

Safety 2000/2001 *Performance*

in the Western Australian Mineral Industry

Accident & injury statistics



Department of
Mineral and Petroleum Resources

Safety Performance

in the Western Australian Mineral Industry 2000/2001

Accident & Injury Statistics



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Mineral and Petroleum Resources

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SUMMARY

The 2000/01 year has been one of consolidation in the overall safety performance of the Western Australian mining industry. Statistics from the Department's AXTAT database, as of November 2001, show a downward trend following the marginal increase in 1999/00.

Over the ten year period from 1991/92 to 2000/01 the lost time injury frequency rate (lost time injuries per million hours worked) fell from 23.1 to 5.6. This performance, although very creditable, leaves scope for further improvement through a joint effort by employers and employees in the area of risk management.

The incidence and frequency of reported lost time injuries in both the surface and underground mining sectors improved during the year, falling by 20 percent and 18 percent respectively in surface mining and by 25 percent for each in the underground mining sector.

A rise in injury duration rate in both the surface and underground sectors represented a 35 percent deterioration overall and resulted in an 11 percent increase in the injury index.

Total serious injuries reported rose from 235 in 1999/00 to 263 in 2000/01 while the number of minor injuries reported fell from 348 to 212 for the same period. The total decrease in injuries represents a significant improvement on last year.

The 40,032 employees in the mining industry (a rise of three percent) worked a total of 84.38 million hours.

There were five fatal injuries during the year – two in the surface nickel sector, one in the iron ore sector, one in the dimension stone sector and one in the underground gold sector.

The Department's view is that no fatal accident is acceptable and that a fatal incidence rate of zero in the industry is achievable.

During the year, the Department continued to implement its program of greater self-regulation by industry. In doing so, the Department still maintained a high degree of visibility and interaction with industry. This regulatory transition is underpinned by a move from compliance inspections to field audits and a new emphasis on risk management.

Throughout the year, occupational health audits, management safety systems audits and high impact function audits were conducted by the Department. The audits were complemented by inspections and site visits for other purposes. The program of audits, accident investigations and inspections at times resulted in items of plant and machinery being stood down, site closures, and the preparation of prosecution briefs.

Most of the large complex mineral-processing plants in Western Australia increased production during the year, either through plant upgrades or resolution of commissioning problems. Industry

has increasingly developed more formalised safety management systems. MPR is encouraging the employment of a safety case approach to risk management by those enterprises which are large enough and sufficiently complex in their operation to benefit.

The safety case model places the onus on the operator to identify and reduce risks through engineering changes and the implementation of safety-management systems. While taking considerable resources to develop and implement, companies which adopt the safety case approach have established better safety management systems, including appropriate and effective safety assessments. Another benefit is better plant operation through improved employee training, operating and maintenance procedures.

The Department continued to play an important role in providing education, training support and information to industry. During the year, safety meetings, presentations to mine site employees, along with briefings to industry safety and health representatives, were conducted by the Department. These activities were complemented by a range of publications and a much-appreciated telephone information and advisory service provided by the Department's occupational safety and health professionals.

The Mines Occupational Safety and Health Advisory Board (MOSHAB) again took an active part in promoting safety in the industry with the development of a three year strategic plan to improve mine safety performance across the industry. Its *Priority Areas Report* identified four priority areas, the first being risk management, which resulted in the formation of the Risk Management Working Group who conducted nine one-day information workshops on risk management across the State. Promotion of the *Thinksafe Minesafe* campaign continued with the release of the second series of *Thinksafe Minesafe* posters and *Safety Matters* pamphlets. A guideline for Occurrence, Accident and Occupational Disease Reporting under the Mines Safety and Inspection Act 1994 and Mines Safety and Inspection Regulations 1995 was also produced and released.

In summary, the Western Australian mining industry data reported to the AXTAT system for the 2000/01 financial year indicates an improved safety performance. It is recognised that the Industry's treatment of injured employees has changed over the years to a role of active assistance in rehabilitation. Whilst the Department is fully supportive of this enlightened approach to rehabilitation of injured employees, it is conscious of the anomaly being created in reporting of injuries: ie "alternative duties type injuries" often not being reported to the AXTAT database. In consequence the Department has made changes to the AXTAT system to allow the recording of all disabling injuries as specified in the Mines Safety and Inspection Act 1994.

SUMMARY

STATISTICAL SUMMARY

- There were five fatal accidents during 2000/01; four occurred on the surface in metalliferous mines and one occurred underground in a metalliferous mine.
- There were 475 lost time injuries during 2000/01, significantly less than for the previous year, (583 injuries in 1999/00), for a total workforce of 40,032. The breakdown of the number of injuries by commodity mined is illustrated graphically in Appendix A.
- The overall injury frequency rate for 2000/01 was 5.6. This shows a 19 percent improvement on the 1999/00 figure, which was 6.9.
- The overall duration rate of average work days lost per injury increased from 12.3 to 16.6 during 2000/01. The breakdown of the average workdays lost for each commodity mined is illustrated graphically in Appendix A.
- The injury index increased by 11 percent during 2000/01 (up from 85 to 94).
- Serious injuries in the mining industry during 2000/01 totalled 263, which is 28 more than for 1999/00.
- During 2000/01 the overall serious injury frequency rate deteriorated from 2.8 to 3.1.
- The bauxite and alumina sector had the lowest lost time injury frequency rate at 2.5 during 2000/01.
- The gold sector lost time injury frequency rate improved by 10 percent during 2000/01, decreasing from 6.8 to 6.1.
- The iron ore sector lost time injury frequency rate improved by 47 percent during 2000/01 decreasing from 7.0 to 3.7.
- The nickel sector lost time injury frequency rate deteriorated slightly during 2000/01, rising 6 percent from 4.7 to 5.0.

EXPLANATORY NOTES

Introduction

The statistics published in this report relate to accidents that occurred in 2000/01 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 2000/01 has three components :

- i) *Initial Injuries* - days lost in 2000/01 from injuries that occurred in 2000/01.
- ii) *Recurrent Injuries* - days lost in 2000/01 through recurrences of injuries that occurred in 2000/01 and previous years.
- iii) *Carry Over Injuries* - days lost in 2000/01 by persons continuously off work from injuries which occurred before 1 July 2000.

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, have not been included. In addition, the oil and gas industry injuries are not included in the statistics in this report.

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 calculations except in the tables on page 11 which are in accordance with Australian Standard 1885.1-1990.

Collection of Information

Information is collected monthly, or by period (4 weeks). Accident/ Injury details are reported to the Department of Mineral and Petroleum Resources by mine managers, as are the number of persons employed (including contractor employees) and the hours worked during the month.

During the twelve months, on average, 176 mines or groups of mines reported to the AXTAT system.

Journey Accidents

Injuries which occurred in journey accidents (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 – an 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 and where the injured person is disabled for a period of two weeks or more.

Incidence Rate – the number of lost time injuries per 1000 employees for a 12 month period.

Frequency Rate – the number of lost time injuries per million hours worked.

Duration or Severity – the average number of workdays lost per injury.

Injury Index – the number of workdays lost per million hours worked (frequency x duration).

Fatal Incidence Rate – the number of fatal accidents per 1000 employees for a 12 month period.

Fatal Frequency Rate – the number of fatal accidents per million hours worked.

Serious Incidence Rate – the number of serious injuries per 1000 employees for a 12 month period.

Serious Frequency Rate – the number of serious injuries per million hours worked.

EXPLANATORY NOTES

ABBREVIATIONS

| | |
|-----------------|---|
| BAUX ALUM | - bauxite and alumina mines |
| BRUISE/CONT | - bruise/contusion |
| C/BY MACH | - caught by or between operating machine |
| CHANGE RMS | - change rooms |
| CONST MAT | - construction materials |
| C/BY BETWN | - caught by or between moving and stationary object |
| C/W ELECTRIC | - contact with electric current |
| C/W FRGN BODY | - contact with foreign body |
| C/W OBJ/TOOL | - contact with object or tool |
| EFF CHEM | - effects of chemicals |
| EXPL DETON | - explosives detonation |
| FRACT/BREAKS | - fractures and breaks |
| FRGN BODY | - foreign body |
| METAL AV | - metalliferous average |
| METWORKERS | - metal workers |
| MIN SANDS | - mineral sands |
| MINE ROAD | - mine access road (not haul road) |
| MOTOR COLLSN | - motor vehicle collision |
| MOTOR VEH ROLL | - motor vehicle roll over |
| M VEH/EQUIP | - motor vehicle/equipment |
| O/C PROD | - open cut production |
| OBJT | - object |
| OVER/STREN MOV | - over exertion or strenuous movements |
| OFF/ADMIN | - office and administration |
| POWER GEN | - power generation |
| R/WAY | - railway |
| R/FALL U/G | - rock fall underground |
| S/AGAINST OBJT | - struck against object |
| S/BY OBJT | - struck by object |
| S/BY VEH/MOBILE | - struck by vehicle or mobile plant |
| STREN MOV | - strenuous movements |
| T/PLANT | - treatment plant |
| U/G ACCESS | - underground access, includes: travelling and haulage ways |
| U/G DUMPG | - underground dumping |
| U/G PROD/DEV | - underground production/development |
| U/G PROD | - underground production |
| U/GROUND | - underground |
| VEH/EQP JOLT | - vehicle/equipment jolting |
| W/SHOP | - workshop |

FATAL ACCIDENTS

Review of Fatal Accidents during 2000/01

Five fatalities occurred in the Western Australian mining industry during the 2000/01 fiscal year; one occurred underground in a gold mine and four occurred on the surface; two at nickel mines, one at an iron ore mine and one at a dimension stone quarry.

- A drill jumbo operator received fatal injuries in an extensive underground rockfall. He was reversing his jumbo back towards a cross-cut when a seismic event occurred and rock from the backs fell on him.
- An underground manager, suffered fatal injuries when struck by lightning. At the time he was inspecting a pond that collected overflow from the tailings dam. A storm was observed on the horizon and thunder could be heard in the distance.
- A bulldozer operator suffered fatal injuries when his machine slipped over the edge of an open pit and slid 90-100 metres down a steep rill of broken material. It appears he was thrown from the cab.
- A fitter died when the Integrated Tool Carrier (IT) he was driving rolled onto its side crushing him between the cab and the ground. The IT, fitted with a fork attachment and carrying a crane jib, rolled when it drove over the crane jib after a fork tyne disengaged and the load fell off.
- An electrical worker died while upgrading a switchboard. He was discovered lying on the ground in front of the switchboard with his head between two phase conductors. It is believed that he may have contacted the conductors during the course of the work he was performing.

Fatal Incidence Rate by Mineral Mined 1996/97 - 2000/01

Figure 1 is a chart of fatal incidence by mineral mined (excluding exploration) for the last five years. The grouped information for all surface and underground mines is given at the top of the chart.

Fatal Incidence by Mineral Mined 1996/97 - 2000/01

Figure 1

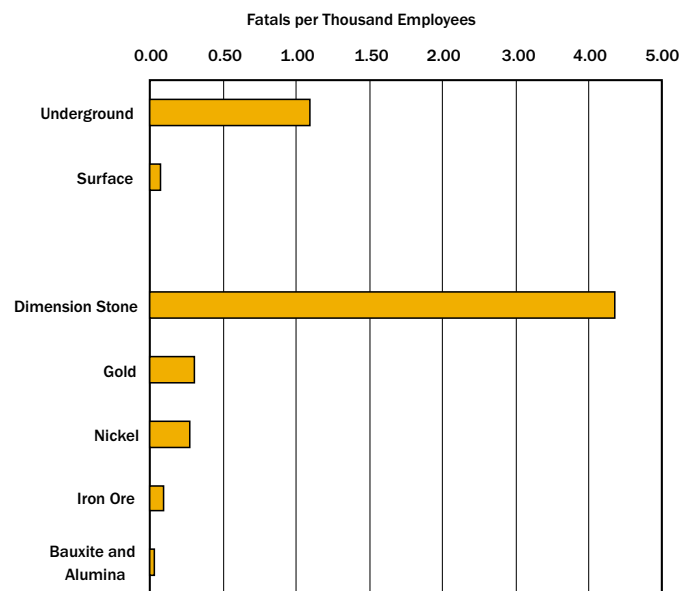


Figure 1 shows that underground mining has a much higher rate of fatal incidence than surface operations. This is reflected in the gold and nickel sectors where the majority of the State's underground mining occurs. The high incidence rate for the dimension stone sector was the result of two fatal accidents in a relatively small work-force.

Fatal Incidence Rate 1991/92 - 2000/01

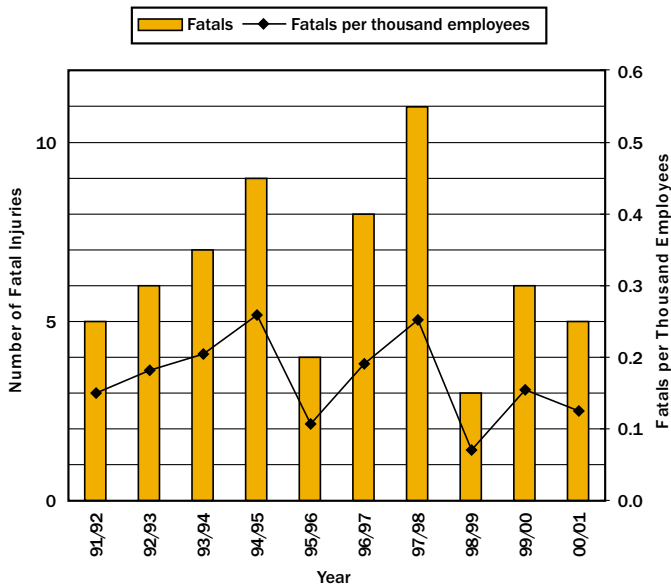
The fatal incidence rate for 2000/01, as indicated in Figure 2, was 0.13 (0.15 in 1991/92) and is still a concern to the Department. While the overall trend continues to decline, there is a year-by-year scatter of incidence rate which is typical for fatalities because of the low number of occurrences.

The Department maintains the view that no fatal accident is acceptable and a fatal incidence rate of zero is achievable and sustainable.

FATAL ACCIDENTS

Fatal Incidence Rate 1991/92 - 2000/01

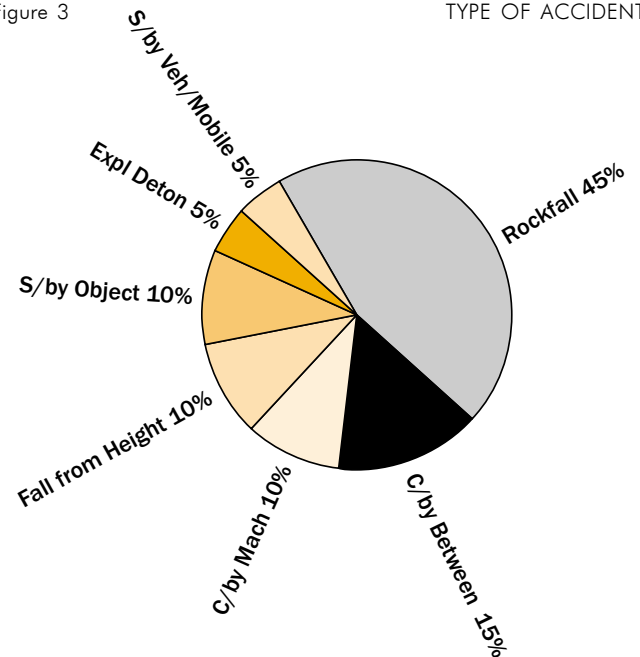
Figure 2



Underground Fatalities 1996/97 - 2000/01

Figure 3

TYPE OF ACCIDENT



Fatal Accidents by Type 1996/97 - 2000/01

Figures 3 and 4 show the type of accidents (excluding exploration) for the 33 fatalities that occurred in the mining industry over the last five years. Of these fatalities, 20 occurred underground and 13 were in surface operations.

