Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

WorkSafe
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Mines Safety

SAFETY PERFORMANCE

IN THE WESTERN AUSTRALIAN MINERAL INDUSTRY

2020 -21

ACCIDENT AND INJURY STATISTICS

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ACCIDENT AND INJURY STATISTICS 2020-21

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Surface	Underground	Exploration
		
131,855 employed	**12,174** employed	**4,343** employed
No fatal injury	**2** fatal injury	No fatal injury
401 lost time injuries	**57** lost time injuries	**17** lost time injuries
691 restricted work injuries	**160** restricted work injuries	**43** restricted work injuries

STATISTICAL SUMMARY

MINING

- Two fatal mining accidents occurred during 2020-21, both underground at gold operations.
- There were 458 lost time injuries (LTIs) during 2020-21, 29 more than in the previous year (429 lost time injuries in 2019-20).
- LTIs resulted in a total of 11,516 rostered days lost and a further 13,239 rostered days of restricted work in 2020-21.
- There was an average workforce of 144,029 in 2020-21, an increase of 9% from the previous year's average of 132,144.
- The overall LTI duration rate deteriorated by approximately 2% during 2020-21, rising from 24.6 to 25.1.
- The overall LTI frequency rate improved by approximately 5% during 2020-21, falling from 2.1 to 2.0.
- The overall injury index (days lost per million hours worked) improved slightly by 0.4%, falling from 50.6 in 2019-20 to 50.4 in 2020-21.
- Serious LTIs in mining during 2020-21 totalled 402, 24 more than in 2019-20, with the overall serious LTIFR remaining the same at 1.80.
- The iron ore sector LTIFR improved by 31%, falling from 1.6 to 1.1 during 2020-21.
- The bauxite and alumina sector LTIFR deteriorated by 37% during 2020-21, rising from 5.1 to 7.0.
- The gold sector LTIFR deteriorated by 10% during 2020-21, rising from 2.0 to 2.2.
- The nickel sector LTIFR deteriorated by 11%, during 2020-21, rising from 1.9 to 2.1.
- There were 851 restricted work injuries (RWIs) during 2020-21, a 2% improvement from the previous year (870 RWIs reported in 2019-20).
- RWIs resulted in a total of 27,787 rostered days of restricted work in 2020-21.
- The overall RWI frequency rate for 2020-21 improved by 12% from 2019-20, falling from 4.2 to 3.7.

EXPLORATION

- There were no exploration fatalities in 2020-21.
- There were 17 lost time injuries (LTIs) reported during 2020-21, 11 less than the previous year.
- LTIs resulted in a total of 103 rostered days lost and a further 303 rostered days of restricted work in 2020-21.
- There was an average workforce of 4,343 workers, an increase of approximately 21% from the previous year's average.
- The overall LTIFR improved by approximately 52% in 2020-21, falling from 4.2 to 2.0. Rates for exploration such as LTIFR may vary significantly from year to year due to the low numbers of both the LTIs reported and hours worked.
- There were 43 restricted work injuries (RWIs) reported for exploration during 2020-21, resulting in an RWI frequency rate of 5.1, 31% higher than the 2019-20 rate of 3.9.
- RWIs resulted in a total of 1346 rostered days of restricted work in 2020-21.

INTRODUCTION

As Western Australia's (WA) resources regulator, the Department of Mines, Industry Regulation and Safety (DMIRS) is committed to improving safety and health outcomes in the mining sector. A key part of our role is analysing the accidents and incidents reported to DMIRS, with the information used to drive activities to improve workplace health and safety across the sector.

For 2020-21, WA's mining sector reported two fatalities, each at underground gold operations. A further 458 mine workers suffered a lost time injury (LTI) – a work injury that results in an absence from work for at least one full day or shift any time after the day or shift on which the injury occurred. However, since 2019-20 the overall mining LTI frequency rate has improved by approximately 5 per cent. We acknowledge industry's efforts to improve safety outcomes, however these figures are a reminder we still have too many workers being put in harm's way.

Using data to improve safety

This safety performance report presents some of the accident and injury data DMIRS collects. Analysis of this data led to the identification of four areas of concern that WorkSafe Mines Safety inspectors will focus on throughout 2022.

Hazardous manual tasks remain a key area for incidents and related injuries. Injury types related to manual tasks were identified to contribute to the greatest amount of lost time and restricted work duties when compared to overall industry figures.

There will be a focus on workers **repeatedly exposed to a workplace hazard**. Inspectors will be investigating if sites have identified, assessed and understood the hazards, and applied appropriate controls to minimise exposure.

There has been an increase in the **contract workforce**, based on a significant rise in workforce numbers and continued growth in the sector. For 2020/21, 58 per cent of reported work hours were attributed to contractors. Sites are encouraged to be mindful of the risks introduced with both larger workforces and a greater proportion of contractors.

DMIRS continues to focus on supporting **mentally healthy workplaces** in WA, with the mentally healthy workplaces audit a principal source on how businesses manage psychosocial hazards and risk factors in the mining sector.

The audits emphasise the need to raise awareness of the requirements to report injuries and potentially serious occurrences to DMIRS, including psychological injuries and hazard exposures. Psychosocial hazard exposures that can lead to psychological injury and may be reportable can include workplace violence and aggression; harassment, including sexual harassment; bullying; stress; burnout and exposure to traumatic events.

Employers must have controls and policies in place to reduce the risk of potential psychosocial hazards in the workplace. As reflected in the current parliamentary inquiry into sexual harassment of women working in FIFO mining, workplace behaviours are a community concern that should be addressed with changes to workplace culture and the management of incident reporting.

A new regulatory environment

Proclamation of the *Work Health and Safety Act 2020* (WHS Act) in 2022 will bring together most of WA's workplaces under the one WHS Act. As part of the WHS regime, there will be three sets of regulations – general, mining and petroleum, developed with the knowledge that the different sectors have different hazards and conditions that need to be addressed.

To align with the legislative changes, DMIRS has brought together all its workplace health and safety business areas, under one shared identity, WorkSafe Western Australia.

Helping industry prepare for the new laws

Information to help WA prepare for the new WHS laws is available on the department's website. This includes videos and webinars released as part of October's Safe Work Month. Guidance will be added as it becomes available. Follow @WorkSafeWA on LinkedIn, Facebook or Twitter to stay up-to-date about the latest on WHS.

Staying safe and looking ahead

I thank the resources sector for sharing information and contributing to our collective safety knowledge. Cooperation and collaboration form the bedrock that underpins our aim to make WA the world's safest mining environment.

In addition, it's important to emphasise that COVID-19 risks should be managed with a combination of controls such as testing, vaccination and hygiene measures, to ensure the health of WA's workers remains healthy and safe.

And lastly, let's remember we all have a responsibility to look out for one another, so if you see a safety issue or an incident, speak up and report it.

Andrew Chaplyn
State Mining Engineer

15 March 2022

DEFINITIONS

BASE METALS
In this report base metals refers to copper, lead and zinc

DAYS LOST
Rostered days absent from work due to work injury

DAYS OFF
Total calendar days, whether rostered or not, absent from work or on alternative duties, restricted duties or restricted hours due to work injury

DURATION RATE (LTI)
Average number of workdays lost per lost time injury

DURATION RATE (RWI)
Average number of restricted workdays per restricted work injury

EXPLORATION
Exploration activities not under the control of a registered mine manager; usually associated with exploration leases

FATAL INJURY INCIDENCE RATE
Number of fatal injuries per 1,000 employees for a 12 month period

INCIDENCE RATE
Number of injuries per 1,000 employees for a 12 month period

INJURY INDEX (LTI)
Number of workdays lost per million hours worked

INJURY INDEX (RWI)
Number of restricted workdays per million hours worked

LOST TIME INJURY (LTI)
Work injury that results in an absence from work for at least one full day or shift any time after the day or shift on which the injury occurred

LOST TIME INJURY FREQUENCY RATE (LTIFR)
Number of lost time injuries per million hours worked

METALLIFEROUS MINES
All mines other than coal mines are classed as metalliferous mines

MINOR INJURY
Work injury that results in the injured person being disabled for a period of less than two weeks

NOC
Not otherwise classified

REPORTABLE INJURY
A work injury which results in the injured person being unable to fully perform his or her ordinary occupation (regular job) any time after the day or shift on which the injury occurred and includes both lost time and restricted work injuries

RESTRICTED WORK INJURY (RWI)
Work injury (not LTI) that results in the injured person being unable to fully perform his or her ordinary occupation (regular job) any time after the day or shift on which the injury occurred, e.g. where a person is on alternative or light duties or hours are restricted

RESTRICTED WORK INJURY FREQUENCY RATE (RWIFR)
Number of restricted work injuries per million hours worked

SERIOUS INJURY
Work injury that results in the injured person being disabled for a period of two weeks or more

SERIOUS INJURY FREQUENCY RATE
The number of serious injuries per million hours worked

EXPLANATORY NOTES

Introduction

The statistics published in this annual compilation mainly relate to accidents between 1 July 2020 and 30 June 2021 (2020-21) involving time lost from work of one day or more (lost time injuries) or incapable of working their usual job (restricted work 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 2020-2021 has three components:

i) **Initial injuries** — days lost in 2020-21 from injuries that occurred in 2020-21

ii) **Recurrent injuries** — days lost in 2020-21 through recurrences of injuries that occurred in 2020-21 and previous years

iii) **Carry-over injuries** — days lost in 2020-21 by persons continuously off work from injuries that occurred before 1 July 2020.

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.

Mineral exploration is included in the report, with statistics available in the statistical summary, Tables 1, 2, 4, 8 and 10, an LTI performance indicator summary, and Appendices K and L.

Restricted work injuries are covered in the statistical summary, the "Restricted work injuries" section and Appendices L, M and N.

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

Unless otherwise stated, all rates are based on LTI.

Fatal accidents

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

Collection of information

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

This report has been made using data for 2020-21 received by the 5 October 2021. It will not reflect any data received or changed after this date.

During the twelve months covered by this compilation, 544 mining operations and 420 exploration companies reported to the Safety Regulation System (SRS). Of these, 35 mines and 58 exploration companies reported zero hours worked for the year.

Some of the terms most commonly used to describe accident type in incident reports are listed in Appendix A.

Charts

For clarity, most bar charts in this publication are restricted to 12 or fewer categories.

The term "other" is used for a grouping of accident categories that each contain a smaller proportion of injuries than the smallest individual category shown on the chart (typically less than 2%).

FATAL ACCIDENTS

Fatal accidents during 2020-21

Mining

Michael Benjamin Johnson, 13 July 2020

Michael Johnson, a 38 year old underground bogger operator sustained fatal injuries when his bogger fell into an open stope. Markings labelled "bund" were observed on the walls either side of the drive at a distance of six metres from the stope edge. There were no delineators or other markings in the drive to indicate distance to the stope edge.

This is the third fatality in WA mines since 2000 as a result of boggers falling into stopes.

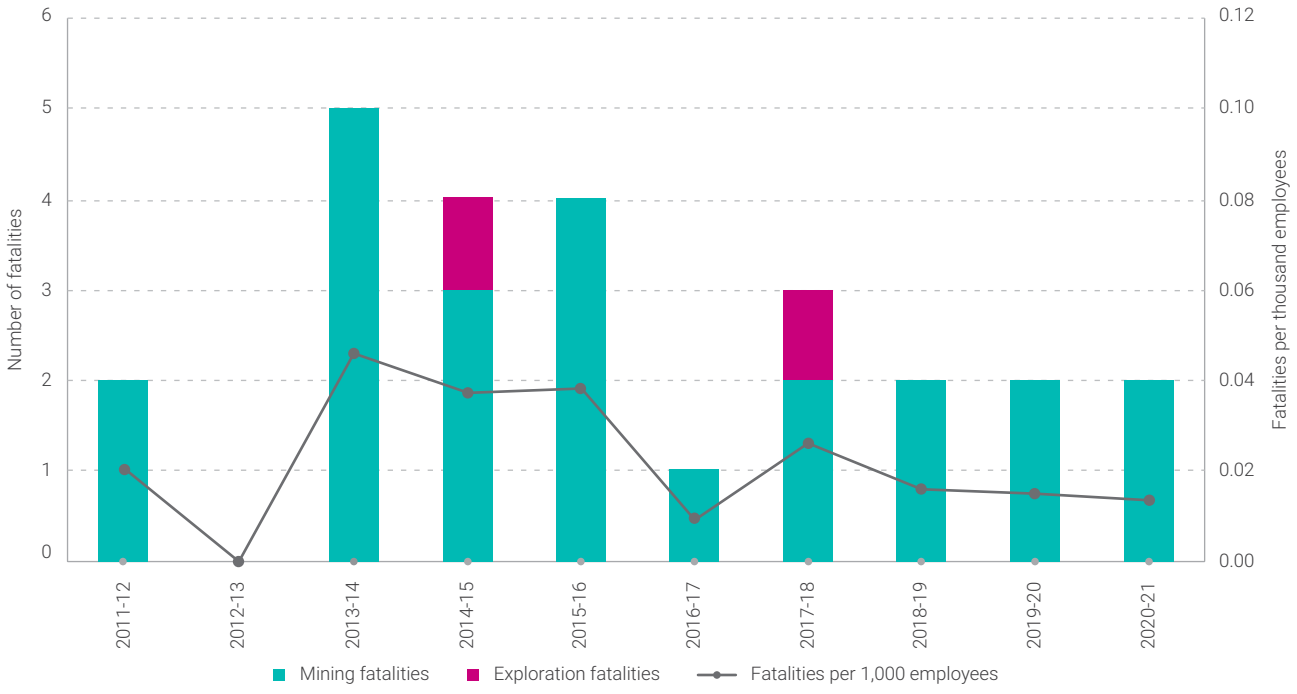
Related safety alert

Mines Safety Significant Incident Report No. 283 *Manned loader falls into open stope – fatal accident*

Paige Taylor Counsell, 15 December 2020

Paige Counsell, a 25 year old underground truck operator was out of her vehicle, walking in the underground decline after her truck had broken down. At this time, another truck was tramming up the decline, the secondary truck struck Ms Counsell who sustained fatal injuries.

FIGURE 1 FATAL INJURY INCIDENCE RATE 2011-12 TO 2020-21



Fatal injury incidence rate 2011-12 to 2020-21

There were two fatal accidents in the Western Australian mineral industry during 2020-21, both occurred on mining operations. This resulted in a fatal injury incidence rate (per thousand employees) for 2020-21 of 0.013.

While there had been a long term overall decrease in the number of fatalities per thousand employees, in recent years the average rate of improvement has slowed, with a fatal incidence rate in the last ten years varying between 0.05 and zero (see Figure 1).

The Department maintains the view that no fatal accident is acceptable, and that a fatal injury incidence rate of zero is achievable. The zero fatal incidence rate achieved for 2012-13 supports this view.

Fatal injury incidence rate by mineral mined 2016-17 to 2020-21

Table 1 lists fatal injury incidence rates by mineral mined for the past five years, as well as the grouped information for all surface and underground mines. The underground fatal injury incidence rate over that period was 2.9 times higher than the fatal injury incidence rate for surface operations.

Fatal accidents by type of accident 2016-17 to 2020-21

Table 2 indicates the type of accidents for the 10 fatalities in the mineral industry (mining and exploration) over the past five years, with two underground, seven at surface operations and one in exploration.

The two types of underground fatal accident which occurred within the past five years were fall from height and struck by vehicle or mobile plant.

Of the five types of surface fatal accidents occurring in the past 5 years the most common was caught by machine and vehicle or mobile plant rollover (2 fatalities each). This was followed by fall getting on or off vehicle, sting from insect, and struck by object (one fatality each).

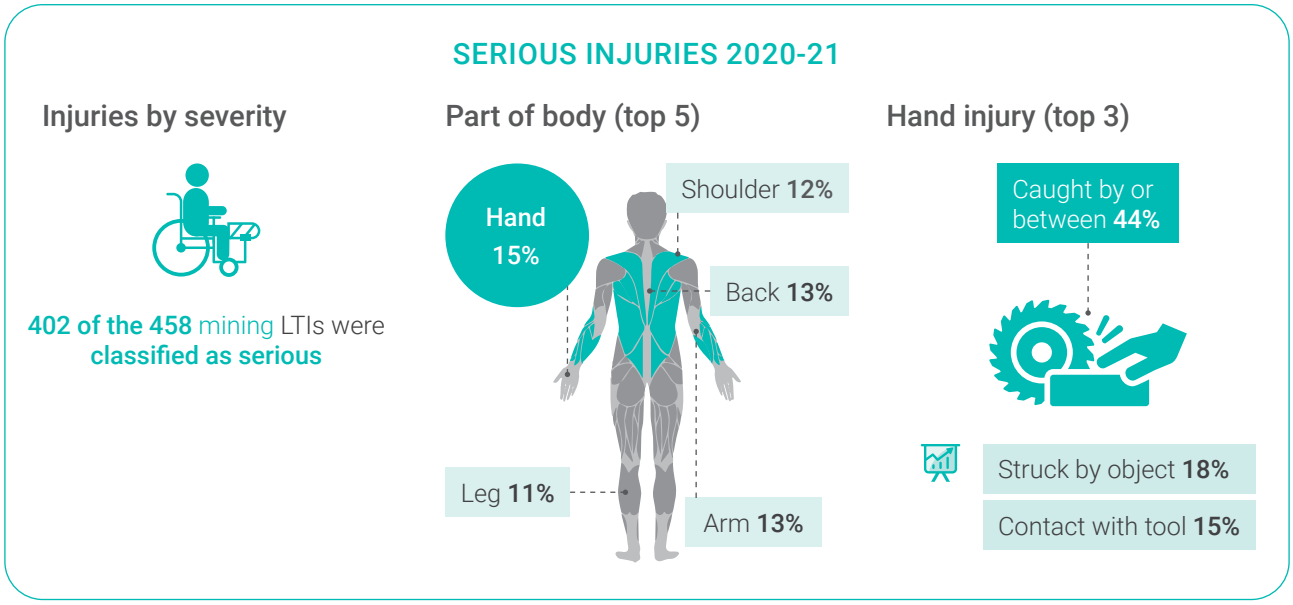
The accident type for the exploration fatality was exposure to environmental heat.

TABLE 1 FATAL INJURY INCIDENCE RATE BY MINERAL MINED 2016-17 TO 2020-21

Category		Fatalities per thousand employees
Mineral	Coal	0.176
	Construction materials	0.076
	Gold	0.020
	Heavy mineral sands	0.073
	Iron ore	0.006
	Nickel	0.031
Underground		0.039
Surface		0.014
Exploration		0.062

TABLE 2 NUMBER OF FATALITIES BY TYPE OF ACCIDENT 2016-17 TO 2020-21

Category		Number of fatalities
Underground	Fall from height	1
	Struck by vehicle or mobile plant	1
Surface	Caught by machine	2
	Vehicle or mobile plant rollover	2
	Fall getting on or off vehicle	1
	Sting from insect	1
	Struck by object	1
Exploration	Exposure to environmental heat	1
Total		**10**



SERIOUS INJURIES

Review of serious injuries during 2020-21

There were 402 serious lost time injuries reported in the WA mining industry during 2020-21 (378 in 2019-20). Of these, 384 were in metalliferous mines and 18 were in coal mines. There were a further 9 serious lost time injuries reported for exploration (24 in 2019-20).

Some examples of serious injuries in 2010-21

Struck by wet fines

An operator went under the fines stack feed conveyor at a processing plant to investigate the cause of the conveyor below pull wire tripping. While under the stacker, wet fines fell on his head, neck and upper back, knocking him to the ground. The operator was taken to the medical centre, then transferred to the regional hospital.

Fingers crushed by sole plate

Two boilermakers were fitting a sole plate to the underside of a wheel loader bucket at an open pit workshop. As one boilermaker was lowering the plate to inspect the base, they lost control and juggled it to the ground. The plate impacted the boilermaker's finger as it fell, resulting in crush injury and partial amputation.

Head injury from falling rock

A worker received a head wound and concussion while carrying out work adjacent to the portal of an underground mine. It is suspected he was struck by a falling rock. The worker was taken to the regional hospital for treatment.

Injury from haul truck rollover

An empty haul truck was going down the two lane ramp at an open pit when the truck swung wide turning around a left hand switchback. As it pulled back into the left lane, the truck continued to veer until it made contact with the highwall. The front left tyre rode up the highwall and the truck rolled onto its side. An emergency was called. The driver of the truck was taken to the regional hospital with pain in his upper body and right leg.

