

# QUEENSLAND MINES AND QUARRIES SAFETY PERFORMANCE AND HEALTH REPORT

2016–2017



This publication has been compiled by the Department of Natural Resources and Mines.

© State of Queensland, 2017

The Queensland Government supports and encourages the dissemination and exchange of its information.  
The copyright in this publication is licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.

Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms.

You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

Note: Some content in this publication may have different licence terms as indicated.

For more information on this licence, visit <https://creativecommons.org/licenses/by/4.0/>.

The information contained herein is subject to change without notice. The Queensland Government shall not be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using this information

# TABLE OF CONTENTS

List of figures	5
List of tables	6
A message from Mine Safety and Health	7
<b>CHAPTER 1: INDUSTRY OVERVIEW OF SAFETY OUTCOMES</b>	<b>11</b>
Observations and emerging issues	12
Fatal injuries	12
Fatal hazards	14
Investigation report	15
Serious accidents	16
High potential incidents	17
Lost time injuries	20
<b>CHAPTER 2: SAFETY OUTCOMES FOR SURFACE COAL MINES</b>	<b>21</b>
Observations and emerging issues	22
Serious accidents	23
High potential incidents	25
Lost time injuries	26
<b>CHAPTER 3: SAFETY OUTCOMES FOR UNDERGROUND COAL MINES</b>	<b>27</b>
Observations and emerging issues	28
Serious accidents	29
High potential incidents	31
Lost time injuries	32
<b>CHAPTER 4: SAFETY OUTCOMES FOR SURFACE MINERAL MINES</b>	<b>33</b>
Observations and emerging issues	34
Serious accidents	35
High potential incidents	35
Lost time injuries	36
<b>CHAPTER 5: SAFETY OUTCOMES FOR UNDERGROUND MINERAL MINES</b>	<b>37</b>
Observations and emerging issues	38
Serious accidents	39
High potential incidents	40
Lost time injuries	41

# TABLE OF CONTENTS

<b>CHAPTER 6: SAFETY OUTCOMES FOR QUARRIES</b>	<b>42</b>
Observations and emerging issues	43
Serious accidents	44
High potential incidents	44
Lost time injuries	45
<b>CHAPTER 7: INDUSTRY OVERVIEW OF OCCUPATIONAL HEALTH OUTCOMES</b>	<b>46</b>
Observations and emerging issues	47
Mine dust lung disease	48
Respirable dust monitoring	50
Occupational health in a societal context	58
<b>CHAPTER 8: INDUSTRY OVERVIEW OF COMPLIANCE OUTCOMES</b>	<b>59</b>
Observations and emerging issues	60
Education and awareness	61
Inspections, audits and investigations	62
Corrective action	64
Prosecutions	66
Complaints about safety and health in mines and quarries	67
<b>APPENDICES</b>	<b>69</b>
Appendix 1: Data collection on mine safety and health	70
Appendix 2: Workforce profile of mines and quarries	72
Appendix 3: Fatalities in Queensland mines (all sectors) 1900 to 2017	73
Appendix 4: Safety alerts issued in 2016–17	74
Appendix 5: Safety bulletins issued in 2016–17	75
<b>ABBREVIATIONS</b>	<b>76</b>
<b>DEFINITIONS</b>	<b>77</b>

## LIST OF FIGURES

<b>Figure 1.1:</b>	Fatalities and employment numbers (all sectors), 2001–2017	13
<b>Figure 1.2:</b>	Five-year rolling average of fatality frequency rate by sector, 2001–2017	13
<b>Figure 1.3:</b>	Fatal hazards for coal, 2001–2017	14
<b>Figure 1.4:</b>	Fatal hazards for mineral mines and quarries, 2001–2017	14
<b>Figure 1.5:</b>	Number of serious accidents, by sector, 2015–2017	16
<b>Figure 1.6:</b>	Frequency rate of serious accidents, by sector, 2015–17	16
<b>Figure 1.7:</b>	Five-year rolling average of high potential incidents and five-year rolling average employment numbers (all sectors), 2003–08 to 2012–2017	17
<b>Figure 1.8:</b>	Five-year rolling average of high potential incident frequency rates by sector, 2003–08 to 2012–17	18
<b>Figure 1.9:</b>	Number of lost time injuries, all sectors, 2014–15 to 2016–17	20
<b>Figure 2.1:</b>	Serious accidents by type of hazard, surface coal mines, 2014–15 to 2016–17	23
<b>Figure 2.2:</b>	Serious accidents by equipment type, surface coal mines, 2014–15 to 2016–17	24
<b>Figure 2.3:</b>	High potential incidents by hazard type, surface coal mines, 2014–15 to 2016–17	25
<b>Figure 2.4:</b>	Mechanism for lost time injuries, surface coal mines, 2014–15 to 2016–17	26
<b>Figure 3.1:</b>	Serious accidents by type of hazard, underground coal mines, 2014–15 to 2016–17	29
<b>Figure 3.2:</b>	Serious accidents by equipment type, underground coal mines, 2014–15 to 2016–17	30
<b>Figure 3.3:</b>	High potential incidents by hazard type, underground coal mines, 2014–15 to 2016–17	31
<b>Figure 3.4:</b>	Mechanism for lost time injuries, underground coal mines, 2014–15 to 2016–17	32
<b>Figure 4.1:</b>	High potential incidents by hazard type, surface mineral mines, 2014–15 to 2016–17	35
<b>Figure 4.2:</b>	Mechanism for lost time injuries, surface mineral mines, 2014–15 to 2016–17	36
<b>Figure 5.1:</b>	High potential incidents by hazard type, underground mineral mines, 2014–15 to 2016–17	40
<b>Figure 5.2:</b>	Mechanism for lost time injuries, underground mineral mines, 2014–15 to 2016–17	41

## LIST OF FIGURES

<b>Figure 6.1:</b> High potential incidents by hazard type, quarries, 2014–15 to 2016–17	44
<b>Figure 7.1:</b> Change in single exceedance rate – underground coal 2016 and 2017	51
<b>Figure 7.2:</b> Respirable dust, longwall workers SEG, underground sites	52
<b>Figure 7.3:</b> Respirable dust, development workers SEG, underground sites	53
<b>Figure 7.4:</b> Respirable crystalline silica, longwall workers SEG, underground sites	55
<b>Figure 7.5:</b> Respirable crystalline silica, development workers SEG, underground sites	56
<b>Figure 8.1:</b> Number of complaints by type, coal, 2014–15 to 2016–17	67
<b>Figure 8.2:</b> Number of complaints by type, minerals, 2014–15 to 2016–17	68
<b>Figure 8.3:</b> Number of complaints by type, quarries, 2014–15 to 2016–17	68
<b>Figure A.1:</b> Size of mining workforce by sector, 2014–15 to 2016–17	72
<b>Figure A.2:</b> Employment status (employee/contractor) by sector, 2016–17	72

## LIST OF TABLES

<b>Table S.1:</b> Comparison of key performance indicators 2015–16 and 2016–17 by sector	9
<b>Table S.2:</b> Comparison of key regulation indicators 2015–16 and 2016–17 by sector	10
<b>Table 2.1:</b> Permanent incapacities in surface coal mines, 2016–17	24
<b>Table 3.1:</b> Permanent incapacities in underground coal mines, 2016–17	30
<b>Table 5.1:</b> Permanent incapacities in underground mineral mines, 2016–17	39
<b>Table 8.1:</b> Inspections undertaken, by sector, 2014–15 to 2016–17	62
<b>Table 8.2:</b> Audits undertaken, by sector, 2014–15 to 2016–17	62
<b>Table 8.3:</b> Investigations undertaken, by sector, 2014–15 to 2016–17	63
<b>Table 8.4:</b> Number of substandard conditions or practices, by sector, 2014–15 to 2016–17	63
<b>Table 8.5:</b> Directives undertaken, by sector, 2014–15 to 2016–17	64
<b>Table 8.6:</b> Number of compliance meetings (SSE level), 2014–15 to 2016–17	65
<b>Table 8.7:</b> Number of compliance meetings (SSE/operator level), 2014–15 to 2016–17	65
<b>Table 8.8:</b> Number of complaints, all sectors, 2014–15 to 2016–17	66

# MESSAGE FROM THE CHIEF INSPECTORS

**The mining industry is encouraged to use this information to improve their safety and health management systems and processes.**

We are pleased to present the 2016–17 Queensland Mines and Quarries Safety Performance and Health Report. The report provides an overview of current trends and emerging issues in Queensland mines and quarries, for the purpose of improving safety and health outcomes. Industry is encouraged to use the information contained within the report, and the detailed data available for download, to improve safety and health management systems and processes.

The Queensland Mines Inspectorate has responsibility for administering state mining safety and health laws. In addition to its regulatory responsibilities, the Inspectorate also works with industry, unions and other stakeholders, to provide advice and assistance on safety and health matters, for the benefit of all workers. This tripartite approach is an important element in improving safety and health outcomes in the industry.

In 2017 the Mines Inspectorate revised its organisational structure to create two distinct operating streams; Coal, and Mineral Mines and Quarries. The new arrangements better enable the delivery of responsive, targeted compliance programs and initiatives, across the state.

We are saddened to report that there were two fatalities during 2016–17. On 30 August 2016, Mr Ian Hansen was fatally injured while working at the Newlands Coal Mine and on 22 October 2016, Mr Sidney Cuddy died following a fall of ground at his mining claim in the Winton district.

These fatalities serve as stark reminders of the need for constant vigilance and effective risk management to ensure each Queensland miner returns home safely, every day.

Key industry performance indicators are provided in Summary tables S.1 and S.2. This provides a frame for understanding current trends and emerging issues in mines and quarries in Queensland.

## Coal mines

The statistics summarised in this report show that the number and frequency rate of serious accidents and high potential incidents has remained stable, with the most common hazards being: falls; trapped/crushed between; and strata control.

Work undertaken by the Mines Inspectorate on the control of the respirable dust hazard has shown positive results. The data submitted by industry demonstrates a major reduction in the exposure of coal mine workers to respirable coal dust and crystalline silica.

This reflects a broad set of initiatives implemented by industry and the Mines Inspectorate since the re-identification of coal workers' pneumoconiosis in 2015, and the independent review of the Coal Mine Workers' Health Scheme performed by Monash University in collaboration with the University of Illinois in July 2016. Tripartite developed regulatory changes relating to dust monitoring and reporting have also driven improved outcomes.

The management of respirable dust will continue to be a strong focus for the Mines Inspectorate in 2017–18, to ensure sustained performance through compliance with new legislative and regulatory requirements.

Audits on the effectiveness of ventilation and gas management systems at all underground coal mines will also be a priority.

#### **Mineral mines and quarries**

The number of serious accidents at surface and underground sites has remained stable for the 2016 and 2017 periods. Data for both periods shows the majority of serious accidents involve interaction with mechanical equipment while performing maintenance. This highlights a need for increased caution in this area.

While the lost time injury frequency rate continues to decline in surface and underground sites, we see an increasing trend in quarrying, particularly in the areas of falls over uneven ground, and strains.

In response to the hazards associated with respirable dust, the Mines Inspectorate released several publications for workers and Senior Site Executives (SSE). The *Guideline on Management of Respirable Crystalline Silica (RCS) in Queensland Mineral Mines and Quarries* was developed in conjunction with industry and workers unions, to provide advice on monitoring exposure to RCS and achieving an acceptable level of risk when mining silica-bearing material. The guideline adopts important recommendations from the independent review of the Coal Mine Workers' Health Scheme performed by Monash University in collaboration with the University of Illinois in July 2016.

In 2017–18 the Mines Inspectorate will focus on the effective implementation of safety and health management systems (SHMS). Operators are encouraged to extend SHMS ownership to the operator level, where work is carried out.

Contractor management is also an area of focus for 2017–18. SSEs must ensure contractors fully understand their obligations and responsibilities under the site SHMS.

#### **Current and future reporting**

Further information on the statistical data used in this report is set out in Appendix 1. Information on the size and characteristics of the mining workforce, including data on the mix of workers and contractors, is provided in Appendix 2.

The Queensland Mines Inspectorate is continuing its work to improve the analysis and availability of accurate and pertinent mine safety and health information. Improved access to quality data will create new insights and ultimately, contribute to improved safety and health outcomes in the Queensland

**RUSSELL ALBURY**  
CHIEF INSPECTOR  
OF COAL MINES

**LUCA ROCCHI**  
CHIEF INSPECTOR OF  
MINES (MINERAL MINES  
AND QUARRIES)

**TABLE S.1**

**COMPARISON OF  
KEY PERFORMANCE  
INDICATORS 2015–16  
AND 2016–17 BY SECTOR**

Year	Lost time injuries (LTI)		Disabling injuries (DI)		Serious accidents		High potential incidents (HPI)		LTI days lost†		DI days*		LTI frequency rate		HPI frequency rate		Million hours worked		Permanent incapacities		Fatalities	
	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17
<b>Coal surface</b>	116	117	174	160	28	32	1138	1145	5508	3484	7286	3233	2.3	2.3	22.9	22.2	49.8	51.5	52	19	0	1
<b>Coal underground</b>	79	84	88	86	26	27	299	287	4048	3078	4230	2934	5.8	7.2	21.8	24.5	13.7	11.7	29	11	0	0
<b>All coal</b>	<b>195</b>	<b>201</b>	<b>262</b>	<b>246</b>	<b>54</b>	<b>59</b>	<b>1437</b>	<b>1432</b>	<b>9556</b>	<b>6562</b>	<b>11 516</b>	<b>6167</b>	<b>3.1</b>	<b>3.2</b>	<b>22.6</b>	<b>22.7</b>	<b>63.5</b>	<b>63.2</b>	<b>81</b>	<b>30</b>	<b>0</b>	<b>1</b>
<b>Mineral surface</b>	38	29	27	24	3	3	148	153	1246	510	949	1061	2.8	2.1	10.7	10.9	13.8	14.0	2	0	0	1
<b>Mineral underground</b>	22	20	38	51	7	7	128	105	1851	1094	1776	2373	2.1	1.9	12.4	9.8	10.3	10.7	3	1	0	0
<b>All mineral</b>	<b>60</b>	<b>49</b>	<b>65</b>	<b>75</b>	<b>10</b>	<b>10</b>	<b>276</b>	<b>258</b>	<b>3097</b>	<b>1604</b>	<b>2725</b>	<b>3434</b>	<b>2.5</b>	<b>2.0</b>	<b>11.5</b>	<b>10.4</b>	<b>24.1</b>	<b>24.7</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>1</b>
<b>Quarries</b>	11	19	2	4	1	6	56	64	739	442	118	174	4.6	8.6	23.3	29.1	2.4	2.2	1	0	0	0
<b>All sectors</b>	<b>266</b>	<b>269</b>	<b>329</b>	<b>325</b>	<b>65</b>	<b>75</b>	<b>1769</b>	<b>1754</b>	<b>13 392</b>	<b>8608</b>	<b>14 359</b>	<b>9775</b>	<b>3.0</b>	<b>3.0</b>	<b>19.7</b>	<b>19.5</b>	<b>90.0</b>	<b>90.1</b>	<b>87</b>	<b>31</b>	<b>0</b>	<b>2</b>

† Days lost to LTIs includes lost time days and days on alternative duties

\* Number of disabling injury days includes days on alternative duties

**TABLE S.2**

**COMPARISON OF  
KEY REGULATION  
INDICATORS 2015–16  
AND 2016–17 BY SECTOR**

Year	Number of inspections		Number of audits		Number of investigations		Number of substandard conditions or practices (SCP)		Number of directives		Number of compliance meetings (SSE level)		Number of compliance meetings (SSE/operator level)		Number of complaints	
	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17	15–16	16–17
<b>Coal surface</b>	274	294	1	8	54	37	147	198	72	83	3	4	1	4	56	38
<b>Coal underground</b>	155	125	3	2	11	4	96	80	77	47	11	1	7	1	6	5
<b>All coal</b>	<b>429</b>	<b>419</b>	<b>4</b>	<b>10</b>	<b>65</b>	<b>41</b>	<b>243</b>	<b>278</b>	<b>149</b>	<b>130</b>	<b>14</b>	<b>5</b>	<b>8</b>	<b>5</b>	<b>62</b>	<b>43</b>
<b>Mineral surface</b>	477	383	9	20	18	21	288	301	88	101	5	5	0	2	18	22
<b>Mineral underground</b>	134	119	7	1	11	19	68	81	13	28	1	1	0	0	7	10
<b>All mineral</b>	<b>611</b>	<b>502</b>	<b>16</b>	<b>21</b>	<b>29</b>	<b>40</b>	<b>356</b>	<b>382</b>	<b>101</b>	<b>129</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>30<sup>†</sup></b>	<b>32</b>
<b>Quarries</b>	557	555	12	21	7	13	402	437	84	196	3	1	0	0	29	23
<b>All sectors</b>	<b>1597</b>	<b>1476</b>	<b>32</b>	<b>52</b>	<b>101</b>	<b>94</b>	<b>1001</b>	<b>1097</b>	<b>334</b>	<b>455</b>	<b>23</b>	<b>12</b>	<b>8</b>	<b>7</b>	<b>121</b>	<b>98</b>

<sup>†</sup> Total includes 5 complaints with no mine involved

# INDUSTRY OVERVIEW OF SAFETY OUTCOMES



**This chapter** provides an overview of safety outcomes for the Queensland mining industry as a whole. It includes a summary of fatal injuries, serious accidents and high potential incidents for coal mines, mineral mines and quarries.

# OBSERVATIONS AND EMERGING ISSUES

- › The fatality frequency rate in 2016–17 was 0.02 fatalities per million hours worked. Based on a rolling five year average, the fatality frequency rate has trended downwards since the 2007–12 period.
- › Fatalities continue to occur due to the failure of preventative or critical controls.
- › The most common fatal hazard in coal mines is vehicle interactions, and the most common fatal hazard in mineral mines and quarries is falls.
- › Contractors are over-represented in coal mine fatalities involving vehicle interaction and tyre management since 2001, relative to the proportion of the workforce they represent.
- › The number of serious accidents, high potential incidents and lost time injuries remained relatively stable in 2016–17.
- › Poor quality mine safety and health data reported to the Queensland Mines Inspectorate, including information on causation, limits rigorous data analysis and improved management strategies.

## FATAL INJURIES

**There were two fatal accidents in the Queensland mining industry in 2016–17. One accident occurred in a surface coal mine and the other in a surface mineral mine.**

1



**IAN HANSEN**

30 August 2016

Shutdown maintenance work was being undertaken on a chain feeder installed below a run-of-mine (ROM) raw coal dump hopper. A team of contract coal mine workers were in the process of removing a section of the bottom deck. The steel-plated deck fell in an uncontrolled manner striking Mr Hansen. Mines Safety Alert No. 331 was issued on 8 September 2016 in response to the incident. An investigation report was subsequently published on the fatality (see page 15 of this report).

[www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/fatality-involving-chain-feeder-at-a-wash-plant](http://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/fatality-involving-chain-feeder-at-a-wash-plant)

2



**SIDNEY CUDDY**

22 October 2016

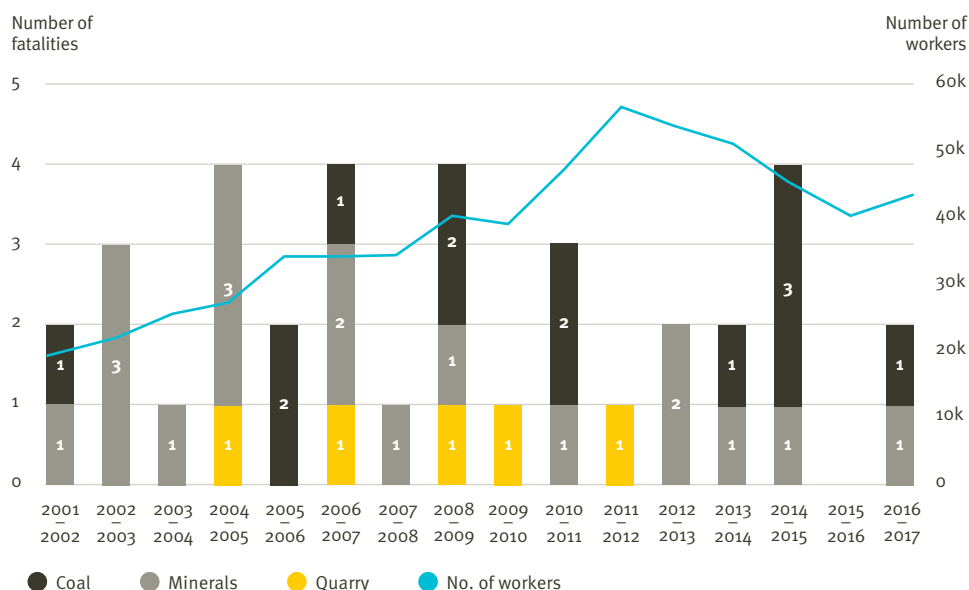
Mr Cuddy had been working alone on his mining claim in the Winton District. It is believed he was undercutting a wall to recover opal when the wall of the shallow trench collapsed. The incident was discovered some time after the collapse by a neighbouring miner who raised the alarm. Mines Safety Alert No. 333 was issued on 28 November 2016 in response to the incident.

[www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/opal-mining-fatality](http://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/opal-mining-fatality)

In the period since the commencement of the *Coal Mining Safety and Health Act 1999* and the *Mining and Quarrying Safety and Health Act 1999*, there has been only one year (2015–16) when zero fatalities have been recorded (Figure 1.1). The number of fatalities that have occurred in Queensland mines since 1900 is provided in Appendix 3.