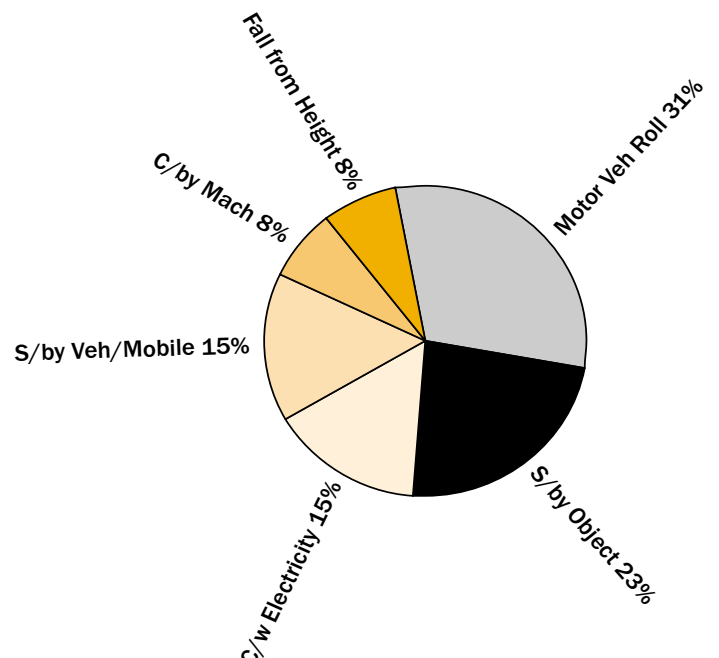
The most common type of underground fatal accident was rockfall which resulted in 9 fatalities (45 percent). Emphasis should continue to be placed on all aspects of ground control in underground mines, including training, excavation design and support, lighting, mechanisation of scaling operations and overhead protection for operators.

The most common type of surface fatal accident was vehicle rollover which resulted in 4 fatalities (31 percent).

Surface Fatalities 1996/97 - 2000/01

Figure 4

TYPE OF ACCIDENT



SERIOUS INJURIES

Review of Serious Injuries During 2000/01

There were of 263 serious injuries in the mining industry during the 2000/01 fiscal year (235 in 1999/00). Of these injuries, 256 occurred in metalliferous mines and 7 were in coal mines. Descriptions of some selected serious incidents that occurred during the year follow:

- A trades assistant was knocked unconscious when an anchor point failed while lowering a 110mm polypipe over a pit wall. The polypipe slipped uncontrolled down the pit wall and as the tail end passed the crane the polypipe swung and struck the trades assistant on the side of the head.
- A trades person received acid burns to his back while working next to a sulphuric acid tank. His hand inadvertently contacted the handle of a valve causing the valve to partially open spraying him with acid.
- A plant operator sustained a hernia while he was climbing a truck access ladder. The wire rope step on the ladder was bent under the body of the truck and the exertion of pulling himself to a higher step caused the strain.
- A truck driver was climbing down from a water truck when he jumped to the ground from the second last step straining his back in the process.
- A supervisor had his foot crushed while pushing against a drill rod with his foot in an attempt to line up a second drill rod. The driller failed to notice that the supervisor's foot was inside the centraliser and closed the centraliser.
- A crane driver strained his knee and ankle when he slipped and fell while getting off the crane after washing the windscreen.
- A belt repairer fell and received a strained shoulder when the conveyor belt he was working on started moving. He was able to get off the conveyor belt and stop it with the lanyard.
- An underground LHD operator strained his shoulder when he drove his LHD over some rock spillage which caused it to lurch and collide with the wall of the drive.
- A driller received a severe laceration when he was struck in the lower abdomen by a set of stillsons he was using to change the hammer on his drill.
- A truck driver sustained a fractured neck during a mine rescue exercise when she was struck by 20 kg of rescue equipment which fell on her as she was climbing down a ladderway. The equipment fell from a stretcher that other team members had commenced lowering down the rise before ensuring the ladderway was clear.
- A process operator tore tendons in his shoulder when he fell backwards after slipping in mud while walking under a tank. He attempted to 'break his fall' by putting his arm out.
- A truck driver, standing next to his truck, received head injuries after his truck was struck by lightning and he fell to the ground.
- A contractor, spray painting the internal walls of a tank, sustained a puncture wound to his hand when the hose burst under high pressure injecting his hand with paint.
- A surveyor, scaling the backs prior to surveying longholes, had his foot fractured when a scaling bar he was using was pushed through it. He was in the basket of an IT with the scaling bar resting on his foot when the machine operator raised the basket at his request. The bar was pushed through his foot after the other end contacted the backs.
- An apprentice boilermaker sustained crush injuries to his forearm when he slipped and caught his arm between the belt and taildrum of a conveyor while clearing mineral from around the taildrum.
- A fitter received burns to both legs when fumes from the spray can he had used to check welds ignited when he started grinding.
- A boilermaker strained his back while welding in an awkward position for 45 minutes.
- A smelter operator received serious multiple burns while attempting to clear a boiler dust collection bin when a rush of hot dust occurred. He also received a deep laceration when he tripped and fell while trying to escape from the hot dust.
- A truck driver fractured both legs and a vertebra when he jumped from his truck. He was unable to control the truck when it lost air pressure.
- A jumbo operator wearing safety glasses was struck below the eye by a piece of metal which cut through the skin and penetrated his eye. He was using a hammer to remove the shank from the flushing head of a drill on the jumbo when a piece of metal flew off.
- Three alimak rise miners, working 8 metres up a 90 metre rise, received multiple serious injuries when a large rockfall occurred.
- A fitter sustained multiple broken bones, lacerations and bruising when he fell 5 metres through a hole in a conveyor walkway while installing equipment.
- A gold room operator fractured his lower right leg and ankle while operating a bobcat when his leg was caught between the lifting arms and a cross beam at the front of the machine. He had not been wearing a seat belt and had operated the wrong pedals causing the machine to move unexpectedly while he was unrestrained.
- A mill reliner received a serious injury to his foot while inside the mill. He was removing material when a 50 kg lifter fell a few centimetres from the mill onto his foot.
- A truck driver was burnt on his leg, shoulders and back by radiator coolant. After an overheating was indicated he allowed the truck to idle, then pressed the pressure release button before finally attempting to turn the radiator cap with his boot. The radiator cap blew off and the remaining coolant sprayed out hitting his leg and the underside of the truck tray before falling back onto his upper body.

SERIOUS INJURIES

Serious Injury Incidence Rate by Mineral Mined 1996/97 – 2000/01

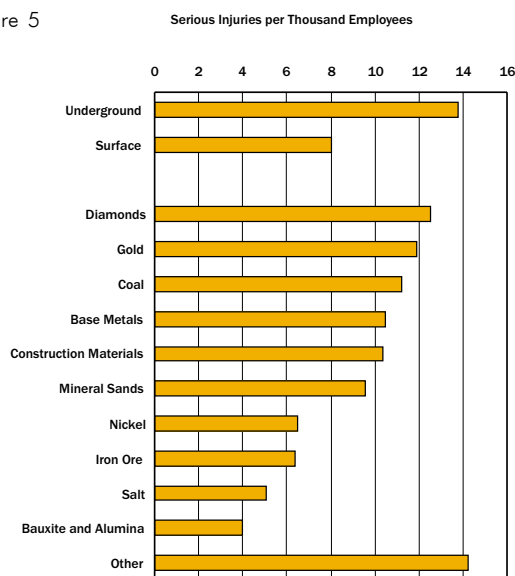
Figure 5 is a chart of incidence rates for serious injuries for the past five years. The top of the chart shows the serious injury incidence rates for surface and underground operations while the lower part of the chart shows serious injury incidence rates by mineral mined.

The chart shows that underground mining had almost twice the incidence rate for serious injuries (13.8) compared to surface mining (8.0).

Of the major mining sectors diamonds had the highest five year average serious incidence rate (12.5) while bauxite and alumina had the lowest (4.0).

Serious Injury Incidence Rate 1996/97-2000/01

Figure 5



Serious Injury Frequency Rate 1996/97 – 2000/01

Figure 6 shows that, for underground metalliferous operations, the serious injury frequency rate remained the same as in 1999/00 while for surface metalliferous operations the rate worsened during 2000/01, as did the rate for the coal sector.

Serious Injury Frequency Rate 1996/97 – 2000/01

Figure 6

| | Year | | | | |
|-----------------------|-------|-------|-------|-------|-------|
| | 96/97 | 97/98 | 98/99 | 99/00 | 00/01 |
| Metalliferous U/G | 7.5 | 4.7 | 4.3 | 3.9 | 3.9 |
| Metalliferous Surface | 3.5 | 3.0 | 2.6 | 2.6 | 3.0 |
| Coal | 9.0 | 5.3 | 7.9 | 2.3 | 5.6 |
| Total | 4.0 | 3.2 | 2.9 | 2.8 | 3.1 |

Serious Injury Percentage Breakdown for 2000/01

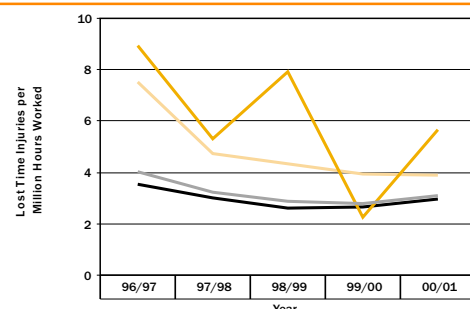
Appendices B and C provide a percentage breakdown of the number of serious injuries by part of body, nature of injury, location of accident, and type of accident for underground and surface operations, respectively.

Underground

- Injuries to hands and backs accounted for 26 and 17 percent of serious injuries respectively followed by injuries to arms which accounted for 14 percent of serious injuries.
- Fracture was the most common injury (26 percent), followed by strain at 11 percent then amputation, crushing and sprain each at 9 percent.
- The majority of serious injuries underground were in production and development areas (60 percent), and in access and haulage ways (23 percent).
- The most common accident types associated with serious injuries underground were rockfall, caught by or between moving objects and fall from height (14 percent each), followed by over exertion and strenuous movements (11 percent), and caught by or between operating machines (9 percent).

Surface

- Injuries to backs, legs, and hands accounted for 26, 21, and 16 percent of serious injuries, respectively. Of serious leg injuries, 69 percent were to knees and ankles.
- Consistent with the high proportion of back, knee and ankle injuries, strain represented the highest proportion by nature (34 percent). Fracture was the next highest (16 percent) and sprain accounted for 11 percent.
- The majority of serious injuries on the surface occurred in treatment plants (39 percent), open pits (25 percent) and workshops (15 percent).
- The most common accident types associated with serious injuries in surface operations were over exertion and strenuous movements (24 percent), slip/trip (14 percent) and struck by object (11 percent).



LOST TIME INJURIES

Review of Lost Time Injuries during 2000/01

In 2000/01, 15,555 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 2000/01 (7,902), the number of days lost from recurrences of injuries which occurred before 2000/01 and in 2000/01 (1,897) and from lost time injuries which were carried over into 2000/01 from accidents which occurred prior to July 2000 (5,756). A breakdown of work days lost in coal and metalliferous mining is given in Table 1.

During the 2000/01 fiscal year there were 475 lost time injuries in the State's mining industry, 440 in metalliferous mines and 35 in coal mines. A breakdown of this data together with performance indicators is given in Tables 2 and 3.

In addition to the initial injuries there were 82 recurrences of previous injuries resulting in 1,897 work days lost during 2000/01. A breakdown of recurrent injuries by year of initial injury is given in Table 4.

Seventy seven persons who were injured before July 2000 lost time in 2000/01 amounting to 5,756 work days. A breakdown of these carry over injuries is given in Table 5.

Table 1. Time Lost Through Injury during 2000/01

| | Days Lost | | | |
|----------------------|------------------|--------------------|---------------------|---------------|
| | Initial Injuries | Recurrent Injuries | Carry Over Injuries | TOTAL |
| Metalliferous Mining | 7,670 | 1,694 | 5,734 | 15,098 |
| Coal Mining | 232 | 203 | 22 | 457 |
| TOTAL MINING | 7,902 | 1,897 | 5,756 | 15,555 |

Table 2. Initial Lost Time Injuries during 2000/01

| Mines | No. of Employees | No of LTIs | Incidence | Frequency | Duration | Injury Index | Days Lost |
|------------------------|------------------|------------|-------------|------------|-------------|--------------|--------------|
| Metalliferous Surface | 35,892 | 380 | 10.6 | 5.1 | 17.1 | 88 | 6,514 |
| Metalliferous U/Ground | 3,444 | 60 | 17.4 | 6.7 | 19.3 | 129 | 1,156 |
| Metalliferous Total | 39,336 | 440 | 11.2 | 5.3 | 17.4 | 92 | 7,670 |
| Coal Total | 696 | 35 | 50.3 | 28.2 | 6.6 | 187 | 232 |
| TOTAL MINING | 40,032 | 475 | 11.9 | 5.6 | 16.6 | 94 | 7,902 |

LOST TIME INJURIES

Table 3. Injuries by Mineral Mined during 2000/01

| Mineral Mined | No of Employees | No of LTIs | Incidence | Frequency | Duration | Injury Index | Days Lost |
|------------------------|-----------------|------------|-------------|------------|-------------|--------------|--------------|
| Gold | 11,486 | 163 | 14.2 | 6.1 | 20.5 | 124 | 3,342 |
| Iron Ore | 8,973 | 66 | 7.4 | 3.7 | 12.3 | 46 | 809 |
| Bauxite and Alumina | 6,419 | 30 | 4.7 | 2.5 | 17.4 | 43 | 521 |
| Nickel | 5,297 | 58 | 10.9 | 5.0 | 18.6 | 93 | 1,076 |
| Mineral Sands | 2,308 | 40 | 17.3 | 8.9 | 6.5 | 57 | 259 |
| Base Metals | 1,317 | 21 | 15.9 | 6.7 | 22.8 | 153 | 479 |
| Diamonds | 956 | 16 | 16.7 | 8.2 | 10.0 | 82 | 160 |
| Coal | 696 | 35 | 50.3 | 28.2 | 6.6 | 187 | 232 |
| Salt | 685 | 6 | 8.8 | 5.2 | 11.7 | 60 | 70 |
| Construction Materials | 414 | 8 | 19.3 | 10.4 | 38.3 | 397 | 306 |
| Other | 1,481 | 32 | 21.6 | 9.4 | 20.3 | 189 | 648 |
| TOTAL MINING | 40,032 | 475 | 11.9 | 5.6 | 16.6 | 94 | 7,902 |

NOTE: Duration in Tables 2 and 3 does not take into consideration time lost after 30 June 2001 by persons still off work at the end of the fiscal year, for time lost from recurrent injuries or time lost by persons with carry over injuries from before July 2000.

