Resources Safety & Health
Queensland

Queensland Mines and Quarries
Safety Performance and Health Report

2019
2020

This publication has been compiled by Resources Safety and Health Queensland.

Table of contents

List of Figures

BACKGROUND

The Queensland Mines Inspectorate forms part of Resources Safety and Health Queensland, a statutory body established on 1 July 2020. In 2019-20, the inspectorate was a division of the Department of Natural Resources, Mines and Energy.

The inspectorate is primarily responsible for enforcing the provisions of the *Coal Mining Safety and Health Act 1999*, Coal Mining Safety and Health Regulation 2017, the *Mining and Quarrying Safety and Health Act 1999*, the Mining and Quarrying Safety and Health Regulation 2017 and supporting Standards and Guidlines[1]. The inspectorate also advises and educates the mining industry about safety and health.

This report analyses industry performance using accident and incident data collected from Queensland mines and quarries during 2019-20. The aim is to focus the attention on areas of safety and health priority and encourage implementation of strategies to further improve safety and health performance.

1 Including the 19 recognised standards and three guidelines published on the Business Queensland website at *www.business.qld.gov.au*

MESSAGE FROM THE CHIEF INSPECTORS

We are pleased to introduce the Queensland mines and quarries safety performance and health report 2019-20. This report covers incidents, trends, and emerging safety and health issues in our mines and quarries over the last financial year. We encourage industry to use the information in this report, and the detailed data available for download from the website, to inform risk-management practices, with a view to improving.

The Queensland Mines Inspectorate forms part of Resources Safety and Health Queensland, the statutory body responsible for administering safety and health legislation in the resources sector. The inspectorate works with industry and worker representative organisations to protect the safety and health of mine and quarry workers. This cooperative, tripartite approach remains critical to the achievement of our vision of zero serious harm in the mining and quarrying industries.

We regret to report that three fatalities occurred in the Queensland mining industry in 2019-20. We express our deepest sympathies to the families, friends, and colleagues of these men. It is our vision, and our expectation, that every worker should return home safe and healthy at the end of each day. These incidents serve as a stark reminder that constant vigilance is required to attain that goal.

While the number of deaths is lower than last year, any death in the workplace is unacceptable, and a tragedy for those bereaved. The risk-based approach to regulation for Queensland mining and quarrying was introduced more than 20 years ago. Since its introduction there have been no multiple–fatality disasters and the overall number of fatalities for any 12–month period has reduced. However, while the 1999 legislation has made significant progress, it has been insufficient to reduce fatalities to zero in the long term. This is, and will remain, a major source of concern within the inspectorate.

Last year, Dr Sean Brady's *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019* examined 20 years of data relating to fatalities, serious accidents, and high potential incidents. The review found that the causes of fatalities are "typically a combination of banal, every day, straightforward factors, such as a failure of controls, a lack of training, and/or absent or inadequate supervision." To some, this is a startling revelation. To us, while the review certainly highlights past failures, it also offers a degree of hope: there is significant potential to address these issues. Industry is not facing a battle against freak accidents, but a range of issues that are within our control. The recommendations from the Brady Review provide an ongoing focus to the activities of the inspectorate.

Following the publication of the Brady Review, the inspectorate took a random sample of serious accident (SA) and high potential incident (HPI) investigation reports for in-depth review. The process included interviews with mines and quarries, Original Equipment Manufacturers (OEM) and other stakeholders to establish if all relevant causal factors had been identified and effective controls implemented to prevent the SA or HPI happening again. The review found:

- minimal, if any input, from OEMs and other stakeholders
- a very high occurrence of simplistically blaming the worker, and human factors as contributing factors
- lack of understanding/identification of what caused the SA or HPI
- high reliance on administrative controls

These results are unacceptable and validate the findings of the Brady review and provide fresh impetus for the Inspectorate to target SA and HPI reporting and investigation, ensure industry thoroughly investigates incidents, accurately identifies causal factors and applies effective controls.

Reflecting on the information in this report, we remain concerned that the lessons of the past are not being learnt.

Areas of concern include:

- supervision
- guarding of equipment
- effective isolation
- gas management
- frictional ignition
- highwall stability
- tyre management
- vehicle interaction

These are not new issues: the persistence of serious accidents in these areas indicates that risks are not being managed to an acceptable level.

While we are conscious of the challenges facing the industry, the year has also seen several positive developments. Changes to the coal mining regulations to introduce new gas and ventilation requirements reinforce the importance of preventative and mitigating controls in managing gas in underground mines. It is vitally important that industry accepts the new requirements and ensures they are fully implemented and maintained in order to protect workers.

Amendments to the regulations around worker health surveillance – in particular, drawing workers in the metalliferous and quarrying sectors within the scope of these checks – are an important step in the ongoing effort to protect workers from the effects of mine dust, to aid the early identification of respiratory abnormalities, and to reduce the incidence of mine dust lung diseases.

Relatedly, the release of QGL02 – Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries has seen mines and quarries submitting their dust monitoring results to the inspectorate. This data has been collated and analysed to guide inspectorate activity. The inspectorate has also published the data in dashboard format for ease of interpretation, to assist industry in making informed decisions on how best to implement effective controls to manage mine dust, and mine dust lung diseases.

Applying knowledge and experience is key to reducing harm. To share learning, the inspectorate continues to provide training and information sessions – adapting to the challenges of the Covid-19 pandemic to deliver online offerings on a range of topics including:

- safety and health management systems
- risk management
- incident investigation
- electrical installations
- drill and blast
- dust awareness “Clearing the Air – Mineral Mines and Quarries”

These courses are available at a range of training providers, including Simtars (Safety In Mines, Testing And Research Station)

We also note the convening of a Board of Inquiry under the *Coal Mining Safety and Health Act 1999*, the first time such a Board has been formed. The Board was established by the Honourable Minister for Natural Resources, Mines and Energy, Dr Anthony Lynham MP on 22 May 2020, to investigate the serious accident that occurred at Grosvenor mine on 6 May 2020, and various high potential incidents involving longwall-related exceedances of methane that occurred in the Queensland coal mining industry between 1 July 2019 and 5 May 2020.

The Board will provide a final report about its findings and recommendations to the Minister for Resources by 31 May 2021. We are committed to continuous improvement in the industry and in the regulator’s systems and programs, and we await the outcome of the Board’s investigation and recommendations.

Hermann Fasching
Chief Inspector of Mines (Mineral Mines and Quarries)

Peter Newman
Chief Inspector of Mines (Coal)

CHAPTER ONE
OVERVIEW OF SAFETY PERFORMANCE

FATAL ACCIDENTS IN 2019-20

There were three fatal accidents in the Queensland mining industry in 2019-20[2]. Two of the fatalities occurred at surface coal mines and one fatality occurred at an underground coal mine.

The Queensland Mines inspectorate investigates all fatal accidents.

Full details of the safety alerts issued relating to these incidents can be found on the Business Queensland website.

DONALD RABBITT
12 January 2020

Fatality – 12 January 2020 (Coal Surface)

Mr Donald Rabbitt, a 33-year-old tyre-fitter employed by Thiess, was fatally injured when working at Coronado Curragh mine on Sunday 12 January 2020. Mr Rabbitt was engaged in maintenance of a rear axle expanding low loader when the tyre and rim assembly fell from the wheel hub, landing on him.

In response to the incident, the inspectorate issued a newsflash on 14 January 2020 alerting all coal mine site senior executives to the incident.

The inspectorate issued a directive to the site senior executive to suspend all tyre and wheel rim fitting activities until evidence was provided to the inspectorate that these activities could recommence with an acceptable level of risk.

BRADLEY DUXBURY
25 November 2019

Fatality – 25 November 2019 (Coal Underground)

Mr Bradley Duxbury, a 57-year-old electrician employed at Fitzroy Australia Resources Carborough Downs coal mine, was fatally injured on 25 November 2019. Mr Duxbury was carrying out repairs to the longwall shearer electrical and hose management system, the Bretby, when a fall of coal, from the longwall face, occurred, trapping him between the Armoured Face Conveyor spill plates and the section of coal.

Following the incident, a safety newsflash was issued to industry on 26 November 2019.

Two directives were issued by the inspectorate: to suspend relevant operations, and to prevent access to the face side of the AFC spill plates on the Longwall 9c (where the incident occurred), until the root cause/s and contributing factors for the incident had been identified.

JACK GERDES
7 July 2019

Fatality – 7 July 2019 (Coal Surface)

Mr Jack Daniel Gerdes, a 27-year-old excavator operator at the Baralaba Coal Company, Baralaba Mine, was fatally injured on 7 July 2019 as a result of injuries sustained when he became entangled between the movable part of the excavator's access ladder and the wall of the excavator engine room.

Following the incident, the inspectorate issued a safety alert to industry on 7 August 2019 due to the potential that similar circumstance may exist at other sites across Queensland. A safety bulletin was published on 28 February 2020 which noted that the findings from this incident and two similar incidents in other states suggests that similar circumstances may exist across the industry requiring operators to audit their equipment and operating practices and ensure lessons are learnt.

The inspectorate issued two directives to the site senior executive: to cease using hydraulic access ladders until they could be used safely, and to put in place measures to reduce the likelihood of recurrence.

2 The number of fatalities that have occurred in Queensland mines since 1900 is provided in Appendix 2

SAFETY RESET

As the organisation responsible for regulating safety and health in the industry, the fact that workplace fatalities continue to occur with no significant reduction in frequency is of fundamental concern. In July 2019, following a tragic and unprecedented twelve months in Queensland mines and quarries that saw the deaths of six workers, the Minister for Natural Resources, Mines and Energy, the Hon Dr Anthony Lynham MP, convened with key stakeholders from across the mining and quarrying sector to forge an action plan to 'reset' the safety and health culture in Queensland's mining industries.

On 10 July 2019, a joint communique was released by the Queensland Government, the Queensland Resources Council, Cement, Concrete and Aggregates Australia, the Construction, Forestry, Maritime, Mining and Energy Union, and the Australian Workers' Union.

The key action announced was a commitment to holding a program of Safety Reset sessions to facilitate open and frank discussion between management, operational staff and workers' representatives to improve safety outcomes. The Minister made it clear that every worker, from every mine and quarry site in Queensland, was expected attend.

More than 53,000 workers joined management and union representatives attending Safety Reset sessions throughout July and August 2019.

An online survey was conducted at the same time as the Safety Resets. The four most prevalent themes linked to safety and health in the survey responses were:

1. the importance of leadership in addressing safety issues and the impact this had on safety culture
2. the impact of workforce casualisation and the importance of an experienced, well-trained and permanent workforce in improving safety culture
3. the need for improved quality of training and more frequent training
4. the need for more clearly defined, standardised and simplified processes, policies and procedures.

Other notable themes raised in the survey included:

- safety concerns could not be raised without fear of reprisal
- a focus on production over safety
- a desire for greater enforcement of existing laws and regulations including more unannounced site inspections and more independent monitoring of mine operations
- environmental hazards that impact workers health.

The regulator also notes an increase in complaints made by workers, following the Safety Resets. This suggests that workers feel more empowered to come forward with concerns. While it is often the case that issues are effectively addressed and managed onsite, the regulator fully supports workers who wish to draw attention to matters that may not have been adequately dealt with, in order to secure the safety and health of workers and the community.

MINING FATALITY REVIEW

In addition to the Safety Reset, an expert review was undertaken to identify changes needed to improve health and safety and health in Queensland mines and quarries.

The *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, or Brady Review, was undertaken by Dr Sean Brady with information provided by DNRME and examined:

a. the causes of mine worker fatalities over the past 20 years

b. what industry can do to improve

c. how the mines inspectorate can better support industry safety and health outcomes.

The key finding of the Brady Review pointed to the existence of a fatality cycle in the mining and quarrying industry, in which the industry experiences periods where frequent fatalities occur, followed by periods of few or no fatalities. The Review also found that fatalities are typically the cause of a combination of banal, every day, straightforward factors, rather than freak accidents or human error.

Dr Brady makes 11 recommendations: seven to industry and four to the regulator. These include the need for industry to ensure that workers are appropriately trained and supervised for the tasks being undertaken, as well as the need for the regulator to play an increased role in analysing incident data and disseminating lessons learnt to industry.

RSHQ accepts the recommendations and has commenced implementing a new data analytics function, as part of a new central assessment and performance unit. This will be supported by a new simplified incident reporting system which will play a key role in meeting the recommendations of the Brady Review. In addition, RSHQ is committed to implementing a serious incident investigation unit.

Dr Brady has produced a series of podcasts — named "Rethinking Safety" — about his review of fatalities in Queensland's mines and quarries over the last 20 years.
There are 6 episodes exploring the findings of the review and featuring voices from industry, unions, safety experts, and RSHQ. Episodes are around half an hour and can be found on most streaming services and at https://www.brady-heywood.com.au/podcasts/.

SERIOUS ACCIDENTS IN 2019-20

A serious accident is defined as an accident that causes the death of a worker or requires a worker to be admitted to hospital as an in-patient. The serious accident frequency rate (SAFR) is a count of serious accidents per million hours worked. The SAFR provides an insight into the effectiveness of safety controls on mine and quarry sites and is a specific and objective measure of safety in the industry.

The serious accident frequency rate across industry climbed steadily between 2014-15 and 2018-19, from 0.59 to 1.0 serious accidents per million hours worked. While there has been a notable reduction in the frequency rate in the last reporting year, the number of accidents remains an unacceptable level of serious harm to workers; harm requiring hospital admission.

As we continue our journey towards zero serious harm, this figure represents a useful measure of safety performance and is of significant interest to the inspectorate.

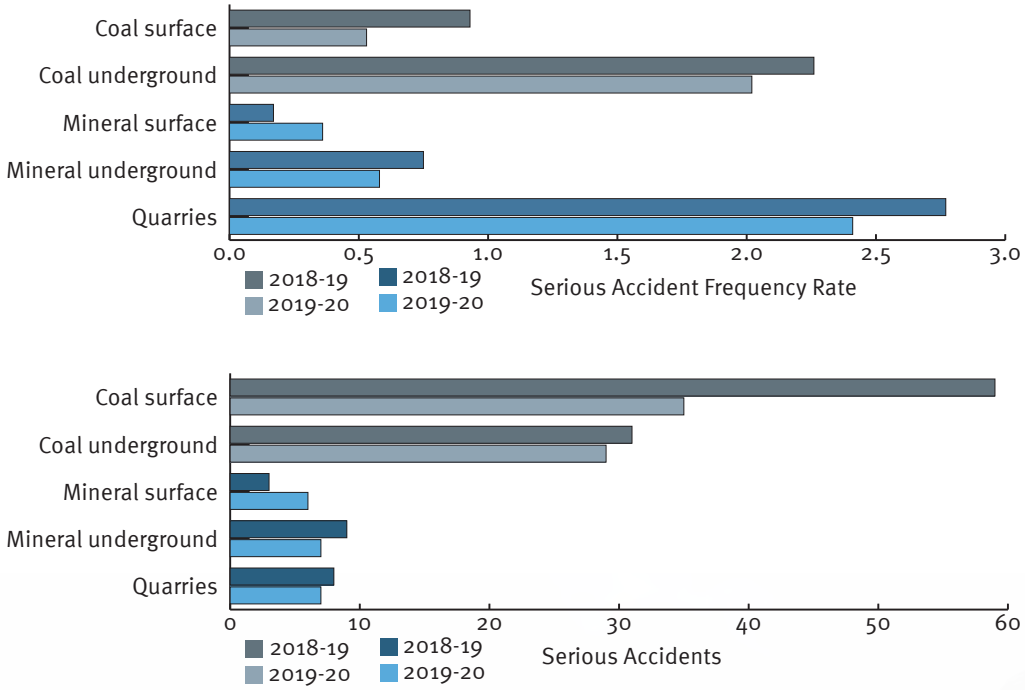


Figure 1-1 Serious Accident and Frequency Rate 2018-2019 financial year to 2019-2020 financial year comparison

The total number of serious accidents, and the frequency rate, fell in all sectors – other than surface minerals – in 2019-20 compared to 2018-19.

Surface mineral operations saw a doubling of the number of serious accidents and a consequent doubling of the SAFR for that sector.

Conversely, surface coal recorded significant improvement on last year, with the industry recording a reduction of 41 per cent in the total number of accidents during the period, almost halving the frequency rate recorded in 2018-19.

Across all sectors, the serious accident frequency rate reduced in the 2019-2020 financial year by 30 per cent.

Serious Accident Frequency Rate 2015 to 2020

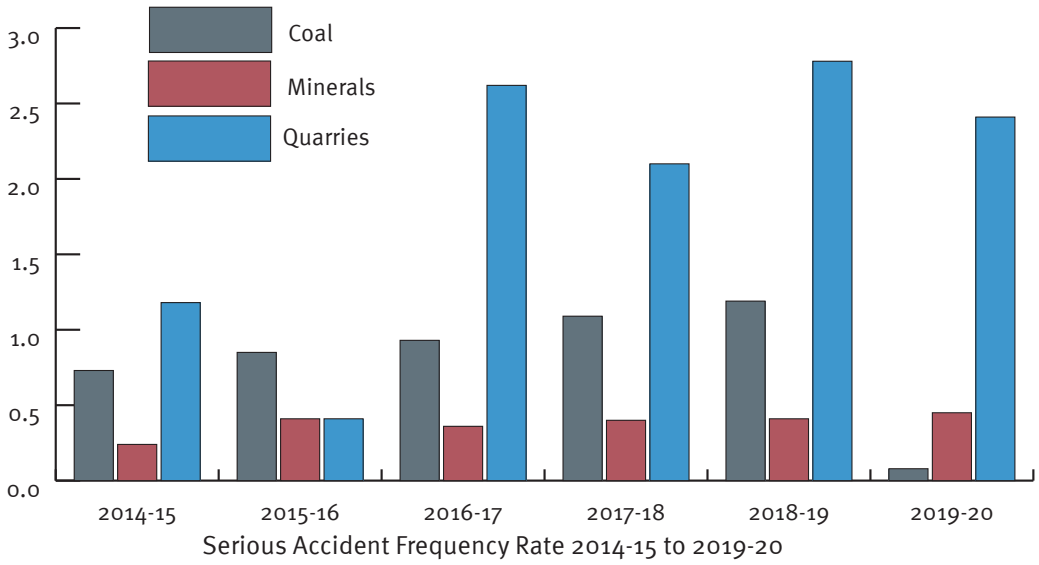


Figure 1-2 SAFR 2014-15 to 2019-20

In all sectors, the most frequent causes of serious accidents in 2019-20 were:

- falls of people, and
- workers being struck by falling equipment or material.

Mine and quarry operators have an obligation to report serious accidents as soon as practicable after the event has occurred. The median time for all mines and quarries to report and accident to the inspectorate was 6.3 hours for the period 2014-15 to 2018-19. In the last reporting year, this increased to 7.8 hours.

Industry is reminded that the inspectorate expects to be notified of accidents within three hours of occurrence.

The inspectorate relies on prompt notification to ensure it can determine an appropriate response and communicate urgent safety issues to industry. Delay in notification remains a critical concern given the impact on these important functions, as well as the risk to proper scene preservation and effective investigation. This will continue to be an area discussed with sites across the reporting year, compliance and enforcement action may be taken if appropriate.

HIGH POTENTIAL INCIDENTS

A high potential incident (HPI) is an event, or a series of events, that causes or has the potential to cause a significant adverse effect on the safety or health of a person. It remains the case that the vast majority (96 per cent in 2019-20) of HPIs do not involve injury to a person.

The inspectorate considers HPIs to be an important lead indicator for measuring the effectiveness of safety and health systems. This approach accords with Dr Sean Brady's recommendation that the regulator should adopt HPI as a measure of reporting culture within the industry – a recommendation the regulator has now actioned.

The reporting of high potential incidents to the regulator is an indicator of an industry with a mature reporting culture, strong oversight, and an appetite to share learning in the interests of improving safety outcomes. It is the expectation of the inspectorate that the HPI frequency will rise as more incidents are recognised, reported and acted on. Industry is encouraged to review internal reporting systems to ensure they promote fulsome, accurate and timely notification of incidents

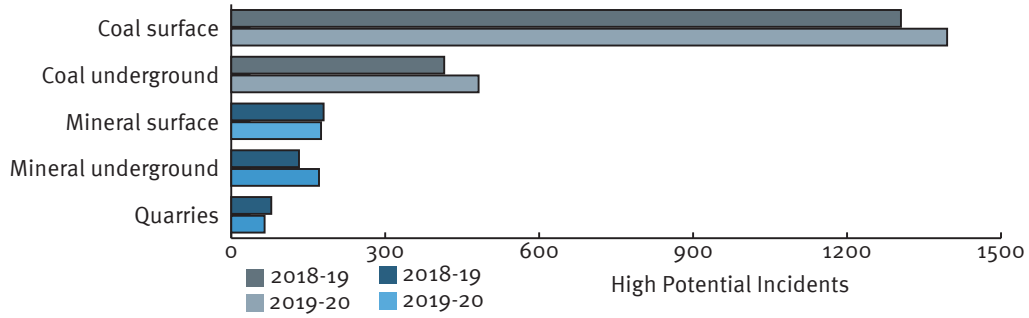


Figure 1-3 High Potential Incidents 2018-2019 financial year to 2019-2020 financial year comparison

Overall, the high potential incident frequency rate increased in the 2019-2020 financial year by 3 per cent.

There was notable variation across sectors with the number of incidents reported in surface mineral mines and quarries both lower than last year.

The reduction in incidents reported for surface minerals is matched by a reduction in hours worked, meaning the frequency rate remains unchanged at 10 incidents per million hours worked. The reduction in reported incidents for quarries comes despite almost identical hours worked year on year, meaning the frequency rate fell from 27 to 22 incidents per million hours worked.

Reported incidents increased in surface coal (up 7 per cent), underground coal (up 16 per cent), and underground mineral mines (up 24 per cent) in the reporting year. However, worked hours also increased leaving the frequency rate unchanged for surface coal at 21 per million hours worked. The increase in worked hours had a marked effect for underground coal which recorded a 13 per cent in the HPI frequency rate, from 30 to 34 incidents per million hours worked. The rise was 27 per cent in underground mineral mines where the frequency rate increased from 11 to 14 reported incidents per million hours worked.

The most frequently reported HPIs for coal mines were:

- fire on vehicle or plant
- unplanned movement of vehicle or plant
- collisions involving vehicles or plant

For mineral mines and quarries, the most commonly reported HPIs related to:

- unplanned movement of vehicles
- fire
- unplanned movement of earth or rock.

This is broadly consistent with the trend over the past four years and demonstrates that the value of effective HPI reporting and investigation cannot be overstated; these hazards and the failed and absent controls feature time and again in serious accidents and fatalities and are therefore obvious focus areas for industry to review incidents and controls.

