of an incident.

4.3 rolling stock irregularities

Rolling stock irregularities are a precursor to collisions and derailments. For example, a derailment of the XPT passenger service at Harden in February 2006 was caused by a broken axle on the power car.

The largest number of rolling stock irregularities in 2005–06 was associated with brake faults (480 in 2005–06; Figure 16). Most incidents were associated with passenger trains (286) but the incident rate (considering the total number of passenger and freight train kilometres travelled) was higher for freight trains. Under ON–S1, brake faults covers a wide range of incidents including component failure (sticking brakes) as well as crew and vandalism–related incidents, for example, interference with handbrakes. Further, the majority of wheel–related incidents in 2005–06 (97) comprised wheel flats and wheel scale which will often have a brake–related cause. For this reason they are combined in the historical record (Figure 17).

The other major rolling stock fault was faulty passenger doors (440 in 2005–06). Again, gauging current performance by comparison to historical data is of limited value because such incidents were generally not reported prior to 2000 (Figure 17). Door failures are the most common type of failure reported for Sydney's metropolitan passenger trains. In recent years, RailCorp has implemented a number of initiatives to reduce the rate of door failure. The number of incidents in 2005–06 was similar to the previous two years but the failure rate is expected to improve in 2006–07.

The number of train parting incidents (79) was comparable to the historical record. All of these incidents involved freight trains and approximately 95% of these incidents were associated with faulty couplers.

