Explanatory notes

Introduction

The statistics published in this report relate to accidents between 1 July 2005 and 30 June 2006 (2005–06) 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 2005–06 has three components:

i) **Initial injuries** — days lost in 2005–06 from injuries that occurred in 2005–06

ii) **Recurrent injuries** — days lost in 2005–06 through recurrences of injuries that occurred in 2005–06 and previous years

iii) **Carry-over injuries** — days lost in 2005–06 by persons continuously off work from injuries that occurred before 1 July 2005.

Note: Appendix L contains statistics on 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, 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 this type of accident, 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 213 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 — a 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 — a lost time injury that results in the injured person being disabled for a period of two weeks or more.

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

Frequency rate — the number of injuries per million hours worked.

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

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

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

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

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

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

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 2005–06

There were five fatal accidents in the Western Australian mineral industry during 2005–06:

- A project manager died after becoming trapped between the trays of two haul trucks at a gold mine. One of the haul trucks had broken down and another haul truck was being maneuvered into position to enable jumper cables to be connected to re-start the disabled haul truck. The manager was standing on the cab decking of the disabled haul truck directing the driver of the other haul truck who was watching the manager's hand signals in order to get as close as possible. The manager was looking down and as the gap between the vehicles narrowed his head was caught and crushed between the trays of the trucks.
- A drill jumbo operator died in an underground gold mine after a rock weighing about one tonne fell from the backs, striking his head, shoulders and back. He was assisting another drill jumbo operator during ground support operations and was in the process of placing a split set rock bolt onto a boom of the twin boom drill jumbo when the rock fell from behind an area of mesh that had not been pinned to the backs.
- An electrician was electrocuted while attempting to restore a dewatering pump to working condition in a pump chamber in an underground nickel mine. A supervisor found the deceased lying face up on the floor in front of the open pump starter box with a plastic termination shroud and a screwdriver nearby. A subsequent inspection of the pump starter box identified that the pump circuit was switched on at the time of the accident.
- A senior charge-up operator received fatal injuries when an explosion occurred while he was attempting to assemble an impact cannon adjacent to a hung up ore pass in an underground nickel mine. The deceased had intended to use the cannon to fire an explosive projectile into the ore pass. Evidence indicates that the projectile detonated in the barrel of the cannon.
- A blast hole drill operator received fatal injuries at night when the tray-back truck he was driving collided with the back of a truck parked near an open pit gold mine workshop. Two drill rods protruding from the tray of the parked truck speared through the operator's windscreen and struck him, causing massive injuries. The operator was treated at a hospital but succumbed to his injuries two days later.

Fatal incidence rate by mineral mined 2001–02 to 2005–06

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 four 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.

The high fatal incidence rate for the dimension stone sector was the result of one fatal accident in a relatively small workforce.

Table 1 Fatal incidence rate by mineral mined 2001-02 to 2005-06

Category		Fatalities per thousand employees
Mineral	Dimension stone	1.87
	Base metals	0.16
	Diamonds	0.16
	Nickel	0.12
	Gold	0.11
	Iron ore	0.09
Underground		0.27
Surface		0.06

Fatal accidents continued

Fatal incidence rate 1996–97 to 2005–06

The fatal incidence rate for 2005–06 was 0.09 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.

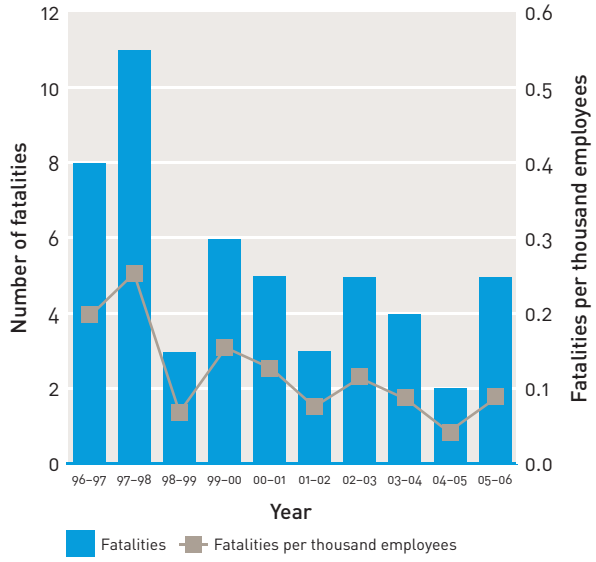


Figure 1 Fatal incidence rate 1996–97 to 2005–06

Fatal accidents by type 2001–02 to 2005–06

Table 2 indicates the type of accidents for the 19 fatalities in the mining industry (excluding exploration) over the past five years, with six underground and 13 at surface operations.

The most common type of underground fatal accident was contact with electricity, 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 and caught by or between operating machine, with two fatalities each.

Table 2 Number of fatalities 2001-02 to 2005-06

Category		No. of fatalities
Underground	C/w electricity	2
	Veh/mob collision	1
	Rockfall	1
	Fall from height	1
	Explosives detonation	1
Surface	Veh/mob collision	3
	Rockfall	2
	C/by machine	2
	Veh/mob rollover	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 2005–06

There were 349 serious injuries reported in the mineral industry during 2005–06 (316 in 2004–05). Of these, 339 were in metalliferous mines and ten were in coal mines.

Typical serious injuries include:

A gardener, planting Zamia nuts in a rehabilitation area, sprained his right shoulder after falling sideways onto a rip line. He was carrying 15 kg of Zamia nuts in two containers around his waist.

A development miner, boring holes underground with an air-leg drill, suffered severe lacerations and damage to his right forearm muscles and tendons when he was struck by a sharp piece of ore, which had deflected off the drill steel after falling from the backs.

A boilermaker, using a hydraulic power pack to remove a pin from a strut on a haul truck, sustained a high pressure oil injection injury to his hand when the hose on the power pack split and pressurised hydraulic oil penetrated his glove and hand.

A fitter tore a muscle in his left forearm while lifting a rubber liner into position for the primary scrubber in a treatment plant.

A train driver received a fractured left foot after the cut rail he was unclamping suddenly released and trapped his foot against a second piece of rail.

A pipe-fitter dislocated his right shoulder after extending his arm in an attempt to stop himself falling forward against a wall while carrying pipes and hooks underground.

A blast-hole drill operator on the deck of a drill rig sustained two crushed toes after a breakout spanner weighing 15 kg fell 8 m onto his left foot.

An exploration driller sustained partial amputations of his right index and middle fingers after a drill rod dropped onto his hand while he was changing a blow up sub on a drill rig.

A quarry labourer sustained serious lacerations after a piece of diamond wire being used for cutting nearby came out of the joiner, whipped back and broke off violently, striking her right leg.

A diesel motor mechanic, working on the steering of a dump truck, sustained a partial amputation of his right middle finger when his fingers were caught between a steering cylinder and a tie rod.

A fitter sustained two herniated discs in his lower back lifting a 10 kg plastic tool box.

A haul truck driver, checking his truck engine's water level after the temperature light came on, suffered scalding burns to his head, body and legs.

A welder, cutting with an angle grinder, received a severe laceration to his hand when the angle grinder kicked back.

A fitter sustained fractures and lacerations to his hand and wrist when his hand was caught by the engine fan of a grader while he was inspecting the wiring harness.