Table 4. Recurrent Injuries during 2000/01

| Year | Metalliferous Mining | | Coal Mining | |
|--------------|----------------------|---------------------|--------------------|---------------------|
| | Number of Injuries | Number of Days Lost | Number of Injuries | Number of Days Lost |
| 2001 | 8 | 206 | – | – |
| 2000 | 46 | 992 | 10 | 131 |
| 1999 | 15 | 471 | – | – |
| 1997 | 2 | 25 | 1 | 72 |
| TOTAL | 71 | 1,694 | 11 | 203 |

NOTE: Apart from the information shown in Tables 1, 4 and 5 analysis of recurrent and carry over injuries has not been presented in this publication.

Table 5. Carry Over Injuries during 2000/01

| Year | Metalliferous Mining | | Coal Mining | |
|--------------|----------------------|---------------------|--------------------|---------------------|
| | Number of Injuries | Number of Days Lost | Number of Injuries | Number of Days Lost |
| 2000 | 57 | 2,686 | 1 | 22 |
| 1999 | 9 | 1,119 | – | – |
| 1998 | 8 | 1,477 | – | – |
| 1997 | 1 | 240 | – | – |
| 1996 | 1 | 212 | – | – |
| TOTAL | 76 | 5,734 | 1 | 22 |

LOST TIME INJURIES

Review of Lost Time Injuries during 2000/01 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. This 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 AXTAT and this Standard. The Standard treats fatalities as lost

time injuries with a penalty of 220 workdays lost for each, whereas AXTAT keeps them separate with no penalty. Also, AXTAT calculates incidence per thousand, in contrast to the Standard's definition of injuries per hundred employees.

Tables 6 and 7 provide statistical information in accordance with this standard.

Table 6. Initial Lost Time Injuries during 2000/01 (AS1885.1-1990)

| Mines | No of Employees | No of LTIs | Injuries per Hundred | Frequency | Duration | Days Lost |
|------------------------|-----------------|------------|----------------------|------------|-------------|--------------|
| Metalliferous Surface | 35,892 | 384 | 1.1 | 5.2 | 19.3 | 7,394 |
| Metalliferous U/Ground | 3,444 | 61 | 1.8 | 6.8 | 22.6 | 1,376 |
| Metalliferous Total | 39,336 | 445 | 1.1 | 5.4 | 19.7 | 8,770 |
| Coal Total | 696 | 35 | 5.0 | 28.2 | 6.6 | 232 |
| TOTAL MINING | 40,032 | 480 | 1.2 | 5.7 | 18.8 | 9,002 |

NOTE : Duration in this table does not take into consideration time lost after 30 June 2001 by persons still off work at the end of the fiscal year, or time lost by persons with carry over injuries from before July 2000, or for time lost from recurrent injuries.

Table 7. Injuries by Mineral Mined during 2000/01 (AS1885.1-1990)

| Minerals Mined | No of Employees | No of LTIs | Injuries per Hundred | Frequency | Duration | Days Lost |
|------------------------|-----------------|------------|----------------------|------------|-------------|--------------|
| Gold | 11,486 | 164 | 1.4 | 6.1 | 21.7 | 3,562 |
| Iron Ore | 8,973 | 67 | 0.7 | 3.8 | 15.4 | 1,029 |
| Bauxite and Alumina | 6,419 | 30 | 0.5 | 2.5 | 17.4 | 521 |
| Nickel | 5,297 | 60 | 1.1 | 5.2 | 25.3 | 1,516 |
| Mineral Sands | 2,308 | 40 | 1.7 | 8.9 | 6.5 | 259 |
| Base Metals | 1,317 | 21 | 1.6 | 6.7 | 22.8 | 479 |
| Diamonds | 956 | 16 | 1.7 | 8.2 | 10.0 | 160 |
| Coal | 696 | 35 | 5.0 | 28.2 | 6.6 | 232 |
| Salt | 685 | 6 | 0.9 | 5.2 | 11.7 | 70 |
| Construction Materials | 414 | 8 | 1.9 | 10.4 | 38.3 | 306 |
| Other | 1,481 | 33 | 2.2 | 9.6 | 26.3 | 868 |
| TOTAL MINING | 40,032 | 480 | 1.2 | 5.7 | 18.8 | 9,002 |

WORKERS' COMPENSATION

PREMIUM RATES FOR THE WESTERN AUSTRALIAN MINERAL INDUSTRY

The Workers' Compensation premium rates determined by the Premium Rates Committee, are published in a dedicated Western Australian Government Gazette and are effective from 30 June.

Figure 7 indicates workers' compensation cost trends for selected mineral groups for the 10 year period since 1992/93.

Most mineral groups have shown reductions in compensation costs since 1992/93. In particular, underground gold operations for the 1992/93 fiscal year incurred a cost equivalent to 6.76 percent of payroll which has been reduced to 4.25 percent for 2001/02. This represents a 37 percent improvement in costs.

The overall average premium rate for the Western Australian mining industry for 2001/02 is currently 2.74 percent, a 15 percent reduction on 2000/01 (3.22 percent).

Figure 8 shows the current recommended premium rates for the 2001/02 fiscal year for a variety of mineral groups and other industries.

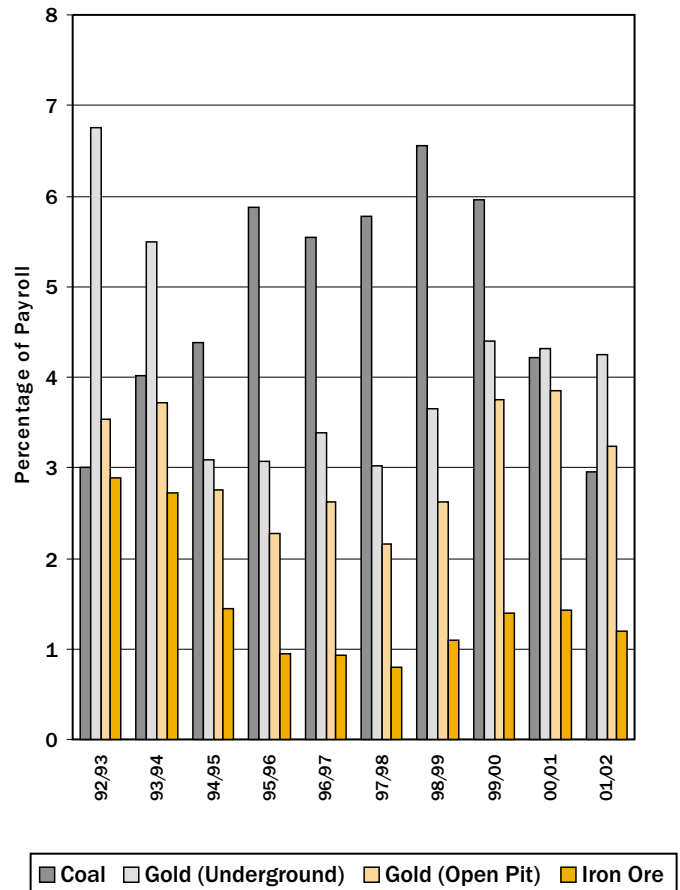
Premium rates for mining industry groups compare favourably with other industry groups such as clay brick manufacturing and structural steel fabrication which have current premium rates of 6.93 and 7.48 percent of payroll, respectively.

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 accident rates.

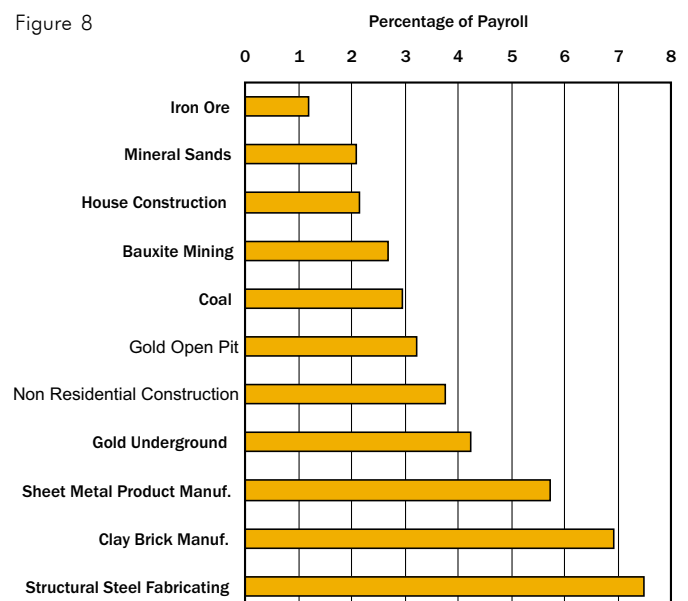
Western Australian Mines Workers Compensation Cost Trends

Figure 7



Western Australian Recommended Premium Rates 2001/02

Figure 8



INJURIES BY COMMODITY

METALLIFEROUS PERFORMANCE INDICATORS

The performance indicators for the metalliferous mining sector show mixed results during 2000/01. Figures 9 to 12 depict the performance indicators; incidence, frequency, duration and injury index (see explanatory notes for definitions) for the last five years.

Some interesting trends noted in the performance indicators for metalliferous mines during 2000/01 include the following:

- The overall incidence rate improved by 24 percent, falling from 14.8 to 11.2. The surface sector improved by 24 percent (from 13.9 to 10.6) while the underground sector rate improved by 25 percent (from 23.2 to 17.4).
- The overall frequency rate improved by 21 percent, falling from 6.7 to 5.3. The surface sector improved by 22 percent (from 6.5 to 5.1) while the underground sector rate improved by 25 percent (from 8.9 to 6.2).
- A rise in the duration rate for both underground and surface operations was evident. The overall duration rate is currently 17.4, 37 percent higher than in 1999/00.
- The rise in duration rate more than compensated for the fall in frequency rate in surface operations and resulted in an increase in the overall injury index, a rise of 7 percent (up from 86 to 92).

Metalliferous Injury Percentage Breakdown for 2000/01

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

- Back injuries accounted for the largest proportion of injuries for both underground and surface at 20 percent and 23 percent respectively.
- Hand injuries accounted for the second largest proportion of injuries underground (20 percent), followed by legs and arms each at 13 percent.
- Leg injuries accounted for the second largest proportion for surface operations (18 percent, over half of which were knee and ankle injuries), followed by hand injuries at 16 percent.

Injuries by Nature

- Strains accounted for the majority of injuries for both underground and surface operations at 18 and 29 percent respectively.

- For underground operations the second highest ranking nature of injury was fracture (17 percent), followed by sprain at 10 percent.
- The second highest ranking nature of injury for surface operations was also fracture (13 percent), followed by bruise/contusion and sprain both at 9 percent.

Injuries by Location

- For underground operations most injuries occurred in production and development areas (58 percent), followed by access and haulage ways at 25 percent.
- The majority of injuries for surface operations occurred in treatment plants (42 percent), followed by open pits at 22 percent.

Injuries by Type

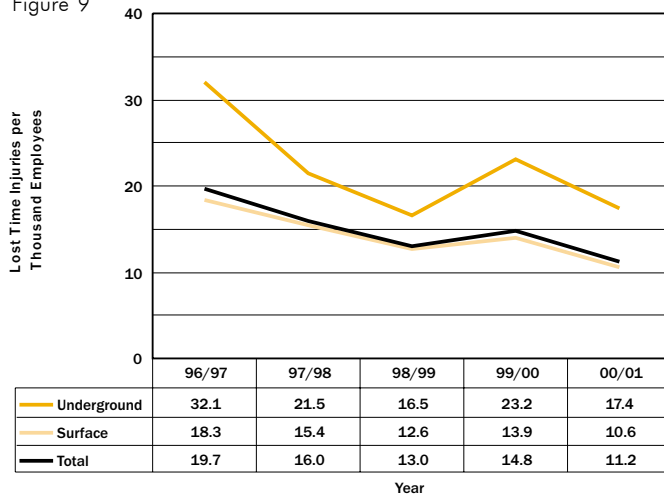
- Over exertion and strenuous movements was the major accident type for underground injuries (14 percent), followed by caught by or between moving objects at 10 percent. Rockfall was 8 percent (down from 16 percent in 1999/00).
- For injuries in surface operations the most common accident types were over exertion and strenuous movements (21 percent), followed by struck by object at 12 percent and slip/trip at 11 percent.

INJURIES BY COMMODITY

Metalliferous Performance Indicators 1996/97 – 2000/01

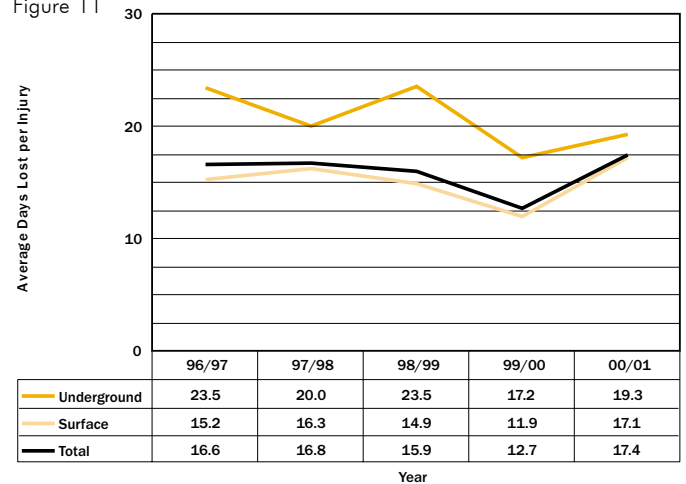
Incidence Rate

Figure 9



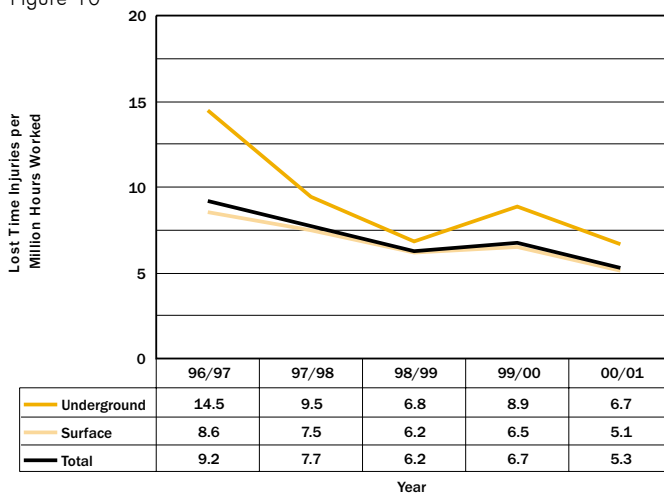
Duration Rate

Figure 11



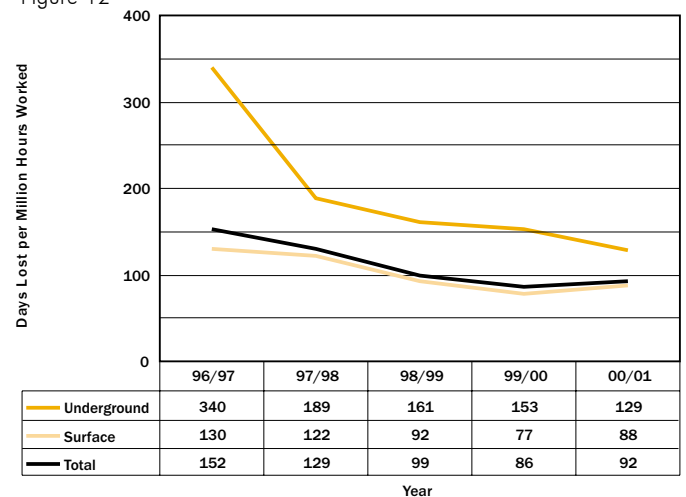
Frequency Rate

Figure 10



Injury Index

Figure 12



INJURIES BY COMMODITY

GOLD PERFORMANCE INDICATORS

The performance indicators for the gold sector showed mixed results for 2000/01. Figures 13 to 16 depict the performance indicators; incidence, frequency, duration and injury index.