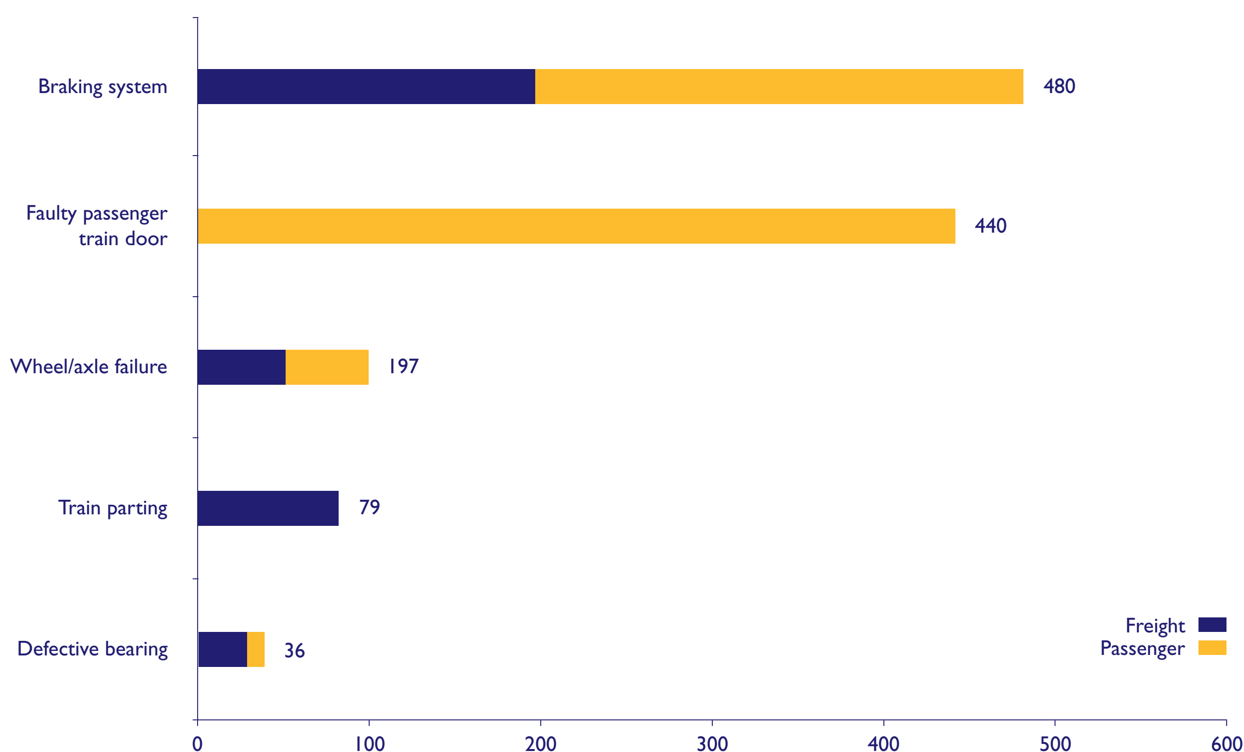

Figure 16. Rolling stock irregularities on the NSW Rail Network — July 2005 to June 2006

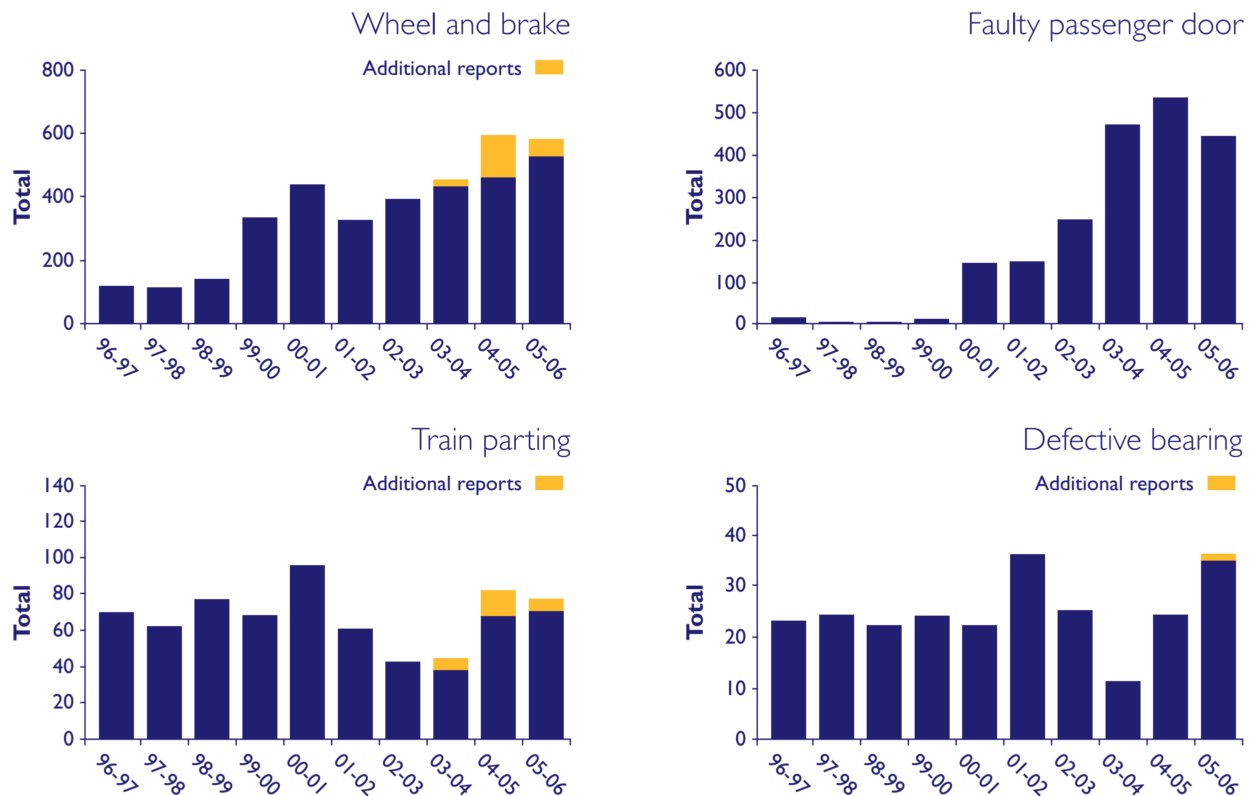

Figure 17. Rolling stock irregularities on the NSW Rail Network — 1996–97 to 2005–06.
"Additional Reports" refers to incidents reported directly by small operators (available for recent years)

4.4 load irregularities

Load irregularities are important precursor events to a range of hazardous incidents. Loads that shift in transit may protrude from wagons and pose a collision hazard for passing trains or infrastructure. Loads spilt on or near to tracks may cause derailments or, in the case of liquids, may lead to slippery rails and a loss of traction.