Falling windscreen led to laceration

A worker opened a transport crate containing a windscreen in preparation for it to be lifted by crane at an open pit. As the worker removed the top of the crate, the windscreen fell forwards, off the flat top trailer, knocking the worker to the ground. As they fell, the worker hit their head on an adjacent vehicle, knocking them unconscious and causing a laceration. Paramedics attended and took the worker to the regional hospital for treatment.

Struck by falling rock

A charge up operator at an underground mine was inspecting burn holes at the face in preparation to charge up when they were struck on the head and arms by a rock that fell from the face above. The operator was treated for lacerations to both arms and the head and a fractured arm.

Thermal burn from hot slurry

A worker at a processing plant walked past an open box drain leg that was believed to be sanded up when it released hot slurry onto the back of their leg. The worker was provided with first aid before being taken to a metro hospital and treated for a thermal burn to the leg.

Hand trapped between pipe and basket

A paste operator at an underground mine was in a work basket removing the clamp from a paste pipe when a one metre steel pipe dropped approximately 400 millimetres, trapping their hand against the basket. The worker suffered fractures to the bones in their hand.

Cold caustic entered eye

While attempting to clear a blocked injection line at a processing plant, a worker removed an attached water hose while it was under pressure causing a sudden release of cold caustic. The force knocked the worker's face shield off and caustic entered their eye. The worker was taken to the site medical facility before being transferred to a metro hospital.

Back fracture from slip

A mobile fire suppression technician reported that while working at an open pit maintenance workshop, they slipped and grabbed onto a vehicle to stop their fall when their hat fell off and the bonnet came down on their head. The technician did not report the incident at the time. The technician experienced pain in his head and neck and it was later identified that he had suffered two fractures to his back.

Steel liner struck leg

While removing a mill discharge gate at a processing plant, the steel liner slipped and struck a worker on the lower leg. An emergency was called. The medical and emergency response teams attended prior to the worker being transferred to a regional hospital for treatment to a fractured leg.

Fall from flatbed truck

A rigger at a processing plant was standing on the back of a flatbed truck and turned to communicate with a crane operator when he slipped and fell from the truck to the ground. The rigger fell approximately 800mm and landed on his foot, but injured a knee. The rigger attended the site medical facility and was transferred to a regional hospital for treatment to a musculoskeletal injury to the knee.

Injury from trapped arm

A fitter at an open pit was diagnosing a fault on a dump truck ladder control box when the wiring was disturbed and the ladder actuated, trapping the maintainer's arm against the boarding platform. The fitter was treated for a laceration to the upper arm.

Finger caught between objects

A driller offsider at an underground mine was carrying a core tube while wearing gloves when they caught their finger between the core tube and offside trestle. The offsider was taken to the site medical facility and treated for a crush injury to their finger.

Hot caustic contact worker's leg

A worker at a processing plant was setting up a pump for a caustic wash when the drain valve released hot liquor that contacted the worker's lower legs, resulting in chemical and heat burns.

Injury from slipped flange

A worker at a processing plant was rotating a flange on a water pipe, which was resting on a bund wall, when it slipped and crushed their finger against the wall, amputating the tip.

Crush injury whilst working on EWP

A worker at a processing plant was using an elevated work platform (EWP) to survey crane rails when they received a crush injury to their chest area while relocating the basket to access measurement points. The worker was taken to a regional hospital for assessment.

Drill head struck and lacerate arm

A drill offsider at an underground mine was loading a rod onto the drill mast when they noticed that the rotary hose was tangled. The offsider leaned on the mast to untangle the hose as the driller raised the drill head, which struck the offsider on the arm. The offsider was treated for a 20 centimetre long laceration to the arm.

Wheel assembly landed on leg

A fitter was removing the wheel and tyre assembly from a drill rig on the ramp at an underground mine when the wheel assembly fell, landing on his leg. He was attended by the site emergency services officer before being taken to the regional hospital for treatment of a fractured leg.

Sprayed liquid burnt foot

An operator at a processing plant opened a drain valve on a digester and liquid sprayed out and onto the operator's boots. The operator later noticed a pain in their foot, removed the boot and sock to reveal two burn marks. The operator attended the site medic who referred the worker to the burns clinic.

Wheel handle struck shoulder

During a prestart at a processing plant, workers noticed a tank and sand line were going to bog out. An operator changed the pumps over and went to open the valves when they noticed that the valve wheel handle had broken and was no longer connected. The operator tried to hammer the handle, but the wheel handle came off and struck the operator on the shoulder. The operator reported the issue and was referred to the regional hospital for treatment.

Slipped on wet surface

A worker at a processing plant slipped on a wet surface and landed heavily on their shoulder. The shoulder was fractured by the fall.

SERIOUS INJURIES CONTINUED

Serious injury percentage breakdown for 2020-21

Appendices C and D 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. There was a total number of 402 serious lost time injuries reported in 2020-21 (352 surface injuries and 50 underground injuries).

Injuries by part of body

- **Underground**: Injuries to hands made up the largest proportion of serious injuries with 9 injuries (18% of total), followed by injuries to arm NOC (Not otherwise classified) at 14% (7 injuries), then injuries to ankle, back and multiple parts of body all at 12% (6 injuries each). In total, 36% of serious injuries were to arms, then legs and trunk both at 22% each.
- **Surface**: Injuries to hand accounted for the largest proportion of serious injuries with 52 (15% of total), followed by shoulder (46) and back (45) injuries at 13% each. Legs NOC (Not otherwise classified) accounted for 42 of total injuries (12%), next with knee at 35 (10%) and arm NOC with 30 (9%). In total, 41% of serious injuries were to arms (including shoulders) and 28% were to legs.

Injuries by nature

- **Underground**: Sprain or strain represented the highest proportion by nature of injury with 21 injuries (42% of total), followed by fracture with 16 injuries (32%), then laceration next with 3 injuries (6%).
- **Surface**: Sprain or strain represented the highest proportion by nature of injury with 179 injuries (51% of total). Fracture was the next highest with 58 injuries (16%), followed by laceration with 27 injuries (8%) and effects of chemical or fumes with 18 injuries (5%).

Injuries by location

- **Underground**: The largest proportion of serious injuries underground was in production and development areas with 33 injuries (66% of total), followed by underground access and haulage ways with 11 injuries (22%).
- **Surface**: The largest proportion of serious injuries on the surface occurred in treatment plants with 132 injuries (38% of total), followed by open pits with 82 injuries (23%), workshop with 51 injuries (14%) and general surface areas with 50 injuries (14%).

Injuries by type of accident

- **Underground**: The most common accident type associated with serious injuries underground was over-exertion or strenuous movements with 12 injuries (28% of total), followed by slipping or tripping with 6 injuries (14%). Caught by or between still or moving objects, rockfall, stepping, and struck by objects each accounted for 9% of total injuries (4 injuries each).
- **Surface**: The most common accident type associated with serious injuries on the surface was over-exertion or strenuous movements with 96 injuries (27% of total) followed by stepping with 42 injuries (12%). Next is struck by object with 34 injuries (10% of total), then caught by or between objects with 30 injuries (9% of total).

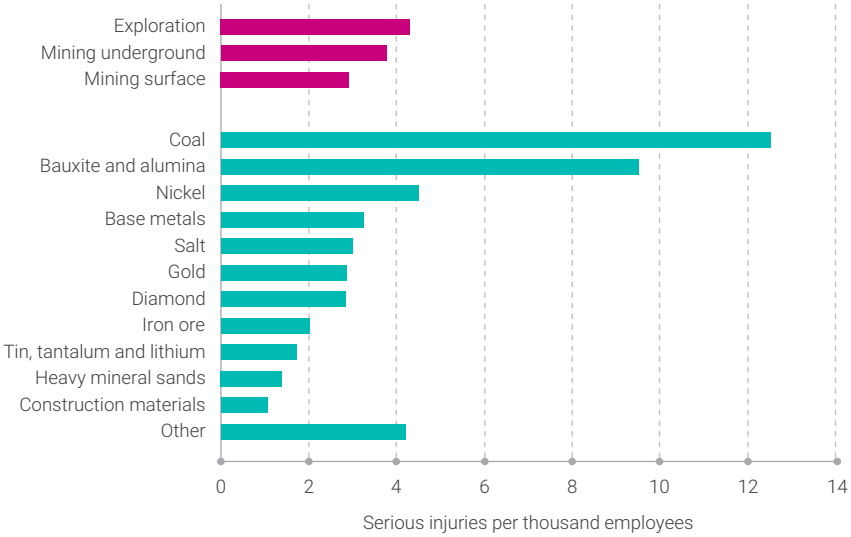
Serious injury incidence rate by mineral mined 2016-17 to 2020-21

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

The serious injury incidence rate for underground mining (3.7) was 22% higher than that for surface operations (2.9). The serious injury incidence rate for exploration was 4.3.

Of the major mining sectors, coal had the highest five-year average serious injury incidence rate (12.5), followed by bauxite-alumina at 9.5. The mining sector referred to as "Other", with a five-year average serious injury incidence rate of 4.2, contained 3% of the total number of employees spread over 20 small commodity groups.

FIGURE 2 SERIOUS INJURY INCIDENCE RATE 2016-17 TO 2020-21



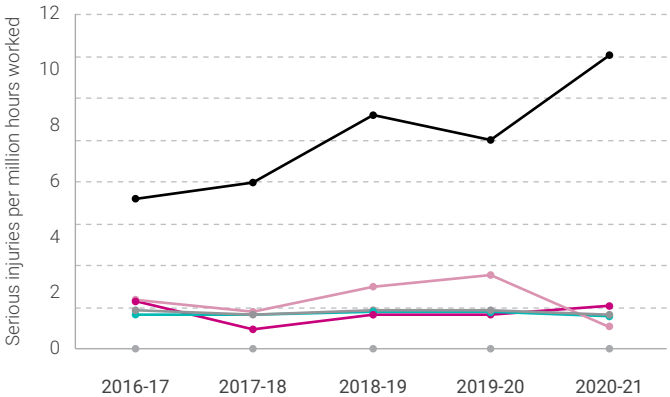
Serious injury frequency rate 2016-17 to 2020-21

Figure 3 shows that over the five years since 2016-17 the total mining serious injury frequency rate has returned to 1.8. The total exploration serious injury frequency rate has improved from 2.4 to 1.1.

The rate for surface metalliferous mining improved slightly from 1.7 to 1.6, and the rate for underground metalliferous mining improved from 2.3 to 2.1.

The serious injury frequency rate for coal deteriorated from 7.2 to 14.0.

FIGURE 3 SERIOUS INJURY FREQUENCY RATES 2016-17 TO 2020-21



	2016-17	2017-18	2018-19	2019-20	2020-21
Underground	2.3	1.0	1.7	1.7	2.1
Metalliferous surface	1.7	1.7	1.8	1.8	1.6
Coal	7.2	8.0	11.2	10.0	14.0
Exploration	2.4	1.8	3.0	3.6	1.1
Total	1.9	1.7	1.9	1.9	1.7

LOST TIME INJURIES

Review of lost time injuries during 2020-21

In 2020-21, 23,695 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 2020-21 (11,516), recurrences of injuries sustained before and in 2020-21 (662), and LTIs and recurrences carried over into 2020-21 from accidents before July 2020 (11,517). A breakdown of work days lost in coal and metalliferous mining is given in Table 3.

During 2020-21, there were 475 LTIs in the State's mineral industry. Of those, 440 were in metalliferous mines, 18 in coal mines and 17 in exploration. A breakdown of these data with performance indicators is given in Tables 4 and 5.

In addition to the initial injuries, there were 17 recurrences of previous injuries, resulting in 662 work days lost in 2020-21. A breakdown of recurrent injuries by financial year of initial injury is given in Table 6. Two hundred and fourty seven people, who were still off work from injuries received before July 2020, lost 11,517 work days in 2020-21. A breakdown of these carryover injuries is given in Table 7.

TABLE 3 DAYS LOST THROUGH INJURY DURING 2020-21

Mines	Days lost			
	Initial injuries	Recurrent injuries	Carry-over injuries	Total
Metalliferous	11,081	638	10,818	22,537
Coal	435	24	699	1,158
Total mining	**11,516**	**662**	**11,517**	**23,695**

TABLE 4 INITIAL LOST TIME INJURIES DURING 2020-21

Sector	No. of employees	No. of LTIs	Incidence rate	Frequency rate	Duration rate	Injury index	Days lost
Metalliferous surface	130,853	383	2.9	1.9	24.5	46	9,380
Metalliferous underground	12,174	57	4.7	2.4	29.8	72	1,701
Metalliferous total	143,027	440	3.1	1.9	25.2	49	11,081
Coal total	1,002	18	18.0	14.0	24.2	339	435
Total mining	**144,029**	**458**	**3.2**	**2.0**	**25.1**	**50**	**11,516**
Exploration	4,343	17	3.9	2.0	6.1	12	103

TABLE 5 LOST TIME INJURIES BY MINERAL MINED DURING 2020-21

Mineral mined	No. of employees	No. of LTIs	Incidence rate	Frequency rate	Duration rate	Injury index	Days lost
Iron ore	76,150	132	1.7	1.1	34.8	38	4,594
Gold	34,154	127	3.7	2.2	25.6	57	3,247
Bauxite and alumina	10,079	96	9.5	7.0	12.5	88	1,203
Nickel	7,348	31	4.2	2.1	38.6	79	1,197
Construction materials	2,661	5	1.9	3.7	5.2	19	26
Base metals	2,319	4	1.7	1.1	6.5	7	26
Tin, tantalum and lithium	2,419	7	2.9	1.9	35.1	67	246
Mineral sands	2,814	2	0.7	0.5	1.5	1	3
Coal	1,002	18	18.0	14.0	24.2	339	435
Salt	878	3	3.4	2.4	17.3	42	52
Diamonds	320	0	0	0	0	0	0
Other	3,887	33	8.5	5.9	14.8	87	487
Total mining	**144,029**	**458**	**3.2**	**2.0**	**25.1**	**50**	**11,516**

Note: Duration in Tables 4 and 5 does not take into consideration time lost after 30 June 2021 by persons still off work at the end of the fiscal year, time lost from recurrent injuries, or time lost by persons with carry-over injuries from before July 2020.

TABLE 6 RECURRENT LOST TIME INJURIES DURING 2020-21

Year	Metalliferous mining		Coal mining		Total mining	
	No. of injuries	Days lost	No. of injuries	Days lost	No. of injuries	Days lost
2020-21	2	113	0	0	2	113
2019-20	9	448	0	0	9	448
2018-19	4	30	1	24	5	54
2017-18	1	47	0	0	1	47
Total	**16**	**638**	**1**	**24**	**17**	**662**

Note: Apart from the information shown in Tables 3, 6 and 7, analysis of recurrent and carry-over injuries has not been presented in this publication.

LOST TIME INJURIES CONTINUED

TABLE 7 CARRY-OVER LOST TIME INJURIES DURING 2020-21

Year	Metalliferous mines		Coal mines		Total mining	
	No. of injuries	Days lost	No. of injuries	Days lost	No. of injuries	Days lost
2019-20	184	7,327	6	461	190	7,788
2018-19	42	2,389	4	238	46	2,627
2017-18	8	606	0	0	8	606
2016-17	2	253	0	0	2	253
2015-16	1	243	0	0	1	243
Total	**237**	**10,818**	**10**	**699**	**247**	**11,517**

Review of lost time injuries during 2020-21 in accordance with Australian Standard AS 1885.1:1990

The *National Standard for Workplace Injury and Disease Recording* is designed to be used by individual workplaces. Tables 8 and 9 provide statistical information in accordance with AS 1885.1:1990.

There are two major differences between reporting for AS 1885.1:1990 and the Department's SRS database.

The Australian Standard treats fatalities as LTIs with a penalty of 220 workdays lost for each, whereas fatalities are reported separately from other injury data in the SRS database.

The incidence rate reported in accordance with the Australian Standard definition is injuries per hundred employees, rather than injuries per thousand employees.

TABLE 8 INITIAL LOST TIME INJURIES DURING 2020-21 (AS 1885.1:1990)

Sector	No. of employees	No. of LTIs	Injuries per hundred	Frequency rate	Duration rate	Days lost
Metalliferous surface	130,853	383	0.29	1.9	24.5	9,380
Metalliferous underground	12,174	59	0.48	2.5	36.3	2,141
Metalliferous total	143,027	442	0.31	1.9	26.1	11,521
Coal total	1,002	18	1.80	14.0	24.2	435
Total mining	**144,029**	**460**	**0.32**	**2.0**	**26.0**	**11,956**
Exploration	4,343	17	0.39	2.0	6.1	103

Note: Duration in Tables 8 and 9 does not take into consideration time lost after 30 June 2021 by persons still off work at the end of the fiscal year, time lost from recurrent injuries, or time lost by persons with carry-over injuries from before July 2020.

TABLE 9 LOST TIME INJURIES BY MINERAL MINED DURING 2020-21 (AS 1885.1:1990)

Mineral mined	No. of employees	No. of LTIs	Injuries per hundred	Frequency rate	Duration rate	Days lost
Iron ore	76,150	132	0.17	1.1	34.8	4,594
Gold	34,154	129	0.38	2.3	28.6	3,687
Bauxite and alumina	10,079	96	0.95	7.0	12.5	1,203
Nickel	7,348	31	0.42	2.1	38.6	1,197
Construction materials	2,661	5	0.19	3.7	5.2	26
Base metals	2,319	4	0.17	1.1	6.5	26
Tin, tantalum and lithium	2,419	7	0.29	1.9	35.1	246
Mineral sands	2,814	2	0.07	0.5	1.5	3
Coal	1,002	18	1.80	14.0	24.2	435
Salt	878	3	0.34	2.4	17.3	52
Diamonds	320	0	0	0	0	0
Other	3,887	33	0.85	5.9	14.8	487
Total mining	**144,029**	**460**	**0.32**	**2**	**26**	**11,956**

AUSTRALIAN WORK HEALTH AND SAFETY STRATEGY 2012–2022

The *Australian Work Health and Safety Strategy 2012–2022* was launched by Safe Work Australia in October 2012. There are three specific targets to be achieved by 2022.

- 20 percent or greater reduction in the number of worker fatalities due to injury
- 30 percent or greater reduction in the incidence rate of workers' compensation claims where the worker has been off work for one or more working weeks
- 30 percent or greater reduction in the incidence rate of workers' compensation claims for musculoskeletal disorders where the worker has been off work for one or more working weeks.

Western Australia's safety performance

Because the number of fatalities can vary considerably from year to year, Safe Work Australia is measuring progress towards the national target for worker fatalities using a three year rolling average. This guards against an unusually low number of fatalities in 2022 meeting the target by chance rather than by sustained improvement.

Further information on the *Australian Work Health and Safety Strategy 2012-2022* is available on Safe Work Australia's website.

Australian Work Health and Safety Strategy 2012-2022

Measuring progress towards targets

Figure 4 shows the Western Australian fatality data for mining and exploration as a three-year rolling average for the number of fatalities, as well as a line representing a 20% improvement over 11 years.

Safe Work Australia's targets for injuries, including musculoskeletal disorders, relate to compensation claims. Serious claims are defined as those where the worker has been off work for one or more working weeks. This differs from the definition used for reporting serious mining and exploration injuries to the Department. However, for consistency, injury reports for mining and exploration fitting the Safe Work Australia definition have been extracted and the same targets applied to injury incidence rates.

Figure 5 shows the Western Australian data for reportable injuries per 1,000 employees where the injured person did not return to their regular occupation within 7 days, as well as a line representing a 30% reduction over 11 years.

Figure 6 shows the Western Australian statistics for musculoskeletal reportable injuries per 1,000 employees where the injured person did not return to their regular occupation within 7 days, also with a line representing a 30% reduction over 11 years.

The injury reporting requirements for petroleum facilities do not allow a similar data treatment.

Note: Safe Work Australia presents the national data in calendar years, with the targets applying from 2012 to 2022. The safety performance data for mining and exploration in Western Australia is reported for financial years and hence the Safe Work Australia targets are applied from 2011-12 to 2021-22.