## 1.1

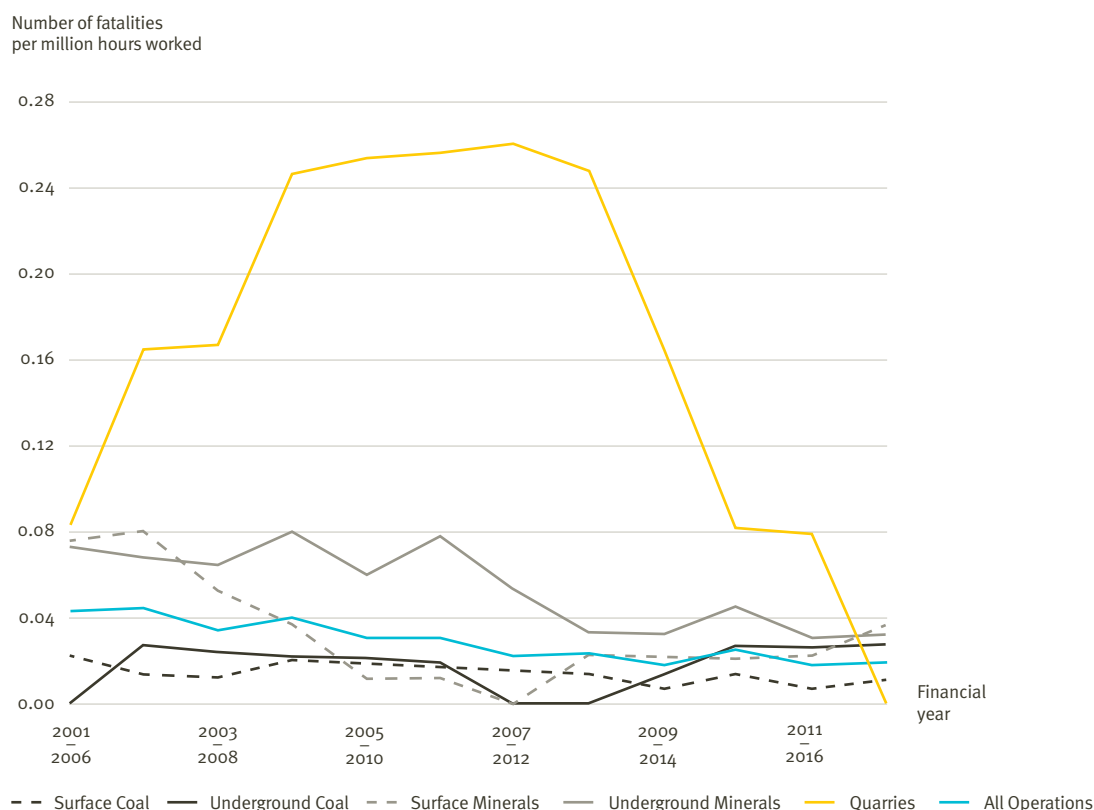
### FATALITIES AND EMPLOYMENT NUMBERS (ALL SECTORS), 2001–2017



Analysis suggests there is no clear relationship between the size of the industry and the number and frequency rate of fatalities. Figure 1.1 shows that increases in fatalities have occurred during periods of industry growth, as well as contraction.

## 1.2

### FIVE-YEAR ROLLING AVERAGE OF FATALITY FREQUENCY RATE BY SECTOR, 2001–2017

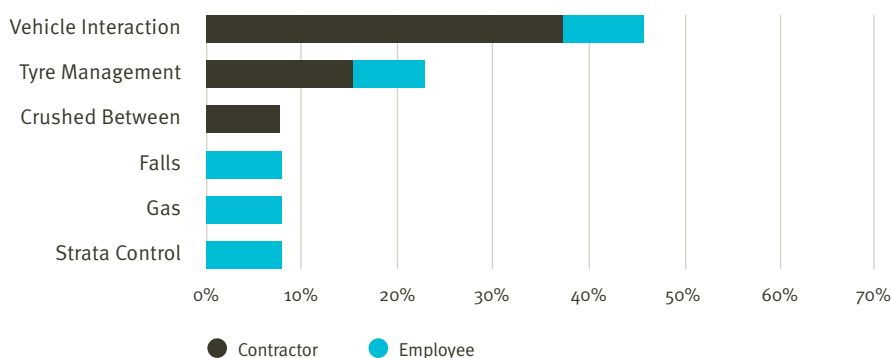


# FATAL HAZARDS

Figures 1.3 and 1.4 set out the most common fatal hazards for coal mines and mineral mines and quarries, in the period 2001 to 2017. Vehicle interactions (including collisions and rollovers) remain the most common form of fatal hazard, accounting for almost half (46 per cent) of fatalities in coal mines during the period (Figure 1.3). Contractors appear to be over-represented in coal mining to fatalities involving both vehicle interaction and tyre management; further discussion in industry is needed to understand this issue, including whether contractors are more exposed to this hazard because of the type of work they typically undertake.

## 1.3

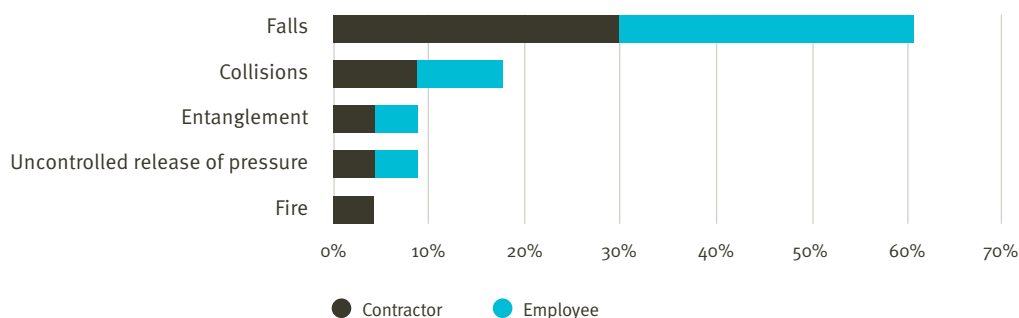
### FATAL HAZARDS FOR COAL, 2001–2017



In mineral mines and quarries, the most common fatal hazard is falls, which accounts for 61 per cent of fatalities (Figure 1.4). These fatalities involved gravity-related falls of equipment, rocks, vehicles and people.

## 1.4

### FATAL HAZARDS FOR MINERAL MINES AND QUARRIES, 2001–2017



Every fatality presents the opportunity for industry and regulators to learn from the experience and minimise the risks of reoccurrence. With this objective, the Queensland Mines Inspectorate undertook to publish investigative reports that set out the circumstances of a fatality. The first report of this type was published on 7 August 2017 (see box over page).

# INVESTIGATION REPORT

## Fatality at the Newlands Mine Coal Handling and Preparation Plant on 30 August 2016

The Newlands Mine in Queensland's Bowen Basin is operated by Glencore Coal Queensland. On the morning of 30 August 2016, a contract worker employed by UGL was fatally injured by a falling deck plate that he and three other workers were in the process of removing. An investigation by the Queensland Mines Inspectorate identified several key factors that contributed to the incident, including inadequate supervision, poor planning and incomplete safe work method statements and risk assessments.

The report provides detail about the findings and recommendations made by the Inspectorate to address short-comings identified during its investigation. The report makes recommendations that acknowledge and address deficiencies found in the safety and health process, to enhance the future safety of workers at mine sites.

The Queensland Mines Inspectorate's investigation reports provide a factual account of the events leading to serious and fatal incidents at mines and quarries, and detail the adequacy and compliance of relevant safety systems and procedures in place at the time of the accident.

<https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/accidents-incidents/investigations-inquiries>

Importantly, fatal hazard data for Queensland mines is consistent with Australian mining trends over time, whereby the nature of fatalities has shifted away from multiple fatalities, to incidents resulting in individual loss of life. This shift has been attributed in part to technological developments, as well as improved legislative and regulatory frameworks, more proactive safety management systems, and better risk management practices<sup>1</sup>. Sustaining these improvements is dependent however on continued alertness to fatal hazards; data on serious accidents and high potential incidents demonstrate there is no room for complacency.

<sup>1</sup>David Cliff, "OHS in the Mining Industry in the 21<sup>st</sup> Century", Proceedings of the 16<sup>th</sup> Coal Operators' Conference, Mining Engineering, University of Wollongong, 2016, p. 421.



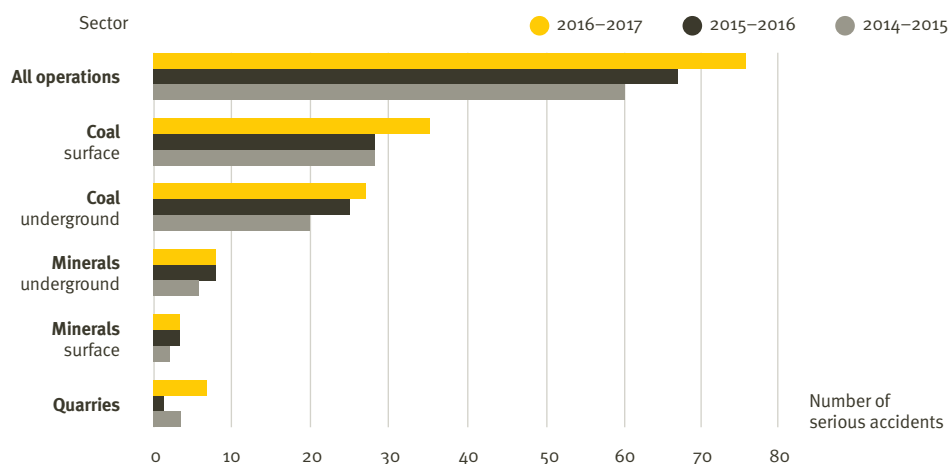
**Continued alertness  
to fatal hazards is  
important to ensure  
these improvements  
are sustained.**

# SERIOUS ACCIDENTS

Serious accidents are defined as those requiring admission to hospital as an inpatient, and exclude fatalities. Figure 1.5 below shows that the number of serious accidents in the Queensland mining industry overall increased by 10 to 75 in 2016–17.

## 1.5

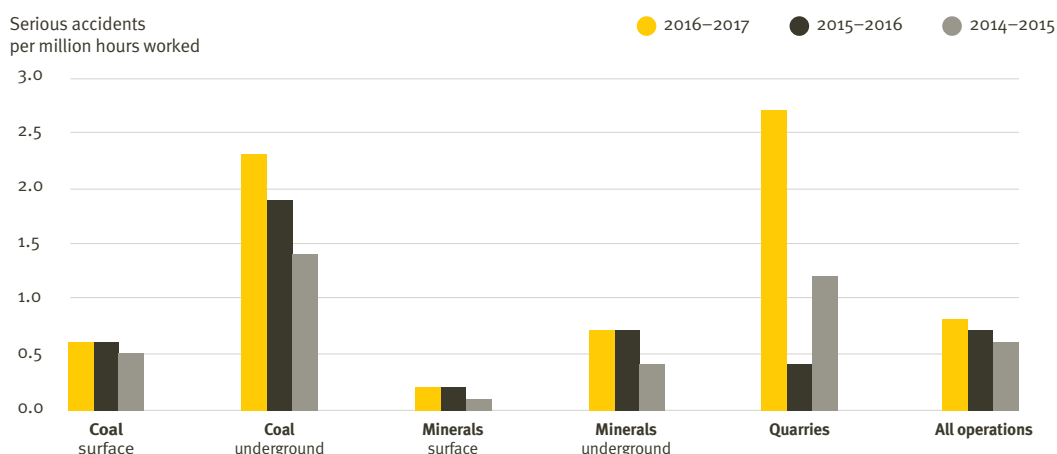
### NUMBER OF SERIOUS ACCIDENTS, BY SECTOR, 2014–15 TO 2016–17



The frequency rate of serious accidents provides some insight into the effectiveness of preventative safety and health systems. Figure 1.6 below shows that the rate of incidents in the three years to June 2017. Overall, the frequency rate of serious accidents in the industry as a whole has increased year-on-year, rising by almost one quarter since 2014–15. The frequency rate of serious accidents in quarries is highly variable from year-to-year.

## 1.6

### FREQUENCY RATE OF SERIOUS ACCIDENTS, BY SECTOR, 2014–15 TO 2016–17



The Queensland Mines Inspectorate collects causation data on serious accidents. This data has not been included in this year's report due to data quality issues. The Inspectorate will work with industry to improve the quality of causation data over the next year, with a view to publishing accurate causation data in the future.

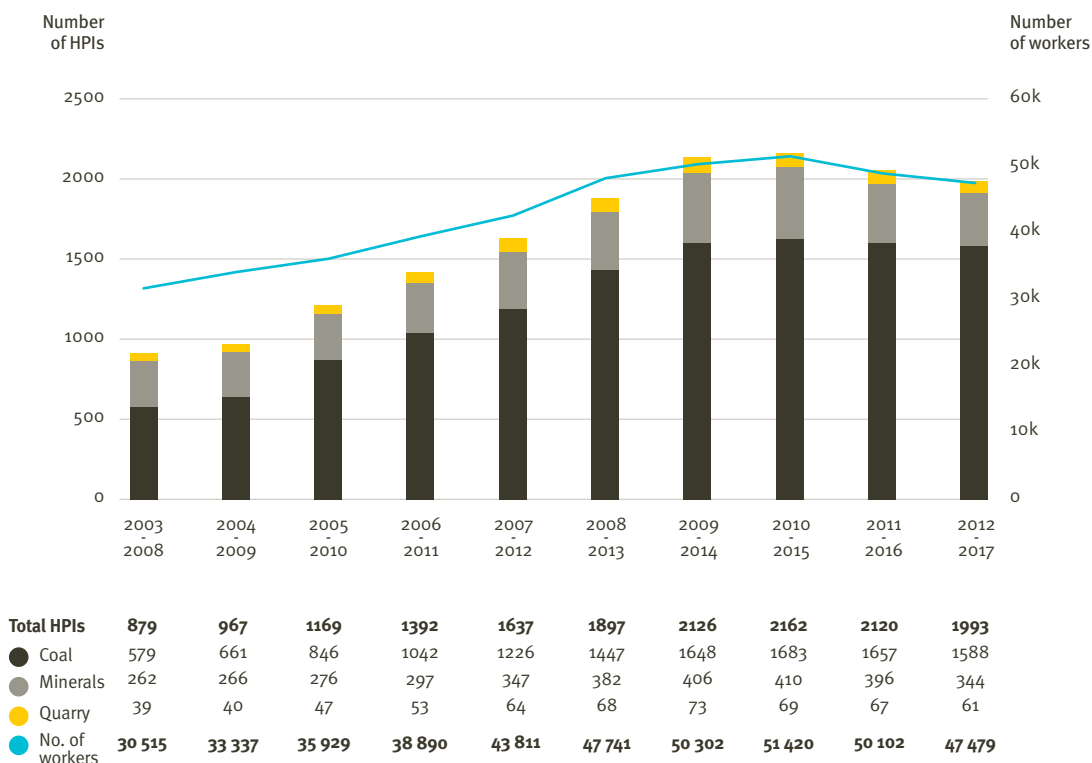
# HIGH POTENTIAL INCIDENTS

High potential incidents refer to an event, or series of events, that cause or have the potential to cause a significant adverse effect on the safety or health of a person. They are an important ‘lead’ indicator for measuring the effectiveness of safety and health systems but are not a predictor of accidents.

The number of high potential incidents decreased marginally in 2016–17, falling from 1769 in 2015–16 to 1754 in 2016–17. High potential incidents correlate to the size of the mining industry workforce. However, data for 2016–17 reverses this trend, with the number of high potential incidents falling slightly at the same time as the size of the workforce increased.

## 1.7

**FIVE-YEAR ROLLING AVERAGE OF HIGH POTENTIAL INCIDENTS AND FIVE-YEAR ROLLING AVERAGE EMPLOYMENT NUMBERS (ALL SECTORS), 2003–08 TO 2012–17**



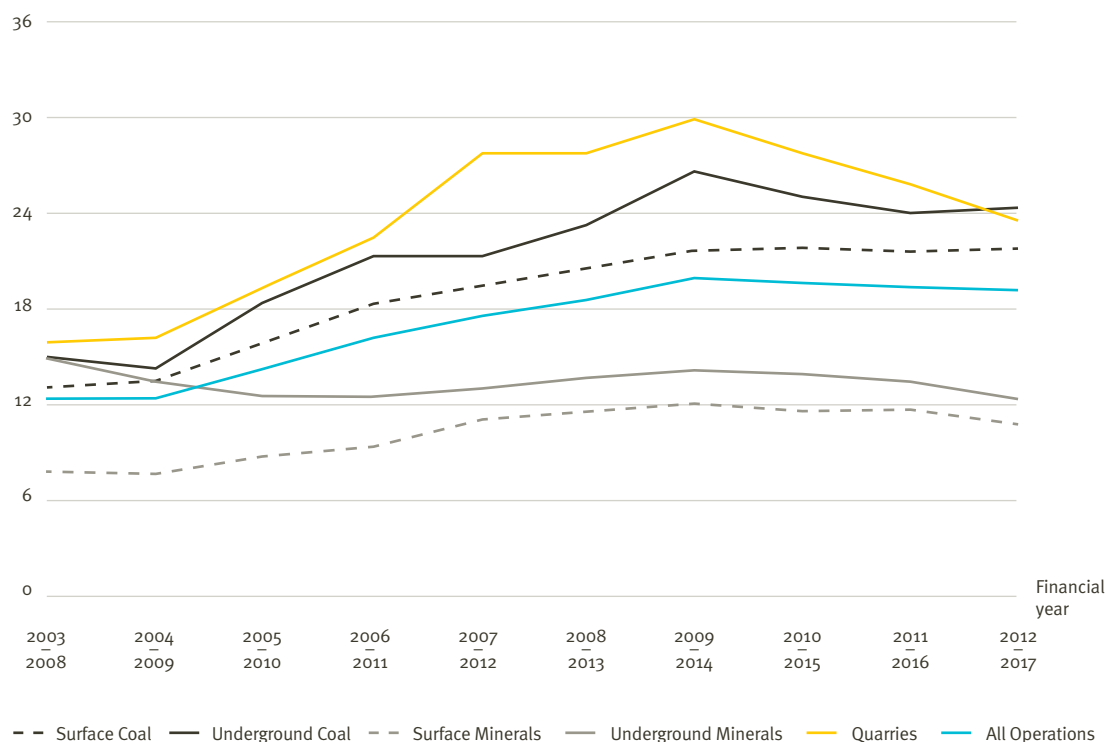
The figure above shows the five-year rolling average in high potential incidents. The average has trended marginally downwards after peaking in the 2010–15 period.

The frequency rate for high potential incidents in the mining industry has remained stable over the past three years, with 19 high potential incidents occurring per million hours worked in 2016–17. An analysis of five-year rolling averages shows that the frequency rate for high potential incidents in the mining industry has trended upwards since 2004–09.

## 1.8

### FIVE-YEAR ROLLING AVERAGE OF HIGH POTENTIAL INCIDENT FREQUENCY RATES BY SECTOR, 2003–08 TO 2012–17

Number of high potential incidents  
per million hours worked



The cause of high potential incidents can be varied, including organisational factors, the operating environment, individual and team causes, and absent or failed defences. Causation data has not been included in this report due to the inadequacy of coding reports provided to the Inspectorate; indeed, in many instances, no specific causal factor has been identified. This is an area of focus for improvement in future reporting. The following HPI examples are representative of the total and may be useful in tool box talks and risk assessments.

## EXAMPLES OF HPIS – COAL MINES

- ▶ A large strata failure occurred at a longwall maingate rib. Soft coal conditions had been identified, however the failure took place before secondary support could be installed. The strata failure was significant, being approximately three metres long by one metre deep.
- ▶ The ‘impact idler’ from a conveyor belt dislodged from its housing and fell approximately three metres to the ground.
- ▶ A ‘load-haul-dump loader’ collided with another loader that had broken down. The moving loader was travelling with stowage in the bucket and failed to see the stationary loader.
- ▶ The trailing cable for a ‘continuous miner’ was damaged while being towed by a shuttle car. The shuttle car operator failed to stop when the cable pulled taught. The cable was pulled apart, exposing the conductors.
- ▶ A dozer on the dig floor reversed into the counterweight of the shovel.
- ▶ A front end loader uncovered a booster with detonator cord attached, and a small amount of product.
- ▶ A dragline trailing cable was damaged when a dozer reversed over it.

## EXAMPLES OF HPIS – MINERAL MINES AND QUARRIES

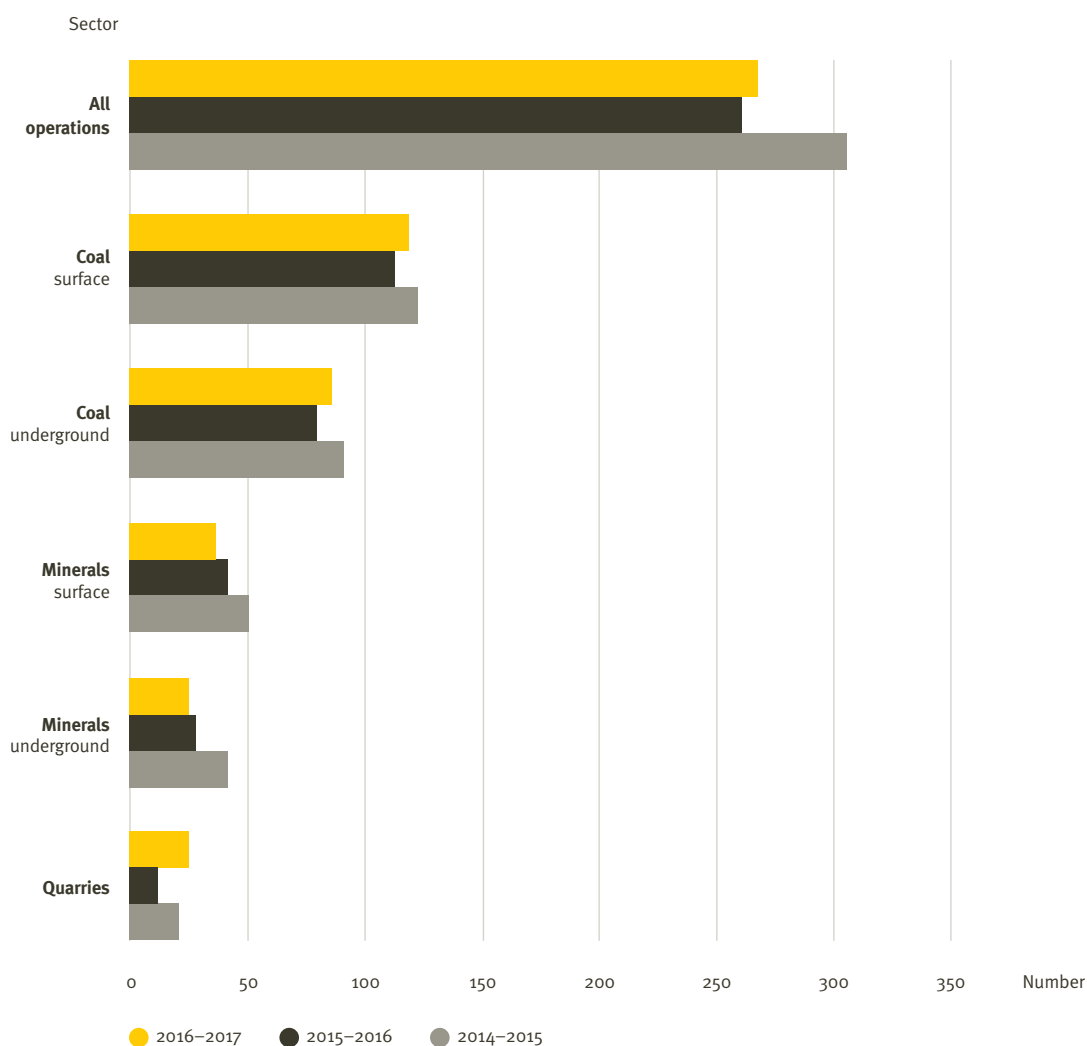
- ▶ An dump truck reversed off the edge of a bench and fell approximately 15 metres to the pit floor below. The operator suffered serious injuries.
- ▶ A workshop supervisor was struck in the eye by an airborne sliver of steel that had fractured from a universal joint being centre-punched nearby. The sliver of steel travelled approximately 3.5 metres through the air and lodged in the supervisor’s eye. The supervisor suffered a serious injury and required surgery to remove the steel.
- ▶ A loader ran over the bonnet and cabin of a light vehicle that was parked nearby. The loader was in the process of reversing off a shot after distributing stemming material. Nobody was injured in the incident.
- ▶ Waste oil was pumped into a disposal tanker that contained residual chemicals from a previous job. The oil and chemicals reacted, causing a hazardous substance spill. The area was evacuated, and the chemical reaction was allowed to continue and vent from the tanker.
- ▶ The edge of a dump gave way beneath the rear wheels of a rear dump truck, leaving the truck suspended on the edge of the dump face. The operator exited the truck uninjured.
- ▶ A supply delivery driver was found travelling inside the ‘mine firing zone’ during firing time. The driver was attempting to exit the underground mine before firing time, however they took a wrong turn and had not exited the mine before firing time commenced.

