# Safety performance

in the Western Australian mineral industry

## Accident and injury statistics

# 06-07

Department of **Consumer and Employment Protection**
Government of **Western Australia**

Resources Safety

## Reference

The recommended reference for this publication is:
Department of Consumer and Employment Protection, 2008, Safety performance in the Western Australian mineral industry — accident and injury statistics 2006–07: Resources Safety, Department of Consumer and Employment Protection, Western Australia, 41 pp.

ISBN 978 1 921163 39 5



This publication is available on request in other formats for people with special needs.

This publication is also available in digital format (PDF) online at www.docep.wa.gov.au/ResourcesSafety

**Further details of publications produced by Resources Safety can be obtained by contacting:**

Resources Safety — Publications
Department of Consumer and Employment Protection
Locked Bag 14
CLOISTERS SQUARE WA 6850

**Telephone:** +61 8 9358 8002 (general queries)
+61 8 9358 8154 (publications)
**NRS:** 13 36 77
**Facsimile:** +61 8 9358 8000
**Email:** ResourcesSafety@docep.wa.gov.au (general queries)
RSDcomms@docep.wa.gov.au (publications)

# Contents

# Contents cont.

## LIST OF FIGURES



## LIST OF TABLES

# Summary

Statistics generated from Resources Safety's AXTAT database for the year 2006–07 show a slight but continuing improvement in the overall safety performance of the Western Australian mining industry.

The actual number of serious injuries recorded since 2002–03 has increased due primarily to an increase in the reported number of people employed. The 60,861 employees in the mining industry (an increase of 8%) worked a total of 125.37 million hours. In 2006–07, the lost time injury frequency rate for serious injuries fell to 2.8.

There was only a small improvement in the lost time injury frequency rate (LTIFR), supporting the previous year's suggestion that the curve has plateaued.

For many years the focus has been on lost time injuries (LTIs) and how they can be managed more effectively, both in terms of the individual employee's welfare and the related issue of workers' compensation. Much has been achieved in this regard, and it is to industry's credit that considerable progress has been made in the areas of early return of employees to operational status, on-the-job post-accident rehabilitation and retraining of personnel.

However, the number of LTIs reported in recent years has become so small that the value of the LTIFR as an indicator of safety performance is questionable and recorded improvements in the rate are more marginal.

Disabling injuries (DIs) statistics have been collected since the beginning of fiscal 2001–02. This program was initiated with a view to establishing a more effective safety performance indicator than the current LTI-based system.

Allegations that LTIs are 'managed' to provide favourable accident reporting data have been made by various parties in recent times. Disabling injuries are generally not amenable to the mechanism alluded to above and are more numerous than LTIs. There were 705 disabling injuries recorded for 2006–07, an increase of 199 on the 2005–06 figure of 506. The disabling injury incidence and frequency rates both deteriorated at 11.6 and 5.6 respectively.

All of the above suggest that the various indicator numbers are reaching plateaus and any further improvement is likely to be minimal. Equally, a deterioration in performance cannot be discounted. Renewed effort on the part of all stakeholders is required, and new approaches to the issue of accident prevention are necessary to continue to improve safety.

Four mining industry employees lost their lives during the year, one less than the previous year.

Resources Safety continues to regulate the mining industry by statutory inspections, safety management system and high impact function audits. It plays an important role in providing education, training support and information to industry. During the year, safety meetings, presentations to mine site employees, and briefings to industry safety and health representatives complemented the inspection activities.

Resources Safety continues to participate in and assist with the development of the National Mine Safety Framework, an initiative of the Ministerial Council on Mineral and Petroleum Resources.

# Statistical summary

- There were four fatal accidents during 2006–07 – one each underground at a nickel mine, underground at a gold mine, on the surface at an iron ore mine and on the surface at an exploration site.
- There were 460 LTIs during 2006–07, 2 less than the previous year (462 injuries in 2005–06). The breakdown of the number of injuries by commodity mined is shown in Table 5 and Appendix A.
- There was an average workforce of 60,861 employees in 2006–07, an increase of 8% over the previous year (56,425 employees in 2005–06). The breakdown of the number of employees by commodity mined is shown in Table 5 and Appendix A.
- The overall LTI duration rate deteriorated slightly by 1% during 2006–07, rising from 20.2 to 20.4. The breakdown of the work days lost for each commodity mined is shown in Table 5 and Appendix A.
- The overall LTIFR improved by 10% during 2006–07, falling from 4.1 to 3.7.
- The overall injury index improved by 10% during 2006–07, down from 83 to 75.
- Serious LTIs in the mining industry during 2006–07 totalled 348, which is 1 less than for 2005–06.
- The overall serious LTIFR improved by 10% during 2006–07, falling from 3.1 to 2.8.
- The iron ore sector LTIFR improved by 17% during 2006–07, falling from 2.4 to 2.0.
- The bauxite and alumina sector LTIFR deteriorated significantly by 37% during 2006–07, rising from 3.0 to 4.1.
- The gold sector LTIFR improved slightly by 2% during 2006–07, falling from 4.4 to 4.3.
- The nickel sector LTIFR improved significantly by 58% during 2006–07, falling from 5.9 to 2.5.
- There were 705 DIs during 2006-07, 199 more than the previous year (506 injuries in 2005-06). The breakdown of the number of injuries by commodity mined is shown in Table 11.
- The overall DI frequency rate deteriorated by 24% during 2006-07, rising from 4.5 to 5.6.

# Explanatory notes

## Introduction

The statistics published in this annual compilation mainly relate to accidents between 1 July 2006 and 30 June 2007 (2006–07) involving time lost from work of one day or more (lost time injuries) on mines in Western Australia. The day on which the accident occurred is not counted as a day lost. The total number of working days lost through injury in 2006–07 has three components:

i) **Initial injuries** — days lost in 2006–07 from injuries that occurred in 2006–07

ii) **Recurrent injuries** — days lost in 2006–07 through recurrences of injuries that occurred in 2006–07 and previous years

iii) **Carry-over injuries** — days lost in 2006–07 by persons continuously off work from injuries that occurred before 1 July 2006.

Recent annual compilations have included an appendix containing statistics on disabling injuries. However, this compilation for 2006-07 has an expanded coverage of statistics for disabling injuries.

## Scope

Injuries to all company and contractor employees who worked at mining operations are included in these statistics. The definition of 'mining operation' is stated in section 4 of the *Mines Safety and Inspection Act 1994* and includes mining company treatment plants, port facilities and railways. Exploration activities, although now included in the definition of mining operations, are not covered by this report, apart from the fatality, nor are oil and gas industry injuries.

## Metalliferous mines

All mines other than coal mines are classed as metalliferous mines.

## Fatal accidents

Work days lost have not been allocated to fatal accidents, nor have fatalities been included in injury incidence, frequency or duration rate calculations except in Tables 8 and 9, which are in accordance with Australian Standard AS 1885.1:1990 'Workplace Injury and Disease Recording Standard'. This Standard treats fatalities as lost time injuries with a penalty of 220 work days lost for each.

## Collection of information

Accident and injury details are reported monthly to Resources Safety by mine managers, as are the number of persons employed (including contractor employees) and hours worked during the month.

During the twelve months covered here, an average of 234 mines or groups of mines reported to the AXTAT system.

## Journey accidents

Injuries that occurred in journey accidents not on mine sites (travelling to or from work) have not been included in calculations of incidence, frequency or duration rates.

## Definitions

Lost time injury — work injury that results in an absence from work of at least one full day or shift any time after the day or shift on which the injury occurred.

Serious injury — lost time injury that results in the injured person being disabled for a period of two weeks or more.

Days lost — rostered days absent from work due to work injury.

Incidence rate — number of injuries per 1,000 employees for a 12 month period.

Frequency rate — number of injuries per million hours worked.

Duration rate — average number of work days lost per injury.

Injury index — number of work days lost per million hours worked (frequency rate x duration rate).

Fatal incidence rate — number of fatalities per 1,000 employees for a 12 month period.

Fatal frequency rate — number of fatalities per million hours worked.

Serious incidence rate — number of serious injuries per 1,000 employees for a 12 month period.

Serious frequency rate — number of serious injuries per million hours worked.

Disabling injury — work injury (not LTI) that results in injured person being unable to fully perform his or her ordinary occupation (regular job) any time after the day or shift on which the injury occurred, and where either alternative or light duties are performed.

Days off — total calendar days, whether rostered or not, absent from work or on alternative duties, restricted duties or restricted hours due to work injury.

# Abbreviations

| | |
|---|---|
| **BRUISE/CONTUSION** | – bruise or contusion |
| **C/BY BETWEEN** | – caught by or between moving or stationary objects or both |
| **C/BY MACHINE** | – caught by or between operating machine |
| **CHEM/FUMES** | – chemicals or fumes |
| **COMP** | – compressed |
| **C/W** | – contact with |
| **DETON** | – detonation |
| **DI** | – disabling injury |
| **ENV** | – environment |
| **EXP** | – exposure |
| **FR** | – frequency rate |
| **JOLT/JAR** | – jolting or jarring |
| **LTI** | – lost time injury |
| **LTIFR** | – lost time injury frequency rate |
| **NOC** | – not otherwise classified |
| **ON/OFF** | – on or off |
| **PRESS** | – pressure |
| **OVER/STREN MOV** | – over-exertion or strenuous movements |
| **S/AGAINST** | – struck against |
| **S/BY** | – struck by |
| **SLIP/TRIP** | – slip or trip |
| **SPRAIN/STRAIN** | – sprain or strain |
| **U/G** | – underground |
| **U/G ACCESS/HAUL** | – underground access, travelling or haulage ways |
| **U/G PROD/DEV** | – underground production or development areas |
| **VEH/MOB** | – vehicle or mobile equipment |

# Fatal accidents

## Fatal accidents during 2006–07

There were four fatal accidents in the Western Australian mineral industry during 2006–07:

- An air-leg miner died in an underground nickel mine when he was caught in a rockfall while stripping the sidewall of a stope. A firing crew, preparing to fire the mid-shift blast, had noticed that his tag was still on the tag-board and when they investigated they found him lying near the stope sidewall stripping face between two rocks, weighing about 0.75 tonnes and 1.3 tonnes, that had fallen from an unsupported area of the roof overhead. The ground support in the stope, point-anchor rock-bolts, had not been extended to the area immediately above the point where he had been working.
- A transport truck driver died in a tyre unloading accident at an iron ore mine. He was helping to unload the third group of three haul-truck tyres from his truck, after two groups of three tyres had been successfully unloaded. It appears that he had already released the tie-down holding the tyres and had climbed onto the tray to retrieve the tie-down chains when the load moved, knocking him from the truck. One of the tyres then fell or slipped from the truck and crushed him, a second tyre fell and landed on the first, while the third tyre toppled onto the other two but was prevented from falling from the truck tray by the other tyres.
- A concrete truck driver suffered fatal injuries in an underground gold mine when he lost control of the concrete agitator truck he was driving down the main decline and the truck struck the decline sidewall.
- An exploration driller's assistant received fatal head injuries when he was struck by a sample hose and dust deflector box that had detached from the cyclone of a dust collection trailer under pressure while an attempt was being made to clear a blockage in the sample hose.

## Fatal incidence rate by mineral mined 2002–03 to 2006–07

Table 1 lists fatal incidence rates (excluding exploration) by mineral mined for the past five years, as well as the grouped information for all surface and underground mines.

The underground fatal incidence rate is more than five times higher than the fatal incidence rate for surface operations. This is reflected in the gold, nickel and base metal sectors where most of the State's underground mining occurs.

**Table 1** Fatal incidence rate by mineral mined 2002-03 to 2006-07

| Category | | Fatalities per thousand employees |
|---|---|---|
| **Mineral** | Diamonds | 0.14 |
| | Base metals | 0.14 |
| | Gold | 0.11 |
| | Nickel | 0.10 |
| | Iron ore | 0.09 |
| **Underground** | | 0.28 |
| **Surface** | | 0.05 |

# Fatal accidents cont.

## Fatal incidence rate 1997–98 to 2006–07

The fatal incidence rate for 2006–07 was 0.05 and is still a concern to Resources Safety. Although the overall trend continues to decline, as shown in Figure 1, there is a year-by-year scatter of the incidence rate because of the low number of occurrences.

Resources Safety maintains the view that no fatal accident is acceptable, and a fatal incidence rate of zero is achievable and sustainable.

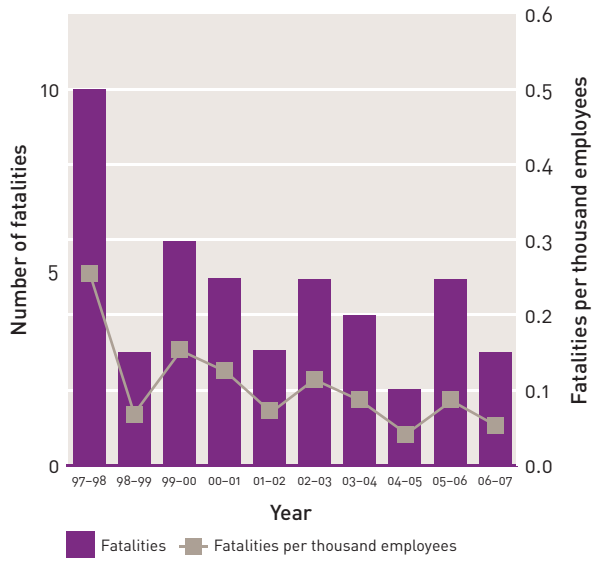



**Figure 1** Fatal incidence rate 1997–98 to 2006–07

## Fatal accidents by type 2002–03 to 2006–07

Table 2 indicates the type of accidents for the 19 fatalities in the mining industry (excluding exploration) over the past five years, with seven underground and 12 at surface operations.

The most common type of underground fatal accident was rockfall, which resulted in two fatalities.

The most common type of surface fatal accident was vehicle or mobile equipment collision, which resulted in three fatalities, followed by rockfall, with two fatalities.

**Table 2** Number of fatalities 2002-03 to 2006-07

| Category | | No. of fatalities |
|---|---|---|
| **Underground** | Rockfall | 2 |
| | Veh/mob rollover | 1 |
| | Veh/mob collision | 1 |
| | Fall from height | 1 |
| | Explosives detonation | 1 |
| | C/w electricity | 1 |
| **Surface** | Veh/mob collision | 3 |
| | Rockfall | 2 |
| | C/by machine | 1 |
| | S/by object | 1 |
| | S/by veh/mob | 1 |
| | Fall from height | 1 |
| | C/w tool | 1 |
| | Contact with flame | 1 |
| | Compressed air explosion | 1 |

# Serious injuries

## Review of serious injuries during 2006–07

There were 348 serious injuries reported in the mineral industry during 2006–07 (349 in 2005–06). Of these, 338 were in metalliferous mines and ten were in coal mines.

Typical serious injuries include:

*A low loader driver sprained his ankle and fractured a toe when he stepped on uneven ground and changed direction while walking away after alighting from his vehicle.*

*A service person, holding pipes that were being lifted by a crane, sustained a lacerated finger when the pipes moved unexpectedly and trapped his fingers.*

*A front-end loader operator, standing on the mud guard of a loader cleaning the windscreen, fractured his ribs when he fell to the ground after slipping and losing his grip on the handrail.*

*A process plant operator, using a rod to clean mud from an operating conveyor belt, sustained a fractured forearm and soft tissue injuries to his arm and shoulder when he pulled his arm backwards striking it on the crusher after his hand became trapped between an idler and the conveyor belt. The rod had caught between the idler and the conveyor belt and pulled his hand in.*

*A drill jumbo operator, scaling a stope face with the drill jumbo, sustained bruising and had a foreign body lodge in his eye when part of a misfired primer in the face exploded. The drill steel was about 400 mm from the primer when the explosion occurred.*

*A service truck operator, hosing down a truck in a workshop, dislocated his finger when he slipped on degreasing fluid on the concrete floor.*

*A process plant labourer who had been using an impact wrench suffered a musculoskeletal disorder that resulted in a tingling sensation to both hands.*

*A process plant operator suffered gradual onset of pain to both his shoulders over a six-month period associated with hammering and lifting.*

*A welder suffered from breathing difficulties after oxy-cutting galvanised grid mesh. He had not been wearing appropriate PPE and was following an incorrect fume extraction procedure.*

*A fitter had grease injected into his hand when he slipped and disengaged a relief valve while attempting to push a coupling into a quick-fill fitting on a bulk grease container.*

*A technical officer strained his lower back while using a crow bar to position a 250 mm diameter polyethylene pipeline.*

*A haul truck driver, reversing her truck up to an excavator so it could be loaded, suffered a whiplash injury to her neck when the truck struck the excavator bucket. The excavator bucket had not been raised to the correct height.*

*An underground rise miner, removing alimak rails from the bottom of a 32 metre rise, sustained a compound fracture to his shoulder when he was struck by a falling rock.*

*A mobile plant fitter, inflating a tyre on a grader, sustained multiple fractures to his lower leg when the tyre dislodged from the rim and he was struck by the flange seal and ring.*

*A drill jumbo operator suffered ligament damage to his shoulder while getting onto a jumbo. He had been pulling on the handrail while climbing the steps.*

*A leading hand fitter tore ligaments in his ankle when he stepped on a disused universal end cap while sweeping a workshop floor.*

*A trades assistant sustained a protruded disc in his lower back after operating a forklift on rough ground over an extended period of time.*

*A charge up operator, connecting a charged face to the permanent firing line underground, suffered multiple lacerations to his back and legs when the charged face detonated. He was 50 metres from the face when it detonated.*