FIGURE 4 NUMBER OF MINING AND EXPLORATION FATALITIES THREE-YEAR ROLLING AVERAGE

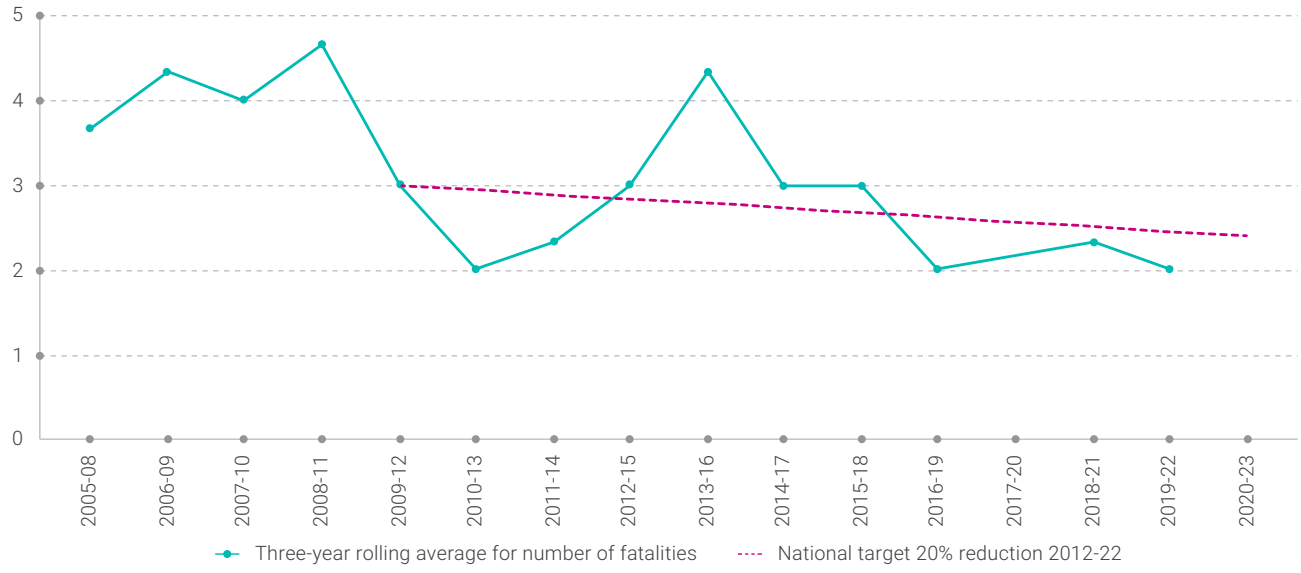


FIGURE 5 MINING AND EXPLORATION INJURIES OF DURATION ONE WEEK OR MORE PER 1,000 EMPLOYEES (INCIDENCE RATE)

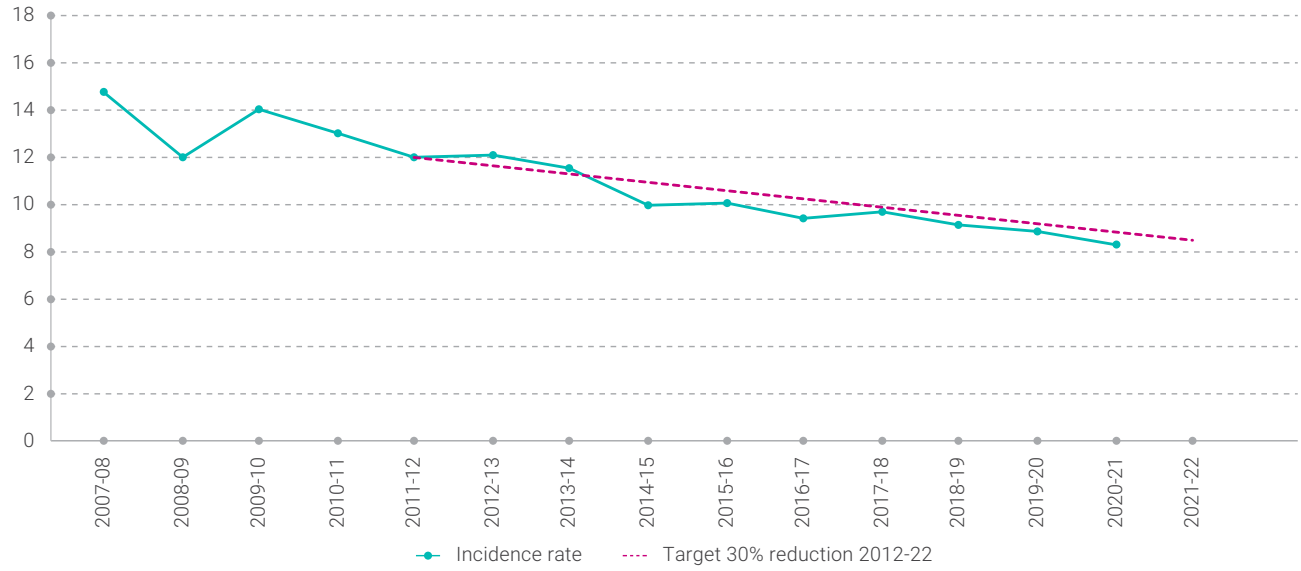
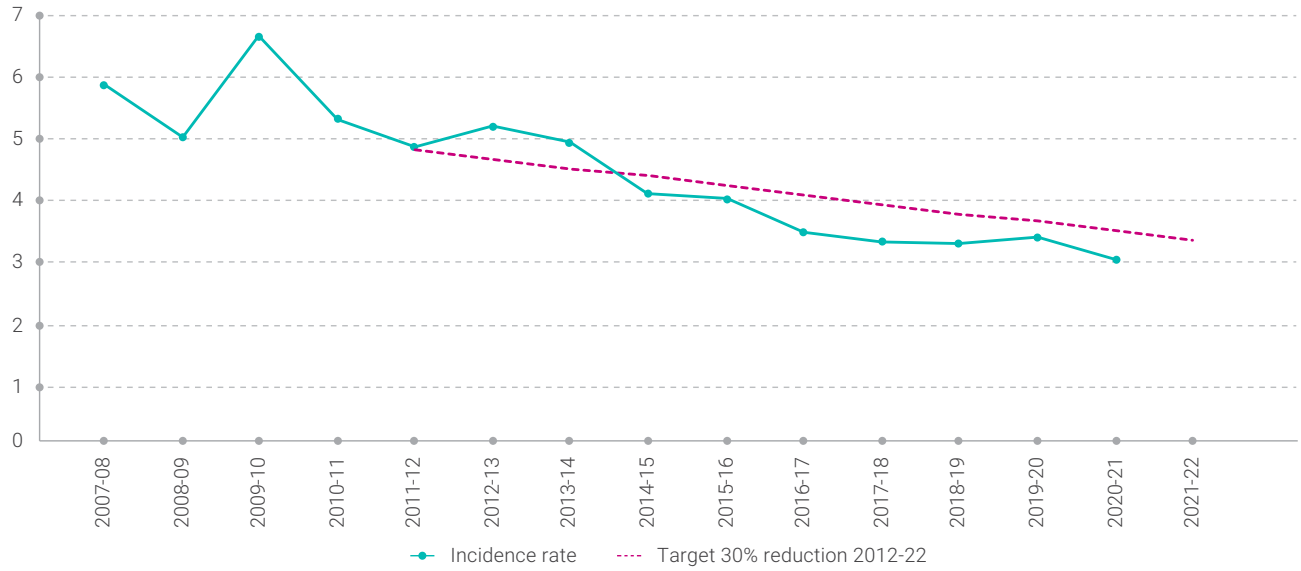


FIGURE 6 MUSCULOSKELETAL INCIDENCE RATE (DURATION ONE WEEK OR MORE) PER 1,000 EMPLOYEES



LOST TIME INJURIES BY COMMODITIES

Metalliferous performance indicators

The performance indicators for the metalliferous mining sector show increasing rates of injuries occurring in 2020-21. Figures 7 to 10 depict the performance indicators of incidence, frequency, duration rates and injury index (see page 2 for definitions).

Performance indicator trends for metalliferous mining in 2020-21 are summarised below.

- The overall incidence rate improved slightly by 3%, falling from 3.2 to 3.1. The surface incidence rate improved by 6% (from 3.1 to 2.9), while the underground incidence rate deteriorated by 21% (from 3.9 to 4.7).
- The overall frequency rate improved by 5%, falling from 2.0 to 1.9. The surface frequency rate improved by 5%, falling from 2.0 to 1.9, while the underground frequency rate deteriorated by 26% (from 1.9 to 2.4).
- The overall duration rate deteriorated by 2%, rising from 24.7 to 25.2. The surface duration rate improved by 2%, falling from 25.0 to 24.5, and the underground duration rate deteriorated by 37% (rising from 21.8 to 29.8).
- The fall in frequency rate offset the rise in the duration rate, resulting in an improvement of the injury index by 8%, from 49 to 45. The surface injury index improved by 8% (from 50 to 46), and the underground injury index improved slightly by 2% (from 42 to 41).

Metalliferous injury percentage breakdown for 2020-21

Appendices **E** and **F** 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. There was a total number of 440 lost time injuries reported in 2020-21 (57 underground injuries, 383 surface injuries).

Injuries by part of body

- **Underground**: Hands were the most frequently injured part of body with 10 injuries (18% of total), followed by ankle and arm NOC (not otherwise classified) with 7 injuries each (12%). Overall, injuries to arm (including shoulders) made up 33% of injuries, with leg (including knees and ankles) injuries representing a further 26%.
- **Surface**: Hands were the most frequently injured part of body, with 57 injuries (15% of total), followed by arm NOC (47), back (46) and shoulder (46) with 12% each. Overall, arm injuries (including shoulders) made up 39% of the total, with leg injuries accounting for a further 26% and trunk injuries next at 16%.

Injuries by nature

- **Underground**: Sprain or strain was the highest ranking nature of injury for underground injuries with 25 injuries (44% of total), followed by fracture with 16 injuries (28%), with crushing and laceration next at 3 injuries (5%) each.
- **Surface**: Sprain or strain was the highest ranking nature of injury for surface injuries with 177 injuries (46% of total), followed by fracture with 58 injuries (15%) and laceration next with 34 injuries (9%).

Injuries by location

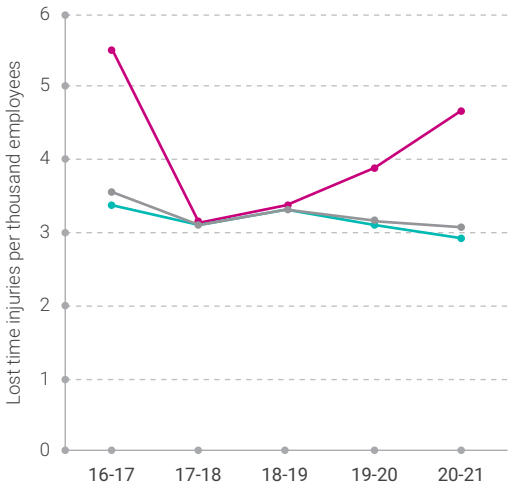
- **Underground**: The largest proportion of underground injuries occurred in production and development areas with 40 injuries (70% of total), followed by access, travelling or haulage ways with 11 injuries (19%).
- **Surface**: The largest proportion of surface injuries occurred in treatment plants with 147 injuries (38% of total), followed by open pits with 80 injuries (21%), and general surface areas next with 57 injuries (15%).

Injuries by type of accident

- **Underground**: Over-exertion or strenuous movements was the most common accident type underground with 16 injuries (28% of total), then slipping or tripping with 6 injuries (11%).
- **Surface**: Over-exertion or strenuous movements was the most common accident type with 97 injuries (25% of total), followed by stepping with 43 injuries (11%), then struck by objects with 39 injuries (10%).

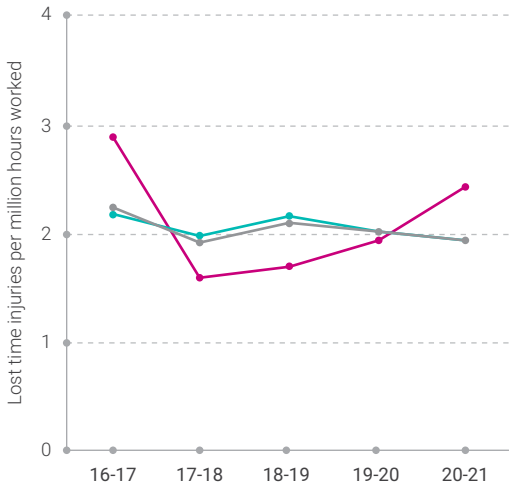
Metalliferous LTI performance indicators 2016-17 to 2020-21

FIGURE 7 INCIDENCE RATE



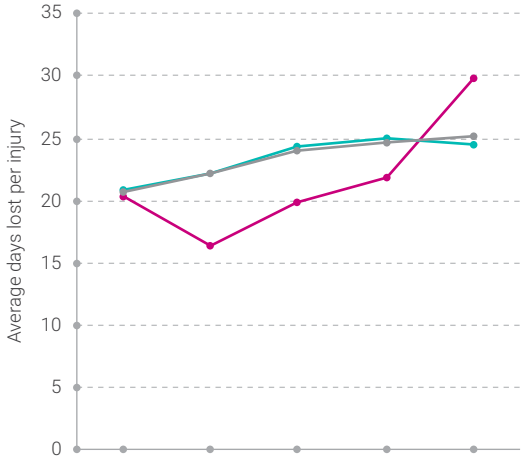
	16-17	17-18	18-19	19-20	20-21
Underground	5.5	3.1	3.4	3.9	4.7
Surface	3.4	3.1	3.3	3.1	2.9
Total	3.6	3.1	3.3	3.2	3.1

FIGURE 8 FREQUENCY RATE



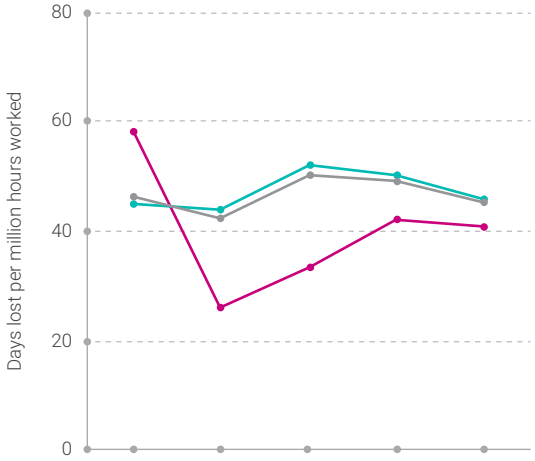
	16-17	17-18	18-19	19-20	20-21
Underground	2.9	1.6	1.7	1.9	2.4
Surface	2.2	2.0	2.1	2.0	1.9
Total	2.2	1.9	2.1	2.0	1.9

FIGURE 9 DURATION RATE



	16-17	17-18	18-19	19-20	20-21
Underground	20.3	16.4	19.8	21.8	29.8
Surface	20.8	22.3	24.3	25.0	24.5
Total	20.7	22.2	24.0	24.7	25.2

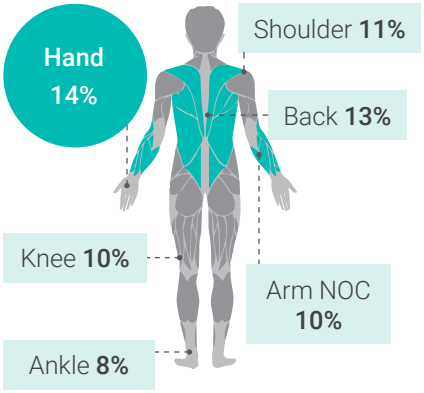
FIGURE 10 INJURY INDEX



	16-17	17-18	18-19	19-20	20-21
Underground	58	26	34	42	41
Surface	45	44	52	50	46
Total	46	42	50	49	45

IRON ORE INJURIES 2020-21

53% of the 144,029 average mining workforce were in **iron ore**



LTIFR for iron ore was **1.1**, compared to 2.0 for all mining

LOST TIME INJURIES BY COMMODITIES CONTINUED

Iron ore performance indicators

The performance indicators for the iron ore sector showed an overall improvement during 2020-21. Figures 11 to 14 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Performance indicator trends for the iron ore sector in 2020-21 are summarised below.

- The incidence rate improved by 32%, falling from 2.5 to 1.7.
- The frequency rate improved by 31%, falling from 1.6 to 1.1.
- The duration rate deteriorated by 26%, rising from 27.6 to 34.8.
- The fall in frequency rate offset the rise of the duration rate resulting in an improvement of 14% in the injury index (from 44 to 38).

Iron ore injury percentage breakdown for 2020-21

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. There was a total number of 132 lost time injuries reported in 2020-21.

Injuries by part of body

- Eighteen hand injuries, at 14%, accounted for the largest proportion of injuries. This is followed by back injuries with 17 (13%), then shoulder injuries with 15 injuries (11%). Next are arm NOC (not otherwise classified) and knee with 13 injuries (10%) each.
- Overall, injuries to arms (including shoulders) made up of 42% of the total (56 injuries), with legs (including knees and ankles) representing 23% of the total (31 injuries), and trunk injuries at 15% (20 injuries).

Injuries by nature

- Sprain or strain was the highest ranking nature of injury with 58 injuries (44% of total).
- Fracture was the second highest ranking nature of injury with 23 injuries (17%), followed by laceration with 13 injuries (10%).

Injuries by location

- The largest proportion of injuries occurred at open pits with 38 injuries (29% of total).
- This is followed by injuries at treatment plants with 30 (23% of total), workshops with 25 injuries (19% of total), and general surface areas with 19 injuries (14% of total).

Injuries by type of accident

- Over-exertion or strenuous movement was the most common type of accident resulting in injury, with 31 injuries (23% of total).
- Struck by object, with 18 injuries (14%), was the next most common type of accident. This is followed by stepping with 17 injuries (13%), and vehicle or mobile equipment jolting or jarring with 11 injuries (8%).