A process plant operator tore the ligaments of his right knee when his knee caught in the rung of a ladder as he slipped.

A safety officer, undertaking a fire training exercise, received serious burns to his hands and face when material in a drum suddenly ignited and flashed back.

A process plant operator, moving a limestone block so it could be lifted by a crane, sustained a fractured right tibia with lacerations and bruising after he moved the block too far and it fell, pinning his right leg between the block and two pallets.

A track labourer sustained a crushed right index finger after his hand was caught under a piece of rail that was being lowered by a crane. He was attempting to retrieve something from under the rail.

A cleaner broke her ankle after slipping on a muddy path while leaving an accommodation room.

A fitter sustained a fractured left tibia after falling about 3 m when the ladder he was using slipped while he was attempting to fix the beacon light on a rubbish truck.

A driller's offsider, working from an integrated tool carrier basket underground, sustained fractured ribs, a punctured lung and a broken left wrist when he was crushed against the backs after the operator accidentally raised the basket.

A process plant operator received a fractured neck after being involved in a light vehicle rollover. He was a passenger in the vehicle at the time of accident.

A bricklayer, working inside a vessel in a treatment plant, sustained a fractured left rib and ruptured spleen when he was struck by a falling scaffolding plank.

A fuel and lubrication serviceman, carrying equipment behind a parked-up grader, fractured his left ankle after losing his balance and falling over.

A supervisor, using oxy-acetylene to cut rusted bolts from the cover of a crusher, received a burnt foot when a hot bolt fell into the top of his safety boot.

A conveyor belt repairer, replacing an old conveyor belt, sustained a fractured left tibia when his foot was caught between the belt and a roller as he attempted to move the old belt with his foot while the belt was moving.

Serious injuries continued

A mine manager sustained a broken left femur and ruptured spinal discs when he was buried under a rock fall while inspecting a stope.

A process plant operator had several bones in his foot fractured when a 300 kg mill lifter rolled off a pallet onto his foot after a retaining strap was cut.

An underground nipper sustained a crushed left hand when it was caught between a front-end loader bucket and the backs of a drive. The entire base of his hand split open and required reconstructive surgery.

A leading hand dislocated his knee after falling on uneven ground while shifting pallets onto the rear of a utility vehicle tray.

A process plant operator twisted the ligaments in his knee after missing his footing while walking up the steps to a control room. He re-aggravated the injury a week later performing alternative duties.

A supervisor, standing on an office chair reaching for a can on top of a cupboard, sustained a severe shoulder strain when he fell from the chair after he overbalanced and the chair rolled out from beneath him.

A driller, trying to remove a plastic sample bag from the bottom of a splitter, dislocated his right shoulder and little finger when he attempted to pull his hand out after catching his finger in the grating on the sample trailer floor.

A boilermaker broke his left wrist when his arm was caught between the frame and the handle of a sliding fire door after he pulled on the door to open it.

A fitter sustained an abdominal hernia while lifting a 40 kg front-end loader belly plate.

A trainee truck driver, sitting in the passenger seat of a truck while being trained, sustained a broken right femur when the truck rolled over after it was driven up a windrow on a ROM pad.

A jumbo operator fractured his ankle after rolling his foot on uneven ground. The operator had a pre-existing condition that contributed to the fracture.

An electrical supervisor, replacing a butterfly valve at the base of an elution column, sustained an amputation of his right ring and little fingers after the butterfly gate slammed shut on his hand. Air had leaked from a closed air valve and pressurised the butterfly valve actuator, causing the valve to close.

A drill operator, removing a drill bit from the deck using a wire rope winch, sustained a crushed middle finger when the wire rope tensioned and caught his hand between the rope and a drill rod.

Serious injury incidence rate by mineral mined 2001–02 to 2005–06

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 (11.5) was almost twice the serious injury incidence rate at surface operations (5.8).

Of the major mining sectors, coal had the highest five-year average serious incidence rate (12.4) whereas iron ore had the lowest (3.8). The mining sector referred to as 'other', with a five-year average serious incidence rate of 10.9, contained 4% of the total number of employees spread over 15 commodity groups. Most of the mine sites in this sector had less than 50 employees.

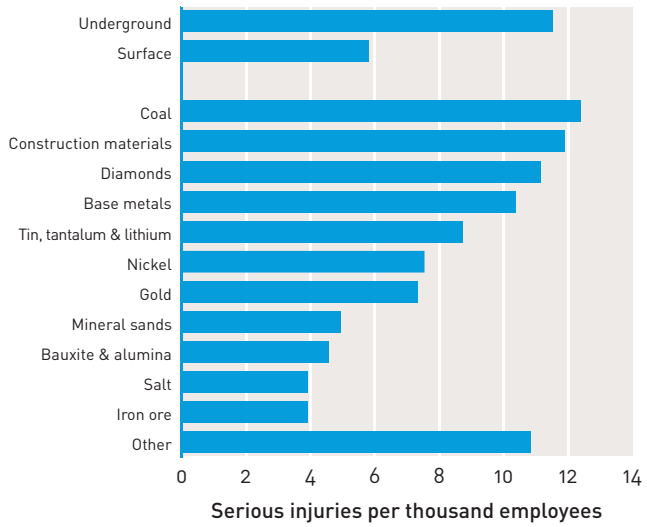


Figure 2 Serious injury incidence rate 2001–02 to 2005–06

Serious injury frequency rate 2001–02 to 2005–06

Figure 3 shows that the serious injury frequency rate decreased for underground metalliferous operations, remained the same for surface metalliferous operations and decreased for the coal sector, resulting in a 3% improvement overall during 2005-06.

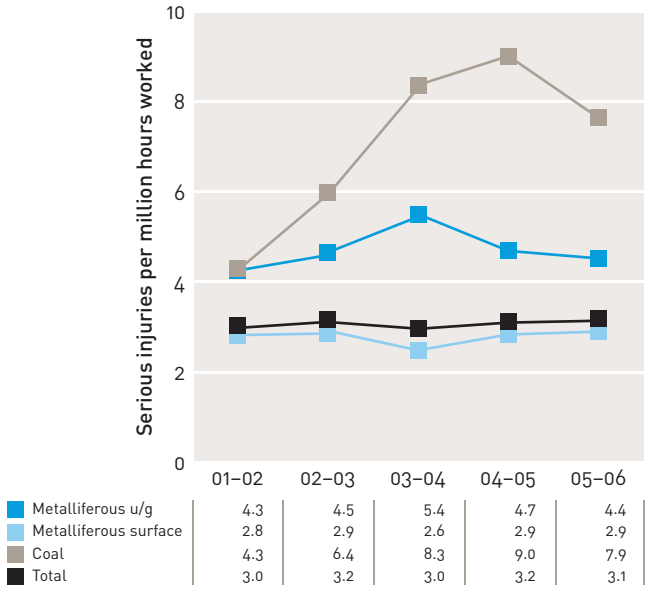


Figure 3 Serious injury frequency rate 2001–02 to 2005–06

Serious injury percentage breakdown for 2005–06

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 26%, hand and neck injuries each accounted for 17% followed by back injuries at 13%. Of the serious leg injuries, 93% were to knees and ankles.
- Consistent with the high proportion of knee, ankle, neck and back injuries, sprain or strain represented the highest proportion by nature of injury (43%), followed by fracture at 17% then laceration at 9%.
- The majority of serious injuries underground were in production and development areas (76%), followed by access and haulage ways at 13% and dumping areas at 6%.
- The most common accident type associated with serious injuries underground was slip or trip (17%), followed by rockfall (13%) and then stepping and over-exertion or strenuous movements both at 11%.