Some interesting trends noted in the gold sector performance indicators during 2000/01 include the following:

- The overall incidence rate improved by 14 percent, dropping from 16.5 to 14.2. The surface sector improved by 5 percent (from 14.5 to 13.8) while the underground sector rate improved significantly by 32 percent (from 23.2 to 15.8).
- A similar trend was noted in the frequency rate for both underground and surface sectors. The overall frequency rate improved by 10 percent (from 6.8 to 6.1). The rate for the surface sector remained stable at 6.2 while the rate for the underground sector improved by 32 percent (from 8.4 to 5.7).
- The overall duration rate is currently 20.5 representing a 29 percent rise for 2000/01. The duration rate for both the underground and surface sectors worsened.
- The rise in duration rate overshadowed the overall improvement in frequency rate and resulted in a 15 percent rise in the injury index (from 108 to 124). In the underground sector the fall in frequency rate more than compensated for the rise in duration rate resulting in the injury index improving by 10 percent (from 155 to 139).

Gold Injury Percentage Breakdown for 2000/01

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 injuries accounted for the largest proportion of injuries underground at 22 percent while back injuries accounted for the largest proportion of injuries in surface operations at 23 percent.
- In the underground sector back injuries accounted for the next largest at 21 percent followed by leg injuries at 18 percent (over half of which were knee injuries).
- For the surface sector hand injuries accounted for the next largest at 20 percent followed by leg injuries at 19 percent (over half of which were knee and ankle injuries).

Injuries by Nature

- Strains accounted for the majority of injuries in both underground and surface operations at 15 percent and 30 percent respectively.
- For the underground sector the second highest ranking nature of injury was fracture (13 percent), followed by sprain at 10 percent.
- For the surface sector the second highest ranking nature of injury was fracture (15 percent), followed by laceration at 11 percent.

Injuries by Location

- For underground operations most injuries occurred in production and development areas (64 percent), followed by access and haulage ways at 23 percent.
- The majority of injuries occurred in treatment plants for the surface sector (35 percent), followed by open pits at 31 percent.

Injuries by Type

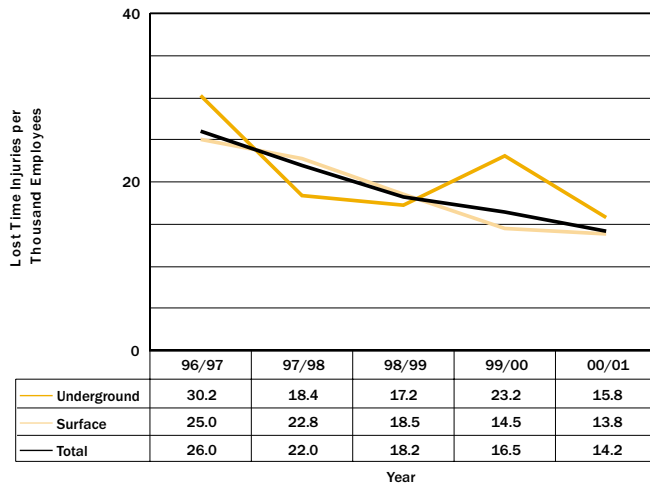
- Rockfall and caught by or between moving and stationary objects were the major accident types for underground injuries each at 13 percent, followed by over exertion and strenuous movements and struck by object both at 10 percent.
- The most common accident types for surface operations were over exertion and strenuous movements (21 percent), followed by struck by object at 18 percent and slip/trip at 11 percent.

INJURIES BY COMMODITY

Gold Performance Indicators 1996/97 – 2000/01

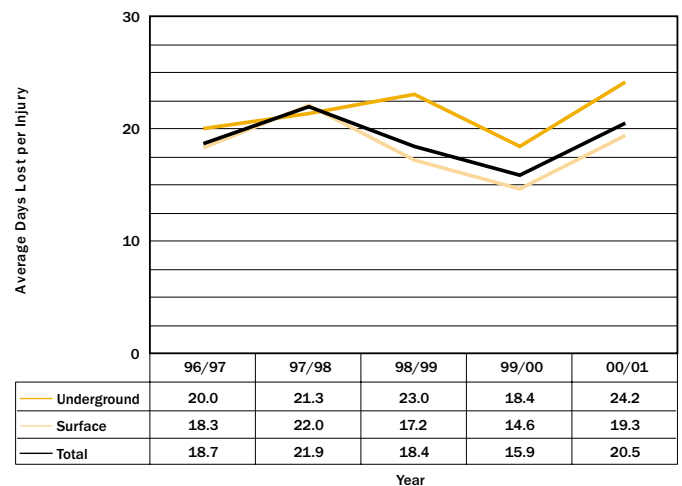
Incidence Rate

Figure 13



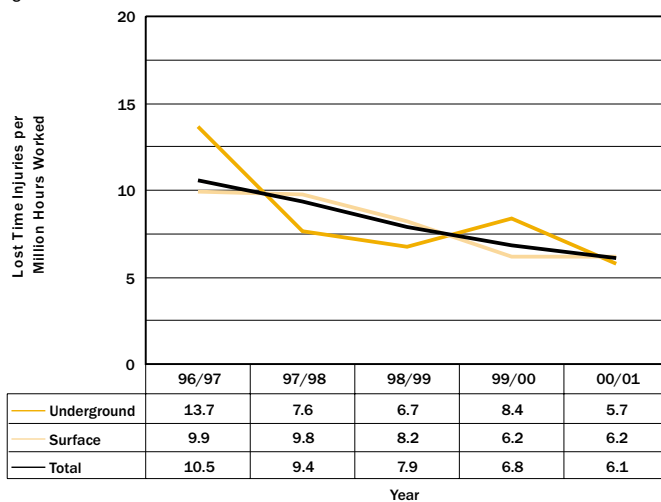
Duration Rate

Figure 15



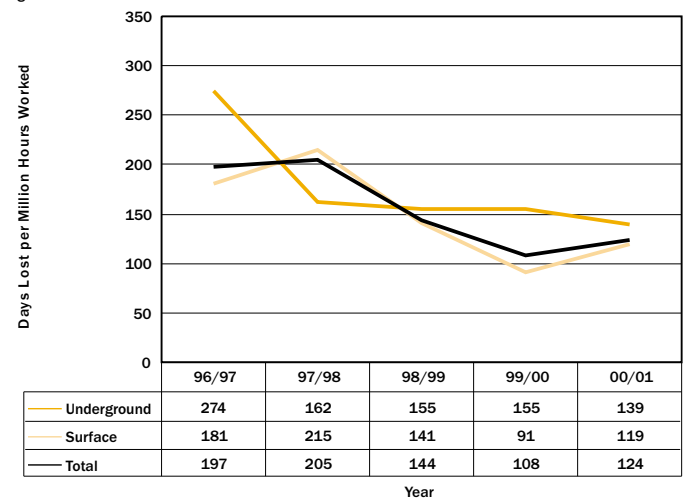
Frequency Rate

Figure 14



Injury Index

Figure 16



INJURIES BY COMMODITY

IRON ORE PERFORMANCE INDICATORS

Apart from duration rate the performance indicators for the iron ore sector show an improvement during 2000/01. Figures 17 to 20 depict the performance indicators; incidence, frequency, duration and injury index.

Some interesting trends noted in the iron ore sector performance indicators during 2000/01 include the following:

- The incidence rate of 7.4 represents a 47 percent improvement on 1999/00.
- The frequency rate also improved by 47 percent, currently at 3.7.
- There was an increase in the duration rate to 12.3 (43 percent).
- The fall in the frequency rate was greater than the rise in duration rate and resulted in an overall improvement in injury index (down 23 percent from 60 to 46).

Iron Ore Injury Percentage Breakdown for 2000/01

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

- Back injuries accounted for the largest proportion of injuries representing 27 percent.
- Leg injuries accounted for the next largest proportion of injuries at 21 percent, followed by hand injuries at 15 percent.

Injuries by Nature

- Strain was the most common nature of injury at 35 percent.
- Crushing was the next highest proportion (11 percent), followed by laceration and fracture both at 9 percent.

Injuries by Location

- The majority of injuries occurred in open pits which accounted for 25 percent.
- The next largest proportion occurred in treatment plants (23 percent), followed by workshops and railways both at 14 percent.

Injuries by Type

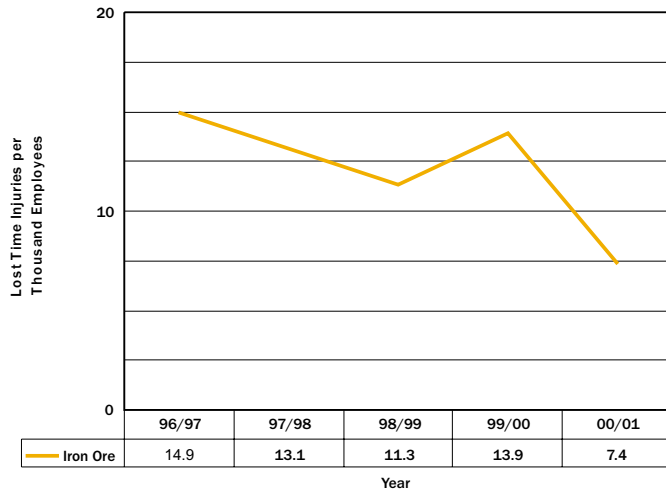
- Over exertion and strenuous movements continued as the major type of accident resulting in injury (19 percent).
- Slip/trip was the next highest type (18 percent), followed by struck by object at 9 percent.

INJURIES BY COMMODITY

Iron Ore Performance Indicators 1996/97 – 2000/01

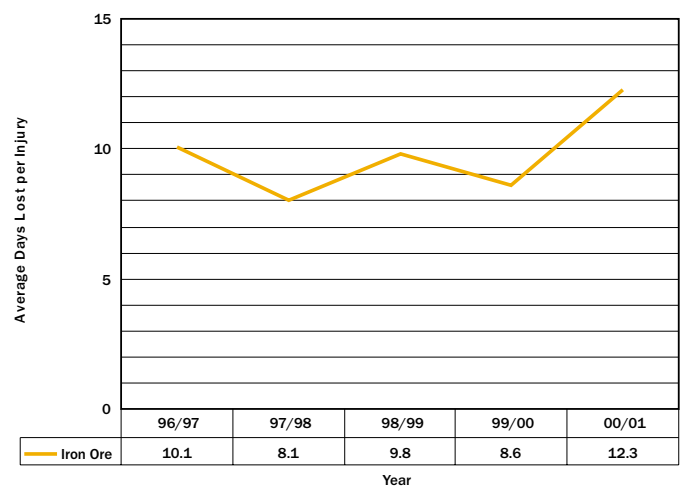
Incidence Rate

Figure 17



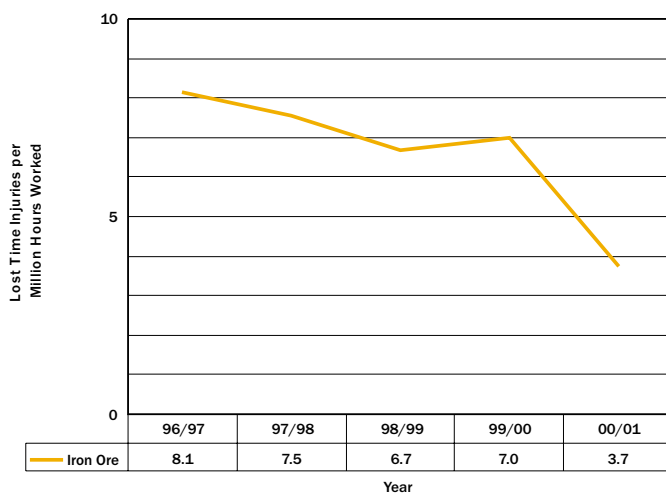
Duration Rate

Figure 19



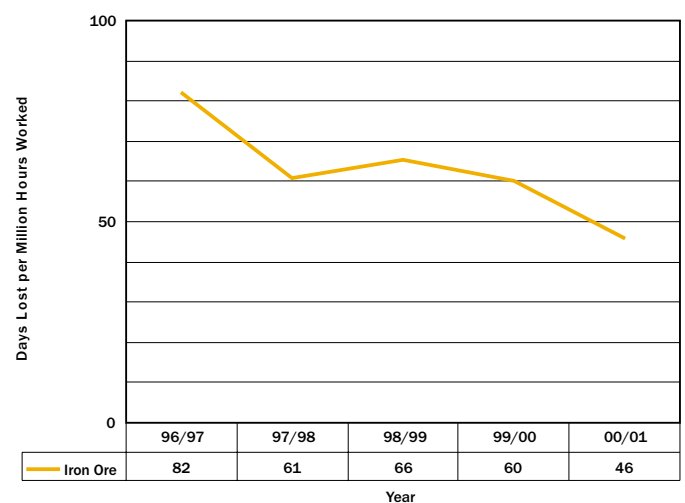
Frequency Rate

Figure 18



Injury Index

Figure 20



INJURIES BY COMMODITY

BAUXITE AND ALUMINA PERFORMANCE INDICATORS

There were mixed results in the performance indicators for the bauxite and alumina sector during 2000/01. Figures 21 to 24 depict the performance indicators; incidence, frequency, duration and injury index.

Some interesting trends noted in the bauxite and alumina sector performance indicators during 2000/01 include the following:

- The incidence rate improved slightly from 4.9 to 4.7 (4 percent) which is still the lowest incidence rate of all the major commodity groups.
- The frequency rate rose slightly from 2.4 to 2.5 but still remained the lowest rate of all the major commodity groups.
- There was a substantial rise in the duration rate from 12.8 to 17.4, a 36 percent deterioration.
- The large rise in duration rate resulted in a significant rise to the injury index of 39 percent, up to 43.
- Apart from duration the bauxite and alumina sector continues to be the better performing major commodity group and is clearly established as the industry benchmark.

Bauxite and Alumina Injury Percentage Breakdown for 2000/01

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 representing 29 percent.
- Leg and hand injuries accounted for the next largest proportion of injuries both at 17 percent followed by arm and eye injuries both at 10 percent.

Injuries by Nature

- Strains accounted for the majority of injuries at 24 percent.
- Fracture and laceration were the next highest proportion both at 13 percent, followed by bruise/contusion, sprain and effects of chemicals each at 10 percent.

Injuries by Location

- The majority of injuries occurred in treatment plants (63 percent), followed by surface general at 23 percent and workshops at 7 percent.