# LOST TIME INJURIES

The number of lost time injuries in the mining industry remains essentially unchanged, increasing from 266 in 2015–16 to 269 in 2016–17. While the number of LTIs has remained relatively stable in coal mining, it has decreased annually for the past three years in mineral mining.

1.9

NUMBER OF LOST TIME INJURIES, ALL SECTORS, 2014–15 TO 2016–17



The LTI frequency rate in the mining industry remained stable in 2016–17 at 3.0 LTIs per million hours worked.

# SAFETY OUTCOMES FOR SURFACE COAL MINES



**This chapter** explores the safety performance of surface coal mines in Queensland. It includes a summary of serious accidents, high potential incidents and lost time injuries, as well as emerging issues.

# OBSERVATIONS AND EMERGING ISSUES

- Failure of preventative controls continues to be a contributing factor in fatalities, with one fatality occurring in surface coal mines in 2016–17. Contributing factors identified in the investigation of the fatality included deficiencies in supervision and risk management processes, such as completing or updating job safety analyses.
- While the number of serious accidents increased marginally, the frequency rate remained stable.
- The most common HPI hazards are fire and explosives, which accounted for 46 per cent of 1145 total incidents in 2016–17. Most of the fires related to equipment, and most explosive hazards were documented as misfires.



# 25 738

**WORKERS**

**11 648** EMPLOYEES

**14 090** CONTRACTORS

**47** MINES IN PRODUCTION

**7** MINES IN CARE & MAINTENANCE



# 1

**FATALITY**

**30 AUGUST 2016**

**FALL OF STEEL-  
PLATED DECK  
MINES SAFETY  
ALERT 331 ISSUED**

# 19

**PERMANENT  
INCAPACITIES**

OVER HALF DUE TO NOISE



# 32

**SERIOUS  
ACCIDENTS**



# 1145

**HIGH POTENTIAL  
INCIDENTS**

**FIRE  
EXPLOSIVES  
VEHICLE COLLISION**

# SERIOUS ACCIDENTS

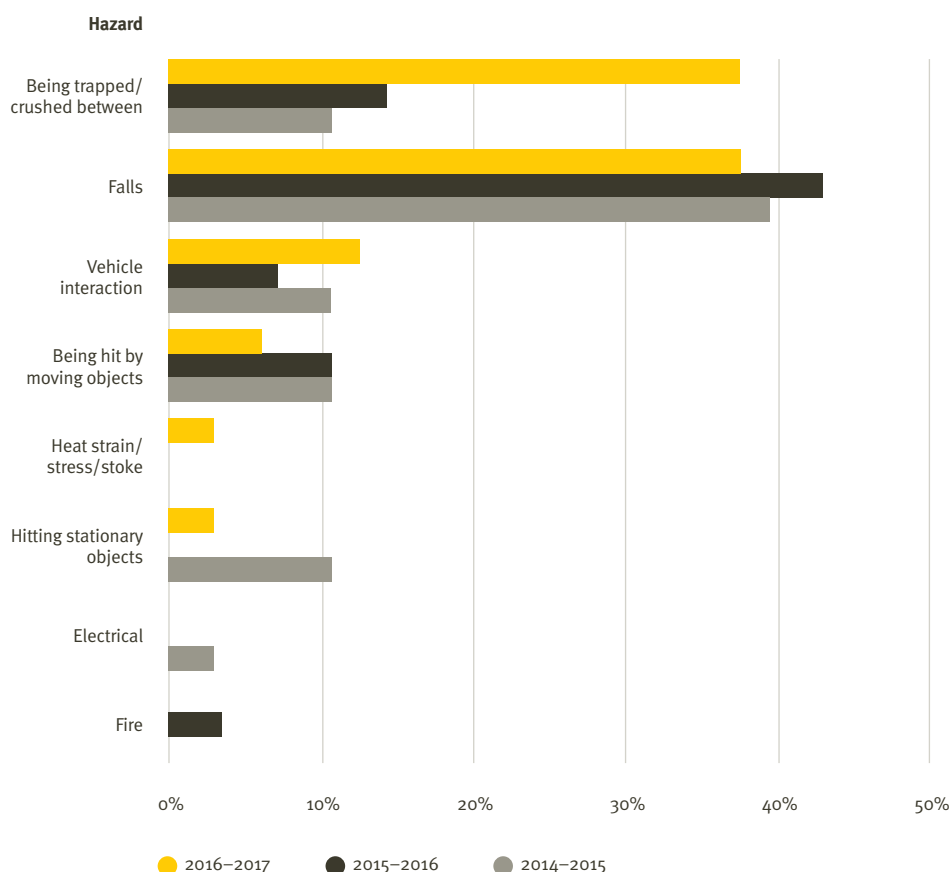
The number of serious accidents in surface coal mines increased in the year to June 2017, rising from 28 to 32. The frequency rate has remained stable at 0.6 serious accidents per million hours worked.

Falls and being trapped/crushed between are the most common hazards resulting in a serious accident in surface coal mines (Figure 2.1). Seventy-five per cent of these falls can be attributed to people falling (i.e. slips and trips), and to a lesser extent, the fall of equipment or other material.

The percentage of serious accidents attributed to falls fell from 43 to 37 per cent in 2016–17. In contrast, the proportion of accidents attributed to being trapped or crushed increased from 14 per cent to 38 per cent, as did those attributed to vehicle interaction (up from 7 per cent to 13 per cent).

## 2.1

### SERIOUS ACCIDENTS BY TYPE OF HAZARD, SURFACE COAL MINES, 2014–15 TO 2016–17

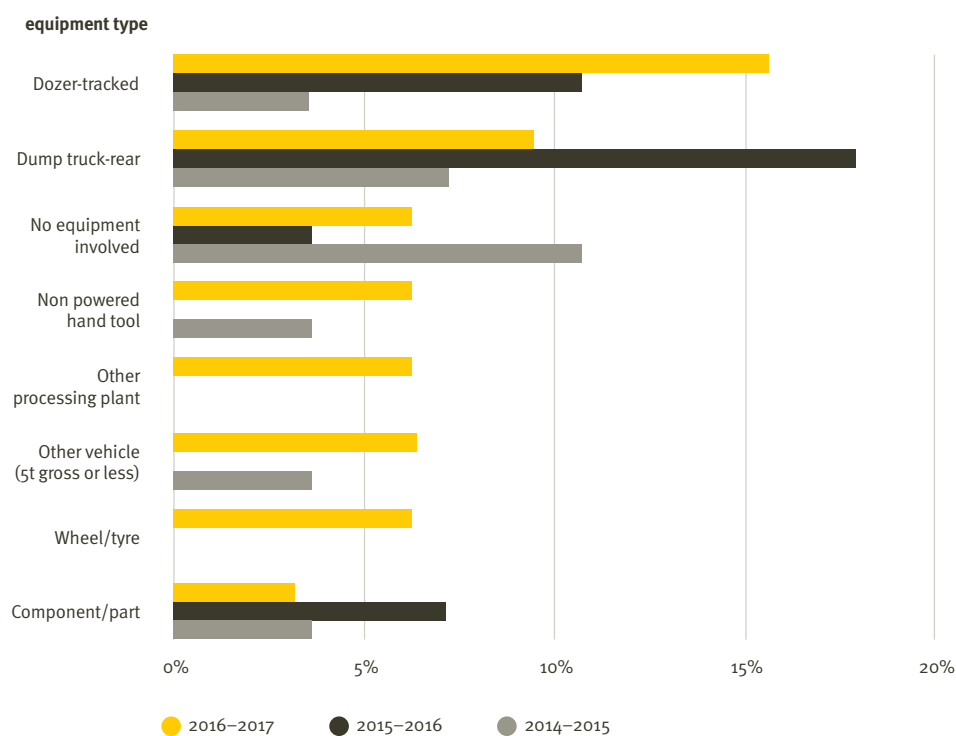


Only the top eight occurring categories have been included.

Dozers and dump trucks are the most common equipment type involved in serious accidents.

## 2.2

### SERIOUS ACCIDENTS BY EQUIPMENT TYPE IN SURFACE COAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

<sup>1</sup> Please refer to the Definitions section of this report for information about how permanent incapacity is defined.

In 2016–17, there were 19 permanent incapacities<sup>1</sup> in surface coal mines. These are summarised as follows:

**TABLE 2.1**

### PERMANENT INCAPACITIES IN SURFACE COAL MINES, 2016–17

Hazard	Mechanism	Incapacity type	Incapacity description	Number
Noise	Sound and pressure	Ears	Noise induced hearing loss	10
Respirable dust	Chemicals and other substances	Lung	Pneumoconiosis	3
Caught / crushed between	Being hit by moving objects	Upper limbs-thumb	Crush injury	1
Falls	Falls / trips / slips	Lower limbs-knee	Knee injuries	1
Falls	Being hit by moving objects	Upper limbs-hand	Hand injuries	1
Caught/crushed between	Vehicle incidents	Upper limbs-thumb	Partial amputation of right ring finger	1
Musculoskeletal	Body stressing	Upper limbs-finger	Index finger injury from repetitive operation of drill	1
Vehicle – collision	Being hit by moving objects	Upper limbs-neck	Neck pain	1
<b>Total</b>				<b>19</b>

# HIGH POTENTIAL INCIDENTS

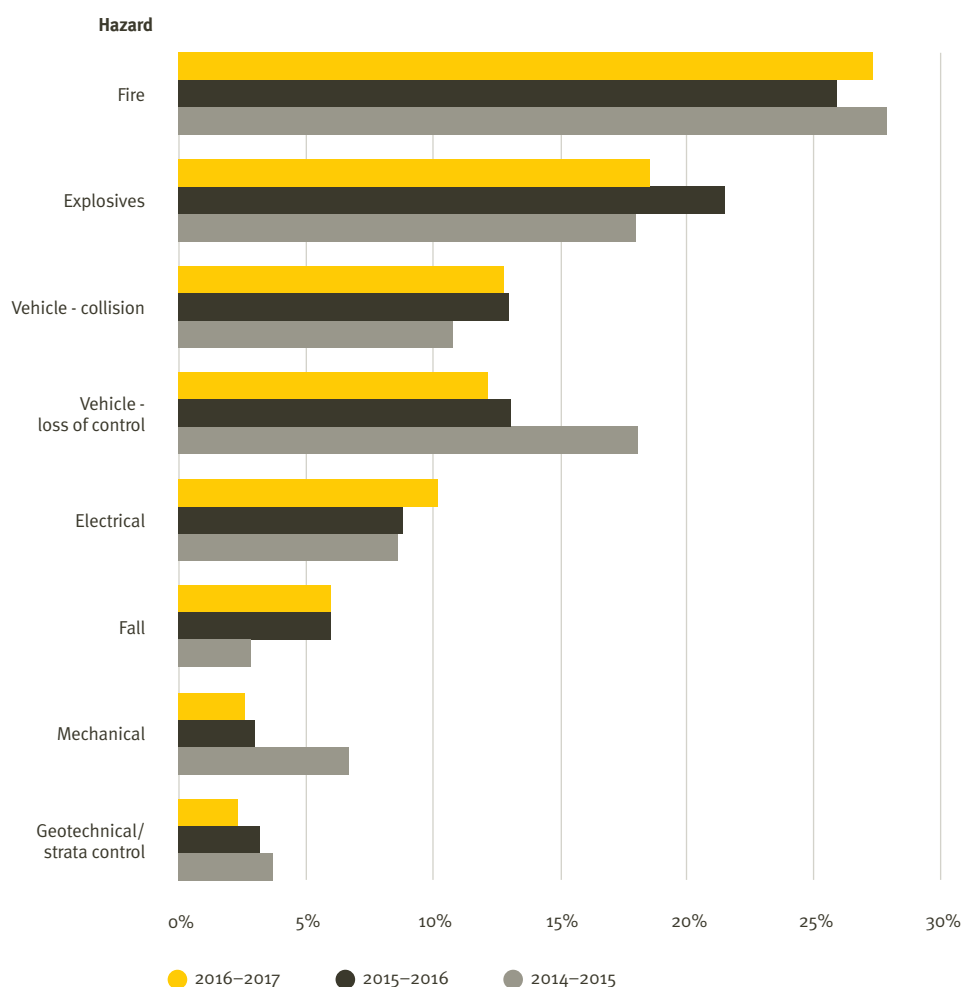
The number of high potential incidents in surface coal mines remained relatively stable, rising from 1138 in 2015–16 to 1145 in 2016–17. The frequency rate for HPIs also remained stable, with a decline from 22.9 to 22.2 HPIs per million hours worked.

Fire is the most commonly occurring hazard that contributes to HPIs in surface coal mines, followed by explosives, together representing 46 per cent of total incidents. Most of the fires related to equipment. Seventy-two per cent of explosive hazards were documented as misfires, which can be attributed to competency issues as well as the quality of explosive.

These two hazards are included in the Big 10 projects for coal mines, which are the basis of the Inspectorate’s safety and health focus for coal mines.

## 2.3

### HIGH POTENTIAL INCIDENTS BY HAZARD TYPE, SURFACE COAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# LOST TIME INJURIES

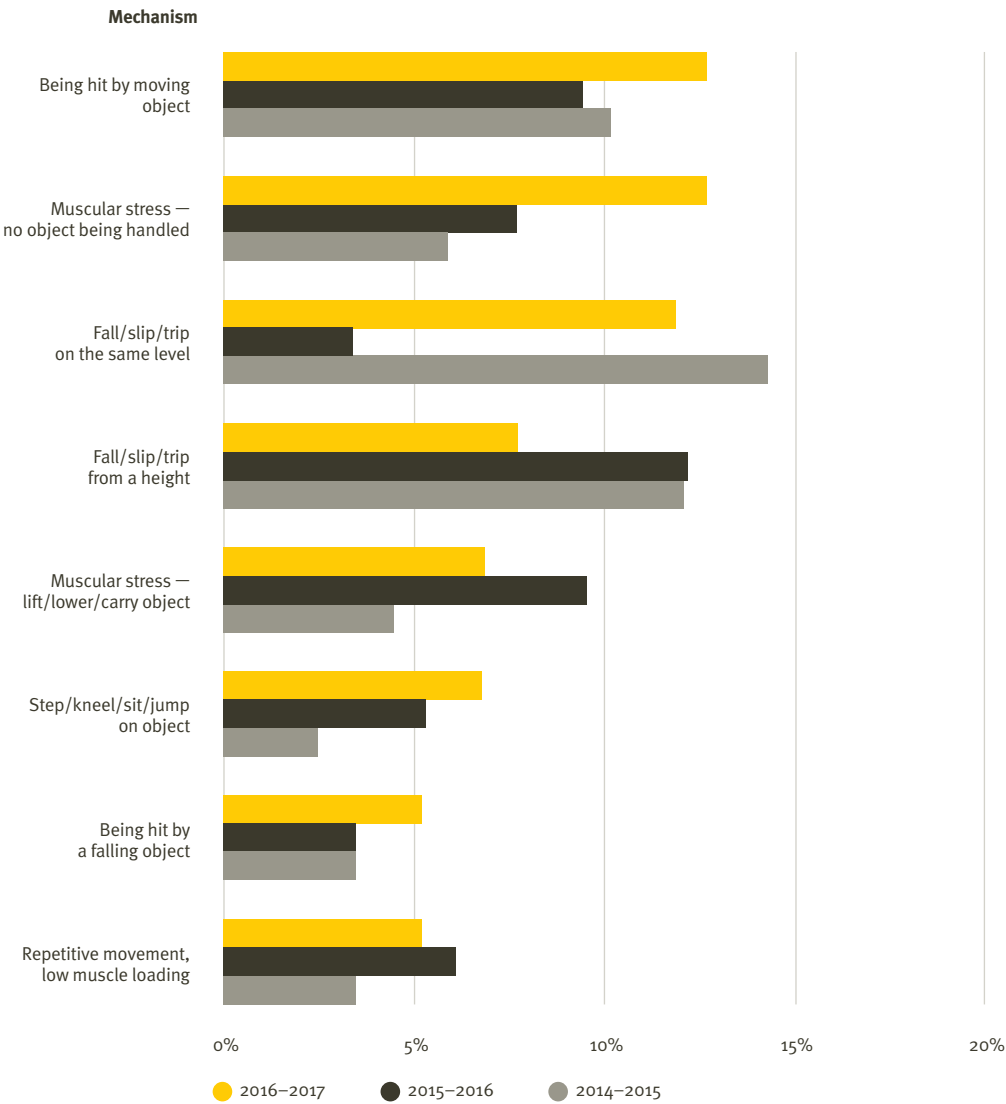
Detailed data on lost time injuries appears in Table 1 of this report and is also available from the Department of Natural Resources and Mines (DNRM) website.

The number of lost time injuries in surface coal mines has remained stable for the past three years, at 117 in 2016–17. The frequency rate has also remained stable at 2.3 lost time injuries per million hours worked for the past three years.

In 2016–17, the most common mechanisms for lost time injuries were being hit by a moving object, muscular stress (both 13 per cent) and falls (12 per cent).

## 2.4

### MECHANISM FOR LOST TIME INJURIES, SURFACE COAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# SAFETY OUTCOMES FOR UNDERGROUND COAL MINES



**This chapter** explores the safety performance of underground coal mines in Queensland. It includes a summary of serious accidents, high potential incidents and lost time injuries, as well as emerging issues.

# OBSERVATIONS AND EMERGING ISSUES

- › The number of serious accidents in underground coal mines has remained stable, increasing from 26 to 27 in 2016–17.
- › The most common hazards for serious accidents are being caught/crushed between and falls.
- › The most hazardous area in underground coal mines is associated with longwall operations.
- › HPIs are trending upwards in underground coal mines, where electrical incidents remain by far the most significant hazard. Electrical incidents cover a variety of occurrences including arc flashes and blasts, cable damage, electric shock, lightning, and power failure.



**5187**

**WORKERS**

**2464** EMPLOYEES

**2723** CONTRACTORS

**11** MINES IN PRODUCTION

**4** MINES IN CARE & MAINTENANCE



**0**

**FATALITIES**

**11**

**PERMANENT  
INCAPACITIES**

9 DUE TO PNEUMOCONIOSIS



**27**

**SERIOUS  
ACCIDENTS**



**287**

**HIGH POTENTIAL  
INCIDENTS**

**ELECTRICAL  
#1 HPI HAZARD**

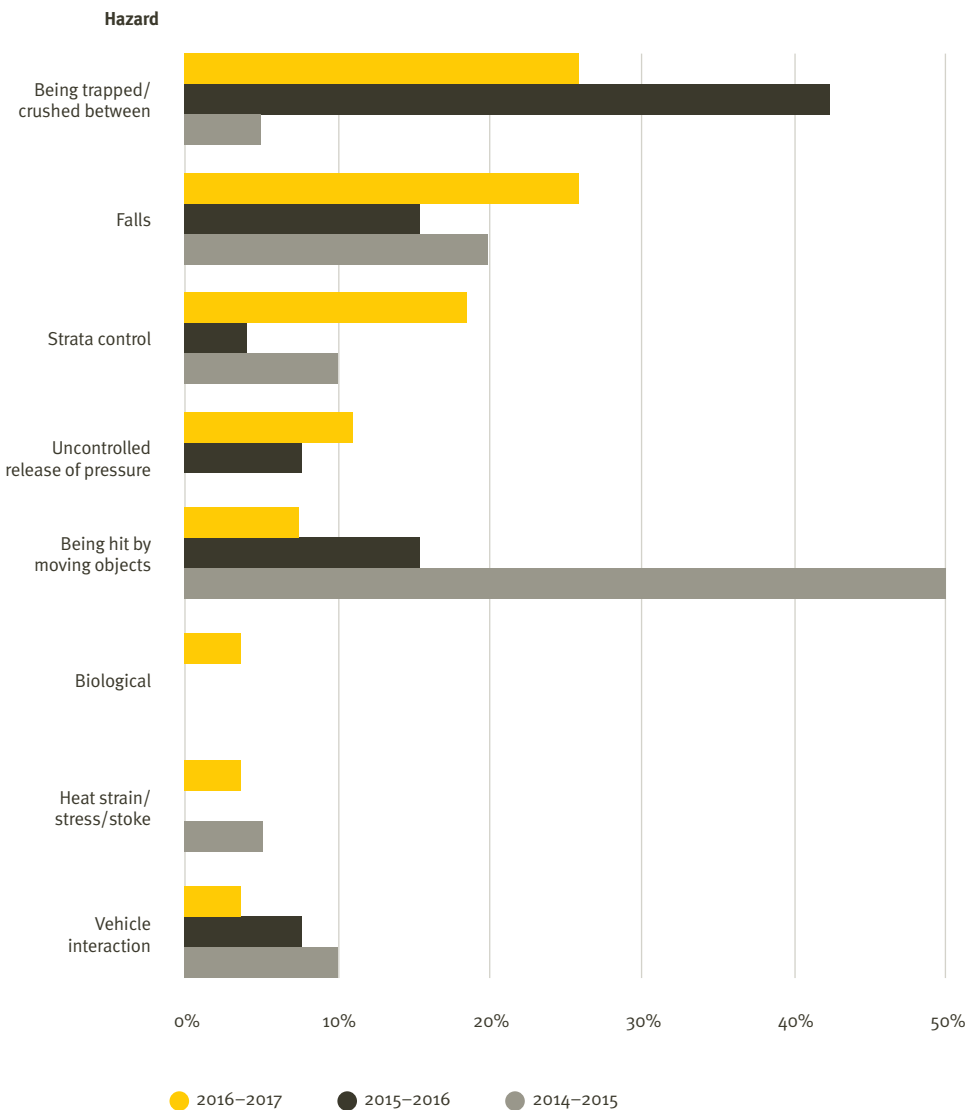
# SERIOUS ACCIDENTS

There were 27 serious accidents in underground coal mines in 2016–17, an increase of one on the previous year. This represents an increase in the frequency rate from 1.9 to 2.3 serious accidents per million hours worked.