Surface

- Injuries to legs accounted for the largest proportion of serious injuries at 24%, and back injuries accounted for 21% followed by injuries to arms at 19%. Of the serious leg injuries, 70% were to knees and ankles. Of the serious arm injuries, 72% were to shoulders and wrists.
- Consistent with the high proportion of knee, ankle, back, shoulder and wrist injuries, sprain or strain represented the highest proportion by nature of injury (49%). Fracture was the next highest (18%), followed by bruise or contusion and laceration both at 7%.
- The majority of serious injuries on the surface occurred in treatment plants (40%), followed by open pits at 21% and workshops at 13%.
- The most common accident types associated with serious injuries in surface operations were over-exertion or strenuous movements (32%), slip or trip (13%) and struck by object at 10%.

Lost time injuries

Review of lost time injuries during 2005–06

In 2005–06, 20,849 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 2005–06 (9,310), recurrences of injuries that occurred before 2005–06 and in 2005–06 (1,044), and LTIs and recurrences carried over into 2005–06 from accidents that occurred before July 2005 (10,495). A breakdown of work days lost in coal and metalliferous mining is given in Table 3.

During 2005–06, there were 462 LTIs in the State's mining industry — 451 in metalliferous mines and 11 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 38 recurrences of previous injuries, resulting in 1,044 work days lost during 2005–06. A breakdown of recurrent injuries by calendar year of initial injury is given in Table 6.

One hundred and thirteen persons who were still off work from injuries received before July 2005 lost 10,495 work days in 2005–06. A breakdown of these carry-over injuries is given in Table 7.

Table 3 Time lost through injury during 2005–06

Mining	Days lost			
	Initial injuries	Recurrent injuries	Carry-over injuries	TOTAL
Metalliferous	9,097	850	10,222	20,169
Coal	213	194	273	680
TOTAL MINING	**9,310**	**1,044**	**10,495**	**20,849**

Table 4 Initial lost time injuries during 2005–06

Mines	No. of employees	No. of LTIs	Incidence	Frequency	Duration	Injury index	Days lost
Metalliferous surface	50,446	385	7.6	3.9	20.1	79	7,752
Metalliferous underground	5,228	66	12.6	5.4	20.4	111	1,345
Metalliferous total	55,674	451	8.1	4.1	20.2	82	9,097
Coal total	751	11	14.6	8.7	19.4	168	213
TOTAL MINING	**56,425**	**462**	**8.2**	**4.1**	**20.2**	**83**	**9,310**

Table 5 Injuries by mineral mined during 2005–06

Mineral mined	No. of employees	No. of LTIs	Incidence	Frequency	Duration	Injury index	Days lost
Iron ore	14,428	72	5.0	2.4	18.8	46	1,355
Gold	12,051	109	9.0	4.4	21.0	93	2,287
Bauxite and alumina	9,757	56	5.7	3.0	15.5	47	869
Nickel	9,682	111	11.5	5.9	19.5	116	2,164
Mineral sands	2,831	18	6.4	3.7	10.9	40	197
Base metals	1,881	11	5.8	2.9	17.3	50	190
Diamonds	1,483	17	11.5	4.8	21.8	104	370
Salt	838	8	9.5	6.1	12.8	77	102
Coal	751	11	14.6	8.7	19.4	168	213
Tin, tantalum and lithium	540	4	7.4	2.8	21.8	62	87
Construction materials	371	4	10.8	5.1	102.3	518	409
Other	1,812	41	22.6	11.7	26.0	304	1,067
TOTAL MINING	**56,425**	**462**	**8.2**	**4.1**	**20.2**	**83**	**9,310**

NOTE: Duration in Tables 4 and 5 does not take into consideration time lost after 30 June 2006 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 2005.

Table 6 Recurrent injuries during 2005–06

Calendar year	Metalliferous mining		Coal mining		Total mining	
	No. of injuries	Days lost	No. of injuries	Days lost	No. of injuries	Days lost
2006*	1	7	–	–	1	7
2005	22	593	1	26	23	619
2004	7	87	2	66	9	153
2003	2	161	–	–	2	161
2002	1	1	–	–	1	1
2001	1	1	–	–	1	1
Pre-2001	–	–	1	102	1	102
TOTAL	**34**	**850**	**4**	**194**	**38**	**1,044**

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 2006.*

Table 7 Carry-over injuries during 2005–06

Calendar year	Metalliferous mining		Coal mining		Total mining	
	No. of injuries	Days lost	No. of injuries	Days lost	No. of injuries	Days lost
2005*	68	4,396	6	258	74	4,654
2004	19	2,749	1	15	20	2,764
2003	12	1,965	–	–	12	1,965
2002	3	444	–	–	3	444
2001	3	501	–	–	3	501
Pre-2001	1	167	–	–	1	167
TOTAL	**106**	**10,222**	**7**	**273**	**113**	**10,495**

** Covers period from 1 January to 30 June 2005.*

Lost time injuries continued

Review of lost time injuries during 2005–06 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 2005–06 (AS 1885.1:1990)

Mines	No. of employees	No. of LTIs	Injuries per hundred	Frequency	Duration	Days lost
Metalliferous surface	50,446	387	0.8	3.9	21.2	8,192
Metalliferous underground	5,228	69	1.3	5.7	29.1	2,005
Metalliferous total	55,674	456	0.8	4.1	22.4	10,197
Coal total	751	11	1.5	8.7	19.4	213
TOTAL MINING	**56,425**	**467**	**0.8**	**4.2**	**22.3**	**10,410**

NOTE : Duration in Tables 8 and 9 does not take into consideration time lost after 30 June 2006 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 2005 .

Table 9 Injuries by mineral mined during 2005–06 (AS 1885.1:1990)

Mines	No. of employees	No. of LTIs	Injuries per hundred	Frequency	Duration	Days lost
Iron ore	14,428	72	0.5	2.4	18.8	1,355
Gold	12,051	112	0.9	4.5	26.3	2,947
Bauxite and alumina	9,757	56	0.6	3.0	15.5	869
Nickel	9,682	113	1.2	6.0	23.0	2,604
Mineral sands	2,831	18	0.6	3.7	10.9	197
Base metals	1,881	11	0.6	2.9	17.3	190
Diamonds	1,483	17	1.1	4.8	21.8	370
Salt	838	8	1.0	6.1	12.8	102
Coal	751	11	1.5	8.7	19.4	213
Tin, tantalum and lithium	540	4	0.7	2.8	21.8	87
Construction materials	371	4	1.1	5.1	102.3	409
Other	1,812	41	2.3	11.7	26.0	1,067
TOTAL MINING	**56,425**	**467**	**0.8**	**4.2**	**22.3**	**10,410**

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 1997–98.

Over this period, the coal mining compensation rate decreased, by 65%, to 2.04% of payroll. The compensation rate for surface gold operations decreased, by 4%, to 2.07% of payroll, and that for iron ore operations deceased by 20%, to 0.63% of payroll. The rate for underground gold operations increased, by 17%, during this period to 3.52% of payroll.