Iron ore LTI performance indicators 2016-17 to 2020-21

FIGURE 11 INCIDENCE RATE

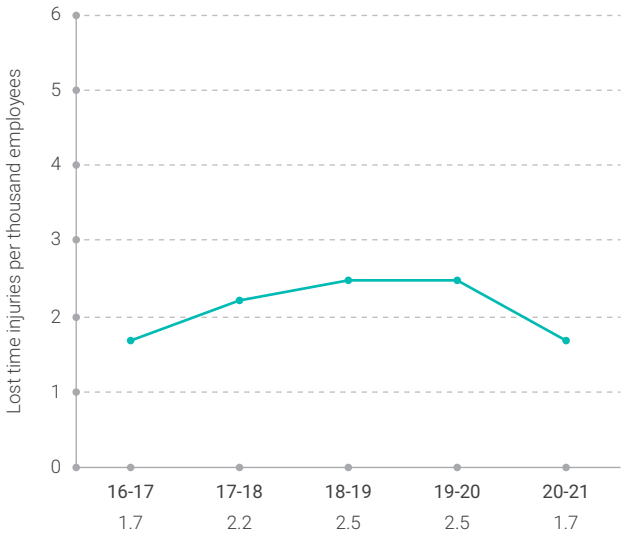


FIGURE 12 FREQUENCY RATE

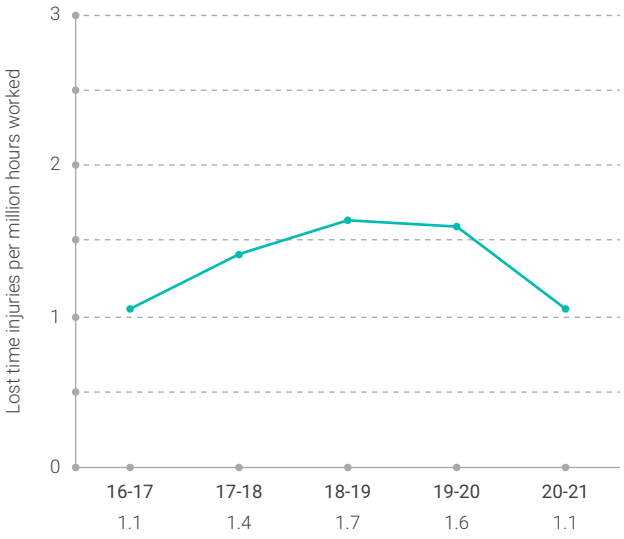


FIGURE 13 DURATION RATE

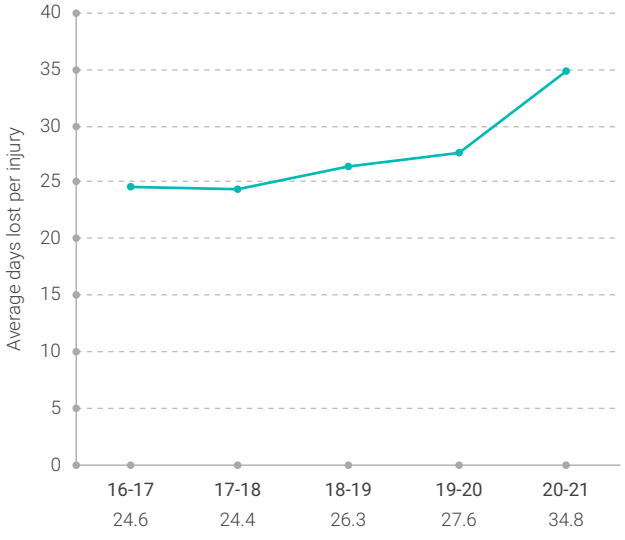
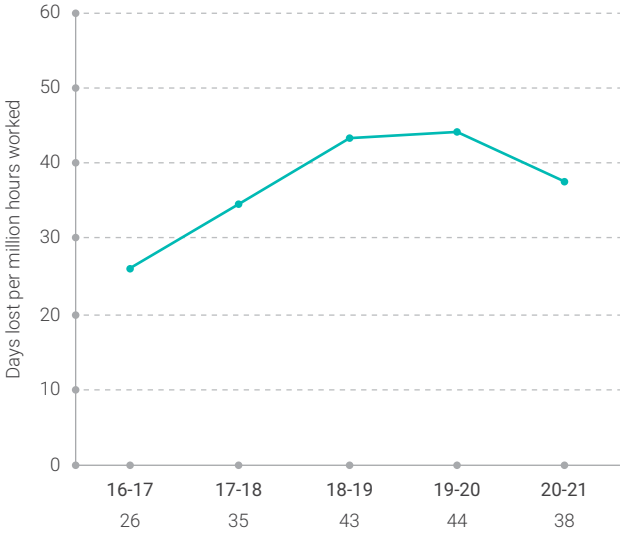
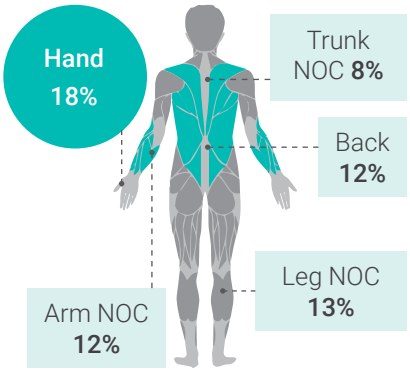


FIGURE 14 INJURY INDEX



GOLD INJURIES 2020-21

24% of the 144,029 average mining workforce were in **gold**



LTIFR for gold was **2.2**, compared to 2.0 for all mining

LOST TIME INJURIES BY COMMODITIES CONTINUED

Gold performance indicators

The performance indicators for the gold sector deteriorated during 2020-21. Figures 15 to 18 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Performance indicator trends for the gold sector in 2020-21 are summarised below.

- The overall incidence rate deteriorated by 12%, rising from 3.3 to 3.7. The surface incidence rate deteriorated by 3%, rising from 3.2 to 3.3, and the underground incidence rate also deteriorated by 38% (from 3.4 to 4.7).
- The overall frequency rate deteriorated by 10%, rising from 2.0 to 2.2. The surface frequency rate remained unchanged at 2.1, while the underground frequency rate deteriorated by 47%, rising from 1.7 to 2.5.
- The overall duration rate deteriorated by 11%, rising from 23.0 to 25.6. The surface duration rate deteriorated by 7%, rising from 23.6 to 25.2, and the underground duration rate also deteriorated by 23%, from 21.4 to 26.3.
- Both the rise in the duration rate and the frequency rate resulted in an overall deterioration of 27% in the injury index, rising from 45 to 57. The surface injury index deteriorated by 9% (rising from 49 to 53) and the underground injury index deteriorated by 78% (from 37 to 66).

Gold injury percentage breakdown for 2020-21

Appendix G provides 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. There was a total number of 127 lost time injuries reported in 2020-21 (46 underground injuries, 81 surface injuries).

Injuries by part of body

- Hand injuries were the most commonly injured part of body at 18% (14 surface injuries, 9 underground injuries), followed by leg NOC (not otherwise classified) at 13% (14 surface, 3 underground).
- Arm not otherwise classified (NOC) (8 surface, 7 underground) and back (10 surface, 5 underground) were next, at 12% each.
- Overall, arm injuries (including shoulders) made up 37% of the total (30 surface injuries, 17 underground injuries), and leg (including knees and ankles) injuries accounted for a further 27% (21 surface, 13 underground).

Injuries by nature

- Sprain or strain was the highest ranking nature of injury for both surface and underground injuries at 43% (34 surface injuries, 21 underground injuries)
- This was followed by fracture, at 22% (15 surface, 13 underground), then laceration next at 7% (8 surface, 1 underground).

Injuries by location

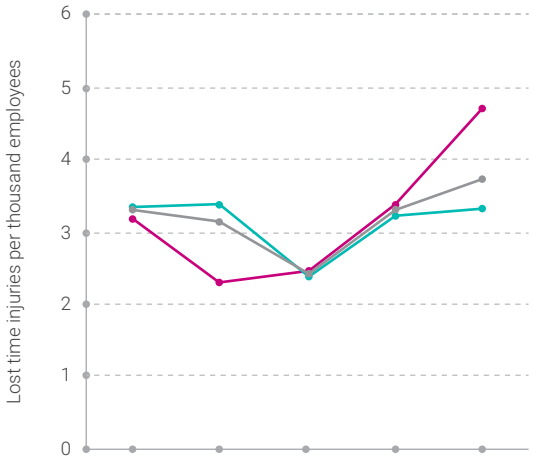
- Underground production and development areas had the highest injuries with 33 (26% of total).
- This was followed by open pits with 19% (24 surface injuries), then treatment plants at 18% (23 surface injuries).

Injuries by type of accident

- Over-exertion or strenuous movements (18 surface, 12 underground), was the most common type of accident at 24%.
- This is followed by struck by objects (9 surface, 3 underground), slipping or tripping (7 surface, 5 underground), caught by or between still or moving objects (7 sufrace, 4 underground), and stepping injuries (7 surface, 4 underground) at 9% each.

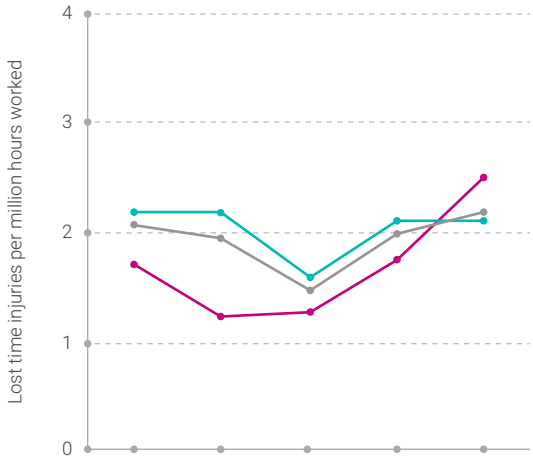
Gold LTI performance indicators 2016-17 to 2020-21

FIGURE 15 INCIDENCE RATE



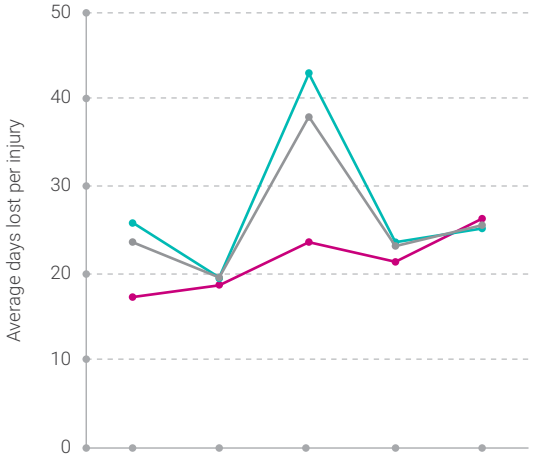
	16-17	17-18	18-19	19-20	20-21
Underground	3.2	2.3	2.4	3.4	4.7
Surface	3.3	3.4	2.4	3.2	3.3
Total	3.3	3.1	2.4	3.3	3.7

FIGURE 16 FREQUENCY RATE



	16-17	17-18	18-19	19-20	20-21
Underground	1.7	1.2	1.3	1.7	2.5
Surface	2.2	2.2	1.5	2.1	2.1
Total	2.0	1.9	1.5	2.0	2.2

FIGURE 17 DURATION RATE



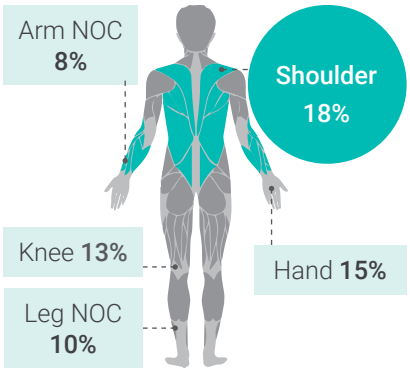
	16-17	17-18	18-19	19-20	20-21
Underground	17.3	18.5	23.6	21.4	26.3
Surface	25.6	19.4	42.9	23.6	25.2
Total	23.7	19.2	38.0	23.0	25.6

FIGURE 18 INJURY INDEX

	16-17	17-18	18-19	19-20	20-21
Underground	30	22	30	37	66
Surface	56	42	67	49	53
Total	48	37	56	45	57

BAUXITE AND ALUMINA INJURIES 2020-21

7% of the 144,029 average mining workforce were in **bauxite and alumina**



LTIFR for bauxite and alumina was **7.0**, compared to 2.0 for all mining

LOST TIME INJURIES BY COMMODITIES CONTINUED

Bauxite and alumina performance indicators

The performance indicators for the bauxite and alumina sector were mixed for 2020-21. Figures 19 to 22 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Performance indicator trends for the bauxite and alumina sector in 2020-21 are summarised below.

- The incidence rate deteriorated by 16%, rising from 8.2 to 9.5.
- The frequency rate deteriorated by 37%, rising from 5.1 to 7.0.
- The duration rate improved by 39%, falling from 20.4 to 12.5.
- Improvement of the duration rate was greater than the deterioration of the frequency rate, resulting in the injury index improvement by 15%, falling from 104 to 88.

Bauxite and alumina injury percentage breakdown for 2020-21

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. There was a total of 96 lost time injuries reported in 2020-21.

Injuries by part of body

- Shoulder injuries accounted for the largest proportion of injuries with 17 injuries (18% of total).
- Hand injuries were the next highest with 14 injuries (15%), followed by leg NOC (Not otherwise classified) with 10 injuries (10%).
- Overall, injuries to arms (including shoulder) contributed 41% of total injuries, with leg injuries (including knees and ankles) at 29%, and trunk injuries made up of 14%.

Injuries by nature

- Sprain or strain was the highest ranking nature of injury with 49 injuries (51% of total), next was effects of chemicals or fumes with 18 injuries (19%).
- This is followed by fracture with 9 injuries (9%), then laceration with 7 injuries (7%).

Injuries by location

- The largest proportion of injuries occurred in treatment plants with 65 injuries (68% of total).
- The next largest proportion of injuries occurred in general surface areas with 11 injuries (11%) then workshops with 7 injuries (7%).

Injuries by type of accident

- Over-exertion or strenuous movements was the most common type of accident resulting in injury with 28 injuries (29% of total).
- Contact with chemicals or fumes was the next highest with 18 injuries (19%). This is followed by caught by or between still or moving objects, slipping or tripping, and stepping with 9 injuries (9%) each.

Bauxite and alumina LTI performance indicators 2016-17 to 2020-21

FIGURE 19 INCIDENCE RATE

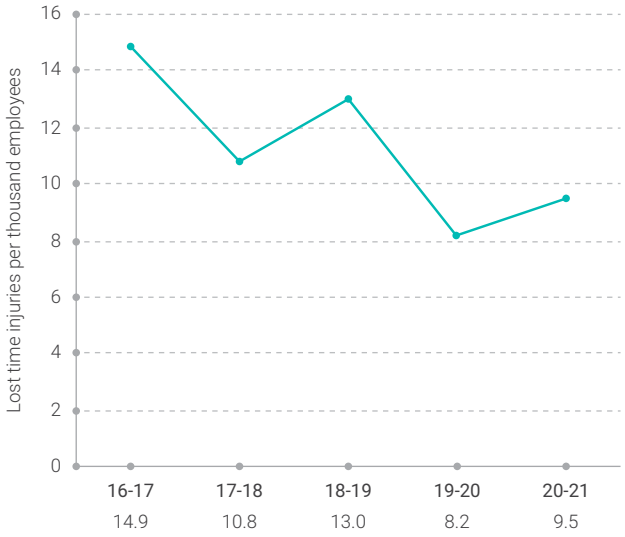


FIGURE 20 FREQUENCY RATE

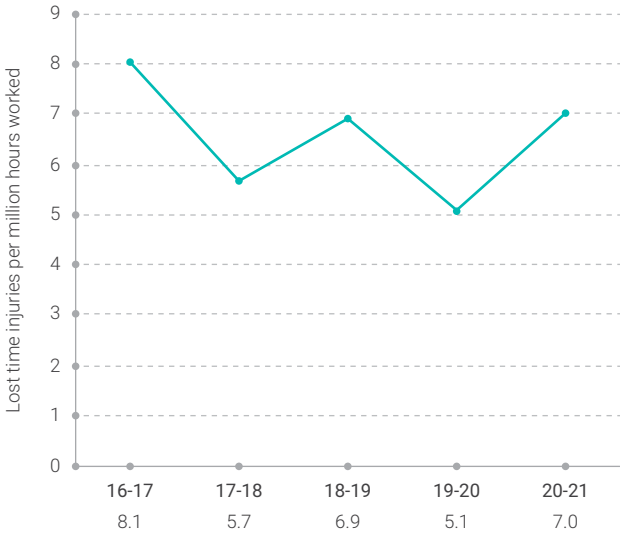


FIGURE 21 DURATION RATE

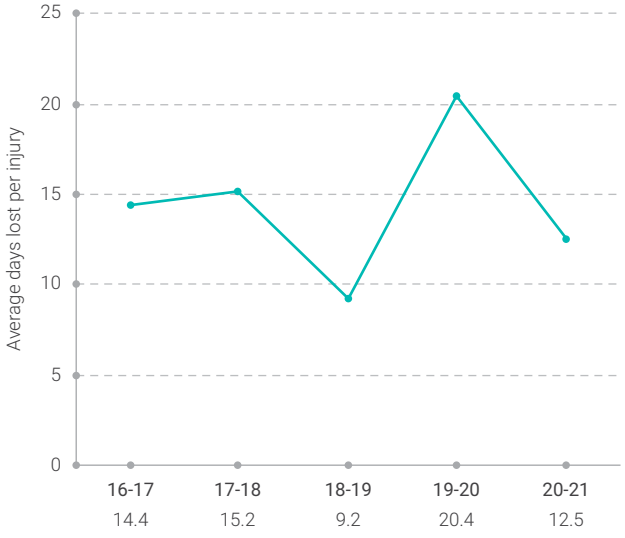
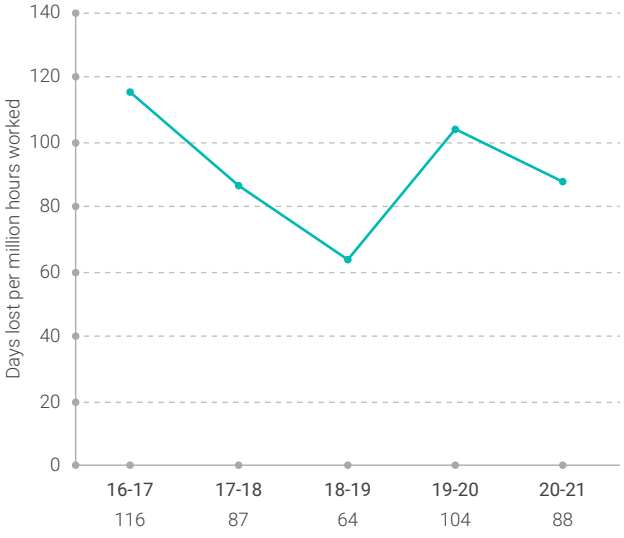
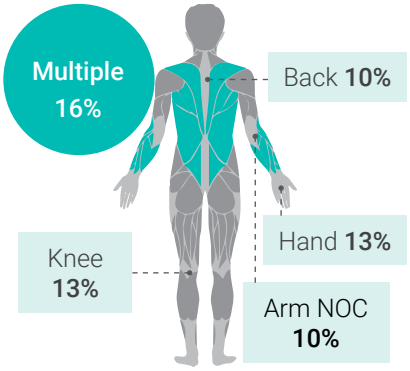


FIGURE 22 INJURY INDEX



NICKEL INJURIES 2020-21

5% of the 144,029 average mining workforce were in **nickel**



LTIFR for nickel was **2.1**, compared to 2.0 for all mining

LOST TIME INJURIES BY COMMODITIES CONTINUED

Nickel performance indicators

The performance indicators for the nickel sector showed an overall deterioration for 2020-21. Figures 23 to 26 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Performance indicator trends for the nickel sector in 2020-21 are summarised below.

- The overall incidence rate deteriorated slightly by 5%, rising from 4.0 to 4.2. The surface incidence rate deteriorated by 23%, (from 3.0 to 3.7), and the underground incidence rate improved by 25%, (from 9.1 to 6.8).
- The overall frequency rate deteriorated by 11%, rising from 1.9 to 2.1. The surface frequency rate deteriorated by 20% (from 1.5 to 1.8), and the underground frequency rate improved by 18% (from 3.8 to 3.1).
- The overall duration rate deteriorated by 42%, rising from 27.2 to 38.6. The surface duration rate deteriorated by 13% (from 29.3 to 33.1), while the underground duration rate significantly deteriorated by 119% (from 23.8 to 52.1).
- The derioration of the duration and frequency rate result in an overall deterioration of 49% in the injury index, rising from 53 to 79. The surface injury index deteriorated by 36% (from 44 to 60), while the underground injury index deteriorated greatly by 79% (rising from 90 to 161).

Nickel injury percentage breakdown for 2020-21

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 for the underground and surface sectors. There was a total of 31 lost time injuries reported in 2020-21 (9 underground injuries, 22 surface injuries).

Injuries by part of body

- Injuries to multiple parts of body (3 surface, 2 underground) accounted for the most common type of injury (16% of total).
- Hand (3 surface, 1 underground) and knee (4 surface) injuries were the next highest each at 13%.
- Overall, Legs (8 surface, 2 underground) made up 26% of the total, with arms (6 surface, 2 underground) next accounted for 19%.

Injuries by nature

- Sprain or strain injuries (9 surface, 4 underground) was the highest ranking nature of injury at 42%.
- This is followed by fracture at 23% (5 surface, 2 underground), and exposure to mental stress at 10% (2 surface, 1 underground).

Injuries by location

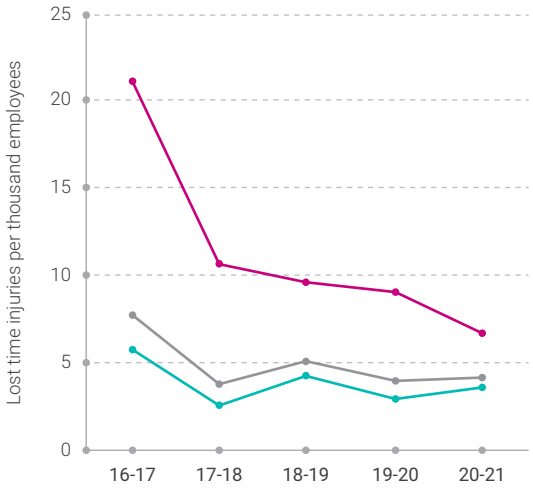
- The largest proportion of injuries occurred in treatment plants with 11 injuries (35% of total).
- Open pits and underground production and development areas were next with 5 injuries (16%) each.