GAS MANAGEMENT

In 2017 the mines inspectorate determined that gas management in underground coal mines was an issue which required additional regulatory focus. As gas management in longwall mines continues to be a challenge for the industry, it remains an area of focus for the inspectorate.

The serious accident that occurred at the Grosvenor mine in May 2020, and a number of frictional ignitions that have occurred in the underground sector this year – in both development and longwall operations – are evidence of the continued challenge, and are of serious concern.

Gas management is a principal hazard with the potential to cause multiple fatalities. As a response to evidence of chronic under-reporting of methane exceedances, the inspectorate published the "Methane management in underground coal mines best practice and recommendations guide" in June 2019. The guide highlights a range of responses including engineering controls, trigger action response plans, means of detection and maintenance of detectors. The guide is intended to assist in applying appropriate and effective controls. The regulator expects industry to adopt best practice in order to control risk. Where it is unwilling to do so, the regulator will continue to use the full range of compliance and enforcement tools available to it.

Modern legislation that reflects and responds to the hazards and risks of an evolving industry is, however, important in ensuring workers' safety and health is at the forefront of all our thinking, as well as providing clarity for industry regarding requirements and obligations.

The 2019-20 reporting year saw significant effort deployed by the inspectorate to develop — in concert with industry and workers' representatives — amendments to the legislation relating to gas management and ventilation in underground mines. The Coal Mining Safety and Health (Methane Monitoring and Ventilation Systems) Amendment Regulation 2019 clarifies minimum requirements in methane monitoring, record keeping requirements and explosion risk zones signposting. The changes also included the requirement for mines to either ventilate and inspect old abandoned workings or seal them, in response to a number of heating's that had, and have the potential to occur in these areas of the mine. In addition, and in recognition of the importance of preventative and mitigating controls in gas management, the regulator worked with stakeholders to develop legislation requiring the reintroduction of explosion barriers in certain circumstances, after a 20-year absence in the industry.

Legislation alone will not resolve the issues, but it provides a solid foundation and equips the inspectorate and industry with additional tools to undertake their regulatory compliance functions.

The inspectorate expects all underground coal mines to have effective gas monitoring systems to prevent explosive accumulations of methane in areas where it could be ignited, and to review their systems and strategies to endure effective controls are in place.

BOARD OF INQUIRY

On 22 May 2020, The Hon. Dr Anthony Lynham MP, Minister for Natural Resources, Mines and Energy established a Board of Inquiry to investigate the serious accident that occurred at Grosvenor mine on 6 May 2020, and various high potential incidents involving longwall-related exceedances of methane that occurred in the Queensland coal mining industry between 1 July 2019 and 5 May 2020.

The inquiry has been a significant area of activity for the inspectorate in the final quarter of the reporting period. The Board took evidence from several representatives of the regulator and required additional information and data to be provided to inform its work. The Board delivered its interim report , which clarifies the range of issues under consider as the Board progresses its inquiry, on 31 August 2020. The final report is expected by 31 May 2021.

The inspectorate's statutory investigation into the Grosvenor incident is ongoing. The investigation, and the findings of the Board of Inquiry are expected to find further learnings and focus areas for the mining industry and the regulator moving forward.

Further Queensland Coal Mining Board of Inquiry information and resouces can be found here

MINERAL MINES AND QUARRIES FOCUS AREAS

In 2019-20, mineral mines and quarries inspectors have maintained a focus on:

- falls
- collisions
- entanglement
- respirable dust.

In all instances where unacceptable levels of risk have been identified, compliance action has been taken.

In 2019-20, the number of high potential incidents reported by mineral mines and quarries decreased from 391 in 2018-19 to 374.

As noted above, in response to Dr Brady's recommendation, the regulator has adopted HPI as a measure of reporting culture within the industry. By encouraging the reporting of high potential incidents, the regulator expects that early warning signals of incidents and fatalities will be captured, disseminated widely and acted upon appropriately (including through investigation, root cause analysis, and risk mitigation performed in alignment with the hierarchy of controls). This provides the best opportunity to identify hazards before they cause harm and ensure they are effectively controlled.

During the 2020-21 year, inspections will examine the reporting culture of mineral mines and quarries to ensure that mines are reporting high potential incidents and thoroughly investigating events to ensure effective controls are identified and implemented to prevent recurrence. This will include targeted inspection of sites whose level of HPI reporting is outside of industry norms. Industry are reminded that failure to notify an inspector of an incident is an offence under Queensland law and the inspectorate takes a dim view of sites who fail to report or report inaccurately.

CAMPAIGN FOR CHANGE

In March 2019 the Campaign for Change program commenced and continued through 2019-20. The Campaign focused on guarding, mobile equipment and isolation – all of which have sadly featured in a number of fatalities and SAs over the past several years – and aimed to ensure industry has a clear understanding that it is unacceptable to:

- operate plant without effective guarding in place
- use mobile equipment that is not maintained and inspected in accordance with original equipment manufacturer requirements
- allow workers to operate mobile equipment without being appropriately trained and competent
- conduct work on plant that is not correctly isolated and locked out.

Throughout the 2019-20 year, the campaign was reinforced with mines and quarries at a number of mining and quarrying industry conferences, with industry peak bodies, through seminars, forums across the state and during inspections.

In 2019-20, the inspectorate conducted 264 targeted Campaign for Change inspections, resulting in 31 directives being issued to suspend operations. The result of the education and enforcement has seen the incident frequency rate associated with the campaign for change fall from 13 in 2018-19 to 7 in 2019-20.

Having spent a number of years educating and reinforcing compliance in industry, the inspectorate will maintain its zero-tolerance approach and will consider prosecution for sites who cannot achieve what are basic requirements to protect workers.

Falls

Incidents involving people falling from structures or into vertical openings, being struck by falling objects or rocks and entering voids while operating mobile equipment have featured in 13 fatalities since 2000.

Overall, the high potential frequency rate for falls in mineral mines and quarries reduced from five in 2018-19 to four in 2019-20. While the incident frequency rate decreased, the number of serious accidents rose from four in 2018-19 to five in 2019-20.

The largest contributory area associated with this hazard was the fall of people. From 2018-19 to 2019-20 there was an increase of 68 percent in this category. Where people suffered an injury, the head and neck accounted for 33 per cent of the impacted area of the body. Fall of ground remained the category with the highest incident rate in relation to falls, though the number of reported falls of ground decreased slightly from 51 in 2018-19 to 47 in 2019-20.

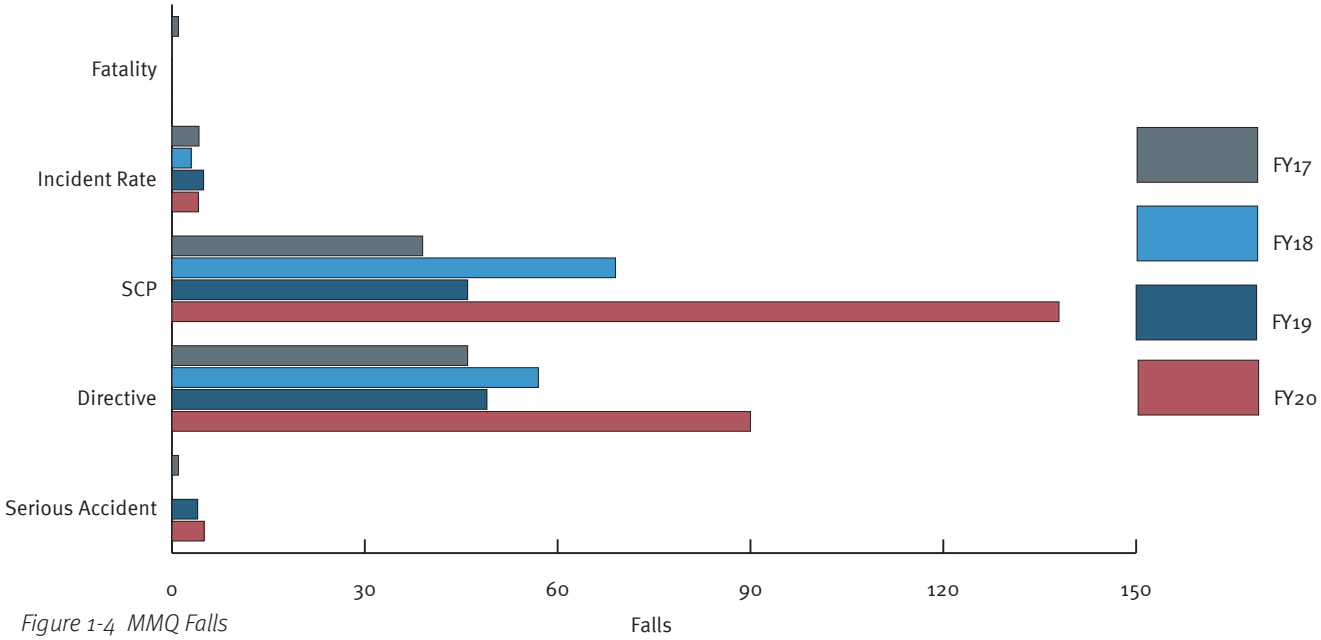


Figure 1-4 MMQ Falls

Vehicle collisions or interactions

Incidents involving collisions or vehicle interactions have resulted in six fatalities in the mineral mines and quarry sector since 2000.

Date	Mine/Quarry	Incident Description
22/10/2004	Mount Windsor Station	Visitor fatally injured when struck by a loader
27/10/2006	Wongabel Quarry	Fatally injured when run over by loader
27/10/2006	Watershed Exploration Project	Loader toppled over and crushed the worker
19/05/2009	George Fisher	Loader fell into open stope
04/07/2009	Roseneath Quary	Water truck tipped over and crashed when driving down haul road.
26/08/2012	Mt Moss	Worker fatally injured when run over by a loader.

Vehicle interactions with people, infrastructure, or other vehicles remained a focus for mineral mines and quarries inspectors in 2019-20. The increased focus on critical controls has demonstrated that safety and health management systems are too often ineffective in identifying controls to prevent an unwanted interaction. The regulator has continued to act in this area resulting in an increase in the number of directives issued in relation to collisions.

Through the action of inspectors, and with mineral mines and quarries implementing more effective controls, the incident frequency rate has reduced from six incidents per million hours worked in 2018-19 to two in 2019-20.

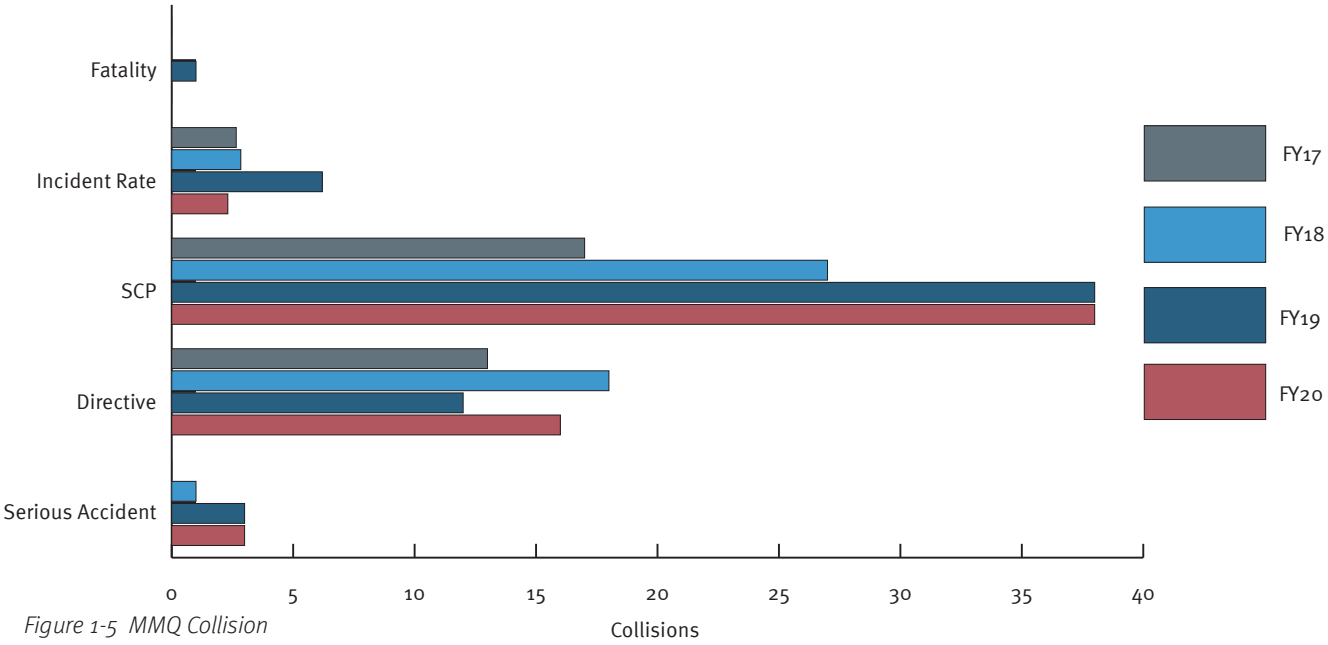


Figure 1-5 MMQ Collision

Entanglement

Entanglement of workers remains a significant concern to the Mineral Mines and Quarry Inspectorate. The chart below shows that in the past five years, a worker has lost their life, and eight others have sustained injuries requiring hospital admission.

Connor-Shaye Campbell Milne, a 21-year-old loader operator, was fatally injured on 15 November 2018 at Fairfield Quarry when he was entangled in the tail pulley of a conveyor. At the time of the accident, Mr Milne and another quarry worker were removing rocks from the return side of a conveyor belt. They removed a guard and used their hands to clear rocks from the tail pulley while the conveyor was operating. While clearing the loose material, Mr. Milne's arm was caught in the conveyor tail pulley and he was entangled.

This concern is manifested in the inspectorate taking a zero-tolerance approach to ineffective guarding associated with conveyors. As a result, the number of directives to implement effective guarding during the 2019-20 year, again increased when compared to previous years.

The high potential incident frequency rate for entanglement in mineral mines and quarries decreased from 0.7 incidents per million hours worked in 2018-19 to 0.3 in 2019-20 but the number of workers who have suffered a serious accident remained unchanged at three.

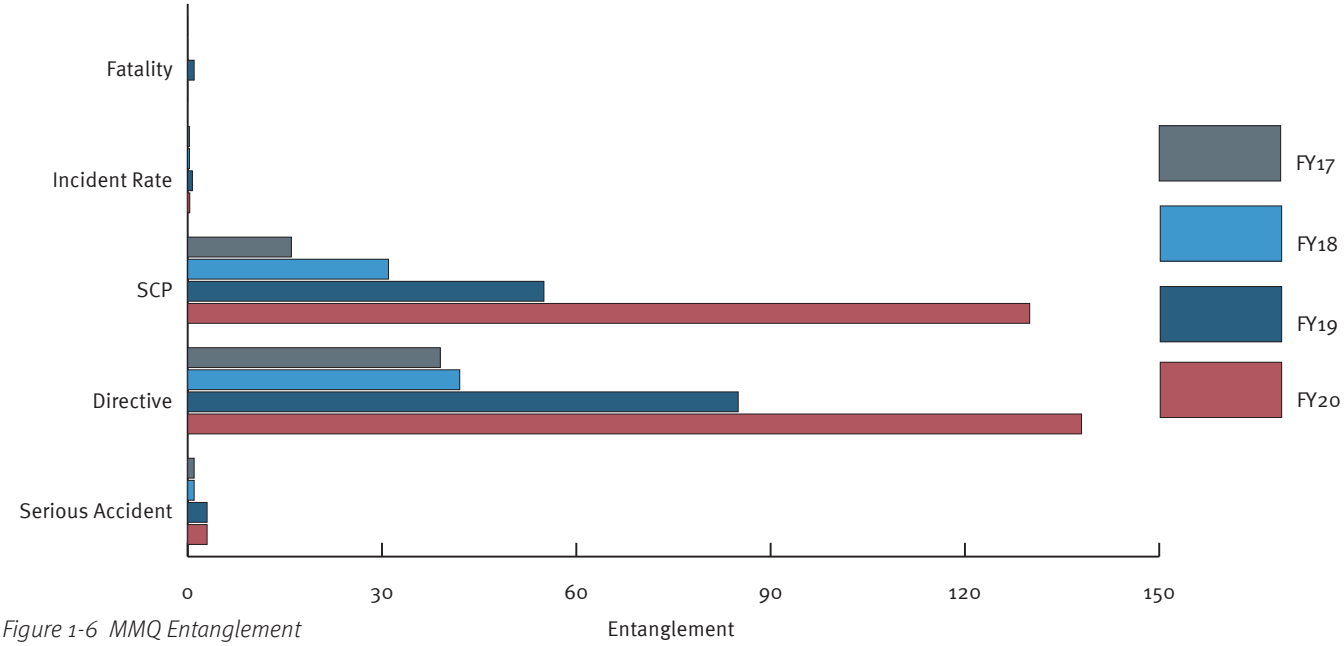


Figure 1-6 MMQ Entanglement

COAL FOCUS AREAS

The focus areas for the coal inspectorate this year have been:

- supervision
- gas management and ventilation
- highwall stability
- tyre management
- vehicle interaction
- polymeric chemicals

Effectiveness of supervision

The effectiveness of supervision across the coal industry has been the subject of a specific audit project. The amount of time supervisors spend in the field supervising the work is a key focus. The effectiveness of supervision in HPIs and serious accidents continues to be a key control that requires improvement in the industry. This work is aimed at collecting data on supervisor skills, experience and infield supervision, in order that data-driven, risk-based decisions on improving regulation and supervision performance may be made.

During the reporting year the inspectorate completed 213 supervisor audit assessments. The assessments comprised two focus areas:

1. Appointments, supervisor competency and experience
2. In field implementation of SHMS risk management procedures relating to supervision

Supervisor Audit Assessments	Total FY19-20 (n=213) Percentage Yes or Acceptable
Supervisor have been authorised by the SSE	99
Supervisor has been assessed as competent to perform the task	100
Supervisor has practical experience in the task being done	97
Supervisor has competency required by the Coal Mining Safety and Health Advisory Committee	93
Supervisor has other competencies relevant to activity they are supervising	89
Competency achieved in last 5 years / refreshed	92
Work plan for activity	73
Procedural documentation	65
Risk Management	70
Workplace inspection	66
SHMS compliance	75
Workplace standards / housekeeping	80

Dr Brady recommended that "The industry needs to focus on ensuring workers are appropriately supervised for the tasks they are undertaking. In 32 of the 47 fatalities, the worker was required to be supervised when undertaking the task, i.e., the 32 did not include routine tasks, such as driving. 25 of these 32 fatalities involved inadequate or absent supervision. Not only does absent or inadequate supervision allow tasks to be approached in an unsafe manner, but it also greatly amplifies the consequences of a lack of training or ineffective or unenforced controls."

Preliminary assessment of the audit data shows significant areas for improvement in the application of work planning, procedural documentation, work site inspection, risk management and overall SHMS compliance. Work to address these findings will continue into the next reporting period.

Testing of Polymeric Chemicals used in the Underground Industry

Isocyanates are a family of highly reactive, low molecular weight chemicals. They react with compounds containing alcohol (hydroxyl) groups to produce polyurethane polymers, which are components of polyurethane foams, thermoplastic elastomers, and polyurethane paints. Isocyanates are the raw materials that make up all polyurethane products.

Health effects of isocyanate exposure include irritation of skin and mucous membranes, chest tightness, and difficult breathing. Isocyanates include compounds classified as potential human carcinogens and known to cause cancer in animals. The main effects of hazardous exposures are occupational asthma and other lung problems, as well as irritation of the eyes, nose, throat, and skin.

In 2020 RSHQ occupational hygienists commenced a project to investigate occupational exposure to isocyanates during the pumping of polyurethane and urea silicate resins in underground coal mines.

The project involved working with major suppliers and applicators to better understand exposure risks associated with the use of these products and to assess the adequacy of current atmospheric and biological monitoring techniques. Field sampling is due for completion in October 2020.

The findings will be provided to the recognised standards sub-committee of the Coal Mining Safety and Health Advisory Committee and will support the planned review of Recognised Standard 16, particularly with reference operational zones, health monitoring and chemical approval process.

The information will also be shared with a joint working group established between the RSHQ and the NSW mining regulator.

RESPIRABLE DUST HAZARD

Controlling and monitoring respirable dust exposures is critical to minimising the risk to mine and quarry workers from mine dust lung disease.

The likelihood of a mine or quarry worker developing a mine dust lung disease is dependent on the amount, frequency and duration of the dust exposure. It is important for mines and quarries to implement control strategies to reduce dust levels on site and to undertake monitoring to ensure that those controls are effective.

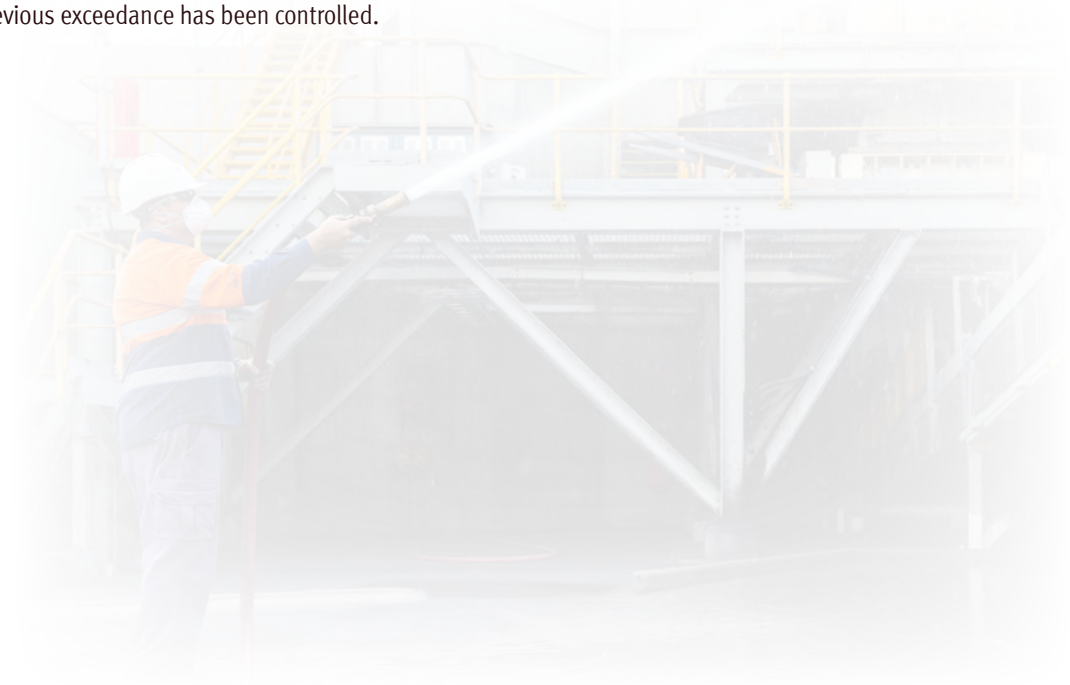
COAL MINES

Since 1 January 2017, all Queensland coal mines have been required to provide all personal respirable dust monitoring data to the Chief Inspector of Mines on a quarterly basis. This data is stored on the RSHQ exposure database, which has over 46,000 respirable dust records for all coal mines from 2000 to 2020.