The average recommended premium rate for the Western Australian mining industry for 2006–07 is currently 1.90% of payroll, a 16% reduction on that for 2005–06 (2.25% of payroll).

Figure 5 shows the current recommended premium rates for 2006–07 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 4.51 and 4.82% 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.

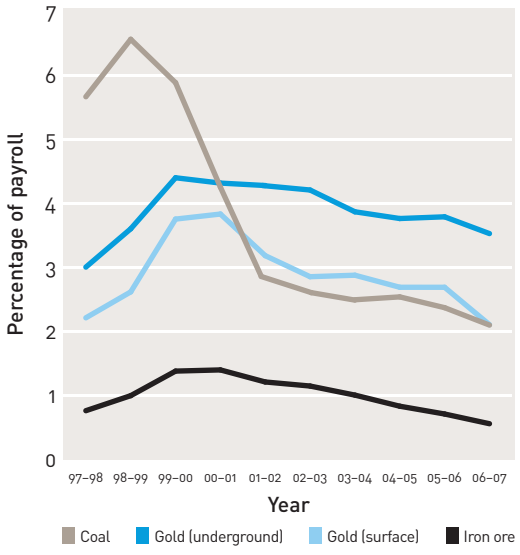


Figure 4 Mine workers' compensation rate trends 1997–98 to 2006–07

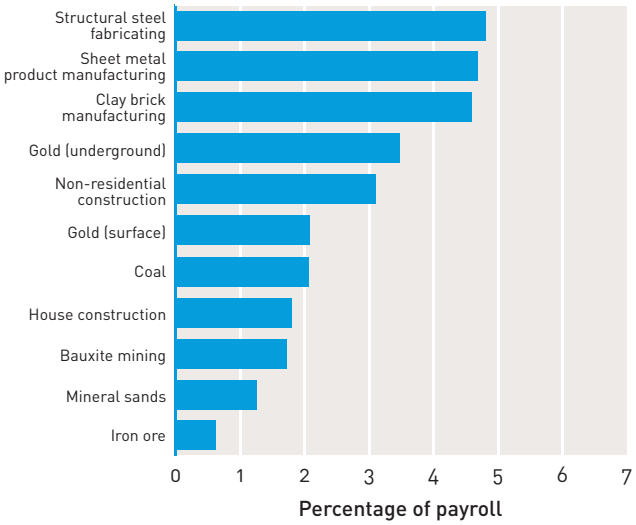


Figure 5 Recommended premium rates 2006–07

Injuries by commodity

Metalliferous performance indicators

The performance indicators for the metalliferous mining sector show mixed results for 2005–06. Figures 6 to 9 depict the performance indicators of incidence, frequency, duration rates, and injury index (see Explanatory notes on page 3 for definitions).

Some interesting trends noted in the performance indicators for metalliferous mines during 2005–06 include the following:

- The overall incidence rate remained the same as the 2004-05 incidence rate of 8.1. The surface incidence rate deteriorated by 4% (from 7.3 to 7.6) whereas the underground incidence rate improved by 22% (from 16.2 to 12.6).
- A similar trend was noted in the frequency rate for both surface and underground. The overall frequency rate remained the same as the 2004-05 frequency rate of 4.1. The surface frequency rate deteriorated by 3% (from 3.8 to 3.9) whereas the underground frequency rate improved by 22% (from 6.9 to 5.4).
- The overall duration rate deteriorated by 2%, rising to 20.2. The surface duration rate improved by 5% (from 21.1 to 20.1) whereas the underground duration rate deteriorated significantly by 42% (from 14.4 to 20.4).
- The injury index remained the same as the 2004-05 injury index of 82. The surface injury index improved slightly by 1% (from 80 to 79) whereas the underground injury index deteriorated by 12% (from 99 to 111).

Metalliferous injury percentage breakdown for 2005–06

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 also accounted for the largest proportion of surface injuries at 23%. Of the underground leg injuries, 93% were to knees and ankles (all of these were serious injuries). Of the surface leg injuries, 70% were to knees and ankles.
- Arm injuries accounted for the second largest proportion of injuries underground at 18%, followed by hand injuries at 17%. Of the arm injuries, 50% were to shoulders.
- Back injuries accounted for the second largest proportion of surface injuries at 22%, followed by arm injuries at 17%. Of the arm injuries, 70% were to shoulders and wrists.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 38% and 45% respectively.
- The second highest ranking nature of underground injury was fracture (15%), followed by bruise or contusion at 12%.
- The second highest ranking nature of surface injury was also fracture (15%), followed by bruise or contusion at 9%.

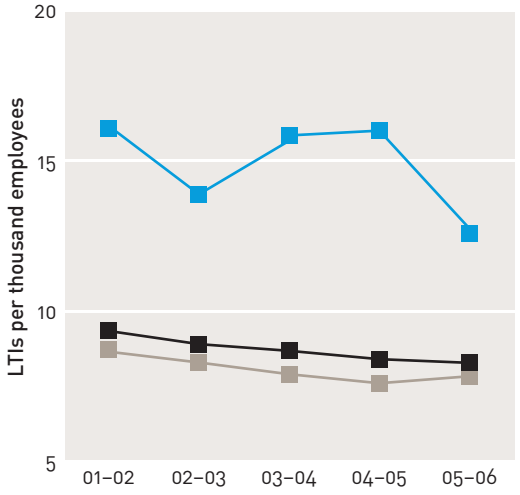
Injuries by location

- Most underground injuries occurred in production and development (77%), followed by access and haulage ways at 14% and dumping at 5%.
- The majority of surface injuries occurred in treatment plants (39%), followed by open pits at 20% then workshops and surface general both at 14%.

Injuries by type

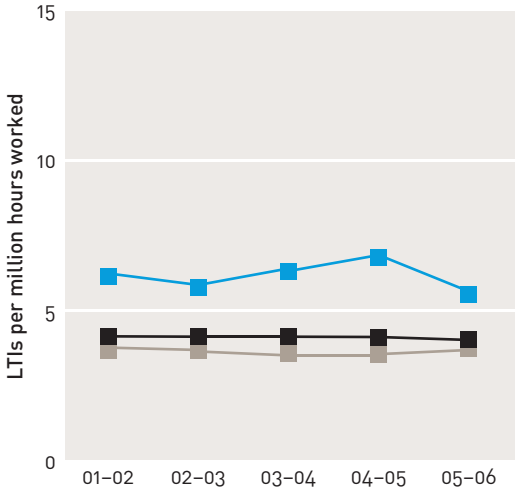
- Slip or trip was the most common accident type for underground injuries at 15%, followed by rockfalls at 14%, and over-exertion or strenuous movements at 12%. The proportion of injuries caused by rockfalls appears to be increasing.
- The most common accident type for surface injuries was also over-exertion or strenuous movements at 29%, followed by slip or trip at 13%, and struck by object at 11%.