Injuries by type of accident

- Over-exertion or strenuous movements was the most common type of accident at 19% (2 surface, 4 underground).
- This is followed by stepping at 16% (5 surface), then struck by object at 13% (3 surface, 1 underground).

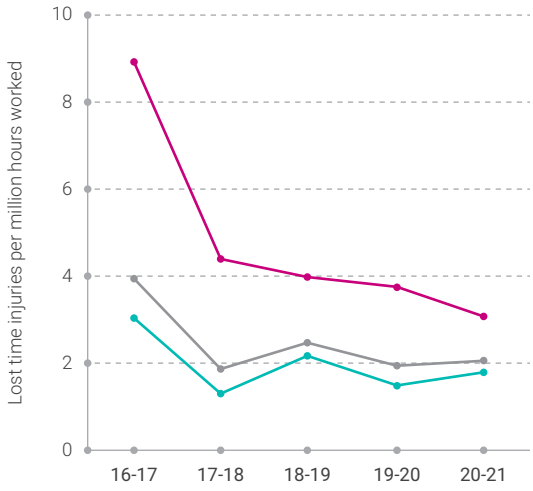
Nickel LTI performance indicators 2016-17 to 2020-21

FIGURE 23 INCIDENCE RATE



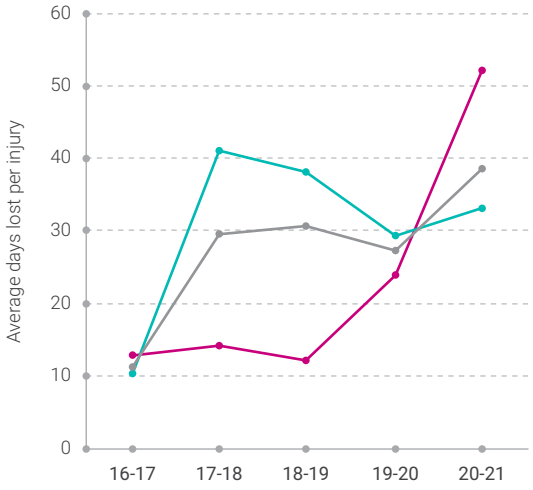
	16-17	17-18	18-19	19-20	20-21
Underground	21.1	10.7	9.7	9.1	6.8
Surface	5.8	2.6	4.3	3.0	3.7
Total	7.8	3.8	5.1	4.0	4.2

FIGURE 24 FREQUENCY RATE



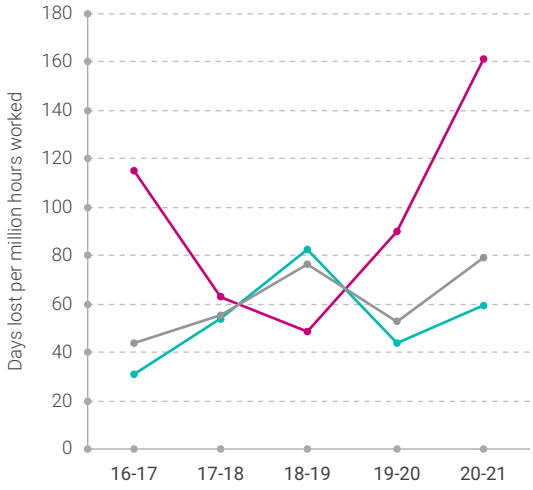
	16-17	17-18	18-19	19-20	20-21
Underground	8.9	4.4	4.0	3.8	3.1
Surface	3.0	1.3	2.2	1.5	1.8
Total	3.9	1.9	2.5	1.9	2.1

FIGURE 25 DURATION RATE



	16-17	17-18	18-19	19-20	20-21
Underground	12.9	14.2	12.2	23.8	52.1
Surface	10.2	41.1	38.2	29.3	33.1
Total	11.2	29.6	30.6	27.2	38.6

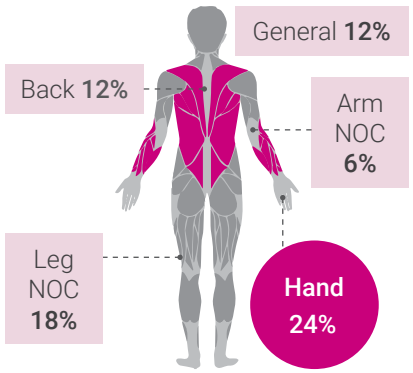
FIGURE 26 INJURY INDEX



	16-17	17-18	18-19	19-20	20-21
Underground	115	63	49	90	161
Surface	31	54	82	44	60
Total	44	56	76	53	79

EXPLORATION INJURIES 2020-21

Exploration employed an average of **4,343** workers, that is about 3% of the total mining workforce



LTIFR for exploration was **2.0**, compared to 2.0 for all mining

EXPLORATION LOST TIME INJURIES

The performance indicators for the mineral exploration sector showed an overall improvement for 2020-21. Figures 27 to 30 depict the performance indicators of incidence, frequency and duration rates, and injury index.

Performance indicator trends for the exploration sector in 2020-21 are summarised below.

- The incidence rate improved by 50%, falling from 7.8 to 3.9.
- The frequency rate improved by 52%, falling from 4.2 to 2.0.
- The duration rate improved by 82%, falling from 33.4 to 6.1.
- Overall improvement of the duration rate and frequency rate resulted in an improvement of 91% in the injury index, falling from 140 to 12.

Exploration injury percentage breakdown for 2020-21

Appendix K provides a percentage breakdown of the number of injuries for part of body, nature of injury, location of accident, and type of accident for exploration. There was a total of 17 lost time injuries reported in 2020-21.

Injuries by part of body

- Injuries to hands were the most common type of injury with 4 (24% of total), follow by leg NOC (Not otherwise classified) with 3 injuries (18%).
- Next were back and general, with each accounted for 2 injuries (12%).

Injuries by nature

- Laceration was the highest ranking nature of injury for surface injuries with 5 injuries (29% of total).
- Sprain or strain injuries were next with 4 injuries (24% of the total), then fracture with 3 injuries (18%).

Injuries by location

- All injuries were in exploration areas (100%).

Injuries by type of accident

- Caught by or between still or moving objects and struck by object each accounted for 3 (18%) injuries.
- This is followed by bites from insects or animals, over-exertion or strenuous movements, and slipping or tripping injuries, each accounted for 2 (12%) injuries.

Exploration LTI performance indicators 2016-17 to 2020-21

FIGURE 27 INCIDENCE RATE

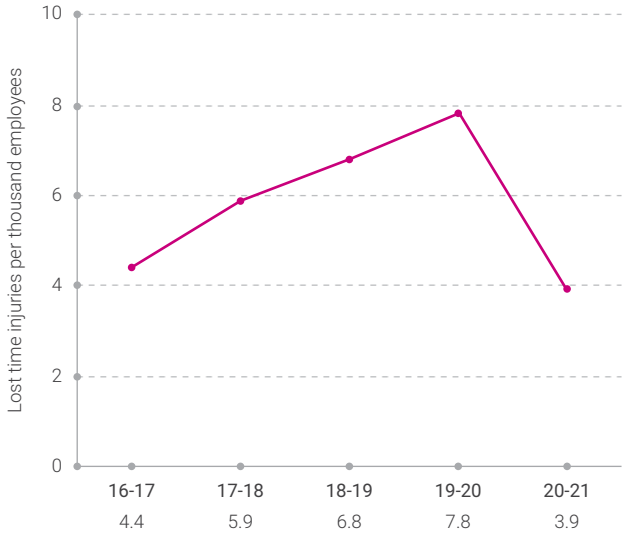


FIGURE 28 FREQUENCY RATE

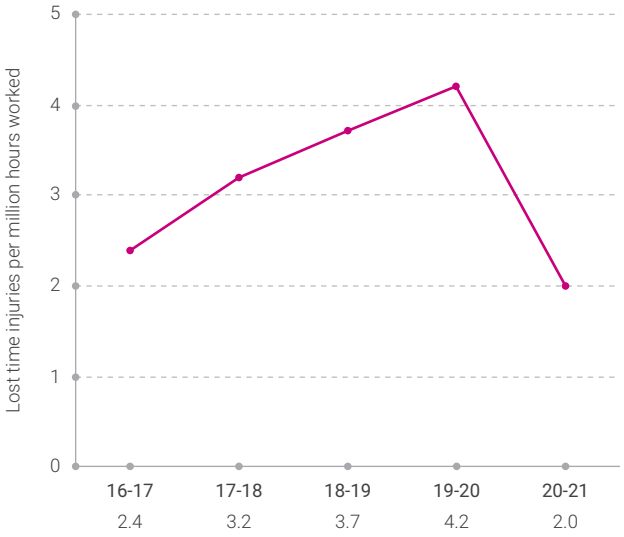


FIGURE 29 DURATION RATE

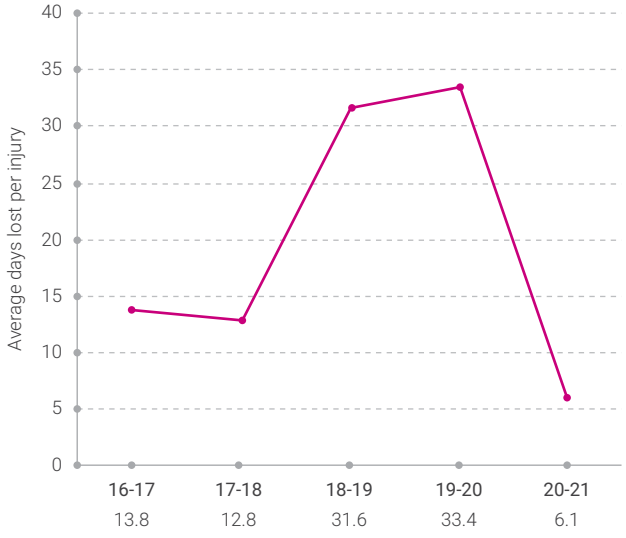
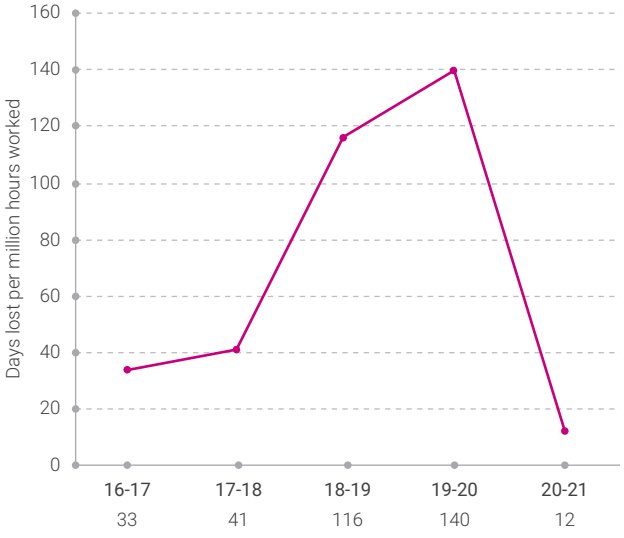


FIGURE 30 INJURY INDEX



RESTRICTED WORK INJURIES

Review of restricted work injuries during 2020-21

In addition to the 458 mining LTIs in 2020-21, there were 851 restricted work injuries (RWIs) reported (847 in metalliferous mines and 4 in coal mines), bringing the total number of mining reportable injuries to 1,309. There were also 17 exploration LTIs and 43 exploration RWIs reported, resulting in 60 reportable injuries. A breakdown of these data with performance indicators is shown in Tables 10 and 11.

Of the 851 mining and 43 exploration restricted work injuries in total, 649 mining and 30 exploration injuries resulted in the injured person not returning to their regular duties for two weeks or more.

Note: Restricted work injury includes circumstances where the injured person:

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

TABLE 10 RESTRICTED WORK INJURIES 2020-21

Sector	No. of employees	Restricted work injuries			Reportable injuries (RWIs and LTIs)		
		No. of injuries	Incidence rate	Frequency rate	No. of injuries	Incidence rate	Frequency rate
Metalliferous surface	130,853	687	5.3	3.4	1,070	8.2	5.3
Metalliferous underground	12,174	160	13.1	6.8	217	17.8	9.2
Metalliferous total	143,027	847	5.9	3.7	1,287	9.0	5.7
Coal total	1,002	4	4.0	3.1	22	22.0	17.1
Total mining	**144,029**	**851**	**5.9**	**3.7**	**1,309**	**9.1**	**5.7**
Exploration	4,343	43	9.9	5.1	60	13.8	7.2

TABLE 11 RESTRICTED WORK INJURIES BY MINERAL MINED 2020-21

Mineral mined	No. of employees	Restricted work injuries			Reportable injuries (RWIs and LTIs)		
		No. of injuries	Incidence rate	Frequency rate	No. of injuries	Incidence rate	Frequency rate
Iron ore	76,150	302	4.0	2.5	434	5.7	3.6
Gold	34,154	276	8.1	4.9	403	11.8	7.1
Bauxite and alumina	10,079	138	13.7	10.1	234	23.2	17.1
Nickel	7,348	67	9.1	4.4	98	13.3	6.5
Construction materials	2,661	1	0.4	0.7	6	2.3	4.4
Base metals	2,319	23	9.9	6.1	27	11.6	7.2
Tin, tantalum and lithium	2,419	9	3.7	2.4	16	6.6	4.3
Mineral sands	2,814	6	2.1	1.6	8	2.8	2.1
Coal	1,002	4	4.0	3.1	22	22.0	17.1
Salt	878	3	3.4	2.4	6	6.8	4.8
Diamonds	320	1	3.1	1.9	1	3.1	1.9
Other	3,887	21	5.4	3.8	54	13.9	9.7
Total mining	**144,029**	**851**	**5.9**	**3.7**	**1,309**	**9.1**	**5.7**

RESTRICTED WORK INJURIES CONTINUED

Restricted work injury performance indicators

The restricted work injury performance indicators for the mining sector showed a general improvement during 2020-21.

Exploration had an overall deterioration in 2020-21. Figures 31 to 34 depict the performance indicators of incidence rate, frequency rate, days off per injury and days off per million hours worked.

- The overall incidence rate for mining improved by 11%, falling from 6.6 to 5.9. The surface incidence rate improved by 13% (from 6.0 to 5.2), while the underground incidence rate improved slightly by 2% (from 13.3 to 13.1). The incidence rate for exploration deteriorated by 36%, rising from 7.3 to 9.9.
- The overall frequency rate for mining improved by 12%, falling from 4.2 to 3.7. The surface frequency rate improved by 13%, falling from 3.9 to 3.4, while the underground frequency rate deteriorated by 3%, rising from 6.6 to 6.8. The frequency rate for exploration deteriorated by 31%, rising from 3.9 to 5.1.
- The average number of rostered days of restricted work per RWI (comparable to the LTI Duration rate) improved by 6%, falling from 34.7 to 32.7. Surface restricted work days per RWI improved slightly by 2% (from 34.6 to 34.0), and restricted work days per underground RWI also improved by 23%, falling from 35.1 to 27.0. Average restricted work days per RWI for exploration deteriorated by 7%, rising from 29.3 to 31.3.
- The fall in the mining restricted work days worked per restricted work injury combined with the fall of frequency rate, resulted in an overall improvement of 15% (from 144 to 122) in the overall restricted work days worked per million hours (comparable to the LTI Injury Index) for mining. The surface restricted work days per million hours worked improved by 14% (from 134 to 115). The restricted work days per million hours worked underground also improved by 20% (from 231 to 184). Exploration restricted work days per million hours worked deteriorated by 41%, rising from 114 to 161.

Restricted work injury percentage breakdown for 2020-21

Appendices L, M and N 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. There was a total of 851 mining related restricted injuries (160 underground, 691 surface) and 43 exploration injuries reported in 2020-21.

Injuries by part of body

- **Underground:** Hands were the most frequently injured part of body with 51 injuries (32% of total), followed by back with 21 injuries (13%), shoulder with 19 injuries (12%), and ankle with 13 injuries (8%).
- **Surface:** Hand injuries (183) accounted for the largest proportion of surface restricted work injuries at 26%, followed by back with 94 injuries (14%), shoulder with 79 injuries (11%), then knee and ankle with 64 injuries (9%) each.
- **Exploration:** Hand injuries accounted for 14 injuries of RWIs (33% of total), followed by ankle with 6 injuries (14%), then back and shoulder with 5 injuries (12%) each.

Injuries by nature

- **Underground:** Sprain or strain was the highest ranking nature of injury for underground restricted work injuries with 83 injuries (52% of total), followed by laceration with 26 injuries (16%), then fracture with 22 injuries (14%).
- **Surface:** Sprain or strain was the highest ranking nature of injury for surface restricted work injuries with 407 injuries (59% of total), followed by fracture with 87 injuries (13%), then laceration with 82 injuries (12%).
- **Exploration:** Sprain or strain, with 23 injuries (53% of total), was the highest ranking nature of injury, followed by crushing and laceration with 6 injuries (14%) each. The next most common was fracture, with 3 injuries (7%).

Injuries by location

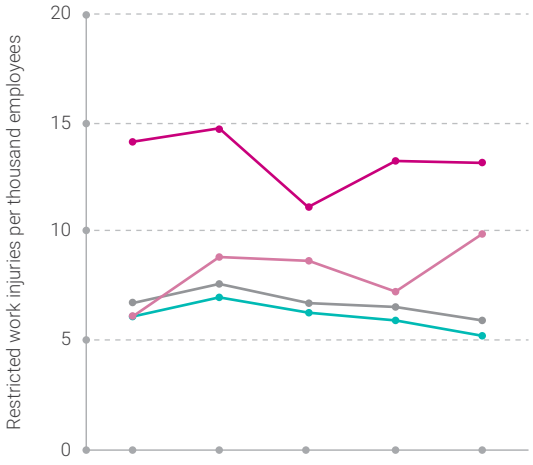
- **Underground:** The largest proportion of underground injuries occurred in production and development areas with 109 injuries (68% of total), followed by access, travelling or haulage ways with 32 injuries (20%).
- **Surface:** The largest proportion of surface injuries occurred in treatment plants with 241 injuries (35% of total), followed by open pits with 148 injuries (21%), then workshops with 118 injuries (17%).
- **Exploration:** All exploration injuries occurred in general exploration areas.

Injuries by type

- **Underground:** Over-exertion or strenuous movement with 42 injuries (26% of total) was the most common accident type for underground injuries, followed by caught by or between still or moving object with 27 injuries (17%), stepping with 17 injuries (11%), and struck by object with 16 injuries (10%).
- **Surface:** The most common accident type for surface injuries was over-exertion or strenuous movements with 230 injuries (33% of total), followed by stepping with 91 injuries (13%), then caught by or between still or moving objects (82 injuries) and slipping or tripping (81 injuries) at 12% each.
- **Exploration:** Over-exertion or strenuous movement at 33% (14 injuries) was the most common type of accident, followed by struck by objects at 14% (6 injuries), then caught by or between still or moving objects at 12% (5 injuries).