The most common form of hazards resulting in serious accidents were being caught/crushed between, falls and strata control.

## 3.1

### SERIOUS ACCIDENTS BY TYPE OF HAZARD, UNDERGROUND COAL MINES, 2014–15 TO 2016–17

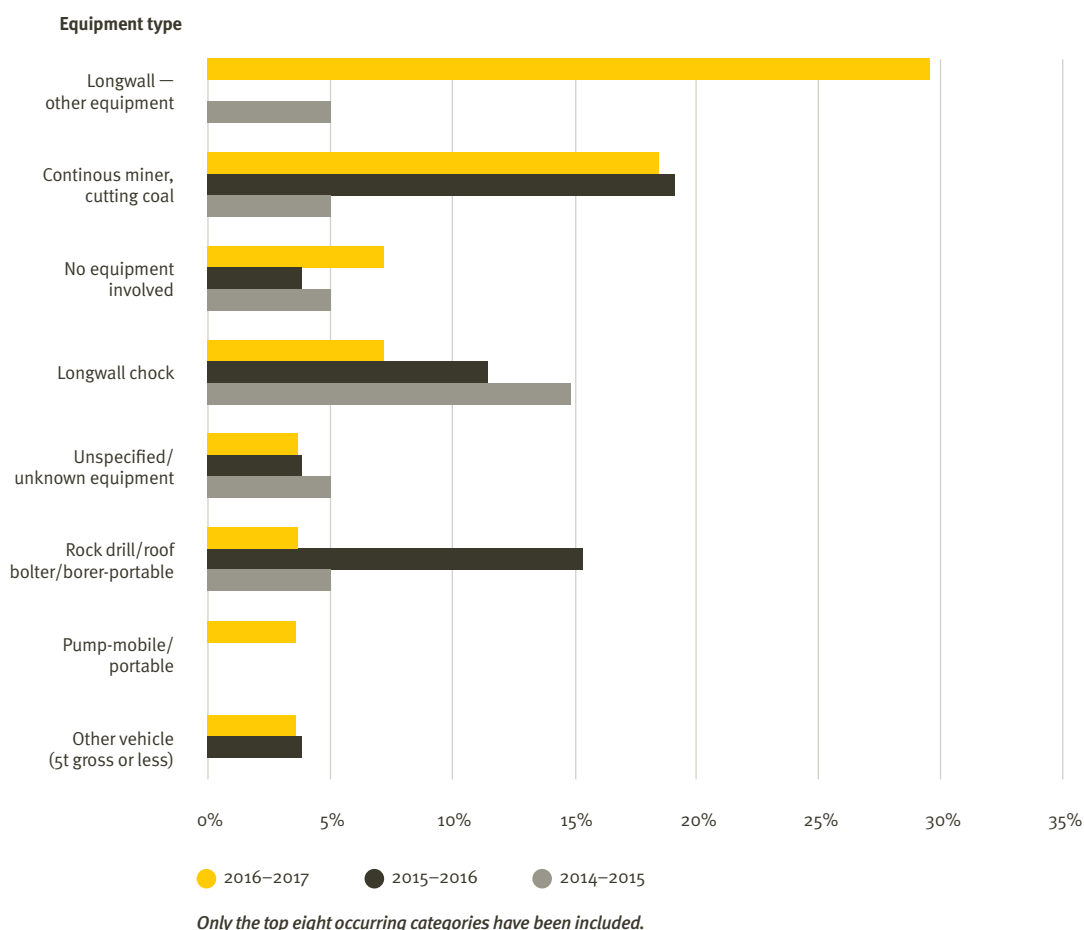


Only the top eight occurring categories have been included.

In 2016–17, the most common form of equipment involved in serious accidents in underground coal mines was ‘longwall - other equipment’. This includes longwall panlines, powered roof support, mini-pans and relay bar extensions.

## 3.2

### SERIOUS ACCIDENTS BY EQUIPMENT TYPE, UNDERGROUND COAL MINES, 2014–15 TO 2016–17



In 2016–17, there were 11 permanent incapacities in underground coal mines (Table 3.1). Nine of these related to respirable dust.

**TABLE 3.1**

### PERMANENT INCAPACITIES IN UNDERGROUND COAL MINES, 2016–17

Hazard	Mechanism	Incapacity type	Incapacity description	Number
Respirable dust	Chemicals and other substances	Lung	Pneumoconiosis	9
Caught/crushed between	Being hit by moving objects	Upper limbs-thumb	Crush injury	1
Pressure	Being hit by moving objects	Head	Multiple facial fractures and lacerations	1
<b>Total</b>				<b>11</b>

# HIGH POTENTIAL INCIDENTS

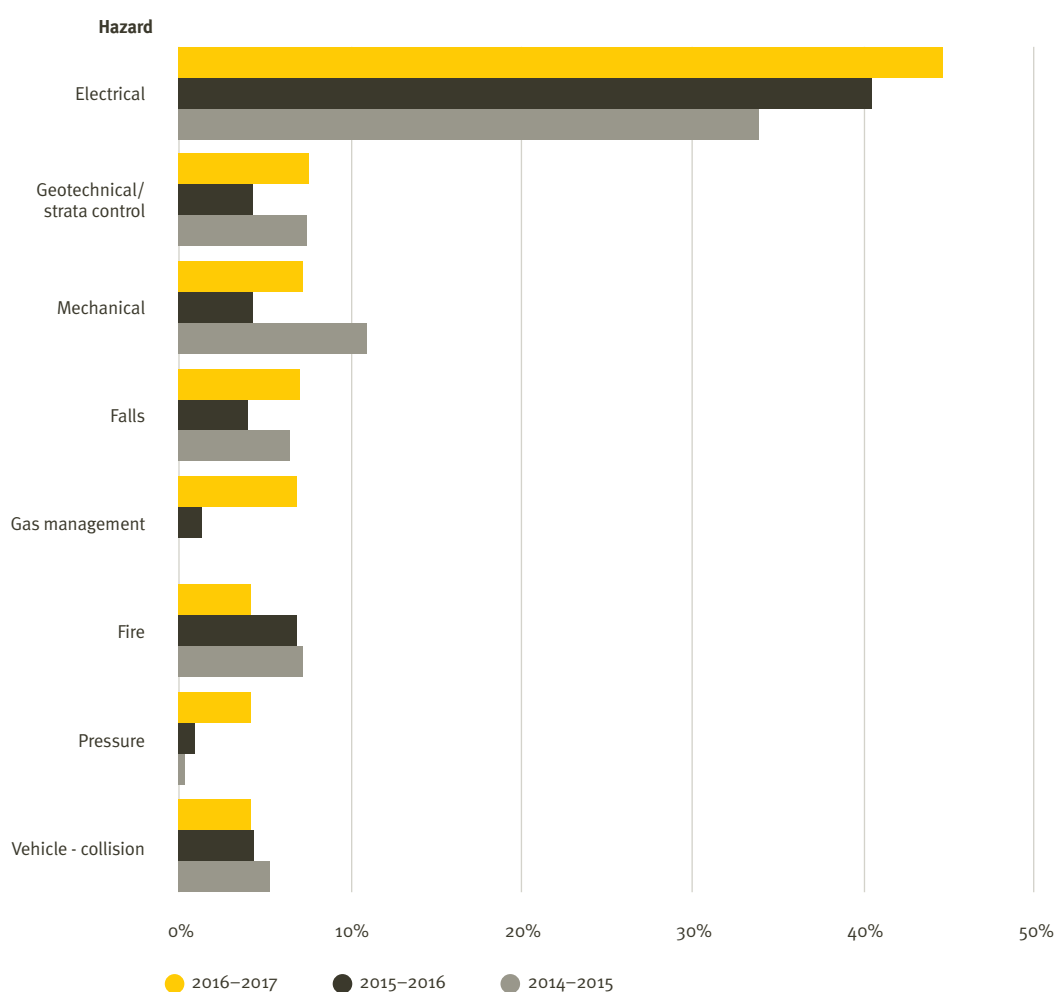
There were 287 high potential incidents in underground coal mines in 2016–17, a decrease of 12 on the previous year. However, this represents an increase in the HPI frequency rate, from 22 to 25 incidents per million hours worked.

The most common form of hazard in underground coal mines for HPIs in 2016–17 was electrical hazards, which represented almost half of all HPIs that year. Of these electrical hazards, 70 per cent related to cable damage, including continuous miner, shearer, shuttle car, loaders, cap lamps and high voltage hazards.

Gas management is also a priority, with methane gas exceedance notifications increasing in 2016–17. This is a principle hazard as defined in legislation and needs to be controlled.

## 3.3

### HIGH POTENTIAL INCIDENTS BY HAZARD TYPE, UNDERGROUND COAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# LOST TIME INJURIES

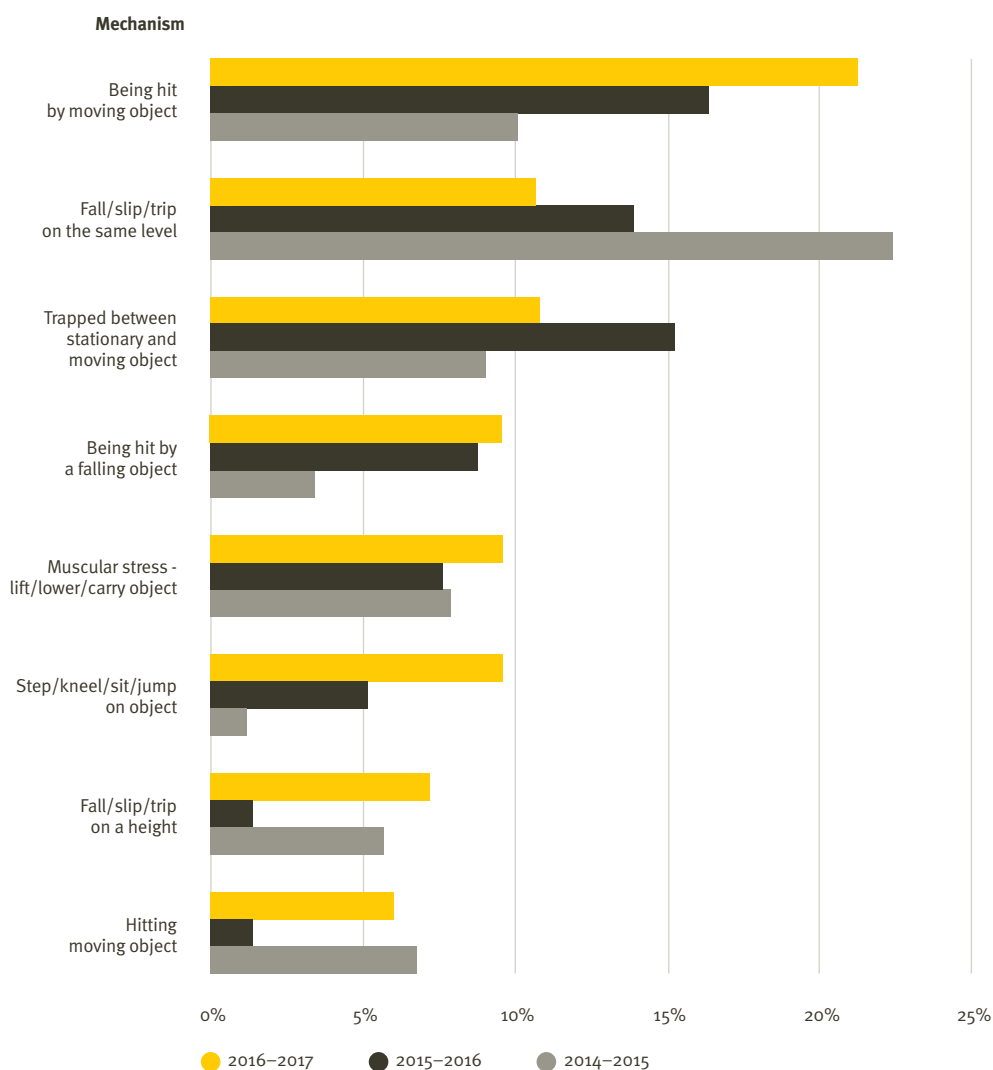
Detailed data on lost time injuries appears in Table 1 of this report and is also available from the DNRM website.

The number of lost time injuries in underground coal mines increased from 79 in 2015–16 to 84 in 2016–17. The frequency rate has trended upwards, from 5.8 to 7.2 in 2016–17.

The most common mechanism for lost time injuries in underground coal mines in 2016–17 was being hit by a moving object, such as an intershield hose, roofbolter, pipe handler, electric dozer, shuttle car and cable, truck, trolley and a ventilation airlock door. This accounted for more than 20 per cent of LTIs.

## 3.4

### MECHANISM FOR LOST TIME INJURIES, UNDERGROUND COAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# SAFETY OUTCOMES FOR SURFACE MINERAL MINES



**This chapter** explores the safety performance of surface mineral mines in Queensland. It includes a summary of serious accidents, high potential incidents and lost time injuries, as well as emerging issues.

# OBSERVATIONS AND EMERGING ISSUES

- › One fatality occurred in surface mineral mines in 2016–17. This is an important reminder of strata controls and the risks associated with working alone on remote mine sites.
- › The number of serious accidents remained stable in 2016–17. Of the three serious accidents that occurred, two were the result of falls, with the third serious accident attributed to entanglement.
- › The frequency rate of high potential incidents remained stable, rising from 10.7 to 10.9 incidents per million hours worked.
- › Falls were identified as the hazard in almost one third of high potential incidents, with over half of these involving the fall of equipment and/or material.



# 7194

## WORKERS

**4144** EMPLOYEES

**3050** CONTRACTORS

**141** MINES IN PRODUCTION

**53** MINES IN CARE & MAINTENANCE

**57** MINES IN INFREQUENT OPERATION

**701** GEMFIELDS OPERATION



# 1

## FATALITY

22 OCTOBER 2016

**COLLAPSE OF  
SHALLOW TRENCH WHILE  
UNDERCUTTING A WALL  
MINES SAFETY  
ALERT 333 ISSUED**



# 3

## SERIOUS ACCIDENTS



# 153

## HIGH POTENTIAL INCIDENTS

**FALLS  
#1 HPI HAZARD**



# SERIOUS ACCIDENTS

The number of serious accidents in surface mineral mines remained stable at three in 2016–17. These accidents involved a person falling, the fall of strata/ground, and entanglement in a rotating plant. A number of safety alerts were issued in response (see Appendix 4).

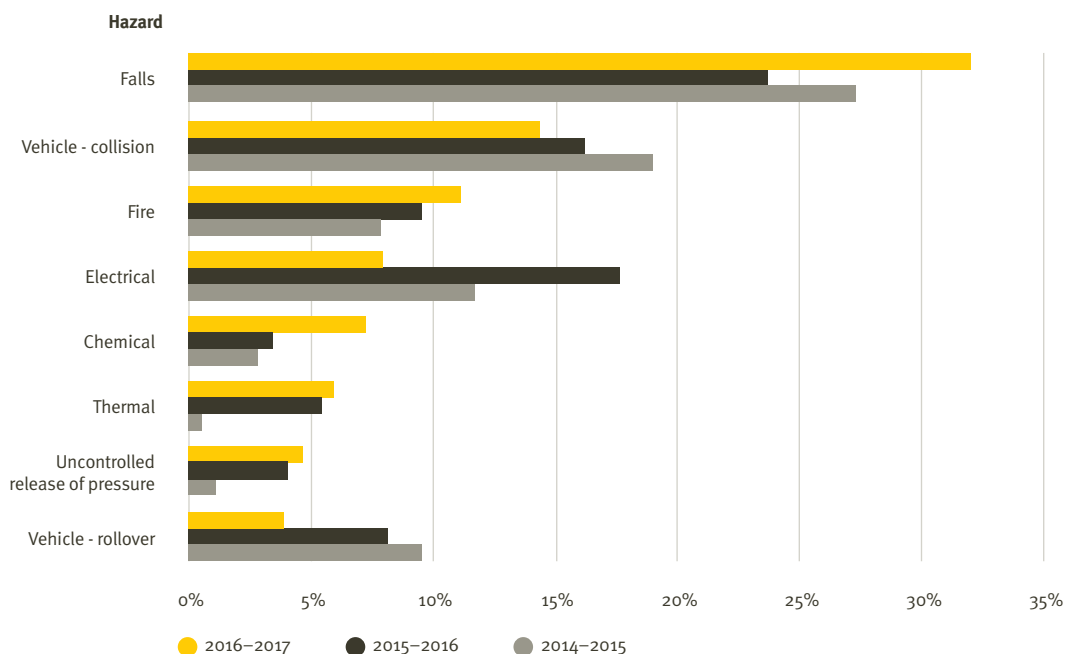
The equipment involved in serious accidents in surface mineral mines in 2016–17 was equally divided between conveyor belts, non-powered hand tools, and no specific equipment involved.

# HIGH POTENTIAL INCIDENTS

In 2016–17, there were 153 high potential incidents in surface mineral mines, an increase of five on the previous year. The frequency rate remained stable at 10.9 incidents per million hours worked. Falls have been the most common hazard in surface mineral mines for the past three years. The percentage of HPIs attributed to falls increased from 24 per cent to 32 per cent in the past year. Fifty-two per cent of the falls in 2016–17 involved a fall of equipment and/or material, with the remainder relating to the fall of ground (21%), the fall of people (12 per cent), the fall of a structure (10 per cent) the fall of a vehicle (3 per cent) and falling into liquid (2 per cent).

## 4.1

### HIGH POTENTIAL INCIDENTS BY HAZARD TYPE, SURFACE MINERAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# LOST TIME INJURIES

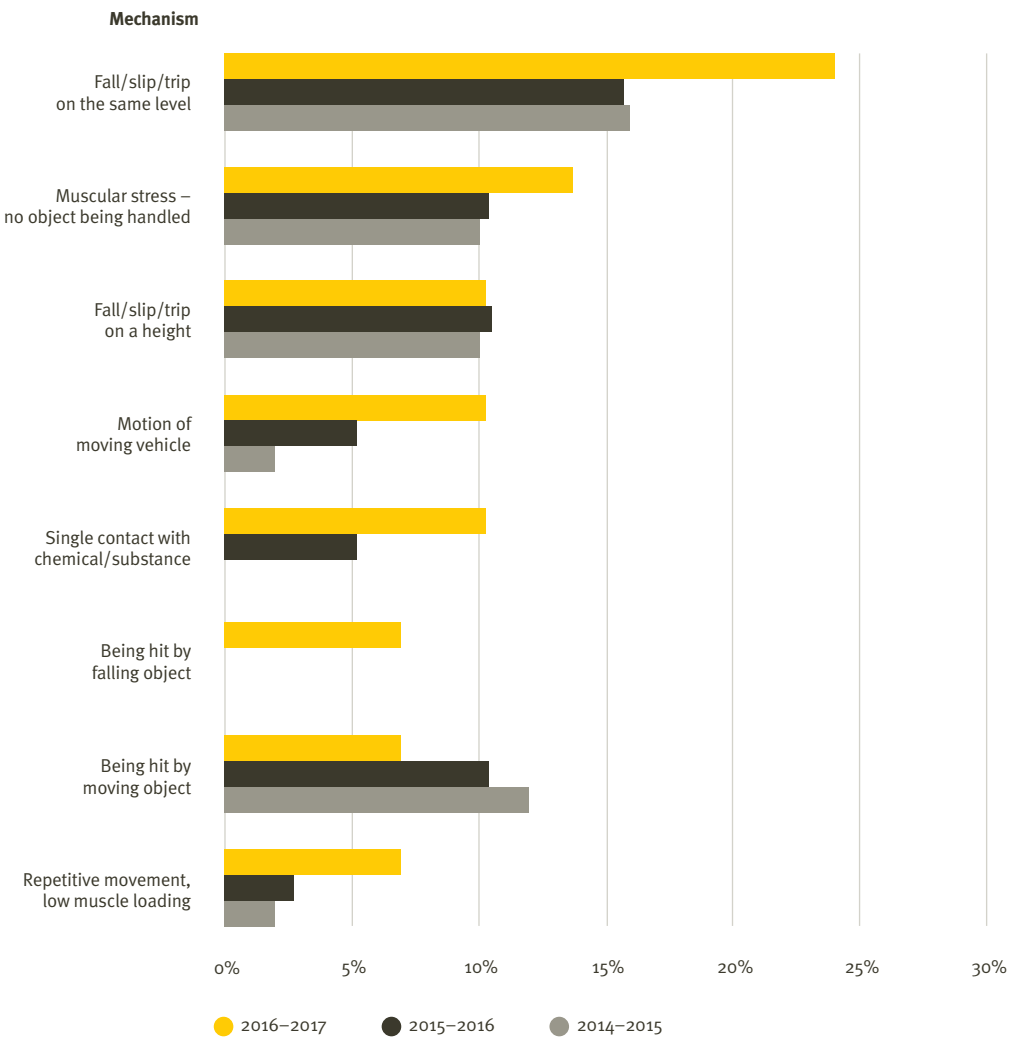
Detailed data on lost time injuries appears in Table 1 of this report and is also available from the DNRM website.

The number of lost time injuries in surface mineral mines decreased from 38 in 2015–16 to 29 in 2016–17. This represents a decline in the frequency rate from 2.8 to 2.1 LTIs per million hours worked.

In 2016–17, the most common mechanism for LTIs in surface mineral mines was falls, slips and trips on the same level, which accounted for almost one quarter of all LTIs. The next most common mechanism relates to muscular stress, including pain caused by twisting or sudden halt in vehicle movement.

## 4.2

### MECHANISM FOR LOST TIME INJURIES, SURFACE MINERAL MINES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# SAFETY OUTCOMES FOR UNDERGROUND MINERAL MINES



**This chapter** explores the safety performance of underground mineral mines in Queensland. It includes a summary of serious accidents, high potential incidents and lost time injuries, as well as emerging issues.

# OBSERVATIONS AND EMERGING ISSUES

- › An emerging issue is the increasing number of equipment fires. Aging equipment is a contributing factor in electrical fires, with implications for equipment maintenance and replacement schedules.
- › Entanglement and falls constitute the most common hazards leading to serious accidents.
- › The number and frequency rate of high potential incidents has decreased year-on-year for the past three years.
- › Falls constitute the most common hazard for high potential incidents, accounting for almost half (44 per cent) of HPIs in underground mineral mines in 2016–17.



# 4994

**WORKERS**

**3038** EMPLOYEES

**1956** CONTRACTORS

**54** MINES IN PRODUCTION

**10** MINES IN CARE & MAINTENANCE

**33** MINES IN INFREQUENT OPERATION



# 0

**FATALITIES**

# 1

**PERMANENT  
INCAPACITY**

DUE TO HEAD INJURY



# 7

**SERIOUS  
ACCIDENTS**



# 105

**HIGH POTENTIAL  
INCIDENTS**

FALLS  
#1 HPI HAZARD

# SERIOUS ACCIDENTS

In 2016–17, the number of serious accidents in underground mineral mines remained stable at seven. Entanglement and falls constituted the most common hazards leading to serious accidents in underground mineral mines (29 per cent respectively).