Metalliferous performance indicators
2001–02 to 2005–06



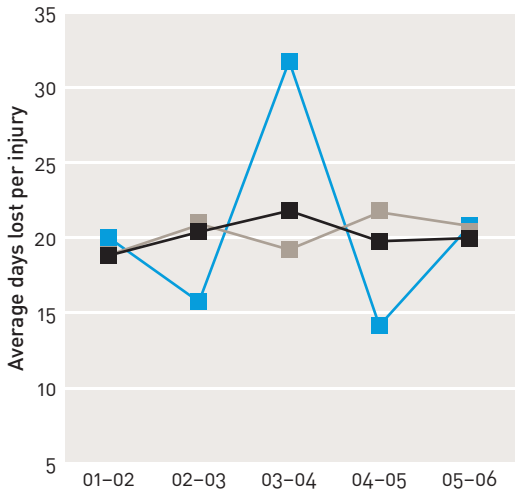
	01–02	02–03	03–04	04–05	05–06
Underground	16.1	13.8	16.0	16.2	12.6
Surface	8.2	7.9	7.6	7.3	7.6
Total	8.9	8.5	8.4	8.1	8.1

Figure 6 Incidence rate



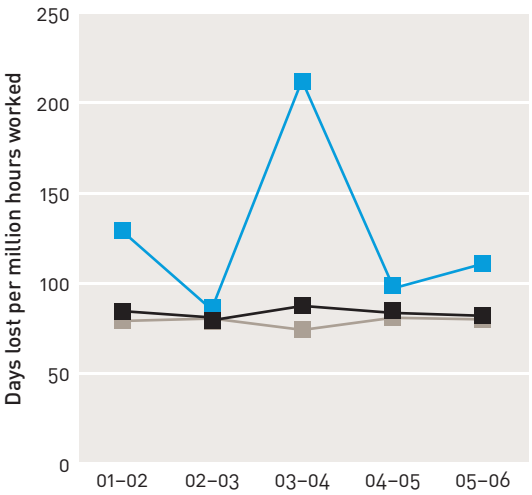
	01–02	02–03	03–04	04–05	05–06
Underground	6.4	5.7	6.6	6.9	5.4
Surface	4.0	4.1	3.8	3.8	3.9
Total	4.3	4.3	4.2	4.1	4.1

Figure 7 Frequency rate



	01–02	02–03	03–04	04–05	05–06
Underground	20.0	15.6	31.9	14.4	20.4
Surface	19.4	21.0	19.7	21.1	20.1
Total	19.5	20.2	21.9	19.8	20.2

Figure 8 Duration rate



	01–02	02–03	03–04	04–05	05–06
Underground	128	89	211	99	111
Surface	79	86	75	80	79
Total	84	86	91	82	82

Figure 9 Injury index

Injuries by commodity continued

Gold performance indicators

The performance indicators for the gold sector showed mixed results for 2005–06. 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 2005–06 include the following:

- The overall incidence rate deteriorated by 13%, rising from 8.0 to 9.0. The surface incidence rate deteriorated by 15% (from 8.0 to 9.2) and the underground incidence rate deteriorated by 5% (from 8.1 to 8.5).
- The overall frequency rate deteriorated by 13% rising from 3.9 to 4.4. The surface frequency rate deteriorated by 20% (from 4.0 to 4.8) whereas the underground frequency rate remained the same as the 2004-05 frequency rate of 3.5.
- The overall duration rate improved by 17%, falling to 21.0. The surface duration rate improved by 23% (from 28.0 to 21.5) whereas the underground duration rate deteriorated by 17% (from 16.5 to 19.3).
- The fall in duration rate was greater than the rise in frequency rate and resulted in a 5% overall improvement in the injury index, falling from 98 to 93. The surface injury index improved by 10% (from 113 to 102) whereas the underground injury index deteriorated by 19% (from 57 to 68).

Gold injury percentage breakdown for 2005–06

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

- Hand and leg injuries accounted for the largest proportion of underground injuries, both at 21%. All of the underground leg injuries were to knees and ankles. Back injuries accounted for the largest proportion of surface injuries at 29%.
- Arm injuries accounted for the second largest proportion of injuries underground at 17%, followed by back and neck injuries both at 13%. Of the arm injuries, 50% were to shoulders.
- Leg injuries accounted for the second largest proportion of surface injuries at 18%, followed by arm injuries at 15%. Of the leg injuries, 53% were to knees and ankles. Of the arm injuries, 69% were to shoulders and wrists.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 46% and 41% respectively.
- The second highest ranking nature of underground injury was bruise or contusion and fracture both at 13%, followed by crushing, dislocation and laceration each at 8%.
- The second highest ranking nature of surface injury was fracture at 16%, followed by bruise or contusion at 11%.

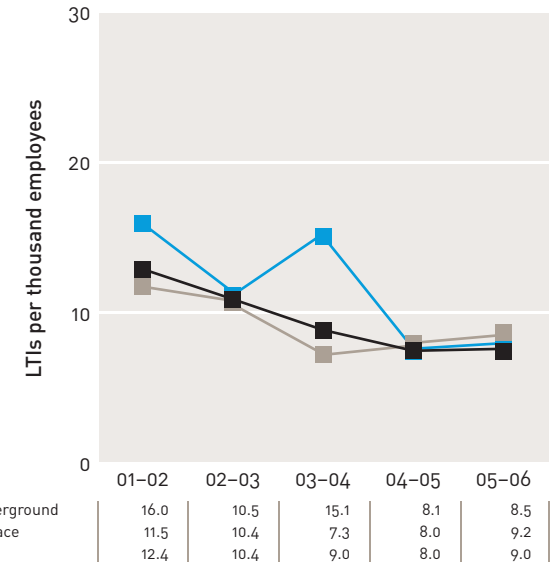
Injuries by location

- Most underground injuries occurred in production and development (79%), followed by access and haulage ways and dumping both at 8% then storage at 4%.
- The majority of surface injuries occurred in treatment plants (25%), followed by workshops at 24% and surface general at 22%.

Injuries by type

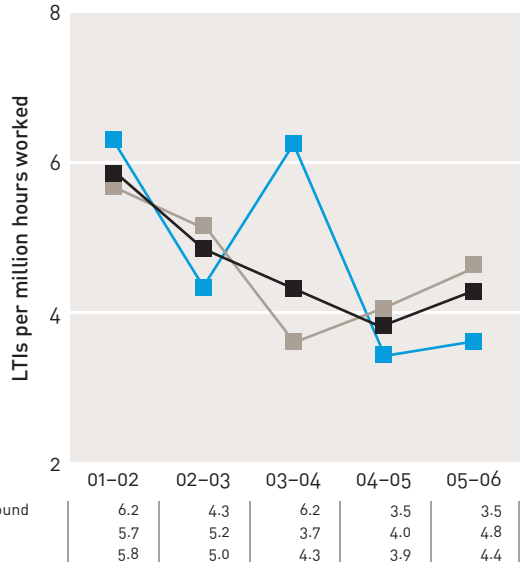
- Over-exertion or strenuous movements and stepping were the most common accident types for underground injuries both at 17%, followed by struck by object, rockfall and slip or trip each at 13% then caught by or between moving objects and caught by or between operating machine both at 8%.
- The most common accident type for surface injuries was also over-exertion or strenuous movements at 33%, followed by struck by object at 12% and slip or trip at 11%.