For chronic exposure hazards such as respirable dust, it is important to understand the average exposure a worker receives across years of exposure in order to make an informed assessment of health risk. Guidance for the monitoring and the establishment of a risk-based monitoring programs at all coal mines is provided in Recognised Standard 14 – Monitoring Respirable Dust in Coal Mines. This standard requires all mines to allocate their coal mine workers into similar exposure groups (SEGs) and determine their risk (exposure) profile. The risk-based approach essentially ensures that those SEGs that are identified to have a higher risk profile, have their exposures continually assessed and reviewed. On review of monitoring data, traditionally the SEGs with the highest level of risk across surface and underground coal mines are:

- QCU001 – Longwall Production
- QCU002 – Development Production
- QCS007 – Blast Crew
- QCS010 – Blast Hole Drillers

In addition to quarterly reporting, coal mines are required to report all single exceedances recorded during personal monitoring to an inspector and an industry safety and health representative . A single exceedance refers to a personal sample that was collected during a single shift that exceeds the occupational exposure limit (OEL) (shift adjusted where applicable). When a site measures a single exceedance, it provides a clear message that attention is required to investigate the circumstances that led to the exceedance. This investigation must involve verifying the existing controls in use, as well as considering additional controls, with the objective of preventing further exceedances occurring during similar tasks. In addition to the investigation, and once additional controls have been identified and implemented where possible, the mine is required to undertake a resample. This resample must be collected from a worker conducting the same or similar activity to ensure that the identified source of dust exposure that caused the previous exceedance has been controlled.



A review of the respirable dust and respirable crystalline silica exposure data demonstrates major improvements in measured levels, likely as a result of:

- increased industry focus on respirable dust following the re-identification of Coal Workers' Pneumoconiosis in 2015
- the introduction of recognised standards for dust control and monitoring
- significant industry effort to trial and implement more effective engineering controls
- regulatory changes requiring the reporting of respirable dust data, including single sample exceedances (from 2017)
- a coordinated and focused enforcement regime by the mines inspectorate including audits against the new recognise standard for dust monitoring and inspections focused on dust control
- industry workshops on respirable dust management
- mandatory training for persons carrying out dust sampling at mines and quarries and
- mandatory qualifications for persons reviewing and approving dust monitoring programs.

RESPIRABLE COAL DUST (RCD)

From 1 November 2018, the OEL for respirable coal dust in Queensland was reduced from 3.0 mg/m3 to 2.5 mg/m3. This was introduced as an interim limit in anticipation of the review being undertaken by Safe Work Australia (SWA). The SWA review of respirable coal dust OEL was finalised in 2019, with Australian regulators agreeing to a reduced time weighted average OEL of 1.5 mg/m3. Data provided in this annual report was compared against the regulatory limit of 2.5 mg/m3in place at the time of collection. The revised exposure limit has been incorporated into Queensland coal mining safety and health regulation as of 1 September 2020.

Single Exceedance Data

Since the introduction of mandatory reporting of quarterly and exceedance monitoring data in 2017, the exceedance rate across surface coal mines has remained below 1 per cent. In 2019 there were twenty-nine single exceedances reported from 2669 valid samples collected in underground coal mines. This resulted in a small increase in the exceedance rate that was reported in 2018 (0.89 to 1.09 per cent). When collectively reviewing both surface and underground exceedance data, the exceedance percentages have showed steady improvement and remained below 1 per cent as shown in Figure 1-7.

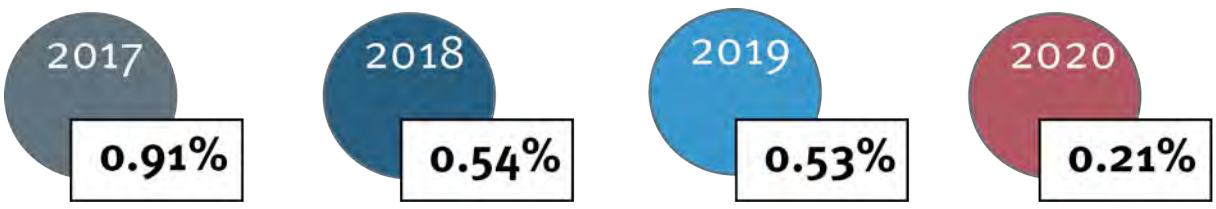


Figure 1-7 Single Exceedance Rate – RCD– Coal Mines (Underground & Surface) 2017 to 2020

SEG Data

Those underground mines with Longwall and Development SEGs are required to monitor at least every quarter (8-10 samples) under the Coal Mining Safety and Health Regulation 2017 and Recognised Standard 14. All other SEGs across both surface and underground mines have their sample quantity and frequency determined by comparing and calculating descriptive statistic parameters with the relevant shift adjusted OEL.

The following graphs depict the average exposures (quarterly and yearly) across the highest risk SEGs for respirable dust. These averages remain below the OEL of 2.5 mg/m3 and are therefore considered to be in compliance. Each vertical bar represents a different de-identified mine site. In addition to the OEL of 2.5 mg/m3, the figures below show the shift-adjusted standard of 2.38 mg/m3. Mines must consider the impact of the revised OELs against their current performance. A strong focus should be maintained on reducing exposure to a level that is as low as reasonably achievable.

Each bar represents a Queensland mine that has been de-identified.

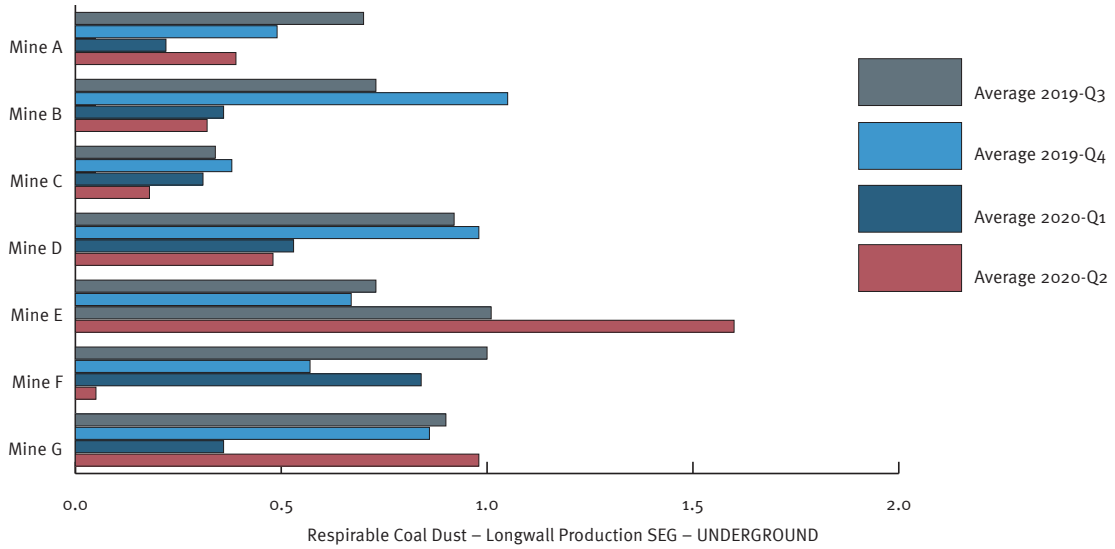


Figure 1-8 RCD – Longwall Production SEG – UNDERGROUND

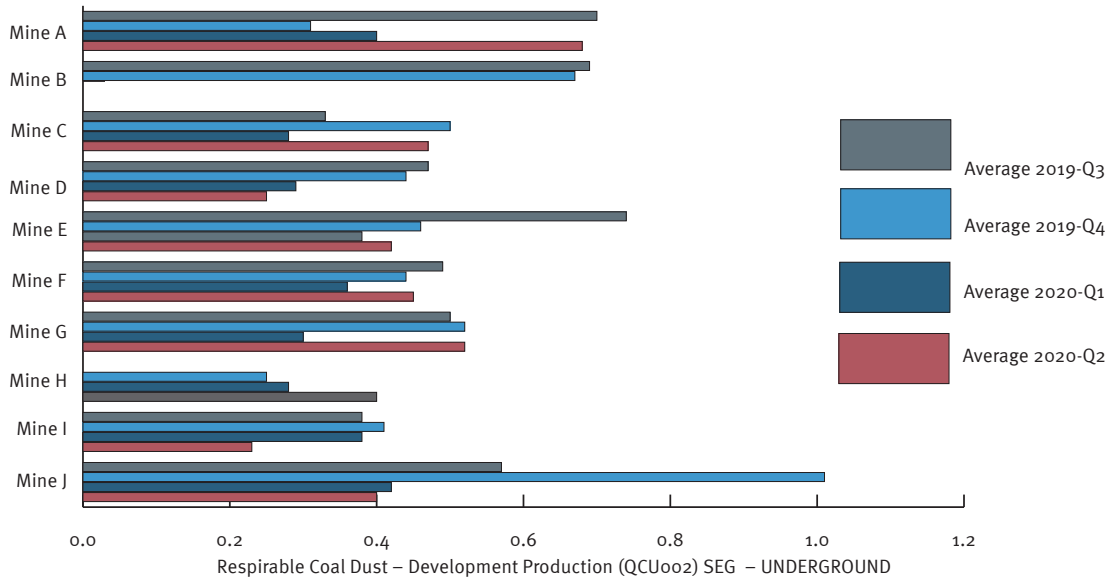


Figure 1-9 RCD – Development Production SEG – UNDERGROUND

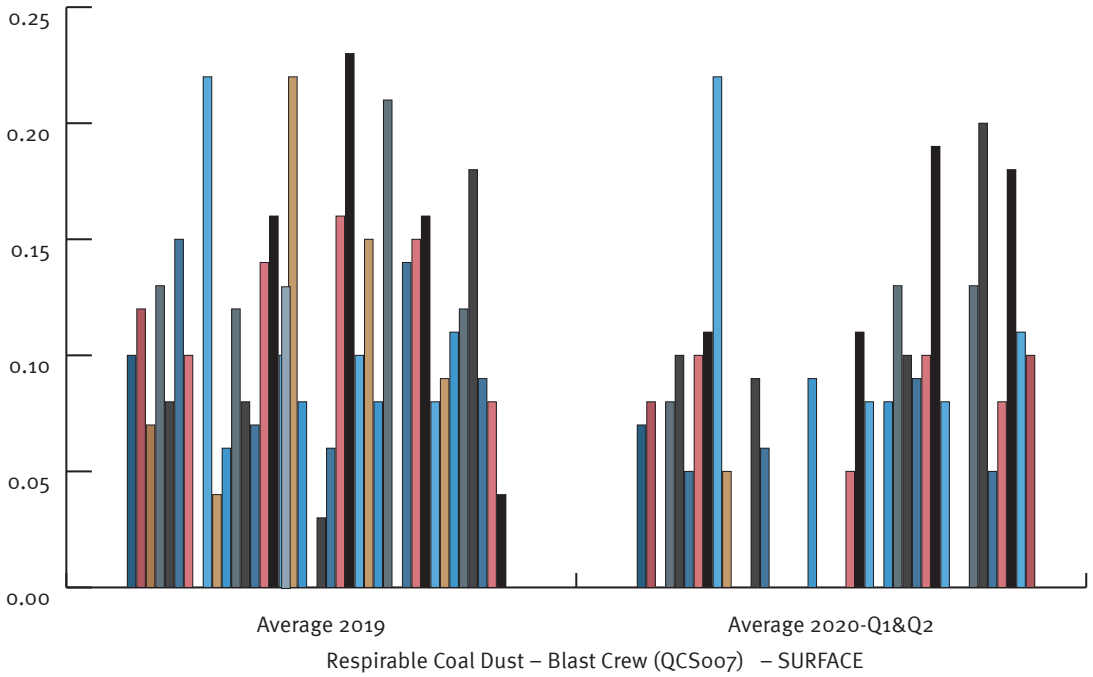


Figure 1-10 RCD – Blast Crew SEG – SURFACE

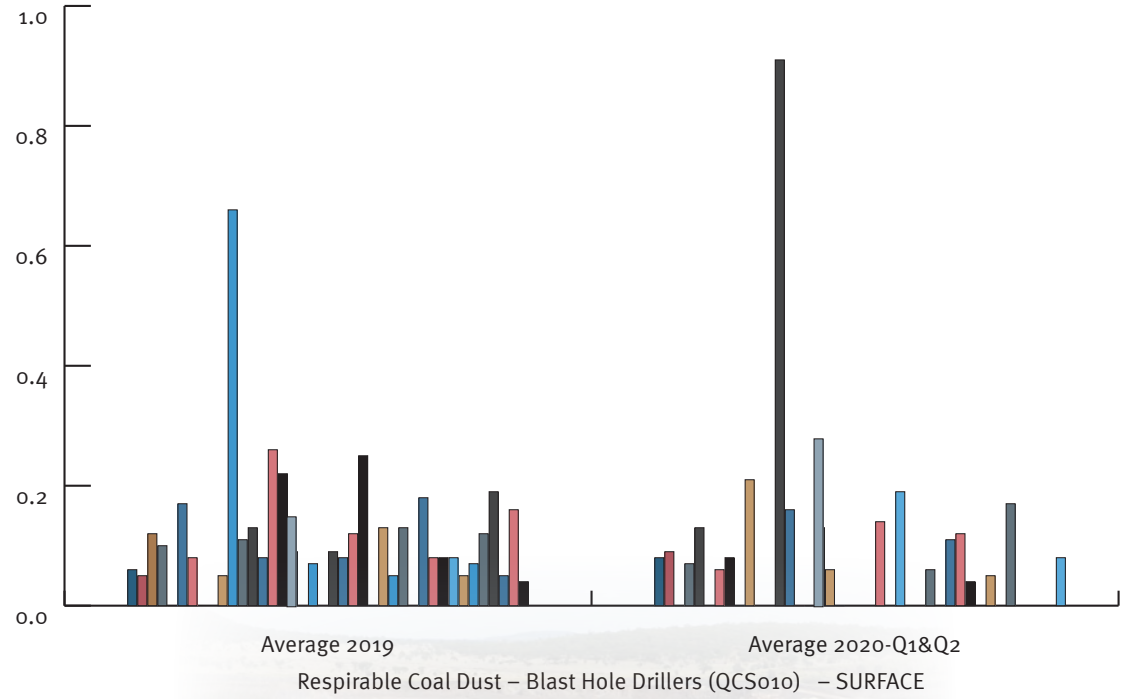


Figure 1-11 RCD – Blast Hole Drillers SEG – SURFACE

RESPIRABLE CRYSTALLINE SILICA (QUARTZ)

In addition to respirable coal dust, Queensland coal mines are also required to monitor and report worker exposure to respirable crystalline silica (RCS) dust. Like respirable dust, exposure to RCS can lead to the development of Mine Dust Lung Disease including silicosis. The International Agency for Research on Cancer has classified RCS as a Class 1 human carcinogen of the lung. Crystalline silica that has been freshly cut or fractured by mechanical processes such as in mining and drilling, is known to be in its most toxic form.

Exposure to RCS presents a risk to both surface and underground coal mine workers. Common activities such as drilling, blasting, crushing, cutting, and mining have the potential to generate large quantities of airborne dust resulting in potential exposure to RCS. Due to the volume of silica-rich overburden handled during mining activities at surface mines, RCS remains a major focus.

The SWA review of OELs, in particular, the respirable crystalline silica OEL, was finalised in 2019, with Australian regulators agreeing to a reduced time weighted average OEL of 0.05 mg/m3. Data provided in this annual report was compared against the regulatory limit of 0.1 mg/m3 in place at the time of collection. The revised exposure limit was incorporate into Queensland coal mining safety and health regulation as of 1 September 2020.

Single Exceedance Data

Since 2017, RCS has accounted for 73 per cent of all single exceedances reported by surface coal mines compared to 43 per cent of the exceedances reported by underground coal mines.

The exceedance rate for RCS across surface coal mines has reduced from 1.15 per cent in 2018 to 0.66 per cent in 2019, with a further decreasing trend for the first two quarters of 2020 (0.18 per cent). A similar trend is shown for underground exceedances with percentages reducing from 1.15 per cent (2018) to 0.37 per cent in 2019.

When collectively reviewing both surface and underground exceedance data, the exceedance percentages are showing an overall decreasing trend as shown in Figure 1-12.

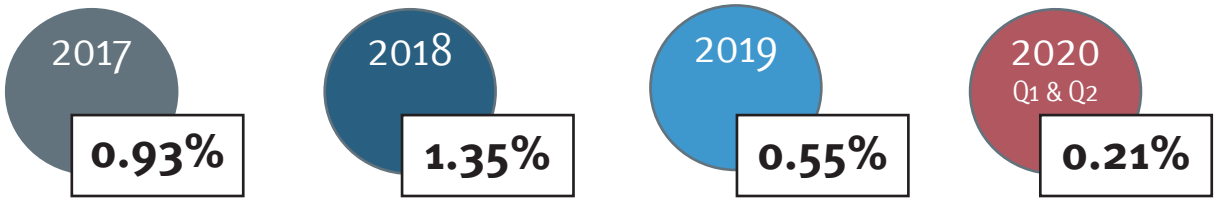


Figure 1-12 Single Exceedance Rate – RCS– Coal Mines (Underground & Surface) 2017 to 2020

SEG Data

The following figures show monitoring results for the high risk SEGs for underground and surface sites. Data that has been provided in this annual report has been compared against the applicable regulatory limit of 0.1 mg/m3 and the most commonly applied shift-adjusted OEL of 0.09 mg/m3

Each bar represents a Queensland mine that has been de-identified.

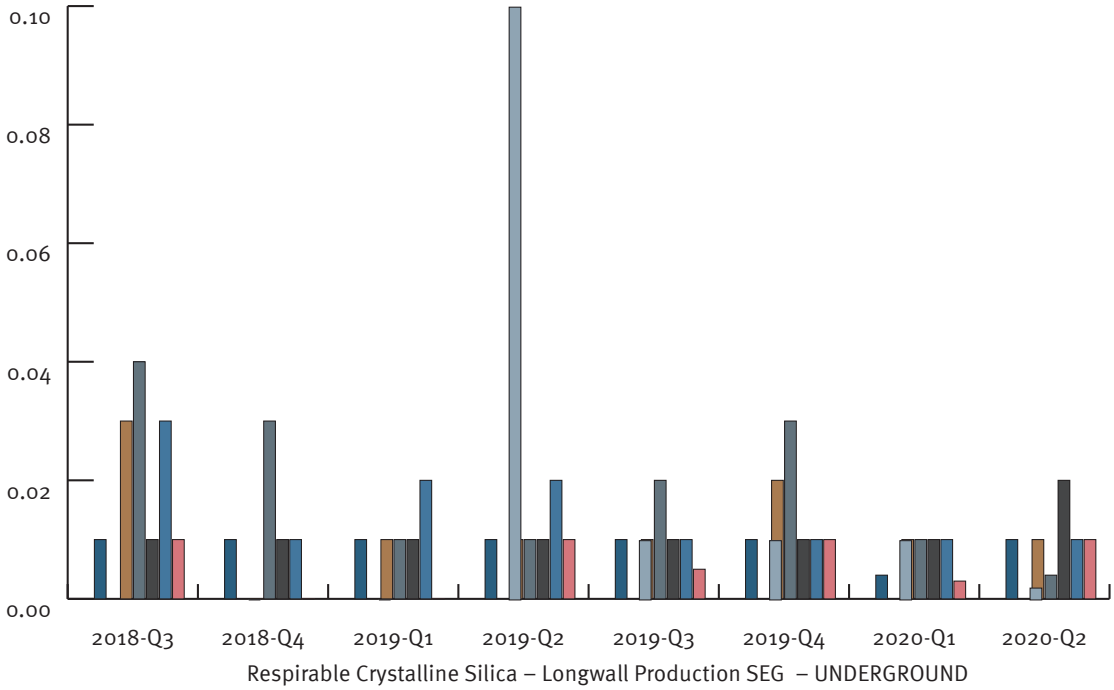


Figure 1-13 RCS – Longwall Production SEG – UNDERGROUND

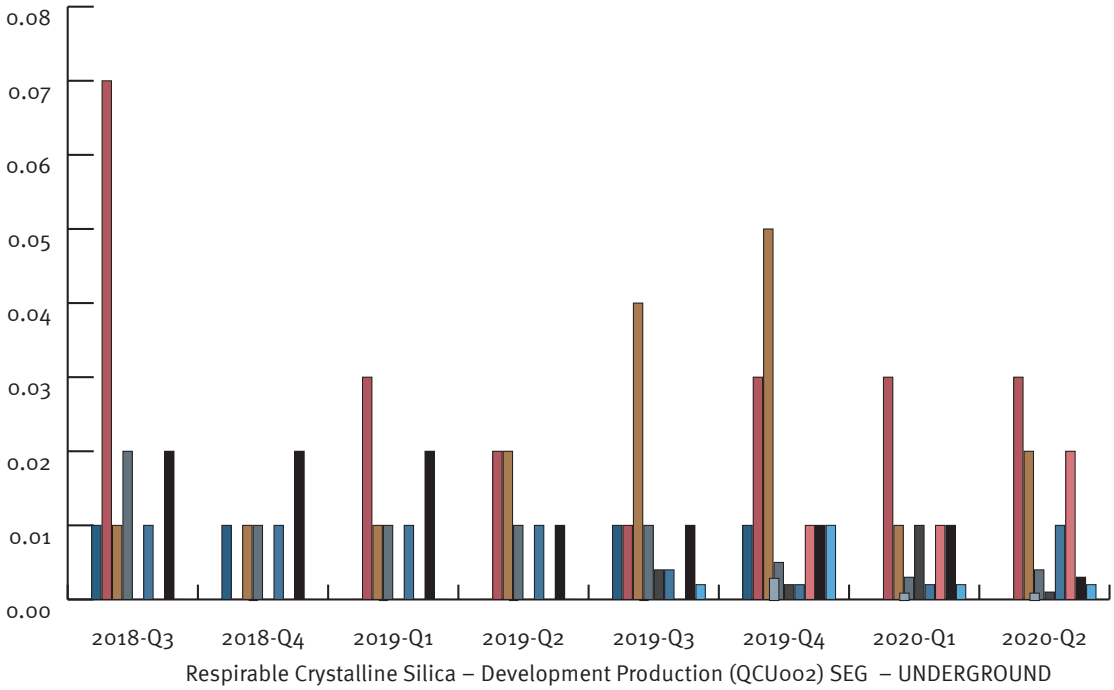


Figure 1-14 Respirable Crystalline Silica – Development Production SEG – UNDERGROUND