*A process technician, hosing out tanks containing mercury amalgam, suffered the effects of mercury poisoning. He had been wearing the appropriate breathing apparatus at the time. It appears that the mercury was ingested.*

*A service person suffered scald burns to his face when boiling coolant sprayed onto him as he removed the radiator cap of a water truck. The truck's radiator cap cover had already been removed and the truck had been stopped for some 20 minutes. The serviceman had half turned the radiator cap and had heard the pressure escape before removing the cap. It appears that the loss of pressure had lowered the boiling point of the coolant.*

*A geologist, scaling a sidewall underground, received a fractured bone in his right foot when it was struck by a rock that fell from the wall.*

*An underground diamond driller's assistant, pulling rods from an up hole, received multiple injuries to his foot including degloving and partial amputation of a toe when the drill head struck the rod and pushed it down onto his foot.*

*A delivery truck driver, directing a forklift that was unloading poly-pipe from his truck, received a fractured femur when a steel beam dislodged and struck his leg.*

# Serious injuries cont.

*A fuel and lubrication serviceman fractured his left ankle when he lost his balance and fell over while carrying equipment.*

*A cleaner suffered from respiratory problems when she was exposed to fumes from the bleach she was using to clean showers in an ablution block.*

*An underground miner, grouting cable bolts in a hangingwall drive, sustained injuries to his eyes when he was sprayed with grout after the fitting connecting the grout hose to the filler came loose. He had been wearing safety glasses at the time.*

*A maintenance supervisor, dismounting from an access platform at the leach feed hopper, fractured his ankle when he fell two metres after his hands slipped from the handrail.*

*A process plant operator, manually opening the flush-water valve on a slurry pump, received burns to his hand and trunk when he was sprayed with hot mineral slurry. The pump liners and expeller ring had failed.*

*A crusher operator received a fractured jaw when he was struck by the crow bar that he was using to free a large rock caught in a jaw crusher.*

*A service person at a refinery received multiple lacerations when he was struck by a valve that fell two metres after the chain slipped from the shortener while the valve was being lowered into position.*

*A process plant operator, cleaning up around a conveyor transfer chute, strained his neck when he struck his head against a spillage tray.*

*A labourer, hammering a star picket into the ground, fractured his finger when he struck it with the hammer.*

*A boilermaker, oxy-cutting an excavator bucket tooth and adaptor during an attempt to remove it from a gyratory crusher, received a spider web fracture to his skull when he was struck by the adaptor after it ejected violently from the crusher.*

*Three employees were seriously injured when their light vehicle rolled over while returning to the accommodation camp at the end of shift. The driver dislocated his shoulder, one passenger received a fractured rib and another passenger received a fractured neck.*

*A process plant operator strained muscles on the right side of his chest while attempting to open a seized one inch wheel-operated air valve.*

*A fitter who was changing tracks on a bulldozer sustained a fractured skull, lacerations and concussion when a towing chain snapped and struck him on the forehead while he was using a forklift to tow track chains away from the bulldozer.*

*A grader driver, assisting a fitter to service a front-end loader, received lacerations to his fingers and an open fracture to one finger when a brake cylinder ejected under pressure, striking his gloved hand. He had inadvertently unscrewed a brake actuator cylinder instead of a gear box filter.*

## Serious injury incidence rate by mineral mined 2002–03 to 2006–07

Figure 2 is a chart of incidence rates for serious injuries for the past five years. The top of the chart shows the serious injury incidence rates for surface and underground operations, and the lower part of the chart shows serious injury incidence rates by mineral mined.

The chart shows that the underground mining serious injury incidence rate (10.9) was almost twice the serious injury incidence rate at surface operations (5.7).

Of the major mining sectors, coal had the highest five-year average serious incidence rate (13.5) whereas iron ore had the lowest (3.8). The mining sector referred to as 'other', with a five-year average serious incidence rate of 11.7, contained 3% of the total number of employees spread over 16 commodity groups. Most of the mine sites in this sector had less than 50 employees.

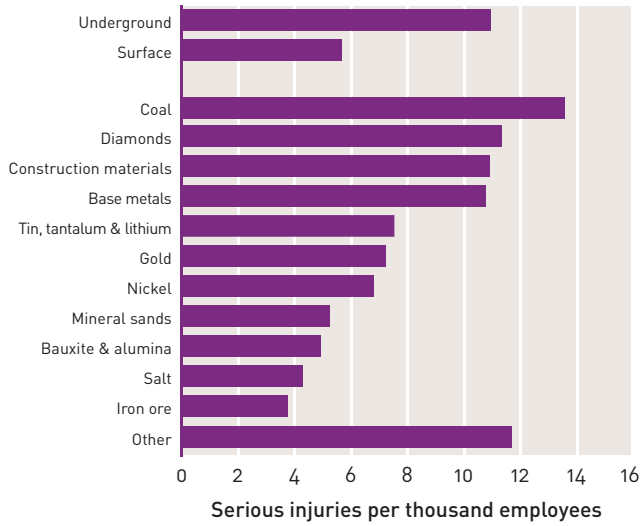
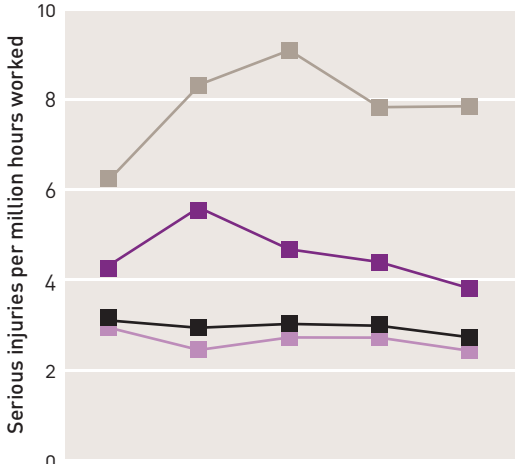



**Figure 2** Serious injury incidence rate 2002–03 to 2006–07

## Serious injury frequency rate 2002–03 to 2006–07

Figure 3 shows that the serious injury frequency rate decreased for underground metalliferous operations, decreased for surface metalliferous operations and remained the same for the coal sector, resulting in a 10% improvement overall during 2006-07.




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Metalliferous u/g | 4.5 | 5.4 | 4.7 | 4.4 | 3.8 |
| Metalliferous surface | 2.9 | 2.6 | 2.9 | 2.9 | 2.6 |
| Coal | 6.4 | 8.3 | 9.0 | 7.9 | 7.9 |
| Total | 3.2 | 3.0 | 3.2 | 3.1 | 2.8 |

**Figure 3** Serious injury frequency rate 2002–03 to 2006–07

## Serious injury percentage breakdown for 2006–07

Appendices B and C provide a percentage breakdown of the number of serious injuries by part of body, nature of injury, location of accident, and type of accident for underground and surface operations respectively.

### Underground

- Injuries to legs accounted for the largest proportion of serious injuries at 23%, back injuries accounted for 16% followed by hand injuries at 14%. Of the serious leg injuries, 77% were to knees and ankles.
- Consistent with the high proportion of knee, ankle, and back injuries, sprain or strain represented the highest proportion by nature of injury (37%), followed by fracture at 16% then laceration and crushing both at 9%.
- The majority of serious injuries underground were in production and development areas (75%), followed by access and haulage ways at 18% and areas not otherwise classified (4%).
- The most common accident type associated with serious injuries underground was over-exertion or strenuous movements (30%), followed by rockfall (14%) and then struck by object at 12%.

### Surface

- Injuries to legs accounted for the largest proportion of serious injuries at 23%, and back injuries accounted for 22% followed by injuries to hands at 19%. Of the serious leg injuries, 76% were to knees and ankles.
- Consistent with the high proportion of knee, ankle and back injuries, sprain or strain represented the highest proportion by nature of injury (48%). Fracture was the next highest (14%), followed by laceration at 7%.
- The majority of serious injuries on the surface occurred in treatment plants (40%), followed by open pits at 17% and workshops at 15%.
- The most common accident types associated with serious injuries in surface operations were over-exertion or strenuous movements (33%), slip or trip (11%) and stepping at 10%.

# Lost time injuries

## Review of lost time injuries during 2006–07

In 2006–07, 20,762 days were lost through occupational injuries on mines in Western Australia. This figure is made up of the number of days lost from injuries occurring in 2006–07 (9,405), recurrences of injuries that occurred before 2006–07 and in 2006–07 (1,077), and LTIs and recurrences carried over into 2006–07 from accidents that occurred before July 2006 (10,280). A breakdown of work days lost in coal and metalliferous mining is given in Table 3.

During 2006–07, there were 460 LTIs in the State's mining industry — 448 in metalliferous mines and 12 in coal mines. A breakdown of these data with performance indicators is given in Tables 4 and 5.

In addition to the initial injuries there were 44 recurrences of previous injuries, resulting in 1,077 work days lost during 2006–07. A breakdown of recurrent injuries by calendar year of initial injury is given in Table 6.

One hundred and thirty six persons who were still off work from injuries received before July 2006 lost 10,280 work days in 2006–07. A breakdown of these carry-over injuries is given in Table 7.

**Table 3 Time lost through injury during 2006–07**

| Mining | Days lost | | | |
|---|---|---|---|---|
| | Initial injuries | Recurrent injuries | Carry-over injuries | TOTAL |
| Metalliferous | 9,175 | 859 | 10,113 | 20,147 |
| Coal | 230 | 218 | 167 | 615 |
| **TOTAL MINING** | **9,405** | **1,077** | **10,280** | **20,762** |

**Table 4 Initial lost time injuries during 2006–07**

| Mines | No. of employees | No. of LTIs | Incidence | Frequency | Duration | Injury index | Days lost |
|---|---|---|---|---|---|---|---|
| Metalliferous surface | 53,782 | 382 | 7.1 | 3.5 | 19.2 | 67 | 7,323 |
| Metalliferous underground | 6,308 | 66 | 10.5 | 4.4 | 28.1 | 124 | 1,852 |
| Metalliferous total | 60,090 | 448 | 7.5 | 3.6 | 20.5 | 74 | 9,175 |
| Coal total | 771 | 12 | 15.6 | 9.5 | 19.2 | 183 | 230 |
| **TOTAL MINING** | **60,861** | **460** | **7.6** | **3.7** | **20.4** | **75** | **9,405** |

**Table 5 Injuries by mineral mined during 2006–07**

| Mineral mined | No. of employees | No. of LTIs | Incidence | Frequency | Duration | Injury index | Days lost |
|---|---|---|---|---|---|---|---|
| Iron ore | 16,594 | 74 | 4.5 | 2.0 | 23.7 | 48 | 1,752 |
| Gold | 13,192 | 116 | 8.8 | 4.3 | 23.2 | 100 | 2,686 |
| Nickel | 11,738 | 60 | 5.1 | 2.5 | 19.3 | 48 | 1,155 |
| Bauxite and alumina | 8,398 | 65 | 7.7 | 4.1 | 15.9 | 65 | 1,034 |
| Mineral sands | 2,862 | 24 | 8.4 | 4.9 | 22.8 | 112 | 547 |
| Base metals | 2,123 | 26 | 12.2 | 5.5 | 27.0 | 150 | 702 |
| Diamonds | 1,719 | 24 | 14.0 | 5.6 | 17.4 | 97 | 418 |
| Salt | 867 | 5 | 5.8 | 3.6 | 10.2 | 37 | 51 |
| Coal | 771 | 12 | 15.6 | 9.5 | 19.2 | 183 | 230 |
| Construction materials | 468 | 7 | 15.0 | 6.7 | 12.7 | 86 | 89 |
| Tin, tantalum and lithium | 414 | 5 | 12.1 | 5.4 | 25.8 | 139 | 129 |
| Other | 1,715 | 42 | 24.5 | 12.8 | 14.6 | 186 | 612 |
| **TOTAL MINING** | **60,861** | **460** | **7.6** | **3.7** | **20.4** | **75** | **9,405** |

*NOTE: Duration in Tables 4 and 5 does not take into consideration time lost after 30 June 2007 by persons still off work at the end of the fiscal year, time lost from recurrent injuries, or time lost by persons with carry-over injuries from before July 2006.*

**Table 6 Recurrent injuries during 2006–07**

| Calendar year | Metalliferous mining | | Coal mining | | Total mining | |
|---|---|---|---|---|---|---|
| | No. of injuries | Days lost | No. of injuries | Days lost | No. of injuries | Days lost |
| 2007* | – | – | 1 | 3 | 1 | 3 |
| 2006 | 22 | 362 | – | – | 22 | 362 |
| 2005 | 7 | 149 | – | – | 7 | 149 |
| 2004 | 3 | 102 | 1 | 180 | 4 | 282 |
| 2003 | 1 | 49 | – | – | 1 | 49 |
| 2002 | 4 | 46 | – | – | 4 | 46 |
| Pre-2002 | 4 | 151 | 1 | 35 | 5 | 186 |
| **TOTAL** | **41** | **859** | **3** | **218** | **44** | **1,077** |

*NOTE: Apart from the information shown in Tables 3, 6 and 7, analysis of recurrent and carry-over injuries has not been presented in this publication.*
** Covers period from 1 January to 30 June 2007.*

**Table 7 Carry-over injuries during 2006–07**

| Calendar year | Metalliferous mining | | Coal mining | | Total mining | |
|---|---|---|---|---|---|---|
| | No. of injuries | Days lost | No. of injuries | Days lost | No. of injuries | Days lost |
| 2006* | 83 | 4,471 | 4 | 57 | 87 | 4,528 |
| 2005 | 27 | 2,663 | 2 | 110 | 29 | 2,773 |
| 2004 | 11 | 1,465 | – | – | 11 | 1,465 |
| 2003 | 6 | 1,263 | – | – | 6 | 1,263 |
| 2002 | 1 | 7 | – | – | 1 | 7 |
| Pre-2002 | 2 | 244 | – | – | 2 | 244 |
| **TOTAL** | **130** | **10,113** | **6** | **167** | **136** | **10,280** |

** Covers period from 1 January to 30 June 2006.*

# Lost time injuries cont.

## Review of lost time injuries during 2006–07 in accordance with Australian Standard AS 1885.1:1990

In June 1990, Standards Australia and Worksafe Australia released a joint standard for recording workplace injuries and diseases. The standard (AS 1885.1:1990 'Workplace Injury and Disease Recording Standard') is designed to be used by individual workplaces. There are two major differences between reporting for the AXTAT database and this standard.

The Australian Standard treats fatalities as LTIs with a penalty of 220 workdays lost for each, whereas in the AXTAT database they are kept separate with no penalty. Also, incidence per thousand employees is calculated from the AXTAT data in contrast to the Australian Standard's definition of injuries per hundred employees.

Tables 8 and 9 provide statistical information in accordance with the Australian Standard.

**Table 8 Initial lost time injuries during 2006–07 (AS 1885.1:1990)**

| Mines | No. of employees | No. of LTIs | Injuries per hundred | Frequency | Duration | Days lost |
|---|---|---|---|---|---|---|
| Metalliferous surface | 53,782 | 383 | 0.7 | 3.5 | 19.7 | 7,543 |
| Metalliferous underground | 6,308 | 68 | 1.1 | 4.6 | 33.7 | 2,292 |
| Metalliferous total | 60,090 | 451 | 0.8 | 3.6 | 21.8 | 9,835 |
| Coal total | 771 | 12 | 1.6 | 9.5 | 19.2 | 183 |
| **TOTAL MINING** | **60,861** | **463** | **0.8** | **3.7** | **21.7** | **10,065** |

*NOTE: Duration in Tables 8 and 9 does not take into consideration time lost after 30 June 2007 by persons still off work at the end of the fiscal year, time lost from recurrent injuries, or time lost by persons with carry-over injuries from before July 2006 .*

**Table 9 Injuries by mineral mined during 2006–07 (AS 1885.1:1990)**

| Mines | No. of employees | No. of LTIs | Injuries per hundred | Frequency | Duration | Days lost |
|---|---|---|---|---|---|---|
| Iron ore | 16,594 | 75 | 0.5 | 2.1 | 26.3 | 1,972 |
| Gold | 13,192 | 117 | 0.9 | 4.3 | 24.8 | 2,906 |
| Nickel | 11,738 | 61 | 0.5 | 2.5 | 22.5 | 1,375 |
| Bauxite and alumina | 8,398 | 65 | 0.8 | 4.1 | 15.9 | 1,034 |
| Mineral sands | 2,862 | 24 | 0.8 | 4.9 | 22.8 | 547 |
| Base metals | 2,123 | 26 | 1.2 | 5.5 | 27.0 | 702 |
| Diamonds | 1,719 | 24 | 1.4 | 5.6 | 17.4 | 418 |
| Salt | 867 | 5 | 0.6 | 3.6 | 10.2 | 51 |
| Coal | 771 | 12 | 1.6 | 9.5 | 19.2 | 230 |
| Construction materials | 468 | 7 | 1.5 | 6.7 | 12.7 | 89 |
| Tin, tantalum and lithium | 414 | 5 | 1.2 | 5.4 | 25.8 | 129 |
| Other | 1,715 | 42 | 2.4 | 12.8 | 14.6 | 612 |
| **TOTAL MINING** | **60,861** | **463** | **0.8** | **3.7** | **21.7** | **10,065** |

# Workers' compensation

## Premium rates for the Western Australian mineral industry

The workers' compensation recommended premium rates determined by the Premium Rates Committee are published in a dedicated Western Australian Government Gazette, and are effective from 30 June in the year of issue.