The most common form of equipment involved in serious accidents in underground mineral mines in 2016–17 was other types of fixed plant (29 per cent). This category is comprised of grinding / milling plant, cages, belt conveyors, mobile cranes and other electrical equipment (14 per cent each).

In 2016–17, there was one permanent incapacity in underground mineral mines (Table 5.1). The worker received a head injury after being struck by a return roller that was ejected while attempting to remove the conveyor belt during an outage. The worker was knocked unconscious by the roller and sustained multiple injuries to the face.

**TABLE 5.1**  
**PERMANENT INCAPACITIES IN UNDERGROUND MINERAL MINES, 2016–17**

Hazard	Mechanism	Incapacity type	Incapacity description	Number
Falls	Being hit by moving objects	Head	Head injuries	1
Total				1



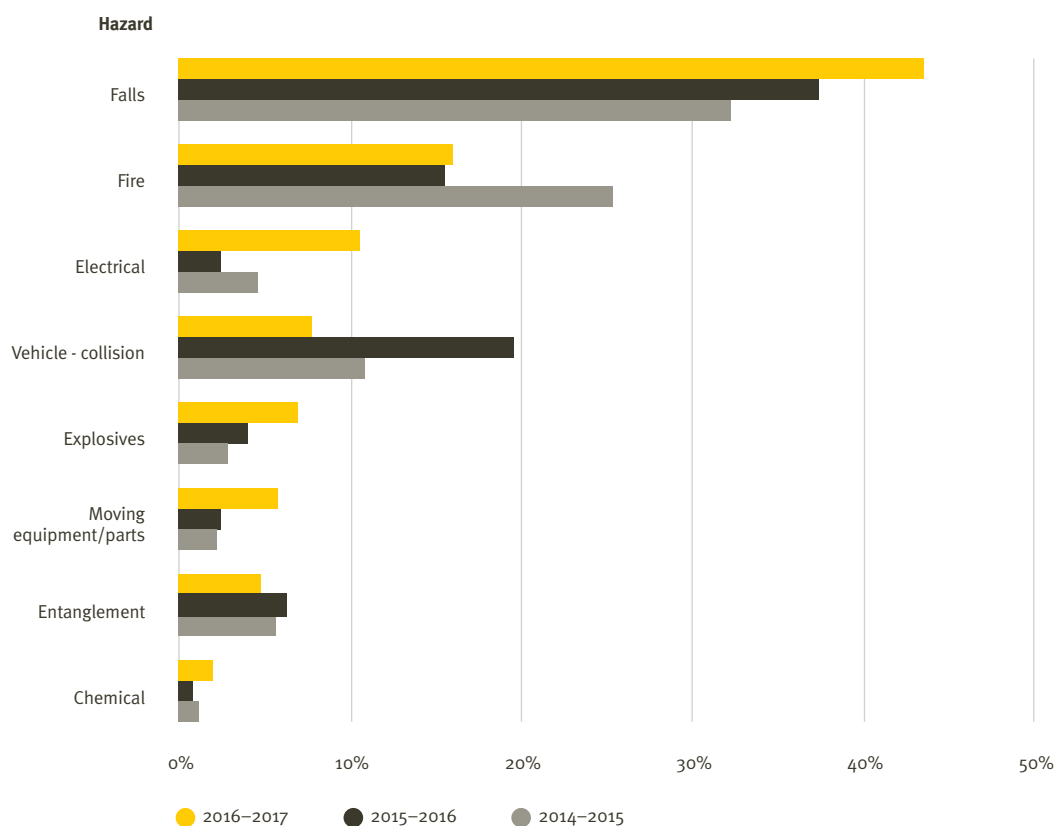
# HIGH POTENTIAL INCIDENTS

The number of high potential incidents in underground mineral mines decreased from 128 in 2015–16 to 105 in 2016–17. This represents a decrease in the HPI frequency rate, from 12.4 to 9.8 incidents per million hours worked.

Falls constitute the most common hazard for high potential incidents, accounting for almost half (44 per cent) of HPIs in underground mineral mines in 2016–17. Falls include a wide variety of incidents, including fall of ground, people, equipment/material and vehicles. Almost 50 per cent of these falls are associated with rock falls.

## 5.1

### HIGH POTENTIAL INCIDENTS BY HAZARD TYPE, UNDERGROUND MINERAL MINES, 2014–15 TO 2016–17



*Only the top eight occurring categories have been included.*

Falls are one of the Fatal 4 hazards for mineral mines and quarries, and will continue to be a major focus of the Inspectorate’s safety and health activities.

The number of equipment fires are of concern. Aging equipment is a contributing factor in electrical fires, with flow-on implications for the maintenance and replacement schedules of underground mineral mines.

# LOST TIME INJURIES

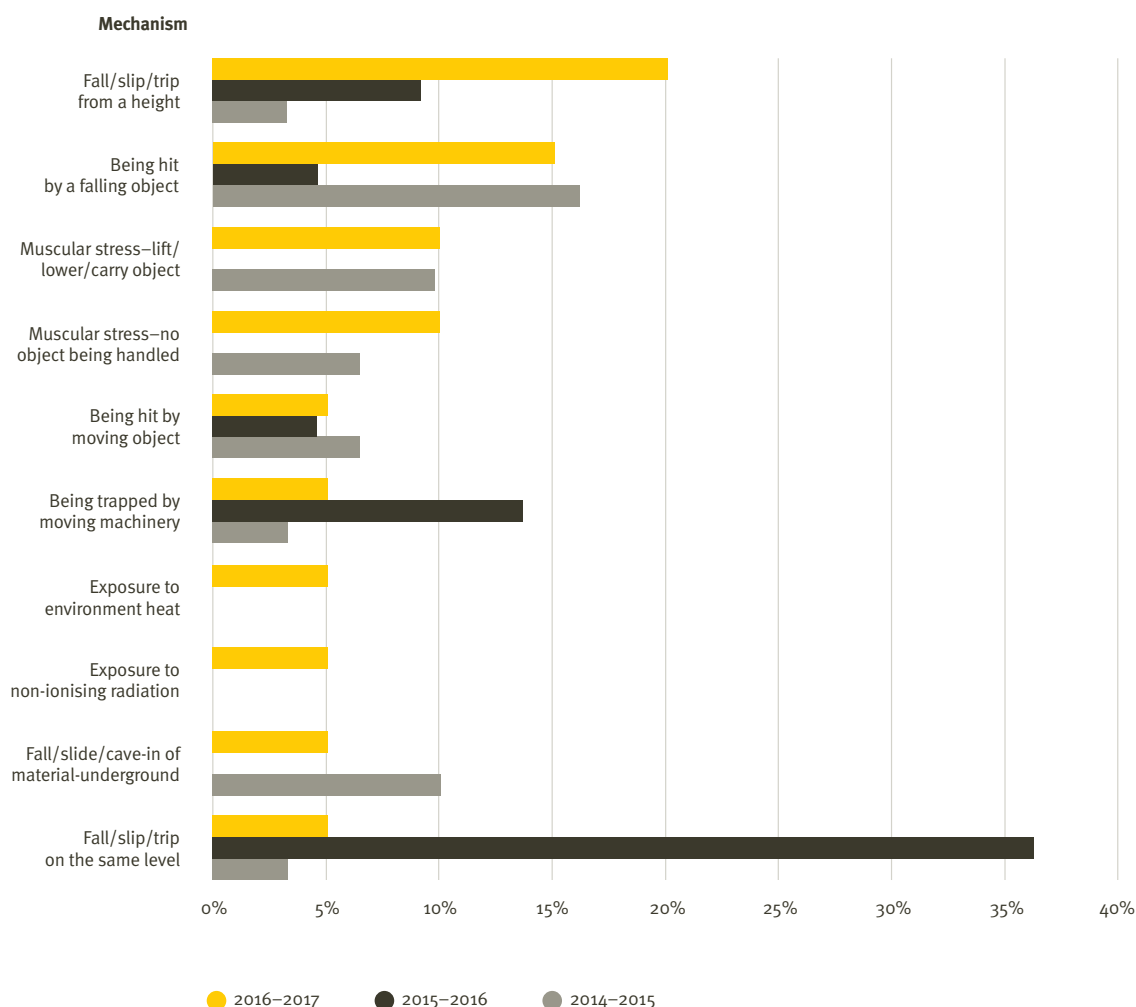
Detailed data on lost time injuries appears in Table 1 of this report and is also available from the DNRM website.

The number of lost time injuries in underground mineral mines decreased from 22 in 2015–16 to 20 in 2016–17. This pattern is also reflected in the lost time injury frequency rate, which declined from 2.1 in 2015–16 to 1.9 in 2016–17.

Some 20 per cent of LTIs in underground mineral mines in 2016–17 can be attributed to falls, slips and trips from a height. The percentage of LTIs attributed to this mechanism more than doubled in the past year. The next common form of LTI mechanisms is being hit by a falling object (15 per cent).

## 5.2

### MECHANISM FOR LOST TIME INJURIES, UNDERGROUND MINERAL MINES, 2014–15 TO 2016–17



Only the top ten occurring categories have been included.

# SAFETY OUTCOMES FOR QUARRIES



**This chapter** explores the safety performance of quarries in Queensland. It includes a summary of serious accidents, high potential incidents and lost time injuries, as well as emerging issues.

# OBSERVATIONS AND EMERGING ISSUES

- › The number of high potential incidents in quarries increased from 56 to 64 in 2016–17. This represents an increase in the frequency rate of 23.3 to 29.1 HPIs per million hours worked.
- › Vehicle collision was identified as the hazard in more than one-third of high potential incidents.
- › Queensland Mines Inspectorate has increased its level of engagement with quarries, which has resulted in improved reporting on safety issues.
- › Improving risk management in smaller quarrying operations that regularly scale up and down in size with market fluctuations will be a priority in the future due to trends in the number and frequency of high potential incidents.



**1464**

**WORKERS**

**992** EMPLOYEES

**472** CONTRACTORS

**216** QUARRIES IN PRODUCTION

**43** QUARRIES IN CARE & MAINTENANCE

**49** QUARRIES IN INFREQUENT OPERATION



**0**

**FATALITIES**



**6**

**SERIOUS  
ACCIDENTS**



**64**

**HIGH POTENTIAL  
INCIDENTS**

**VEHICLE COLLISIONS  
#1 HPI HAZARD**

# SERIOUS ACCIDENTS

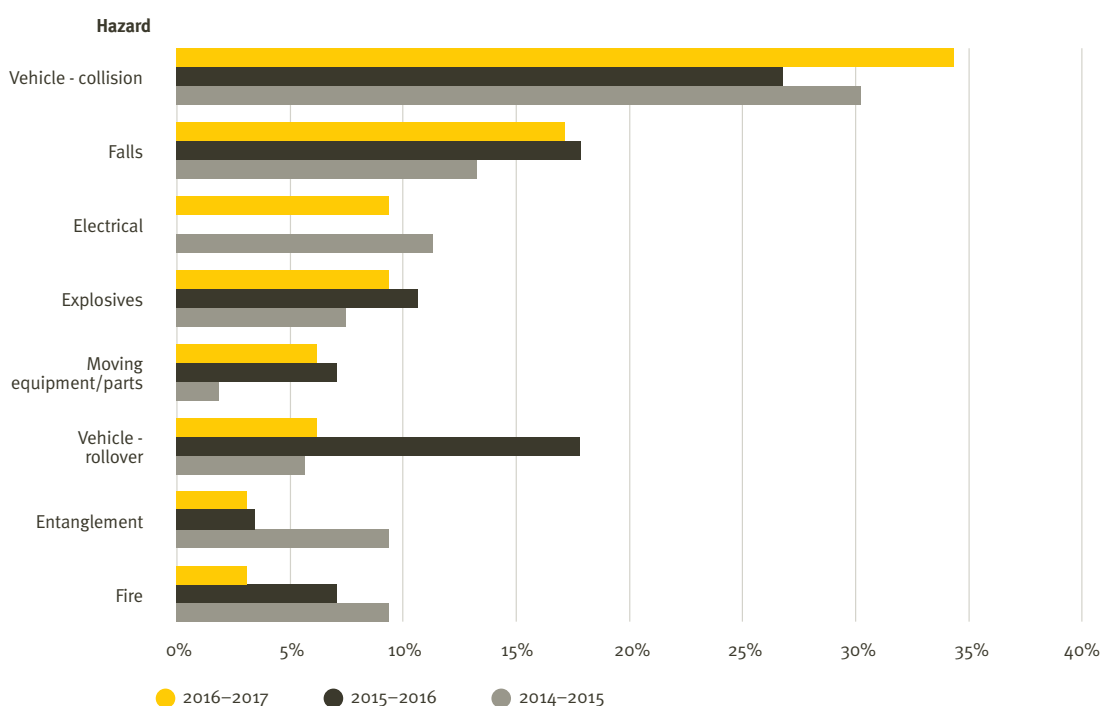
There were six serious accidents in quarries in 2016–17, an increase of five from the previous year. These serious accidents were attributed to three hazards: entanglement, collisions and falls. The most common location for serious accidents at quarries was breaker stations and crushing and screening plants, which accounted for two accidents in 2016–17. The equipment type most commonly involved in serious accidents in quarries was rear dump trucks (33 per cent), followed by conveyor belts, bucket conveyors, non-powered hand tools and other non-powered objects/equipment (all 17 per cent each). These are two of the Fatal 4 hazards for mineral mines and quarries that are currently a focus of the Inspectorate.

# HIGH POTENTIAL INCIDENTS

In 2016–17, the number of high potential incidents in quarries increased from 56 to 64. This pattern is also reflected in the frequency rate for high potential incidents in quarries, which increased from 23.3 to 29.1 HPIs per million hours worked. The hazards most commonly associated with HPIs in quarries in 2016–17 was vehicle collisions (34 per cent) and falls (17 per cent).

## 6.1

### HIGH POTENTIAL INCIDENTS BY HAZARD TYPE, QUARRIES, 2014–15 TO 2016–17



Only the top eight occurring categories have been included.

# LOST TIME INJURIES

Detailed data on lost time injuries appears in Table 1 of this report and is also available from the DNRM website.

The number of lost time injuries in quarries increased in the past year, rising from 11 in 2015–16 to 19 in 2016–17. This represents an increase in the lost time injury frequency rate, from 4.6 to 8.6 LTIs per million hours worked.

Due to the intermittent nature of quarry operations, information on the mechanism for lost time injuries in quarries is incomplete and creates uncertainty in interpretation. The most common mechanism for LTIs in 2016–17 was being hit by a moving object, which accounted for almost 16 per cent of LTIs.



# INDUSTRY OVERVIEW OF OCCUPATIONAL HEALTH OUTCOMES



**This chapter** summarises occupational health outcomes in the Queensland mining industry. It includes activities that have occurred in response to mine dust lung disease (MDLD), including the monitoring of respirable coal dust and respirable crystalline silica. The emergence and impact of chronic disease on occupational health outcomes is also explored.

# OBSERVATIONS AND EMERGING ISSUES

- › The Queensland Government is implementing all recommendations from an independent review of the respiratory component of the Coal Mine Workers' Health Scheme performed by Monash University in collaboration with the University of Illinois at Chicago in July 2016.
- › The Queensland Government supports, or supports in principle, all 68 recommendations of the CWP Select Committee report handed down on 29 May 2017.
- › There has been a major reduction in measured respirable dust levels in underground coal mines in the first half of 2017 compared to the same period in 2016, following regulatory changes that commenced in January 2017. These changes require coal mines to report respirable dust data to the Chief Inspector of Mines, and to report single sample exceedances of the occupational exposure limit.
- › Monitoring respirable crystalline silica in mineral mines and quarries is now required following the gazettal of *QGL02 Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries*, which prescribes mandatory monitoring and reporting to the Queensland Mines Inspectorate.
- › Hearing loss is an area of concern, with 10 of the 19 permanent incapacities in surface coal mines in 2016–17 attributed to noise induced hearing loss. Mine sites should review their audiometry surveillance and the effectiveness of their noise abatement and management controls.
- › Worker well-being is recognised as an increasingly important priority for the mining industry. Mental health, obesity, drug and alcohol use and worker fatigue can all adversely affect safety and health outcomes in the mining and quarrying industry, with potential for serious and tragic consequences.
- › The Queensland Mines Inspectorate will survey the industry on drug and alcohol abuse in 2017–18 and report the findings in next year's report.



# MINE DUST LUNG DISEASE

On 15 September 2016 the Queensland Parliament established the CWP Select Committee to conduct an inquiry into the re-identification of coal workers' pneumoconiosis (CWP) in Queensland.

On 23 March 2017 the terms of reference of the CWP Select Committee were expanded to include other occupational respirable dust issues.

The CWP Select Committee delivered a report on 29 May 2017, containing 68 recommendations. The Queensland Government tabled its response on 8 September 2017, indicating support, or in-principle support for all 68 recommendations.

As part of the response to the re-identification of CWP and prior to the establishment of the Select Committee, the Department of Natural Resources and Mines engaged Monash University (in collaboration with the University of Illinois at Chicago) to undertake an independent review of the respiratory component of the Coal Mine Workers' Health Scheme.

The subsequent report, known as the Monash report, was published on 13 July 2016 and set out 18 recommendations, all of which were supported by government. Actions that had been completed by June 2017 include:

- a range of regulatory amendments to give effect to the Monash report's recommendations such as:
  - chest X-rays and lung function tests are now mandatory for underground and aboveground workers
  - retiring coal miners now have the option of an exit medical
  - CWP and other mine dust lung diseases are now reportable to the Mines Inspectorate
- Queensland Health's eHealth system is being leveraged to deliver a new electronic management system for coal mine workers' records
- the Thoracic Society of Australia and New Zealand were engaged to develop standards for the taking, interpreting and training in spirometry
- a clinical pathway was developed by the Coal Mine Dust Lung Disease (CMDLD) Collaborative Group to ensure consistency in the referral and follow-up investigation of workers with abnormal screening results<sup>1</sup>
- a tender for an Australian-based provider to report chest X-rays by B-reader qualified radiologists was released with arrangements progressed for a B-reader course delivered in Australia by the United States Government's National Institute for Occupational Safety and Health (NIOSH) later in 2017
- X-ray imaging standards were developed by the department with the assistance of Professor Robert Cohen MD from the University of Illinois, together with one of Australia's first B-reader radiologists and Queensland Health
- a departmental register of qualified and experienced doctors, spirometry practitioners and X-ray imaging clinics opened. To be on the register, doctors must meet minimum qualifications and standards and be subject to rigorous accreditation and regular audit

<sup>1</sup> The CMDLD Collaborative Group is voluntary group of medical experts co-chaired by the President of the Australasian Faculty of Occupational and Environmental Medicine and a thoracic physician at the Department of Thoracic Medicine at St Vincent's Hospital in Sydney, and is supported by Professor Robert Cohen MD from the University of Illinois

- a tender for an accreditation provider was released to undertake the assessment and ongoing review of registered providers
- a tender for the development of a doctor training program was released that will ensure doctors who want to undertake health assessments for coal workers have the necessary training and occupational exposure, including visits to coal mines
- Monash University was further engaged to thoroughly assess the health assessment form to ensure the right information is collected for quality health surveillance
- an extensive independent third party audit program was designed by Ernst and Young to ensure the requisite checks and balances are in place to give assurance to workers and prevent repeating mistakes of the past.

As at 30 June 2017, there were 48 confirmed cases of mine dust lung diseases among current and former Queensland mine workers. This consolidated reporting captures all confirmed cases of mine dust lung diseases from 1984.

Respiratory health surveillance requirements have now been implemented. As at 30 June 2017, over 11 000 chest X-rays of current and former Queensland coal mine workers have been sent to the University of Illinois at Chicago, for NIOSH accredited B-reader screening. Around half of these chest X-rays have been read and returned by the University of Illinois.

As part of its surveillance activities, the Department of Natural Resources and Mines' Health Surveillance Unit (HSU) collects and maintains the health assessment records of all coal mine workers in Queensland. These records are generated and submitted by Nominated Medical Advisers (NMAs), whose role it is to identify and detect disease on behalf of operators and coal mine workers.

The unit receives an average of 300-400 health assessment records each week. Over a 10 year period, a backlog developed of health assessments awaiting processing. With the assistance of additional temporary resources, the HSU cleared the backlog over an 18 month period. In that time, a total of 174 288 records were processed.

The HSU now holds more than 400 000 health records for coal mine workers, including records of health assessments conducted under the current Coal Mine Workers' Health Scheme, and those health assessments conducted under the previous Queensland Coal Board.

The clearing of the backlog has allowed any abnormal chest X-ray results to be assessed further to ensure adequate follow-up investigation occurred. The data also provides an important source of baseline data for further analysis. This data will be used in an initial health surveillance scoping study, to be completed by October 2017.



**The backlog of health assessments has been cleared, with a total of 174 288 records being processed in a period of 18 months.**

# RESPIRABLE DUST MONITORING

## RESPIRABLE DUST

Monitoring the level of respirable dust is an important component of understanding the risk to workers and controlling their exposure to dust in Queensland mines.

The Queensland Mines Inspectorate has put in place recognised standards for dust monitoring and control:

- Recognised Standard 14: monitoring respirable dust in coal mines – sets out minimum requirements to be included in a coal mine’s safety and health management system for monitoring, preparing records and reporting concentrations of respirable dust levels. Recognised Standard 14 became effective on 1 January 2017.
- Recognised Standard 15: underground respirable dust control – states ways for the site senior executive to meet their safety and health obligations, and develop their mine’s safety and health management system for the control of respirable dust in an underground coal mine. Recognised Standard 15 became effective on 1 May 2017.

From 1 January 2017, the Coal Mining Safety and Health Regulation 2017 requires all Queensland coal mines to provide respirable dust data to the Chief Inspector of Coal Mines. The industry reported data is statistically analysed and informs the personal exposure to respirable dust and respirable crystalline silica in Queensland’s coal mines. The monitoring and reporting process supports the Inspectorate’s compliance activities. Industry performance is compared against the occupational exposure level (OEL) of a time-weighted average (TWA) of three milligrams per cubic metre (mg/m<sup>3</sup>). A commonly used shift-adjusted OEL is a TWA of 2.8mg/m<sup>3</sup> for miners working more than 40 hours per week.