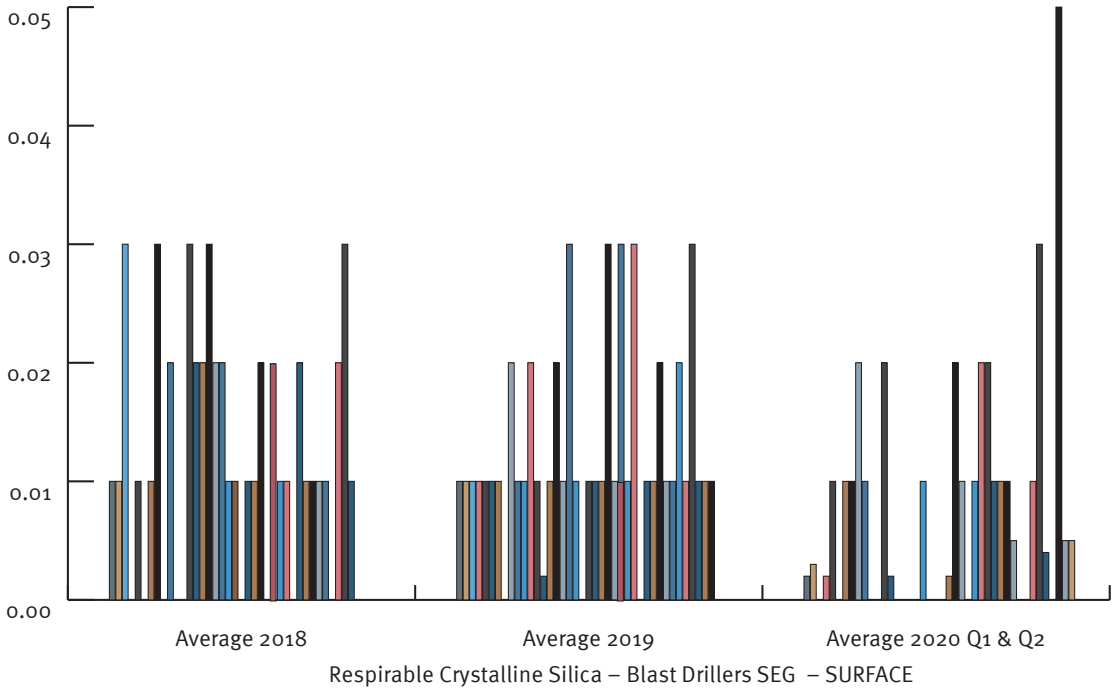


Figure 1-15 RCS – Blast Drillers SEG – SURFACE

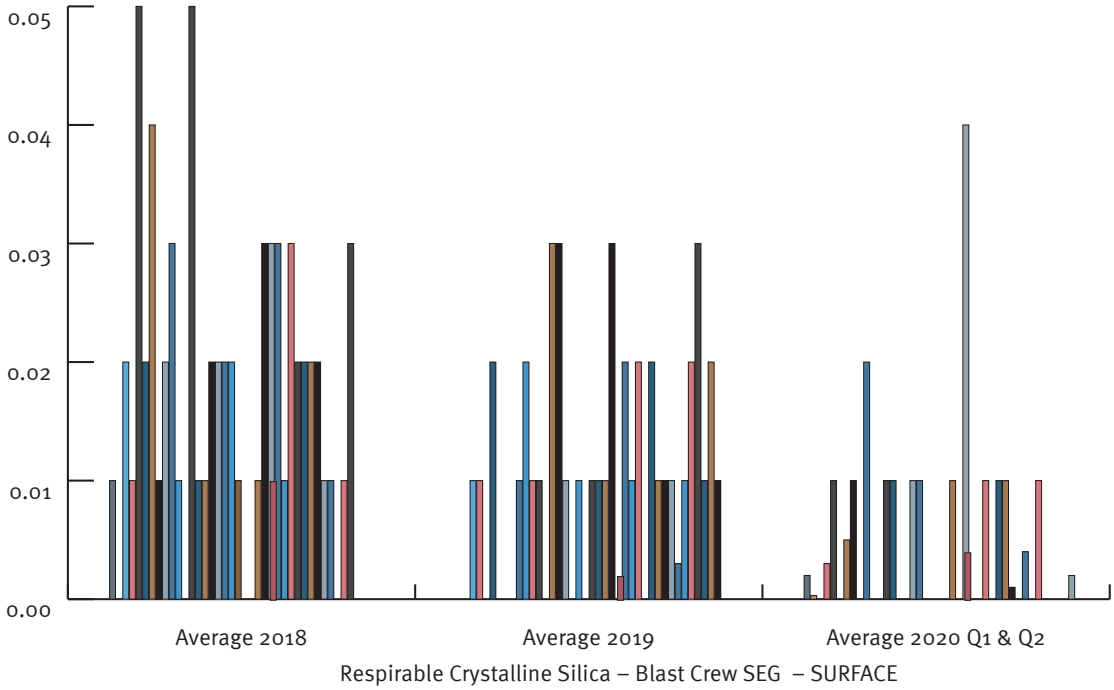


Figure 1-16 RCS – Blast Crew SEG – SURFACE

MINERAL MINES AND QUARRIES

In August 2017, the inspectorate published QGL02 Guideline for management of respirable crystalline silica in Queensland mineral mines and quarries. The guideline states ways in which mines may achieve an acceptable level of risk in managing respirable crystalline silica.

In March 2019, a review of the guideline commenced in consultation with industry stakeholders and the Mining Safety and Health Advisory Committee. Importantly, the review resulted in the scope of the guideline being expanded to include respirable dust more broadly, rather than just respirable crystalline silica. The review was completed in April 2020 when Version 3 of the guideline, now titled QGL02 Guideline for management of respirable dust in Queensland mineral mines and quarries, was published.

Other important changes in version 3 include:

- clarifying requirements of qualitative and quantitative risk assessment of workers' exposure
- new requirements for establishing and maintaining effective and reliable dust controls
- amendment of references to occupational exposure limits in preparation for regulatory changes to the respirable crystalline silica limit from September 2020.

It is expected that these changes to the guideline will assist industry to reduce workers' exposure to respirable dust and to assist in managing the lower exposure limit for respirable crystalline silica in effect from 1st September 2020.

As a result of these changes, in 2019-20, QMI is pleased to report that 95 per cent of workers at mine sites and quarries are covered by risk analysis and personal dust sampling programs associated with the guideline.

Dust monitoring results

QGL02 has now been implemented for three years in mineral mines and quarries and the results of personal sampling data show industry's significant efforts towards improving the effectiveness of controls in dust management. An overall downward trend demonstrating approximately 50 per cent improvement are observed across industry in both respirable crystalline silica and respirable dust.

Since implementation began in August 2017, the industry exceedance rate for respirable crystalline silica fell from 5.3 per cent in 2017-18 to 2.7 per cent in 2019-20. Similarly, the exceedance rate for respirable dust fell from 0.9 per cent in 2017-18 to 0.4 per cent in 2019-20.

With the introduction of the reduced RCS workplace exposure limit, halving from 0.1mg/m3 to 0.05mg/m3 as at 1 September 2020, the inspectorate expects to see an increase in exceedance rates, requiring all mines and quarries to implement more effective controls to manage dust below the workplace exposure limit and to as low as reasonably achievable.

Figure 1-17 compares the percentage of respirable crystalline silica, respirable dust and combined exceedance percentages for contaminants for 2017-18, 2018-19, and 2019-20

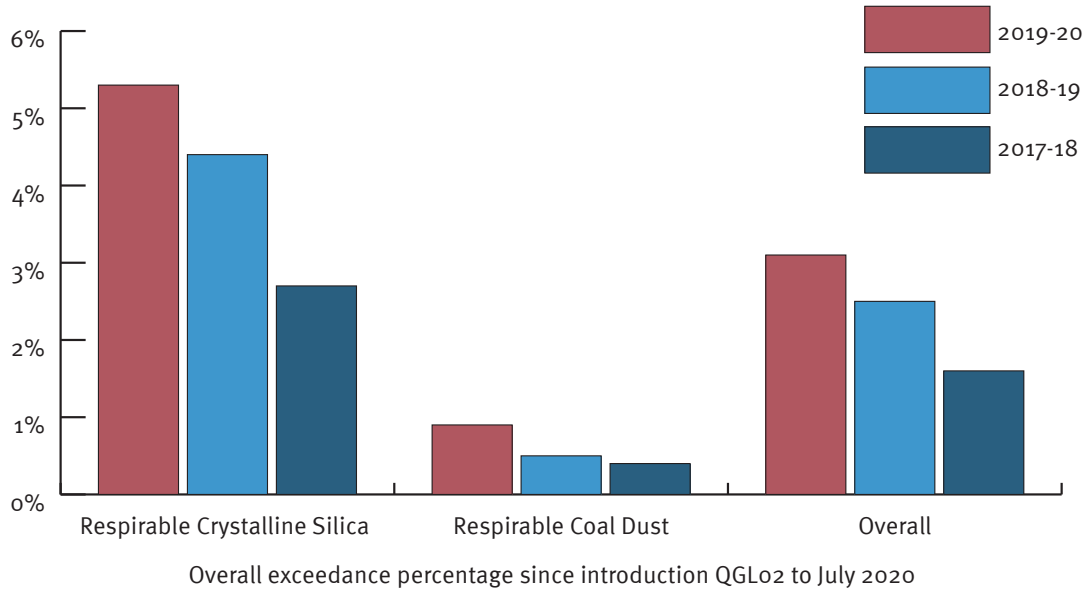


Figure 1-17 Contaminant exceedance percentage

The QMI has received 13,566 dust sample results in the last 3 financial years. It is notable that sample numbers reduced by 18 per cent in 2019-20 compared to 2018-19.

Underground mineral mines report three per cent more sample results in 2019-20 with significantly fewer exceedances than in 2018-19. A reduction in the RCS percentage of exceedances of almost a third has been achieved, compared with last year's figure. RD exceedances have similarly reduced by 33 per cent.

Minerals processing sites show great improvement with fewer exceedances overall, and a reduction in the RCS exceedance percentage of 53 per cent. The RD exceedance percentage has risen but is not statistically significant due to low sample numbers.

Quarries continue to show improvement in dust management practices with the RCS exceedance percentage falling a further 27 per cent and RD exceedance percentage by 40 per cent on last year's figures. Quarries also continue to report the largest amount of sampling data.

Surface mines report 23 per cent fewer RCS exceedances than in 2018-19. There are no RD exceedances to report. (Figures 1-18 and 1-19)

All exceedances must be investigated to identify the cause of the exceedance and identify the control measures or actions that will be taken to prevent or eliminate further exceedances. Control measures implemented must be effective and maintained to reduce dust levels to a level that is as low as reasonably achievable.

Figure 1-18 compares the percentage of respirable crystalline silica exceedance percentages for each category of operation in 2017-18, 2018-19, and 2019-20.

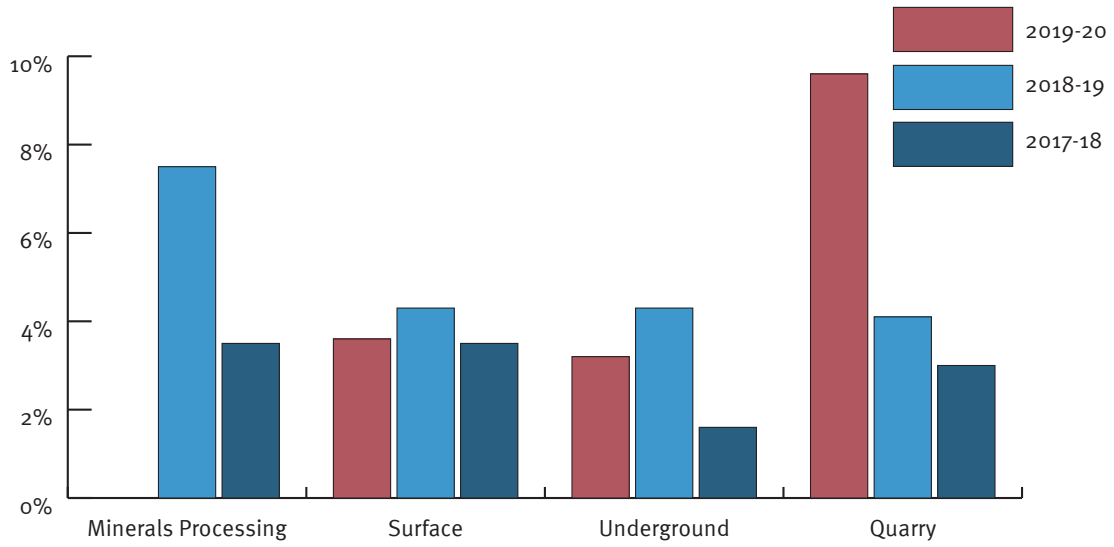


Figure 1-18 RCS exceedance percentage

Figure 1-19 compares the percentage of respirable dust exceedance percentages for each category of operation in 2017-18, 2018-19, and 2019-20.

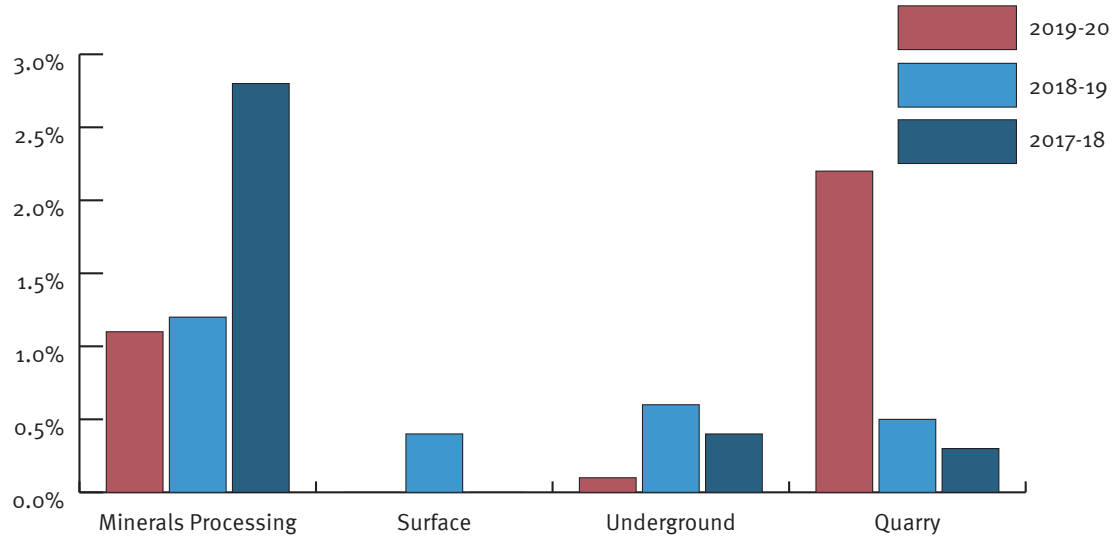


Figure 1-19 RD exceedance percentage

Each category of operation generates dust exceedances in different reporting classes. A general analysis of mine site activities generating exceedances shows the largest number of exceedances arise from support areas, followed by processing, surface activities and finally underground activities.

- Mineral processing sites show the largest number of exceedances is from surface activities during development work in drill and blast. (Figure 1-19)
- Surface mines generate the greatest number of exceedances in export/bagging activities followed by processing/crushing activities. Attention to controls in these areas and technical field activities will deliver dust reductions. (Figure 1-20)
- Underground mines have previously had the highest number of exceedances in the installation of services and have shown significant improvement in 2019-20 in reducing dust during this process. Effort directed towards dust controls during laboratory sample processing and maintenance of mobile plant during breakdown will see further improvements. (Figure 1-21)

Quarries generate the most exceedances during maintenance and crushing activities. Implementation of effective controls in these areas in 2019-20 has shown a reduction in exceedances in these areas. (Figure 1-22)

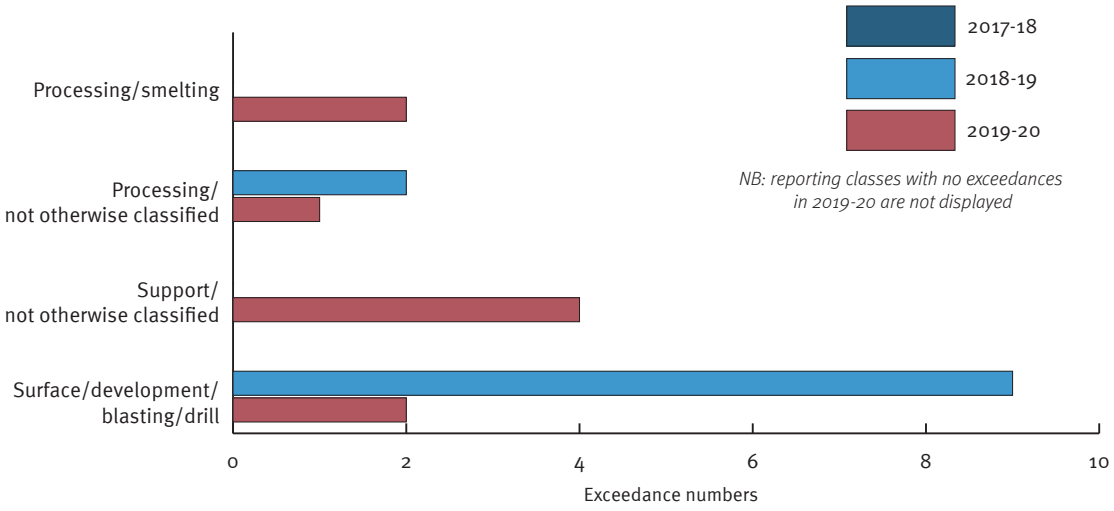


Figure 1-20 Minerals processing exceedances grouped by reporting class

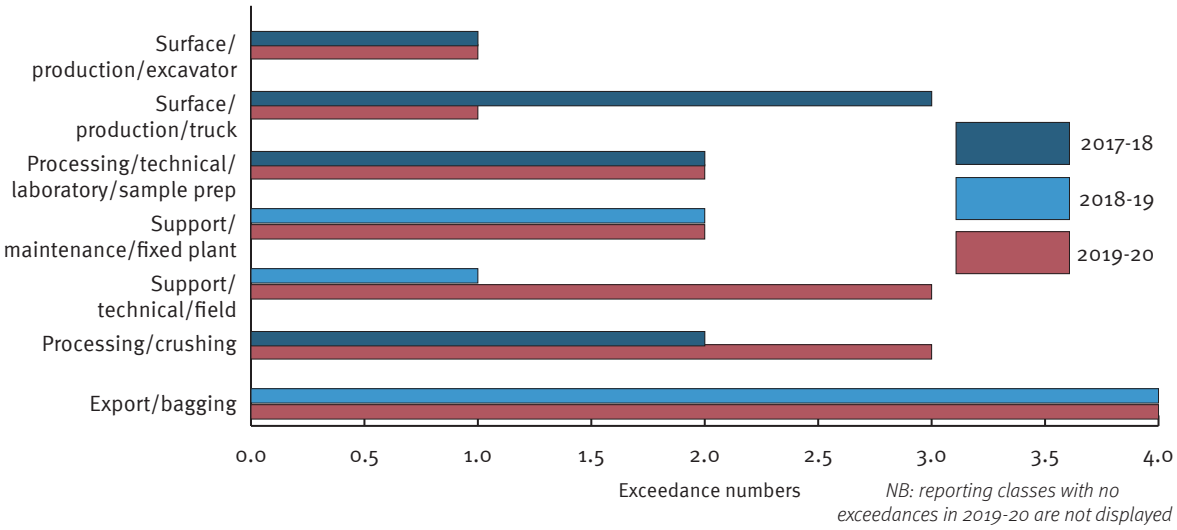


Figure 1-21 Surface mines exceedances grouped by reporting class

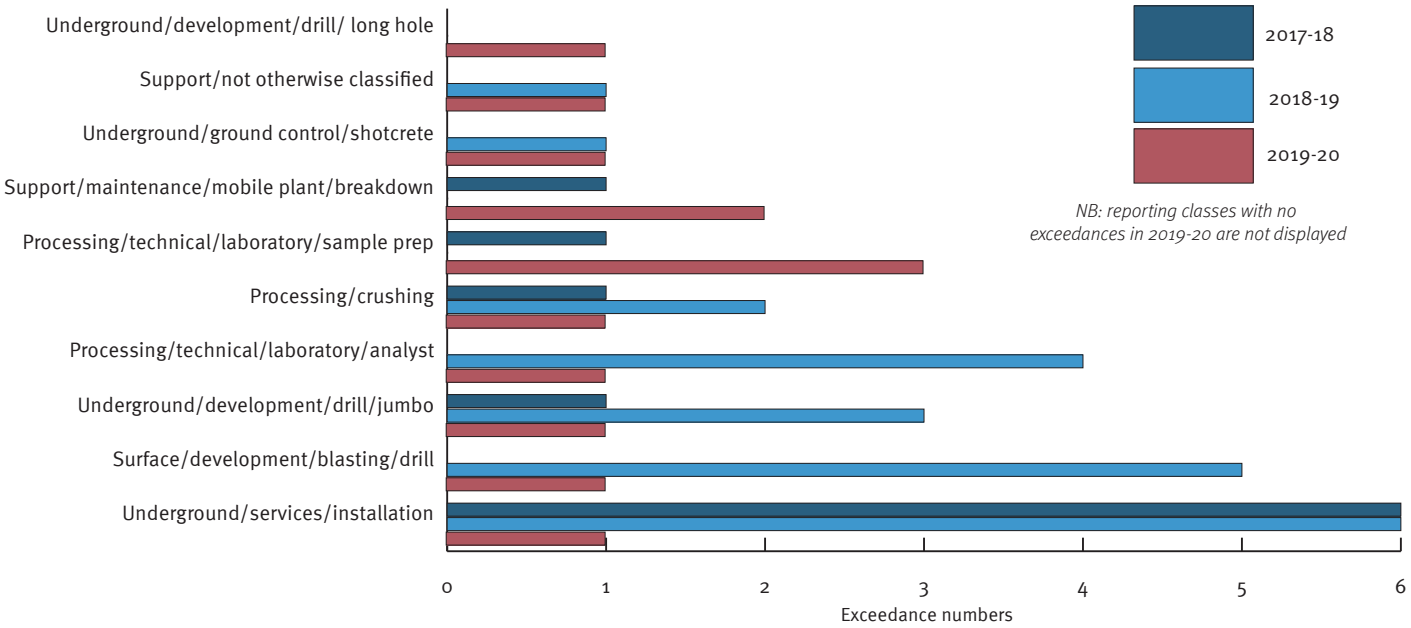


Figure 1-22 Underground mines exceedances grouped by reporting class

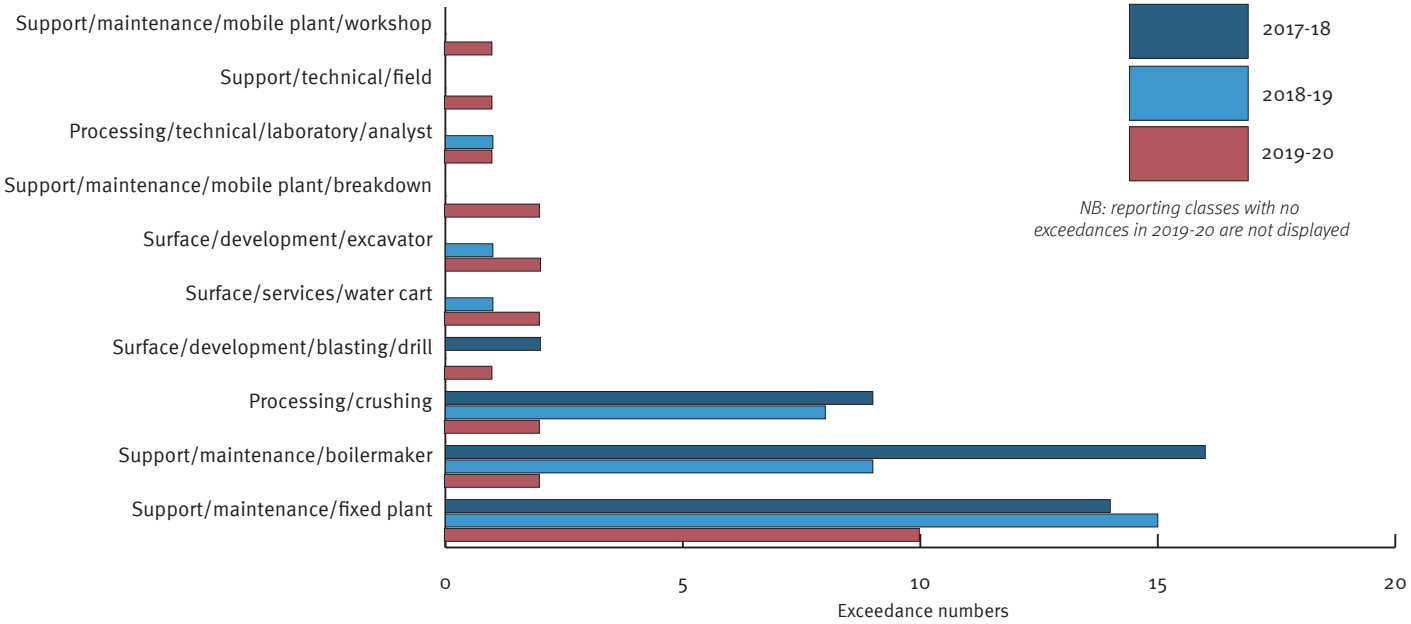


Figure 1-23 Quarry exceedances grouped by reporting class

Monitoring respirable crystalline silica (RCS) in small mineral mines and quarries

