



Safety Performance

in the Western Australian Mineral Industry

1998/99 Accident & injury statistics



DEPARTMENT OF
MINERALS AND ENERGY
WESTERN AUSTRALIA

"Our Resources • Our People • Our Future"

Safety Performance

in the Western Australian Mineral Industry 1998/99

Accident & injury statistics



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1998/99 has been a year of continued improvement in the safety performance of the Western Australian mining industry and the decade-long trend of continuous reduction in lost time injuries in the industry was maintained. The statistics that follow are derived from the Department's AXTAT system as of October 1999.

Over the ten year period 1989/90 to 1998/99 the lost-time injury frequency rate (lost time injuries per million hours worked) fell from 31.2 to 6.6. Although this performance is very creditable, there is scope for further improvement by a joint effort by employers and employees in the process of risk management.

Performance in both the underground and surface mining sectors improved during the year. Incidence and frequency of injuries decreased by 19 percent and 28 percent respectively in underground mining and by 19 percent and 18 percent respectively in the surface mining sector.

Total serious injuries fell from 289 in 1997/98 to 258 in 1998/99 and the number of minor injuries fell from 437 to 329 for the same period. The total decrease in injuries represented a 19 percent improvement on last year. The number of employees in the mining industry fell by less than one percent to 43,219.

There were three fatal accidents during the year – one in the underground gold sector, one in the underground nickel sector and one road-rail crossing traffic accident in the iron ore 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 carried out an industry survey to assess the understanding by those with safety responsibilities of the services provided by the Mining Operations Division and the effectiveness of service delivery. Views were also sought on the suitability and effectiveness of the current legislation. The results of the survey, which have been published, will assist the Department in effecting improvements in these areas.

The Department continued its program of change in emphasis of activities towards a degree of industry self-regulation whilst maintaining a high inspectorate profile underpinned by a move towards audits and risk management. It conducted 34 management safety system audits, 196 high impact function audits, 99 occupational safety and health audits and 2162 inspections during the year.

Audits and inspections by the Department have shown that a very high level of effort has been applied by the underground mining sector to achieving compliance with the geotechnical requirements in the legislation (Regulation 10.28). A marked reduction in incidence of injuries from rockfalls has been noted.

The Department also continued to play an important role in providing education, training support and information to the mining industry; 109 joint initiatives involving workshops, seminars and conferences on safety and health were held during the year and a range of publications was made available.

In summary, data reported to the AXTAT system for the 1998/99 financial year and analysed in October 1999 indicates an encouraging trend in improved safety performance in the Western Australian mining industry. However, it is recognised that the Industry's treatment of injured employees has changed over the years to a role of active assistance in rehabilitation. This is often achieved by allowing an employee who is not seriously injured to continue attending the workplace and carrying out lighter duties. 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 no "lost time" results in the injury not being reported to the AXTAT database. In consequence the Department, together with MOSHAB, is exploring the practicability of recording all injuries, regardless of "lost time", as part of the existing reporting procedure.

SUMMARY

STATISTICAL SUMMARY

- There were three fatal accidents during 1998/99; one in a surface metalliferous mine and two in underground metalliferous mines.
- There were 587 lost time injuries during 1998/99, 19 percent less than for the previous year (726 injuries in 1997/98) for a total workforce of 43,219.
- The overall injury frequency rate for 1998/99 was 6.6. This shows a 19 percent improvement on the 1997/98 figure which was 8.1.
- The overall duration rate of average work days lost per injury decreased from 16.5 to 15.5 during 1998/99.
- Injury Index improved by 23 percent during 1998/99 (down from 133 to 102).
- Serious injuries in the mineral industry during 1998/99 totalled 258, which is 31 less than for 1997/98.
- During 1998/99 the overall serious injury frequency rate decreased from 3.2 to 2.9.
- The bauxite and alumina sector had the lowest frequency rate at 2.4 during 1998/99.
- The gold sector frequency rate improved by 16 percent during 1998/99, decreasing from 9.4 to 7.9.
- The iron ore sector frequency rate improved by 11 percent during 1998/99 from 7.5 to 6.7.
- The nickel sector frequency rate improved during 1998/99, falling from 5.6 to 4.8, representing a 14 percent fall.

EXPLANATORY NOTES

EXPLANATORY NOTES

Introduction

The statistics published in this report relate to accidents that occurred in 1998/99 and involved time lost from work of one day or more (lost time injuries) in the mineral industry 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 1998/99 has three components :

- i) *Initial Injuries* - days lost in 1998/99 from injuries that occurred in 1998/99.
- ii) *Recurrent Injuries* - days lost in 1998/99 through recurrences of injuries that occurred in 1998/99 and previous years.
- iii) *Carry Over Injuries* - days lost in 1998/99 by persons continuously off work from injuries which occurred before 1 July 1998.

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 petroleum 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 Minerals and Energy by mine managers, as are the number of persons employed (including contractor employees) and the hours worked during the month or period.

During the twelve months, on average, 173 mines or groups of mines reported to the AXTAT system. One hundred per cent of returns were received in 1998/99.

Journey Accidents

Injuries which occurred in journey accidents (to or from work) have not been included in calculations of incidence, frequency or duration rates.

Definitions

Lost Time Injury - a work injury which results in inability to work for at least one full day or shift any time after the day or shift on which the injury occurred.

Serious Injury - an injury which results in the injured person being 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 work-days 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.

Abbreviations

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

FATAL ACCIDENTS

Review of Fatal Accidents During 1998/99

There were three fatalities in the mining industry during the 1998/99 fiscal year, one in a surface metalliferous mine, and two in underground metalliferous mines.

- A rise miner was found unconscious at the bottom of a 'gig' rise in a bosun's chair which did not have a rope attached. It appears that he had been taking a drill steel up to the 'gig' which was set up at the face ready for drilling. The bosun's chair rope attachment failed, when the bosun's chair was approximately 1.2 metres below the bottom of the 'gig', which caused the bosun's chair to become detached from the hoist rope.
- An underground diesel operator was killed by a rockfall in a flat back cut and fill stope. He was one of three people present during the charging and tying in of blast holes. One of his co-workers was operating the controls of an integrated tool carrier fitted with a platform attachment while the other was standing in the charge up work platform charging holes in preparation for the blast. The deceased assisted by loading some holes whilst standing on the ground. During a movement of the integrated tool carrier a rockfall occurred trapping the deceased.
- A grader operator suffered fatal injuries when the grader he was driving was struck by a ballast regulator at a rail crossing. The operator of the ballast regulator saw the grader approach the rail crossing from the railway access road but the ballast regulator operator was unable to stop when it became apparent that the grader was not stopping at the STOP sign governing right of way on the level crossing.

Fatal Incidence by Mineral Mined 1994/95-1998/99

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 1994/95-1998/99

Figure 1

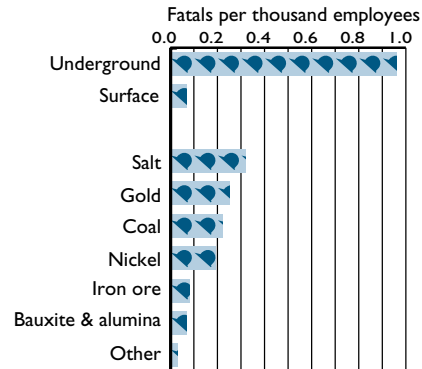


Figure 1 shows that underground mining has a much higher rate of fatal incidence than surface operations. This is reflected in the gold and nickel sectors where the majority of the State's underground mining occurs. The high incidence for the coal and salt sectors were the result of two fatal accidents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

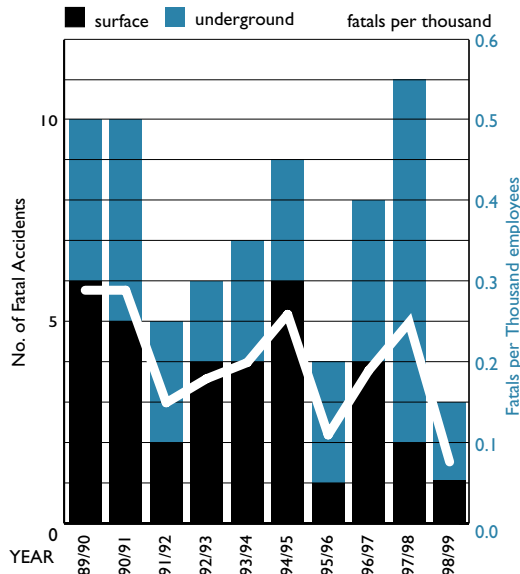
Fatal Incidence Rate 1989/90 - 1998/99

The fatal incidence rate for 1998/99 as indicated in Figure 2 was 0.07 (0.25 in 1997/98), a significant improvement but still a concern to the Department. While the overall trend continues to decline, there is a year-by-year scatter of incidence rates which is typical for fatalities.

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

Fatal Incidence Rate 1989/90-1998/99

Figure 2



Fatal Accidents by Type 1994/95 - 1998/99

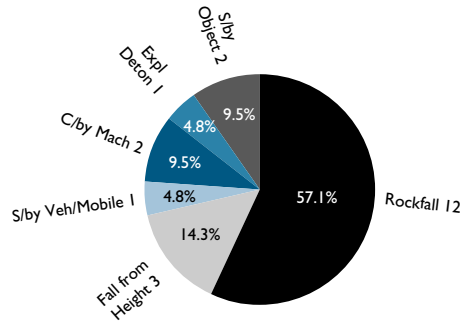
Figures 3 and 4 show the type of accidents (excluding exploration) for the 35 fatalities that occurred in the mining industry over the last five years. Of these fatalities, 21 occurred underground and 14 were in surface operations.

The most common type of underground fatal accident was rockfall which resulted in 12 fatalities (57.1%). 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 being struck by vehicles or mobile plant.