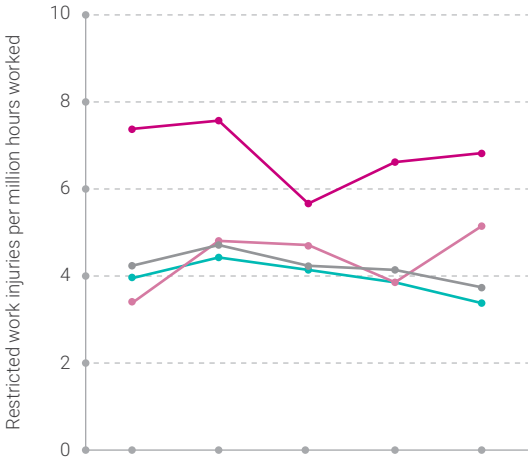
Restricted work injury performance indicators 2016-17 to 2020-21

FIGURE 31 INCIDENCE RATE



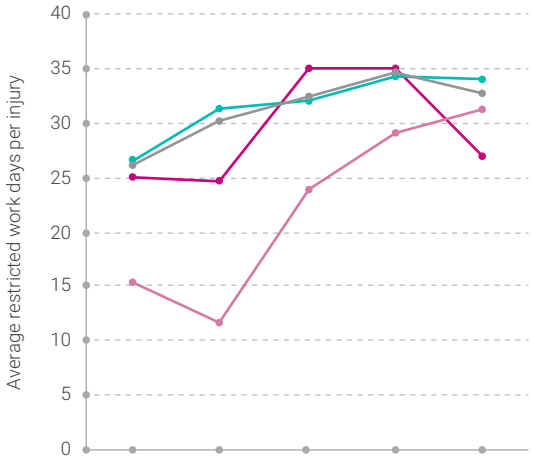
	16-17	17-18	18-19	19-20	20-21
Underground	14.2	14.8	11.2	13.3	13.1
Surface	6.1	7.0	6.3	6.0	5.2
Total	6.7	7.6	6.7	6.6	5.9
Exploration	6.1	8.9	8.7	7.3	9.9

FIGURE 32 FREQUENCY RATE



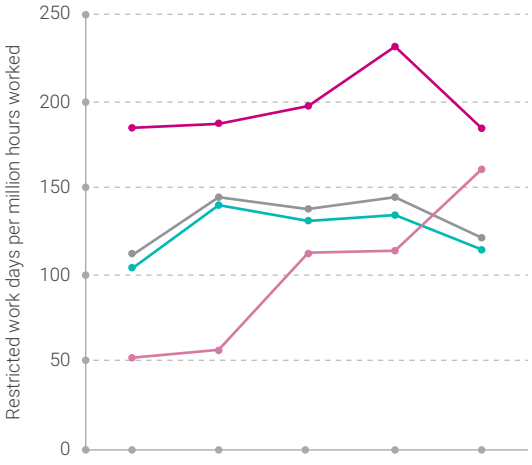
	16-17	17-18	18-19	19-20	20-21
Underground	7.3	7.5	5.6	6.6	6.8
Surface	3.9	4.4	4.1	3.9	3.4
Total	4.2	4.7	4.2	4.2	3.7
Exploration	3.4	4.8	4.7	3.9	5.1

FIGURE 33 DURATION RATE



	16-17	17-18	18-19	19-20	20-21
Underground	25.2	24.9	35.1	35.1	27.0
Surface	26.6	31.5	32.1	34.6	34.0
Total	26.4	30.5	32.5	34.7	32.7
Exploration	15.5	11.8	24.0	29.3	31.3

FIGURE 34 INJURY INDEX



	16-17	17-18	18-19	19-20	20-21
Underground	185	186	197	231	184
Surface	104	140	131	134	115
Total	112	144	138	144	122
Exploration	53	57	113	114	161

APPENDICES

ABBREVIATIONS USED IN APPENDICES

Chem/fumes – chemicals or fumes

Exp to – exposure to

NOC – not otherwise classified

Sprain/strain – sprain or strain injuries

U/g – underground

U/g access/haul – underground access, travelling or haulage ways

U/g crush – Underground crushing areas

U/g prod/dev – underground production or development areas

U/g ore/waste dmpg – underground ore or waste dumping areas

APPENDIX A

DESCRIPTIONS OF COMMONLY USED TERMS FOR THE TYPE OF ACCIDENT

Bite insect/animal – bites or stings from insects, spiders, snakes and other animals

C/by between – caught by or between still or moving objects (e.g. finger caught between two pipes while attempting to move one of them) but does not include getting caught between parts of an operating machine

C/by machine – caught between parts of an operating machine

C/w chem/fumes – inhalation, absorption or ingestion of chemicals or fumes; includes smoke, blast fumes, acids, caustic substances and industrial solvents

C/w electric current – contact with electric current; includes electric shock, electrocution, burning from electric current and static electricity discharge

C/w foreign body – contact with foreign body; includes entry into the skin, eyes, nose, ears, mouth or other part of the body by an object, but does not include sharp objects such as metal splinters

C/w friction/rubbing – blistering or abrasion due to rubbing by footwear, clothing or personal equipment

C/w hi press fluid – contact with high pressure fluid, including hydraulic fluid.

C/w hot substance – contact with hot solid, liquid, gas or steam, molten metal or naked flame; usually results in burns

C/w sharp object – contact with sharp object (e.g. metal splinter) but does not include objects such as sharp tools or operating machines

C/w tool – contact with a handheld manual or power tool

Exp to dust – exposure to environmental dust

Exp to heat – exposure to environmental heat; usually results in injuries related to heat stress

Exp to mental stress – stress-related conditions; includes post-traumatic stress and effects of workplace harassment

Explosion comp air – compressed air explosions, including pressure vessel and tyre explosions

Fall from height – fall from height equal to or greater than 0.5 metres; includes falls from vehicles or mobile equipment but does not include falls while getting on or off the vehicle or mobile equipment

Fall getting on/off – falls getting on or off vehicles or mobile equipment but does not include falls stepping on uneven ground while disembarking from a vehicle or mobile equipment

Jumping – jumping by a person; includes jumping to a higher or lower level or from a moving object

Over/stren mov – over-exertion or strenuous movements; usually associated with lifting, carrying, pulling, pushing and moving objects; also includes strenuous movements, repetitive movements with no specific event, and working in a confined area or while in an awkward posture

Rockfall – falls of rock usually from the face, walls and backs of underground excavations or from the face and walls of surface excavations

S/against object – struck against stationary or moving objects (e.g. hitting head on low structure while walking)

S/by object – struck by falling, flying, sliding or moving objects but does not include rockfalls or being struck by persons, vehicles or mobile equipment

S/by veh/mob – struck by a vehicle or mobile equipment

Slip/trip – other falls not from height or while getting on or off vehicles or mobile equipment; includes falls on stairs, falls on slippery or uneven ground, falls over loose or fixed objects and falls while handling equipment

Stepping – stepping on object, loose rock, uneven surface or to a higher or lower level; includes stepping on uneven ground while disembarking from a vehicle or mobile equipment; usually results in a sprain or strain to the ankle or knee

Veh/mob collision – vehicle or mobile equipment collision; includes colliding with stationary objects or walls

Veh/mob jolt/jar – vehicle or mobile equipment jolting or jarring (e.g. jolting or jarring while driving over an uneven surface, sitting in a truck being loaded with large material, bogging a face, ripping with a bulldozer)

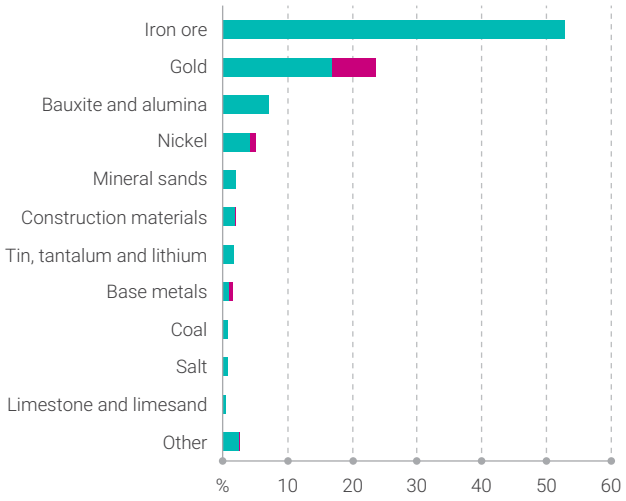
Veh/mob rollover – vehicle or mobile equipment rollovers; includes partial rollovers

APPENDIX B

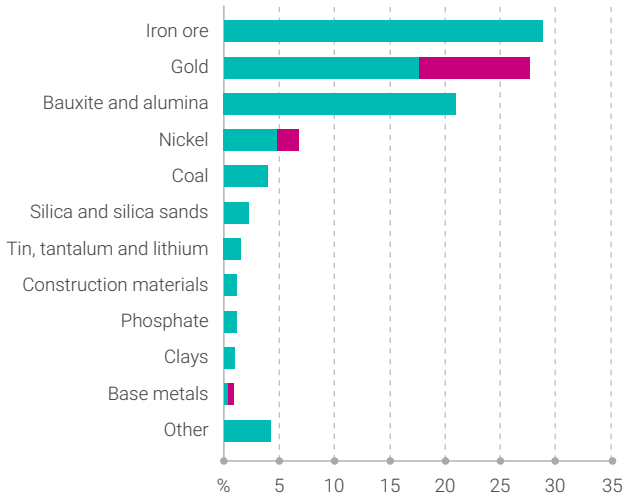
WESTERN AUSTRALIAN MINES 2020-21

458 lost time injuries

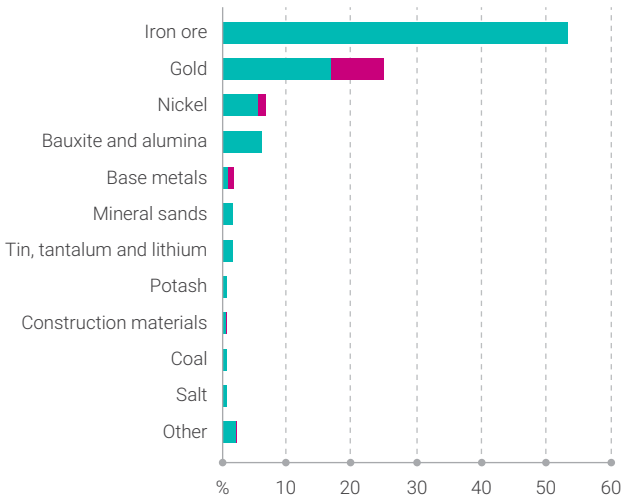
PERCENTAGE OF EMPLOYEES



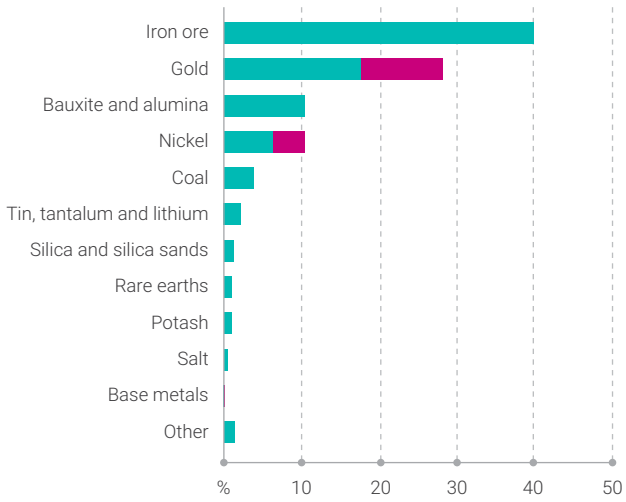
PERCENTAGE OF INJURIES



PERCENTAGE OF HOURS WORKED



PERCENTAGE OF WORK DAYS LOST

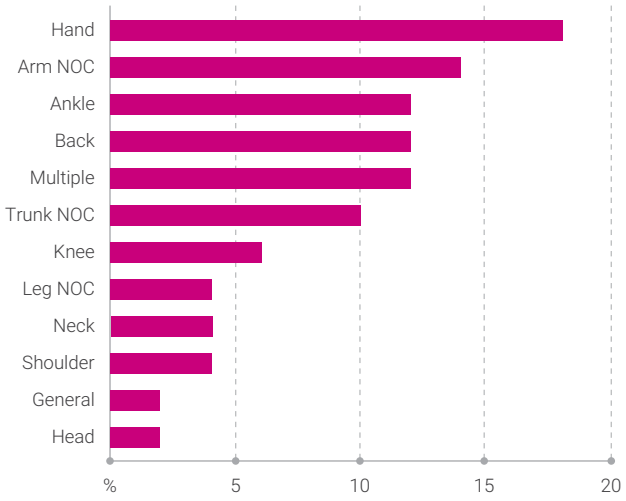


APPENDIX C

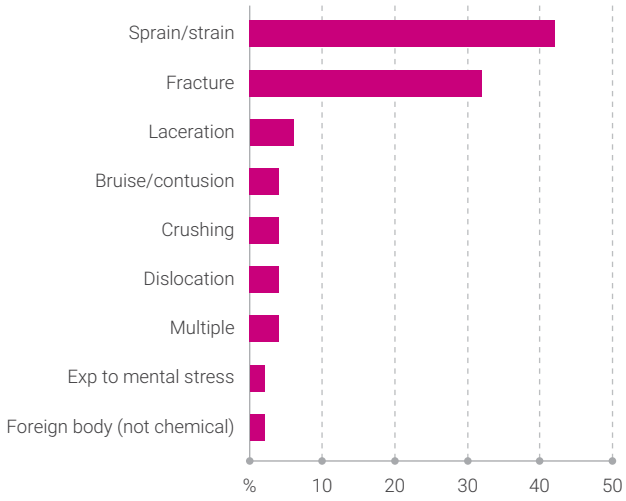
SERIOUS INJURIES UNDERGROUND 2020-21

50 lost time injuries

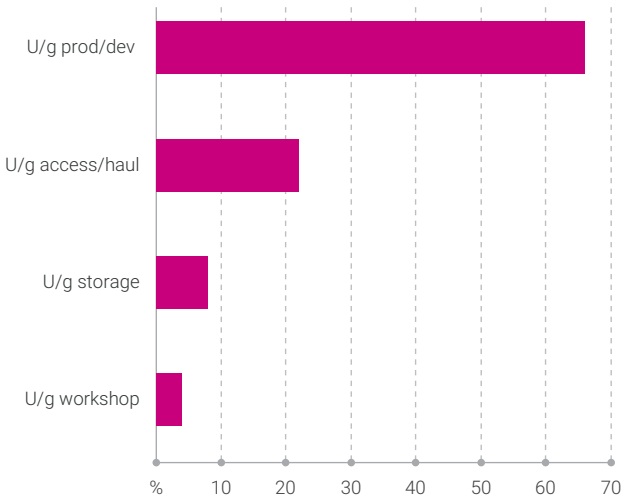
PART OF BODY



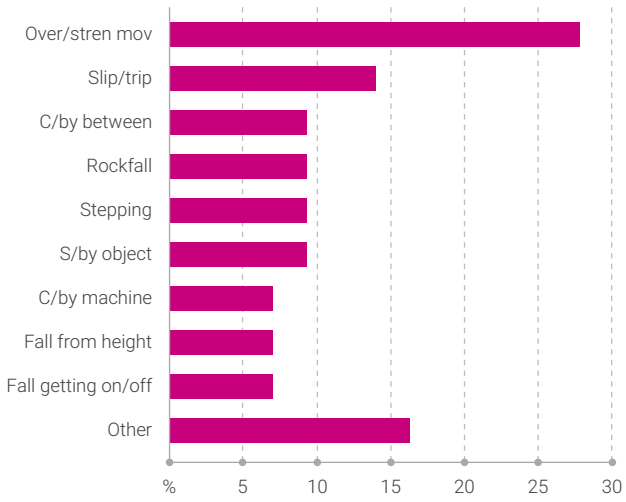
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

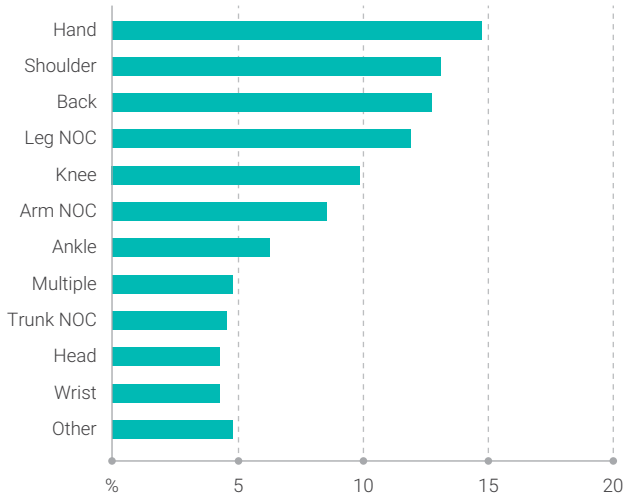


APPENDIX D

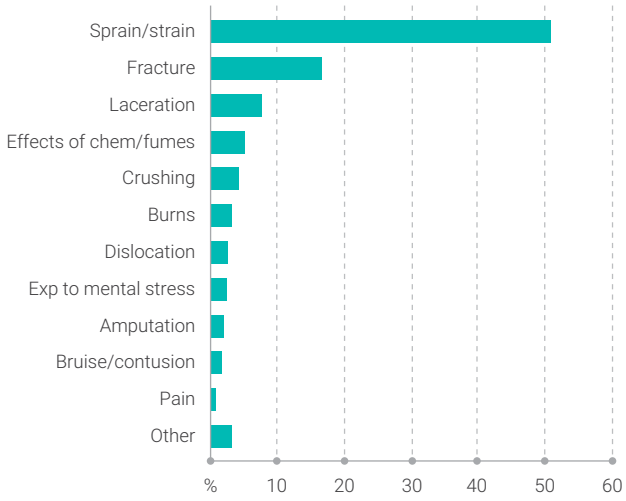
SERIOUS INJURIES SURFACE 2020-21

352 lost time injuries

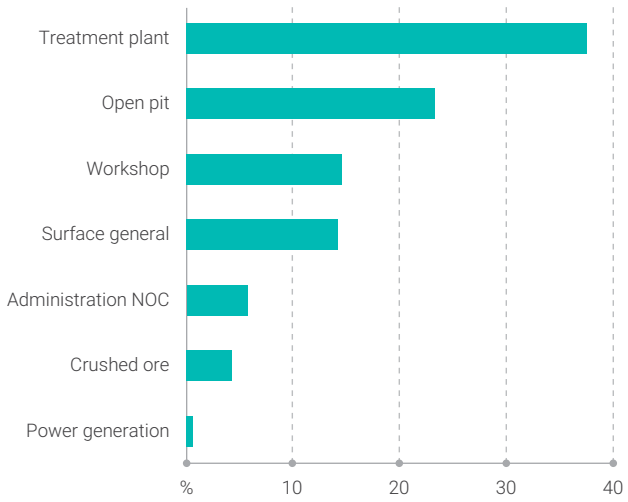
PART OF BODY



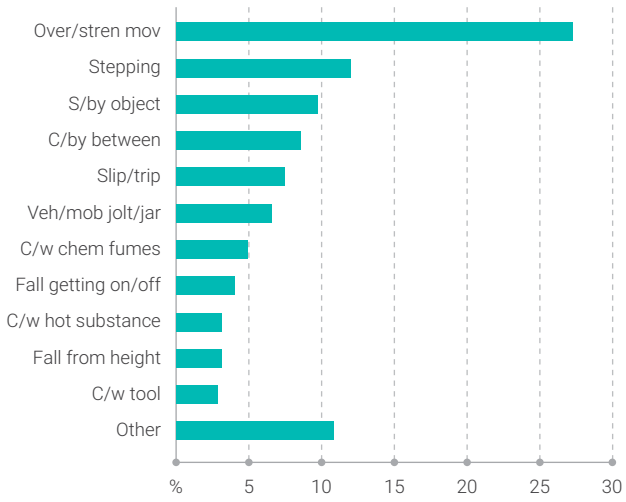
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

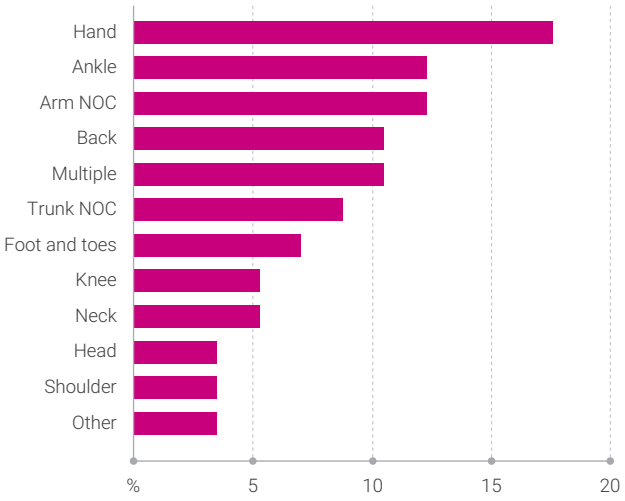


APPENDIX E

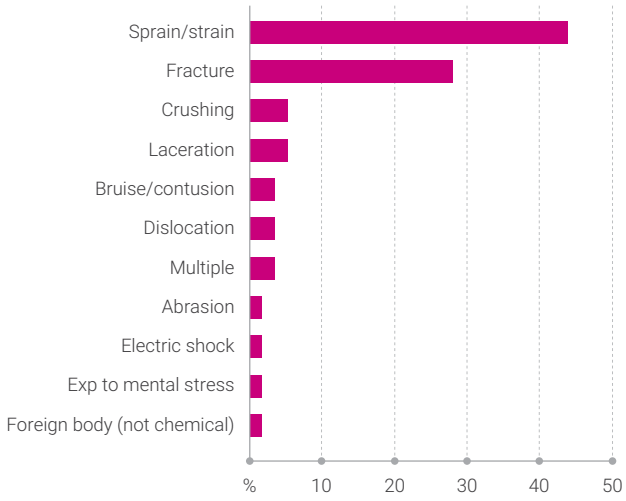
METALLIFEROUS UNDERGROUND INJURIES 2020-21