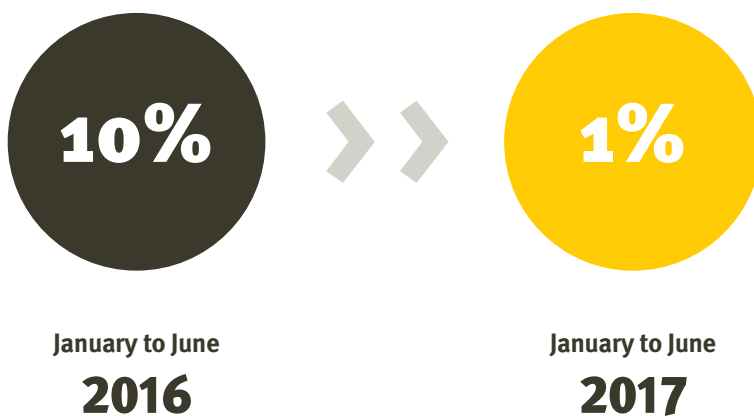
The regulated exposure limit stated in the Coal Mining Safety and Health Regulation 2017 aligns with the standard set by Safe Work Australia. This standard is based on epidemiological studies, and is determined to be an airborne concentration that should not cause adverse health effects or cause undue discomfort to nearly all workers.

Data for the first half of 2017 indicates a major reduction in respirable dust levels in underground coal mines compared to the same period in 2016. The single exceedance rate for respirable dust decreased from ten per cent to one per cent during this period.

## 7.1

### CHANGE IN SINGLE EXCEEDANCE RATE – UNDERGROUND COAL 2016 AND 2017

*Note: The number of personal respirable dust samples exceeding the shift adjusted exposure limit for respirable dust in underground coal mines has reduced significantly. Data from 2016 represents 12 operating underground coal mines, and 2017 data represents 11 operating underground coal mines.*



Research indicates that the type of work undertaken may increase a worker's risk of developing CWP if effective controls are not put in place. Analysis of data from similar exposure groups (SEGs) allows risk to be better monitored and controlled. The SEGs with a higher level of risk include longwall workgroups and development workgroups. Mines with these work groups are required to monitor every quarter under the Coal Mining Safety and Health Regulation 2017.

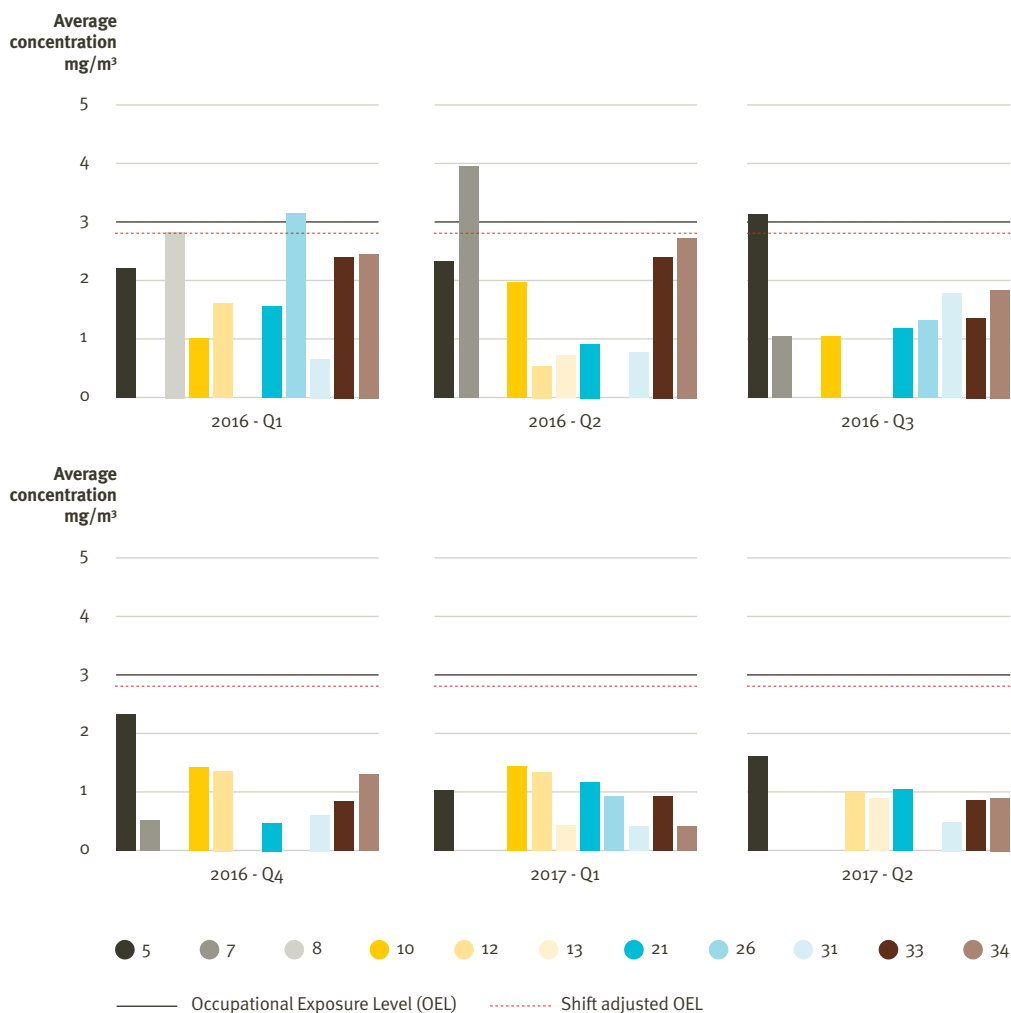
The figures below demonstrate the sustained improvements that have occurred for SEGs in coal mines. Each vertical bar and numbered circle represents a different, de-identified mine site.

The improvements have been achieved in response to:

- renewed industry focus on respirable dust in response to the re-identification of CWP, the release of the Monash report, Inspectorate enforcement and Industry Safety and Health Representatives (ISHR) field activities
- a coordinated and focussed enforcement regime administered by the Queensland Mines Inspectorate that has required mines to control dust at source by introduction of emerging controls
- ISHR initiatives on respirable dust
- industry workshops on respirable dust
- changes to the regulatory provisions for dust monitoring, exposure review and control.

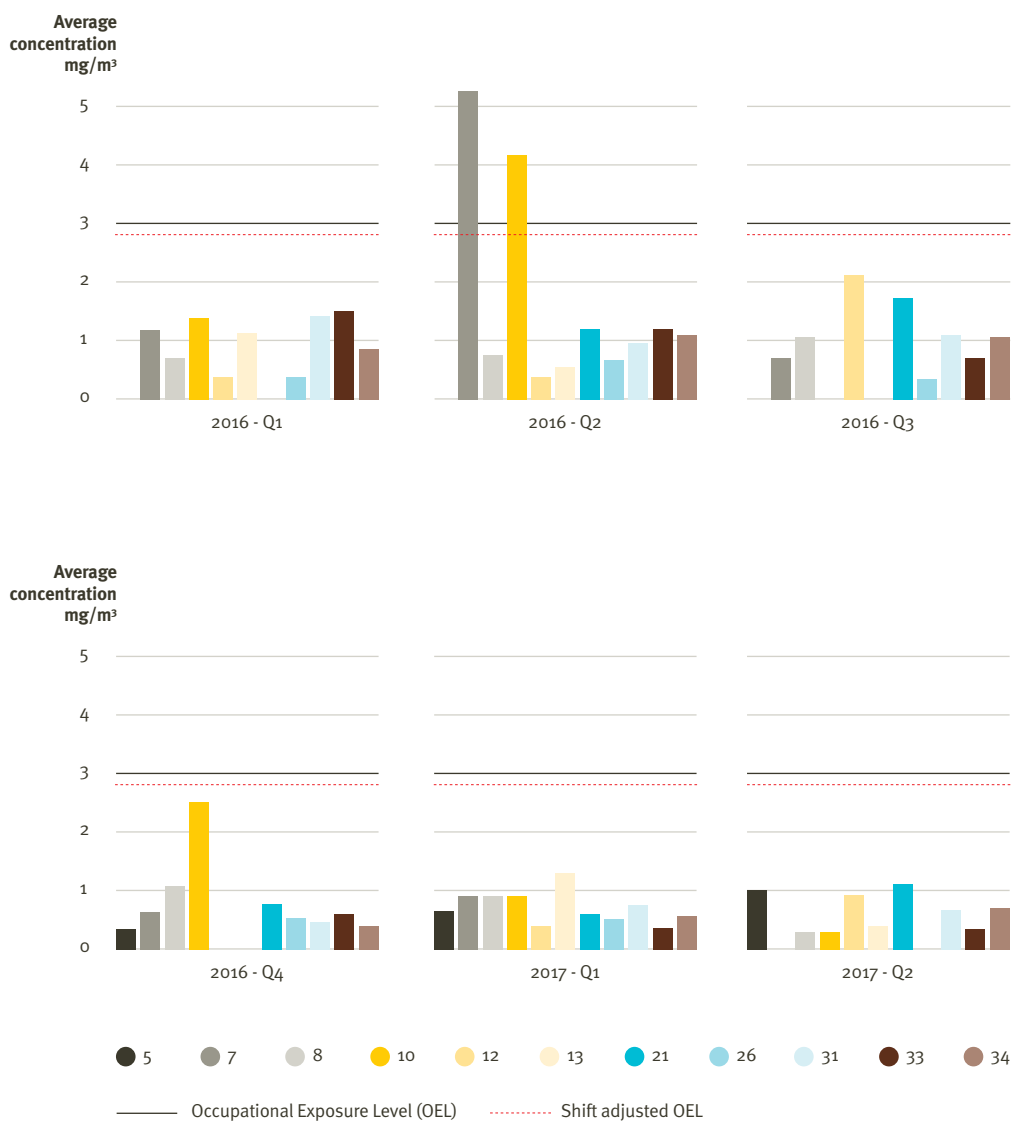
## 7.2

### RESPIRABLE DUST, LONGWALL WORKERS SEG, UNDERGROUND SITES



## 7.3

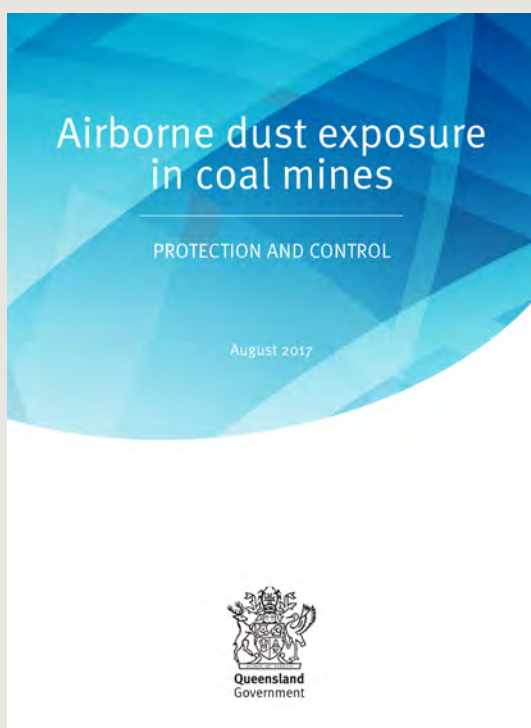
### RESPIRABLE DUST, DEVELOPMENT WORKERS SEG, UNDERGROUND SITES



Open cut sites and all other SEGs for underground sites monitor dust based on a risk ratio to determine the frequency as outlined in Recognised Standard 14 – monitoring respirable dust in coal mines.

As at June 2017, the Department of Natural Resources and Mines now has respirable dust data for underground sites from 2000 to 2017, and the first two quarters of respirable dust data for open cut sites.

## PUBLICATION OF 'AIRBORNE DUST EXPOSURE IN COAL MINES: PROTECTION AND CONTROL'



Coal mine workers are exposed to coal and crystalline silica dust particles so small they cannot be seen by the naked eye. Prolonged exposure to high concentration of these fine dust particles can lead to a range of serious lung diseases, such as silicosis, coal workers' pneumoconiosis, chronic obstructive pulmonary disease, and cancer.

Dust control measures in the Queensland coal mining industry continue to help protect coal mine workers from developing these diseases.

This handy pocket booklet, published in August 2017, promotes a better understanding of dust control measures for coal mine workers. The booklet explores the health effects of dust, how scarring occurs in the lungs, preventative measures used in Queensland, and methods of controlling dust exposure.

The booklet is a must-have for underground and open-cut coal mine workers and employers. Request a free copy at <https://www.dnrm.qld.gov.au/business/forms/pocket-guides-order-form>

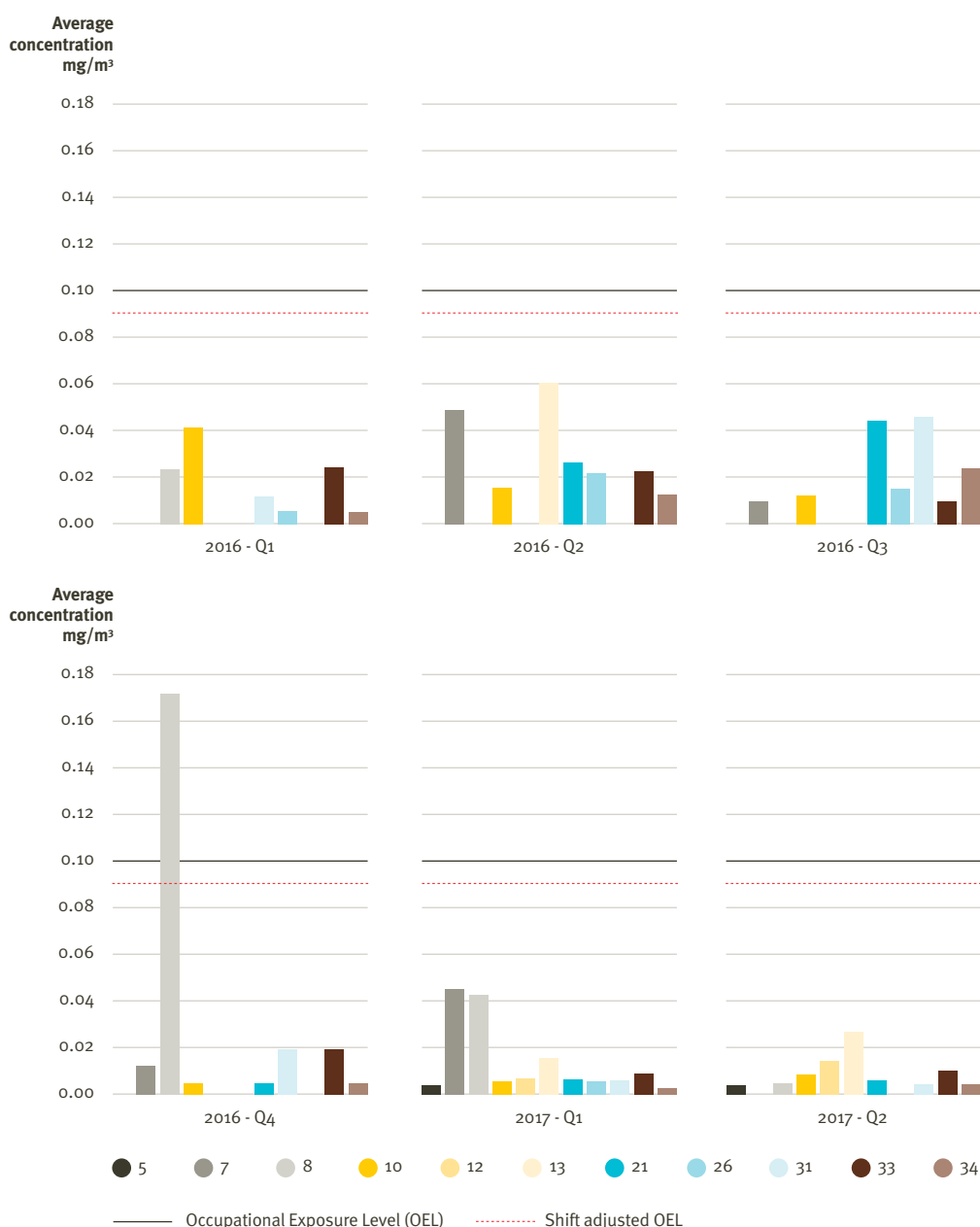
## RESPIRABLE CRYSTALLINE SILICA (QUARTZ)

The Inspectorate also requires the monitoring of respirable crystalline silica levels.

The figures below set out results for the two highest-risk SEGs for underground coal operations. The graphs show the average exposure of the SEG to respirable crystalline silica over the previous quarters. Each vertical bar and numbered circle represents a different, de-identified mine site. In addition to the OEL at 0.1 mg/m<sup>3</sup>, the figure also shows a shift-adjusted OEL of 0.09 mg/m<sup>3</sup>, a common adjusted exposure limit for miners who work more than 40 hours per week.

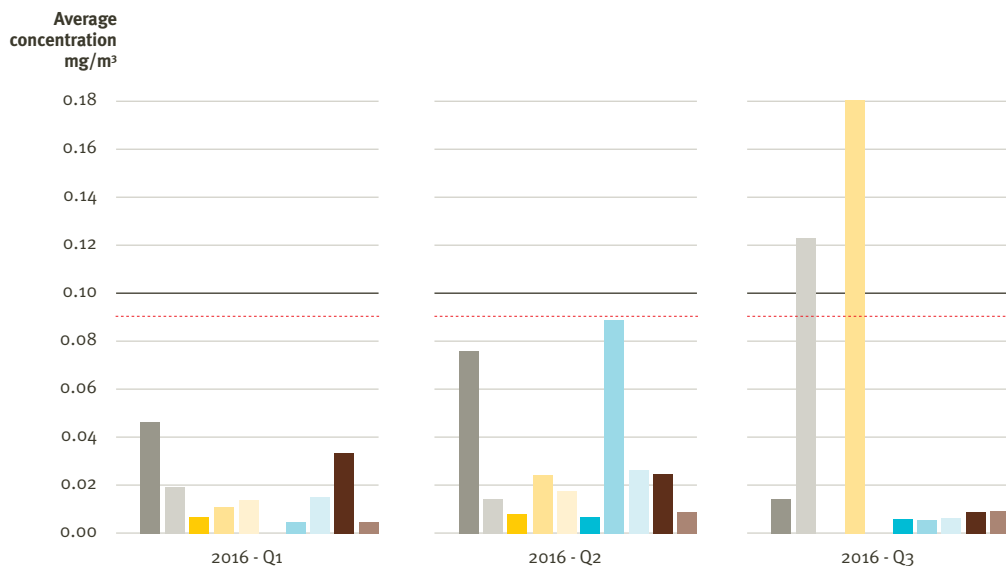
### 7.4

#### RESPIRABLE CRYSTALLINE SILICA, LONGWALL WORKERS SEG, UNDERGROUND SITES

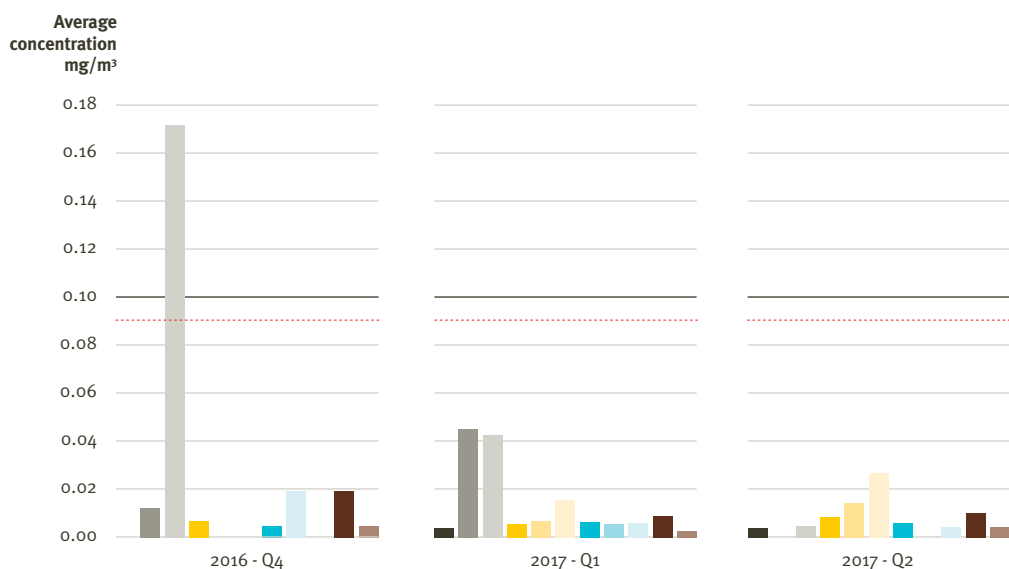


## 7.5

### RESPIRABLE CRYSTALLINE SILICA, DEVELOPMENT WORKERS SEG, UNDERGROUND SITES



Note: Mine 13 in 2016-Q3 recorded two high single exceedances which resulted in an average of 1 mg/m<sup>3</sup> RCS for this period. These exceedances were addressed directly with the site and results since show good control. With very high variation in the data (GSD 10.16), associated with low sample numbers, this has been provided for information only and completeness of data.



● 5 ● 7 ● 8 ● 10 ● 12 ● 13 ● 21 ● 26 ● 31 ● 33 ● 34  
 — Occupational Exposure Level (OEL) ..... Shift adjusted OEL

In August 2017, the Inspectorate published *QGLO2 Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries*. The guideline adopts important recommendations from the independent review of the Coal Mine Workers' Health Scheme performed by Monash University in collaboration with the University of Illinois in July 2016. The health and compliance issues were discussed in tripartite workshops with the regulator, industry and unions to ensure a common understanding of the issues and an agreed way forward.

Safe Work Australia is reviewing the respirable dust and respirable crystalline silica exposure standard, and it is the position of the government to accept the revised standard when it becomes available.

Blood lead levels in workers is also an area of ongoing interest to the mining industry. Safe Work Australia released a Decision Regulation Impact Statement on the subject, *Managing risks associated with lead in the workplace: blood lead removal levels and workplace exposure standard*, which recommended that new levels be implemented over a two year transition period.

In January 2017, the Department of Natural Resources and Mines reviewed the Safe Work Australia position on blood lead levels and, as part of its analysis, collated de-identified blood lead information from all lead mining and processing operations. The analysis found that compliance to blood lead levels in Queensland was well within the current levels and exposure profiles show a consistent reduction over the past ten years. The analysis recommended that the Queensland Mining and Quarrying Safety and Health Regulation 2017 be amended to start the transitional period of two years at the soonest possible opportunity.



# OCCUPATIONAL HEALTH IN A SOCIETAL CONTEXT

The management of broader societal issues is increasingly important in mine safety and health. Issues such as fatigue and the use of drugs and alcohol can all affect occupational health outcomes in the mining industry. The demographic profile of the mining workforce, including a large component of young, well-paid male workers operating on a fly-in, fly-out basis, may also increase the risk profile posed by these broader societal issues.

The management of fatigue is particularly important because of its safety implications. Vehicle accidents to and from the mine site are an identified risk, and industry has responded through the use of journey management plans and other strategies to ensure workers do not drive when tired.

The RISKGATE site<sup>2</sup> includes bow-tie analysis of a range of fitness-for-duty topics, including fatigue, alcohol consumption, misuse of drugs and mental ill-health. While these bow-ties are an important tool in managing occupational risk, the development of bow-ties for fitness-for-duty topics is made more difficult by the fact that some preventative controls are beyond the immediate and direct influence of mine sites. In these circumstances, education and awareness programs for workers and the community become vital.<sup>3</sup>

<sup>2</sup> RISKGATE is a website funded by Australian Coal Association Research Program (ACARP). RISKGATE explores principal hazards and includes 18 bow-ties for mining-related hazards.