Figure 4 indicates trends in workers' compensation costs for selected mineral groups in the ten-year period since 1998–99.

Over this period, the coal mining compensation rate decreased, by 69%, to 2.03% of payroll. The compensation rate for surface gold operations decreased, by 45%, to 1.45% of payroll, and that for iron ore operations deceased by 57%, to 0.47% of payroll. The rate for underground gold operations decreased, by 17%, during this period to 3.04% of payroll.

The average recommended premium rate for the Western Australian mining industry for 2007–08 is currently 1.63% of payroll, a 14% reduction on that for 2006–07 (1.90% of payroll).

Figure 5 shows the current recommended premium rates for 2007–08 for a variety of mineral groups and other industries.

Premium rates for mining industry groups compare favourably with other industry groups such as clay brick manufacturing and structural steel fabrication, which have current premium rates of 3.53 and 4.03% of payroll respectively.

The recent trend of the traditionally higher risk mining sectors having lower premium rates than many manufacturing sectors has continued.

Although premium rates in isolation are not necessarily reliable indicators of risk, they do represent a cost to industry and, in part, reflect past safety performance.

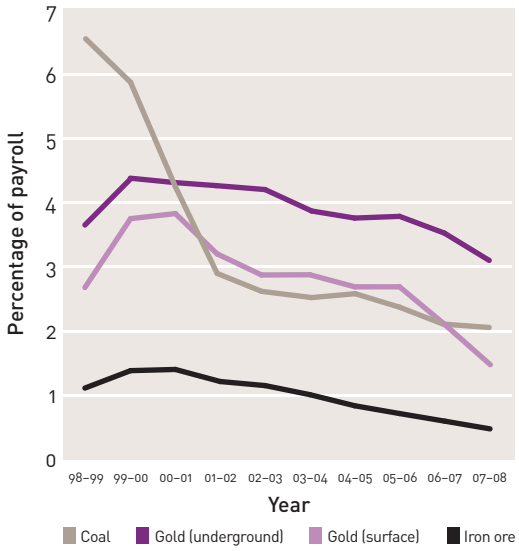



Figure 4 Mine workers' compensation rate trends 1998–99 to 2007–08

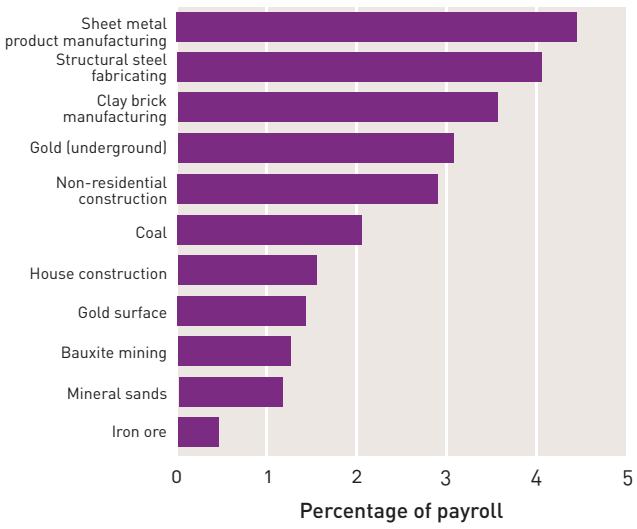



Figure 5 Recommended premium rates 2007–08

# Injuries by commodity

## Metalliferous performance indicators

The performance indicators for the metalliferous mining sector show mixed results for 2006–07. Figures 6 to 9 depict the performance indicators of incidence, frequency, duration rates, and injury index (see page 3 for definitions).

Some interesting trends noted in the performance indicators for metalliferous mines during 2006–07 include the following:

- The overall incidence rate improved by 7%, falling from 8.1 to 7.5. The surface incidence rate improved by 7% (from 7.6 to 7.1) and the underground incidence rate improved by 17% (from 12.6 to 10.5).
- A similar trend was noted in the frequency rate for both surface and underground. The overall frequency rate improved by 12%, falling from 4.1 to 3.6. The surface frequency rate improved by 10% (from 3.9 to 3.5) and the underground frequency rate improved by 19% (from 5.4 to 4.4).
- The overall duration rate deteriorated slightly by 1%, rising to 20.5. The surface duration rate improved by 4% (from 20.1 to 19.2) whereas the underground duration rate deteriorated significantly by 38% (from 20.4 to 28.1).
- The fall in frequency rate was greater than the rise in duration rate resulting in an improvement of 10% to the injury index, down from 82 to 74. The surface injury index improved by 15% (from 79 to 67) whereas the underground injury index deteriorated by 12% (from 111 to 124).

## Metalliferous injury percentage breakdown for 2006–07

Appendices D and E provide a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident for underground and surface operations respectively.

### Injuries by part of body

- Leg injuries accounted for the largest proportion of underground injuries at 21%. Leg injuries and back injuries accounted for the largest proportion of surface injuries both at 23%. Of the underground leg injuries, 79% were to knees and ankles. Of the surface leg injuries, 76% were to knees and ankles.
- Back injuries accounted for the second largest proportion of injuries underground at 17%, followed by hand injuries at 15%.
- Hand injuries accounted for the second largest proportion of surface injuries at 16%, followed by arm injuries at 15%. Of the arm injuries, 76% were to shoulders, elbows and wrists.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 39% and 46% respectively.
- The second highest ranking nature of underground injury was fracture (15%), followed by laceration and crushing both at 9%.
- The second highest ranking nature of surface injury was also fracture (11%), followed by laceration at 8%.

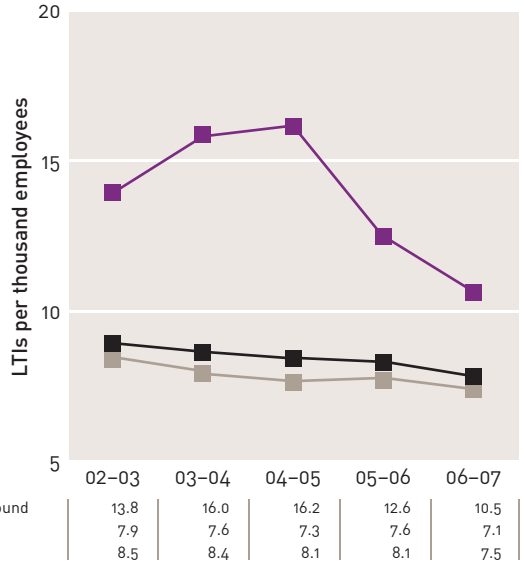
### Injuries by location

- Most underground injuries occurred in production and development areas (71%), followed by access and haulage ways at 20% then dumping areas and underground areas not otherwise classified both at 3%.
- The majority of surface injuries occurred in treatment plants (41%), followed by open pits at 16% then workshops at 15%.

### Injuries by type

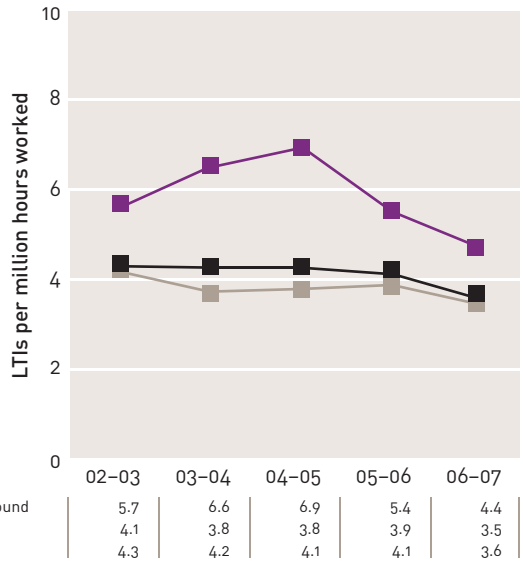
- Over-exertion or strenuous movements was the most common accident type for underground injuries at 27%, followed by rockfall at 14%, and struck by object at 12%. The proportion of injuries caused by rockfalls remained the same as in 2005-06.
- The most common accident type for surface injuries was also over-exertion or strenuous movements at 31%, followed by slip or trip at 10%, and stepping at 9%.

## Metalliferous performance indicators
2002–03 to 2006–07



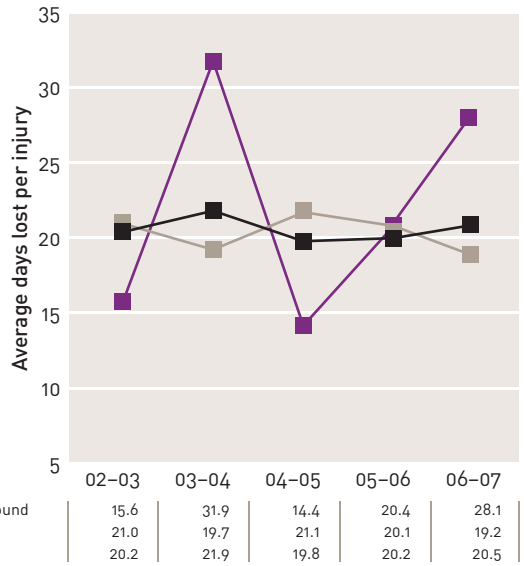

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 13.8 | 16.0 | 16.2 | 12.6 | 10.5 |
| Surface | 7.9 | 7.6 | 7.3 | 7.6 | 7.1 |
| Total | 8.5 | 8.4 | 8.1 | 8.1 | 7.5 |

Figure 6 Incidence rate



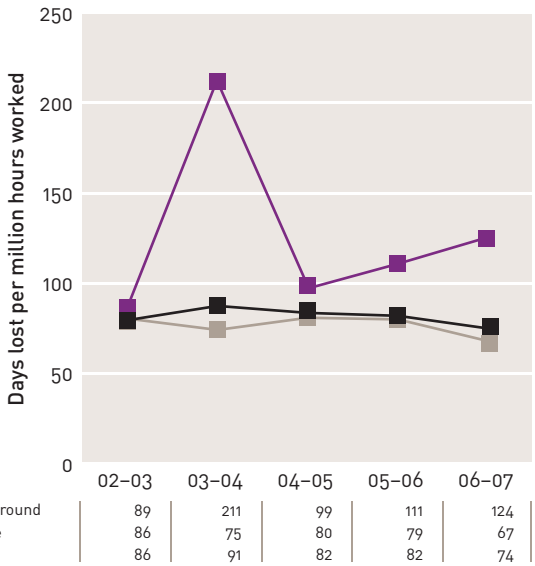

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 5.7 | 6.6 | 6.9 | 5.4 | 4.4 |
| Surface | 4.1 | 3.8 | 3.8 | 3.9 | 3.5 |
| Total | 4.3 | 4.2 | 4.1 | 4.1 | 3.6 |

Figure 7 Frequency rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 15.6 | 31.9 | 14.4 | 20.4 | 28.1 |
| Surface | 21.0 | 19.7 | 21.1 | 20.1 | 19.2 |
| Total | 20.2 | 21.9 | 19.8 | 20.2 | 20.5 |

Figure 8 Duration rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 89 | 211 | 99 | 111 | 124 |
| Surface | 86 | 75 | 80 | 79 | 67 |
| Total | 86 | 91 | 82 | 82 | 74 |

Figure 9 Injury index

# Injuries by commodity cont.

## Gold performance indicators

The performance indicators for the gold sector showed mixed results for 2006–07. Figures 10 to 13 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Some interesting trends noted in the gold sector performance indicators during 2006–07 include the following:

- The overall incidence rate improved slightly by 2%, falling from 9.0 to 8.8. The surface incidence rate improved by 10% (from 9.2 to 8.3) whereas the underground incidence rate deteriorated by 21% (from 8.5 to 10.3).
- The overall frequency rate improved slightly by 2% falling from 4.4 to 4.3. The surface frequency rate improved by 10% (from 4.8 to 4.3) whereas the underground frequency rate deteriorated by 26% (from 3.5 to 4.4).
- The overall duration rate deteriorated by 10%, rising to 23.2. The surface duration rate improved by 10% (from 21.5 to 19.4) whereas the underground duration rate deteriorated significantly by 72% (from 19.3 to 33.1). The large increase in the underground duration rate was the result of four serious LTIs, each with over 100 days lost, accumulating a total of 673 days lost time during 2006-07.
- The rise in duration rate was greater than the fall in frequency rate and resulted in an 8% overall deterioration in the injury index, rising from 93 to 100. The surface injury index improved by 19% (from 102 to 83) whereas the underground injury index deteriorated significantly by 112% (from 68 to 144).

## Gold injury percentage breakdown for 2006–07

Appendices F and G provide a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident for the underground and surface sectors respectively.

### Injuries by part of body

- Leg injuries accounted for the largest proportion of underground injuries at 22%. Of the underground leg injuries, 71% were to knees. Back injuries accounted for the largest proportion of surface injuries at 25%.
- Back injuries accounted for the second largest proportion of injuries underground at 19%, followed by arm injuries at 16%. Of the arm injuries, 60% were to shoulders and wrists.
- Arm injuries accounted for the second largest proportion of surface injuries at 20%, followed by hand injuries and leg injuries both at 18%. Of the arm injuries, 82% were to shoulders, elbows and wrists. Of the leg injuries, 60% were to knees and ankles.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 38% and 43% respectively.
- The second highest ranking nature of underground injury was fracture at 22%, followed by laceration at 16%.
- The second highest ranking nature of surface injury was also fracture at 13%, followed by laceration at 8%.

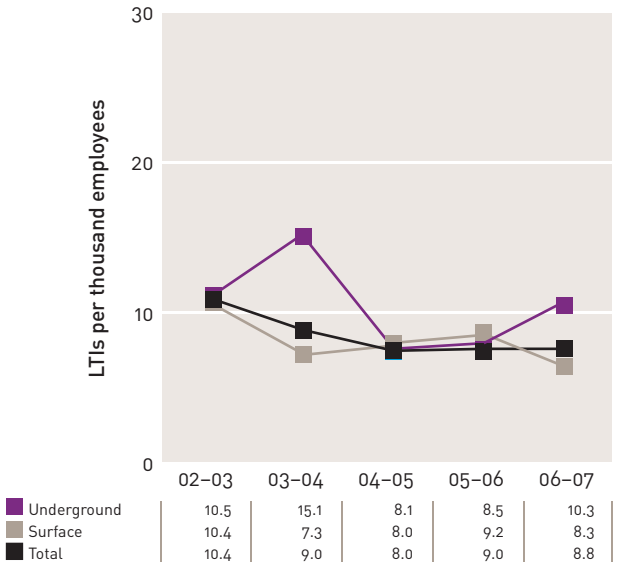
### Injuries by location

- Most underground injuries occurred in production and development (75%), followed by access and haulage ways at 25%.
- The majority of surface injuries occurred in treatment plants (38%), followed by workshops at 19% and open pits at 18%.

### Injuries by type

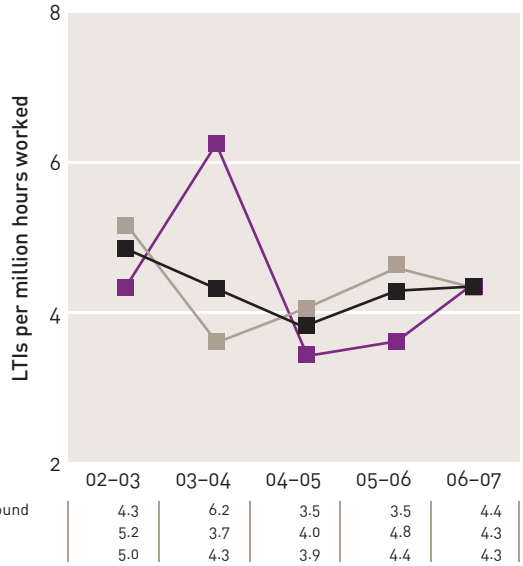
- Over-exertion or strenuous movements was the most common accident type for underground injuries at 25%, followed by rockfall at 22% then slip or trip at 13%.
- The most common accident type for surface injuries was also over-exertion or strenuous movements at 33%, followed by slip or trip at 12% then caught by or between moving objects at 8%.