The regulator has continued its program of conducting RCS sampling in small to medium mineral mines and quarries and assessing compliance against QGL02. The program includes the collection of samples by the mines inspectorate and a structured inspection program to evaluate compliance with the guideline.

These sample results reflect those of larger mineral mining and quarrying operations and indicate that, while many workers in smaller operations are not routinely exposed to dangerous levels of respirable crystalline silica, a small percentage of workers are at risk of unacceptable exposure.

Exceeded Occupational Exposure Limit (OEL)	4%
50% - 100% OEL	7%
Less than 50% OEL	24%
RCS not detected	63%
Invalid results	2%

Sampling has taken place at hard-rock quarries, sand mines, gemfield / alluvial gold mines and operations producing sandstone, silica sand, decorative stone, peat, bentonite, diatomaceous earth and lime.

Over 300 personal samples and 29 static-position samples were collected from 79 sites. The results from this monitoring have helped to clarify the exposure risk level across the small mines and quarries sector.

The inspection program has resulted in the issue of 185 compliance actions, with the majority requiring sites to comply with the obligations under QGL02. These obligations are primarily to evaluate and control their RCS risk and engage with an Occupational Hygienist to develop and undertake an exposure monitoring program.

Significant gaps were identified in the level of understanding and awareness among MMQ workers of the risks from excess RCS exposure. As a result, the regulator oversaw the development of an online training package providing information to workers on:

- the adverse health impacts of dust and RCS exposure
- identifying and controlling emission sources
- personal exposure monitoring
- obligations of SSEs, Operators, and workers
- documentation and record keeping

The presentation also includes a self-assessment and critical thinking exercises that encourage the worker to consider dust exposure issues at their own site and the effectiveness of existing controls.

It is encouraging to see growth and education in this area with ongoing industry activity proving that it can adjust operating practices to manage respirable dust to as low as reasonably practicable.

A reduced respirable crystalline silica occupational exposure limit will come into place on 1 September 2020 and will demand further monitoring and implementation of effective controls in order to ensure workers are protected now and into the future. The inspectorate will continue to support industry in meeting the new requirements.

INHALABLE DUST HAZARD

Inhalable dust refers to particulate matter of all sizes that can enter the nose and mouth during normal breathing. The size of the particles in the inhalable dust cloud will determine where it is deposited within the respiratory system. This can be from the nose through to the gas exchange region of the lungs.

Research by the Health and Safety Executive in the UK suggests that 15 per cent of chronic obstructive pulmonary disease (COPD) – a potentially debilitating disease – cases are likely linked to work-related exposures. It is believed inhalable dust may be one of the contributing factors in the development of COPD.

In 2019, the coal mining inspectorate expanded the industry airborne contaminants database to include personal inhalable dust results. Historical data was requested across all surface and underground coal mines, with data dating back to 2005 submitted. In the last reporting year additional data was requested and the inspectorate will request the data on an annual basis. There are now over 8,000 valid samples from 37 coal mines within the RSHQ airborne contaminant database.

On reviewing the inhalable dust exposure data, some concerning trends are apparent:

- Average exposures for the Development Production and Longwall Production similar exposure groups (SEGs) routinely exceed or approach the Australian Institute of Occupational Hygienists guideline value of 10mg/m3.
- Average exposures in surface coal mines remain generally below the guideline value, however, some tasks have been identified that generate significant exposures.
- Respirable dust exceedance rates are decreasing (below 1 per cent) while inhalable dust exceedance rates remain high (above 10 per cent).

SEG Data

In 2019, four underground coal mines exceeded the guideline value for 10 mg/m3 across one or more of the following SEGs: Longwall Production, Production Support / Bullgang and Second Support. This is an increasing trend when comparing data with previous years.

When evaluating 2019 surface SEG averages, most remained well below the recommended guideline, though some sites were exceeding or approaching the recommended action level of 5 mg/m3. This was across Blast Crew and CHPP Production SEGs, highlighting the need to continually review control measures for these SEGs. Figure 1-24 to 1-29 show SEG averages over the past four years.

Each bar represents a Queensland mine that has been de-identified.

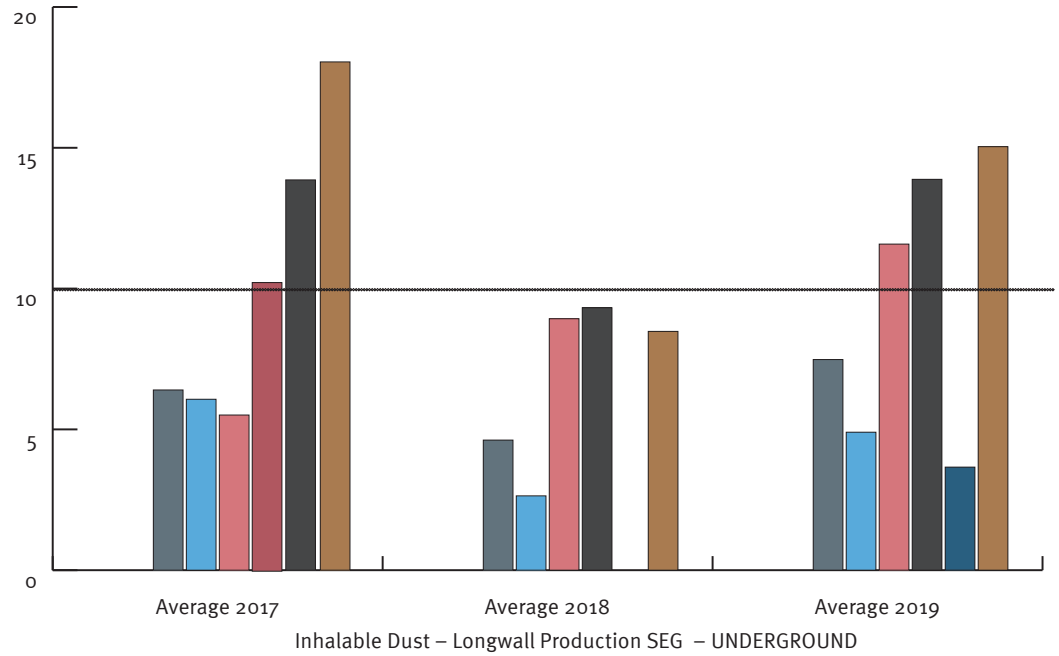


Figure 1-24 Inhalable Dust – Longwall Production SEG – UNDERGOUND

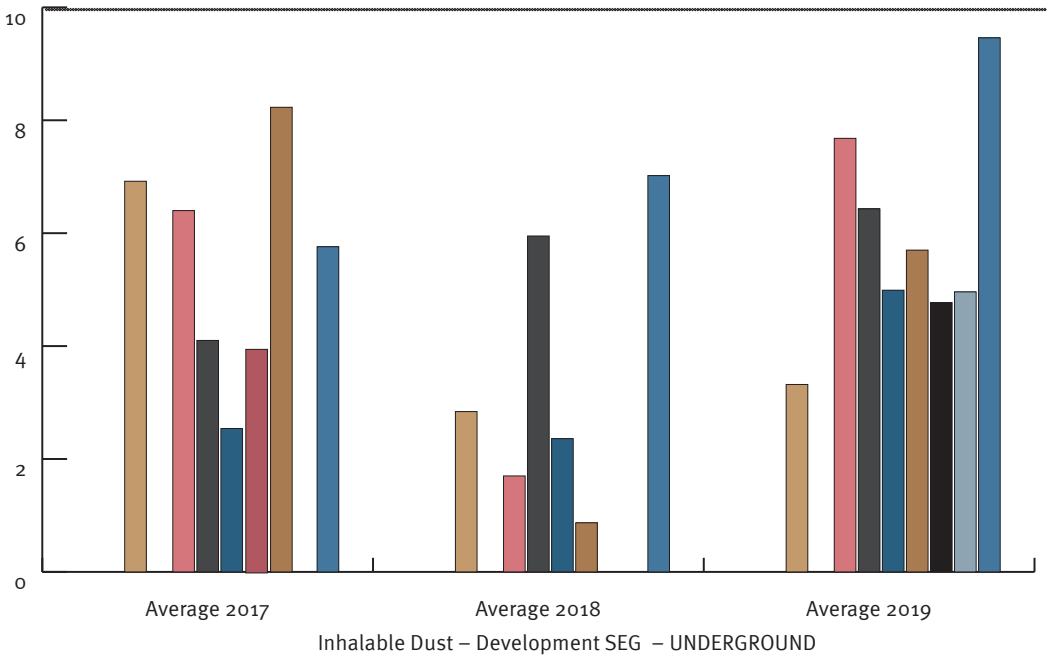


Figure 1-25 Inhalable Dust – Development Production SEG – UNDERGOUND

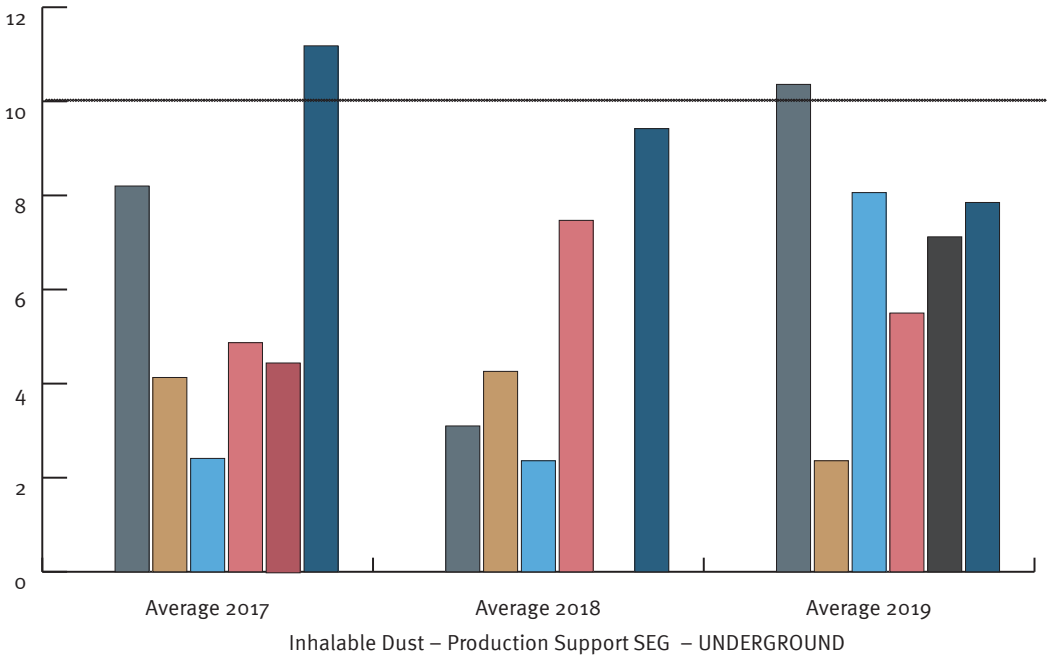


Figure 1-26 Inhalable Dust – Production Support / Bullgang SEG – UNDERGOUND

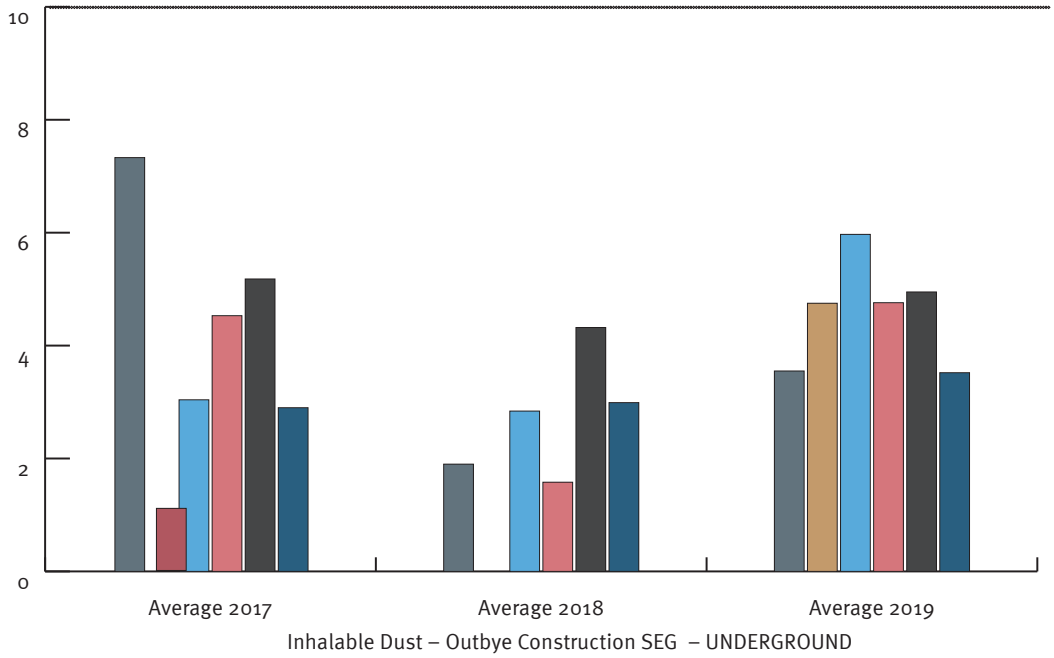


Figure 1-27 Inhalable Dust – Outbye Construction and Infrastructure SEG – UNDERGOUND

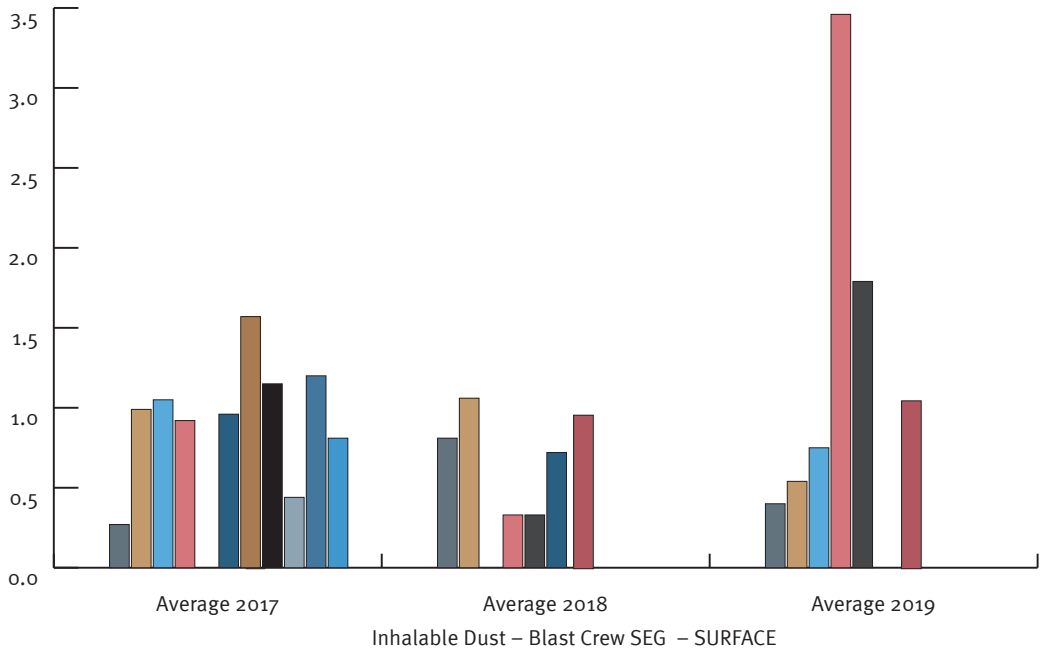


Figure 1-28 Inhalable Dust – Blast Crew SEG – SURFACE

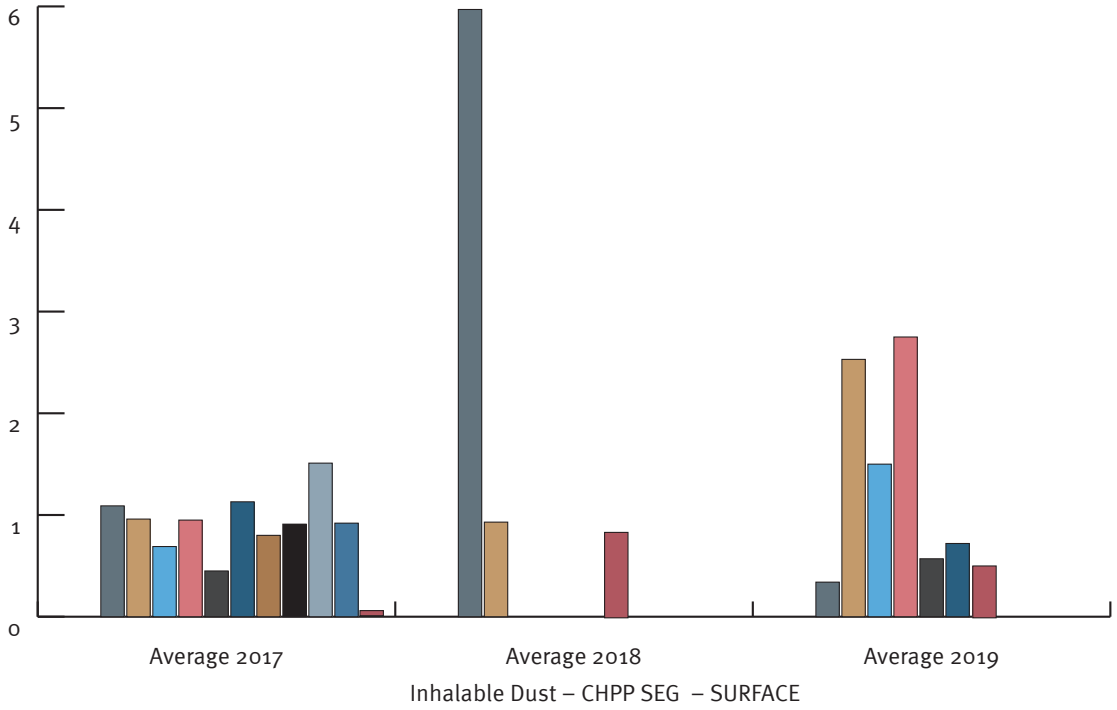


Figure 1-29 Inhalable Dust – CHPP Production SEG – SURFACE

Single Exceedance Data

Approximately 8 per cent of all samples collected across surface and underground coal mines in 2019 exceeded the recommended guideline of 10 mg/m3. While this is an increase from 2018 (4 per cent), the combined exceedance percentage across underground and surface mines has remained consistent since 2016.

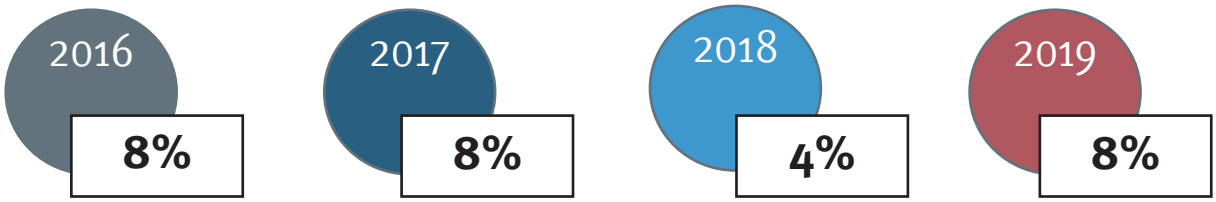


Figure 1-30 Single Exceedance Rate – Inhalable Dust – Coal Mines (Underground & Surface)

Underground coal mines attributed to the majority of exceedance data submitted in 2019 (approx. 99 per cent). Reported concentrations of exceedances reported ranged between 10.21 mg/m3 and 72.29 mg/m3. This is further evident when comparing the single exceedance percentages over four years across both underground and surface coal mines (Figures 1-31and 1-32).