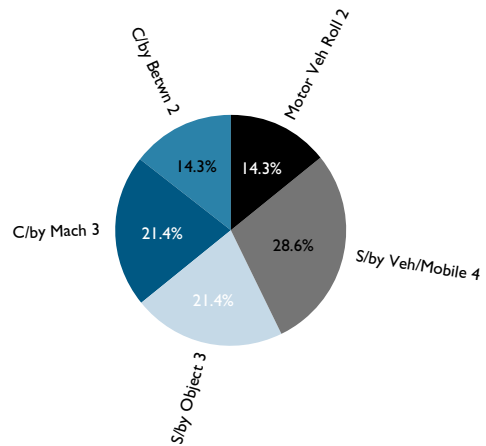
Underground Fatalities 1994/95-1998/99

Figure 3 Type of Accident



Surface Fatalities 1994/95-1998/99

Figure 4 Type of Accident



SERIOUS INJURIES

Review of Serious Injuries During 1998/99

There was a total of 258 serious injuries in the mining industry during the 1998/99 fiscal year (289 in 1997/98). Of these injuries, 248 occurred in metalliferous mines and 10 were in coal mines. Descriptions of some selected serious incidents that occurred during the year follow:

- A mill operator sustained crushed fingers while attempting to clear a blockage in a jaw crusher using a wedge. He tied the wedge to the handrail to support its weight and when the ore caught the wedge unexpectedly his fingers were caught between the rope and lip of the jaw crusher.
- A truck driver received a fractured ankle when struck by a 400 kg bundle of steel falling from his truck. Articles were being unloaded from the truck by forklift and the driver had moved to the opposite side of the truck.
- A truck driver sustained serious head injuries due to being thrown around in the cab when his truck mounted a windrow. The truck had been travelling down a slope when it skidded on a wet surface after a bend.
- A mill operator received burns to his lower body and legs when he was sprayed with hot water and carbon granules whilst opening an inspection hatch near the base of an elution column.
- A boilermaker suffered severe bruising to his back when he fell from a ladder. He had been attempting to free a portable welder which had caught on a handrail while he was carrying it down the ladder.
- A dogman's legs were crushed and fractured by a 1.7 tonne grizzly bar being lifted by a crane in the plant laydown area. After the beam had been slung the dogman turned to move a filter out of the way and the crane driver commenced to raise the load which swivelled and struck the dogman's legs.
- An airleg miner received abrasions to his neck and shoulders and a suspected broken back when he was struck by a slab of rock which fell from the backs while he was boring pin holes to hang a ventilation fan.
- A crusher operator had his finger amputated by an apron feeder. He had been removing spillage next to the head pulley and had lifted the dust skirting from the pulley to gain access to the area while the apron feeder was running.
- An underground miner received severe lacerations to his left side and back of his knee, and multiple fractures of his leg and foot when struck by a rock while charging a hung up stope. He was standing at the bottom of the rill under the meshed area of the brow when the rock came down the rill.
- A driller's offsider sustained a broken arm when the knife splitter of a cyclone partially closed on his arm while he was unblocking the cyclone of a RC drill rig. The driller had noticed dust coming from the top of the cyclone and in his attempt to operate the water injection lever he inadvertently operated the knife splitter lever.
- A mechanical foreman suffered a displaced fracture of his ankle and leg while getting off an excavator when he slipped, overbalanced and fell to the ground.
- A hydraulic fitter had his arm amputated when it became caught and severed by the line mechanism and other working parts of a crane while he was checking hydraulic lines on the cable reel section.
- A tyre fitter broke both bones in his lower leg when a tyre fell onto his leg. A new drill jumbo tyre was on a forklift ready to be fitted when the fitter noticed an oil leak on the forklift. He was attempting to repair the leak when the forklift crept forward tipping the tyre onto his leg.
- A crusher operator sustained a broken back when he fell backwards from a work platform 3.7 metres above the ground while he was tightening screen decking bolts.
- An electrician climbing down an extension ladder which had slipped while resting against an unsecured cable tray fractured his wrist and dislocated his shoulder when he lost his footing and fell.
- A process operator in a refinery received caustic burns to his trunk and limbs when he was sprayed with hot caustic solution. He was fixing a leaking flange in a filter tank rundown line in preparation for the tank being brought on line and had just loosened the flange bolts.
- A boilermaker suffered ligament damage and a fitter broke his ribs and bruised his sternum when they both fell through holes left in the floor of the third level of a treatment plant while attempting to remove a length of pipe from behind barriers.
- A diesel mechanic twisted and badly damaged his knee while climbing down from a crane after checking the window washer.

Serious Injury Incidence Rate by Mineral Mined 1994/95 - 1998/99

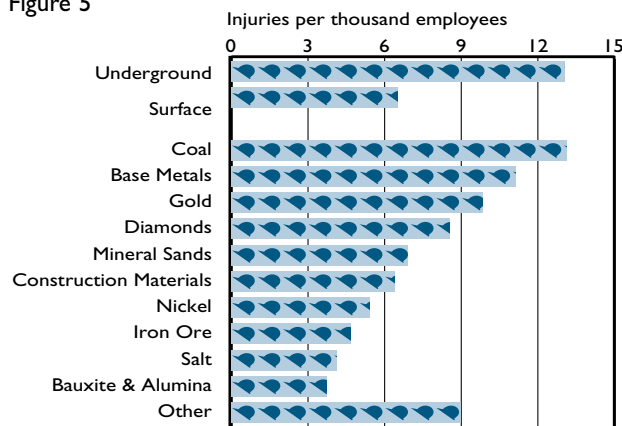
Figure 5 is a chart of incidence rates for serious injuries by mineral mined for the past five years. At the top of the chart the same information, grouped for all surface and underground mines, is provided.

The chart shows that underground mining has over twice the number of employees seriously injured per 1000 employees compared to surface mining.

The coal sector had the worst serious incidence rate.

Serious Injury Incidence Rate 1994/95-1998/99

Figure 5

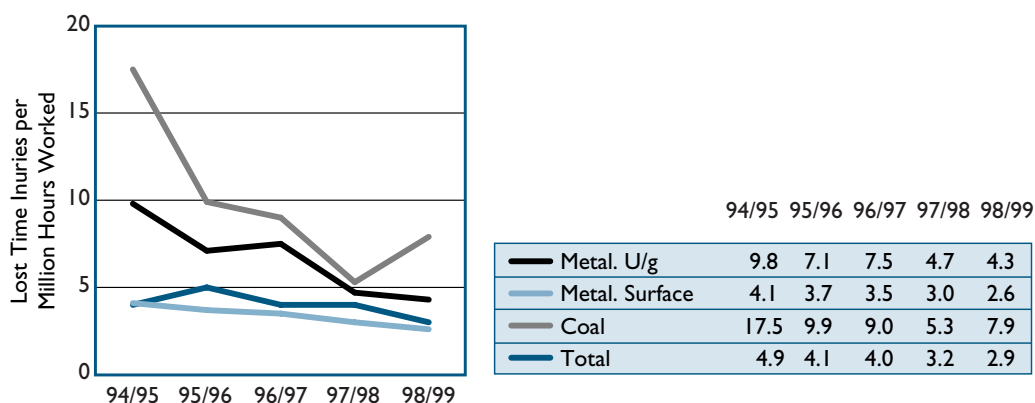


Serious Injury Frequency Rate 1994/95 - 1998/99

Figure 6 shows that, in underground and surface metalliferous operations, the serious injury frequency rate improved during 1998/99. However the coal sector serious injury frequency rate worsened by 49 percent, from 5.3 up to 7.9.

Serious Injury Frequency Rate 1994/95-1998/99

Figure 6



Serious Injury Percentage Breakdown for 1998/99

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, backs and hands accounted for 28, 25 and 20 percent of serious injuries, respectively.
- ▼ Strain was the most common injury at 25 percent followed by fractures at 23 percent and crushing at 17 percent.
- ▼ Underground production and development areas experienced the majority of serious injuries (55 percent).
- ▼ The most common types of serious injuries underground were struck by objects (23 percent), over exertion and strenuous movements (15 percent), rockfalls (13 percent) and slip/trips (10 percent).

Surface

- ▼ Injuries to backs, legs, and hands accounted for 26, 25, and 16 percent of serious injuries, respectively.
- ▼ Consistent with the high proportion of back injuries, strains represented the highest proportion by nature (35 percent). Fractures and sprains accounted for 18 and 10 percent, respectively.
- ▼ The majority of surface serious injuries occurred in treatment plants (41 percent) and open pits (24 percent) followed by workshops (15 percent).
- ▼ The most common types of serious injuries in surface operations were over exertion and strenuous movements (27 percent), struck by objects (12 percent), slip/trips (12 percent), and caught by or between moving objects (9 percent).

LOST TIME INJURIES

Review of Lost Time Injuries During 1998/99

In 1998/99, 18,347 days were lost through occupational injuries on mines in the State. This figure is made up of the number of days lost from injuries in 1998/99 (9,096), the number of days lost from recurrences of injuries which occurred before 1998/99 and in 1998/99 (1,345) and from lost time injuries which carried over into 1998/99 from accidents which occurred prior to July 1998 (7,906). A breakdown of work days lost in coal and metalliferous mining is given in Table 1.

During the 1998/99 fiscal year there were 587 lost time injuries in the State's mining industry, 550 in metalliferous mines and 37 in coal mines. A breakdown together with performance indicators is given in tables 2 and 3.

Eighty-four persons who were injured before July 1998 lost time in 1998/99 amounting to 7,906 work days. A breakdown of these injuries is given in Table 4.

In addition to the initial injuries there were 22 recurrences of previous injuries resulting in 1,345 work days lost during 1998/99. A breakdown of recurrent injuries by year of initial injury is given in Table 5.

Table 1. Time Lost Through Injury During 1998/99

	Days Lost			TOTAL
	Initial Injuries	Recurrent Injuries	Carry Over Injuries	
Metalliferous Mining	8,754	1,326	7,743	17,823
Coal Mining	342	19	163	524
TOTAL	9,096	1,345	7,906	18,347

Table 2. Initial Lost Time Injuries During 1998/99

Mines	No of Employees	No of LTIs	Incidence	Frequency	Duration	Injury Index	Days Lost
Metalliferous Surface	38,508	487	13	6.2	14.9	92	7,271
Metalliferous U/Ground	3,808	63	17	6.8	23.5	161	1,483
Metalliferous Total	42,316	550	13	6.2	15.9	99	8,754
Coal Total	903	37	41	29.4	9.2	271	342
TOTAL MINING	43,219	587	14	6.6	15.5	102	9,096

Table 3. Injuries by Mineral Mined During 1998/99

Mineral Mined	No of Employees	No of LTIs	Incidence	Frequency	Duration	Injury Index	Days Lost
Gold	12,783	233	18	7.9	18.4	144	4,278
Iron Ore	9,204	104	11	6.7	9.8	66	1,022
Bauxite and Alumina	6,961	35	5	2.4	19.8	47	694
Nickel	6,286	66	10	4.8	14.8	72	975
Mineral Sands	2,507	34	14	7.0	14.7	104	501
Base Metals	1,175	15	13	5.5	34.3	189	514
Coal	903	37	41	29.4	9.2	271	342
Diamonds	897	18	20	8.3	13.1	108	236
Salt	673	6	9	4.5	1.7	8	10
Construction Materials	346	2	6	3.2	11.5	37	23
Other	1,484	37	25	12.4	13.5	168	501
TOTAL	43,219	587	14	6.6	15.5	102	9,096

NOTE: Duration in tables 2 and 3 does not take into consideration time lost after 30 June 1999 by persons still off work at the end of the fiscal year, or time lost by persons with carry over injuries from before July 1998, or for time lost from recurrent injuries.