Injuries by Type

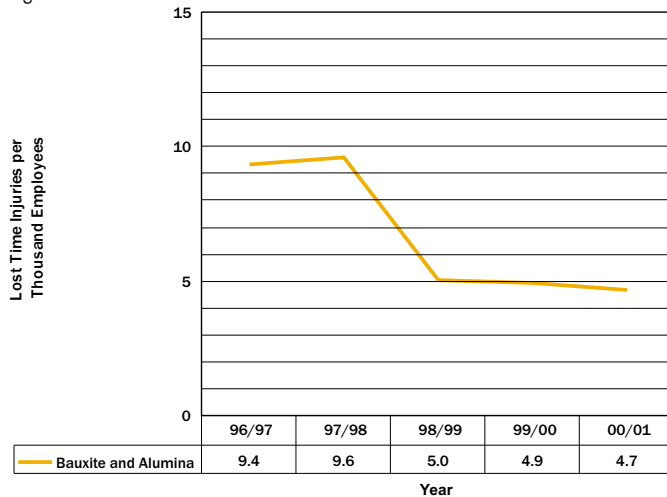
- Over exertion and strenuous movements was once again the most common type of accident resulting in injury (23 percent).
- Struck by object was the next highest proportion at 17 percent followed by fall getting off vehicles/equipment, caught by or between moving objects, and contact with chemicals each at 10 percent.

INJURIES BY COMMODITY

Bauxite and Alumina Performance Indicators 1996/97 – 2000/01

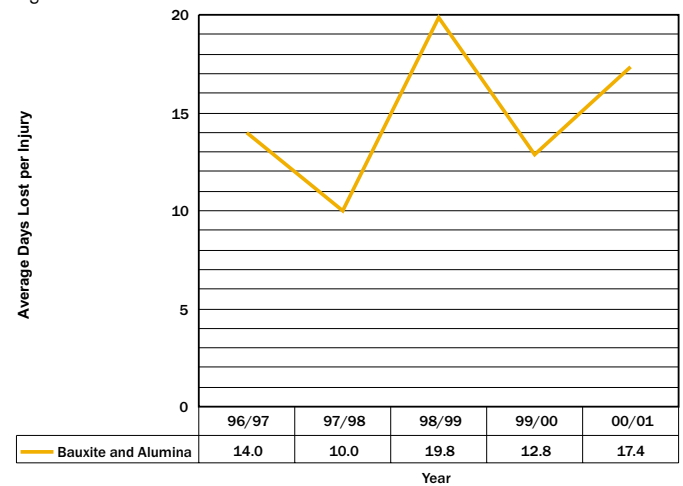
Incidence Rate

Figure 21



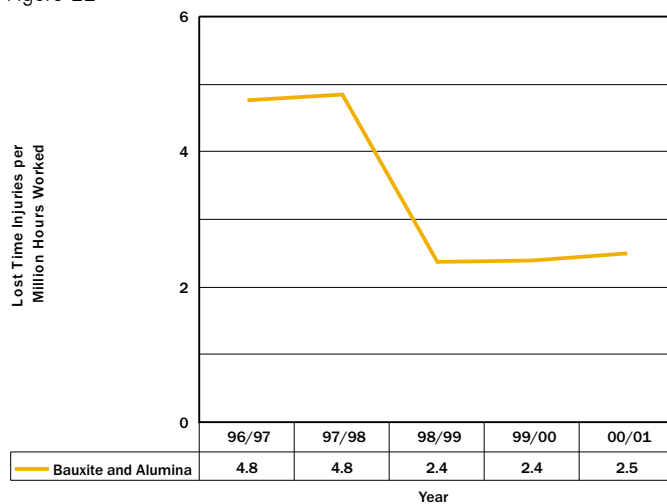
Duration Rate

Figure 23



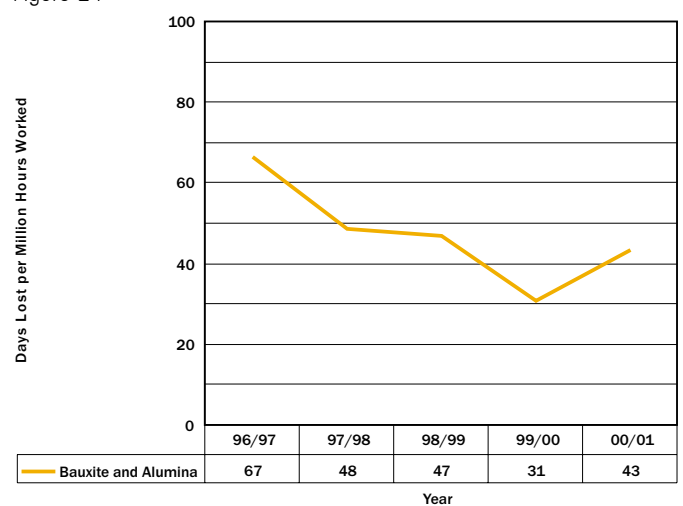
Frequency Rate

Figure 22



Injury Index

Figure 24



INJURIES BY COMMODITY

NICKEL PERFORMANCE INDICATORS

The performance indicators for the nickel sector deteriorated during 2000/01. Figures 25 to 28 depict the performance indicators; incidence, frequency, duration and injury index.

Some interesting trends noted in the nickel sector performance indicators during 2000/01 include the following:

- The incidence rate increased slightly from 10.6 to 10.9 (3 percent).
- The frequency rate rose by 6 percent to 5.0 during 2000/01.
- The duration rate exhibited a significant increase from 11.7 to 18.6 which is 59 percent higher than 1999/00
- The large rise in duration rate resulted in a substantial rise in injury index (from 55 to 93) a 69 percent deterioration. This is the largest rise in injury index of all the major commodity groups.

Nickel Injury Percentage Breakdown for 2000/01

Appendix J 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 continued to account for the largest proportion of nickel mining injuries representing 21 percent.
- Arm and leg injuries accounted for the next largest proportion both at 16 percent, followed by injuries to hands at 14 percent.

Injuries by Nature

- Strains accounted for the majority of injuries at 36 percent.
- Effects of chemicals was the next highest proportion (14 percent), followed by fracture at 12 percent.

Injuries by Location

- The majority of injuries occurred in treatment plants accounting for 52 percent.
- The next largest proportion occurred underground at 21 percent followed by open pits at 14 percent.

Injuries by Type

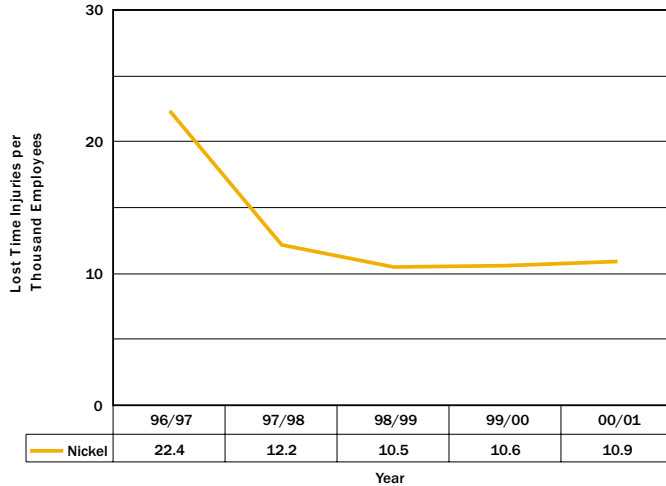
- Over exertion and strenuous movements continued to be the major type of accident resulting in injury (16 percent).
- Contact with chemicals featured as the second most frequent type of accident (14 percent), followed by slip/trip at 12 percent.