A summary of load irregularity incidents in 2005–06 is shown in Figure 18. These incidents are associated with freight operations and most occurred on the Defined Interstate Rail Network (DIRN) and Country Regional Network which carry the majority of freight traffic.

The most common type of loading irregularity incident in 2005–06 was *Door Open* (111). These incidents have various causes including vandalism, faulty door fittings and load shifts. A subset of these incidents involved swinging doors which are an important precursor to train collisions — three train to train collisions in 2005–06 were caused by swinging doors (Section 3.1). The number of door open incidents in 2005–06 was higher than previous years (Figure 19) but this is due to the additional operator records added since the start of 2004.

The other major type of load irregularity was load shift (56 in 2005–06). Shifting loads arise through various causes including fastening failures and improper fastening of loads, vandalism and rough riding (due to track condition). Load shifts are also a precursor event to out of gauge loads so there is potential overlap between the subcategories Load Shift and Out of Gauge. The number of incidents for both subcategories was high relative to the historical record, but this reflects the inclusion of additional incident reports from 2004.

The two remaining types of load irregularity shown in Figure 18 (*Lashings Loose and Loading/Unloading Problems*) are not specifically categorised under ON–S1. Both fall under the ON–S1 subcategory *Loading Irregularity–Other,* the count of which for 2005–06 was comparable to the historical record (Figure 19).