Table 4. Carry Over Injuries During 1998/99

Year	Metalliferous Mining		Coal Mining	
	Number of Injuries	Number of Days Lost	Number of Injuries	Number of Days Lost
1998	53	3,688	1	30
1997	22	2,838	1	133
1996	6	1,098	–	–
1994	1	119	–	–
TOTAL	82	7,743	2	163

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

Table 5. Recurrent Injuries During 1998/99

Year	Metalliferous Mining		Coal Mining	
	Number of Injuries	Number of Days Lost	Number of Injuries	Number of Days Lost
1999	3	21	–	–
1998	6	765	–	–
1997	7	450	1	19
1996	4	70	–	–
1994	1	20	–	–
TOTAL	21	1,326	1	19

Review of Lost Time Injuries During 1998/99 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 employees, 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 1998/99 (AS1885.1-1990)

Mines	No of Employees	No of LTIs	Injuries per Hundred	Frequency	Duration	Days Lost
Metalliferous Surface	38,508	488	1.3	6.2	15.4	7,491
Metalliferous U/ground	3,808	65	1.7	7.0	29.6	1,923
Metalliferous Total	42,316	553	1.3	6.3	17.0	9,414
Coal Total	903	37	4.1	29.4	9.2	342
TOTAL	43,219	590	1.4	6.6	16.5	9,756

NOTE : Duration in this table does not take into consideration time lost after 30 June 1999 by persons still off work at the end of the fiscal year, or time lost by persons with carry over injuries from before July 1998, or for time lost from recurrent injuries.

Table 7. Injuries by Mineral Mined During 1998/99 (AS1885.1-1990)

Mineral Mined	No of Employees	No of LTIs	Injuries per Hundred	Frequency	Duration	Days Lost
Gold	12,783	234	1.8	7.9	19.2	4,498
Iron Ore	9,204	105	1.1	6.7	11.8	1,242
Bauxite and Alumina	6,961	35	0.5	2.4	19.8	694
Nickel	6,286	67	1.1	4.9	17.8	1,195
Mineral Sands	2,507	34	1.4	7.0	14.7	501
Base Metals	1,175	15	1.3	5.5	34.3	514
Coal	903	37	4.1	29.4	9.2	342
Diamonds	897	18	2.0	8.3	13.1	236
Salt	673	6	0.9	4.5	1.7	10
Construction Material	346	2	0.6	3.2	11.5	23
Other	1,484	37	2.5	12.4	13.5	501
TOTAL	43,219	590	1.4	6.6	16.5	9,756

INJURIES BY COMMODITY

METALLIFEROUS PERFORMANCE INDICATORS

The performance indicators for the metalliferous mining sector show a general improvement during 1998/99. Figures 7 to 10 are charts depicting the performance indicators, incidence, frequency, duration and injury index (see explanatory notes for definitions) for the last five years.

Some interesting features of these performance indicators during 1998/99 include the following:

- ▼ Both the surface and underground incidence rates improved during 1998/99 resulting in an overall 19 percent improvement on 1997/98 (falling from 16 to 13).
- ▼ Similarly, the overall frequency rate showed an improvement falling from 7.7 to 6.2 representing a 19 percent improvement.
- ▼ A rise in the duration rate for underground operations, (18 percent) was evident. The overall duration rate is currently 15.9, a slight (less than 1 percent) decrease on 1997/98.
- ▼ The fall in duration rate and in frequency rate has resulted in a significant decrease in the overall injury index, improving by 23 percent (down from 129 to 99).

Metalliferous Injury Percentage Breakdown for 1998/99

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 at 24 percent for both underground and surface operations.
- ▼ Hand injuries accounted for the second largest proportion of injuries underground at 22 percent. This was followed by legs at 21 percent (including 8 percent knee injuries).
- ▼ Leg injuries accounted for the second largest proportion for surface operations at 21 percent (including 9 percent knee injuries) followed by hand injuries at 18 percent.

Injuries by Nature

- ▼ Strains accounted for the majority of injuries for both underground and surface operations at 32 and 33 percent respectively.
- ▼ For underground operations the second highest ranking nature of injury was fractures at 17 percent, bruise/contusions and crushing both at 11 percent.
- ▼ For surface operations the second highest ranking nature of injury was also fractures at 13 percent followed by sprains at 10 percent.

Injuries by Location

- ▼ For underground operations most injuries occurred in production and development areas at 57 percent.
- ▼ The majority of injuries for surface operations occurred in treatment plants at 41 percent and open pits 19 percent.

Injuries by Type

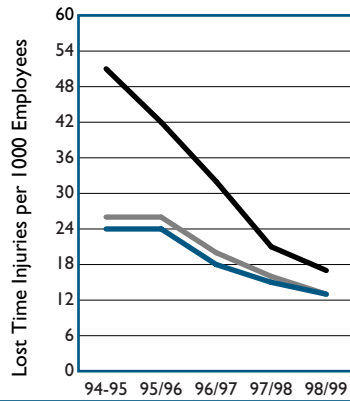
- ▼ Over exertion and strenuous movements were the major cause of underground injuries at 22 percent followed by struck by objects at 17 percent. Injuries caused by rockfalls fell to 10 percent.
- ▼ For surface operations 25 percent of injuries were classified as over exertion and strenuous movements followed by slip/trips and struck by objects both at 12 percent.

INJURIES BY COMMODITY

Metalliferous Performance Indicators 1994/95-1998/99

Incidence Rate

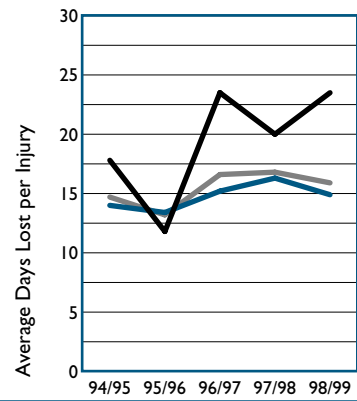
Figure 7



Underground	51	42	32	21	17
Surface	24	24	18	15	13
Total	26	26	20	16	13

Duration Rate

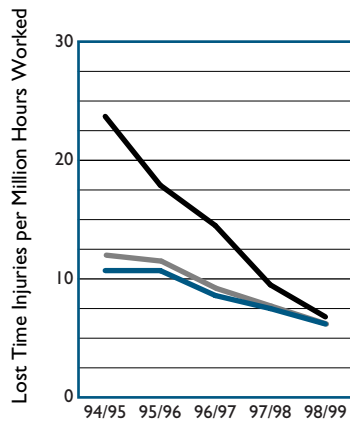
Figure 9



Underground	17.8	11.8	23.5	20.0	23.5
Surface	14.0	13.4	15.2	16.3	14.9
Total	14.7	13.2	16.6	16.8	15.9

Frequency Rate

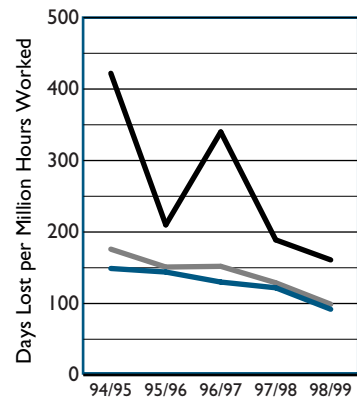
Figure 8



Underground	23.7	17.9	14.5	9.5	6.8
Surface	10.7	10.7	8.6	7.5	6.2
Total	12.0	11.5	9.2	7.7	6.2

Injury Index

Figure 10



Underground	422	210	340	189	161
Surface	149	144	130	122	92
Total	176	151	152	129	99

GOLD PERFORMANCE INDICATORS

The performance indicators for the gold mining sector show a general improvement during 1998/99. Figures 11 to 14 are charts depicting the performance indicators, incidence, frequency, duration and injury index.

Some interesting features of the performance indicators during 1998/99 for the gold mining sector include the following:

- ▼ The overall incidence rate improved by 18 percent, dropping from 22 to 18. The surface sector showed the greatest improvement dropping 22 percent (from 23 to 18).
- ▼ A similar trend was noted for the frequency rate for both underground and surface sectors. The overall frequency rate improved by 16 percent, currently at 7.9.
- ▼ A rise in the duration rate for underground operations, by 8 percent was evident. The overall duration rate is currently 18.4 representing a 16 percent improvement on 1997/98.
- ▼ The fall in duration rate and frequency rate has resulted in a significant decrease in the injury index, falling by 30 percent (from 205 to 144).

Gold Injury Percentage Breakdown for 1998/99

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 27 percent, while back injuries accounted for the largest proportion for the surface sector at 25 percent.
- ▼ Leg injuries accounted for the next largest group of injuries for underground at 24 percent followed by backs at 18 percent.
- ▼ For the surface sector, leg injuries and hand injuries accounted for the next largest both at 21 percent.

Injuries by Nature

- ▼ Strains accounted for the majority of injuries for both underground and surface operations at 31 and 34 percent respectively.
- ▼ For the underground sector the second highest ranking nature of injury was fractures at 22 percent followed by crushing at 11 percent.
- ▼ For the surface sector the second highest ranking nature of injury was fractures at 17 percent followed by sprains at 10 percent.

Injuries by Location

- ▼ For underground operations most injuries occurred in production and development areas at 56 percent followed by access and haulage ways at 18 percent.
- ▼ The majority of injuries occurred in treatment plants for the surface sector at 31 percent, followed by open pit areas at 30 percent.

Injuries by Type

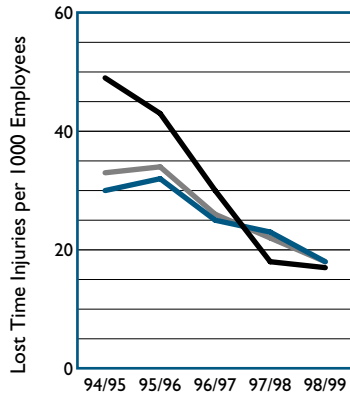
- ▼ Being struck by objects was the major cause of underground injuries at 22 percent followed by over exertion and strenuous movements at 20 percent and rockfalls at 9 percent.
- ▼ For surface operations 22 percent of injuries were classified as over exertion and strenuous movements followed by falls and struck by objects at 12 percent and slip/trips at 11 percent.