INJURIES BY COMMODITY

Nickel Performance Indicators 1996/97 – 2000/01

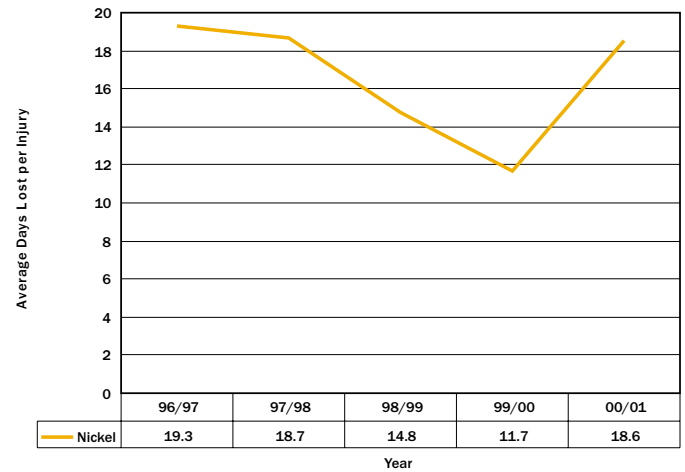
Incidence Rate

Figure 25



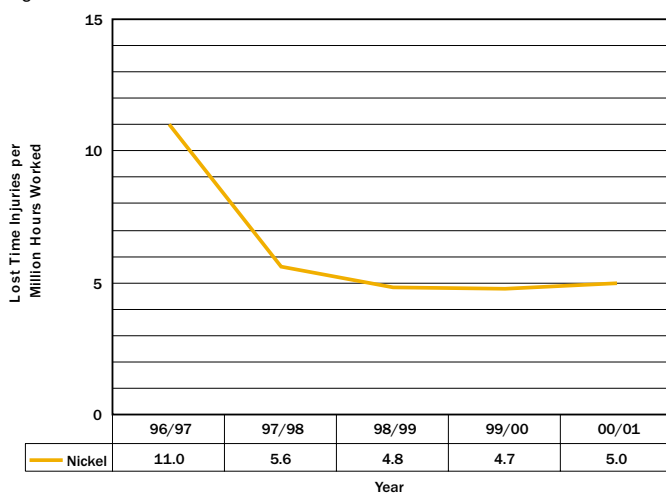
Duration Rate

Figure 27



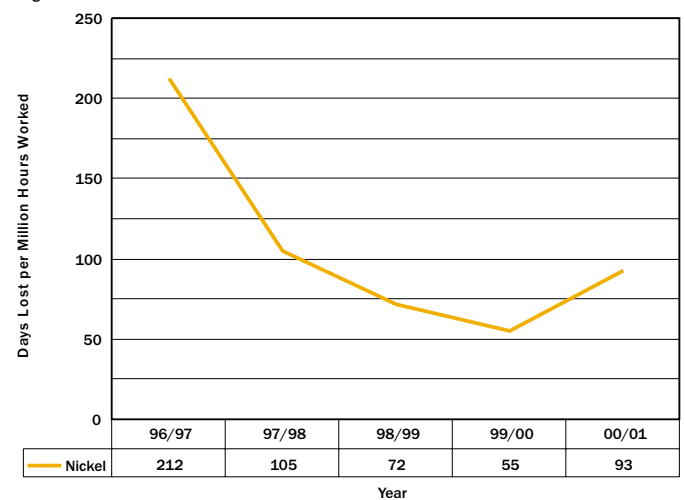
Frequency Rate

Figure 26



Injury Index

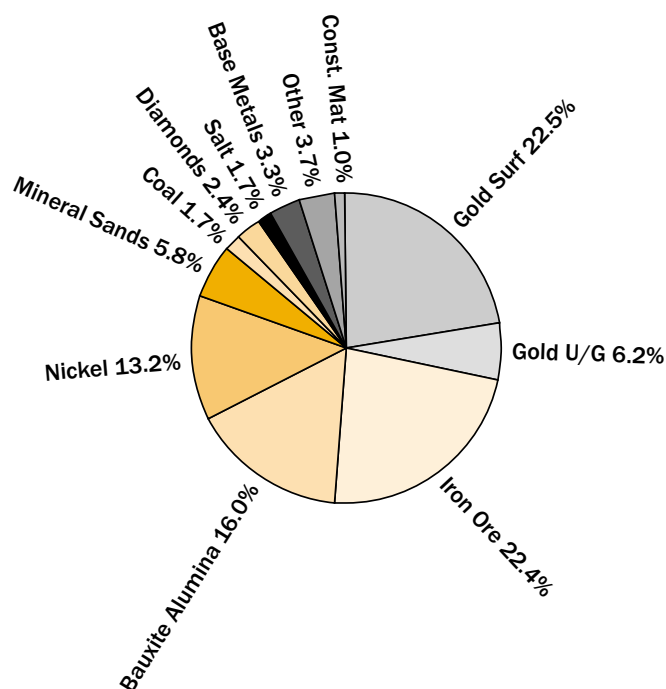
Figure 28



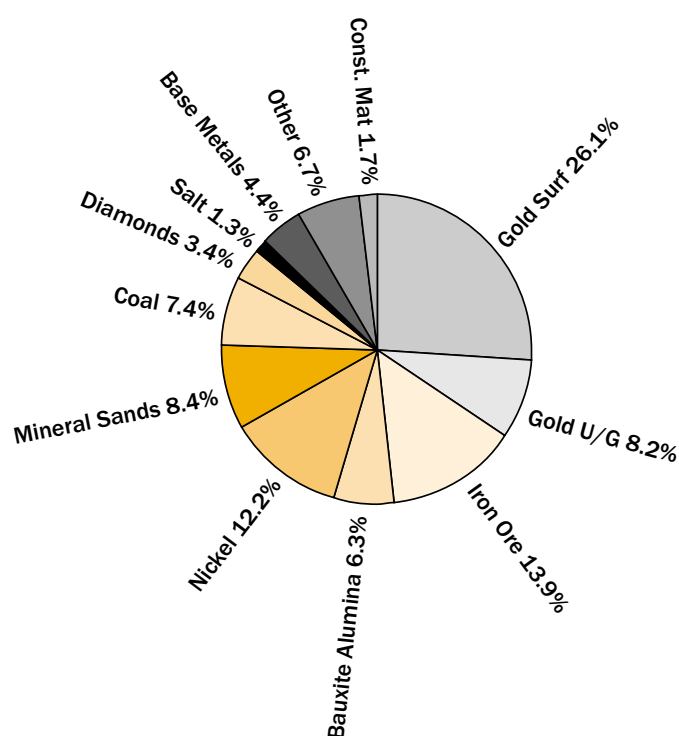
APPENDIX A

WESTERN AUSTRALIAN MINES 2000/01 FINANCIAL YEAR – 475 INJURIES

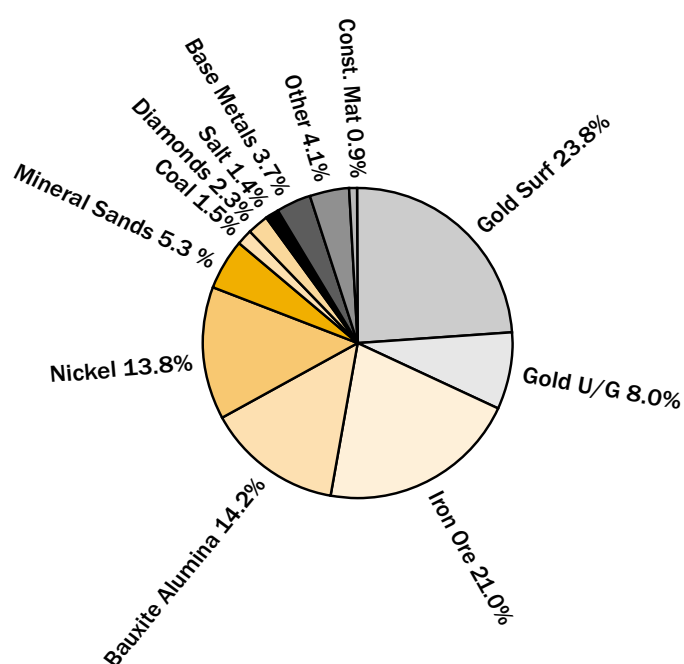
NUMBER OF EMPLOYEES



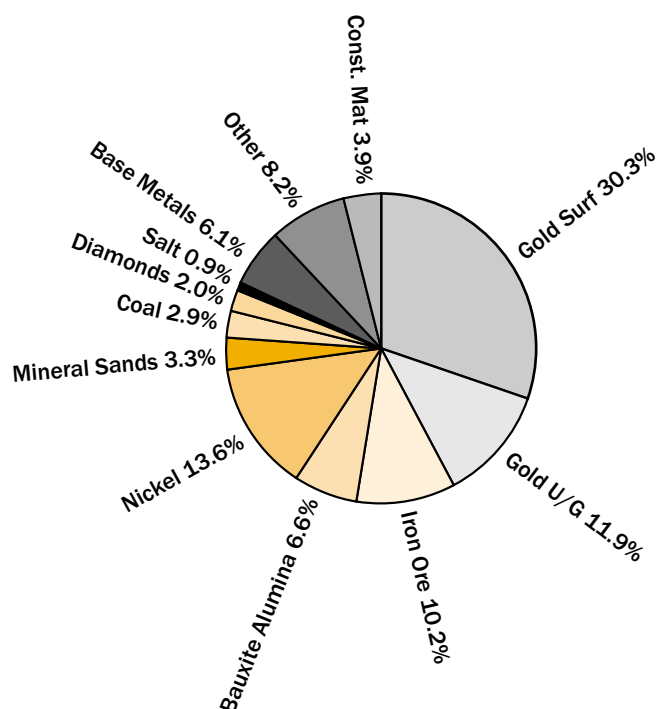
NUMBER OF INJURIES



MILLION HOURS WORKED



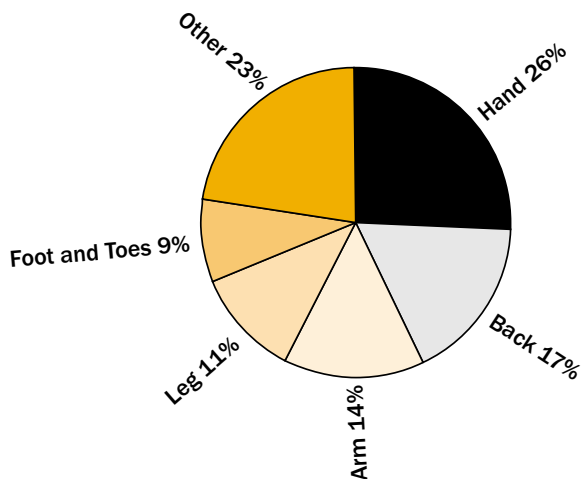
WORK DAYS LOST



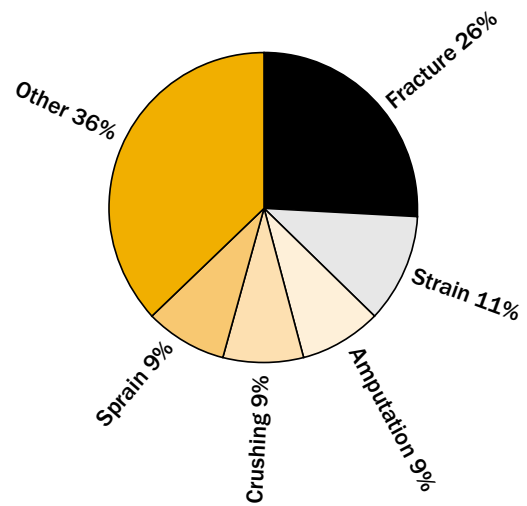
APPENDIX B

SERIOUS INJURIES UNDERGROUND 2000/01 – 35 INJURIES

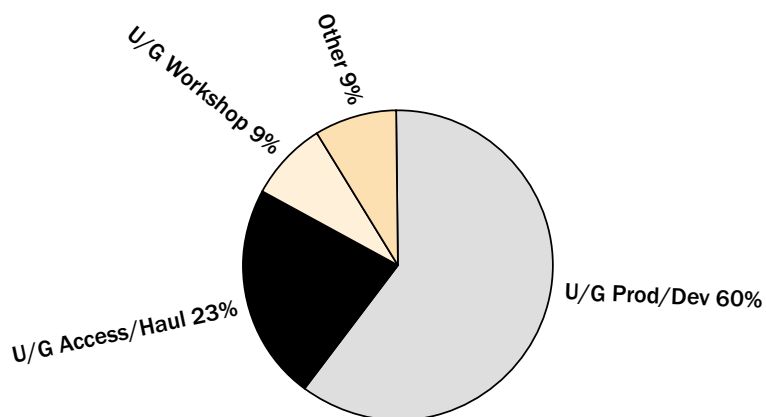
PART OF BODY



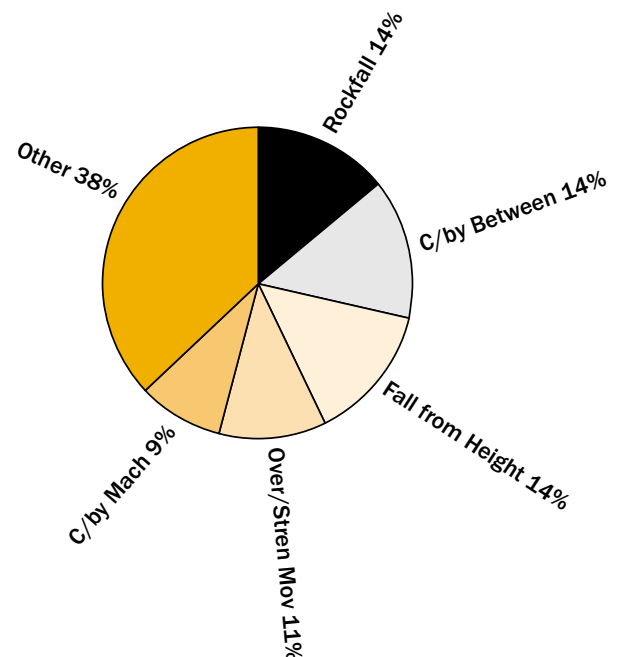
NATURE OF INJURY



LOCATION OF ACCIDENT



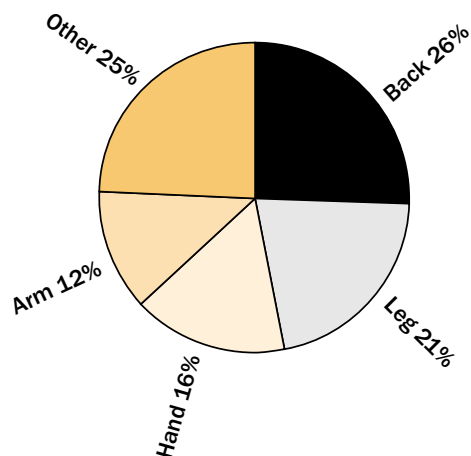
TYPE OF ACCIDENT



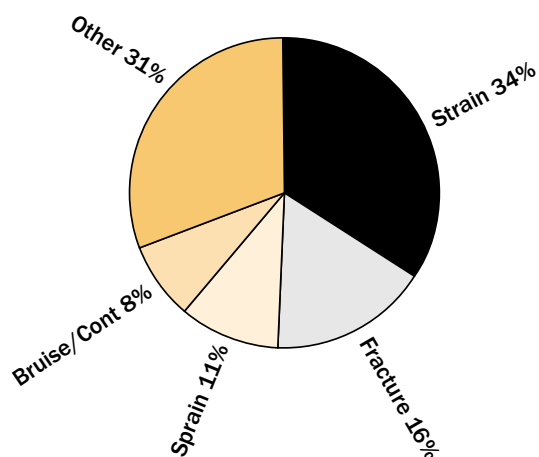
APPENDIX C

SERIOUS INJURIES SURFACE 2000/01 – 228 INJURIES

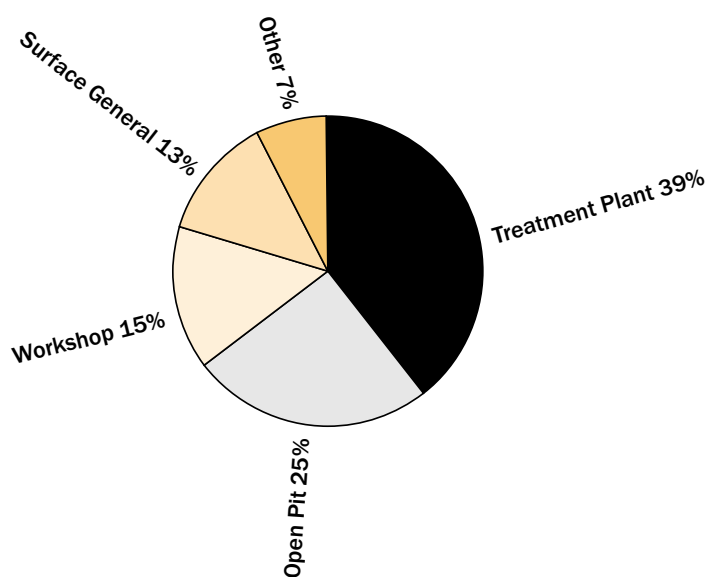
PART OF BODY



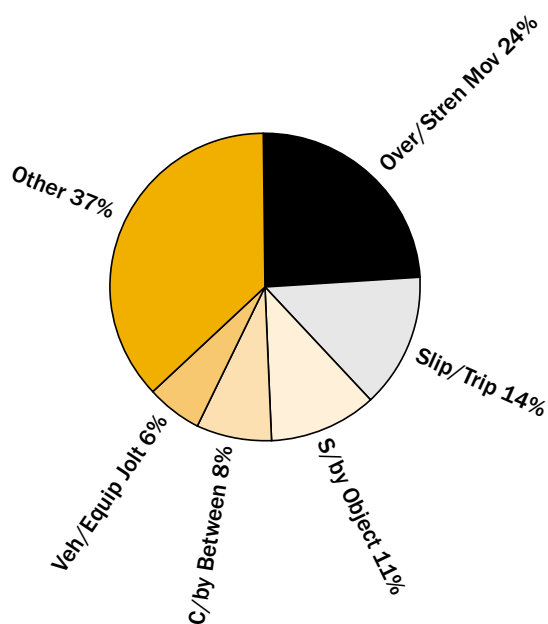
NATURE OF INJURY



LOCATION OF ACCIDENT



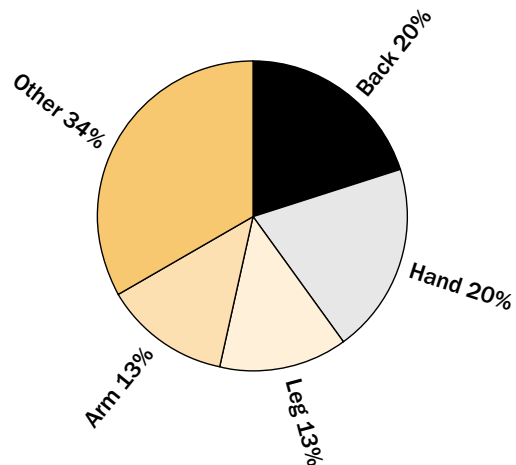
TYPE OF ACCIDENT



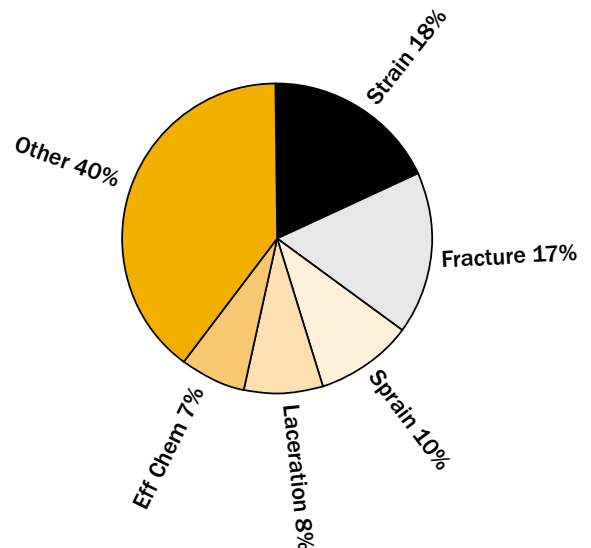
APPENDIX D

METALLIFEROUS UNDERGROUND INJURIES 2000/01 – 60 INJURIES

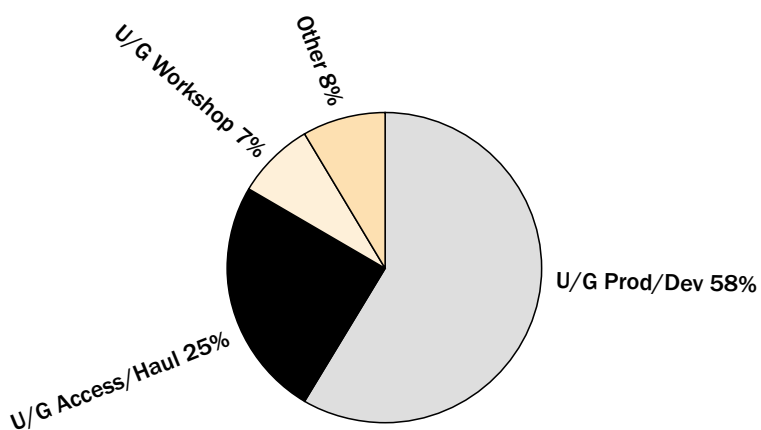
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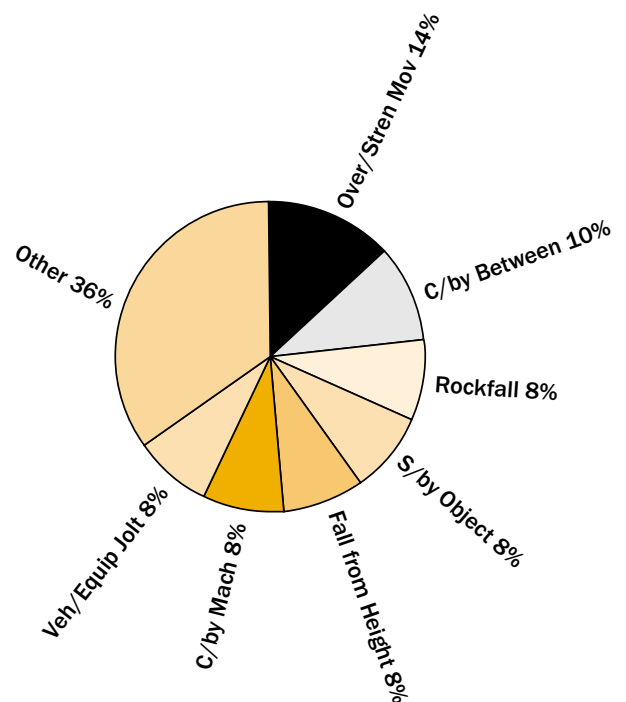
NATURE OF INJURY