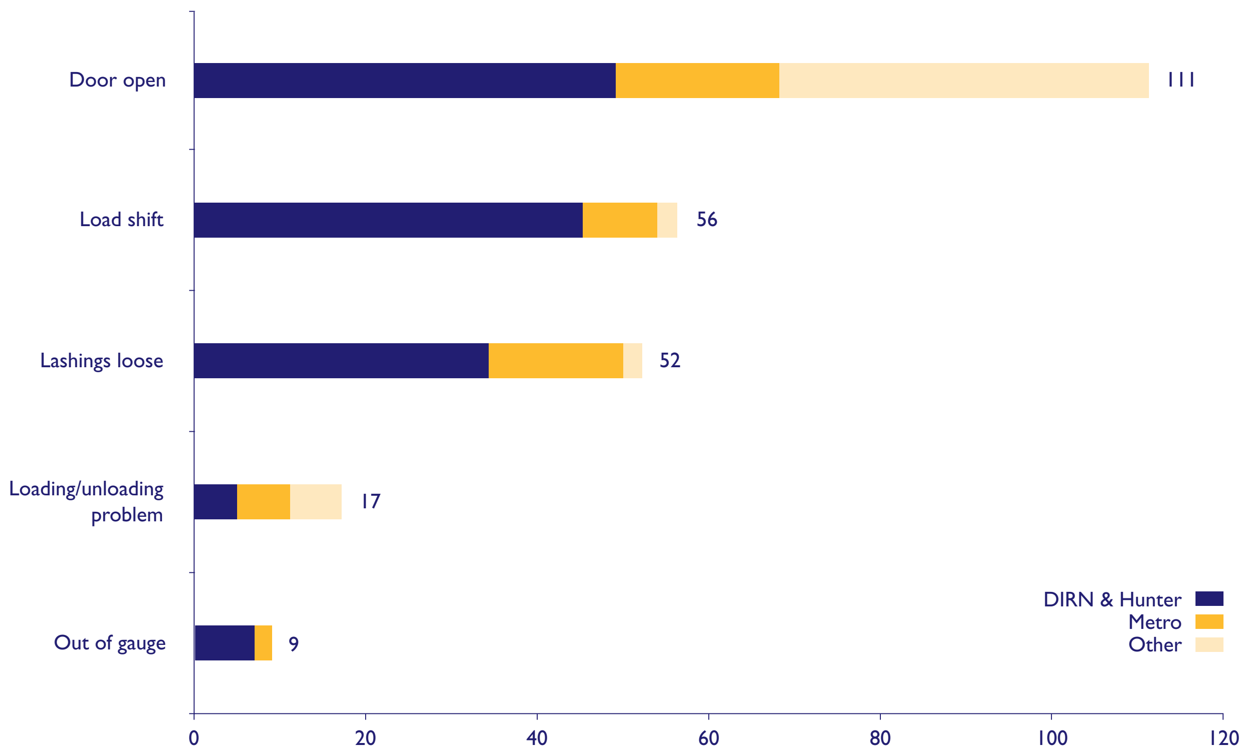

Figure 18. Load irregularities on the NSW Rail Network — July 2005 to June 2006.

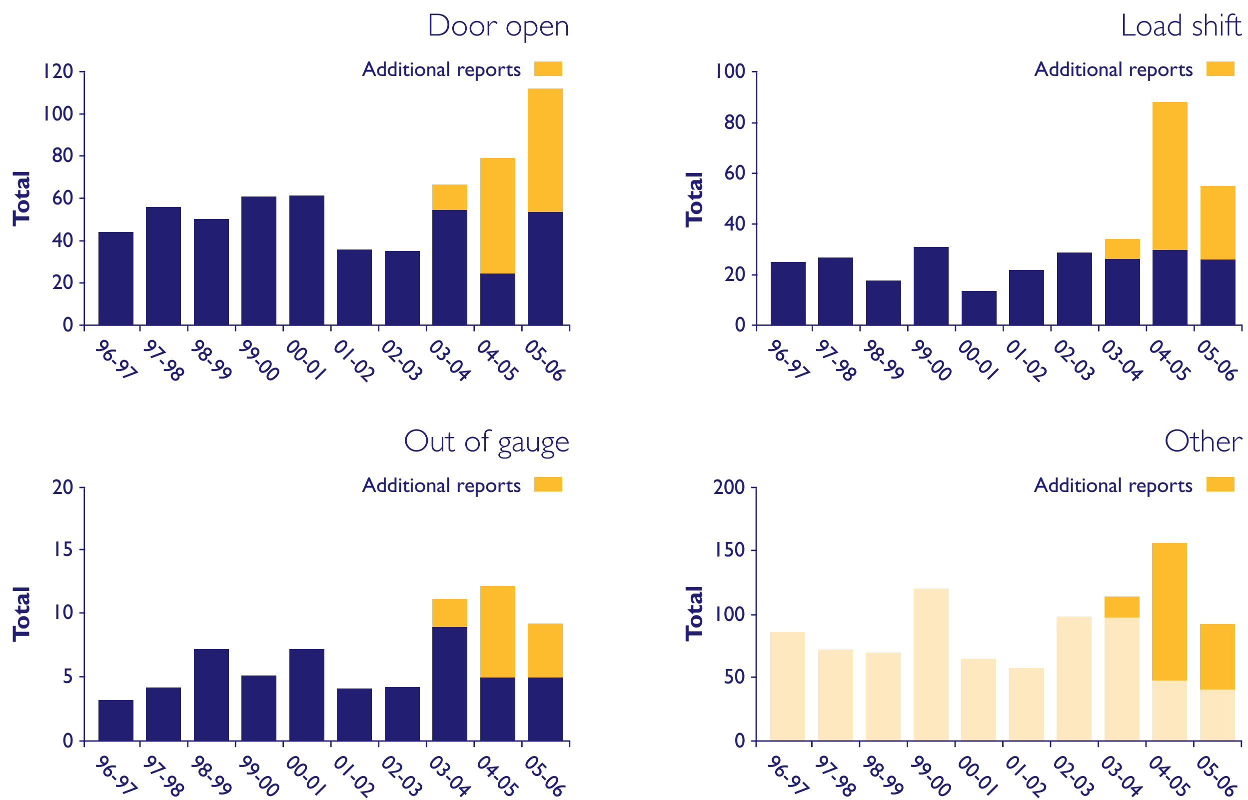

Figure 19. Loading irregularities on the NSW Rail Network — 1996–97 to 2005–06.
"Additional Reports" refers to incidents reported directly by small operators (available for recent years)