<sup>3</sup> David Cliff et al, “Managing occupational health in the mining industry”, Proceedings of the 17th coal operators’ conference, mining engineering, University of Wollongong, 2017, p. 304.

In addition to the issues of dust and societal health issues, noise is an area of increasing concern. Data indicates that over half of the permanent incapacities in surface coal mines (10 of 19) related to noise-induced hearing loss of workers involved in production activities. Health assessments undertaken under the Coal Mine Workers’ Health Scheme includes audiometry testing, and there is a guide on noise management for mineral mines and quarries. Mine sites should review their audiometry surveillance and the effectiveness of their noise abatement and management controls.

The 2016–17 industry census form included an expanded set of questions relating to occupational health outcomes.

Future annual reports on mine safety and health performance will explore health-related matters in more detail, as data from the annual census process continues to evolve and mature.

# INDUSTRY OVERVIEW OF COMPLIANCE OUTCOMES



**This chapter** summarises compliance activities and outcomes in the Queensland mining industry. It explores a range of compliance activities, ranging from education and engagement, through to corrective and other enforcement actions. Trends in the number and type of complaints made about mines and quarries are also analysed.

# OBSERVATIONS AND EMERGING ISSUES

- Respirable dust remains an ongoing focus, with structured audits focussing on recent legislative changes and new recognised standards.
- Ventilation and gas management at all underground coal mines is a priority. This is validated by the large proportion of directives issued relating to the effective management and control of methane in longwall operations.
- The Queensland Mines Inspectorate is currently updating its compliance policy to outline its compliance principles and practices, and to reflect current governance arrangements.
- Despite overall complaint numbers reducing by 20 per cent in 2016–17, complaints about mine worker health in coal and mineral mines have more than doubled.

Mine safety and health compliance is facilitated through a mix of statutory and other functions and powers. The Inspectorate observes that compliance across industry is generally high: most industry participants know their obligations and satisfactorily discharge them. The Inspectorate's compliance approach reflects this by focussing most attention on the relatively few instances where participants demonstrate lower than acceptable levels of engagement with their obligations.



**44 577**  
WORKERS

**19**  
COMPLIANCE  
MEETINGS



**12** ONGOING PROSECUTIONS  
**94** INVESTIGATIONS  
**98** COMPLAINTS RECEIVED

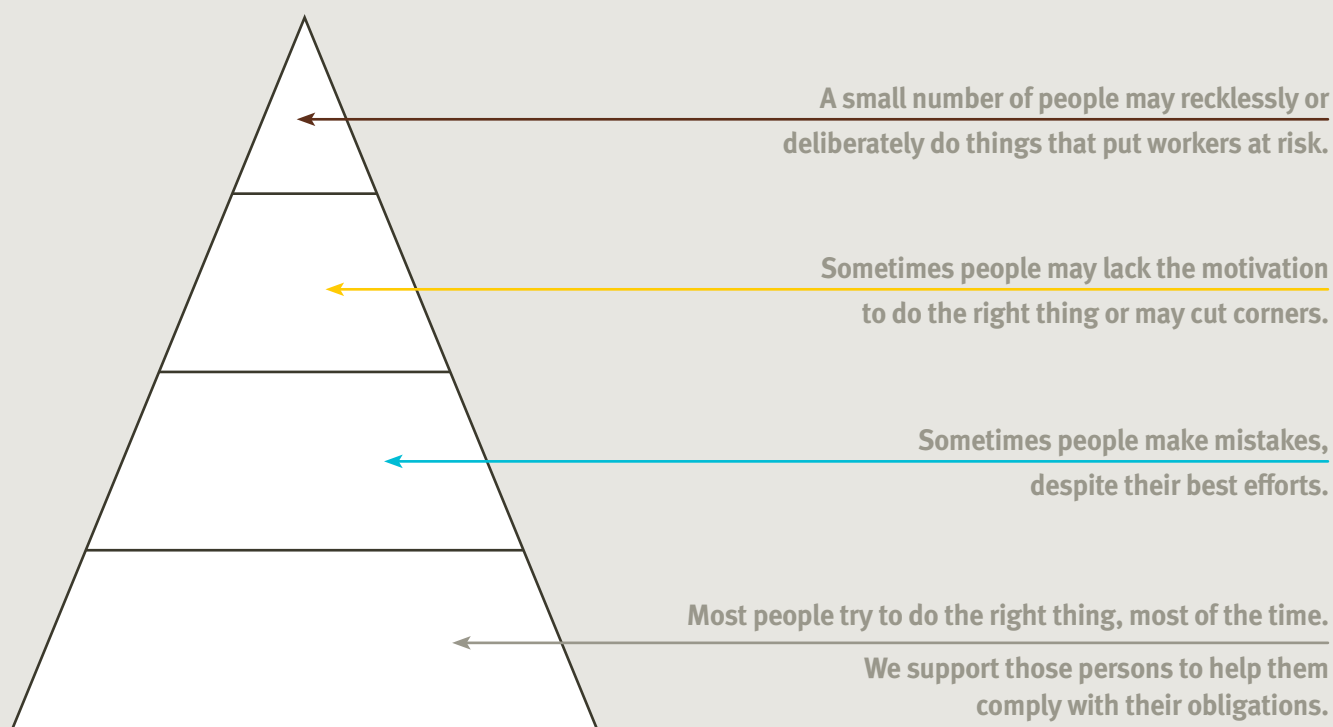


**1426**  
SITES

**1476** INSPECTIONS  
**52** AUDITS

**455**  
DIRECTIVES ISSUED

**1097**  
SUBSTANDARD  
CONDITIONS  
OR PRACTICES



## EDUCATION AND AWARENESS

The Queensland Mines Inspectorate works collaboratively with industry and unions toward improving safety and health performance. This tripartite relationship plays a vital role in creating an environment where issues can be raised and responded to, as they emerge, for the protection of worker safety and health.

As part of its regular program of work, the Inspectorate conducts seminars, training programs and workshops throughout the year to improve industry and worker understanding of safety and health issues in the mining sector. These forums can range from general mine safety and health meetings, to workshops for specific issues or groups, such as respirable dust, quarry operators or longwall mine workers.

The Inspectorate also provides industry with general advice and issues safety alerts and bulletins. In 2016–17, fifteen safety alerts and nine safety bulletins were issued to industry. A list of the safety alerts and bulletins is summarised in Appendices 4 and 5.

# INSPECTIONS, AUDITS AND INVESTIGATIONS

Inspectors and inspection officers have the power to enter and inspect or audit mines under legislation. Inspection and audit scheduling is based on a risk model which considers the hazards present at the site, as well as the demonstrated ability of the site to manage the hazards.

Inspections may be undertaken with or without prior notice, depending on the purpose of the visit and the issue at hand. The number of inspections declined from 1597 to 1476 in 2016–17. Similarly, there was a decline in the number of staff days spent on inspections, from 1751 to 1598 days in 2016–17. This decrease is attributed to having fewer mine sites in operation, and compliance efforts being diverted towards audits in 2016–17.

**TABLE 8.1**

**INSPECTIONS  
UNDERTAKEN, BY SECTOR,  
2014–15 TO 2016–17**

Inspections	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	205	124	509	170	537	<b>1545</b>
2015–16	274	155	477	134	557	<b>1597</b>
2016–17	294	125	383	119	555	<b>1476</b>

Audits are undertaken across a range of issues, including serious accidents or high potential incidents, or as part of a scheduled audit following a site inspection.

Audit activity increased significantly in 2016–17, rising from 32 to 52 audits in 2016–17. This translates to an increase in audit staff days, from 152 to 172 days. Most of the audits occurred in quarries (21) and mineral surface mines (20). The number of audits undertaken can vary from year to year, as it is influenced by other forms of regulatory activity, including investigations and inspections, and need to allocate resources in response to the greatest risks.

**TABLE 8.2**

**AUDITS UNDERTAKEN,  
BY SECTOR,  
2014–15 TO 2016–17**

Audits	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	37	16	9	4	4	<b>70</b>
2015–16	1	3	9	7	12	<b>32</b>
2016–17	8	2	20	1	21	<b>52</b>

The number of investigations undertaken by the Inspectorate declined in 2016–17, down from 101 to 94.

**TABLE 8.3**

**INVESTIGATIONS  
UNDERTAKEN,  
BY SECTOR,  
2014–15 TO 2016–17**

Investigations	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	41	25	14	21	17	<b>118</b>
2015–16	54	11	18	11	7	<b>101</b>
2016–17	37	4	21	19	13	<b>94</b>

The Inspectorate identified 1097 substandard conditions or practices (SCP) in 2016–17. Most of these occurred in quarries (437) and surface mineral mines (301) and surface coal mines (198).

**TABLE 8.4**

**NUMBER OF  
SUBSTANDARD  
CONDITIONS OR  
PRACTICES, BY SECTOR,  
2014–15 TO 2016–17**

Substandard conditions or practices (SCP)	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	171	123	304	139	315	<b>1052</b>
2015–16	147	96	288	68	402	<b>1001</b>
2016–17	198	80	301	81	437	<b>1097</b>



# CORRECTIVE ACTION

Inspectors of mines and inspection officers have the power to issue various directives under the *Coal Mining Safety and Health Act 1999* and the *Mining and Quarrying Safety and Health Act 1999*.

Directives are among the most effective mechanisms for ensuring serious safety and health issues are addressed effectively and as a priority. Directives usually require a mine to take prompt action and rectify issues or deficiencies by a stated date.

A total of 455 directives were issued in 2016–17, an increase of 121 on the previous year. Almost half of the directives issued (196) were to quarries.

**TABLE 8.5**

**DIRECTIVES UNDERTAKEN, BY SECTOR, 2014–15 TO 2016–17**

Directives	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	47	65	36	15	73	236
2015–16	72	77	88	13	84	334
2016–17	83	47	101	28	196	455

The large increase in the number of directives issued to quarries can be attributed in part to the introduction of an improvement process in the Mineral Mines and Quarries Inspectorate that reviews the history of mines and quarries to identify recurring issues and take appropriate action.

The most common type of directives issued across industry in 2016–17 were directives to:

- review the safety and health management system<sup>1</sup>
- reduce risk<sup>2</sup>
- suspend operations due to an unacceptable level of risk<sup>3</sup>.

Collectively, these types of directives represent the vast majority of directives issued in each sector. Some of the more common issues dealt with in directives included:

- the effective management and control of methane in longwall operations
- the effective management and control of respirable dust and silica
- the effective management and control of strata
- a serious accident
- a complaint.

<sup>1</sup> Section 168 *Coal Mining Safety and Health Act 1999*; section 165 *Mining and Quarrying Safety and Health Act 1999*

<sup>2</sup> Section 166 *Coal Mining Safety and Health Act 1999*; section 163 *Mining and Quarrying Safety and Health Act 1999*

<sup>3</sup> Section 167 *Coal Mining Safety and Health Act 1999*; section 164 *Mining and Quarrying Safety and Health Act 1999*

These examples point to some emerging themes, including the importance of having structured audits of ventilation and gas management at all underground coal mines, and the need for a continued focus on respirable dust with structured audits based on the changes in legislation and new recognised standards.

Where compliance with a directive is not achieved by a certain date, the Inspectorate can undertake further action in the form of compliance meetings or other compliance activity. The Inspectorate may conduct a compliance meeting with the mine SSE, or both the SSE and a senior representative of the operator and others accountable for safety and health performance. Compliance meetings require the SSE, operator and others to explain why a deficiency occurred, and the actions taken to ensure it does not occur again.

The Inspectorate undertook compliance meetings a total of 19 times in 2016–17 (see Tables 8.6 and 8.7).

**TABLE 8.6**

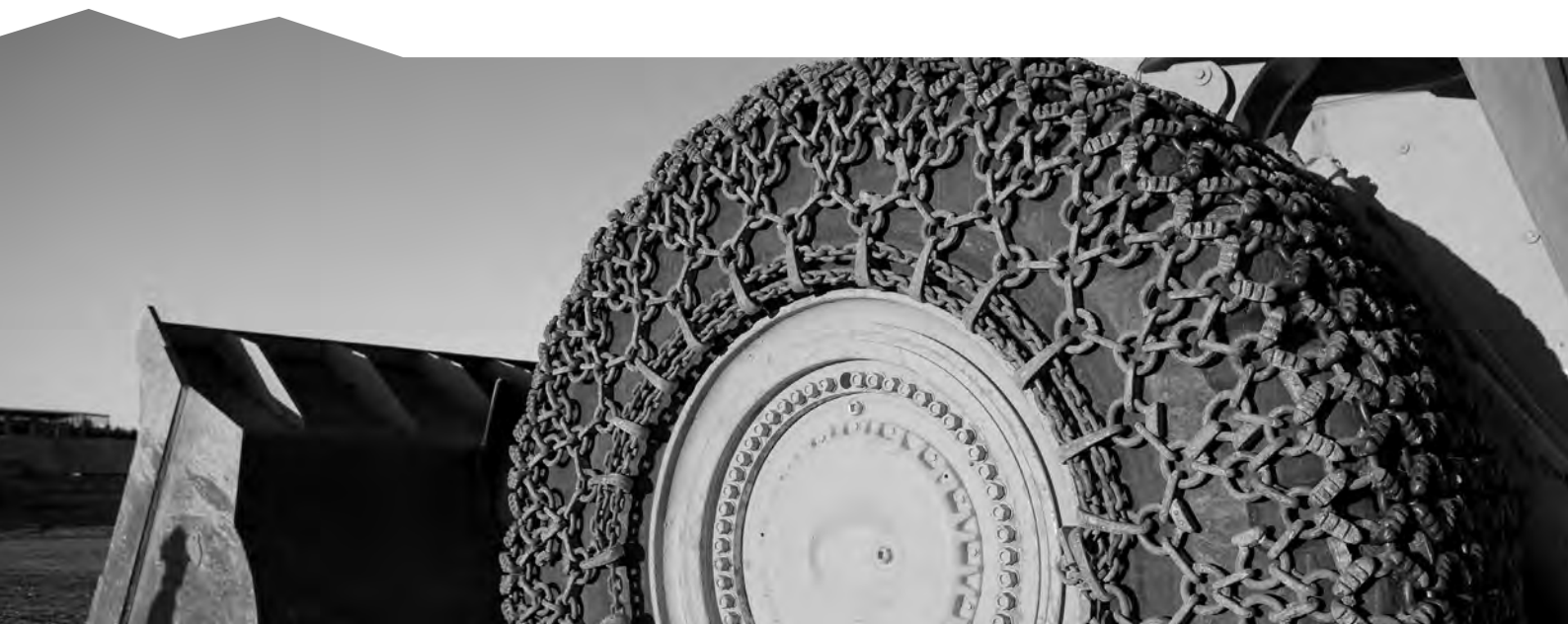
**NUMBER OF  
COMPLIANCE MEETINGS  
(SSE LEVEL),  
2014–15 TO 2016–17**

Compliance meetings (SSE level)	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	3	2	1	2	4	12
2015–16	3	11	5	1	3	23
2016–17	4	1	5	1	1	12

**TABLE 8.7**

**NUMBER OF  
COMPLIANCE MEETINGS  
(SSE/OPERATOR LEVEL),  
2014–15 TO 2016–17**

Compliance meetings (SSE/operator level)	Coal surface	Coal underground	Mineral surface	Mineral underground	Quarries	Total
2014–15	1	0	1	0	0	2
2015–16	1	7	0	0	0	8
2016–17	4	1	2	0	0	7



# PROSECUTIONS

Prosecutions may be undertaken in response to instances of non-compliance where it is in the public interest to prosecute and there is sufficient evidence as to be capable of securing a conviction. For example, prosecution may be considered appropriate where the alleged offender shows significant resistance to or disengagement with its safety and health obligations.

In 2016–17, there were 12 prosecutions before the courts involving 24 defendants. Four of these prosecutions were resolved.

An example of the prosecutions, including cases relating to two fatalities and a serious accident, are outlined below.

- On 6 May 2014 an incident occurred at a coal mine in central Queensland in which an electrician was fatally injured after opening a hatch on a seal to a part of an unused mine. The unused part of the mine was in the process of being permanently sealed, which involved the dilution of the remaining oxygen to prevent spontaneous combustion of any remaining coal. The electrician asphyxiated upon entering the unsealed part of the mine.

One defendant, the operator, was sentenced in the 2016–17 reporting year for failing to discharge their safety and health obligations and causing the death of the worker, contrary to section 34 of the *Coal Mining Safety and Health Act 1999*. The charges related to the operator's obligation to ensure that the risk to workers at the mine was at an acceptable level, and the obligation to ensure that the operator's own safety and health and that of others was not affected by the way the operator conducted operations<sup>4</sup>.

The operator pleaded guilty and was sentenced in October 2016. The Court imposed a \$137 500 fine and made orders that the operator pay investigation costs of \$15 000. No conviction was recorded.

- On 11 December 2014 an incident occurred at a mine in Central Queensland in which a contractor's employee was struck by a section of rock and coal, fatally injuring him. The section was not supported adequately as required by the strata support plan.

One defendant, the operator, was sentenced in the 2016–17 reporting year for failing to discharge their safety and health obligations and causing the death of the worker, contrary to section 34 of the *Coal Mining Safety and Health Act 1999*. The charge related to the operator's obligation to ensure that the risk to workers at the mine was at an acceptable level<sup>5</sup>.

The operator pleaded guilty shortly after the beginning of the trial and was sentenced in May 2017. The Court imposed a \$284 625 fine and a conviction was recorded. The parties bore their own costs.

- On 5 September 2014 a worker was crushed between the Longwall Maingate AFC drive and the mine wall while undertaking unplanned maintenance work, suffering severe injuries.

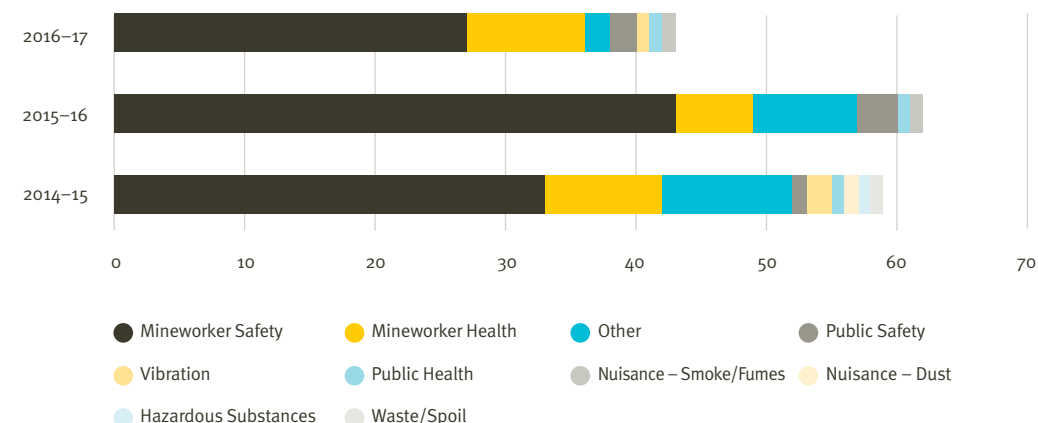
One defendant, the operator, was sentenced in the 2016–17 reporting year for failing to discharge their safety and health obligations and causing injuries amounting to grievous bodily harm to the worker<sup>6</sup>.

The operator was sentenced in June 2017. The Court imposed a fine of \$60 000 and made orders that the operator pay the investigation costs of \$25 785.43. No conviction was recorded.

<sup>4</sup> Section 41 of the *Coal Mining Safety and Health Act 1999*

<sup>5</sup> Section 41 of the *Coal Mining Safety and Health Act 1999*

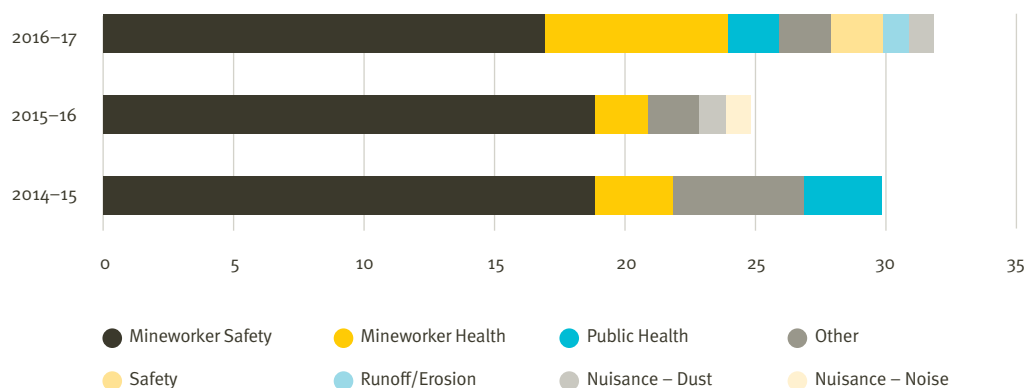
<sup>6</sup> Section 41 of the *Coal Mining Safety and Health Act 1999*



Thirty-two complaints were made about mineral mines in 2016–17. More than half the complaints focussed on mineworker safety. While this represents a decrease from the previous year, there has been an increase in the percentage of complaints relating to mineworker health (up from 8 per cent to 22 per cent). This can perhaps be attributed to the recent increased awareness about mine workers' dust lung diseases generally. The majority of complaints about mineral mines were made by mine workers (72 per cent), with the remainder made by the public.