LOCATION OF ACCIDENT



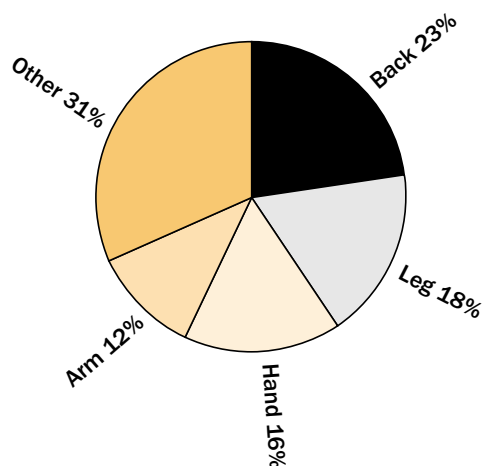
TYPE OF ACCIDENT



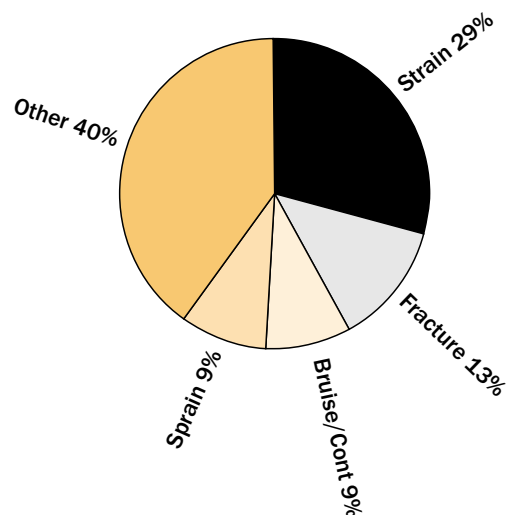
APPENDIX E

METALLIFEROUS SURFACE INJURIES 2000/01 – 380 INJURIES

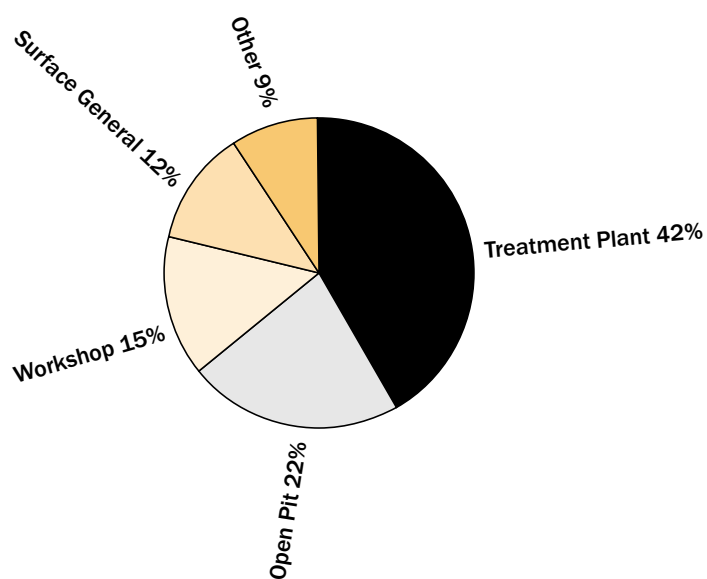
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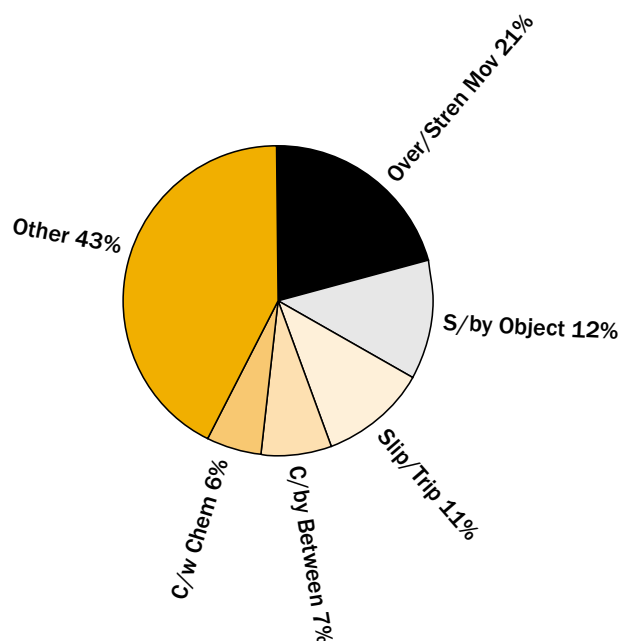
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LOCATION OF ACCIDENT



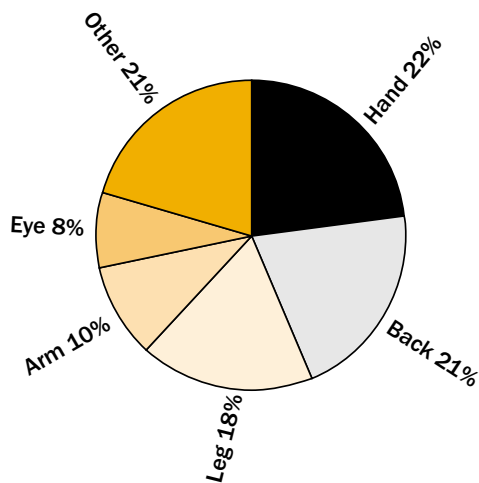
TYPE OF ACCIDENT



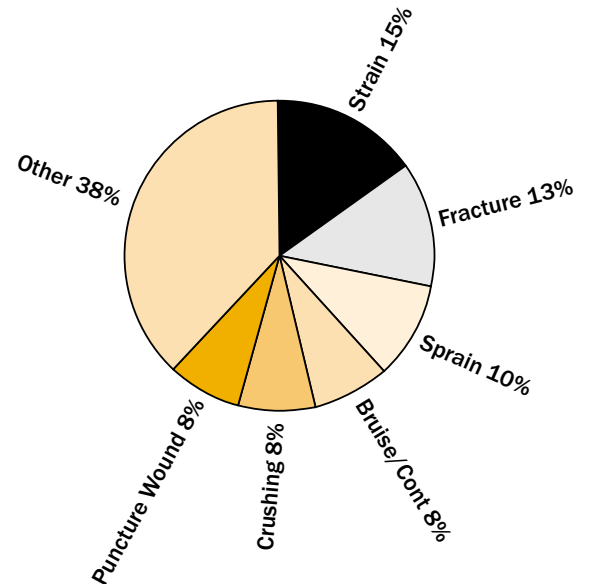
APPENDIX F

GOLD UNDERGROUND INJURIES 2000/01 – 39 INJURIES

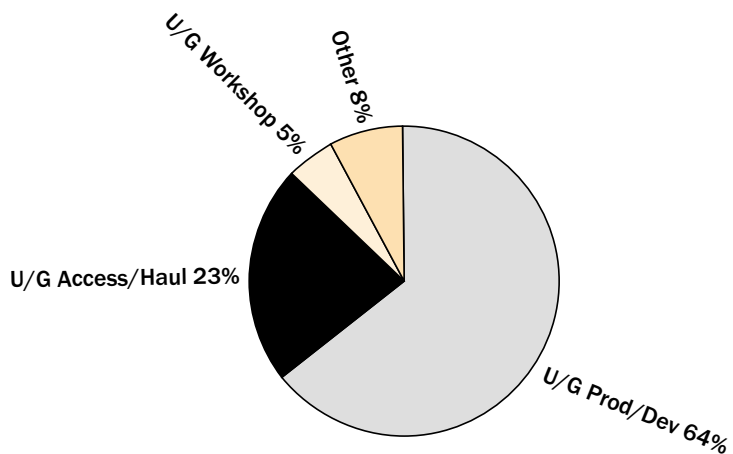
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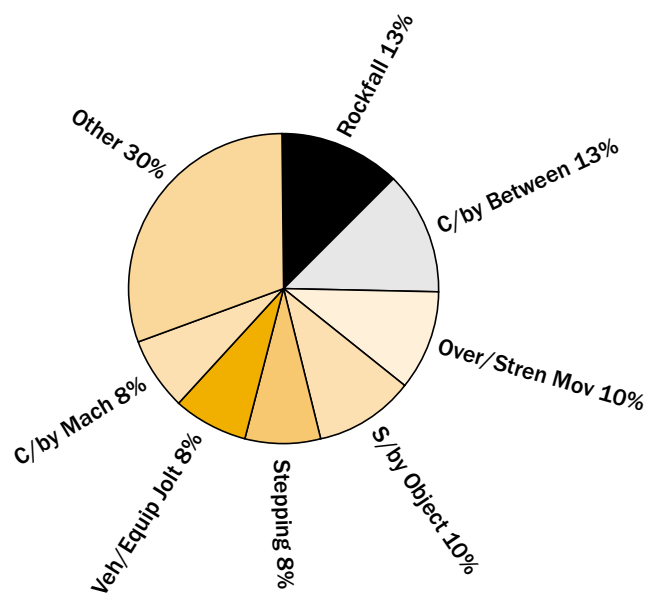
NATURE OF INJURY



LOCATION OF ACCIDENT



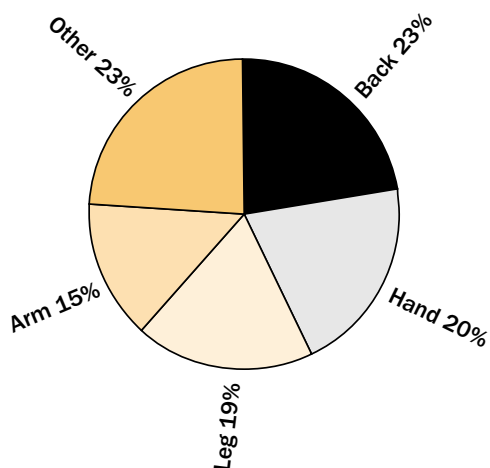
TYPE OF ACCIDENT



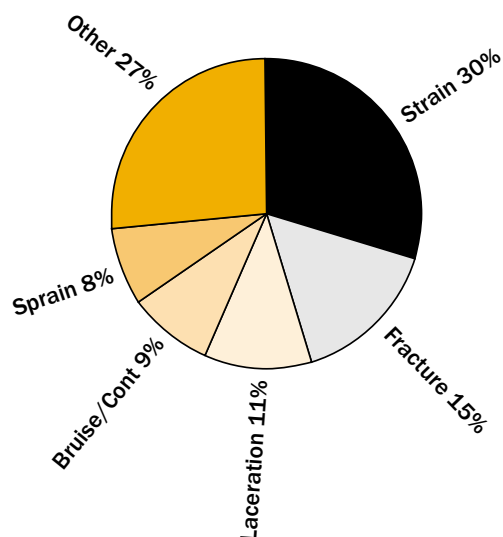
APPENDIX G

GOLD SURFACE INJURIES 2000/01 – 124 INJURIES

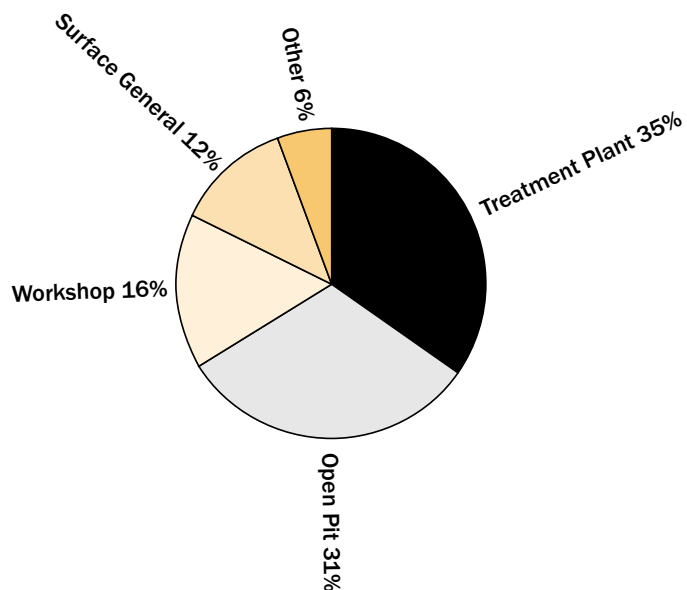
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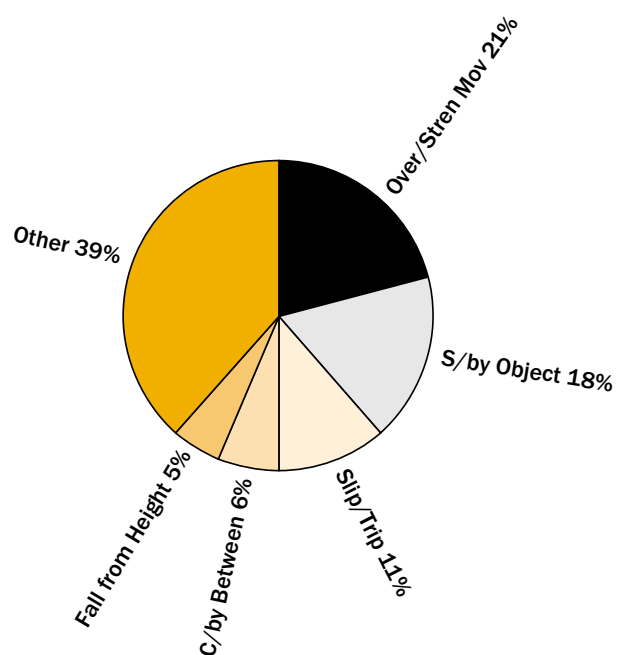
NATURE OF INJURY



LOCATION OF ACCIDENT



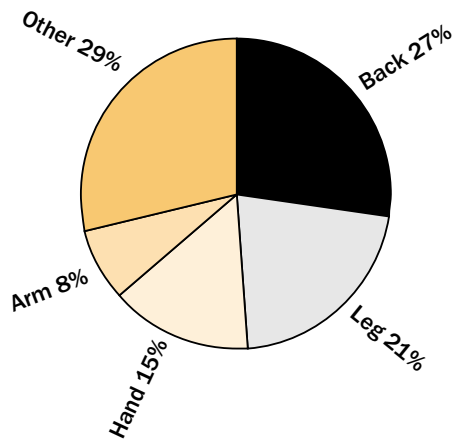
TYPE OF ACCIDENT



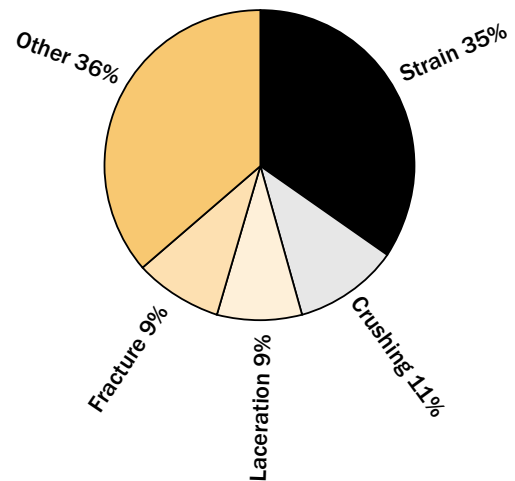
APPENDIX H

IRON ORE INJURIES 2000/01 – 66 INJURIES

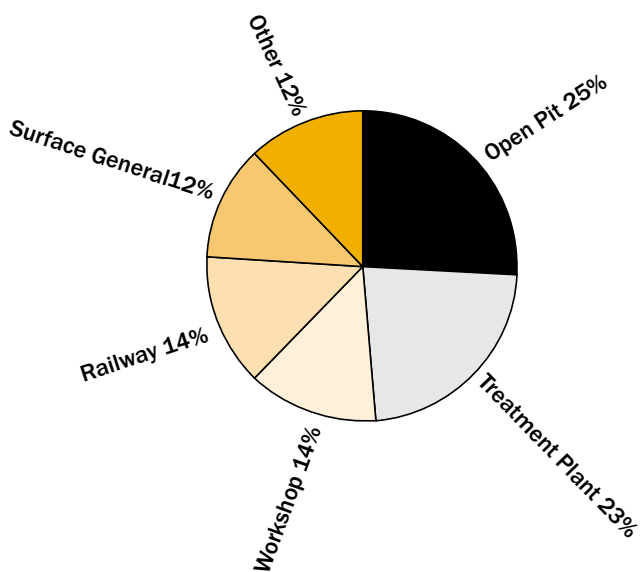
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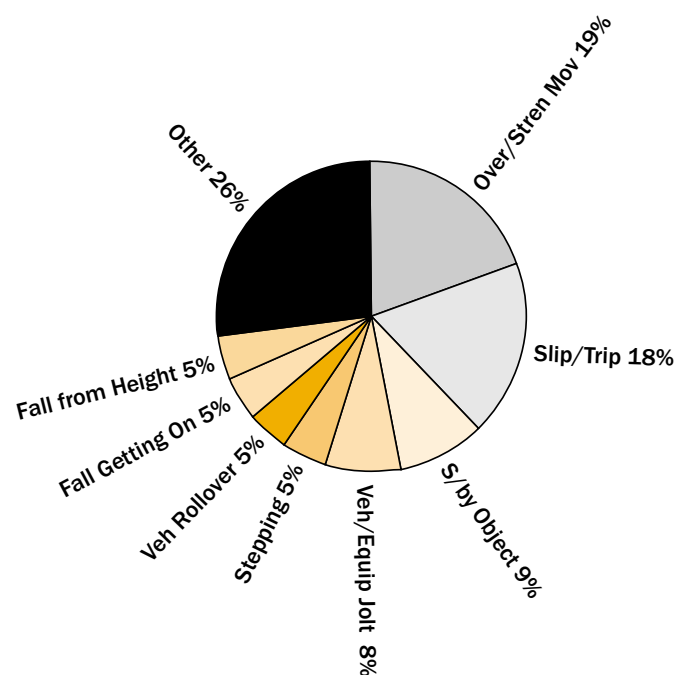
NATURE OF INJURY