Gold performance indicators
2001–02 to 2005–06



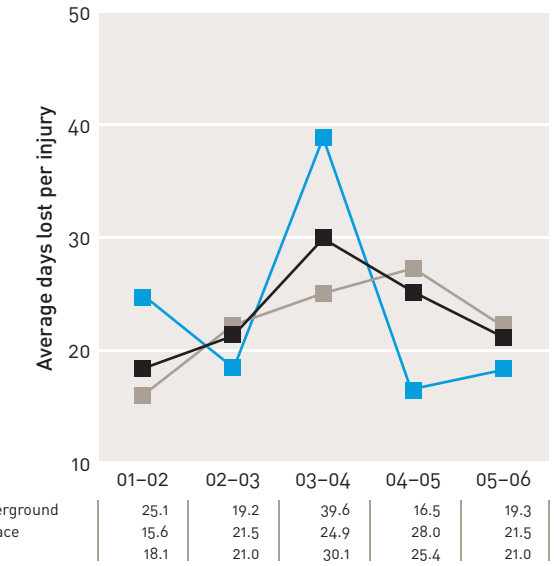
	01–02	02–03	03–04	04–05	05–06
Underground	16.0	10.5	15.1	8.1	8.5
Surface	11.5	10.4	7.3	8.0	9.2
Total	12.4	10.4	9.0	8.0	9.0

Figure 10 Incidence rate



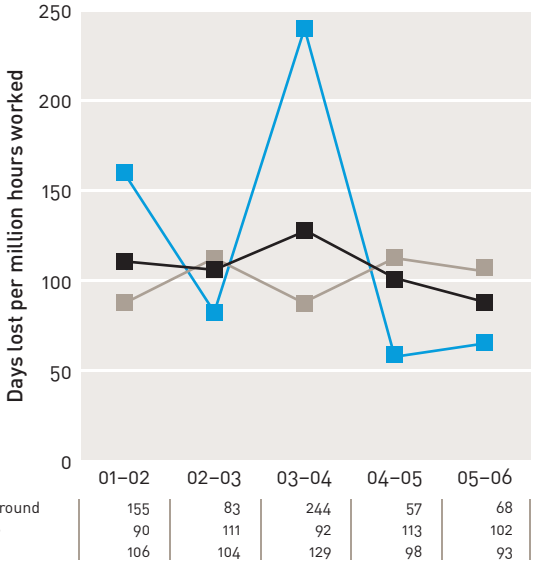
	01–02	02–03	03–04	04–05	05–06
Underground	6.2	4.3	6.2	3.5	3.5
Surface	5.7	5.2	3.7	4.0	4.8
Total	5.8	5.0	4.3	3.9	4.4

Figure 11 Frequency rate



	01–02	02–03	03–04	04–05	05–06
Underground	25.1	19.2	39.6	16.5	19.3
Surface	15.6	21.5	24.9	28.0	21.5
Total	18.1	21.0	30.1	25.4	21.0

Figure 12 Duration rate



	01–02	02–03	03–04	04–05	05–06
Underground	155	83	244	57	68
Surface	90	111	92	113	102
Total	106	104	129	98	93

Figure 13 Injury index

Injuries by commodity cont.

Iron ore performance indicators

The performance indicators for the iron ore sector showed mixed results for 2005–06. 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 2005–06 include the following:

- The incidence rate deteriorated by 16%, rising from 4.3 to 5.0.
- The frequency rate deteriorated by 9%, rising from 2.2 to 2.4.
- The duration rate improved by 9%, falling from 20.6 to 18.8.
- The rise in frequency rate was greater than the fall in the duration rate and resulted in a slight deterioration of 2% in injury index (from 45 to 46).

Iron ore injury percentage breakdown for 2005–06

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 26%. Of the leg injuries, 89% were to knees and ankles.
- Back and hand injuries accounted equally for the second largest proportion of injuries both at 18%, followed by arm injuries at 14%. Of the arm injuries, 90% were to shoulders and wrists.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury at 47%.
- Fracture was the second highest ranking nature of injury at 14%, followed by bruise or contusion and laceration both at 10%.

Injuries by location

- The majority of injuries occurred in treatment plants and open pits, which accounted for 24% each.
- The next largest proportion occurred in workshops at 19%, followed by surface general at 13%.

Injuries by type

- Over-exertion or strenuous movements was the most common type of accident resulting in injury (21%).
- Slip or trip was the second most common type (17%), followed by struck by object at 14%.

Iron ore performance indicators
2001–02 to 2005–06

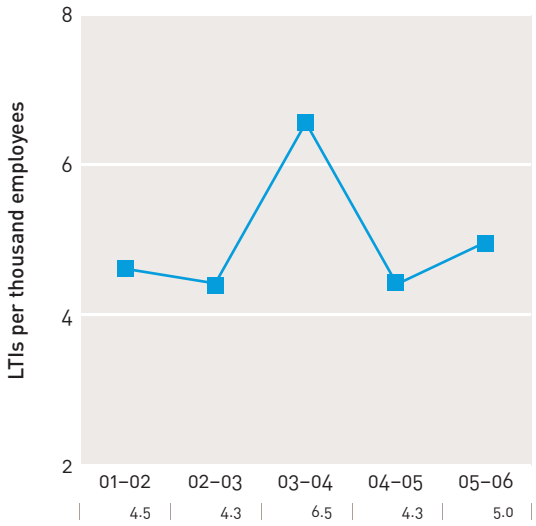


Figure 14 Incidence rate

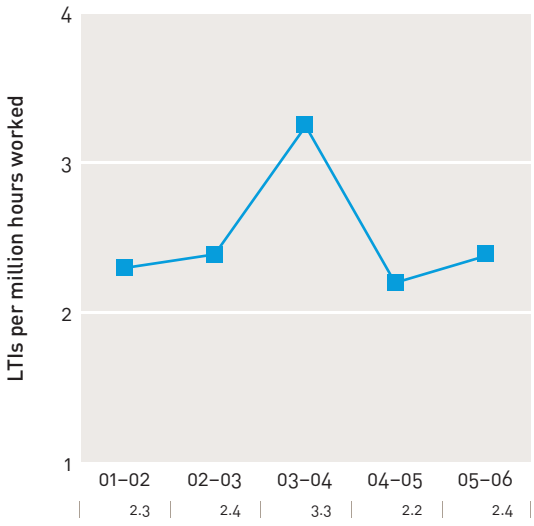


Figure 15 Frequency rate

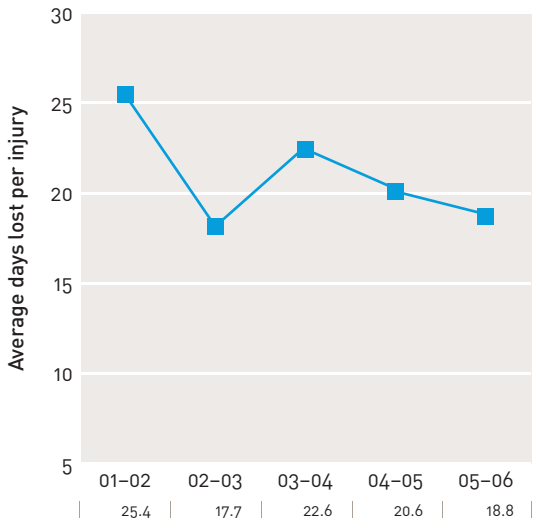


Figure 16 Duration rate

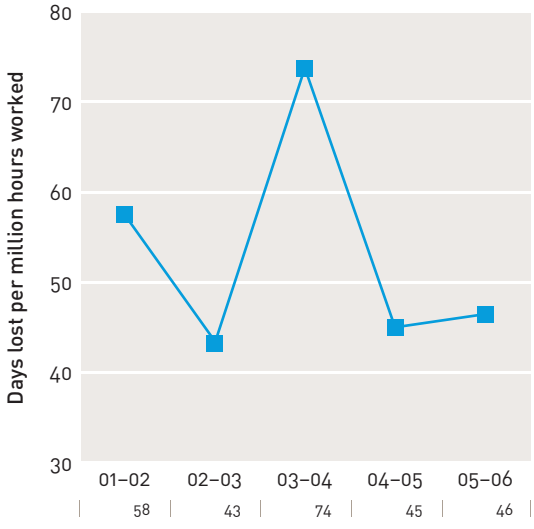


Figure 17 Injury index

Injuries by commodity cont.