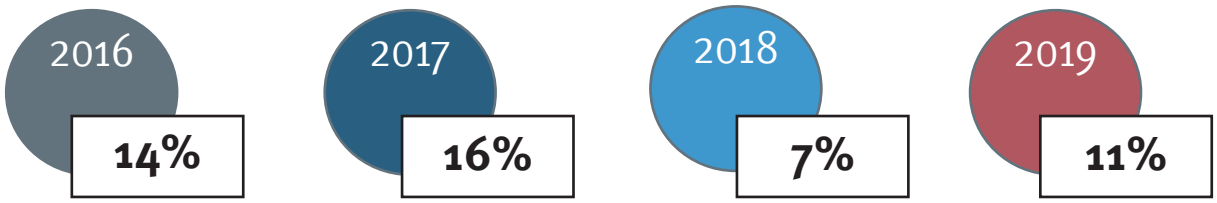


Figure 1-31 Single Exceedance Rate – Inhalable Dust – UNDERGROUND

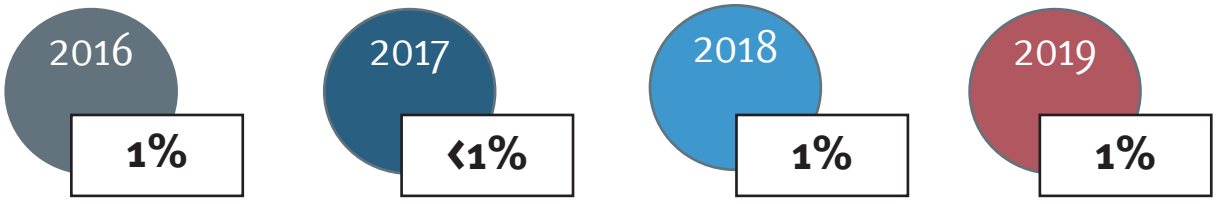


Figure 1-32 Single Exceedance Rate – Inhalable Dust – SURFACE

While there has been a significant reduction in exceedance percentages in respirable dust (less than 1 per cent over the past four years), inhalable dust exceedances remain high. This is illustrated in the following graph showing the total exceedance rate for respirable dust compared to inhalable dust.

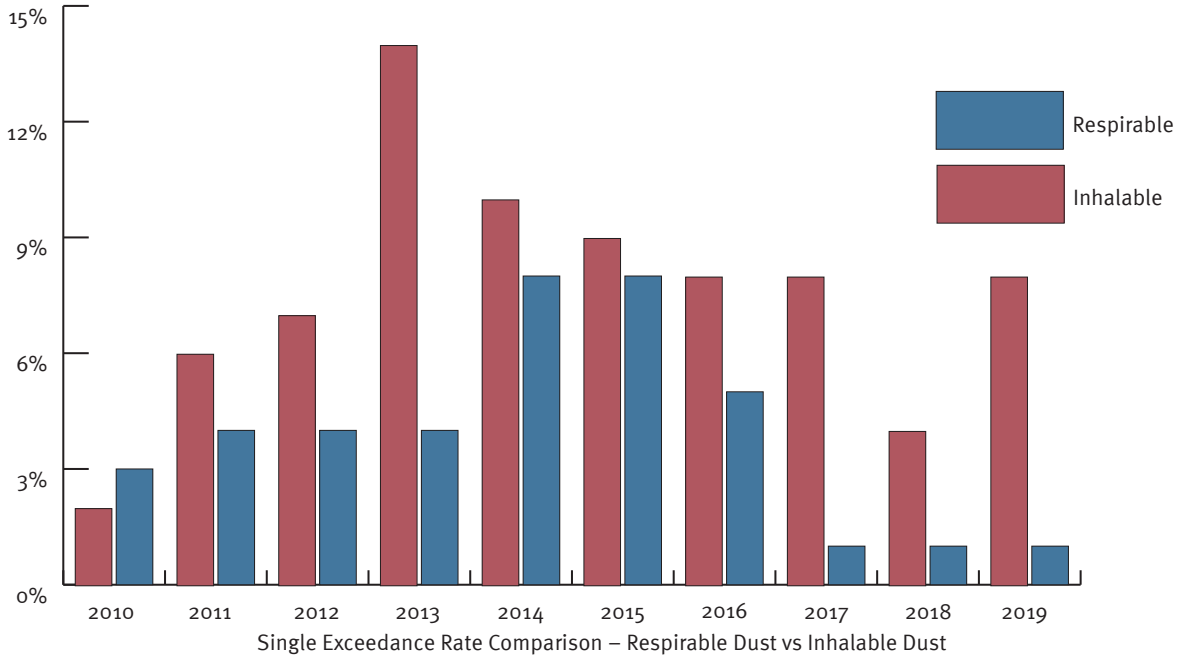


Figure 1-33 Single Exceedance Rate Comparison – Respirable Dust vs Inhalable Dust

The relatively high values for inhalable dust exceedance may be because of regulator and industry focus on respirable dust in recent years. The regulator takes this opportunity to remind operators that they must ensure that the risk of injury or illness to any person resulting from operations is at an 'acceptable' level. This means that the level of risk must be not only within acceptable limits but also as low as reasonably achievable. To achieve this, a review of dust control measures and safety and health management system changes may be required to ensure dust levels above those prescribed are reduced to within prescribed levels

The risk of workers being exposed to hazardous dust particles should be controlled using the hierarchy of controls. Controls should focus on higher-order controls (e.g. elimination, substitution and isolation of the hazard) as the most effective means of treating the hazard.

Due to the potential health impacts of long-term exposure to inhalable dust, it is recommended that sites shift-adjust the guideline value of 10mg/m3 to account for extended work hours and reduced recovery time. Guidance on how to carry out shift adjustments can be found at the Australian Institute of Occupational Hygienists website, here.

After a review of the 2019 data the following recommendations were made to coal mine Site Senior Executives:

- Introduce an action limit of 5 m/mg3. When concentrations at or above this recommended limit are measured, it should as a trigger to identify additional controls required to reduce generated airborne dusts.
- Ensure that inhalable dust is considered and reviewed within the sites current Health Risk Assessment (HRA). HRAs should be reviewed every 5 years.
- Ensure that personal inhalable dust exposure monitoring data is reviewed and where necessary, controls implemented to maintain exposures as low as reasonably achievable.
- Continually review current practices and controls, with particular focus on the Longwall Production, Development Production and Production Support / Bullgang operations.

CHAPTER TWO
OVERVIEW OF OCCUPATIONAL HYGIENE PERFORMANCE

MINE DUST LUNG DISEASE

The major reforms that have been delivered to address mine dust lung disease are focused on three key areas:

- prevention
- early detection
- provision of a safety net for affected workers.

Government, industry, unions and medical professionals continue to work together to deliver on these areas.

In the 2019-20 reporting year 56 cases of mine dust lung disease among the current and former Queensland coal mine, mineral mine and quarry workers were reported to RSHQ, bringing the total cases of mine dust lung disease reported to RSHQ since 1984 to 165. Of this total, 118 cases were among current and former Queensland coal mine workers whose experience was in coal mining only. This included 37 cases reported in 2019-20. There were 31 reported cases of mine dust lung disease which involved workers with experience in both coal mines and mineral mines and/or quarries, of which 13 cases were reported in 2019-20.

A number of the workers included in the 165 reported cases have prior mining or quarrying experience outside of Queensland, most commonly in New South Wales, with additional instances of experience in Western Australia and the Northern Territory. Fifteen workers have overseas mining experience, most commonly in the United Kingdom. For a number of these workers, their experience in other jurisdictions may have also contributed to their diagnosed conditions. Additionally, there are five workers from other Australian jurisdictions that were identified as having a MDLD upon their entry to the Queensland coal mining industry.

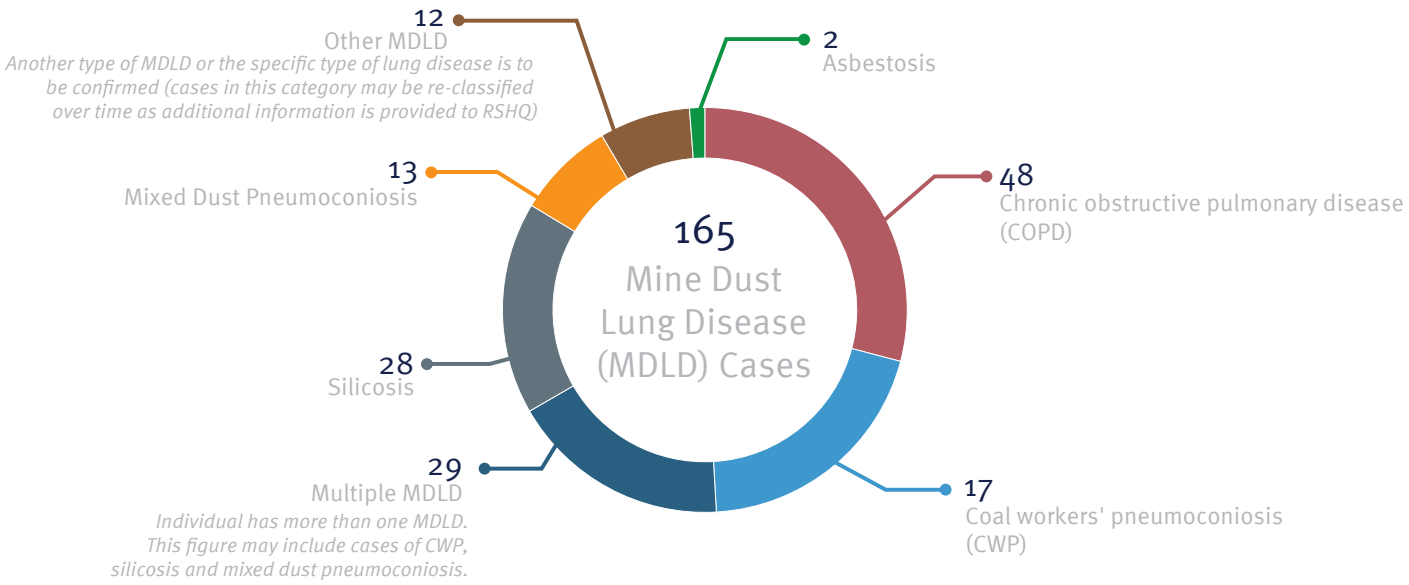


Figure 1-34 Total individuals with mine dust lung disease for all mining since 1984

As a result of improvements made to the screening process, increased awareness of mine dust lung disease across industry, workers, medical professionals and other regulators, and upcoming regulatory changes to health surveillance for mineral miners and quarry workers, we expect an increase in the number of positive screening cases. Over time, we expect industry to continue to reduce worker exposure to dust and this in turn to lead to a reduction in diagnosed disease.

RSHQ receives reports of disease from a variety of sources including Appointed Medical Advisers (via the Coal Mine Workers' Health Scheme), Site Senior Executives and The Office of Industrial Relations (OIR) via the workers' compensation scheme. Since 1 July 2019, cases of notifiable dust lung diseases (NDLDs) in Queensland are reported to the NDLD Register. This allows Queensland Health to monitor and analyse the incidence of NDLDs, including notifiable diseases caused by dust exposure in mining or quarrying such as coal workers' pneumoconiosis and silicosis.

MINERAL MINES AND QUARRIES

As at 30 June 2020, there have been 16 reported cases of mine dust lung disease among current and former Queensland mineral mine and quarry workers who have worked in mineral mining and/ or quarrying only. Two of these cases were for workers with experience in quarries only. There have been 31 reported cases of mine dust lung disease which involved workers with experience in both coal mines and mineral miners and/or quarries.

In 2019-20, six cases of mine dust lung disease were reported for workers with only a mineral mine or quarry work history. While the coal industry has a mandatory Coal Mine Workers' Health Scheme, the non-coal industry does not.

Changes to the Mining and Quarrying Safety and Health Regulation 2017 that are to commence on 1 September 2020 introduce mandatory periodic respiratory health surveillance for mineral mine and quarry workers. This aligns key respiratory health surveillance requirements with those for coal mine workers, and is anticipated to improve detection of mine dust lung disease. An increase in the number of reported cases is expected over the coming years.

Figure 1-35 shows the number of cases reported each financial year for mineral mine and quarry workers since 2015 when coal workers' pneumoconiosis was re-identified. The graph includes cases where workers have experience across coal mining and mineral mining and/or quarrying.

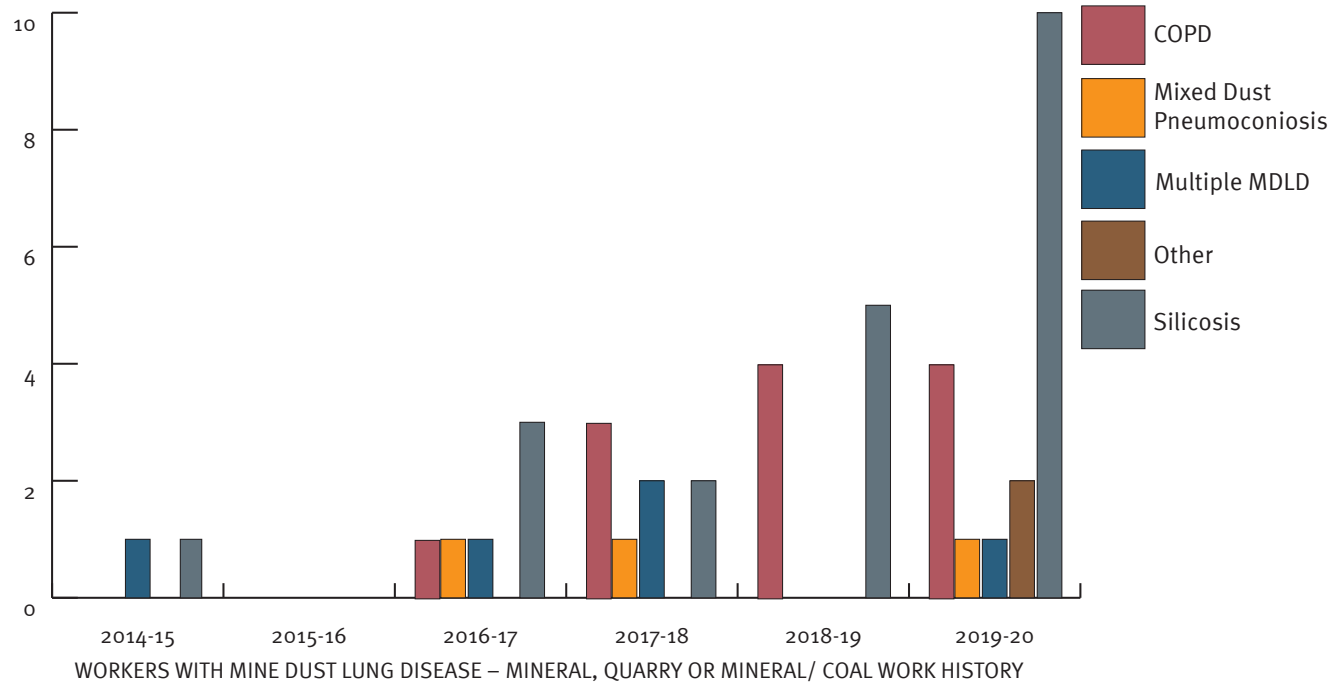


Figure 1-35 Workers with MDLD — mineral, quarry or mineral/ coal work history

COAL MINES

Figure 1-36 shows the number of cases of mine dust lung disease reported each financial year for coal mine workers since 2015 when coal workers' pneumoconiosis was re-identified. The graph includes cases where workers have experience across coal mining and mineral mining and/or quarrying.

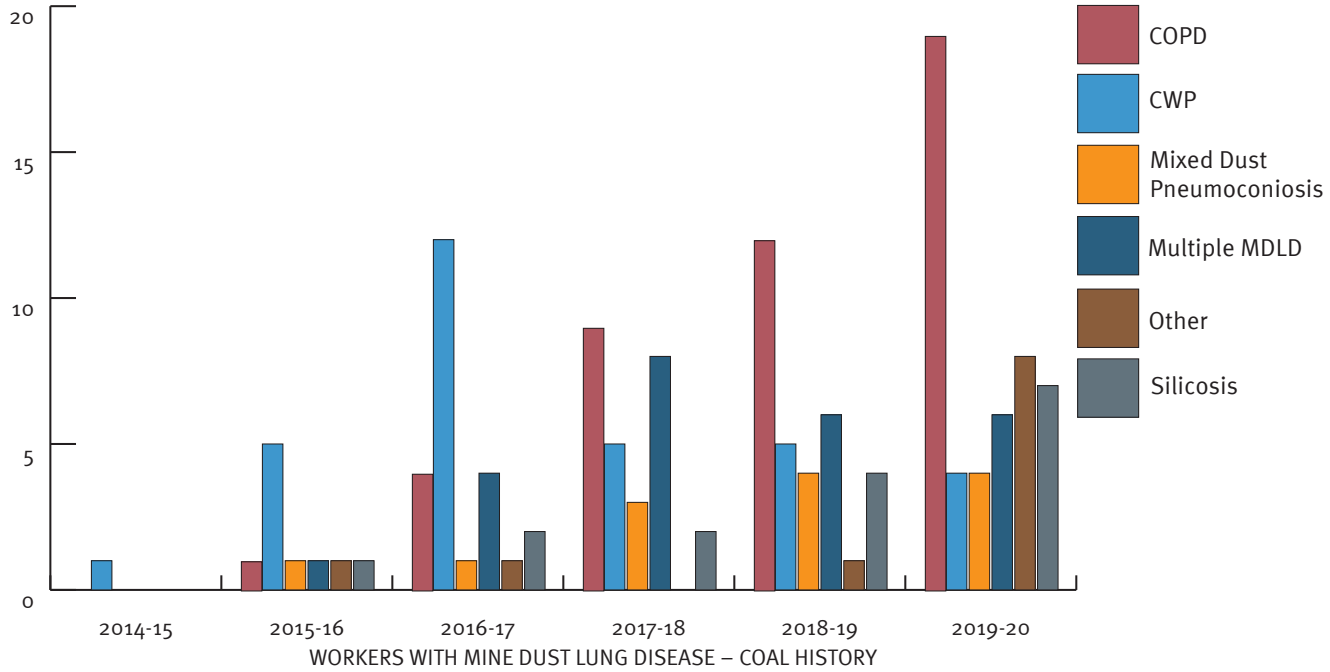


Figure 1-36 Workers with MDLD – coal history

The data shows a general increase in the number of cases of mine dust lung disease, which may reflect a maturing scheme and greater overall awareness of the link between respirable dust and mine dust lung disease across all stakeholders. As disease reporting has become more sophisticated, cases of pneumoconiosis are now classified as coal workers' pneumoconiosis and silicosis, as well as mixed dust pneumoconiosis, where a worker has been exposed to multiple dust types. The types of "other" mine dust lung disease represent cases where the specific mine dust lung disease diagnosis has not been finalised, or where a less-commonly reported respiratory condition is identified, such as lung cancer.

Of the reported cases for workers with coal mining experience in Queensland:

- 81 per cent aged › 50 years
- 41 per cent underground workers
- 40 per cent surface workers
- 25 per cent with interstate or international mining work history.

The increasing proportion of reported cases amongst surface workers may reflect the regulatory changes that now require surface coal mine workers to undergo respiratory health screening at least every five years, consistent with underground coal miners.

Queensland's mandatory health surveillance scheme for coal mine workers aims to detect any signs of mine dust lung disease early. Changes made to enhance the quality of examinations as recommended by the Monash University review, along with on-going enhancements to the scheme, ensures the likelihood of detection is maximised.

Most of Queensland's reported cases have been identified during the early stages of disease and removing or reducing the worker's exposure to dust can prevent symptoms from progressing. Early stage mine dust lung disease has a good prognosis. Generally, it does not result in any symptoms and lung capacity remains within a normal range. However, health surveillance is key to identifying the disease in its earliest stages so that exposure can be reduced to prevent the disease from progressing.[12]

12 Dr Robert Edwards, "Miners' Health Matters", Department of Natural Resources Mines and Energy, 2018

CHEST X-RAY DUAL READING PROGRAM

All chest X-rays are now examined against the International Labour Organisation's International Classification of Radiographs of Pneumoconioses (ILO Classification). The ILO Classification is the accepted international standard to describe and code potential abnormalities in chest X-rays that may indicate a mine dust lung disease. Through this screening process, the worker's X-ray is compared against a set of standard X-ray images. The concentration of small opacities in the affected zone of the lung is classified by increasing size on a 12-point scale which consists of four major categories (0, 1, 2 and 3) with three subcategories in each.

A classification of category 0 indicates a negative screening result. A result of 1 to 3 may indicate early stages of disease. Large abnormalities are classified as A, B or C and may indicate advanced stages of the disease, commonly referred to as progressive massive fibrosis. It is important to note that this is a screening process, and any positive screening result does not necessarily lead to a disease being diagnosed. Results must be further investigated using the clinical pathways guideline which provides the recommended process for follow-up investigation and referral to appropriate medical specialists and tests.

From 1 July 2016 to 30 June 2020, more than 50,000 chest X-rays were sent to the United States for assessment by National Institute for Occupational Safety and Health approved B-readers. All these chest X-rays have been reported and returned. Since 1 March 2019, Lungscreen Australia's certified B-readers had also undertaken more than 29,000 chest X-ray reports.[3] Since July 2016, there were on average 35,000 workers employed in the coal mining industry in Queensland each year.

ILO Category	Number of X-rays reported
Negative (0)	80100
1/0	382
1/1	205
1/2	49
>=2/1	27
A, B, C	12

Figure 1-37 Chest X-ray screening results table

Across both dual reading programs, 99 per cent of chest X-rays have returned a negative ILO Classification result. One per cent returned a positive result and, of these, 31 resulted in a mine dust lung disease diagnosis after investigation using the clinical pathways guideline.

The use of X-ray readers from the United States was an important interim measure until Australian radiologists gained the internationally recognised B-reading qualification and sufficient experience in performing B-reads. With 36 qualified Australian B-readers now on the RSHQ register of approved providers, the transition to an Australian X-ray reading service is complete.

Respiratory health screening for retired and former workers

Since 1 March 2019, RSHQ has provided retired and former miners and quarry workers with access on a voluntary basis, to free respiratory health assessments every five years for life. These former worker assessments support the ongoing health of retired and former workers through the diagnosis of any occupational latent-onset respiratory disease. They also support RSHQ's health surveillance objectives by providing worker health information that extends from commencement of employment into retirement.