## 8.2

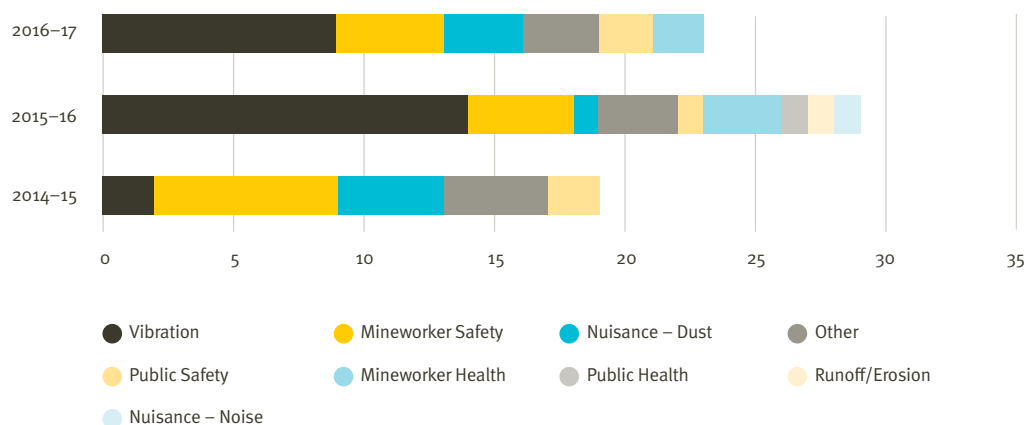
### NUMBER OF COMPLAINTS BY TYPE, MINERALS, 2014–15 TO 2016–17



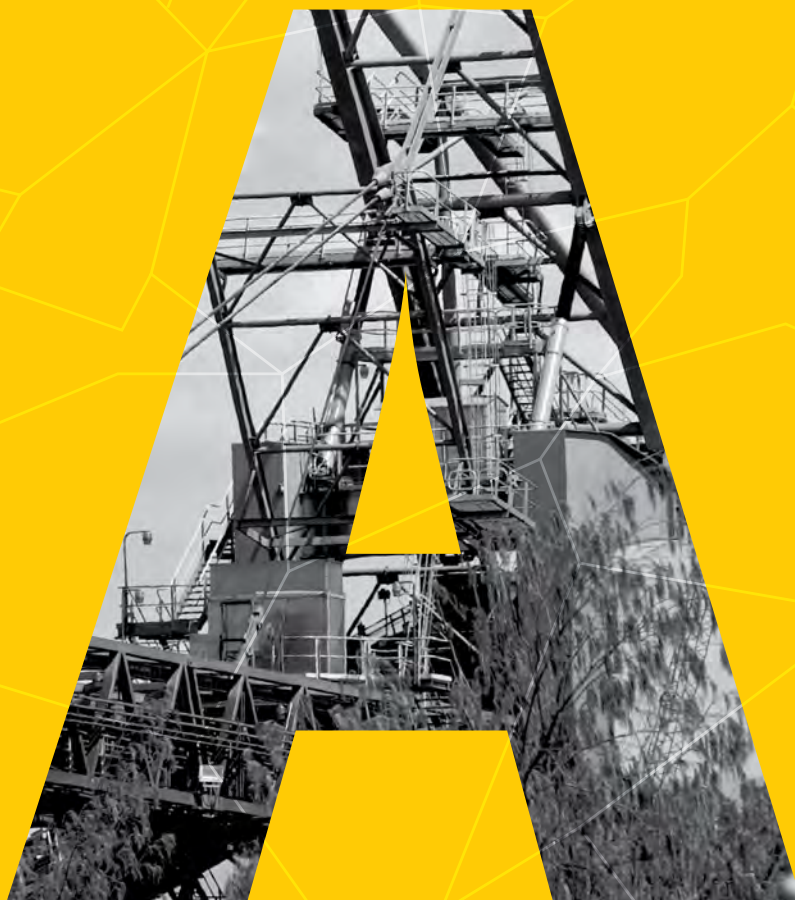
In 2016–17, 23 complaints were made about quarries. Almost 80 per cent of the complaints were made by the public, with complaints focussing mainly on vibration (39 per cent) and mineworker safety (17 per cent).

## 8.3

### NUMBER OF COMPLAINTS BY TYPE, QUARRIES, 2014–15 TO 2016–17



# APPENDICES



# DATA COLLECTION ON MINE SAFETY AND HEALTH

This report presents an overview of the Queensland mining industry's safety and health performance for the period 1 July 2016 to 30 June 2017.

The information in this report is sourced primarily from data returns submitted by mine and quarry operators<sup>1</sup>. Data is collected in accordance with sections 198 and 279 of the *Coal Mining Safety and Health Act 1999* and the *Mining and Quarrying Safety and Health Act 1999*. The data collection is approved by the Chief Inspector of Coal Mines under section 281 and the Chief Inspector of Mines under section 261 of the legislation. Information is sourced as follows:

Data collected	Source
Fatalities, injuries and incidents	Reports submitted by mine and quarry operators
Injuries resulting in time lost and/or alternative duties and hours	Monthly reports from operating mines and quarries
Lead performance indicators, including matters relating to safety, health, disease and permanent incapacity	Annual industry census data
Respirable dust	Quarterly dust data submissions from industry
Number of workers	Quarterly safety and health fee census submissions
Confirmed cases of Coal Worker Pneumoconiosis (CWP)	Health Surveillance Unit Occupational Physician, Department of Natural Resources and Mines

<sup>1</sup> Due to publication deadlines, information received by the Department of Natural Resources and Mines on or before 31 August 2017 is included in the report. Due to the cut-off date, there may be minor changes in data reported for previous years as each new annual report includes the finalised data for the previous financial year.

<sup>2</sup> Consultation was undertaken with representatives from industry and unions, including BHP Billiton, Glencore Australia Pty Ltd, Evolution Mining, Boral, Australian workers union (AWU), Construction Forestry Mining Electrical Union (CFMEU), and Anglo American.

For the 2016–17 reporting year, a new annual census form was launched. Changes to the existing census were made in consultation with industry and unions, and reflect a longer-term goal to improve the quality, value and use of safety and health data in the mining industry<sup>2</sup>. The Queensland Mines Inspectorate appreciates the time taken by stakeholders to respond to the request for additional data, and thanks all who contributed to the form's development.

The annual census benefits industry by identifying areas of potential weakness and opportunities for improvement in future industry performance. Data is collected for:

- ▶ safety focus areas and health focus areas, including sector-specific information on planning, implementation of controls, monitoring, measurement and review
- ▶ disease and permanent incapacity.

The specific safety and health focus areas are set out in the table below.

Safety focus areas				Health focus areas
Coal surface	Coal underground	Coal exploration	Mineral mines and quarries	All mines
Road construction Vehicle interaction Geotechnical Drill and blast Tyre management	Spontaneous combustion Gas management Mine ventilation Methane drainage Strata control Emergency response Inrush Outburst Contractor management Shotfiring	Gas management Emergency response Contractor management Road construction Vehicle interaction Geotechnical Hazardous substances Training Management structures	Falls Uncontrolled release of pressure Entanglement Collisions	Respirable crystalline silica (RCS) Dust (respirable, inhalable and total) Noise Diesel particulate matter (DPM) Fatigue, drugs (licit and illicit), alcohol Isocyanates (underground coal only)

Data collected on lead performance indicators (previously known as positive performance indicators) is designed to improve future performance. It complements lag indicator data for fatalities, serious accidents and lost time injuries. The use of lead performance indicators helps prioritise efforts to reduce the potential for injury.

The Department of Natural Resources and Mines welcomes feedback on this report. Please email [minesafetystats@dnrm.qld.gov.au](mailto:minesafetystats@dnrm.qld.gov.au) or call 13 QGOV (13 74 68) to be connected through to the Mines Inspectorate.

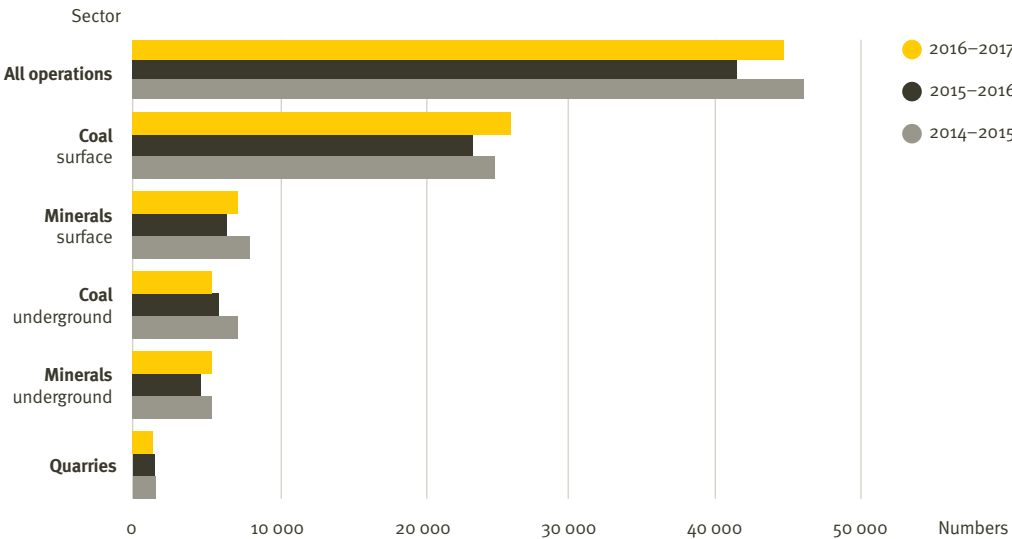
Further data on mine safety and health performance can be accessed from the DNRM website at [www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au)



# WORKFORCE PROFILE OF MINES AND QUARRIES

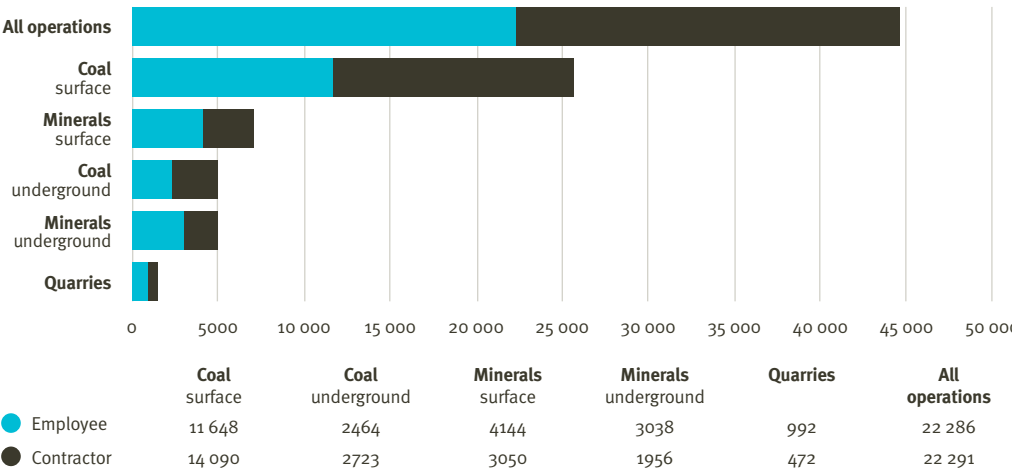
As at 30 June 2017, the Queensland mining industry employed 44 577 people, which represents an increase of 3226 since the previous year.

## A.1 SIZE OF MINING WORKFORCE BY SECTOR, 2014–15 TO 2016–17

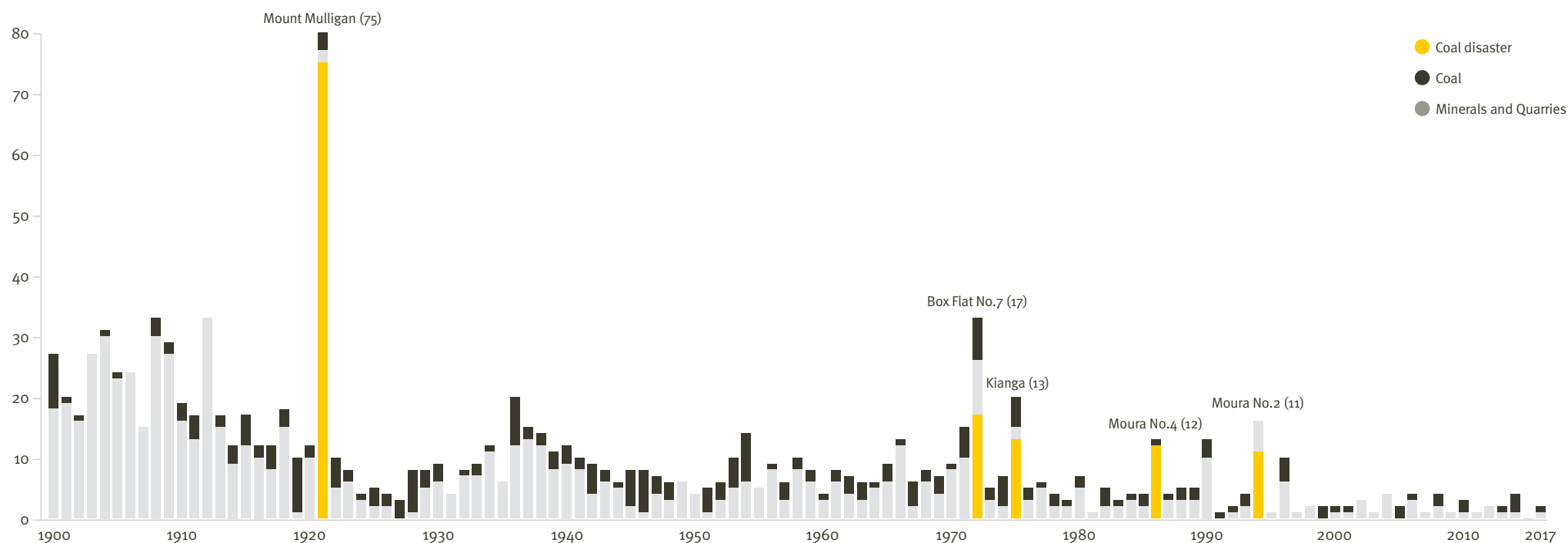


The mining industry draws its workforce from a variety of sources. In 2017, 22 286 workers in the mining industry (50 per cent) were classified as employees, and the remainder engaged as contractors. The highest proportion of contractors are employed in coal mines (55 per cent for coal surface mines, and 52 per cent for underground coal mines, respectively).

## A.2 EMPLOYMENT STATUS (EMPLOYEE/CONTRACTOR) BY SECTOR, 2016–17



# FATALITIES IN QUEENSLAND MINES (ALL SECTORS) 1900 TO 2017



# SAFETY ALERTS ISSUED IN 2016–17

SAFETY ALERT NO.	TITLE	DESCRIPTION
Mines safety alert 329	Issues with the use of semi-conductive insulation	Electrical work practices had not identified and managed the conductive nature of semi-conductive insulation screens and semi-conductive insulation earth screens in high voltage cables.
Mines safety alert 330	Miner struck by rockfall at a development face	An underground operator in a mineral mine was struck by rocks that fell from the face while preparing to charge lifter holes at a face approximately 475 m below the surface.
Mines safety alert 331	Fatality involving chain feeder at a wash plant	A section of the bottom deck had been slung in preparation for its removal when the deck fell in an uncontrolled manner striking a coal mine worker. An investigation report was also prepared – see <a href="https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/accidents-incidents/investigations-inquiries">https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/accidents-incidents/investigations-inquiries</a>
Mines safety alert 332	Abrasive blasting incident	Given the hazards in abrasive blasting, it is important that contract management processes are effective.
Mines safety alert 333	Opal mining fatality	An opal miner who had been working alone was found deceased in a collapsed trench at his remote Winton District mining claim. The incident highlights the hazards associated with trenching and the undercutting of trench walls.
Mines safety alert 334	Earthmover tyre and rims	This alert highlights some of the hazards associated with tyres, rims and wheel assemblies and the need to manage these safety critical items to minimise risks to the safety of workers.
Mines safety alert 335	Driver thrown from cab in articulated truck roll over	The driver was thrown from the cab in an articulated truck roll over, suffering lacerations to his arm and head which required hospital treatment.
Mines safety alert 336	Shaft filling incident	A decommissioned 1.5m diameter intake cooling shaft was being filled before the associated underground coal mine longwall operation retreated past it. After the sixth bucket full the stopping at the shaft bottom blew out with some force and a plug of methane then travelled via the travel road to the longwall.
Mines safety alert 337	Ethylene and carbon monoxide fed into sealed areas of a mine	The failure of a screw compressor on a nitrogen generator led to significant quantities of ethylene and carbon monoxide being injected into sealed areas of the mine.
Mines safety alert 338	Electrical protection batteries discharging	Protection circuitry failed to isolate a fault on a high voltage dragline cable as its battery supply had discharged and this was not alerted.
Mines safety alert 339	Ground collapse while surface drilling	The ground at the rear of a surface drill rig subsided, creating a void approximately two metres in diameter and four metres deep. Two drillers working at the rear of the rig fell into the void suffering various injuries including lacerations, bruising and a fractured finger.
Mines safety alert 340	Drill hole compressed air injection	While drilling a surface to underground paste fill hole two drillers were injured when a sudden release of air, water, mud and fines was ejected under pressure toward them.
Mines safety alert 341	Mobile equipment operator injured when seat belt failed	An operator of a loaded agitator truck was driving down a ramp when he felt a bump and was thrown from the driver's seat, sustaining neck injuries
Mines safety alert 342	Load reversed over light vehicle	As a loader reversed uphill off a shot, the rear of the loader collided with an empty dual cab utility parked nearby, crushing the bonnet and cabin.
Mines safety alert 343	Hot work on sealed components/voids	A fitter received serious burns to his hand, face and lower right torso from an unplanned energy release as he and a boilermaker straightened the upper carousel swing arm (sealed compartment) on an overburden drill.

# SAFETY BULLETINS ISSUED IN 2016–17

SAFETY BULLETIN NO.	TITLE	DESCRIPTION
Mines safety bulletin 155	Maintenance of fire protection equipment	The need for specialist training and licensing of competent workers was highlighted when a tradesman helping to dismantle a redundant fire suppression system suffered serious chest, leg and hand injuries when a fire suppression cylinder suddenly discharged its contents, becoming a violent projectile and striking the tradesman.
Mines safety bulletin 156	Aging electrical switchgear	Continued safe operation of electrical equipment is critical for the safety of all mine personnel, however electrical equipment in mines varies in age and for switching devices, the number of operations.
Mines safety bulletin 157	Storm season 2016	How mines can prepare for and recover from weather events, including a preparation checklist.
Mines safety bulletin 158	Fixed plant and mobile equipment fires on surface coal mines	This provides an analysis of surface coal mine fire HPIs reported during 2015 and recommends strategies for reducing fixed plant and mobile equipment fires.
Mines safety bulletin 159	Managing rockfall hazards at development headings	Injuries and deaths from rockfalls are a key risk in the mining industry. Since 1900, 747 fatalities have occurred in the Queensland mineral sector with 55 due to rockfalls.
Mines safety bulletin 160	Supporting Telstra and other carrier communication networks	This outlines obligations owed to communication carriers by mines.
Mines safety bulletin 161	Applicability of texts, standards, guidelines and codes to safety and health management systems	Clarification and guidance on the use of relevant texts, standards, codes, guidelines and similar reference material in development of mines' safety and health management systems and associated procedures.
Mines safety bulletin 162	Mobile equipment collisions	Open cut coal mines have reported an alarming number of mobile equipment collisions and near misses. Mobile equipment interaction is a principal hazard in open cut coal mines, with the potential for fatalities.
Mines safety bulletin 163	Safety and health management system elements and guidance for effective risk management of fatigue	Coal mines inspectorate investigations involving roster changes, contract arrangements and hours of work arrangements highlighted lack of consideration of key elements in managing fatigue risks to an acceptable level, and ineffective risk management relevant to complex health and psychosocial hazards.

# ABBREVIATIONS

**CMWHS**

Coal mine workers' health scheme

**CWP**

Coal workers' pneumoconiosis

**DI**

Disabling injury

**DNRM**

Department of Natural Resources  
and Mines

**HPI**

High potential incident

**HSU**

Health Surveillance Unit

**ISHR**

Industry Safety and Health  
Representative

**LTI**

Lost time injury/disease

**LTIFR**

Lost time injury frequency rate

**MDLD**

Mine dust lung disease

**NIOSH**

National Institute for Occupational  
Safety and Health

**NMA**

Nominated medical adviser

**OEL**

Occupational exposure level

**SSE**

Site Senior Executive

**SEGs**

Similar exposure groups

**SWA**

Safe Work Australia

**TWA**

Time-weighted average

# DEFINITIONS<sup>3</sup>

## COAL MINE

Mine subject to the *Coal Mining Safety and Health Act 1999* and associated regulations.

## DAYS ON ALTERNATIVE DUTIES

The number of days a worker is unable to perform his/her regular job and has been assigned other temporary or modified duties. Alternative duties include a changed work environment, roster or shift pattern.

## DAYS LOST

All rostered shifts that a worker is unable to work because of injury, not including the day of the injury. This also includes days lost because of recurrences of injuries from previous periods and days on alternative duties after returning to work. A fatal injury is treated as 220 days lost (as per Australian Standard AS1885.1-1990, Clause 6.17).

## DISABLING INJURY

A work-related injury or disease resulting in a worker being unable to fully perform his/her regular job. Either light or alternative duties are performed.

## DURATION RATE

The average time (days) lost and the time (days) on alternative duties for each lost time injury or disabling injury. In this report, time lost includes all time lost for an incident to date.

## HIGH POTENTIAL INCIDENT

An event, or series of events, that causes or has the potential to cause a significant adverse effect on the safety or health of a person.

## LOST TIME INJURY / DISEASE

An incident resulting in a fatality, permanent disability or time lost from work of one shift or more. The shift on which the incident occurred is not counted as a shift lost.

## LOST TIME INJURY FREQUENCY RATE

The number of lost time injuries/diseases per million hours worked.

## LOST TIME AND DISABLING INJURY

### FREQUENCY RATE

The number of lost time injuries/diseases and disabling injuries per million hours worked.

### MECHANISM OF INJURY

The action, exposure or event that is the direct cause of the most serious injury.

## MINERAL MINE

Mine subject to the *Mining and Quarrying Safety and Health Act 1999* and associated regulation.

## PERMANENT INCAPACITY

A permanent incapacity is any work-related injury or disease that leads to one or more of the following outcomes:

- the complete loss, or permanent loss of use, of any member or part of the body
- any permanent impairment of any member or part of the body, regardless of any pre-existing disability of that member or part
- any permanent impairment of physical/mental functioning, regardless of any pre-existing impaired physical or mental functioning
- a permanent transfer to a different job
- termination of employment.

## QUARRY

Excavation of hard rock for use in construction (operations covered by the *Mining and Quarrying Safety and Health Act 1999* and associated regulation).

## SEVERITY RATE

The time (days) lost and time (days) on alternative duties per million hours worked.

## SIMILAR EXPOSURE GROUP

Groups of workers who have the same general exposure to risk e.g. they perform similar tasks or use the same types of materials or processes.

<sup>3</sup> The definitions in the report for lost time injury/disease, mechanism of injury, nature of injury, incidence rate and frequency rate generally conform to the workplace injury and disease recording Australian Standard (AS 1885.1-1990). The Standard's 'average lost time rate' (number of days lost per lost time injury) is called duration rate. The Standard's 'no lost time injuries/diseases' (those occurrences that were not lost time injuries and for which first aid or medical treatment was administered) are called medical treatment injuries or disabling injuries (the injured person cannot return to their normal job and is put on alternative duties). When calculating duration rate (number of days per lost time injury) and severity rate (days lost per million hours worked) for a lost time injury, the days lost include the days away from work and the days on alternative duties. The Australian Standard is not clear on whether days lost should include days on alternative duties. It is common practice in other Australian jurisdictions to only include days away from work in duration and severity calculations. However, as the number of days required to be spent on alternative duties is a reflection of the severity of the injury, it is considered that including these days presents a more accurate picture of the industry with respect to the severity of an injury or illness.