Bauxite and alumina performance indicators

There were mixed results in the performance indicators for the bauxite and alumina sector during 2005–06. 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 2005–06 include the following:

- The incidence rate deteriorated by 24%, rising from 4.6 to 5.7.
- The frequency rate deteriorated by 20%, rising from 2.5 to 3.0.
- The duration rate improved by 9%, falling from 17.0 to 15.5.
- The rise in frequency rate was greater than the fall in duration rate, resulting in a deterioration of 12% to the injury index, up from 42 to 47.

Bauxite and alumina injury percentage breakdown for 2005–06

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

- Leg injuries accounted for the largest proportion of injuries at 25%. All of the leg injuries were to knees and ankles.
- Arm injuries accounted for the second largest proportion of injuries at 21%, followed by back injuries at 14%. Of the arm injuries, 67% were to shoulders.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury at 61%.
- Bruise or contusion was the second highest ranking nature of injury at 13%, followed by laceration at 7%.

Injuries by location

- The majority of injuries occurred in treatment plants, which accounted for 46%.
- The next largest proportion occurred in open pits (20%), followed by surface general at 14%.

Injuries by type

- Over-exertion or strenuous movements was the most common type of accident resulting in injury (32%).
- Stepping was the second most common type (13%), followed by struck by object at 11%.

Bauxite and alumina performance indicators
2001–02 to 2005–06

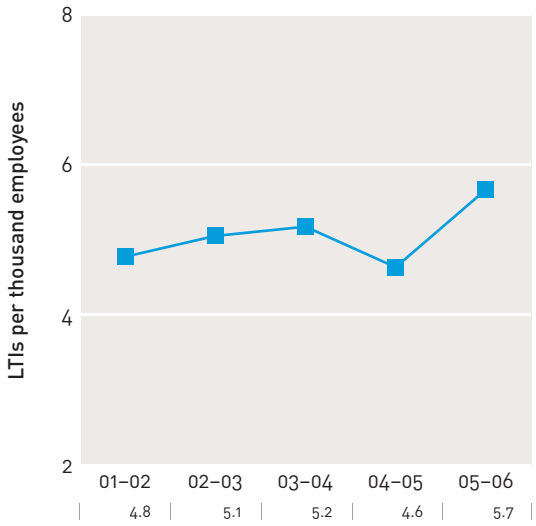


Figure 18 Incidence rate

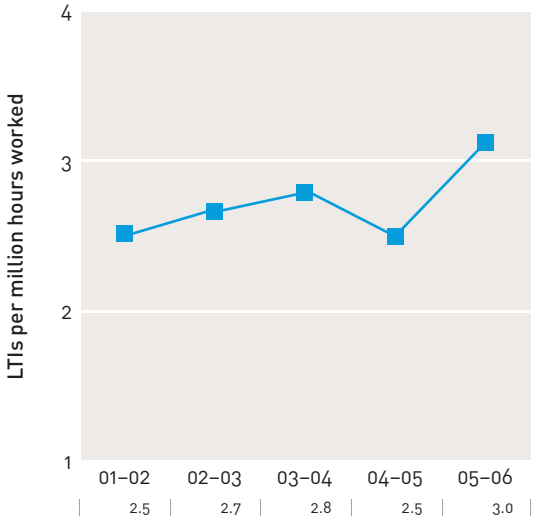


Figure 19 Frequency rate

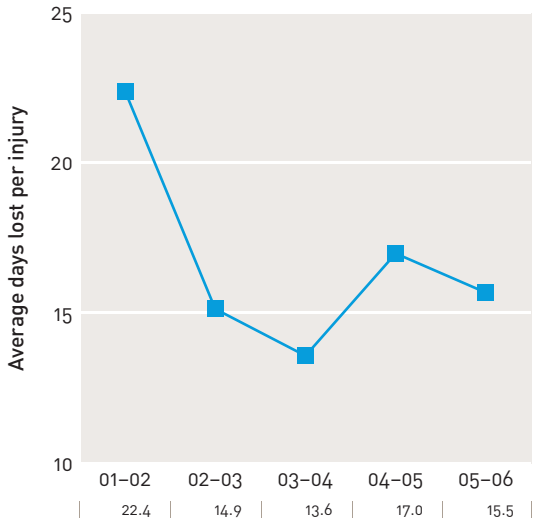


Figure 20 Duration rate

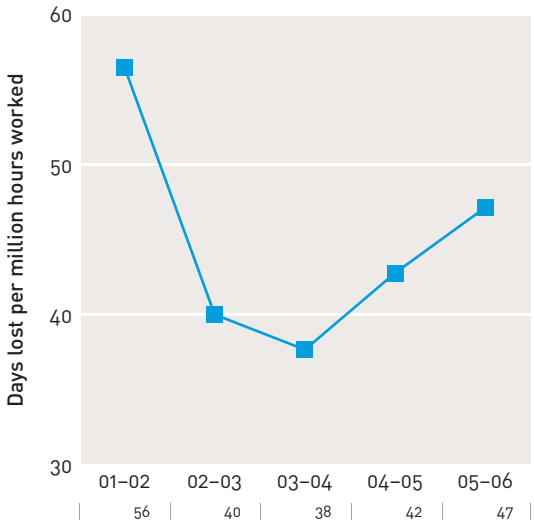


Figure 21 Injury index

Injuries by commodity cont.

Nickel performance indicators

The performance indicators for the nickel sector showed mixed results during 2005–06. 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 2005–06 include the following:

- The overall incidence rate improved by 12%, falling from 13.0 to 11.5. The surface incidence rate improved by 10% (from 10.0 to 9.0) and the underground incidence rate improved by 13% (from 26.7 to 23.2).
- A similar trend was noted in the frequency rate for both surface and underground. The overall frequency rate improved by 16%, falling from 7.0 to 5.9. The surface frequency rate improved by 14% (from 5.6 to 4.8) and the underground frequency rate improved by 13% (from 11.7 to 10.2).
- The overall duration rate deteriorated slightly by 3%, rising to 19.5. The surface duration rate improved by 19% (from 22.6 to 18.3) whereas the underground duration rate deteriorated significantly by 68% (from 13.0 to 21.8).
- The fall in frequency rate was greater than the rise in duration rate and resulted in a 12% overall improvement in the injury index, falling from 132 to 116. The surface injury index improved by 30% (from 126 to 88) whereas the underground injury index deteriorated significantly by 46% (from 152 to 222).