## Gold performance indicators
2002–03 to 2006–07



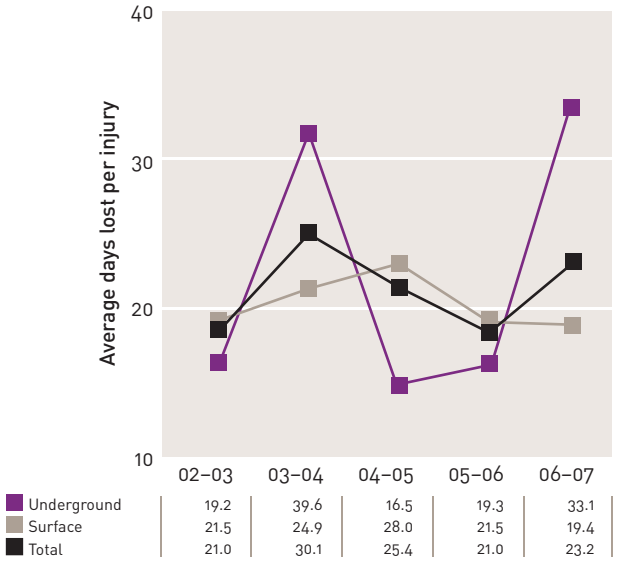

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 10.5 | 15.1 | 8.1 | 8.5 | 10.3 |
| Surface | 10.4 | 7.3 | 8.0 | 9.2 | 8.3 |
| Total | 10.4 | 9.0 | 8.0 | 9.0 | 8.8 |

Figure 10 Incidence rate



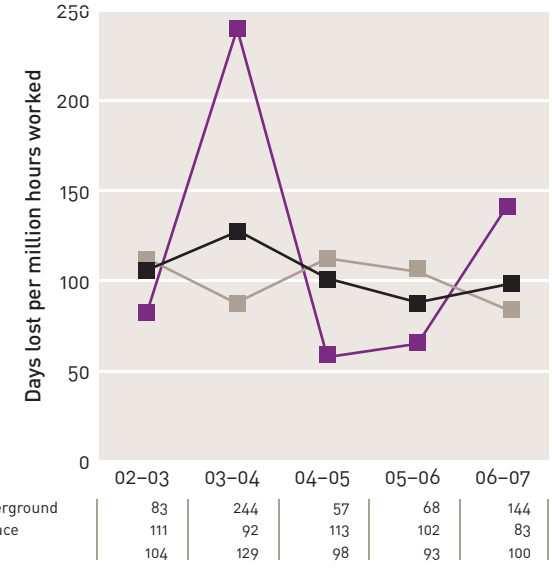

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 4.3 | 6.2 | 3.5 | 3.5 | 4.4 |
| Surface | 5.2 | 3.7 | 4.0 | 4.8 | 4.3 |
| Total | 5.0 | 4.3 | 3.9 | 4.4 | 4.3 |

Figure 11 Frequency rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 19.2 | 39.6 | 16.5 | 19.3 | 33.1 |
| Surface | 21.5 | 24.9 | 28.0 | 21.5 | 19.4 |
| Total | 21.0 | 30.1 | 25.4 | 21.0 | 23.2 |

Figure 12 Duration rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 83 | 244 | 57 | 68 | 144 |
| Surface | 111 | 92 | 113 | 102 | 83 |
| Total | 104 | 129 | 98 | 93 | 100 |

Figure 13 Injury index

# Injuries by commodity cont.

## Iron ore performance indicators

The performance indicators for the iron ore sector showed mixed results for 2006–07. Figures 14 to 17 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Some interesting trends noted in the iron ore sector performance indicators during 2006–07 include the following:

- The incidence rate improved by 10%, falling from 5.0 to 4.5.
- The frequency rate improved by 17%, falling from 2.4 to 2.0.
- The duration rate deteriorated by 26%, rising from 18.8 to 23.7.
- The rise in duration rate was greater than the fall in the frequency rate and resulted in a deterioration of 4% in injury index (from 46 to 48).

## Iron ore injury percentage breakdown for 2006–07

Appendix H provides a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident.

### Injuries by part of body

- Leg injuries accounted for the largest proportion of injuries at 30%. Of the leg injuries, 82% were to knees and ankles.
- Back injuries accounted for the second largest proportion of injuries at 26%, followed by arm injuries at 12%. Of the arm injuries, 56% were to shoulders and wrists.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury at 55%.
- Fracture was the second highest ranking nature of injury at 14%, followed by laceration at 8%.

### Injuries by location

- The majority of injuries occurred in open pits, which accounted for 26%.
- The next largest proportion occurred in treatment plants and workshops both at 20%, followed by surface general at 18%.

### Injuries by type

- Over-exertion or strenuous movements was the most common type of accident resulting in injury (31%).
- Stepping was the second most common type (15%), followed by struck by object at 9%.

## Iron ore performance indicators
2002–03 to 2006–07

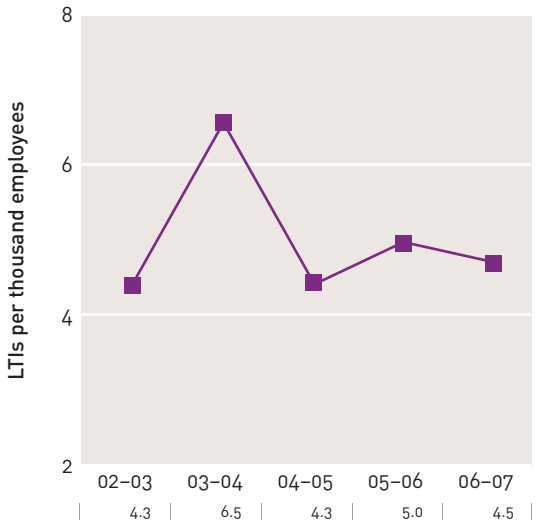



Figure 14 Incidence rate

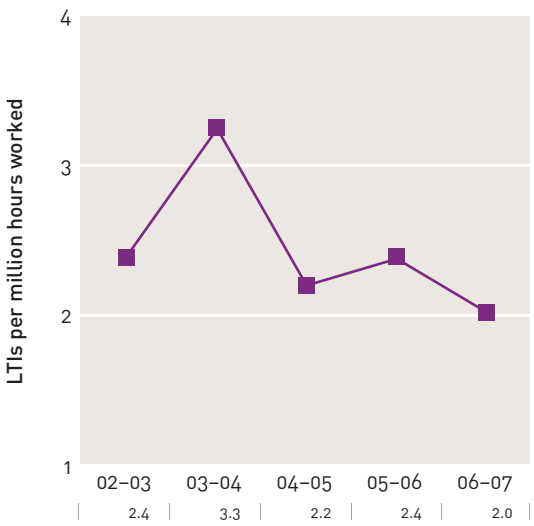



Figure 15 Frequency rate

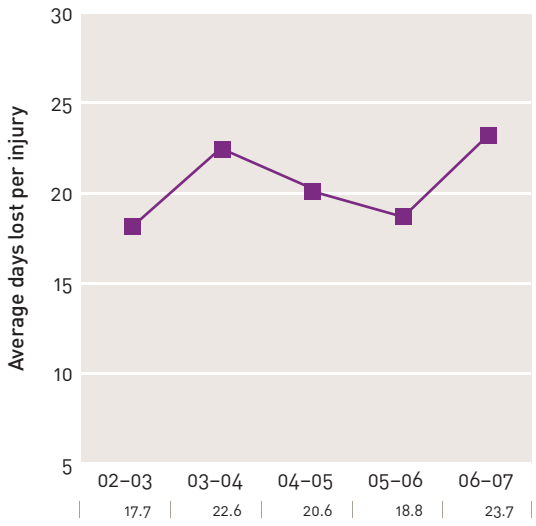



Figure 16 Duration rate

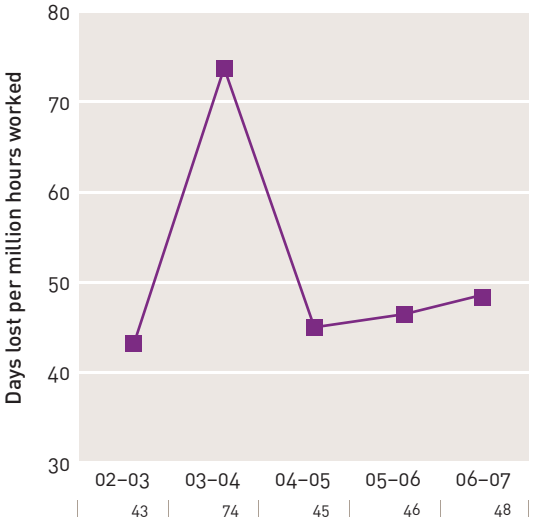



Figure 17 Injury index

# Injuries by commodity cont.

## Bauxite and alumina performance indicators

The performance indicators for the bauxite and alumina sector deteriorated during 2006–07. Figures 18 to 21 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Some interesting trends noted in the bauxite and alumina sector performance indicators during 2006–07 include the following:

- The incidence rate deteriorated significantly by 35%, rising from 5.7 to 7.7.
- The frequency rate deteriorated significantly by 37%, rising from 3.0 to 4.1.
- The duration rate deteriorated slightly by 3%, rising from 15.5 to 15.9.
- The rise in both frequency rate and duration rate resulted in a significant deterioration of 38% to the injury index, up from 47 to 65.

## Bauxite and alumina injury percentage breakdown for 2006–07

Appendix I provides a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident.

### Injuries by part of body

- Back injuries accounted for the largest proportion of injuries at 25%.
- Leg injuries accounted for the second largest proportion of injuries at 18%, followed by arm injuries at 17%. Of the leg injuries 67% were to knees and ankles. Of the arm injuries, 73% were to shoulders and wrists.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury at 52%.
- Effects of chemicals or fumes was the second highest ranking nature of injury at 15%, followed by laceration at 11%.

### Injuries by location

- The majority of injuries occurred in treatment plants, which accounted for 66%.
- The next largest proportion occurred in surface general areas and workshops both at 9%, followed by open pits at 8%.

### Injuries by type

- Over-exertion or strenuous movements was the most common type of accident resulting in injury (42%).
- Contact with chemicals or fumes was the second most common type (15%), followed by caught by or between objects, slip or trip and stepping each at 6%.

## Bauxite and alumina performance indicators
2002–03 to 2006–07

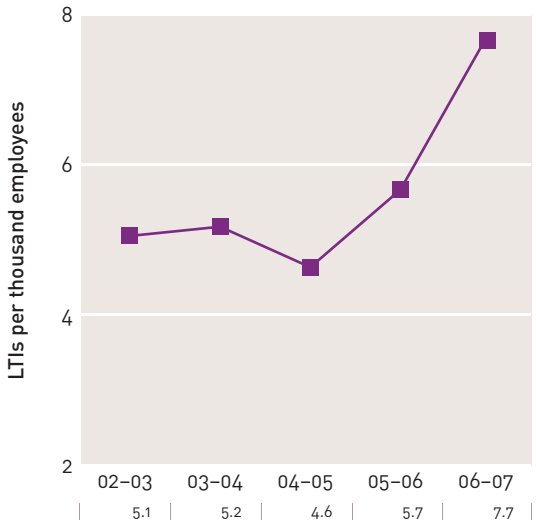



Figure 18 Incidence rate

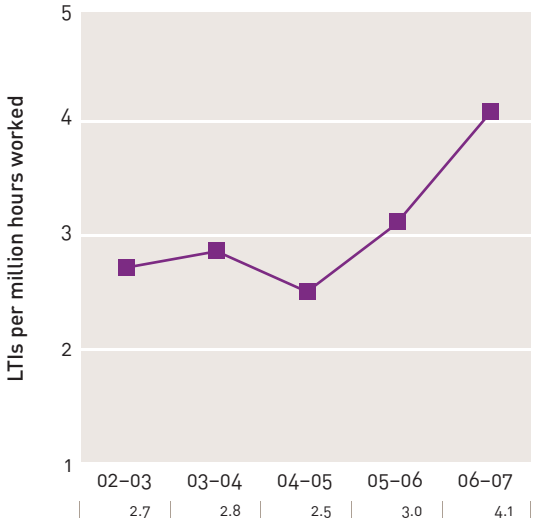



Figure 19 Frequency rate

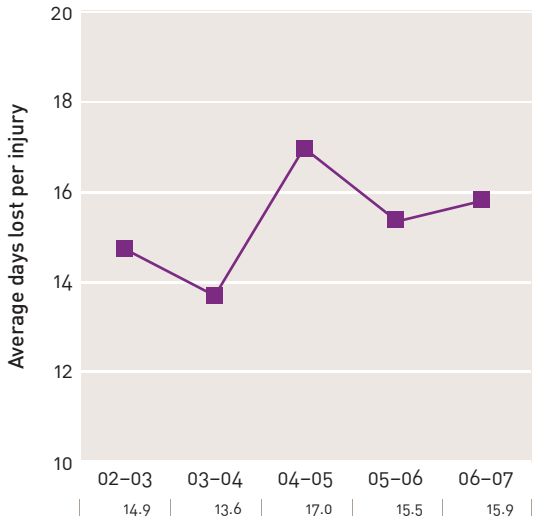



Figure 20 Duration rate

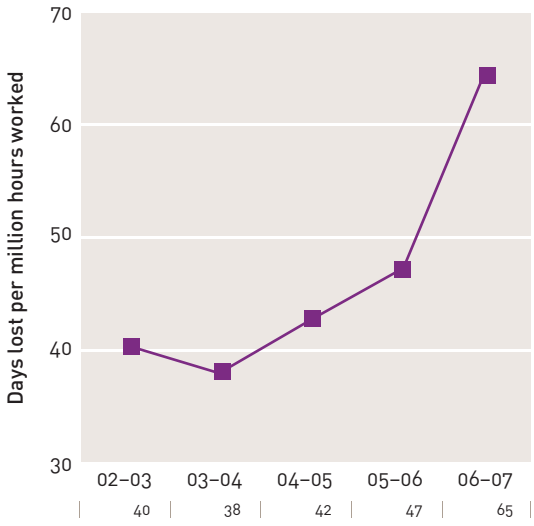



Figure 21 Injury index

# Injuries by commodity cont.

## Nickel performance indicators

The performance indicators for the nickel sector showed mixed results during 2006–07. Figures 22 to 25 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Some interesting trends noted in the nickel sector performance indicators during 2006–07 include the following:

- The overall incidence rate improved significantly by 56%, falling from 11.5 to 5.1. The surface incidence rate improved significantly by 53% (from 9.0 to 4.2) and the underground incidence rate improved significantly by 59% (from 23.2 to 9.5).
- A similar trend was noted in the frequency rate for both surface and underground. The overall frequency rate improved significantly by 58%, falling from 5.9 to 2.5. The surface frequency rate improved significantly by 56% (from 4.8 to 2.1) and the underground frequency rate improved significantly by 60% (from 10.2 to 4.1).
- The overall duration rate improved slightly by 1%, falling to 19.3. The surface duration rate deteriorated slightly by 1% (from 18.3 to 18.4) whereas the underground duration rate improved slightly by 3% (from 21.8 to 21.1).
- The fall in frequency rate and duration rate resulted in a significant overall improvement of 59% in the injury index, falling from 116 to 48. The surface injury index improved significantly by 57% (from 88 to 38) and the underground injury index improved significantly by 61% (from 222 to 87).

## Nickel injury percentage breakdown for 2006–07

Appendices J and K provide a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident for the underground and surface sectors respectively.

### Injuries by part of body

- Leg injuries accounted for the largest proportion of both underground and surface injuries at 26% and 37% respectively. Of the underground leg injuries, 80% were to knees and ankles. Of the surface leg injuries, 80% were to knees and ankles.
- Hand injuries accounted for the second largest proportion of injuries underground at 21%, followed by trunk not otherwise classified injuries at 16%.
- Back injuries accounted for the second largest proportion of surface injuries at 15%, followed by trunk not otherwise classified injuries at 12%.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 47% and 41% respectively.
- The second highest ranking nature of underground injury was crushing and effects of chemicals and fumes both at 16%, followed by fracture at 11%.
- The second highest ranking nature of surface injury was fracture at 17%, followed by dislocation and effects of chemicals and fumes both at 7%.

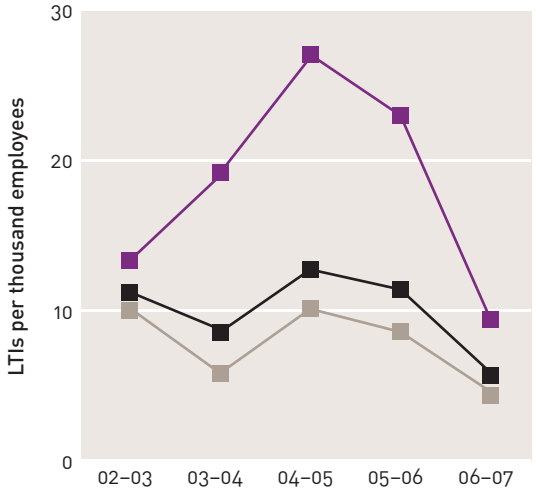
### Injuries by location

- Most underground injuries occurred in production and development areas (68%), followed by underground not otherwise classified areas at 11% then access and haulage ways, dumping areas, storage areas and workshops each at 5%.
- The majority of surface injuries occurred in treatment plants (37%), followed by surface general areas at 22% then open pits at 17%.

### Injuries by type

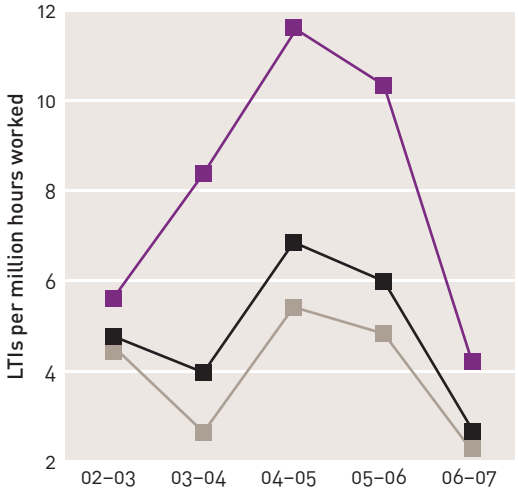
- Over-exertion or strenuous movements was the most common accident type for underground injuries at 37%, followed by struck by object and contact with chemicals and fumes both at 16% then slip or trip, rockfall, caught by or between moving or stationary objects, stepping, struck against object and fall getting off each at 5%.
- The most common accident type for surface injuries was over-exertion or strenuous movements at 29%, followed by slip or trip, stepping and vehicle or mobile equipment rollover each at 10% then contact with chemicals or fumes, fall from height and struck by object each at 7%.