Access to respiratory screening after a worker's mining career is already a right under the Coal Mining Safety and Health Regulation 2017. Changes to the Mining and Quarrying Safety and Health Regulation 2017 that commence on 1 September 2020 extend this right to former mineral miners and quarry workers.

As at 30 June 2020, RSHQ approved 155 retired and former worker assessments. Of the 98 completed, 13 cases of mine dust lung disease were diagnosed. This represents a higher rate of disease diagnosis compared to current workers, likely due to factors such as age, length of mining experience of retired and former workers and the voluntary nature of the assessments, meaning those who are symptomatic are more likely to request assessment.

13 - Dr Robert Edwards, "Miners' Health Matters", Department of Natural Resources Mines and Energy, 2018

The mine dust health support service

Respiratory health screening is only one part of the journey, especially for those workers who are diagnosed with a respiratory condition. That is why RSHQ, in a joint initiative with the Office of Industrial Relations and WorkCover Queensland, launched the Mine Dust Health Support Service on 2 March 2020.

This confidential helpline provides information on screening, compensation and support services for current and former mine and quarry workers who are diagnosed with a dust lung disease from their employment, as well as their families. As at 30 June 2020, the Service has assisted 109 individuals to access the information and support they need. The Service can be contacted either by calling 1300 445 715 or by email at info@minedusthealthsupport.com

MOBILE HEALTH SERVICE FOR REGIONAL QUEENSLAND

In April 2020 RSHQ partnered with Heart of Australia to provide a mobile health service for current and former mine and quarry workers in regional Queensland to support the early detection and prevention of mine dust lung disease.

The service will have the capacity to conduct full health assessments, including chest X-ray screenings and spirometry, as well as follow-up investigations like high-resolution computed tomography and complex lung function testing where required.

Design is underway and Heart of Australia expects the service to commence within 2021. The service will focus on regional and remote areas, where access to registered providers is limited, to improve health outcomes for these workers and the communities in which they live.

Figure 1-38 Heart of Australia truck example

DIESEL PARTICULATE MATTER

In 2018, Safe Work Australia (SWA) commenced a review of all occupational exposure limits (OELs), encompassing over 600 hazardous substances. In addition to the current register of hazardous substances (located on the Hazardous Chemical Information System online database), additional contaminants such as diesel exhaust emissions have been included. While many OEL recommendations have been provided for public comment, the recommendation for diesel engine emissions has been further deferred and as such, specific information cannot yet be provided.

Currently there is no OEL listed for diesel particulate matter (DPM) in the Queensland Coal Mining Safety and Health Regulation. Despite this, Queensland coal mines continue to apply the OEL recommended by the Australian Institute of Occupational Hygienists and the regulatory limit adopted by NSW Coal Mines of 0.1 mg/m3 measured as sub-micron elemental carbon.

The inspectorate continues to facilitate industry diesel exhaust forums to promote and share good practice with an objective to reduce DPM exposures to as low as reasonably achievable, including through the provision of data and analysis. DPM continues to be a key health focus of the coal mining inspectorate, with underground coal mine workers identified as more likely at risk of exposure. This is as a result of the use of diesel-powered machinery in the enclosed environment.

The inspectorate now has a comprehensive record of over 9600 personal valid exposure results provided by industry across fourteen underground coal mines. These results date back to the early 2000s and are stored on the RSHQ exposure database.

Similar exposure groups (SEGs) identified to have the highest level of risk of DPM exposure were:

- QCU001 – Longwall Production
- QCU002 – Development Production
- QCU003 – Underground Maintenance
- QCU005 – Longwall Move
- QCU006 – Outbye Construction and Infrastructure
- QCU019 – Production Support / Bullgang

SEG Data

In 2019, all SEGs measured average exposures equal to or below the guideline value of 0.10 mg/m3. Despite average exposures generally being well below the guideline value, some sites recorded a general increase in the average exposures measured across the six higher risk SEGs. This is demonstrated in Figures 1-39 to 1-44.

Each bar represents a Queensland mine that has been deidentified.

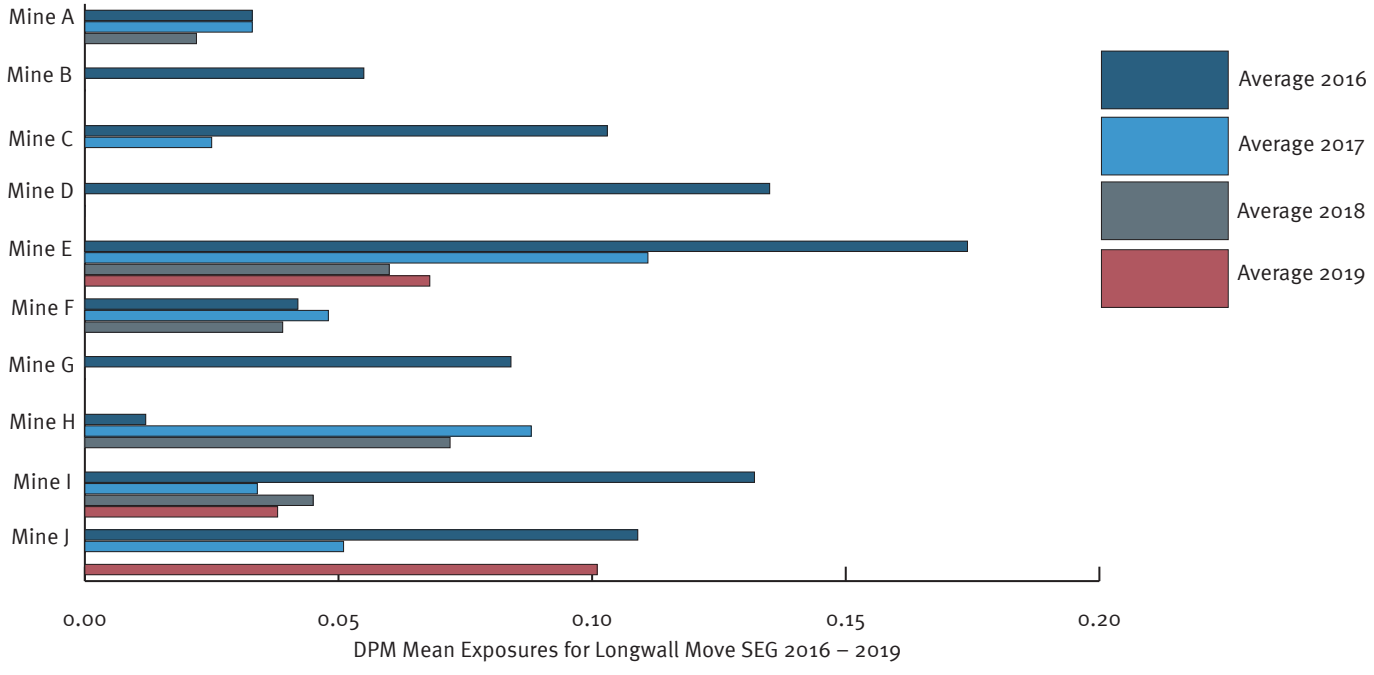


Figure 1-39 Mean Exposures for Longwall Move SEG 2016 - 2019

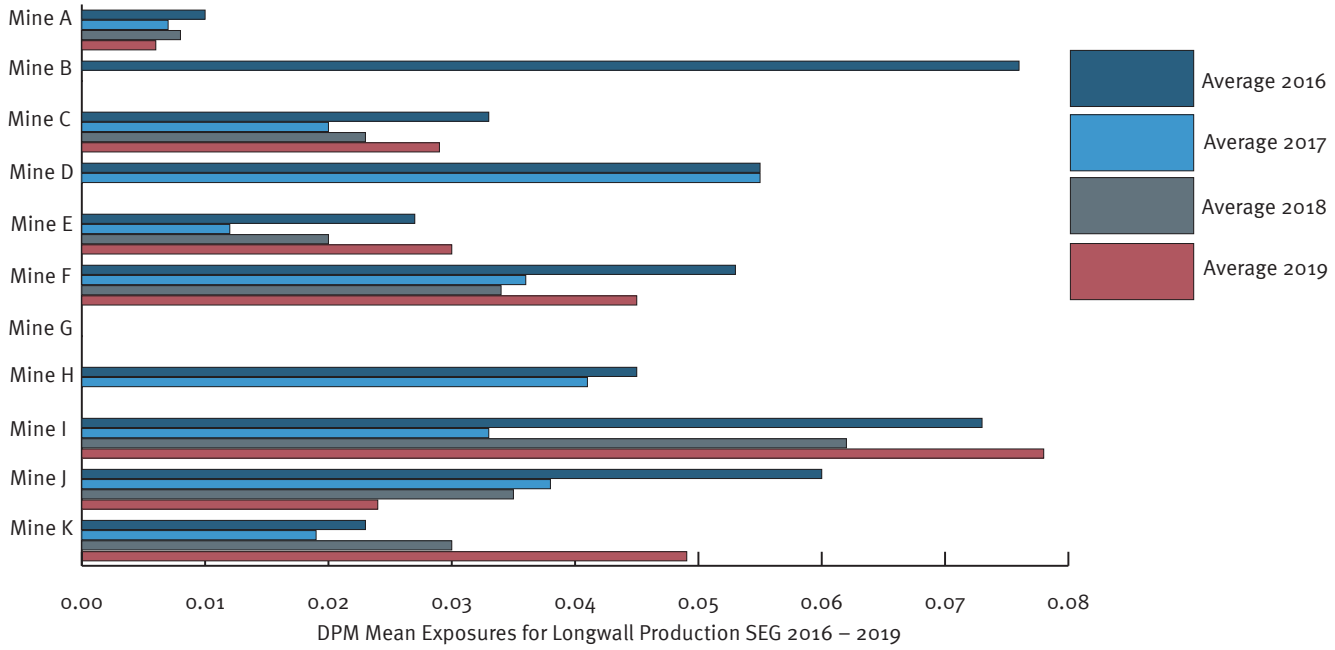


Figure 1-40 Mean Exposures for Longwall Production SEG 2016 -2019

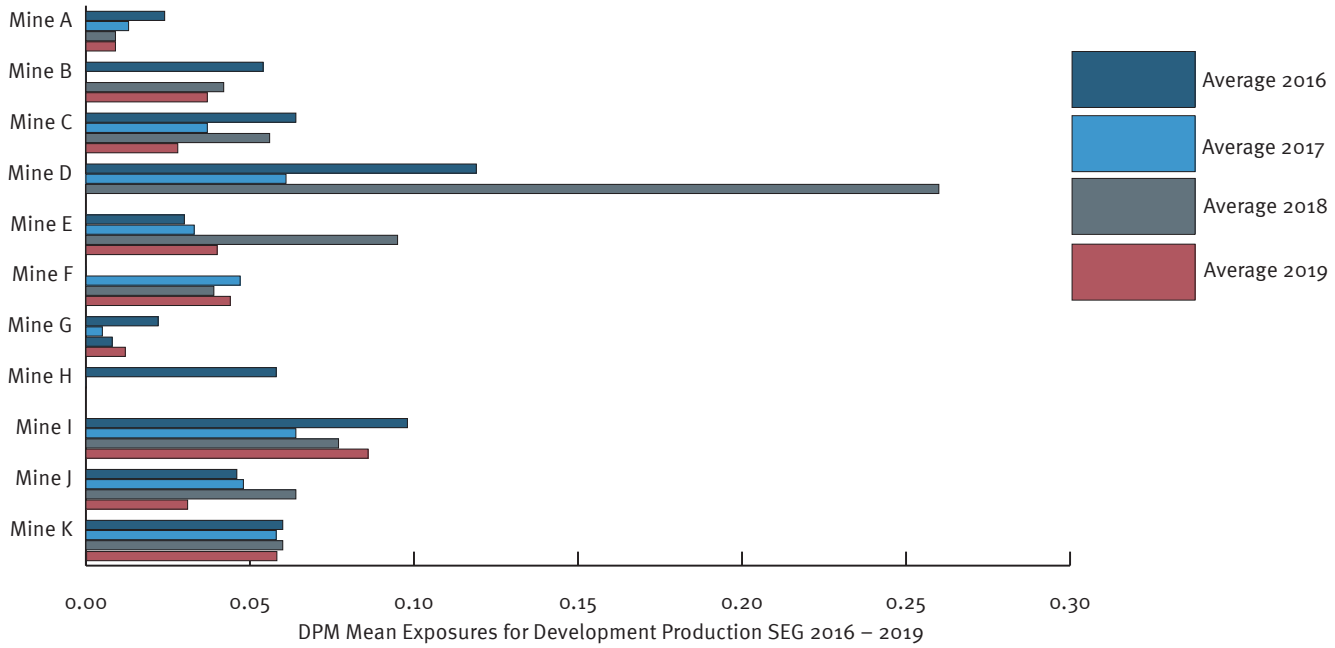


Figure 1-41 Mean Exposures for Development Production SEG 2016 - 2019

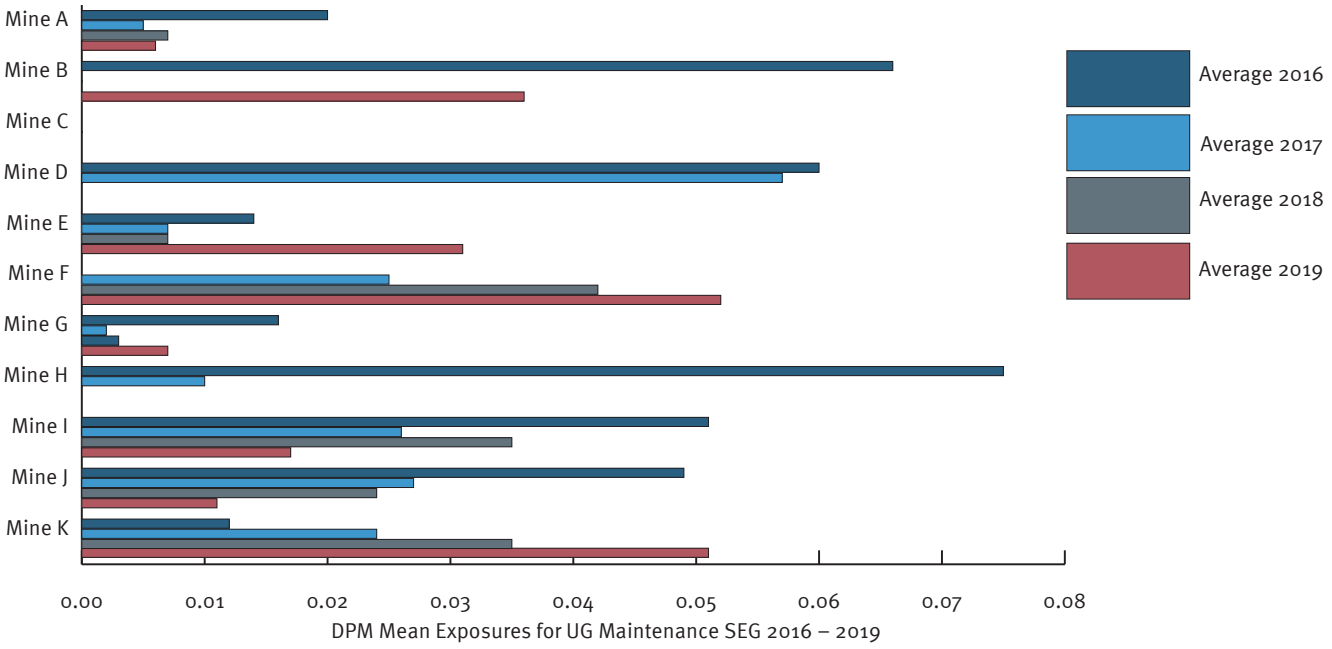


Figure 1-42 Mean Exposures for Underground Maintenance SEG 2016 - 2019

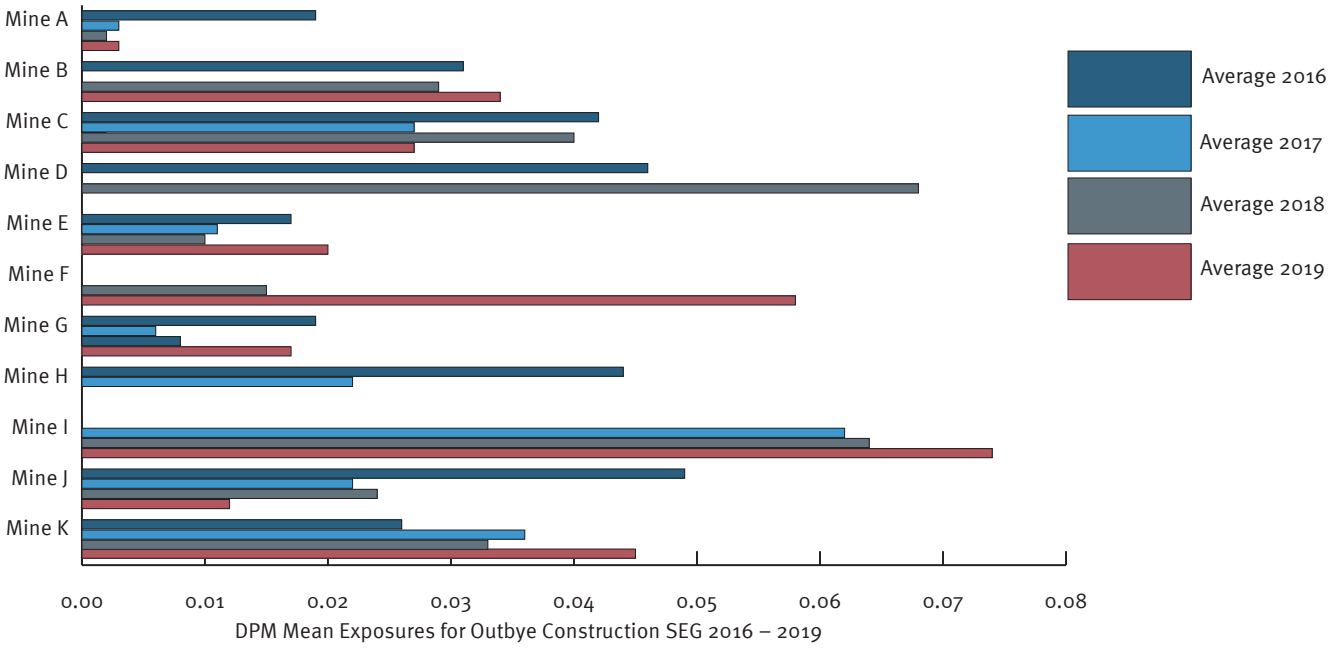


Figure 1-43 Mean Exposures for Outbye Construction SEG 2016 -2019

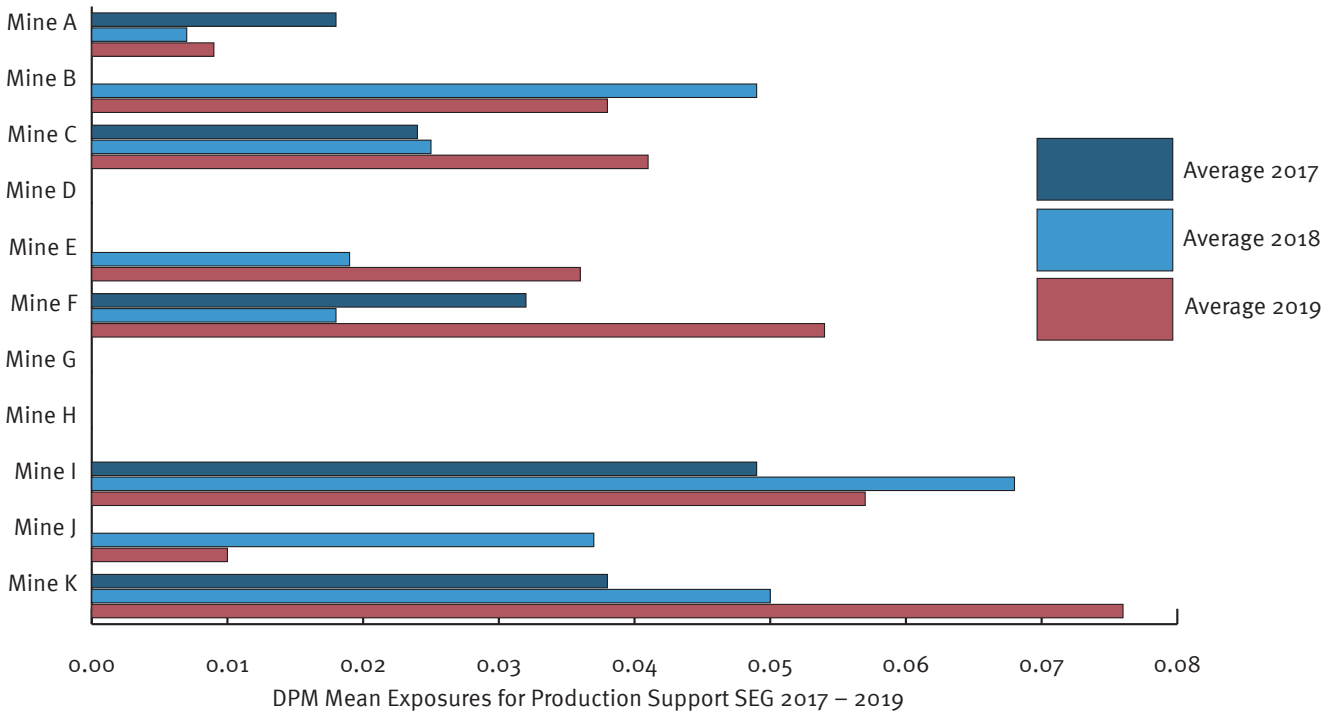


Figure 1-44 Mean Exposures for Production Support SEG 2017 - 2019

Single Exceedance Data

There were 56 exceedances measured across all SEGs in 2019, resulting in a total exceedance rate of 5 per cent. This is a slight increase from 2018 and 2017 as shown in Figure 1-45.

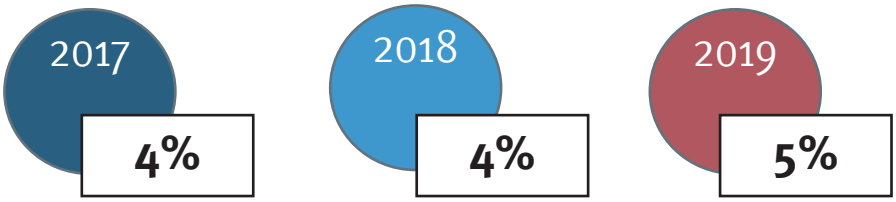


Figure 1-45 Single Exceedance Rate – DPM – All SEGs

The single exceedance rate in 2019 for the Longwall Move SEG almost tripled from the previous year. These single exceedances were measured across three different underground coal mines and accounted for almost one third of the total of exceedances submitted.