INJURIES BY COMMODITY

Gold Performance Indicators 1994/95-1998/99

Incidence Rate

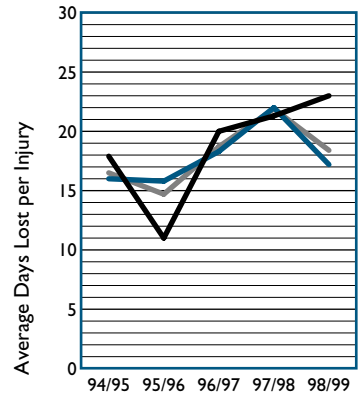
Figure 11



Underground	49	43	30	18	17
Surface	30	32	25	23	18
Total	33	34	26	22	18

Duration Rate

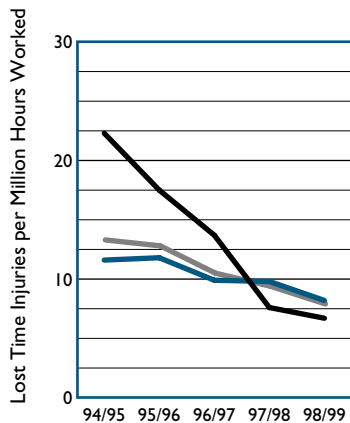
Figure 13



Underground	17.9	11.0	20.0	21.3	23.0
Surface	16.0	15.8	18.3	22.0	17.2
Total	16.5	14.7	18.7	21.9	18.4

Frequency Rate

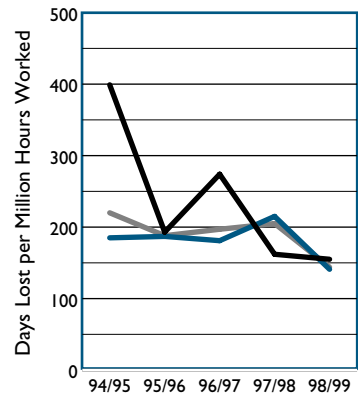
Figure 12



Underground	22.3	17.5	13.7	7.6	6.7
Surface	11.6	11.8	9.9	9.8	8.2
Total	13.3	12.8	10.5	9.4	7.9

Injury Index

Figure 14



Underground	399	193	274	162	155
Surface	185	187	181	215	141
Total	220	188	197	205	144

IRON ORE PERFORMANCE INDICATORS

The performance indicators for iron ore mining show mixed results during 1998/99. Figures 15 to 18 are charts depicting the performance indicators, incidence, frequency, duration and injury index.

Some interesting features of the iron ore performance indicators during 1998/99 include the following:

- ▼ The incidence rate at 11 represents a 15 percent improvement on 1997/98.
- ▼ The frequency rate improved by 11 percent, currently at 6.7.
- ▼ There was a rise in the duration rate now recorded as 9.8. This represents a 21 percent increase but is still low compared to the other major commodity groups.
- ▼ The rise in the duration rate has resulted in producing an overall rise in injury index (up from 61 to 66, 8 percent).

Iron Ore Injury Percentage Breakdown for 1998/99

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 28 percent, 4 percent higher than the surface metalliferous average.
- ▼ Leg injuries accounted for the next largest proportion of injuries accounting for 18 percent, followed by hands and arms both at 15 percent.

Injuries by Nature

- ▼ Strains accounted for the majority of injuries at 37 percent.
- ▼ Sprains and burns accounted for the next highest proportions at 12 and 9 percent, respectively.

Injuries by Location

- ▼ The majority of injuries occurred in open pits which accounted for 23 percent.
- ▼ The next largest proportion occurred at treatment plants at 22 percent, (down from 36 percent in 1997/98) followed by workshops at 19 percent.

Injuries by Type

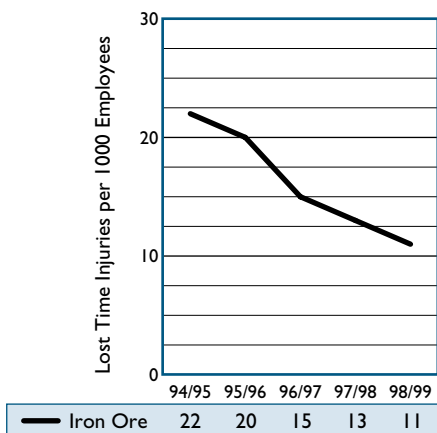
- ▼ Over exertion and strenuous movements continued to dominate as the major type of injury representing 34 percent.
- ▼ Slip/trips were the next highest type at 11 percent followed by caught by or between moving objects at 10 percent.

INJURIES BY COMMODITY

Iron Ore Performance Indicators 1994/95-1998/99

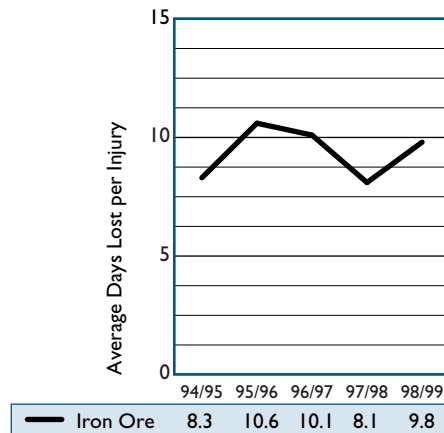
Incidence Rate

Figure 15



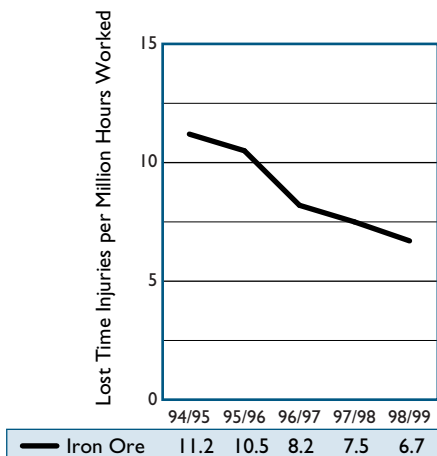
Duration Rate

Figure 17



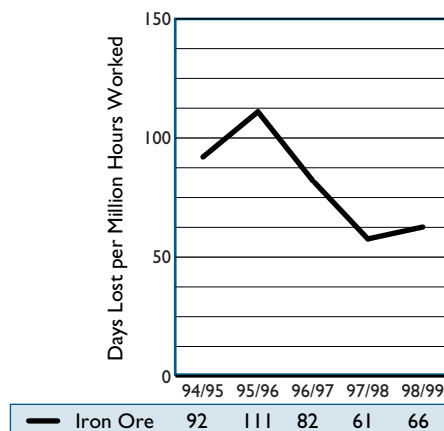
Frequency Rate

Figure 16



Injury Index

Figure 18



BAUXITE AND ALUMINA PERFORMANCE INDICATORS

There were mixed results in the performance indicators for bauxite and alumina mining during 1998/99. Figures 19 to 22 are charts depicting the performance indicators, incidence, frequency, duration and injury index.

Some interesting features of the bauxite and alumina performance indicators during 1998/99 include the following:

- ▼ The incidence rate fell significantly by 50 percent and at 5 remains the lowest incidence rate of all the major commodity groups.
- ▼ The frequency rate also improved by 50 percent falling to 2.4. Once again this is the lowest rate of all the major commodity groups.
- ▼ There was a significant rise in the duration rate now recorded as 19.8, representing a 98 percent increase.
- ▼ The large improvement in frequency rate was balanced by the large increase in duration rate resulting in a modest improvement to the injury index of only 2 percent down to 47.
- ▼ On all accounts 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 1998/99

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

- ▼ Hand injuries accounted for the largest proportion of injuries representing 23 percent.

- ▼ Leg and back injuries accounted for the next largest proportion of injuries representing 20 and 14 percent respectively.

Injuries by Nature

- ▼ Strains accounted for the majority of injuries at 26 percent, lower than the surface metalliferous average (33 percent).
- ▼ Fractures and bruise/contusions accounted for the next highest proportions at 17 percent and 14 percent.
- ▼ Effects of chemicals and sprains were the next highest both at 9 percent.

Injuries by Location

- ▼ The majority of injuries, 80 percent, occurred in treatment plants, followed by open pits, surface general and workshops all at 6 percent.

Injuries by Type

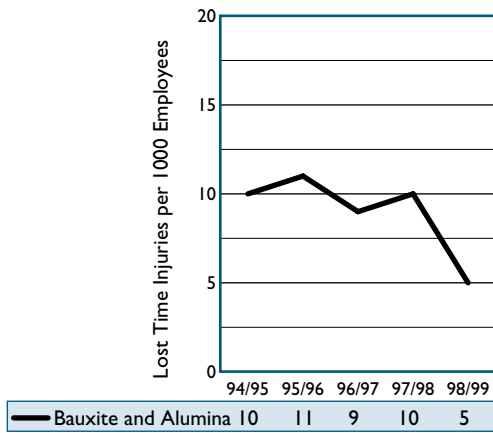
- ▼ Struck by objects was the most common type of injury representing 23 percent.
- ▼ Over exertion and strenuous movements and slip/trips were the next highest proportion both at 17 percent each.

INJURIES BY COMMODITY

Bauxite and Alumina Performance Indicators 1994/95-1998/99

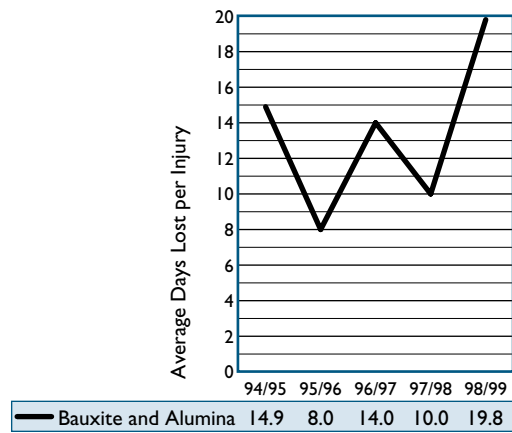
Incidence Rate

Figure 19



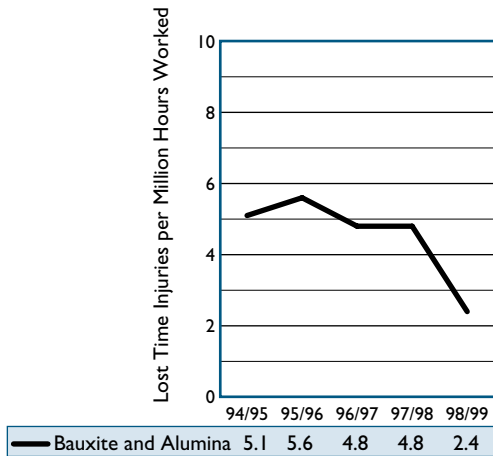
Duration Rate

Figure 21



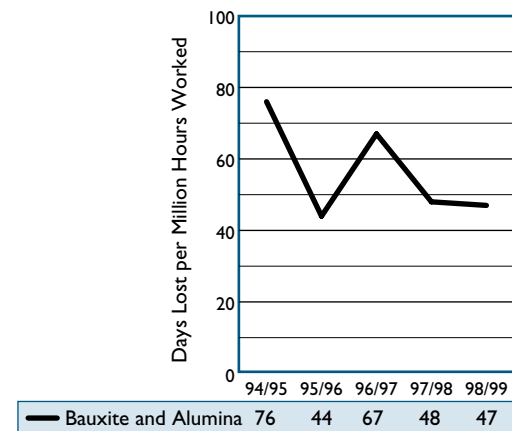
Frequency Rate

Figure 20



Injury Index

Figure 22



NICKEL PERFORMANCE INDICATORS

The nickel industry experienced a significant improvement in performance during 1998/99. Figures 23 to 26 are charts depicting the performance indicators incidence, frequency, duration and injury index.