LOCATION OF ACCIDENT



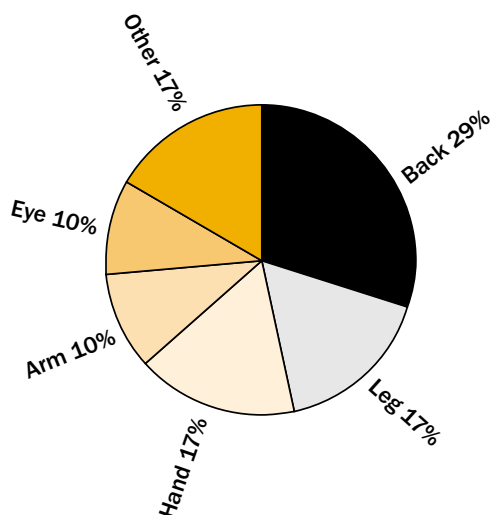
TYPE OF ACCIDENT



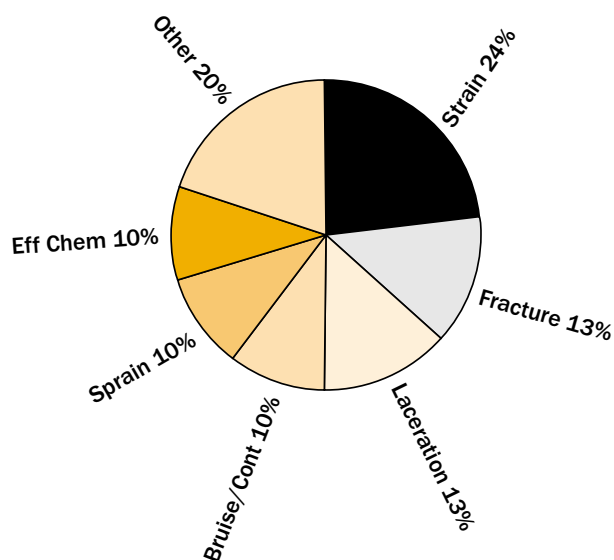
APPENDIX I

BAUXITE AND ALUMINA INJURIES 2000/01 – 30 INJURIES

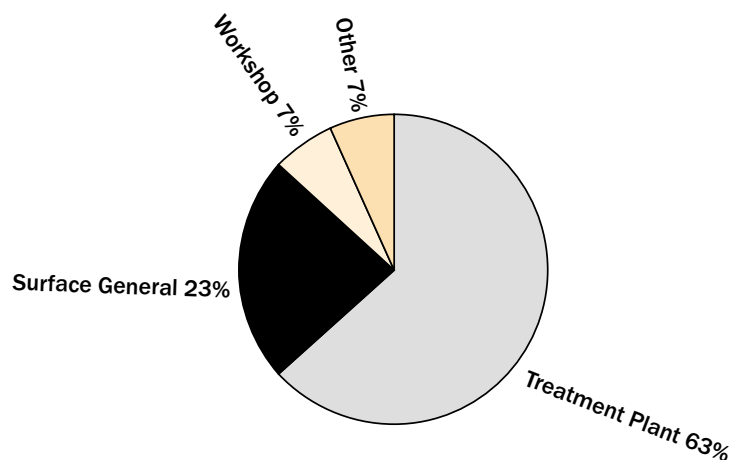
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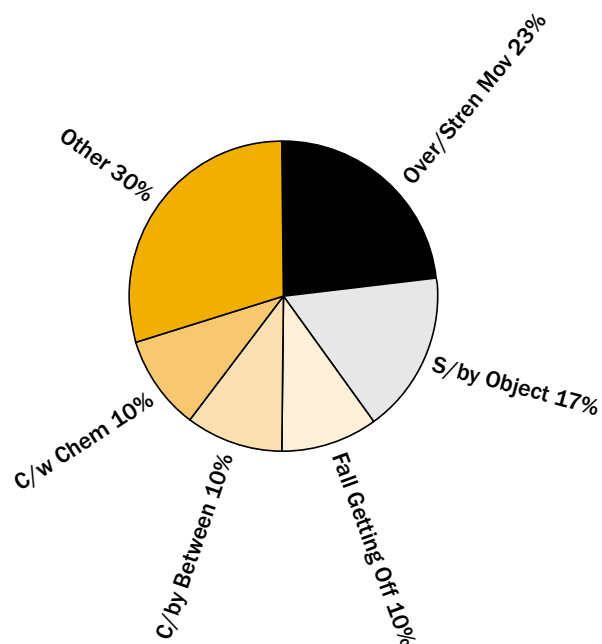
NATURE OF INJURY



LOCATION OF ACCIDENT



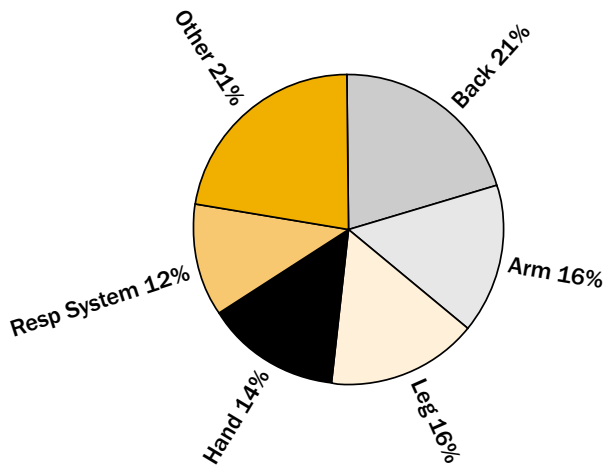
TYPE OF ACCIDENT



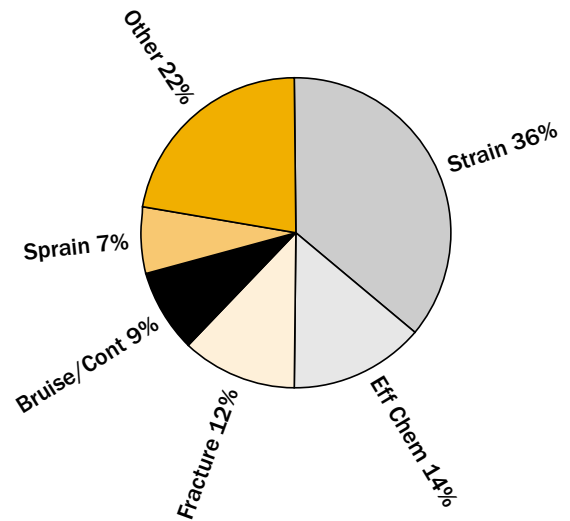
APPENDIX J

NICKEL INJURIES 2000/01 – 58 INJURIES

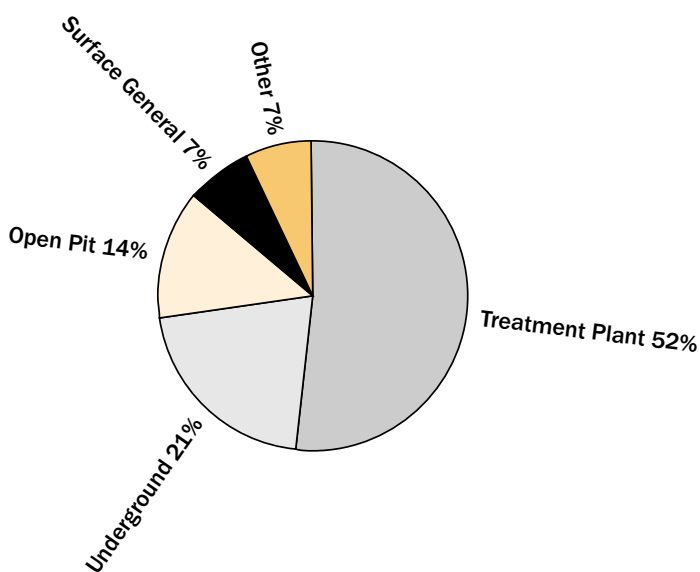
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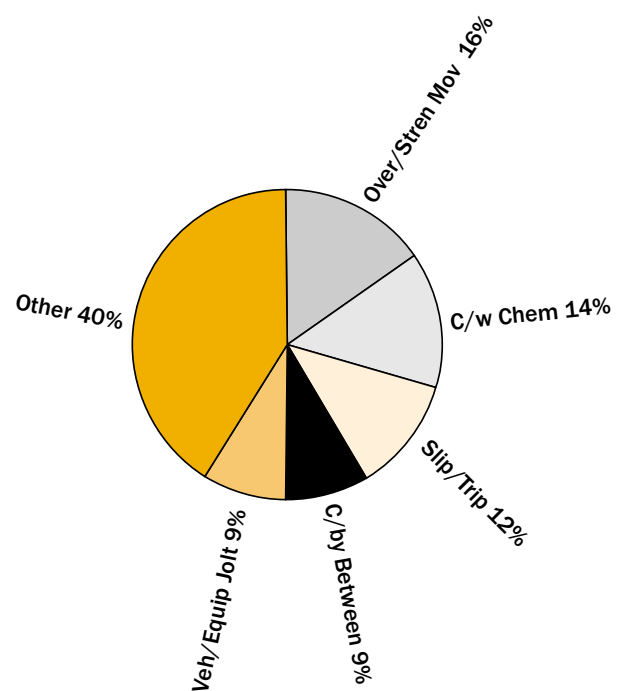
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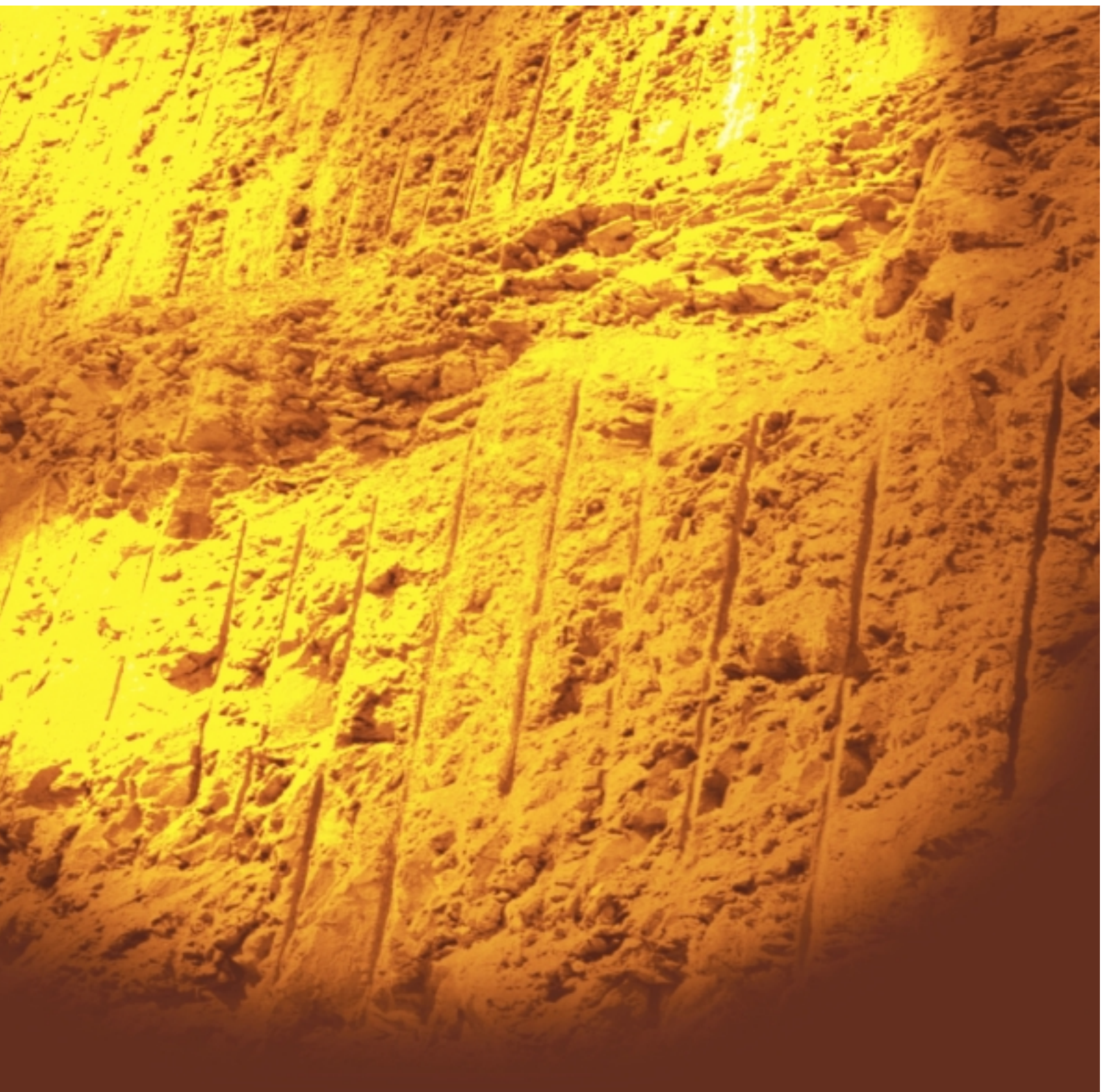


LOCATION OF ACCIDENT



TYPE OF ACCIDENT





Department of
Mineral and Petroleum Resources

Mining Operations Division

Mineral House
100 Plain Street
East Perth
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