## Nickel performance indicators
2002–03 to 2006–07



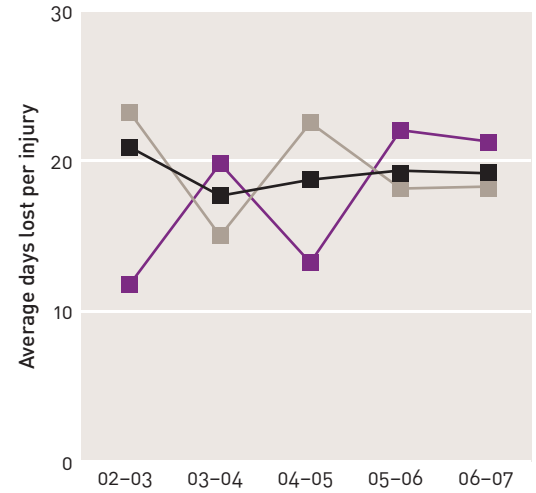

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 13.3 | 19.4 | 26.7 | 23.2 | 9.5 |
| Surface | 10.1 | 5.5 | 10.0 | 9.0 | 4.2 |
| Total | 10.7 | 8.3 | 13.0 | 11.5 | 5.1 |

Figure 22 Incidence rate



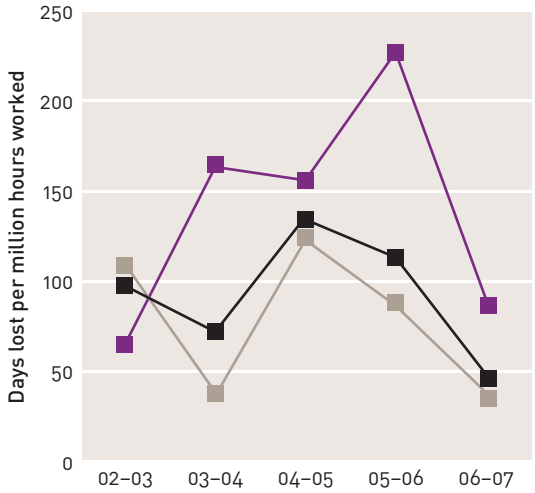

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 5.6 | 8.3 | 11.7 | 10.2 | 4.1 |
| Surface | 4.6 | 2.7 | 5.6 | 4.8 | 2.1 |
| Total | 4.8 | 3.9 | 7.0 | 5.9 | 2.5 |

Figure 23 Frequency rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 12.2 | 19.8 | 13.0 | 21.8 | 21.1 |
| Surface | 23.0 | 14.2 | 22.6 | 18.3 | 18.4 |
| Total | 20.7 | 16.8 | 19.0 | 19.5 | 19.3 |

Figure 24 Duration rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 68 | 165 | 152 | 222 | 87 |
| Surface | 106 | 38 | 126 | 88 | 38 |
| Total | 99 | 66 | 132 | 116 | 48 |

Figure 25 Injury index

# Disabling injuries

## Review of disabling injuries during 2006–07

In addition to the 460 LTIs during 2006–07, there were 705 disabling injuries (DIs) reported (703 in metalliferous mines and two in coal mines), bringing the total number of reportable injuries to 1,165. A breakdown of these data with performance indicators is shown in Tables 10 and 11.

Of the disabling injuries, 387 resulted in the injured person being disabled for two weeks or more.

**Table 10** Disabling injuries during 2006-07

| Mines | No. of employees | Disabling injuries | | | Reportable injuries (DIs and LTIs) | | |
|---|---|---|---|---|---|---|---|
| | | No. of injuries | Incidence | Frequency | No. of injuries | Incidence | Frequency |
| Metalliferous surface | 53,782 | 563 | 10.5 | 5.2 | 945 | 17.6 | 8.7 |
| Metalliferous underground | 6,308 | 140 | 22.2 | 9.4 | 206 | 32.7 | 13.8 |
| Metalliferous total | 60,090 | 703 | 11.7 | 5.7 | 1151 | 19.2 | 9.3 |
| Coal total | 771 | 2 | 2.6 | 1.6 | 14 | 18.2 | 11.1 |
| **TOTAL MINING** | **60,861** | **705** | **11.6** | **5.6** | **1,165** | **19.1** | **9.3** |

**Table 11** Disabling injuries by mineral mined during 2006-07

| Mines | No. of employees | Disabling injuries | | | Reportable injuries (DIs and LTIs) | | |
|---|---|---|---|---|---|---|---|
| | | No. of injuries | Incidence | Frequency | No. of injuries | Incidence | Frequency |
| Iron ore | 16,594 | 82 | 4.9 | 2.3 | 156 | 9.4 | 4.3 |
| Gold | 13,192 | 220 | 16.7 | 8.2 | 336 | 25.5 | 12.5 |
| Nickel | 11,738 | 142 | 12.1 | 5.9 | 202 | 17.2 | 8.3 |
| Bauxite and alumina | 8,398 | 202 | 24.1 | 12.7 | 267 | 31.8 | 16.7 |
| Mineral sands | 2,862 | 21 | 7.3 | 4.3 | 45 | 15.7 | 9.2 |
| Base metals | 2,123 | 7 | 3.3 | 1.5 | 33 | 15.5 | 7.0 |
| Diamonds | 1,719 | 4 | 2.3 | 0.9 | 28 | 16.3 | 6.5 |
| Salt | 867 | 4 | 4.6 | 2.9 | 9 | 10.4 | 6.5 |
| Coal | 771 | 2 | 2.6 | 1.6 | 14 | 18.2 | 11.1 |
| Construction materials | 468 | 4 | 8.5 | 3.8 | 11 | 23.5 | 10.6 |
| Tin, tantalum and lithium | 414 | 0 | 0.0 | 0.0 | 5 | 12.1 | 5.4 |
| Other | 1,715 | 17 | 9.9 | 5.2 | 59 | 34.4 | 17.9 |
| **TOTAL MINING** | **60,861** | **705** | **11.6** | **5.6** | **1,165** | **19.1** | **9.3** |

*NOTE: Disabling injury includes where the injured person:*

- *is placed in a different occupation or job, whether on full or restricted work hours*
- *remains in his or her normal occupation or job, but is not able to perform the full range of work duties*
- *remains in his or her normal occupation or job, but on restricted hours.*

## Disabling injury performance indicators

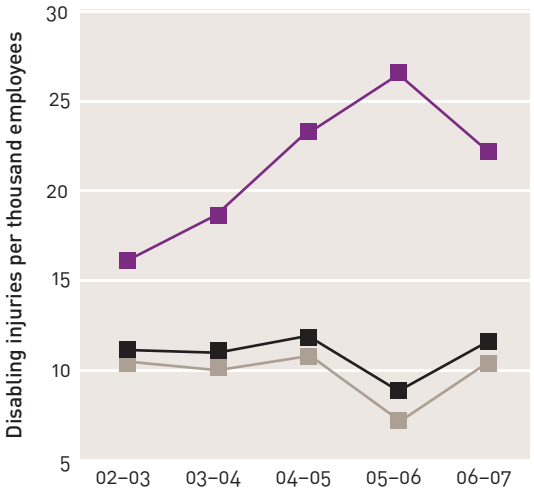
The disabling injury performance indicators for the mining sector show mixed results for 2006–07. Figures 26 to 29 depict the performance indicators of incidence rate, frequency rate, days off per injury, and days off per million hours worked.

Some interesting trends noted in the disabling injury performance indicators for all mines during 2006–07 include the following:

- The overall incidence rate deteriorated significantly by 29%, rising from 9.0 to 11.6. The surface incidence rate deteriorated significantly by 46% (from 7.1 to 10.4) whereas the underground incidence rate improved by 17% (from 26.8 to 22.2).
- A similar trend was noted in the frequency rate for both surface and underground. The overall frequency rate deteriorated by 24%, rising from 4.5 to 5.6. The surface frequency rate deteriorated significantly by 38% (from 3.7 to 5.1) whereas the underground frequency rate improved by 18% (from 11.5 to 9.4).
- The overall days off per disabling injury deteriorated slightly by 2%, rising to 30.9. The surface days off per disabling injury deteriorated by 7% (from 30.8 to 32.9) whereas the underground days off per disabling injury improved by 21% (from 28.9 to 22.8).
- The rise in frequency rate and overall days off per disabling injury resulted in a deterioration of 27% to the days off per million hours worked, up from 137 to 174. The surface days off per million hours worked deteriorated significantly by 49% (from 113 to 168) whereas the underground days off per million hours worked improved significantly by 36% (from 333 to 214).

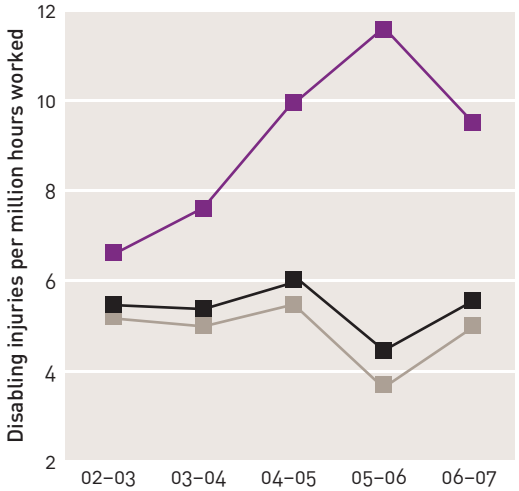
# Disabling injuries cont.

## Disabling injury performance indicators
2002–03 to 2006–07



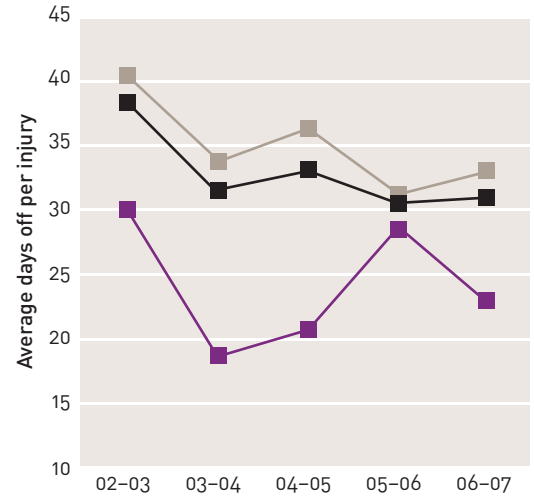

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 16.2 | 18.8 | 23.4 | 26.8 | 22.2 |
| Surface | 10.4 | 10.0 | 10.7 | 7.1 | 10.4 |
| Total | 11.0 | 10.8 | 11.9 | 9.0 | 11.6 |

Figure 26 Incidence rate



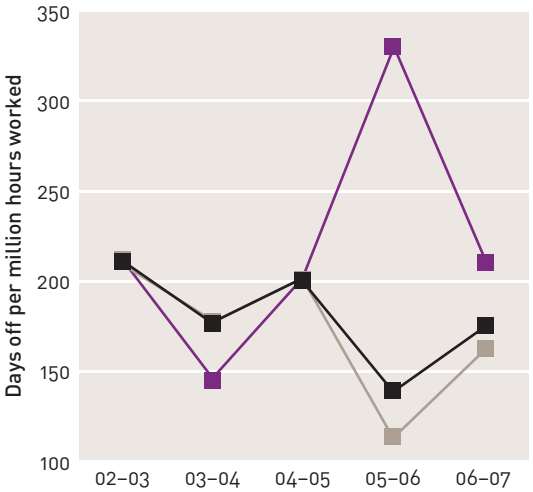

| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 6.7 | 7.7 | 10.0 | 11.5 | 9.4 |
| Surface | 5.4 | 5.1 | 5.6 | 3.7 | 5.1 |
| Total | 5.5 | 5.4 | 6.1 | 4.5 | 5.6 |

Figure 27 Frequency rate




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 30.1 | 19.1 | 20.6 | 28.9 | 22.8 |
| Surface | 40.1 | 33.9 | 36.2 | 30.8 | 32.9 |
| Total | 38.7 | 31.5 | 33.3 | 30.3 | 30.9 |

Figure 28 Average days off per injury




| | 02–03 | 03–04 | 04–05 | 05–06 | 06–07 |
|---|---|---|---|---|---|
| Underground | 203 | 148 | 205 | 333 | 214 |
| Surface | 215 | 173 | 202 | 113 | 168 |
| Total | 214 | 170 | 202 | 137 | 174 |

Figure 29 Days off per million hours worked

## Disabling injury percentage breakdown for 2006-07

Appendices L and M provide a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident for the underground and surface sectors respectively.

### Injuries by part of body

- Back injuries accounted for the largest proportion of underground injuries at 26%. Arm injuries accounted for the largest proportion of surface injuries at 27%. Of the surface arm injuries, 39% were to shoulders, 22% were to elbows and 22% were to wrists.
- Hand injuries accounted for the second largest proportion of injuries underground at 23%, followed by arm injuries at 19%. Of the arm injuries, 54% were to shoulders, 12% were to elbows and 27% were to wrists.
- Back injuries accounted for the second largest proportion of surface injuries at 25%, followed by leg injuries at 18%. Of the leg injuries, 47% were to knees and 28% were to ankles.

### Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 51% and 61% respectively.
- The second highest ranking nature of underground injury was bruise or contusion (11%), followed by crushing at 8%.
- The second highest ranking nature of surface injury was also bruise or contusion (9%), followed by laceration at 7%.

### Injuries by location

- Most underground injuries occurred in production and development areas (58%), followed by access and haulage ways at 25% then underground areas not otherwise classified at 6%.
- The majority of surface injuries occurred in treatment plants (47%), followed by open pits, workshops and surface general areas each at 13% then administration areas at 8%.

### Injuries by type

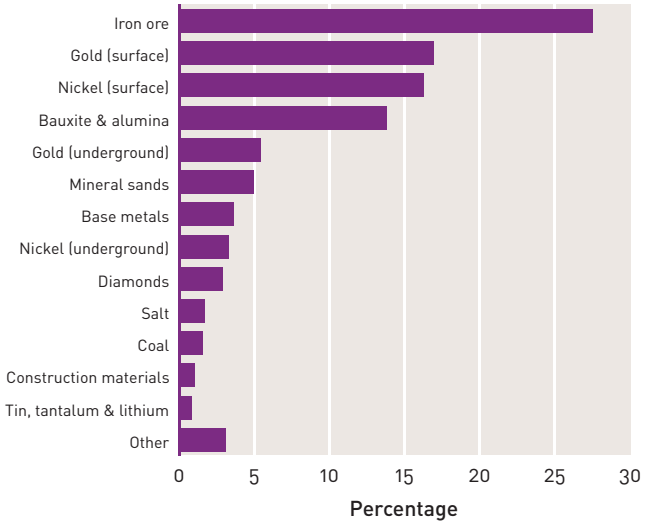
- Over-exertion or strenuous movements was the most common accident type for underground injuries at 30%, followed by stepping at 10%, and slip or trip at 8%.
- The most common accident type for surface injuries was also over-exertion or strenuous movements at 43%, followed by slip or trip at 8%, and caught by or between moving or stationary objects and struck by object both at 7%.