Some interesting features of the nickel mining sector performance indicators during 1998/99 include the following:

- ▼ The incidence rate of 10, represents a 17 percent improvement on 1997/98.
- ▼ A similar trend was noted for the frequency rate which at 4.8 is 14 percent lower than 1997/98.
- ▼ The duration rate of 14.8 is 21 percent lower than 1997/98.
- ▼ The significant improvement in the frequency rate and duration rate resulted in a decline in injury index (from 105 to 72) which is equivalent to a 31 percent improvement.

Nickel Injury Percentage Breakdown for 1998/99

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

- ▼ Leg injuries accounted for the largest proportion of nickel mining injuries representing 23 percent.
- ▼ Back injuries accounted for the next largest proportion of injuries representing 21 percent, followed by arms and hands both at 12 percent.

Injuries by Nature

- ▼ Strains accounted for the majority of injuries at 27 percent.

- ▼ Effects of chemicals accounted for the next highest proportion at 14 percent followed by sprains and lacerations both at 9 percent.

Injuries by Location

- ▼ The majority of injuries occurred in treatment plants accounting for 59 percent.
- ▼ Underground injuries accounted for 15 percent.

Injuries by Type

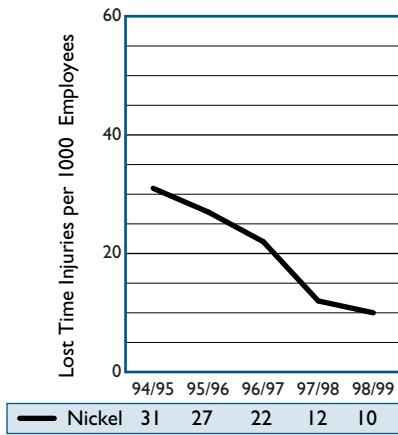
- ▼ Over exertion and strenuous movements continued to dominate as the major type of injury representing 24 percent.
- ▼ Contact with chemicals featured as the second most frequent type of injury (18 percent).
- ▼ Falls from height and slip/trips were the next highest proportion both at 9 percent.

INJURIES BY COMMODITY

Nickel Performance Indicators 1994/95-1998/99

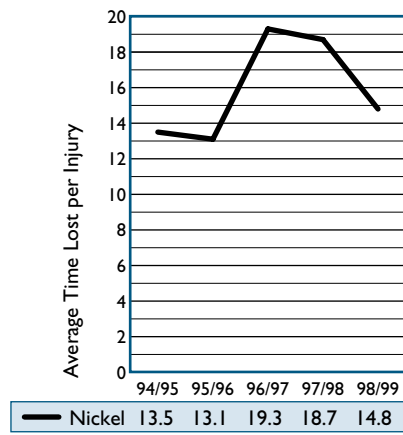
Incidence Rate

Figure 23



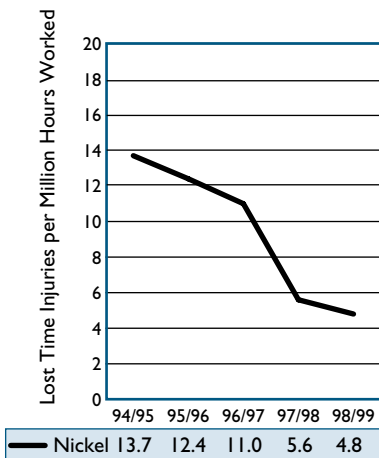
Duration Rate

Figure 25



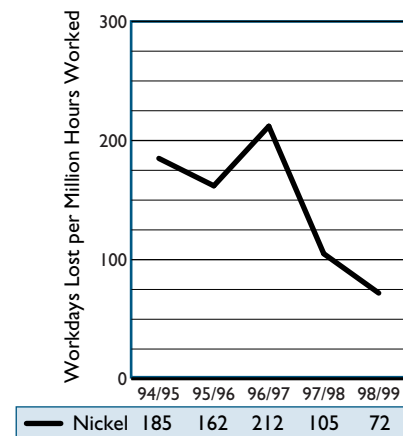
Frequency Rate

Figure 24



Injury Index

Figure 26



WORKERS' COMPENSATION PREMIUM RATES FOR THE WESTERN AUSTRALIAN MINING 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 27 indicates workers' compensation cost trends for some major mineral groups since 1987/88.

Most mineral groups have shown significant reductions in compensation costs since 1990/91. In particular, underground gold operations for the 1990/91 fiscal year incurred a cost equivalent to over 9 percent of payroll which has been reduced to 4.89 percent for 1999/00. This represents a 47 percent improvement in costs even though the overall average premium rate for the Western Australian mining industry for 1999/00 is currently 4.05 percent, a 27 percent increase on 1998/99 at (3.20 percent).

Figure 28 shows the current recommended premium rates for the 1999/00 fiscal year for a variety of mineral groups and other industries.

The poor safety performance in the coal industry, compared to other mining industry sectors, is reflected in the premium rates. The coal mining industry currently has a rate equivalent to 6.62 percent of payroll.

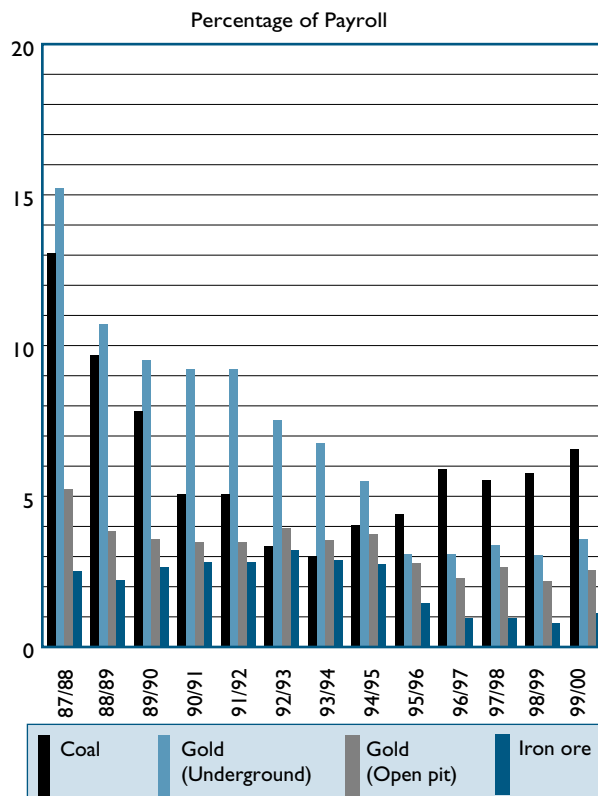
However, the rates for the mining industry groups compare favourably with other industry groups such as structural steel fabrication and clay brick manufacturing both of which have current premium rates of 11.11 and 11.31 percent of payroll, respectively.

The industry has continued the recent trend where even the traditionally higher risk mining sectors have lower premium rates than many manufacturing sectors.

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.

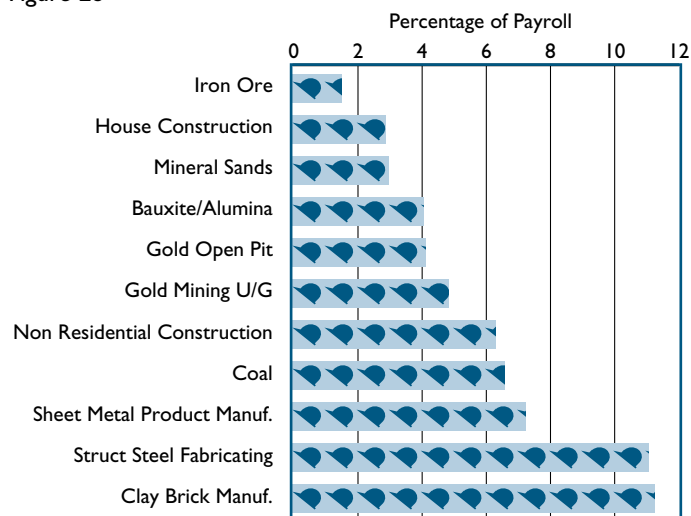
Western Australian Mines Workers Compensation Cost Trends

Figure 27



Western Australian Recommended Premium Rates 1999/2000

Figure 28



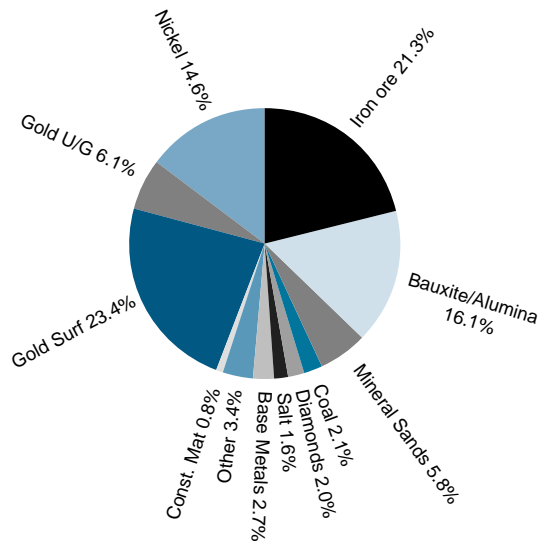
Source: Government Gazette 7 May 1999

APPENDIX A

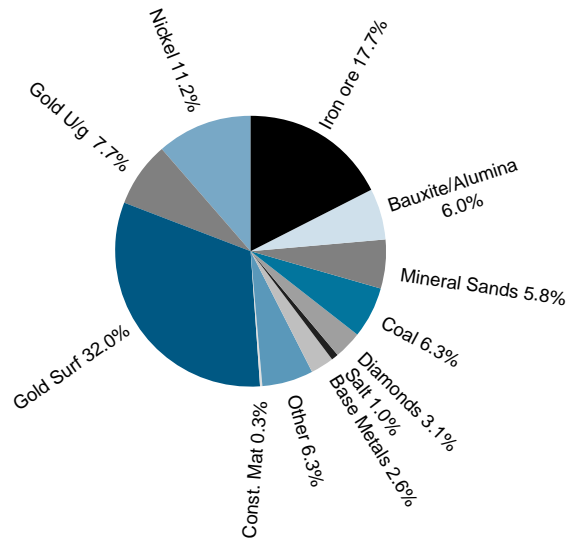
WESTERN AUSTRALIAN MINES 1998/99 FINANCIAL YEAR