57 lost time injuries

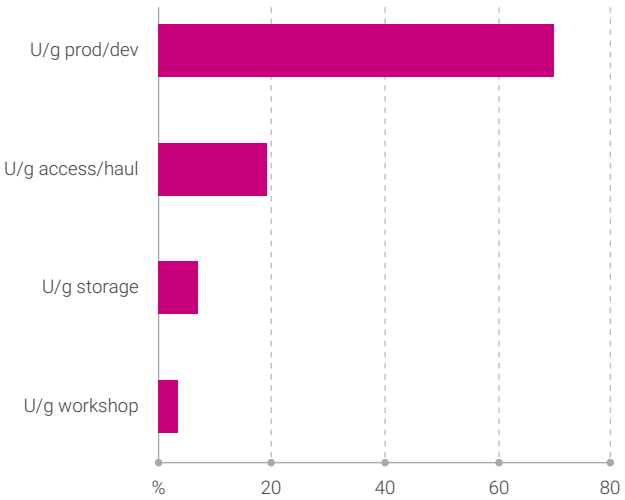
PART OF BODY



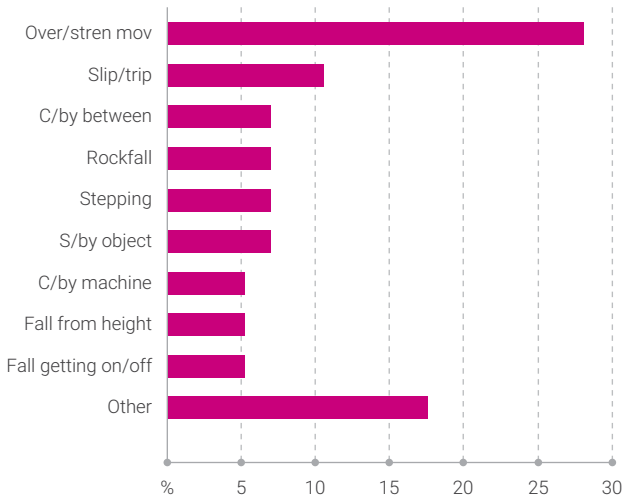
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

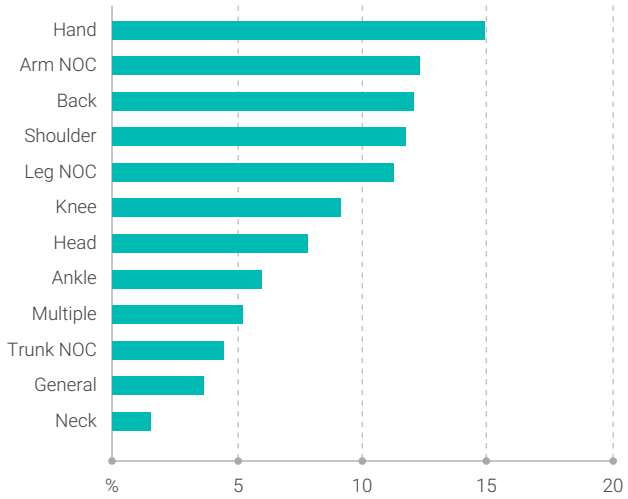


APPENDIX F

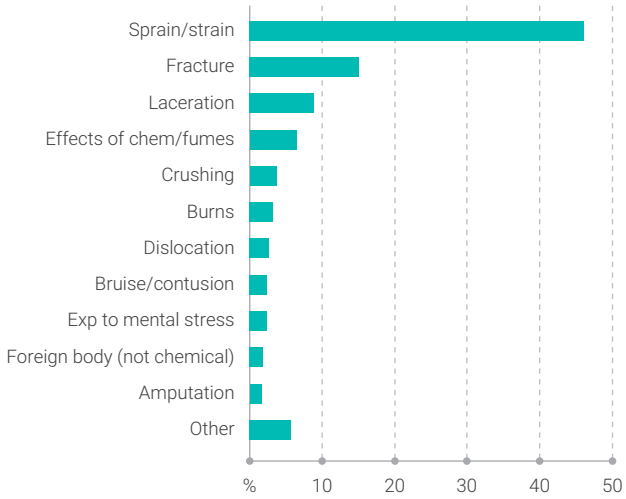
METALLIFEROUS SURFACE INJURIES 2020-21

383 lost time injuries

PART OF BODY



NATURE OF INJURY



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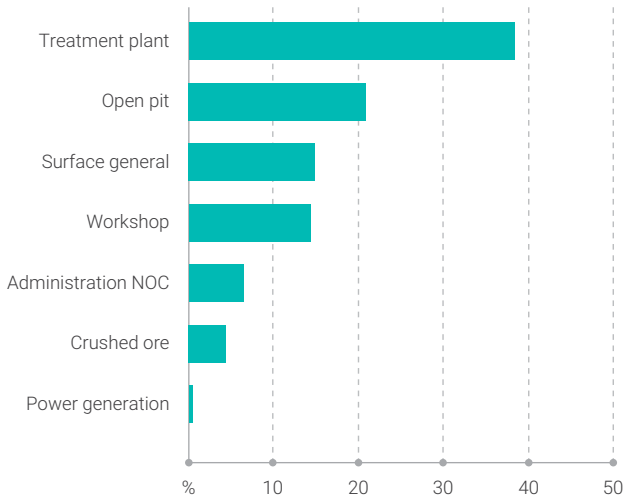
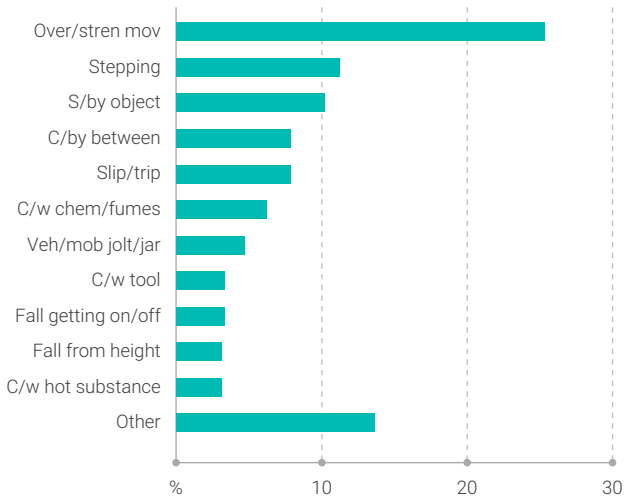


TYPE OF ACCIDENT



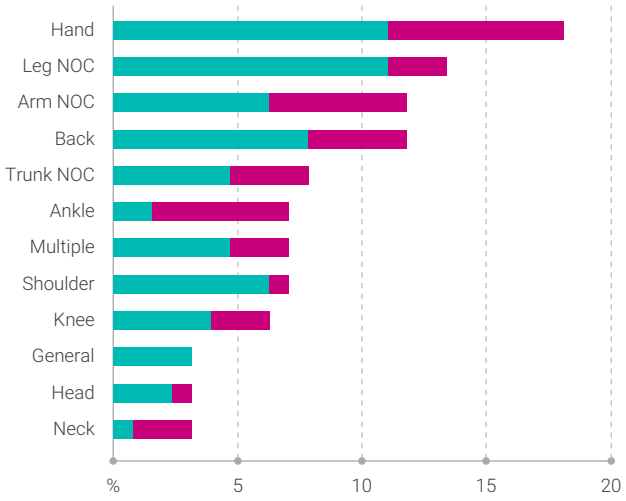
APPENDIX G

GOLD INJURIES 2020-21

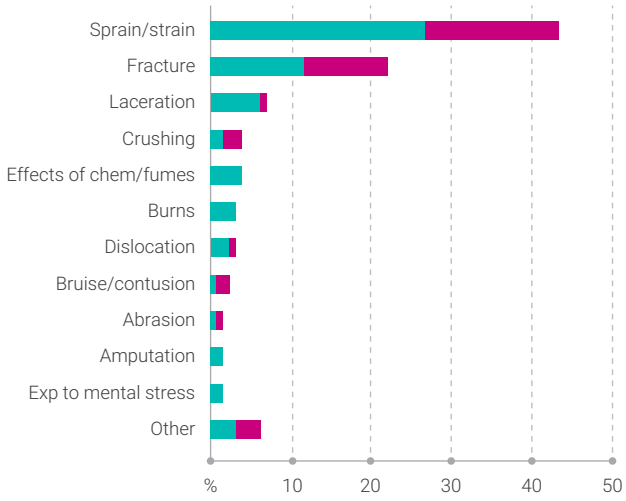
127 lost time injuries

Surface Underground

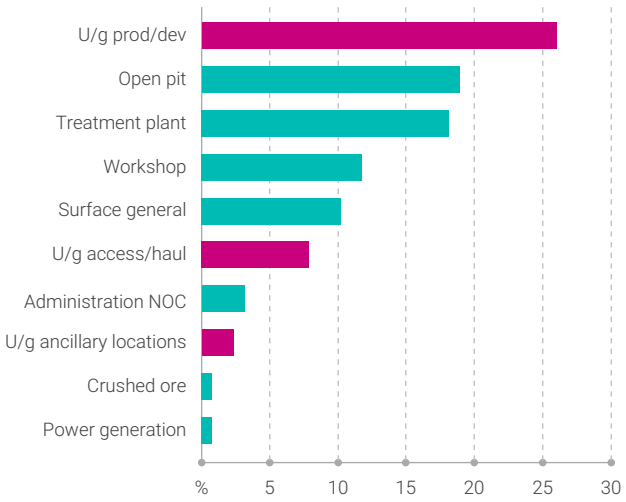
PART OF BODY



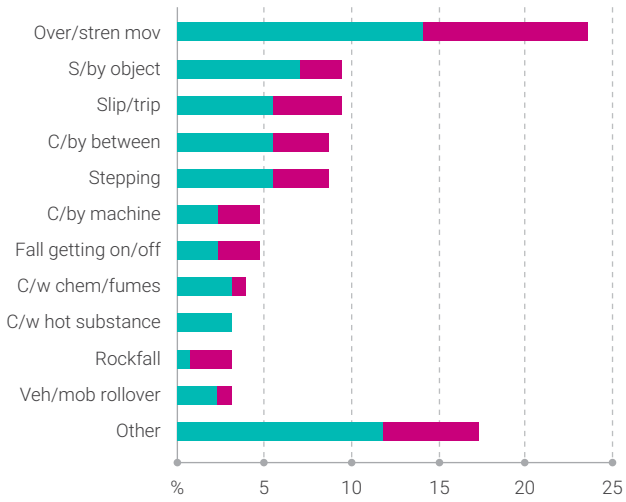
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

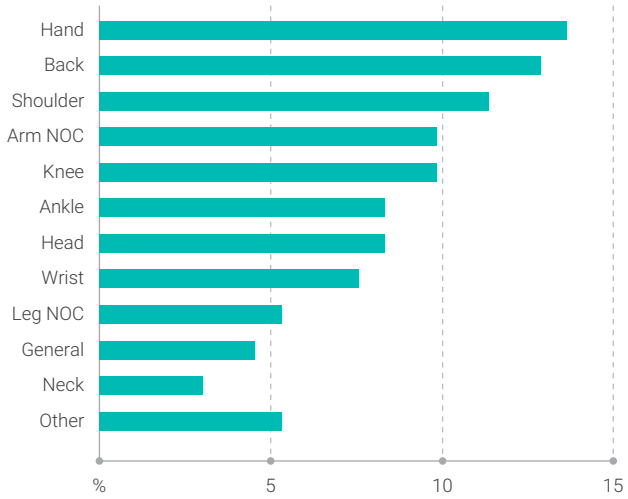


APPENDIX H

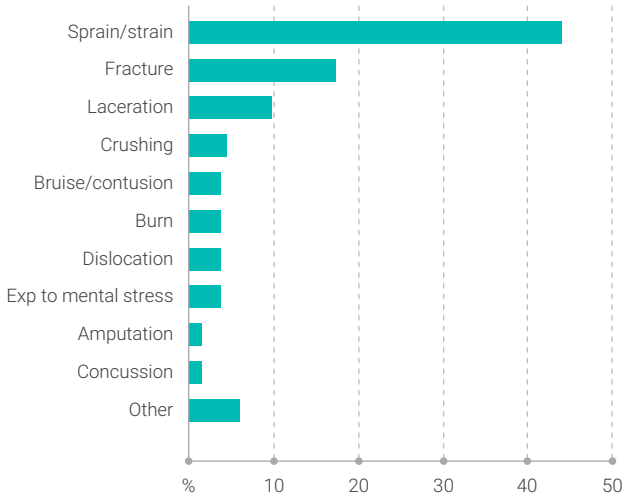
IRON ORE INJURIES 2020-21

132 lost time injuries

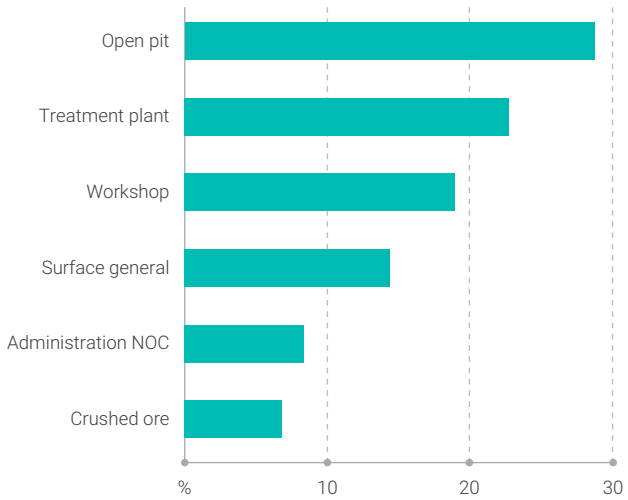
PART OF BODY



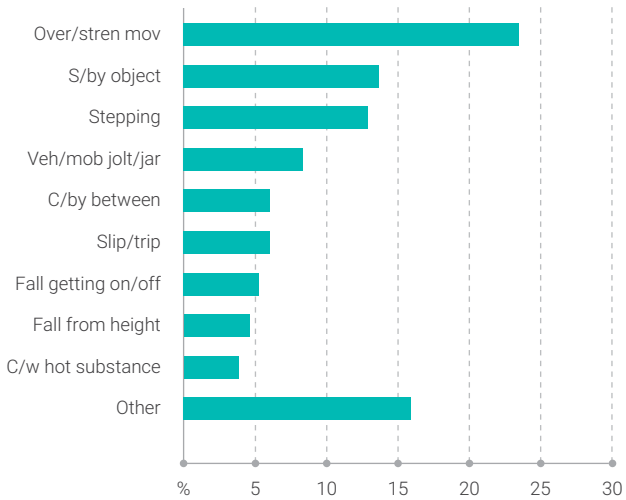
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

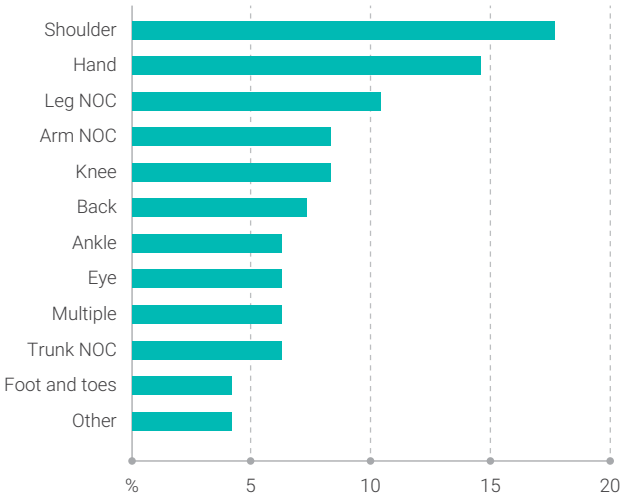


APPENDIX I

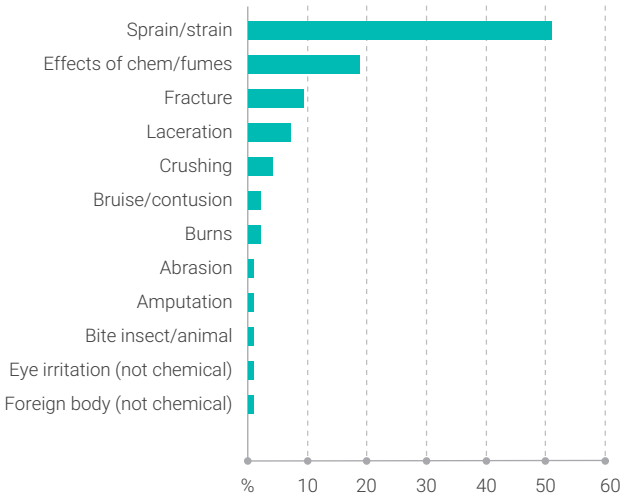
BAUXITE AND ALUMINA INJURIES 2020-21

96 lost time injuries

PART OF BODY



NATURE OF INJURY



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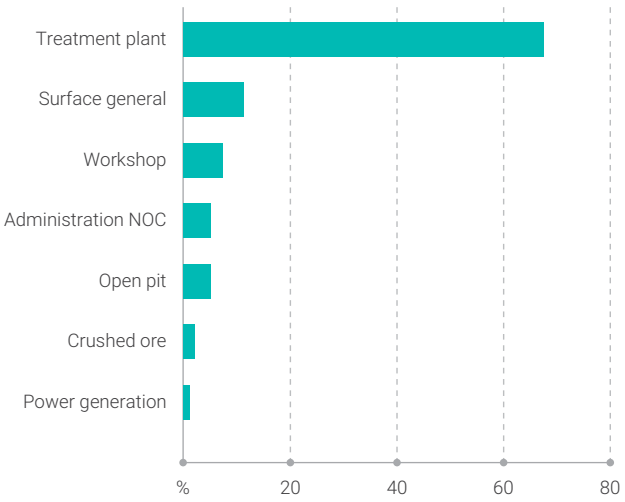
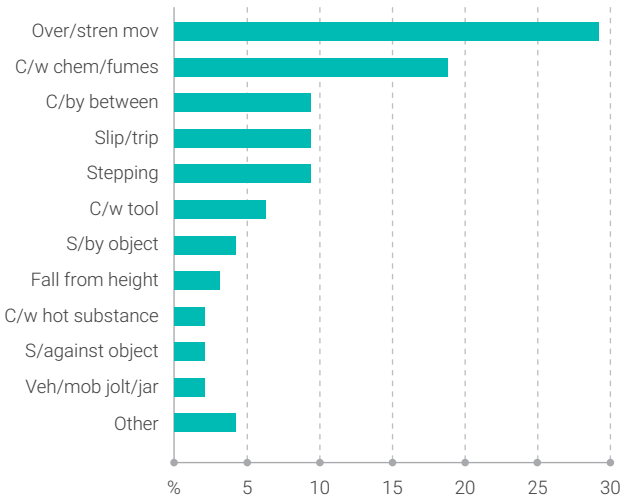