5. drug and alcohol testing

The requirement for railway operators to conduct drug and alcohol testing of employees involved in railway safety work was introduced in the *Rail Safety Act 2002* and further developed under the *Rail Safety (Drug and Alcohol Testing) Regulation 2003*.

The *Rail Safety Act 2002* requires all accredited operators to have formal drug and alcohol programs in place that comply with the program Guidelines . The specific nature of a program will vary according to the size and nature of an organisation's operation. As a minimum, programs are to include education, testing and assistance with rehabilitation for affected employees. Testing may include random, targeted and post–incident testing.

Railway operators have a number of reporting requirements in relation to drug and alcohol programs. In particular, from 1 July 2004, all operators are required to notify ITSRR of positive test results as well as any instance where an employee refused to undergo testing.

Medium to large railway operators are also required to submit quarterly summaries of testing activity to ITSRR. These extra requirements do not apply to most tourist and heritage operators and some other small operators.

Program activity

Approximately three quarters of the accredited railway operators in NSW who are required to submit quarterly summaries of testing activity in 2005–06 had done so at the time of writing.

From quarterly activity statements received at the time of writing, at least 35,000 alcohol and 5,500 drug tests of rail safety workers had been conducted during 2005–06. Based on current rate of testing and number of returns yet to be received, the final number of alcohol and drug tests in 2005–06 is likely to exceed the corresponding final 2004–05 figures by at least 30%.

As well as self–testing by accredited organisations, ITSRR also undertook drug and alcohol testing of rail safety workers on four separate occasions in 2005–06. This resulted in 220 random and 2 for–cause alcohol tests and 21 random drug tests.

Table 4. Drug and alcohol testing results — July 2005 to June 2006*

Description	Alcohol	Drug
Number of organisations testing	34	27
Approximate random component	95%	95%
Overall detection rate†	0.4%	2.6%
Median organisation detection Rate§	0.0%	0.0%
Number of organisations reporting no positive result for year	23	14
organisations reporting exactly 1 positive result for year	4	5
Number of organisations reporting more than 1 positive result for year	7	8

* Statistics based on information in quarterly returns received at time of writing. † Total positive tests (all organisations) divided by total tests (all organisations) multiplied by 100. § Organisation Detection Rate is organisation's total positive tests divided by organisation's total tests multiplied by 100. Median is the middle ranked value of all organisation detection rates.

Program results

Table 4 presents summary statistics for 2005–06. It is based on quarterly returns, which only summarise testing activity and do not provide detailed breakdowns in relation to positive test results, for example, positive test results by type of test.

The overall detection rate — the percentage of total tests that yielded a positive result — was higher for drugs (2.6%) than for alcohol (0.4%). Cannabis was the most common drug associated with positive drug tests. The overall test rate is not representative of the general railway safety worker population because it includes results of non–random testing. Non–random testing yields relatively high rates of detection because it includes for–cause testing — testing conducted on the basis that there is reason to believe an individual could be affected by drugs or alcohol.

The overall detection rate is also sensitive to the influence of larger operators (who conduct the majority of tests) and any organisation reporting anomalous results. Table 4 includes a summary of detection rates on an operator basis. It shows that approximately 70% of operators testing for alcohol and 50% of operators testing for drugs did not return a positive result in 2005–06.

20. ITSRR. 2004. Guidelines Relating to Drug and Alcohol Programs. Reference No. 02437.