587 INJURIES

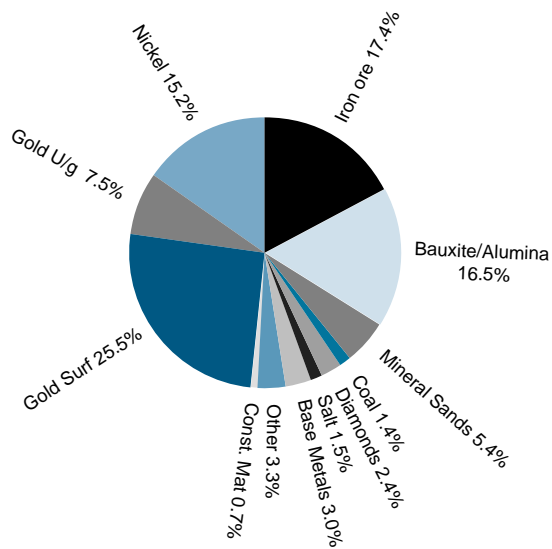
NUMBER OF EMPLOYEES



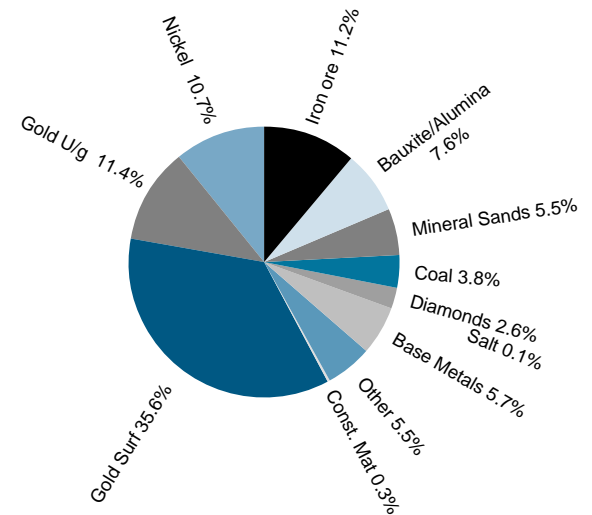
NUMBER OF INJURIES



MILLION HOURS WORKED



WORK DAYS LOST

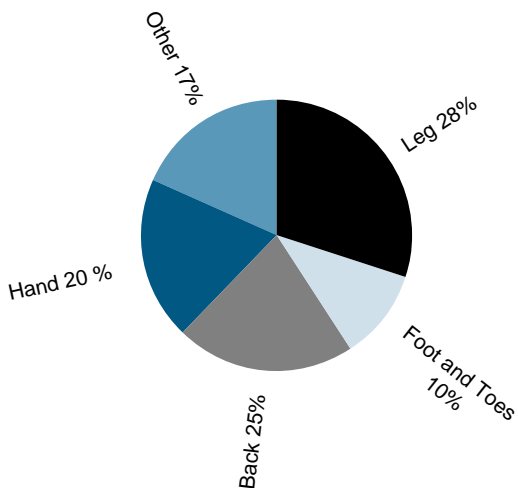


APPENDIX B

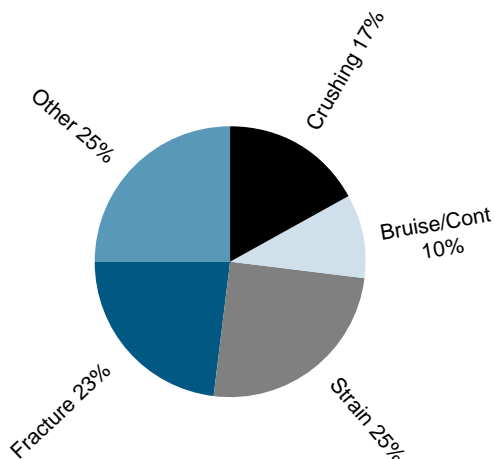
SERIOUS INJURIES UNDERGROUND 1998/99

40 INJURIES

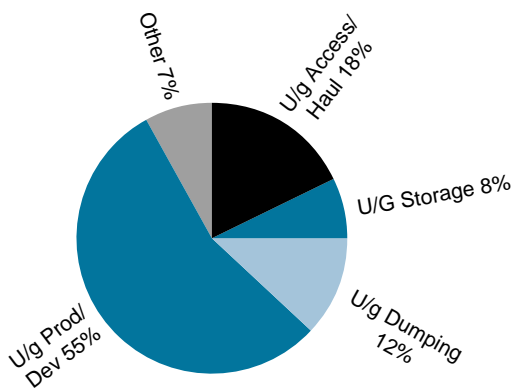
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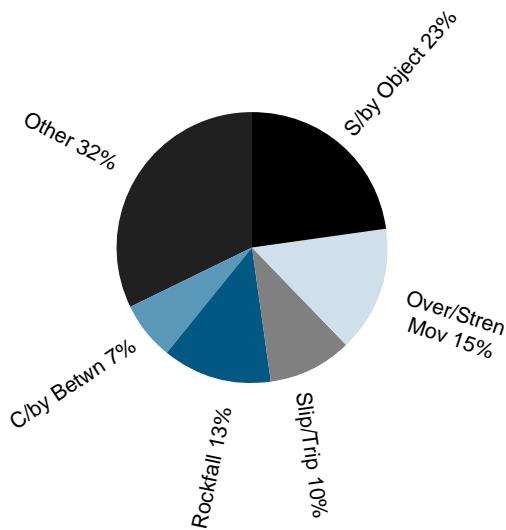
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

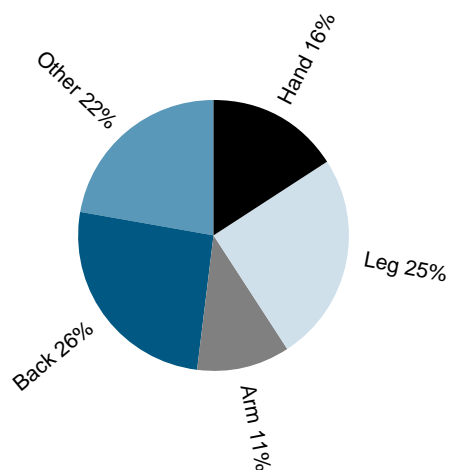


APPENDIX C

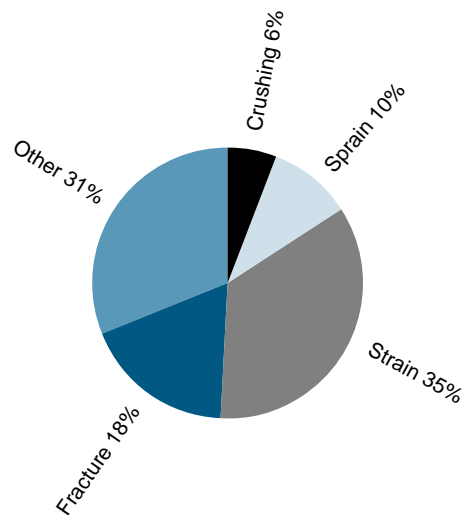
SERIOUS INJURIES SURFACE 1998/99

218 INJURIES

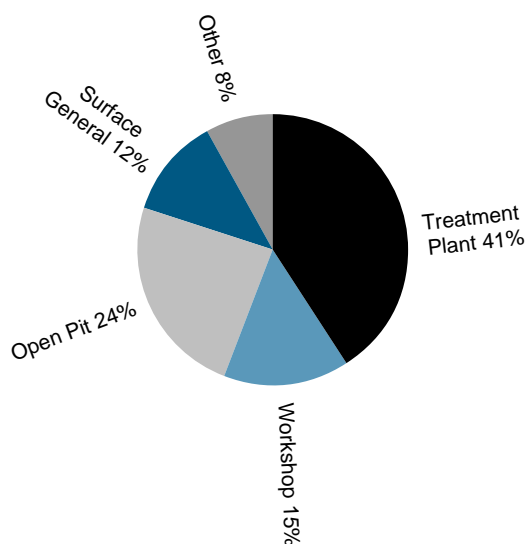
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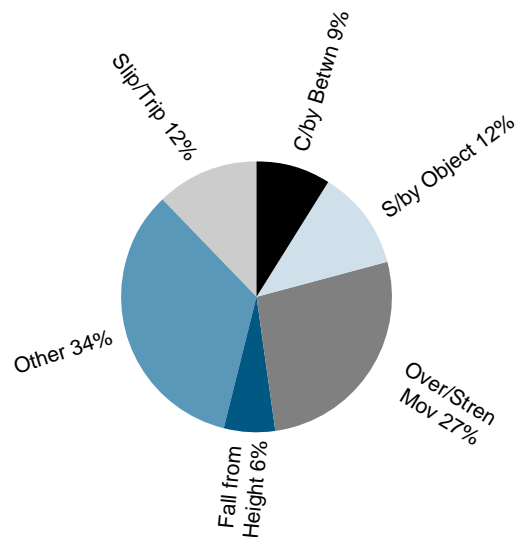
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

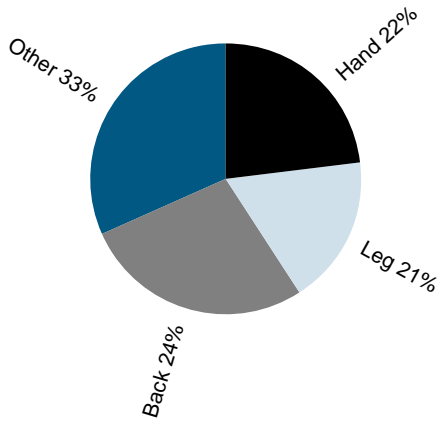


APPENDIX D

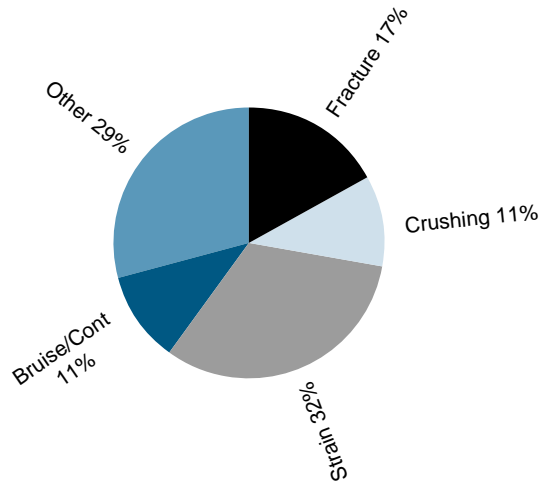
METALLIFEROUS UNDERGROUND INJURIES 1998/99

63 INJURIES

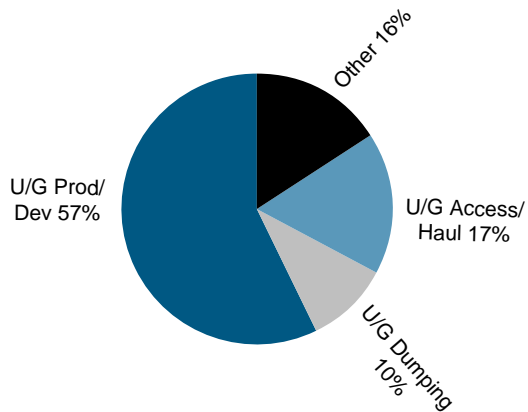
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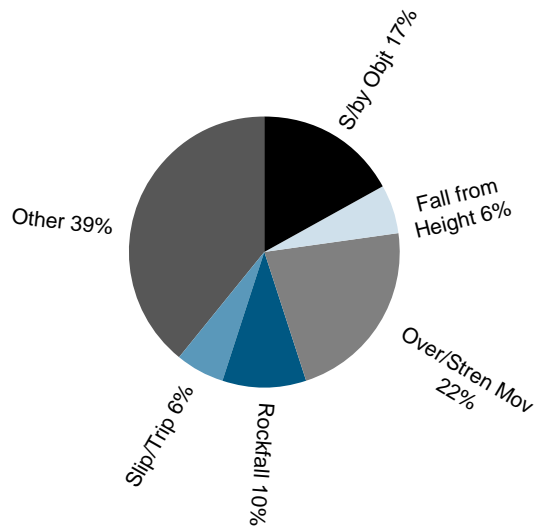
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