# APPENDICES

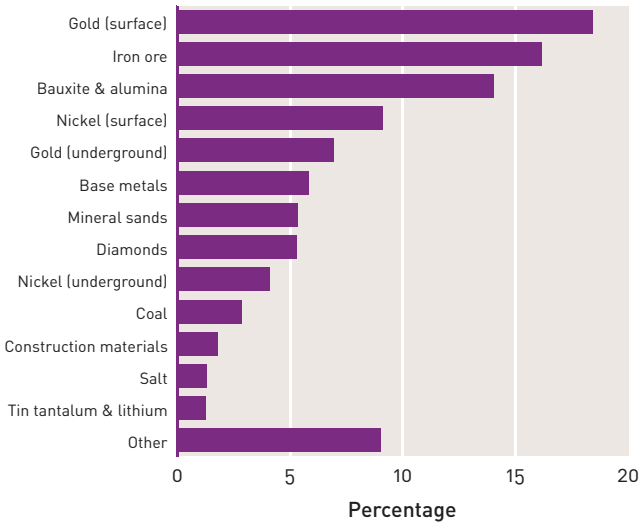
# Appendix A

## Western Australian mines 2006–07

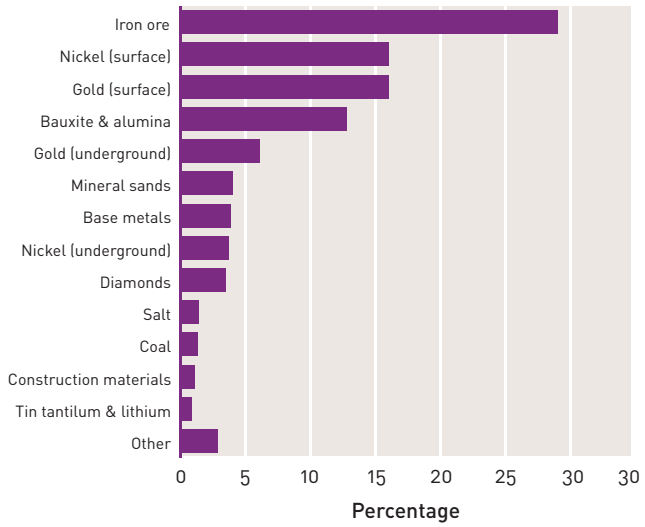
**460 injuries**



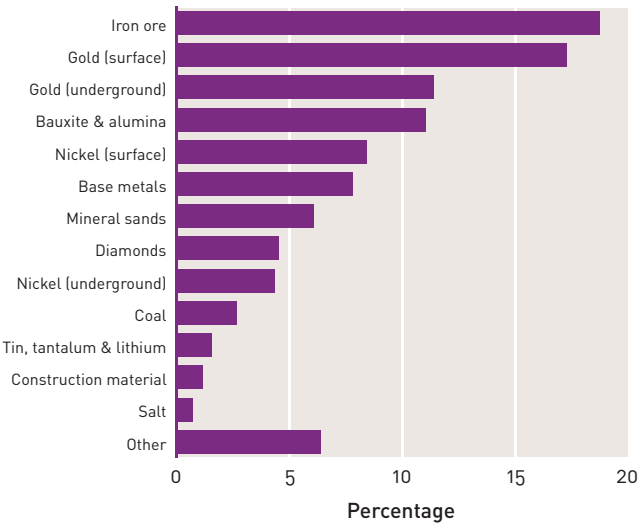

Percentage of employees




Percentage of injuries




Percentage of hours worked

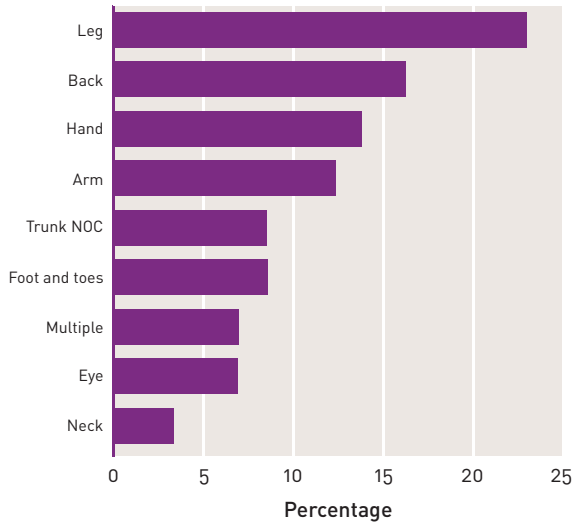



Percentage of work days lost

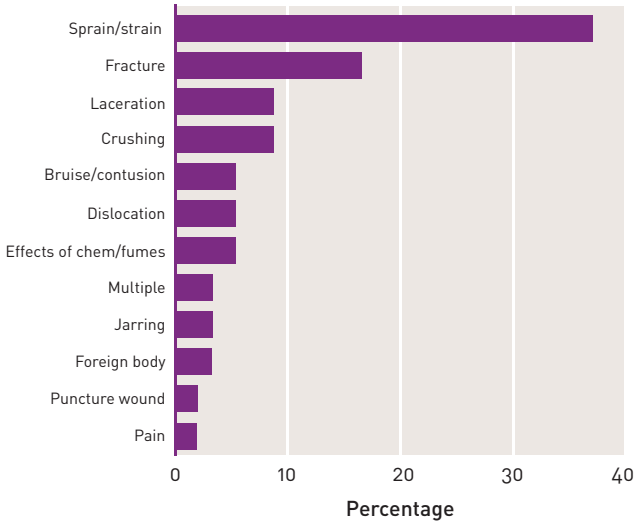
# Appendix B

## Serious injuries underground 2006–07

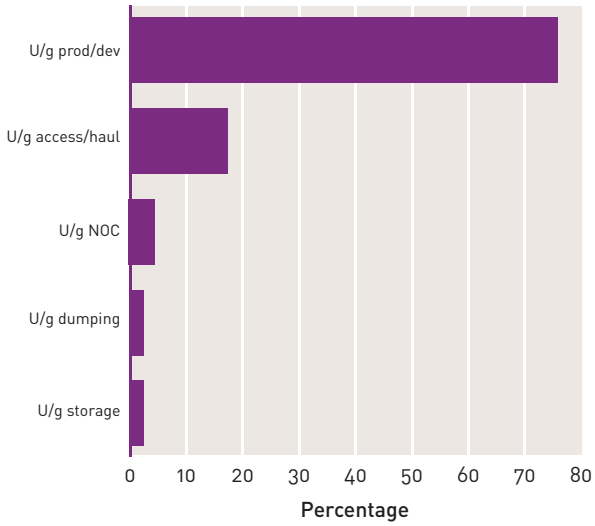
**57 injuries**



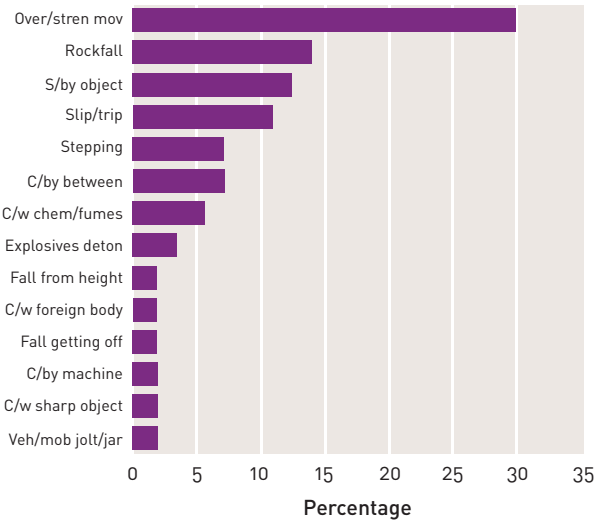

Part of body




Nature of injury




Location of accident

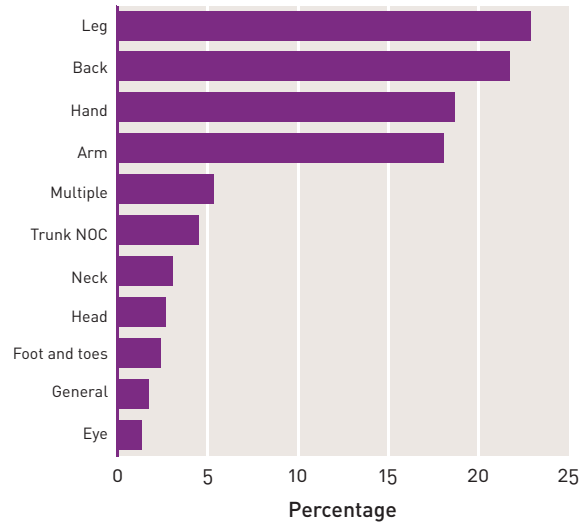



Type of accident

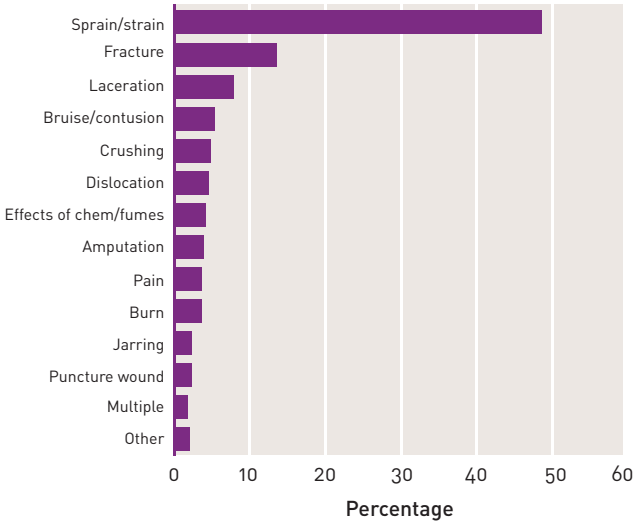
# Appendix C

## Serious injuries surface 2006–07

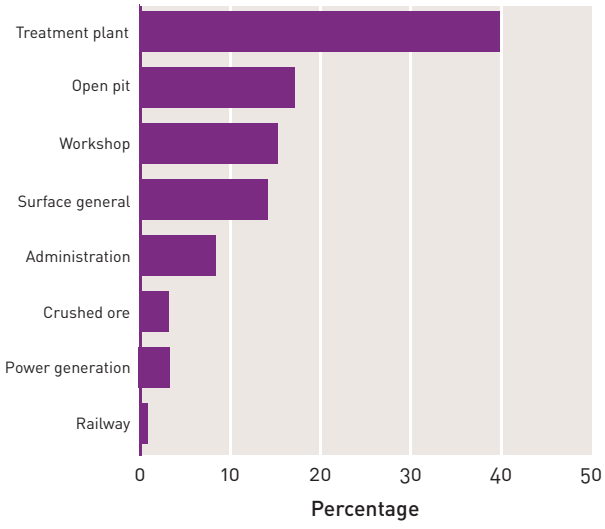
291 injuries



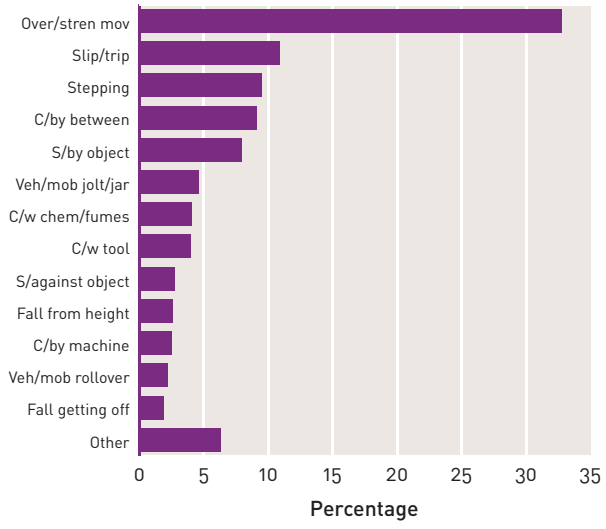

Part of body




Nature of injury




Location of accident

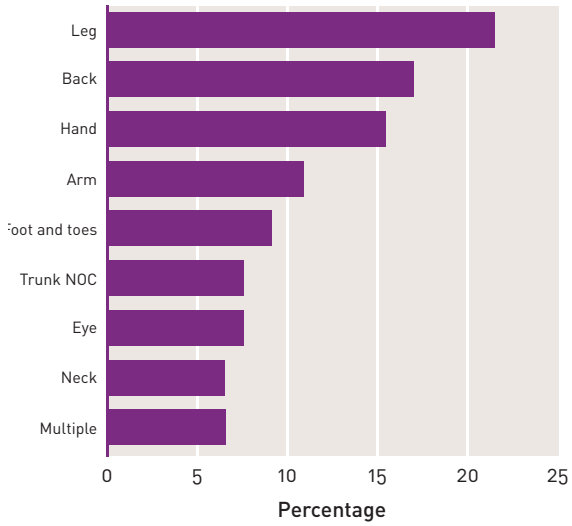



Type of accident

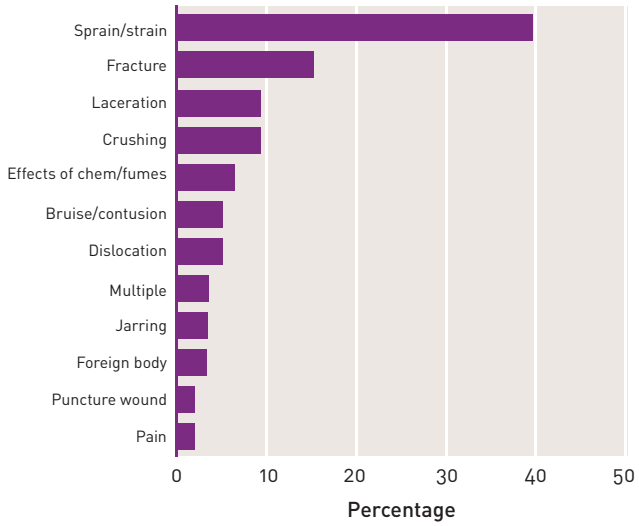
# Appendix D

## Metalliferous underground injuries 2006–07

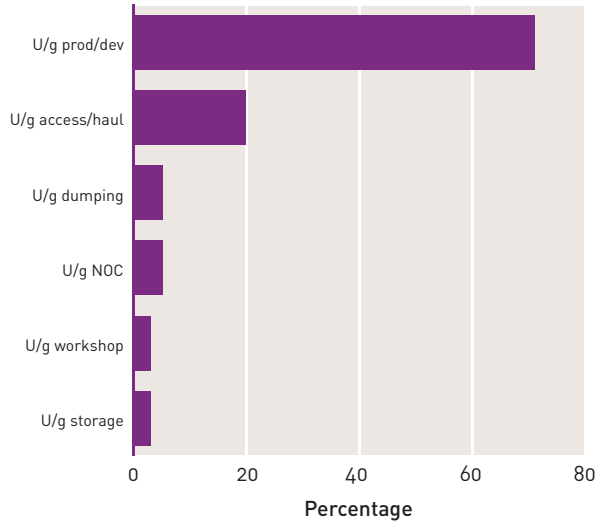
**66 injuries**



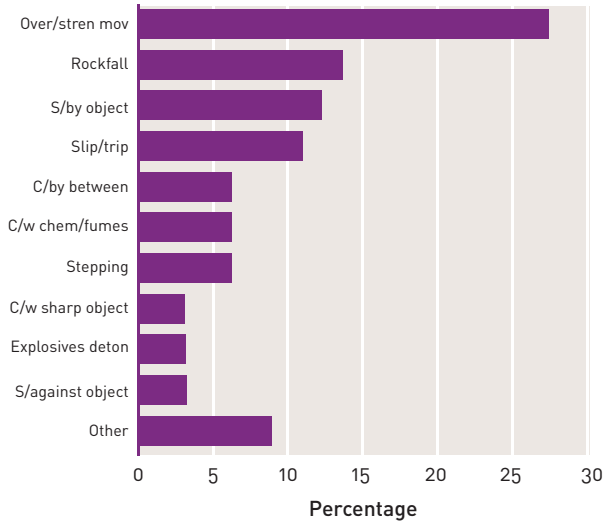

Part of body




Nature of injury




Location of accident

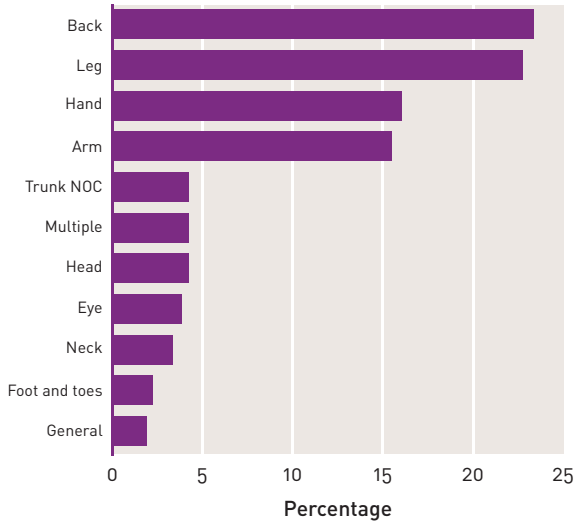



Type of accident

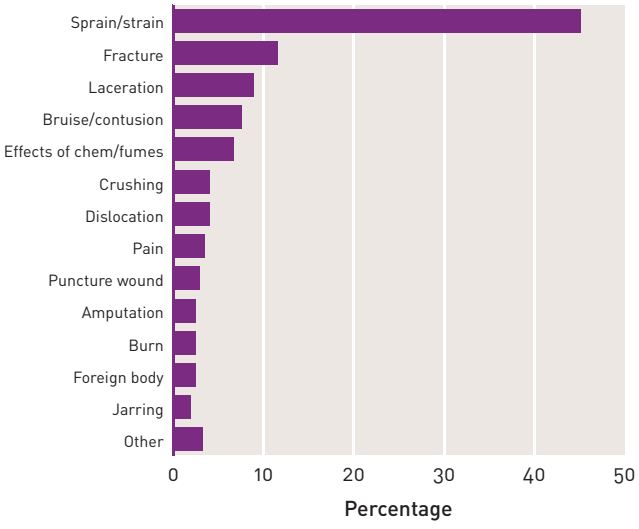
# Appendix E

## Metalliferous surface injuries 2006–07

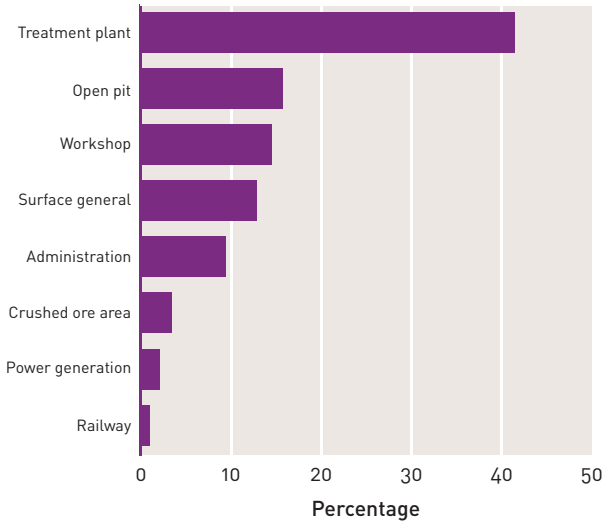
382 injuries