Nickel injury percentage breakdown for 2005–06

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 underground injuries at 23%. Of the leg injuries, 89% were to knees and ankles. Back and leg injuries accounted equally for the largest proportion of surface injuries both at 22%. Of the leg injuries, 56% were to knees and ankles.
- Arm injuries accounted for the second largest proportion of injuries underground at 21%, followed by hand injuries at 15%. Of the arm injuries, 50% were to shoulders.
- Arm injuries accounted for the second largest proportion of surface injuries at 15%, followed by hand injuries at 14%. Of the arm injuries, 64% were to shoulders and wrists.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both underground and surface injuries at 36% and 40% respectively.
- The second highest ranking nature of underground injury was fracture at 18%, followed by laceration and crushing both at 10%.
- The second highest ranking nature of surface injury was fracture at 18%, followed by laceration at 10%.

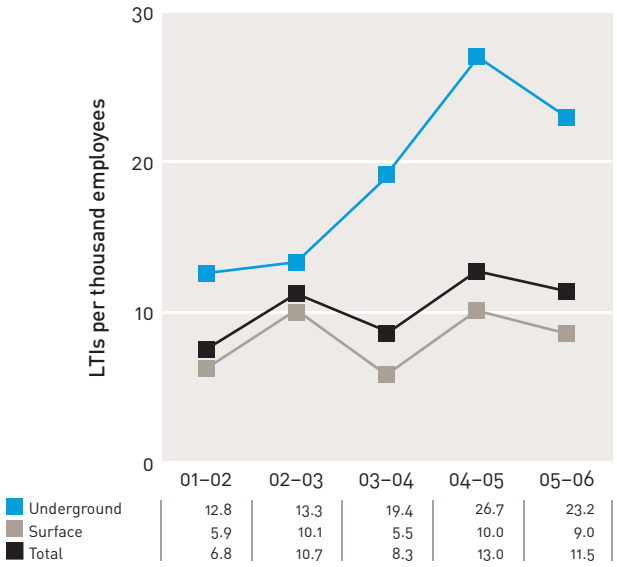
Injuries by location

- Most underground injuries occurred in production and development (74%), followed by access and haulage ways at 18% then pump chambers, workshops and dumping each at 3%.
- The majority of surface injuries occurred in treatment plants (50%), followed by open pits at 22% then surface general and workshops both at 10%.

Injuries by type

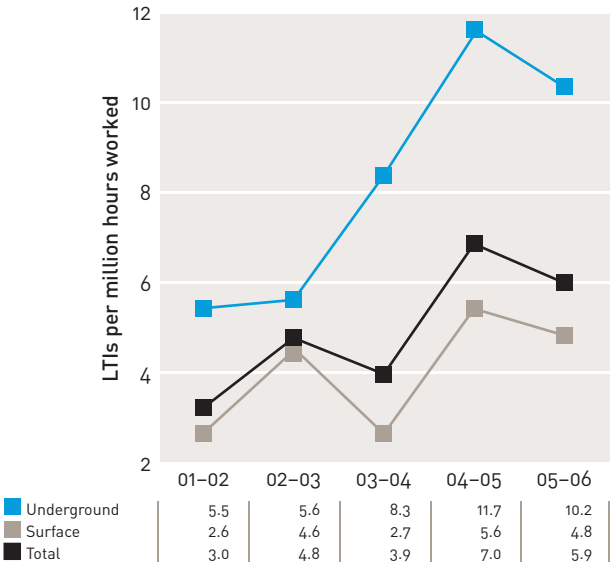
- Slip or trip and rockfall were the most common accident types for underground injuries both at 15%, followed by over-exertion or strenuous movements, fall from height, caught by or between moving or stationary objects and vehicle or mobile equipment collisions each at 10% then caught by or between operating machine, stepping, struck by object and struck against object each at 5%.
- The most common accident type for surface injuries was over-exertion or strenuous movements at 25%, followed by slip or trip at 17% then struck by object at 8%.

Nickel performance indicators
2001–02 to 2005–06



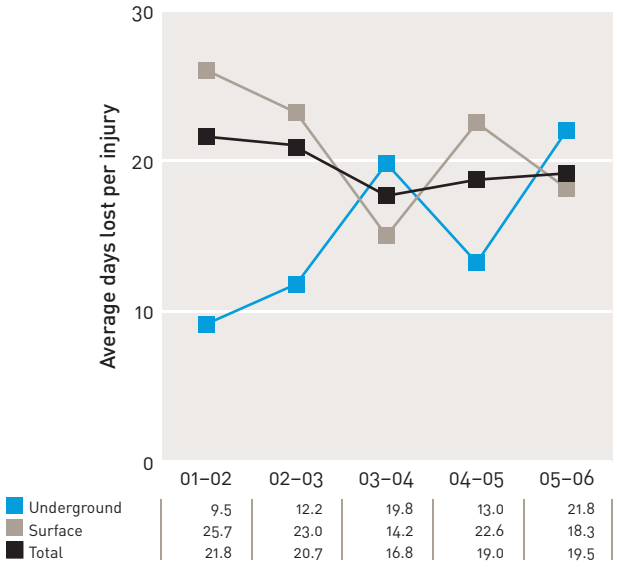
	01–02	02–03	03–04	04–05	05–06
Underground	12.8	13.3	19.4	26.7	23.2
Surface	5.9	10.1	5.5	10.0	9.0
Total	6.8	10.7	8.3	13.0	11.5

Figure 22 Incidence rate



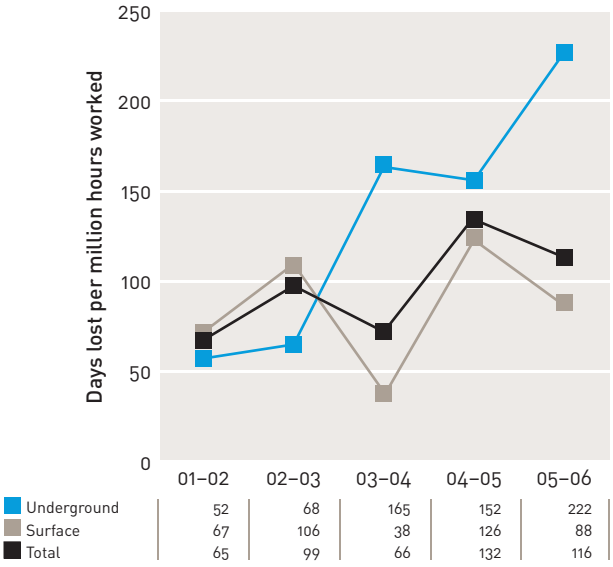
	01–02	02–03	03–04	04–05	05–06
Underground	5.5	5.6	8.3	11.7	10.2
Surface	2.6	4.6	2.7	5.6	4.8
Total	3.0	4.8	3.9	7.0	5.9

Figure 23 Frequency rate



	01–02	02–03	03–04	04–05	05–06
Underground	9.5	12.2	19.8	13.0	21.8
Surface	25.7	23.0	14.2	22.6	18.3
Total	21.8	20.7	16.8	19.0	19.5

Figure 24 Duration rate



	01–02	02–03	03–04	04–05	05–06
Underground	52	68	165	152	222
Surface	67	106	38	126	88
Total	65	99	66	132	116

Figure 25 Injury index