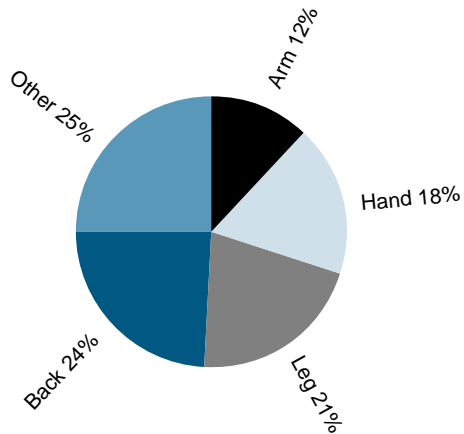


APPENDIX E

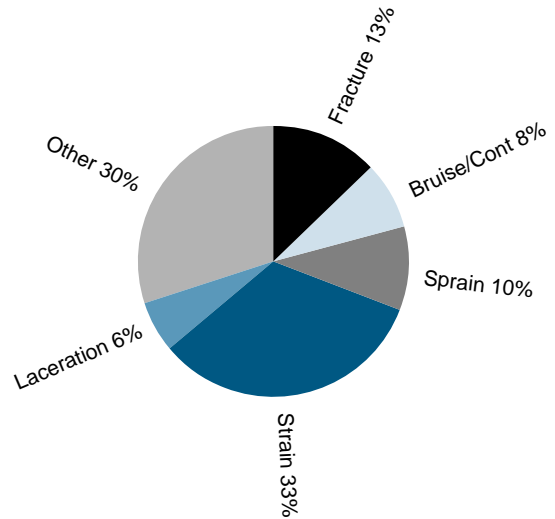
METALLIFEROUS SURFACE INJURIES 1998/99

487 INJURIES

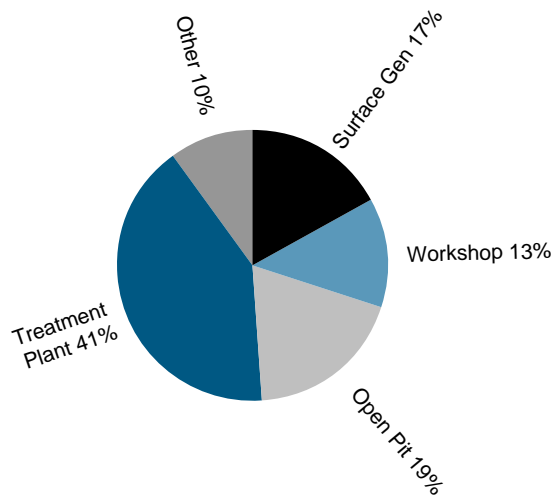
PART OF BODY



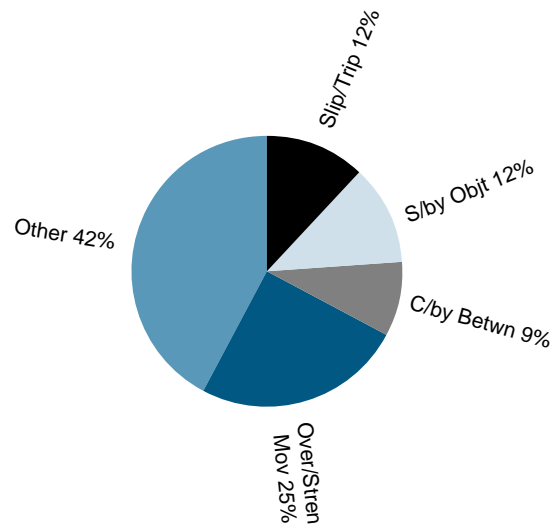
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

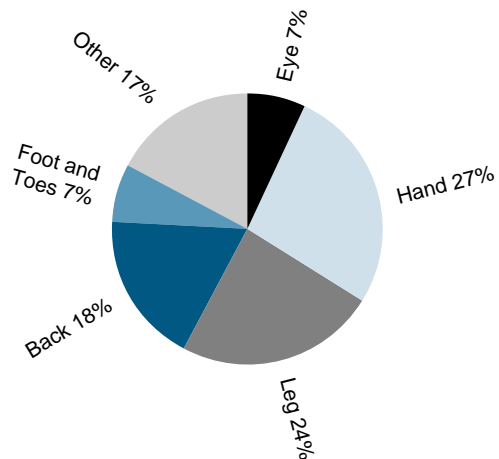


APPENDIX F

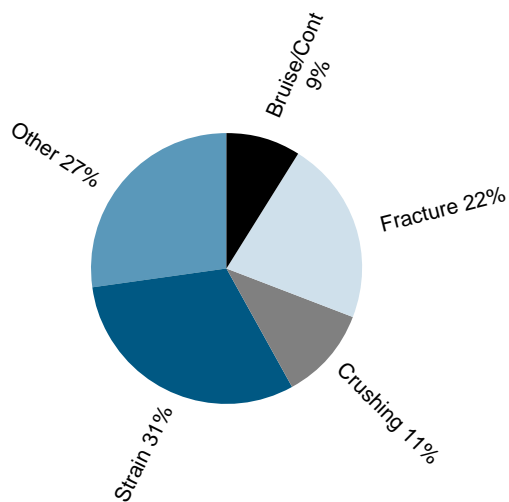
GOLD UNDERGROUND INJURIES 1998/99

45 INJURIES

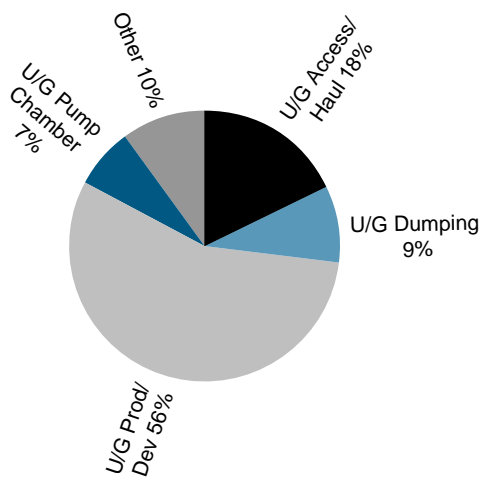
PART OF BODY



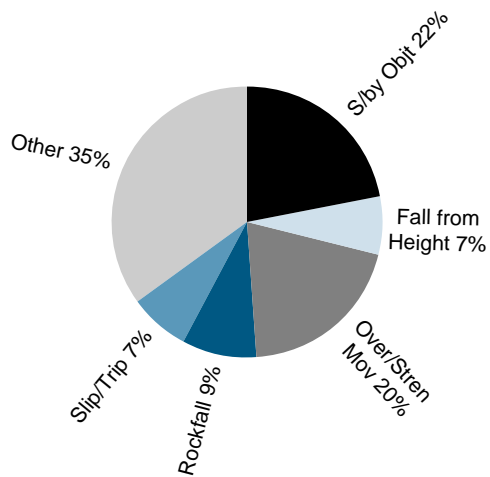
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

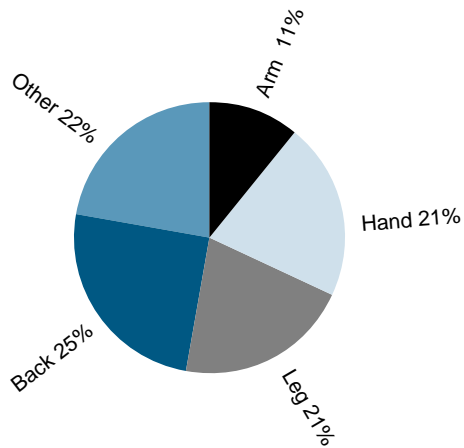


APPENDIX G

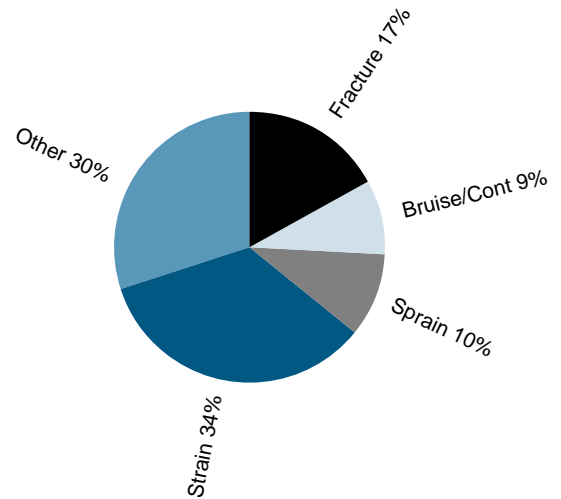
GOLD SURFACE INJURIES 1998/99

188 INJURIES

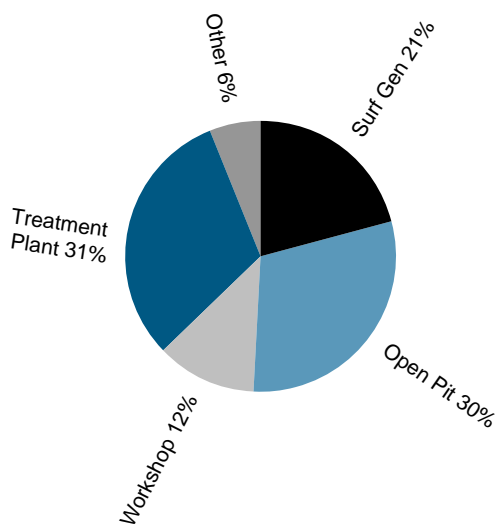
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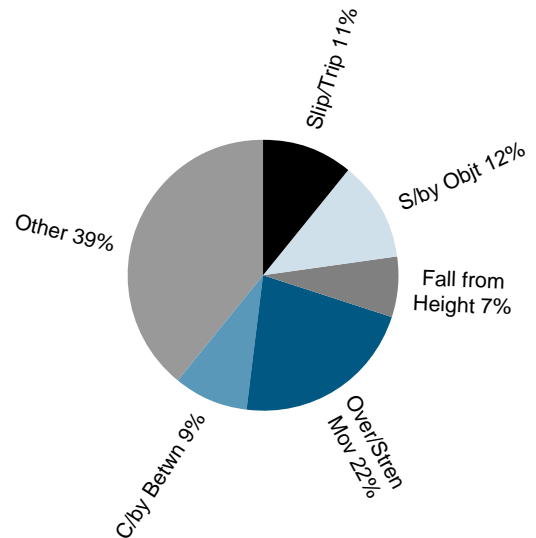
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