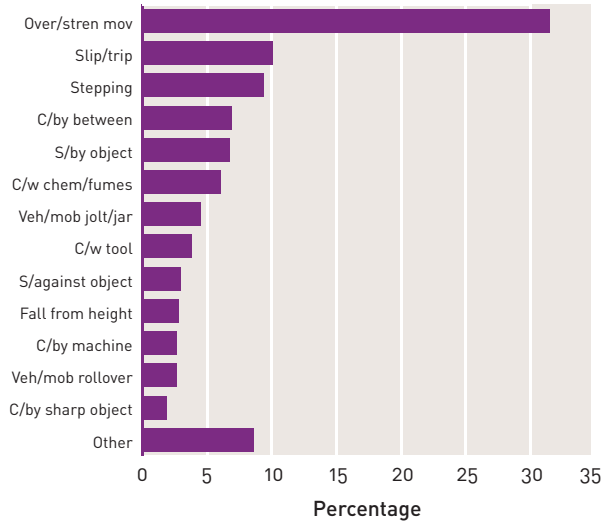

Part of body




Nature of injury




Location of accident

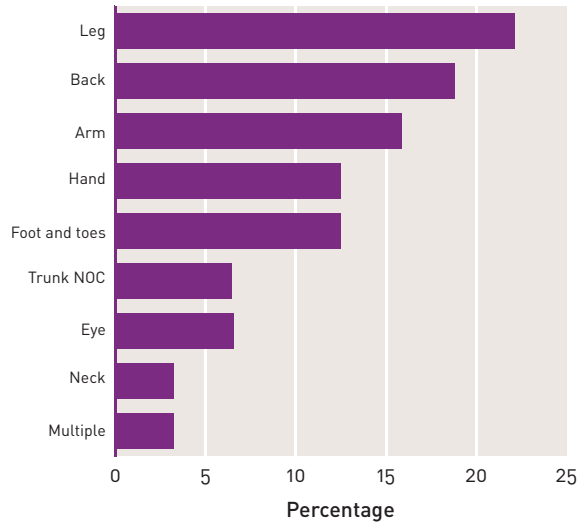



Type of accident

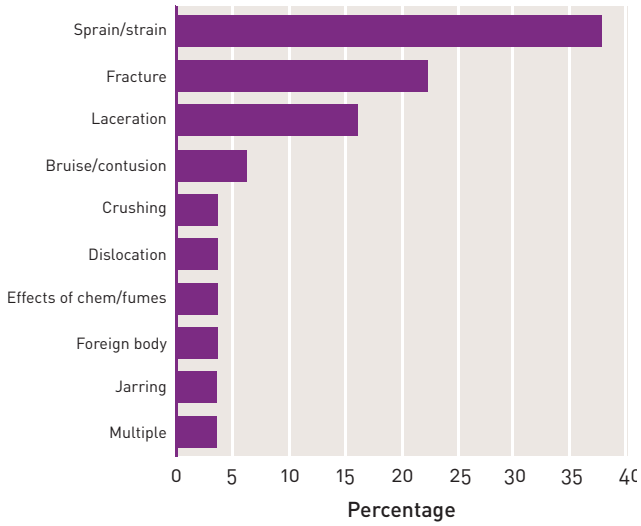
# Appendix F

## Gold underground injuries 2006–07

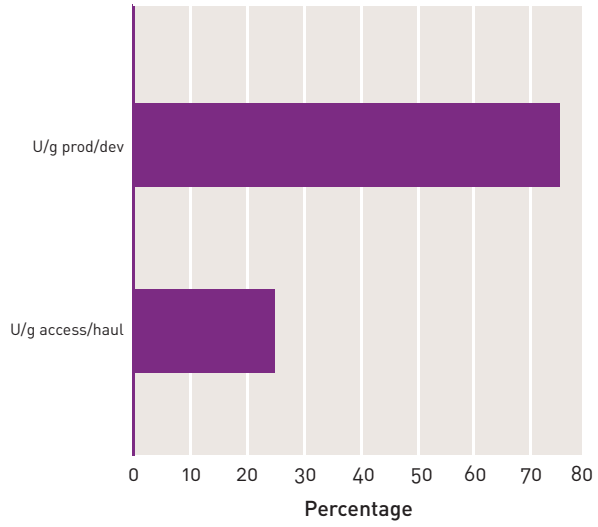
32 injuries



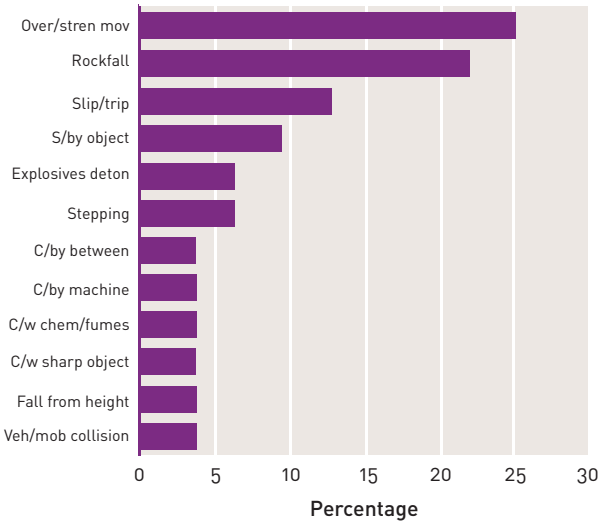

Part of body




Nature of injury




Location of accident

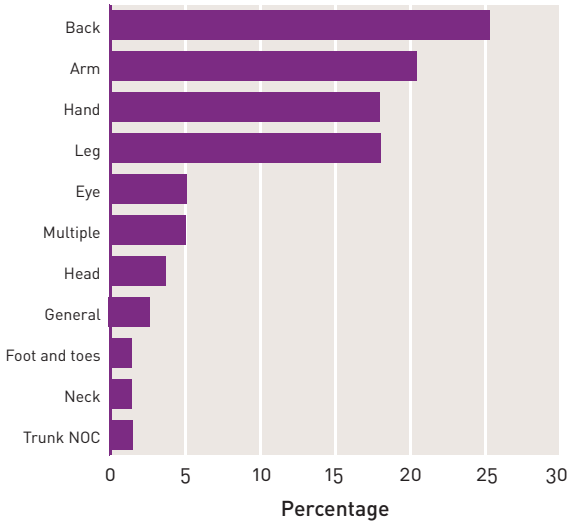



Type of accident

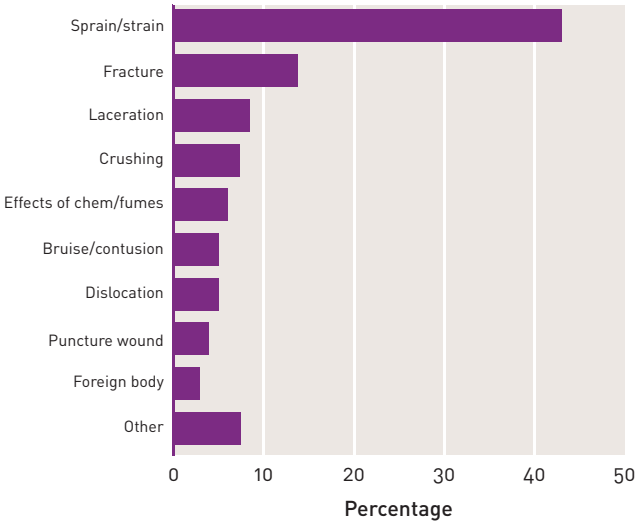
# Appendix G

## Gold surface injuries 2006–07

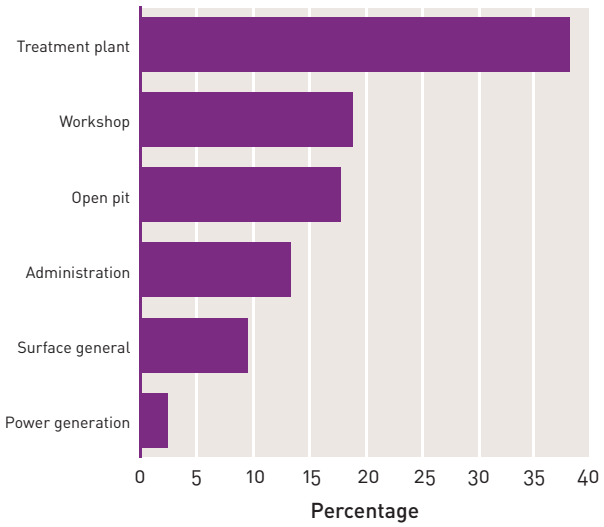
84 injuries



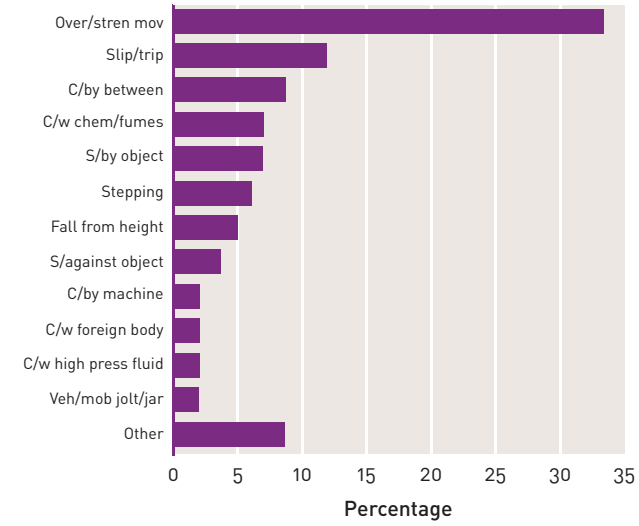

Part of body




Nature of injury




Location of accident

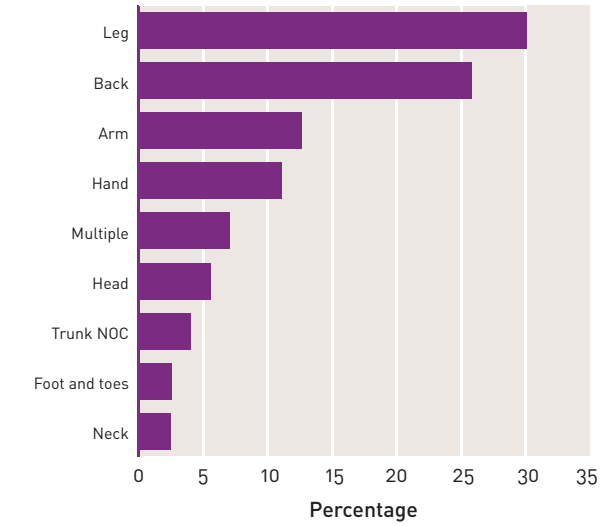



Type of accident

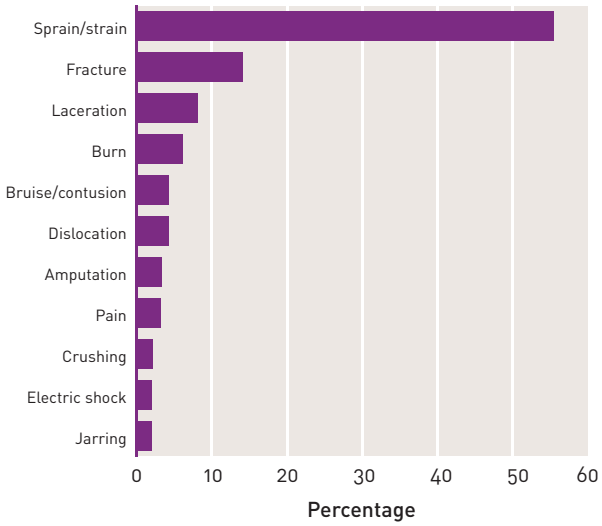
# Appendix H

## Iron ore injuries 2006–07

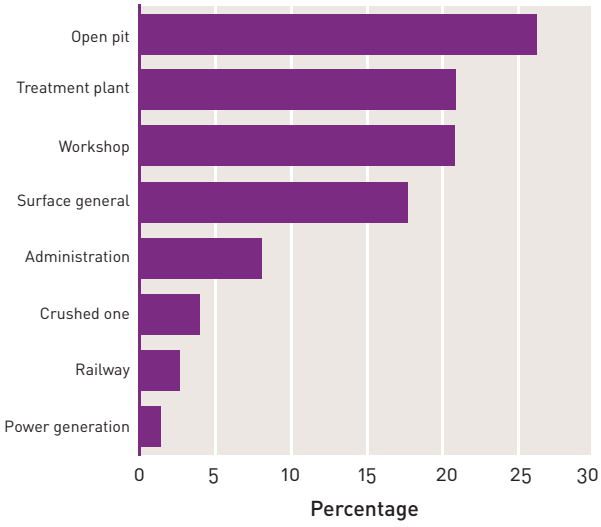
**74 injuries**



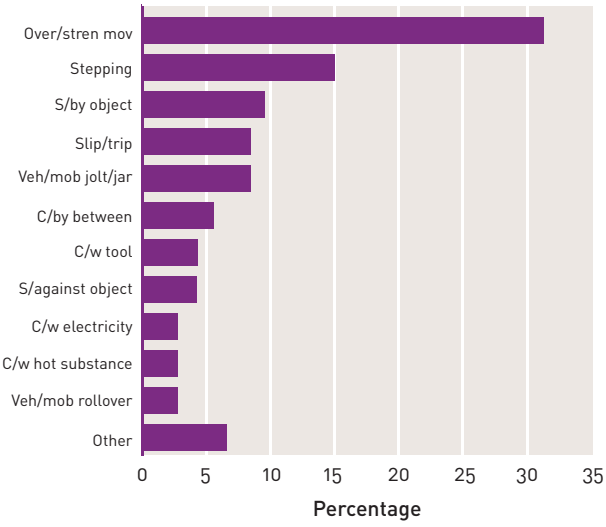

Part of body




Nature of injury




Location of accident

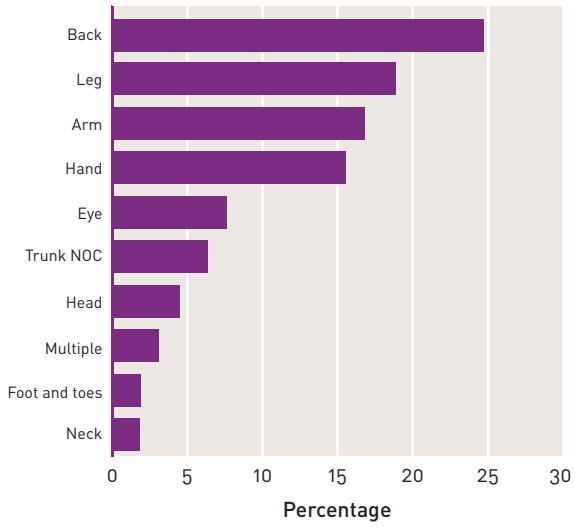



Type of accident

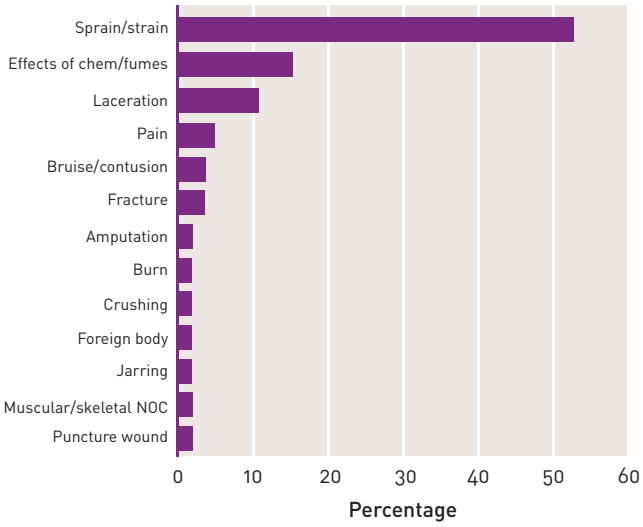
# Appendix I

## Bauxite and alumina injuries 2006–07

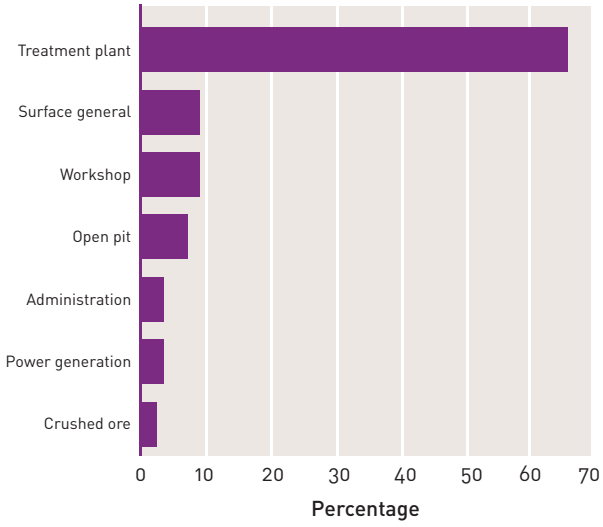
65 injuries



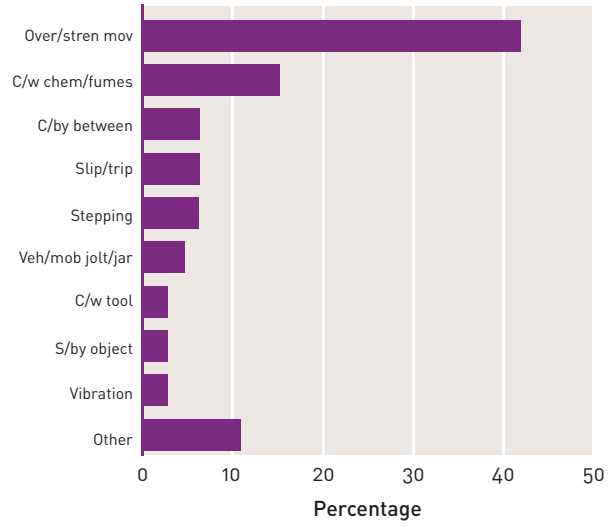

Part of body




Nature of injury




Location of accident

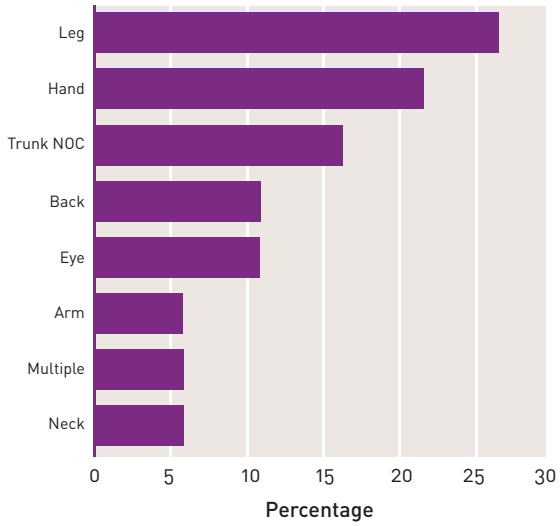



Type of accident

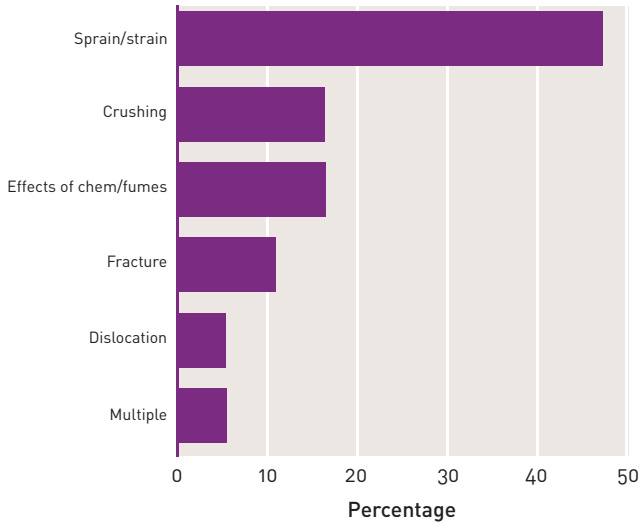