TYPE OF ACCIDENT

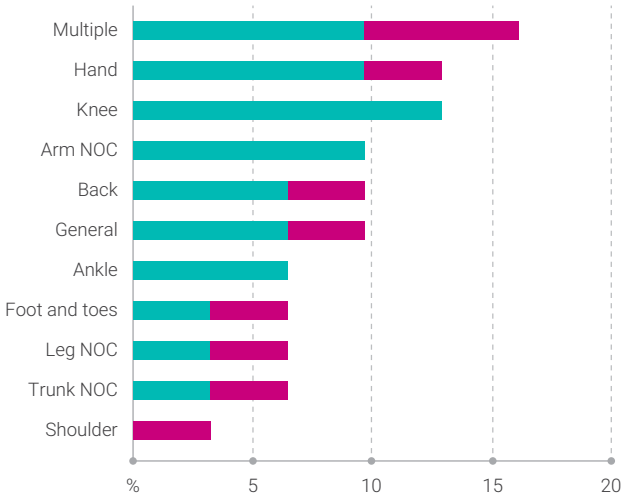


APPENDIX J

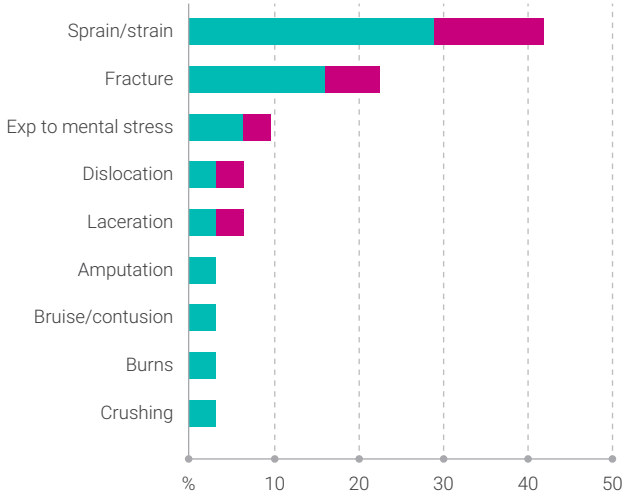
NICKEL INJURIES 2020-21

31 lost time injuries

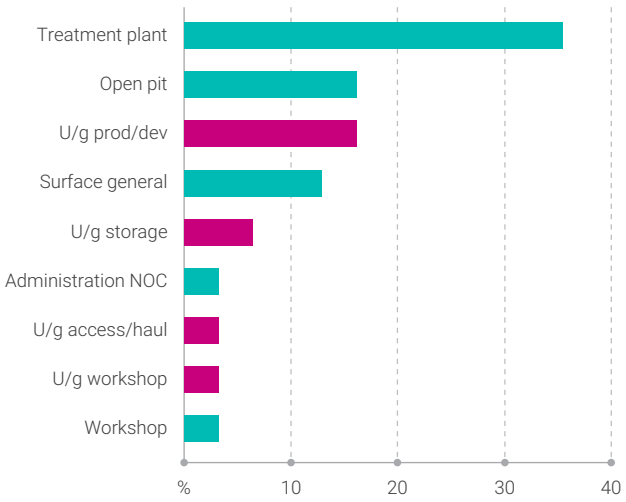
PART OF BODY



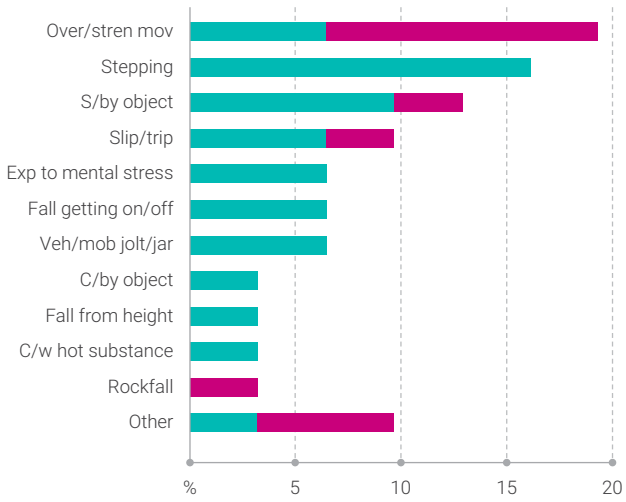
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

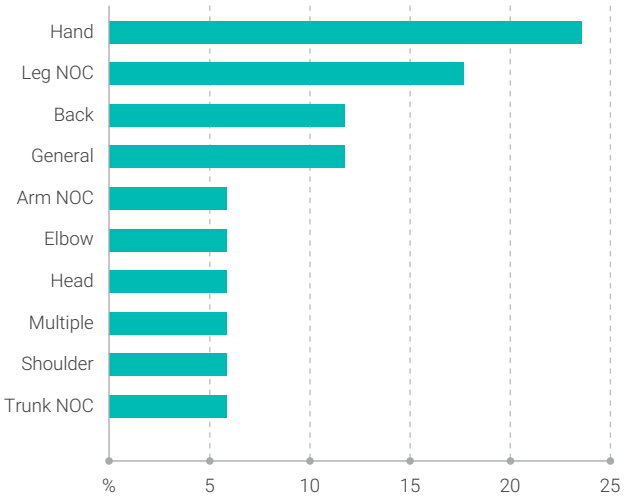


APPENDIX K

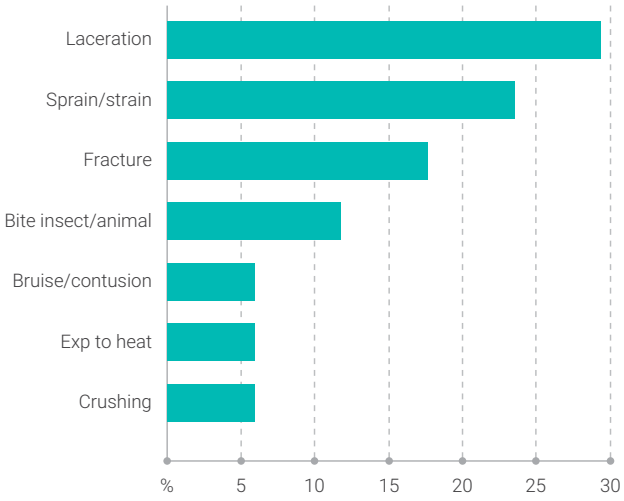
EXPLORATION INJURIES 2020-21

17 lost time injuries

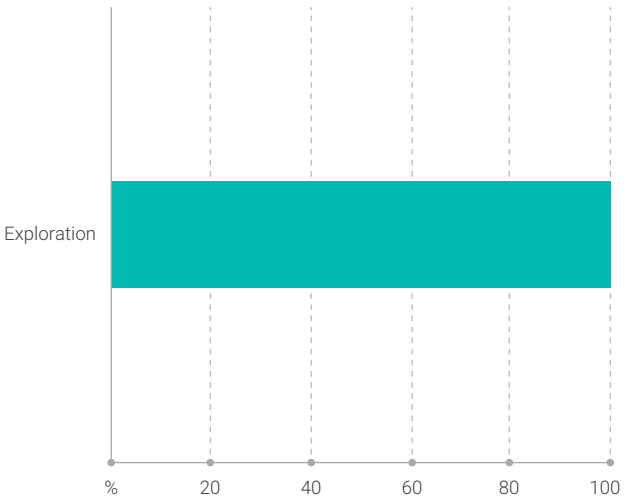
PART OF BODY



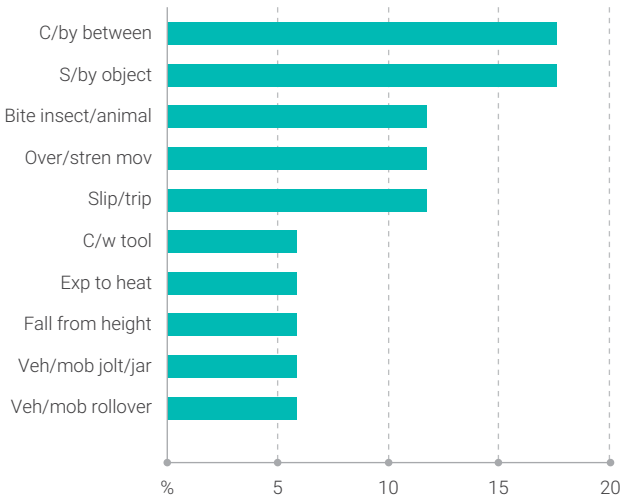
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

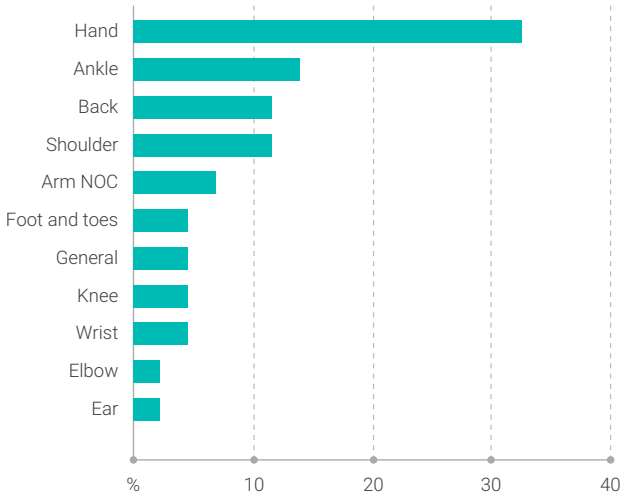


APPENDIX L

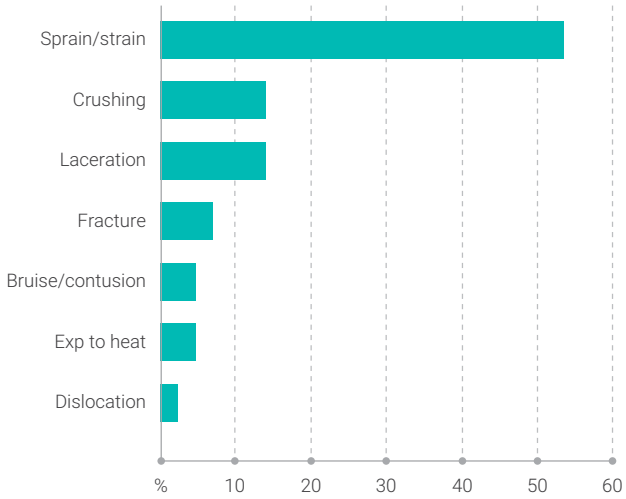
EXPLORATION RESTRICTED WORK INJURIES 2020-21

43 restricted work injuries

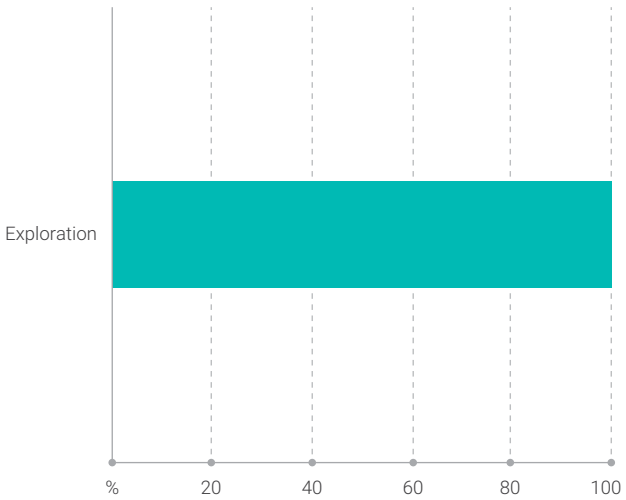
PART OF BODY



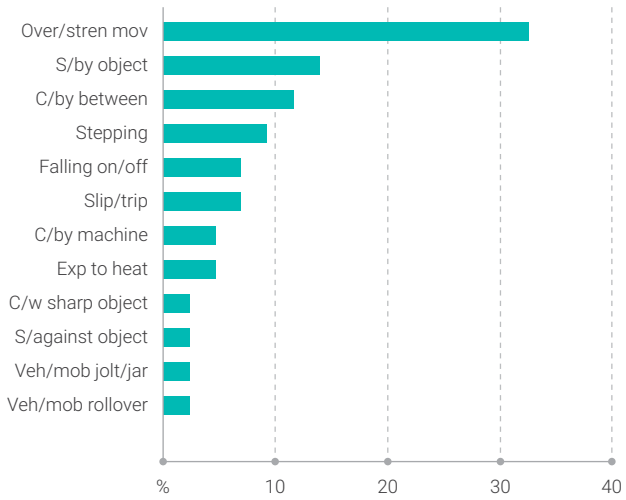
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

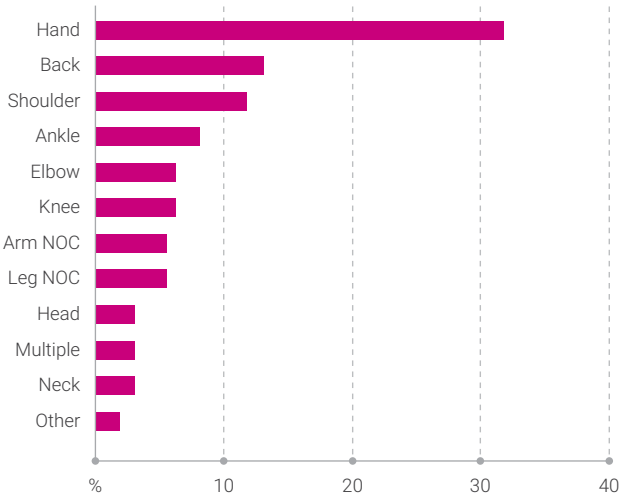


APPENDIX M

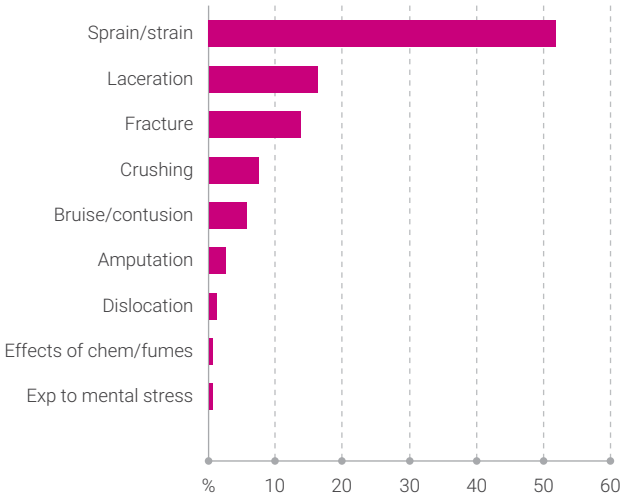
RESTRICTED WORK INJURIES UNDERGROUND 2020-21

160 restricted work injuries

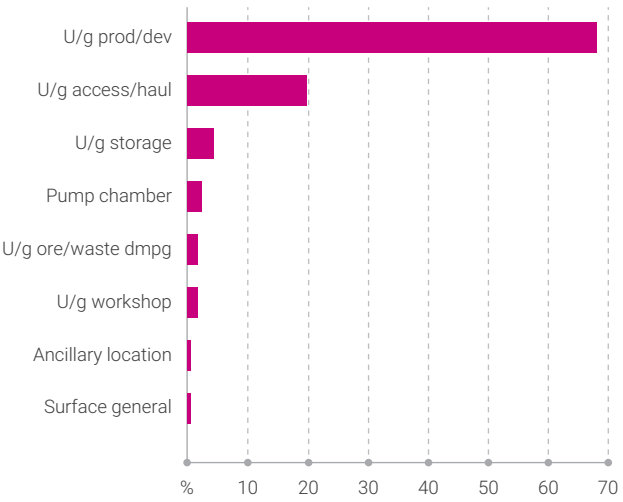
PART OF BODY



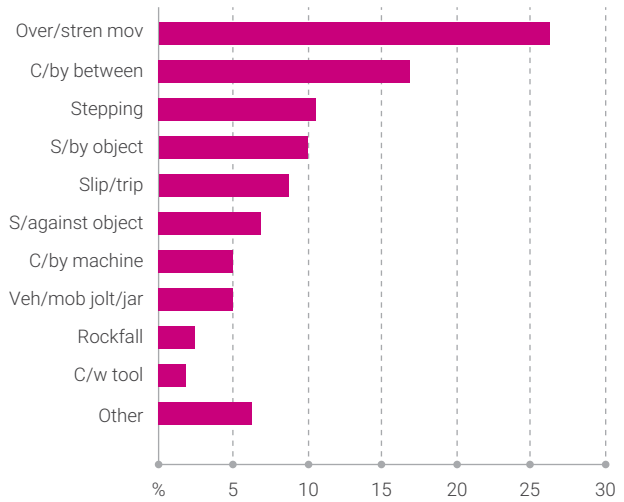
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT

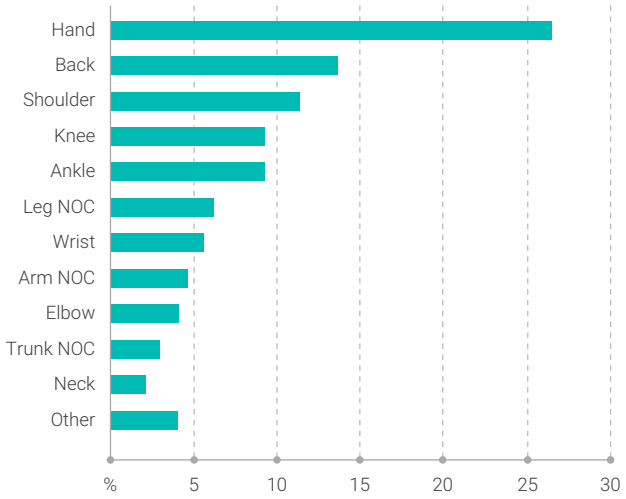


APPENDIX N

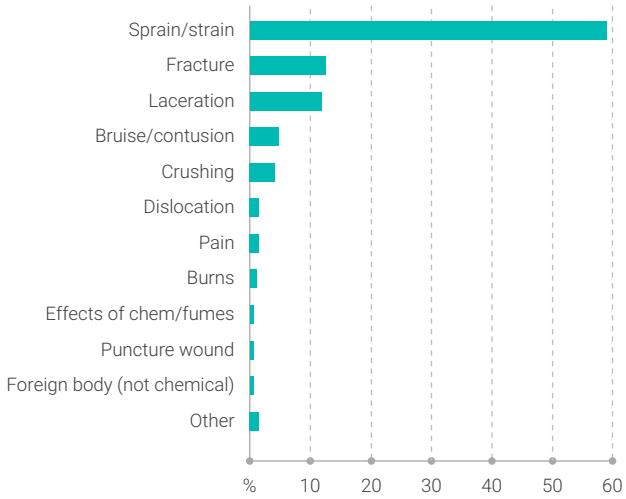
RESTRICTED WORK INJURIES SURFACE 2020-21

691 restricted work injuries

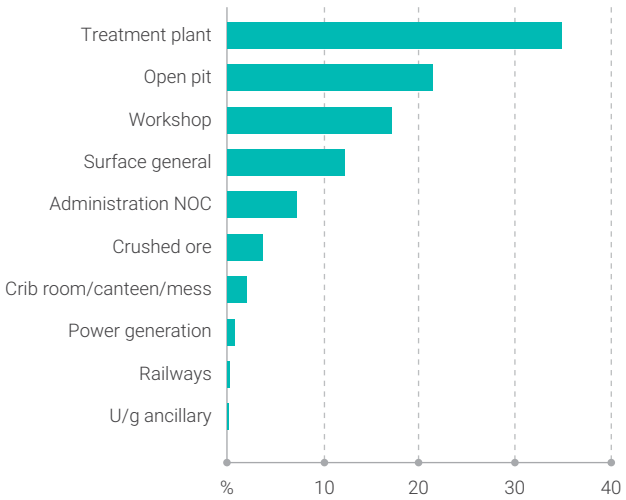
PART OF BODY



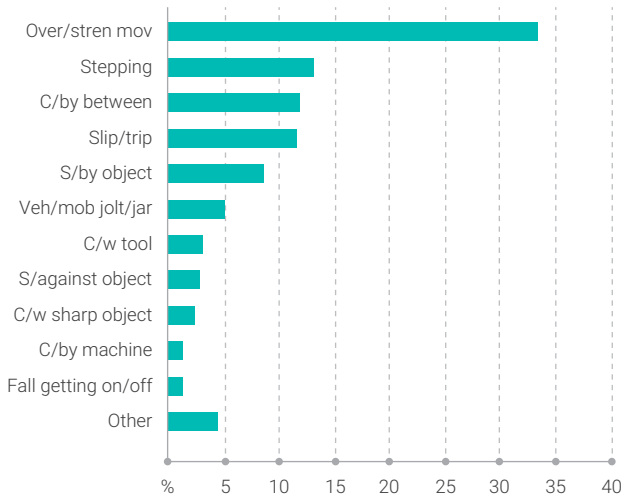
NATURE OF INJURY



LOCATION OF ACCIDENT



TYPE OF ACCIDENT



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