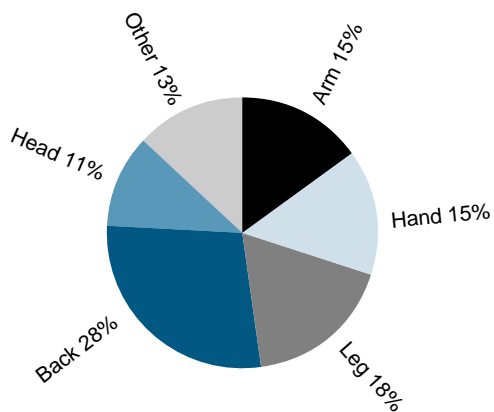


APPENDIX H

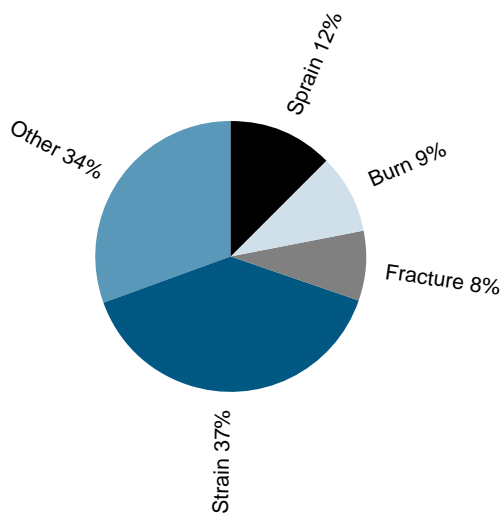
IRON ORE INJURIES 1998/99

104 INJURIES

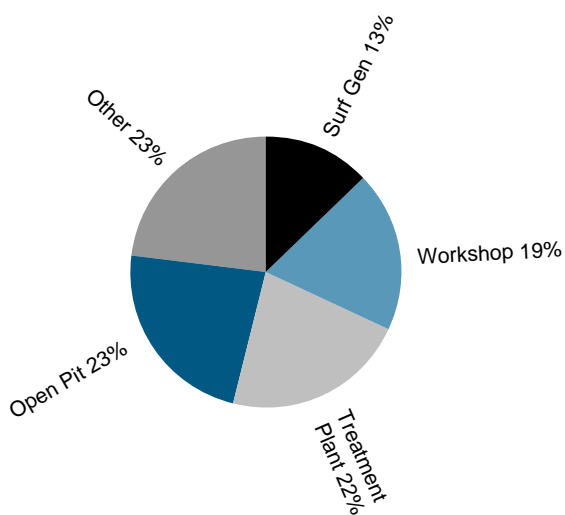
PART OF BODY



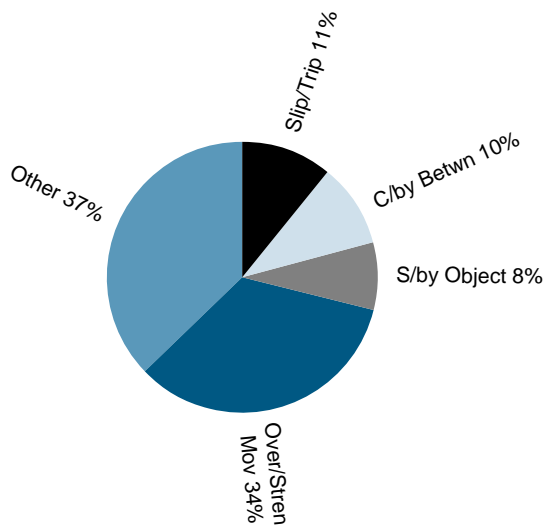
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

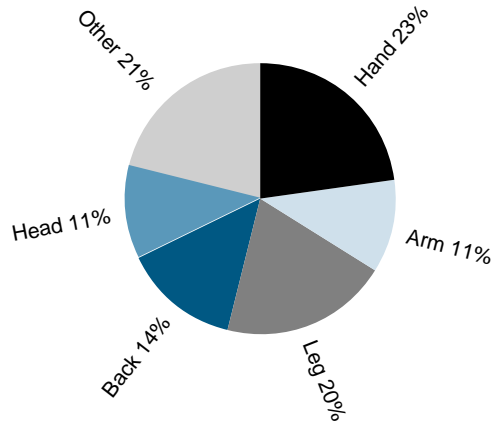


APPENDIX I

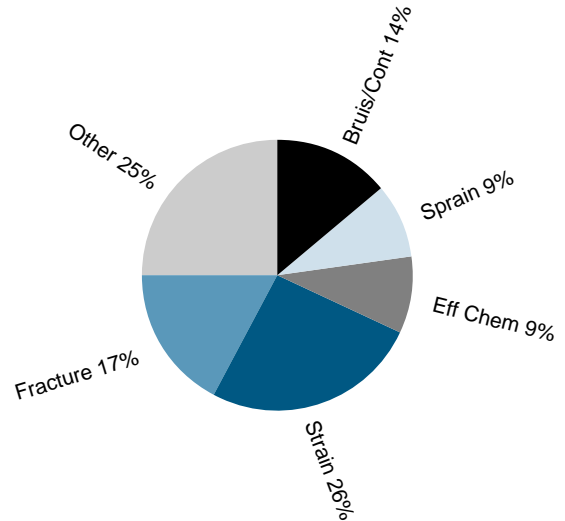
BAUXITE AND ALUMINA INJURIES 1998/99

35 INJURIES

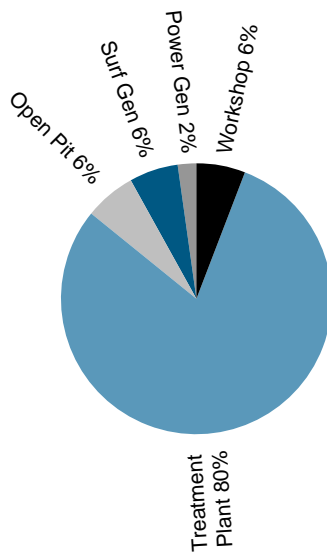
PART OF BODY



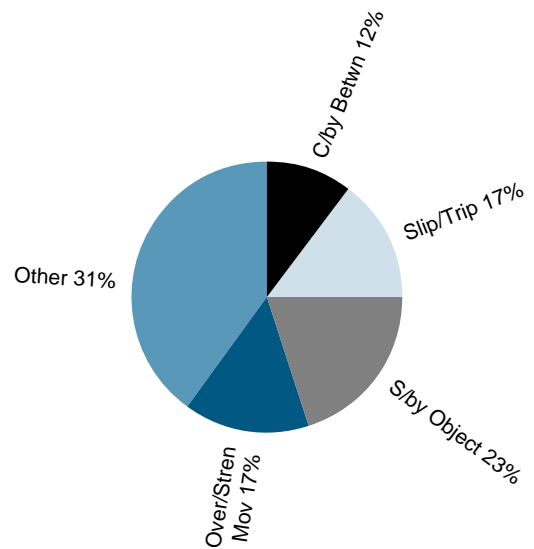
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

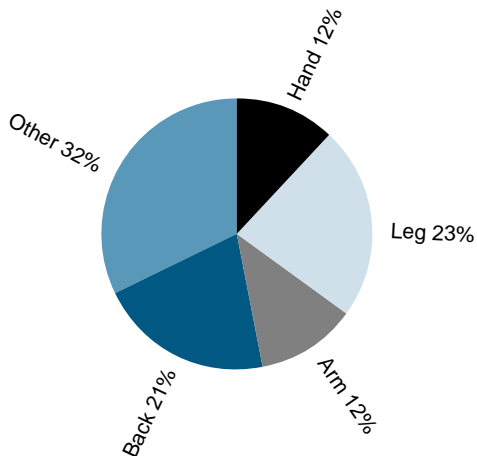


APPENDIX J

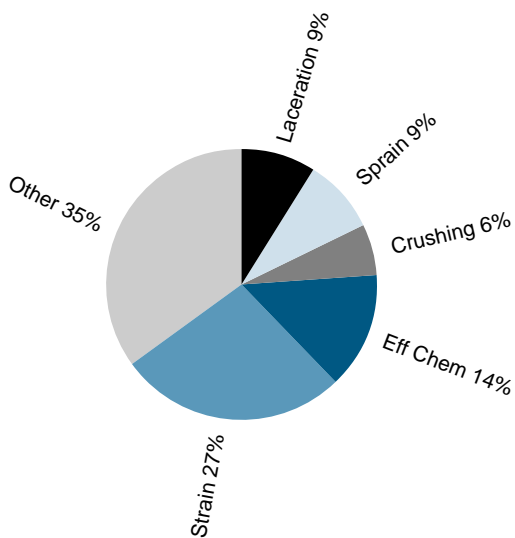
NICKEL INJURIES 1998/99

66 INJURIES

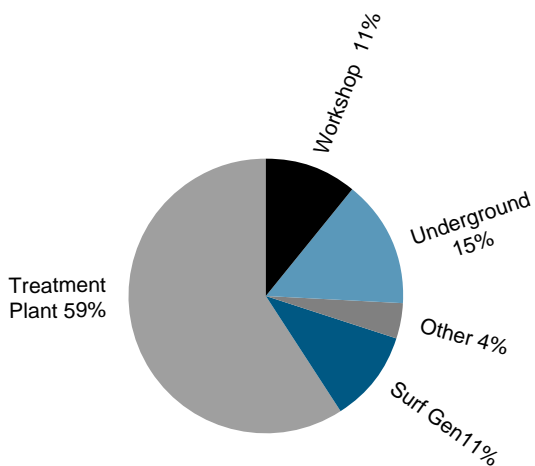
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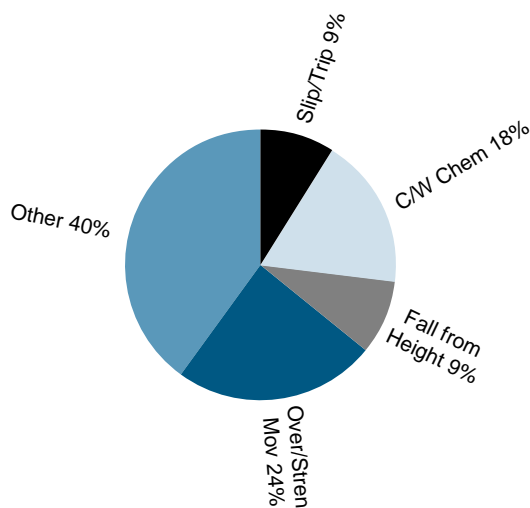
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT





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