# Appendix J

## Nickel underground injuries 2006–07

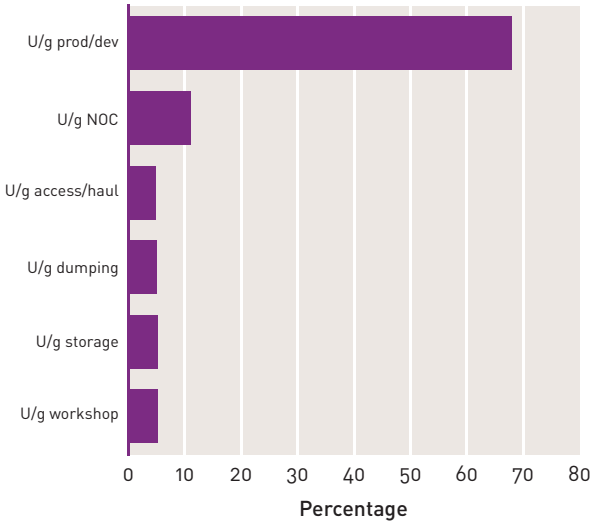
19 injuries



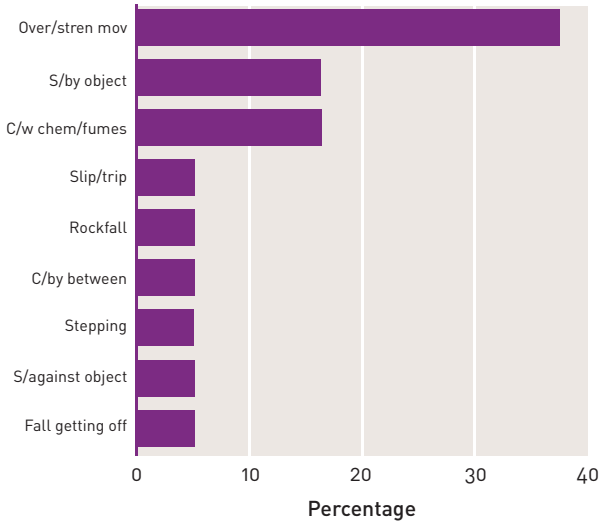

Part of body




Nature of injury




Location of accident

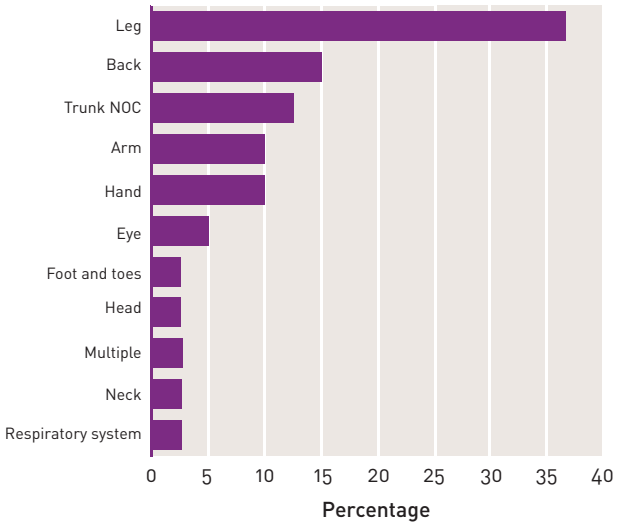



Type of accident

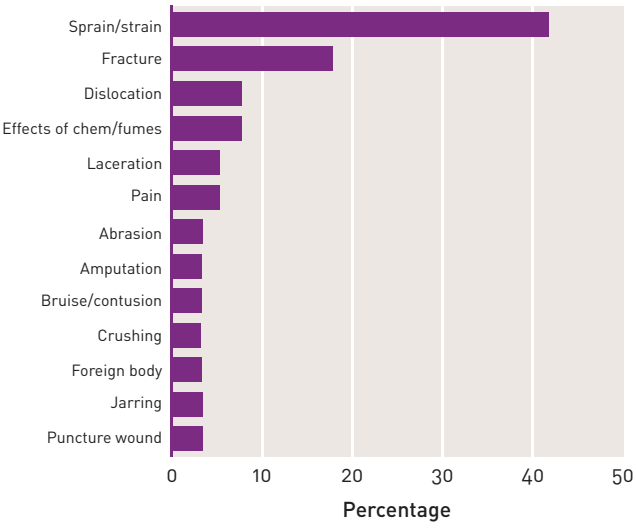
# Appendix K

## Nickel surface injuries 2006–07

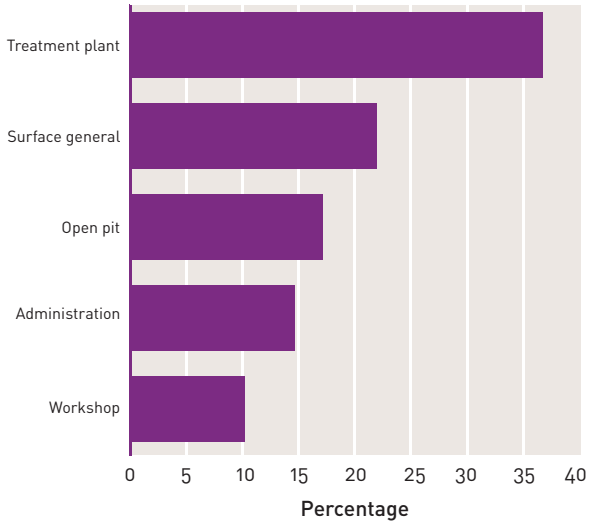
41 injuries



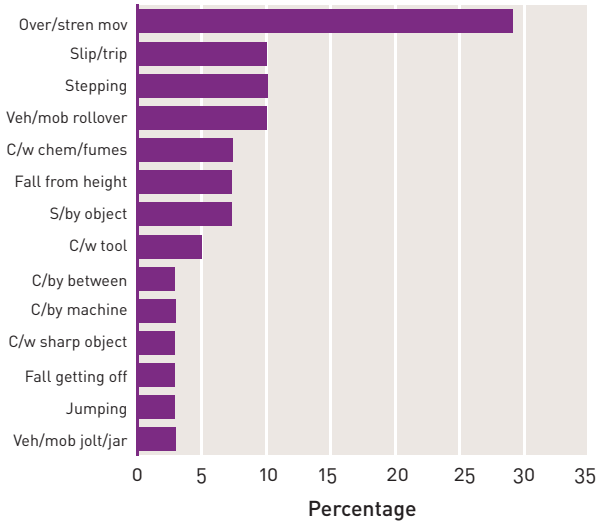

Part of body




Nature of injury




Location of accident

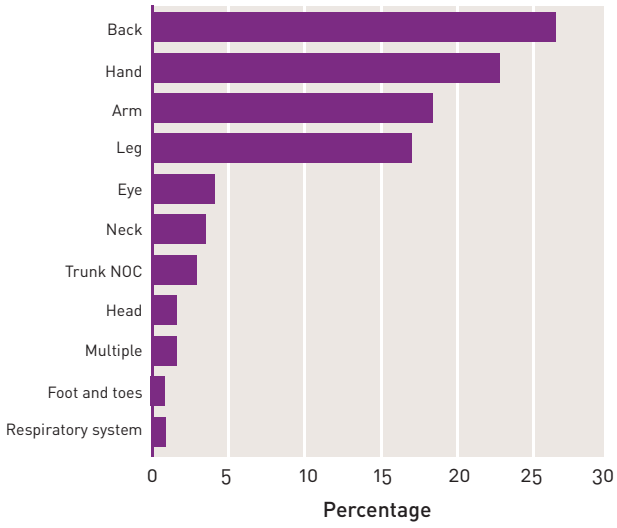



Type of accident

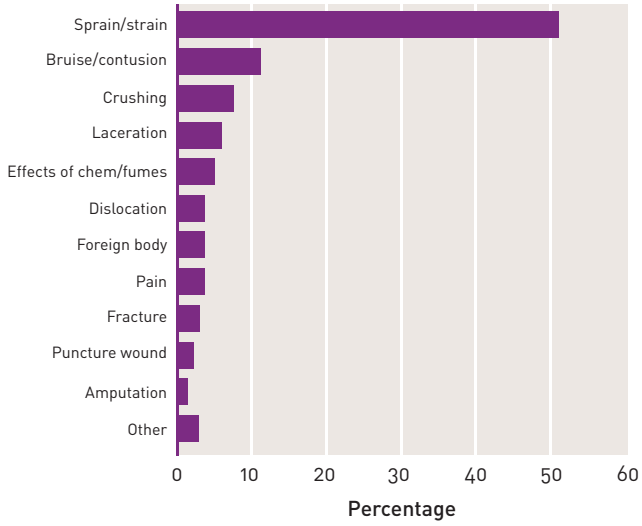
# Appendix L

## Disabling injuries underground 2006–07

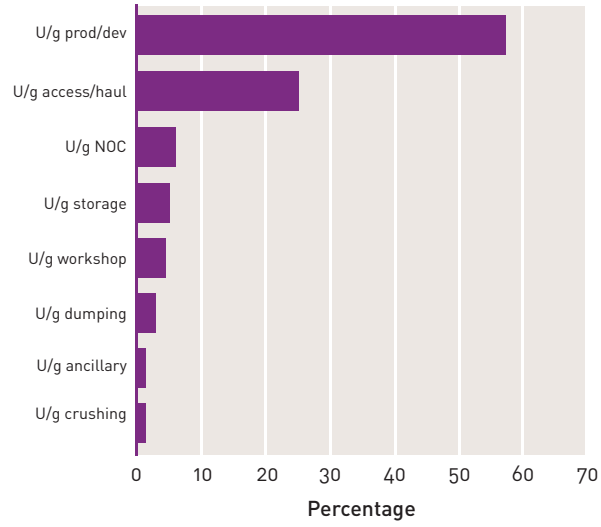
140 injuries



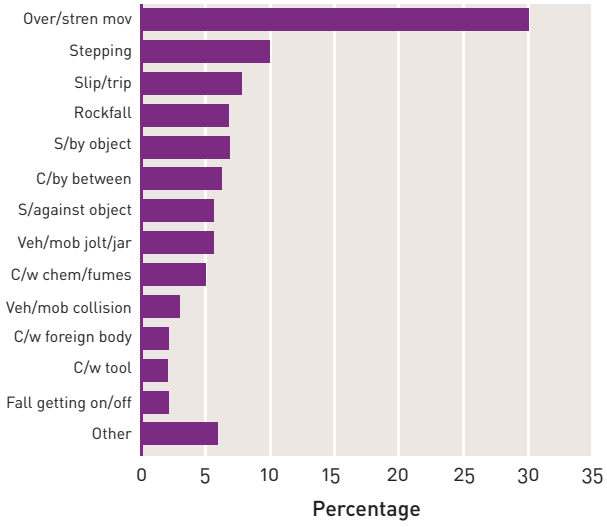

Part of body




Nature of injury




Location of accident

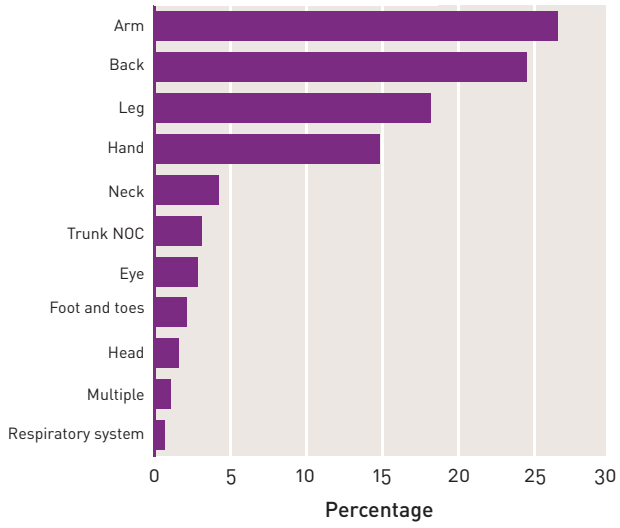



Type of accident

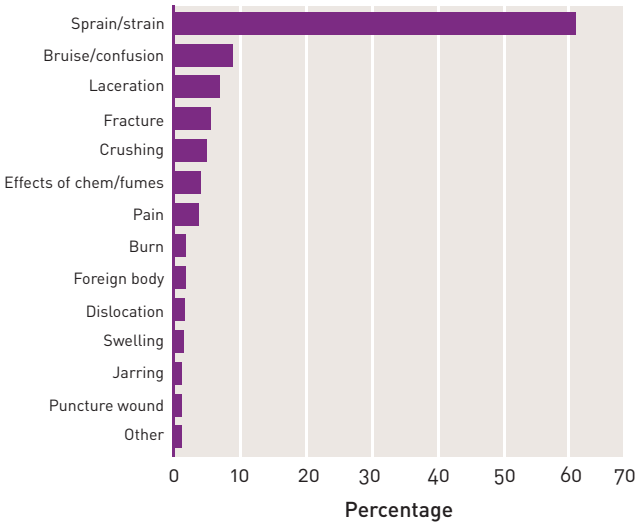
# Appendix M

## Disabling injuries surface 2006–07

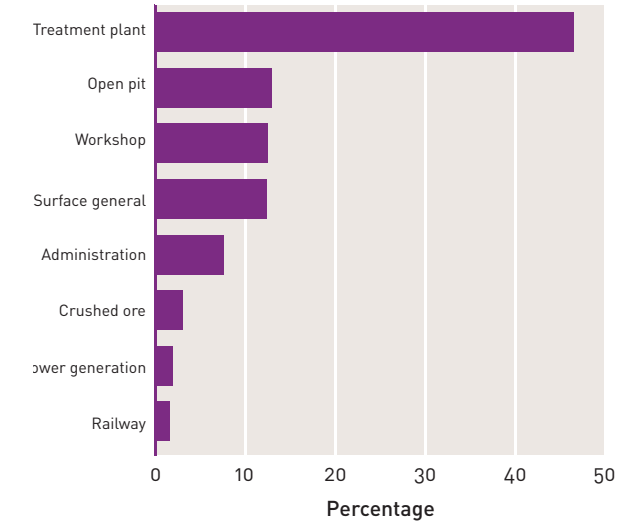
565 injuries



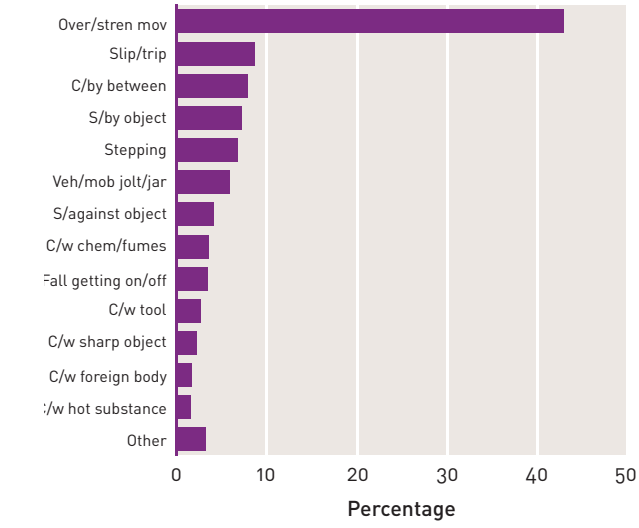

Part of body




Nature of injury




Location of accident




Type of accident

Resources Safety
Locked Bag 14
CLOISTERS SQUARE WA 6850

Telephone: +61 8 9358 8002
NRS: 13 36 77
Facsimile: +61 8 9358 8000
Email: ResourcesSafety@docep.wa.gov.au
Website: www.docep.wa.gov.au/ResourcesSafety

Department of **Consumer and Employment Protection**
Government of **Western Australia**

Resources Safety

RSDMar08_673