All other SEGs measured fewer than ten exceedances (with exceedance rates between 1-7 per cent) for the calendar year across the nine mine sites that reported data.

The exceedance rates for Development Production, Underground Maintenance, and Production Support/Bullgang have remained broadly consistent since 2017.

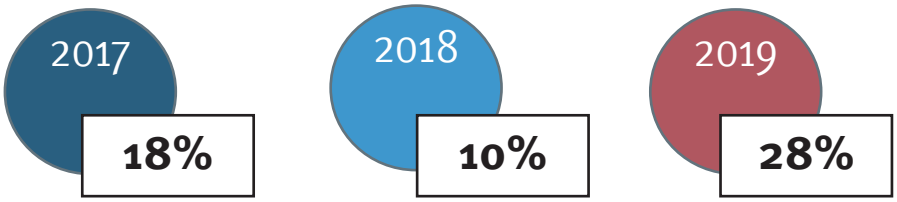


Figure 1-46 Single Exceedance Rate – DPM – Longwall Move SEG

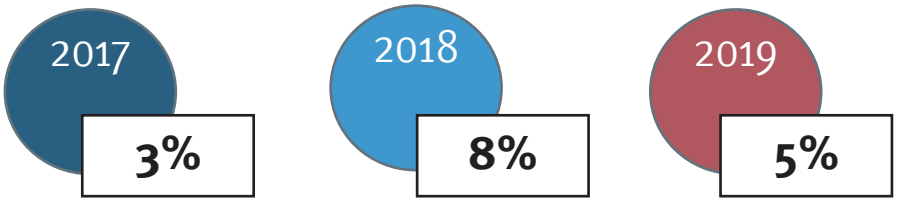


Figure 1-47 Single Exceedance Rate – DPM – Development Production SEG

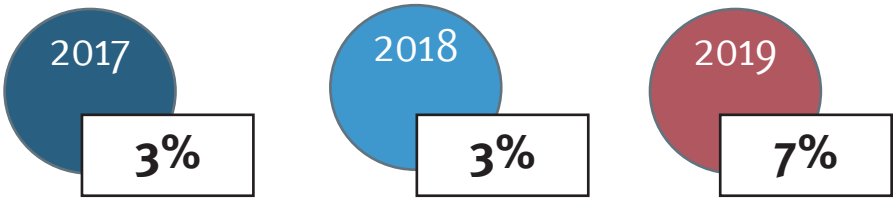


Figure 1-48 Single Exceedance Rate – DPM – Outbye Construction / Infrastructure SEG

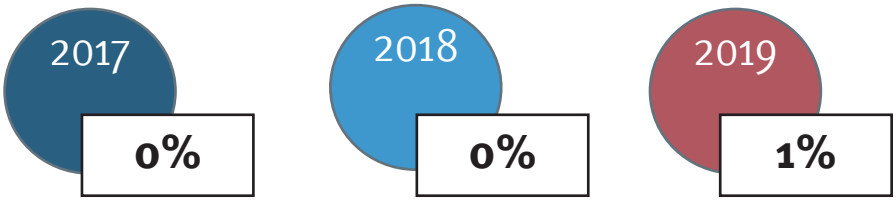


Figure 1-49 Single Exceedance Rate – DPM – Underground Maintenance SEG

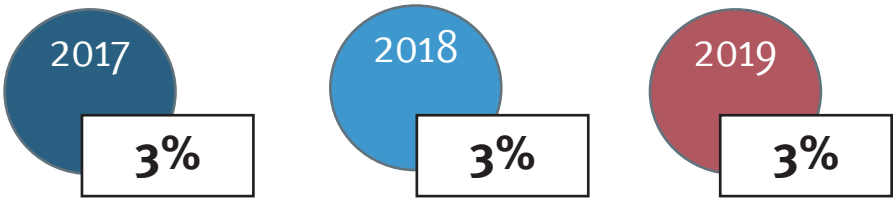


Figure 1-50 Single Exceedance Rate – DPM – Production Support / Bullgang SEG

When comparing personal diesel data across all reported sites, the monitoring rates varied considerably. There has also been an overall decrease in the total number of valid samples collected in the past three years as shown in Figure 1- 51. Monitoring alone does not reduce exposures, thus more monitoring is not necessarily an indication of better standards of control. Monitoring does, however, provide important information about exposure risk and risk control effectiveness. Sites must act on this data and control the hazard. A learning from industry management of the respirable dust hazard is that while sites were monitoring for exposure, they were not consistently controlling the hazard.

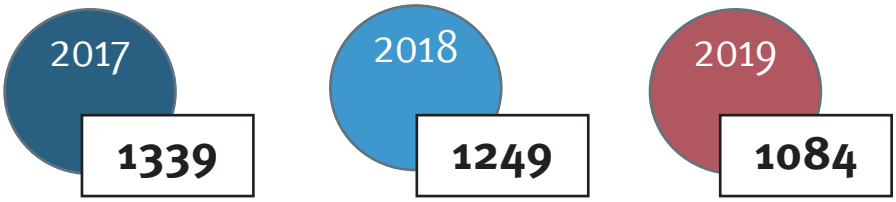


Figure 1-51 Total Valid Samples Collected by Year

Underground sites have been informed that site monitoring programs must be representative of the risk profile defined when the baseline exposure assessment was undertaken. This also includes ensuring that if there have been significant changes to the diesel fleet, mining process, mining environment, maintenance regimes, fuel source or personnel, the baseline is reviewed.

DPM exposure data will continue to be requested on an annual basis, due within the first two months of the following year (i.e. 2020 will be requested from sites in early 2021). The Queensland Coal Mine Inspectorate will collect and analyse the data to identify exposure trends and assess the effectiveness of industry controls.

The inspectorate will continue to share information with industry in reports and forums.

INORGANIC LEAD – AIRBORNE AND BLOOD LEAD

The increased knowledge about the toxicity of lead has brought about the SWA reduction in mandatory removal levels for blood lead. Agreement to these reduced levels occurred in May 2018 with a two-year implementation period. Lead risk work is any work that will likely cause blood lead levels of a worker to exceed 20 µg/dL (0.97 µmol/L), or 5 µg/dL (0.24 µmol/L) for females of reproductive capacity. This is a reduction from previous blood lead levels of 30 µg/dL (1.45 µmol/L) and 10 µg/dL (0.48 µmol/L) for females of reproductive capacity. Due to required legislation changes to the Mining and Quarrying Safety and Health Regulation it is anticipated implementation of the reduced levels will commence in quarter 4, 2020-21.

Exposure to lead can affect human health. In adults, high levels of exposure can cause joint and muscle pain, muscle cramps, anaemia, nausea, constipation, abdominal pain, sleep problems, reduced concentration and headaches. At very high levels, lead may cause neuropathy, encephalopathy, and convulsions. Prolonged high-level exposure to lead can be associated with chronic renal damage many years later.

Exposure to lead while pregnant can result in elevated blood lead levels affecting the unborn baby. Complications from high levels of exposure include premature birth, low birth weight, miscarriage and stillbirth. The baby may also suffer impaired learning and cognitive development. As a result of these potential complications, the blood lead removal levels for women of reproductive age is lower than that for males and all other women.

QMI has an agreed Memorandum of Understanding (MOU) with Queensland Health to provide de-identified blood lead information for mine workers in high lead-risk roles. As at the end of the reporting period, the inspectorate had received 12,815 blood lead results corresponding to 4,081 mineworkers (212 females and 3,868 males). The reports did not identify the reproductive status of females; for the purposes of analysis, females more than 50 years old were classified to be not of reproductive capacity.

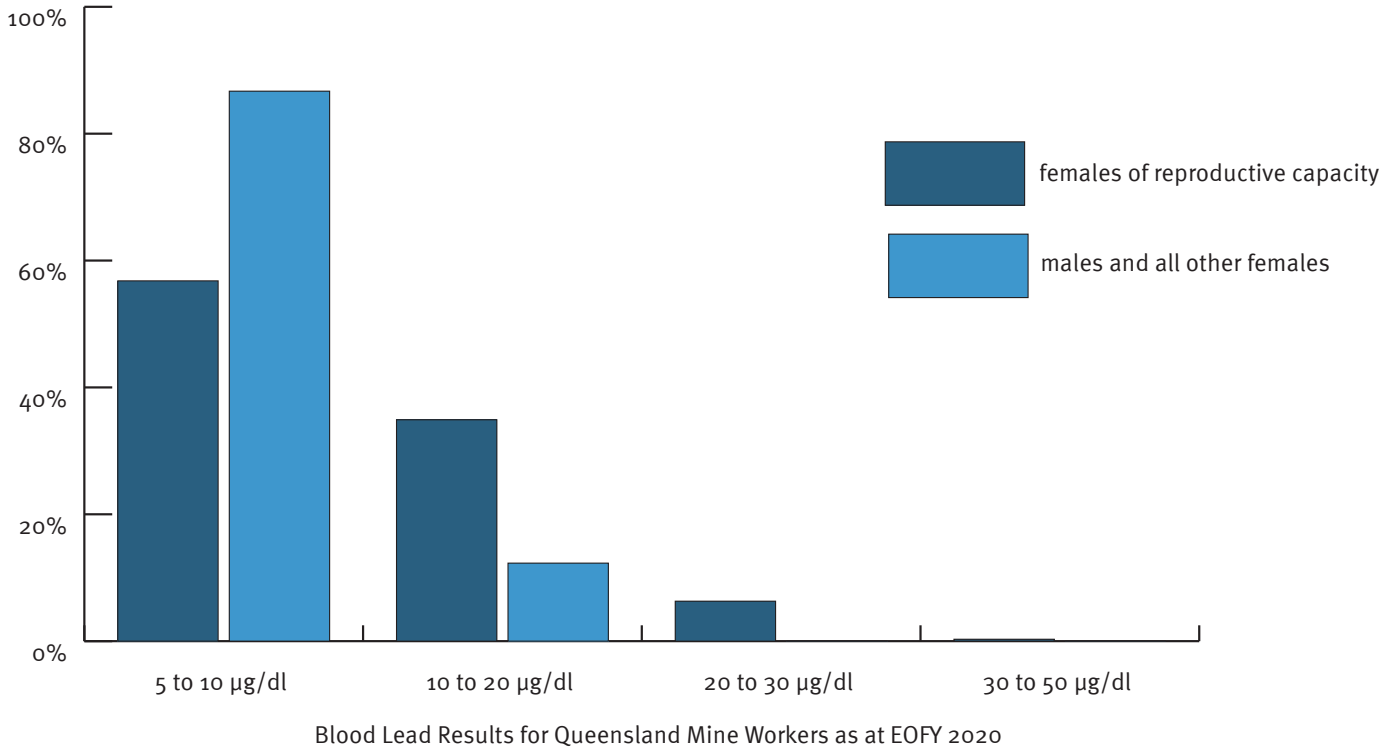


Figure 1-52 BLL for Queensland Mine Workers as at EOFY 2020

The results show high level of compliance with 98th percentile results with the current levels:

- females of reproductive capacity 12.05 µg/dl
- males and all other females 24.1 µg/dl

Mines will need to further implement effective controls to ensure management of workers blood lead removal levels comply with the reduced levels.

CHAPTER THREE
OVERVIEW OF COMPLIANCE ACTIVITY

IMPACT OF COMPLIANCE ACTIVITY

The Queensland Mines Inspectorate continuously reviews and refines its compliance program based on analysis of industry data and emerging risk. In addition to regular compliance activities, the inspectorate focuses on issues identified through the analysis of industry safety and health performance data.

The objective of the inspectorate's compliance approach is to protect the safety and health of resource industry workers and the Queensland community at large, by ensuring that:

- the risk of injury or illness resulting from regulated activities is at an acceptable level
- obligation-holders receive the support, guidance, and information necessary to discharge their safety and health obligations
- industry, workers and the broader community have confidence in Queensland's resources safety and health framework.

As a risk-based regulator, the inspectorate directs its resources to the areas of greatest risk and to the activities that will achieve the best safety and health outcomes.

The various compliance and enforcement tools employed by the inspectorate have characteristics that are **educational** (engagement activities, safety alerts and bulletins, substandard condition or practice advice, inspection and audit activities); **corrective** (directives, inspections, audits, substandard condition or practice advice); **deterrent** (prosecutions, directives, investigations, random inspections and audits); and in some cases, **punitive** (prosecutions).

The inspectorate will consider all relevant circumstances before determining which action or mix of actions is most appropriate in any given case. The inspectorate seeks to support industry participants to uphold their obligations, recognising that most of the time, most people try to do the right thing.

As such, in the majority of cases, an educational or corrective approach is taken. However, in a small minority of cases, obligation holders demonstrate behaviours that require a deterrent or punitive response. This is reflected in the compliance and enforcement activities undertaken in 2019-20.

In 2019-20, the inspectorate conducted 1419 mine inspections, 103 audits and 121 investigations. The inspectorate also issued 997 SCPs, 368 directives, 11 safety alerts, 8 safety newsflashes and 3 safety bulletins.

While the inspectorate sets annual targets for inspections and audits, it must remain flexible to changes in industry performance. This may necessitate a change in the mix of regulatory activity during the year. For example, the inspectorate must prioritise the investigation of fatal incidents, serious accidents, complaints and significant events over routine inspections and other activities.

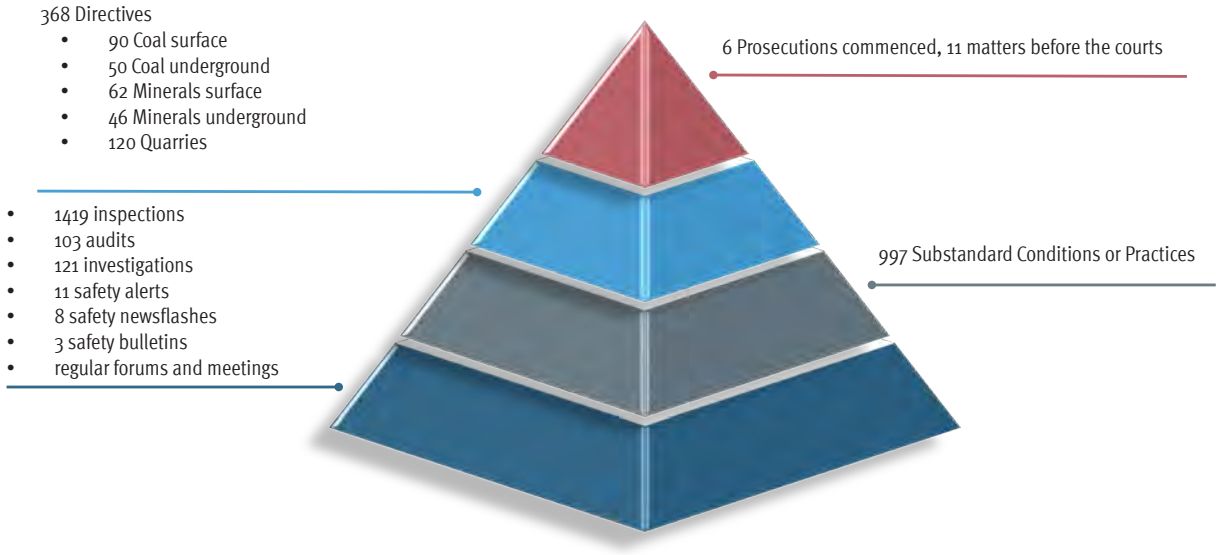


Figure 1-53 Compliance activity

EDUCATION AND AWARENESS

The 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.

During the 2019-20 year, face to face engagement opportunities have been restricted due to the COVID-19 pandemic. This has encouraged engagement to be conducted through other media, such as video conferencing.

The inspectorate also provides industry with general advice and issued safety alerts and bulletins. In 2019-20, eleven safety alerts, eight safety newsflashes and three safety bulletins were issued to industry. A list of the safety alerts and bulletins is summarised in Appendices 4 and 5. The inspectorate also produced a monthly periodical with lessons learnt from HPIs occurring each month.

Mineral mines and quarries inspectors presented at the following forums:

- Civil Construction Federation – Safety Reset applied to the mining industry
- Western Australasian Mining Electrical Safety Association inaugural conference – Guest Speaker
- Queensland Fire and Emergency Services – Guest Speaker
- South West Regional Road Transport Group – Application of MQSHA to council borrow pits
- Outback Regional Road Transport Group – Application of MQSHA to council borrow pits
- Queensland Boulder Opal Association
- Person to Control Electrical Work Forum – Facilitated and presented
- Sapphire Miners Association – Presented opal & Gem handbook
- Australia Institute of Occupational Hygienist – Breath Easy seminar
- Central Highlands Quarry Seminar – Facilitated and presented
- Rockhampton Quarry Seminar – Facilitated and presented

Mineral mines and quarries inspectors attended following forums:

- Australasian Drilling Institute Graduation Day
- Opening of the Lynne Mine
- Concrete Cement and Aggregates Association OHS Sub Committee meetings
- Glencore Mt Isa Mines North West geotechnical meeting
- Mt Isa District Disaster Management Group
- Regional Managers Coordination Network
- Queensland Boulder Opal Association
- Queensland Mining Electrical Safety Association - Chairperson
- Lead Alliance
- Dr Sean Brady Webinar

Mineral mines and quarries inspectors assisted of regulators:

- Worksafe Northern Territory – Bootu Creek fatality
- Department Agriculture and Fisheries – Extraction permit review
- Papua New Guinea – Overview of systems of work
- Western Australia Department of Mines, Industry Regulation and Safety – Electrical Safety through industry forums

Coal mines inspectors presented at the following conferences and forums:

- CFMEU Global Cut the Dust forum
- a number of open cut examiners forums commenced in central Queensland prior to being disrupted due to COVID19
- mine electrical manager forum held to review shuttle car electrocution risk
- two mechanical engineers forums covering open cut and underground mine mechanical engineering were held. The forums were held Moranbah on the 5th and 6th of November 2019. Additional updates were presented at SSE, UMM, MMAA and VO forums.
- presentation of various papers to the Queensland occupational health and safety conference at the Gold Coast
- the Queensland coal industry occupational hygiene and health forum held at the Blackwater coal centre and hosted by Curragh mine on 19 November 2019
- a number of events, including the ERZ controllers forum and mechanical engineering forums scheduled for 2020 were postponed due to COVID19.

Coal mines inspectors attended a range of events as participants, including mining, hygiene, electrical and mechanical industry and regulatory forums and conferences.

COMPLAINTS ABOUT MINE SAFETY AND HEALTH

Queensland's mining safety and health legislation provides that people may make confidential complaints to the inspectorate about safety and health matters.

In 2019-20, a total of 188 complaints were made, which is a notable increase from 104 in 2018–19.

The inspectorate takes the investigation of complaints seriously and investigates all complaints and reports on the outcomes to the complainant.

In the 2019-20 reporting year, directives were issued in relation to 43 complaints while substandard condition or practice notices were issued in relation to 14. In addition, recommended actions were made in relation to 33 complaints. In approximately one third of complaints, advice and education was provided in the first instance. A combination of actions may have been taken, including the issuing of multiple SCPs, directives, or RAs in relation to a single complaint.

At all stages of the investigation, the identity of the complainant is kept confidential. The potential for reprisal is a matter of interest to the inspectorate, with records suggesting this is an area of increasing concern for workers.

At 30 June 2020, 29 complaints remained open.

The number of complaints associated with coal mines in 2019-20 was almost double the number received in 2018-19. This increase could be an effect of the Safety Resets which aimed to impact safety culture to ensure complaints could be freely raised. Ninety-five complaints were made about coal mines in 2019-20. Mineworker safety and health are the primary subjects of concern, accounting for 75 per cent of all complaints (53 per cent relate to safety, 22 per cent relate to health). In common with recent years, most complaints were made by mine workers (82 per cent) with 18 per cent of complaints made by the public.

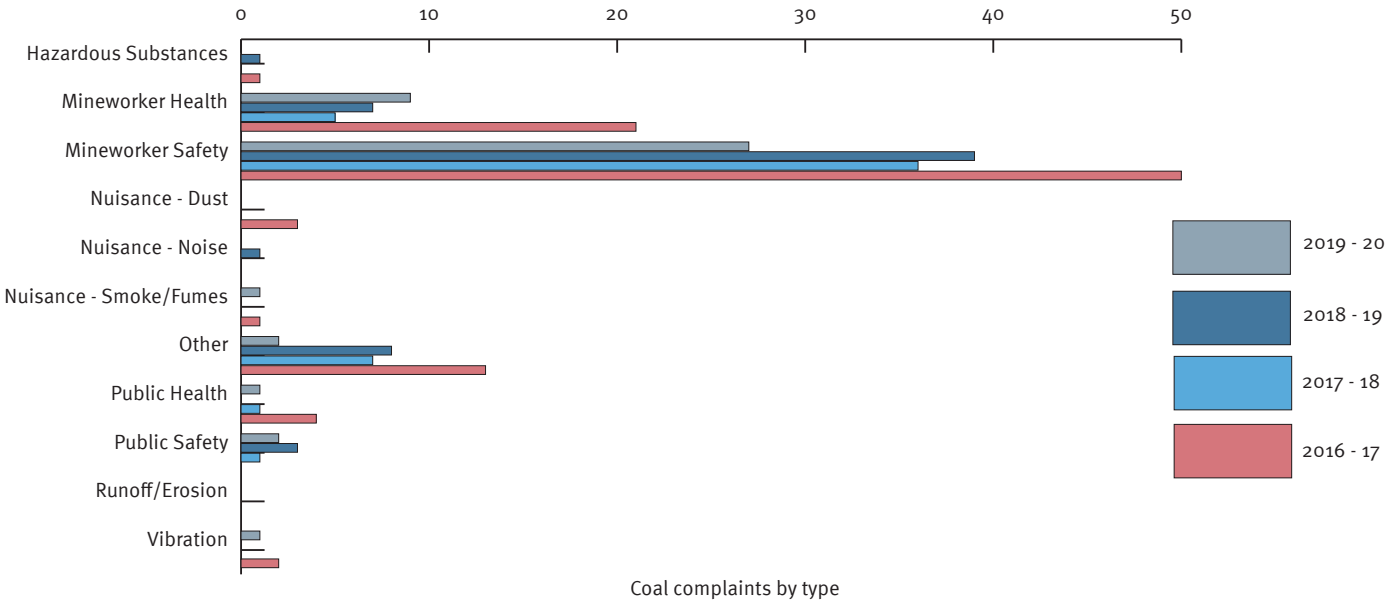


Figure 1-54 Coal complaints by Type

38 complaints were received about mineral mines over the reporting year. As with coal mines, mineworker safety and health are the primary subjects of concern, accounting for 86 per cent of all complaints (77 per cent relate to safety, 11 per cent relate to health). 63 per cent of complaints were made by mine workers, and 37 per cent by members of the public.

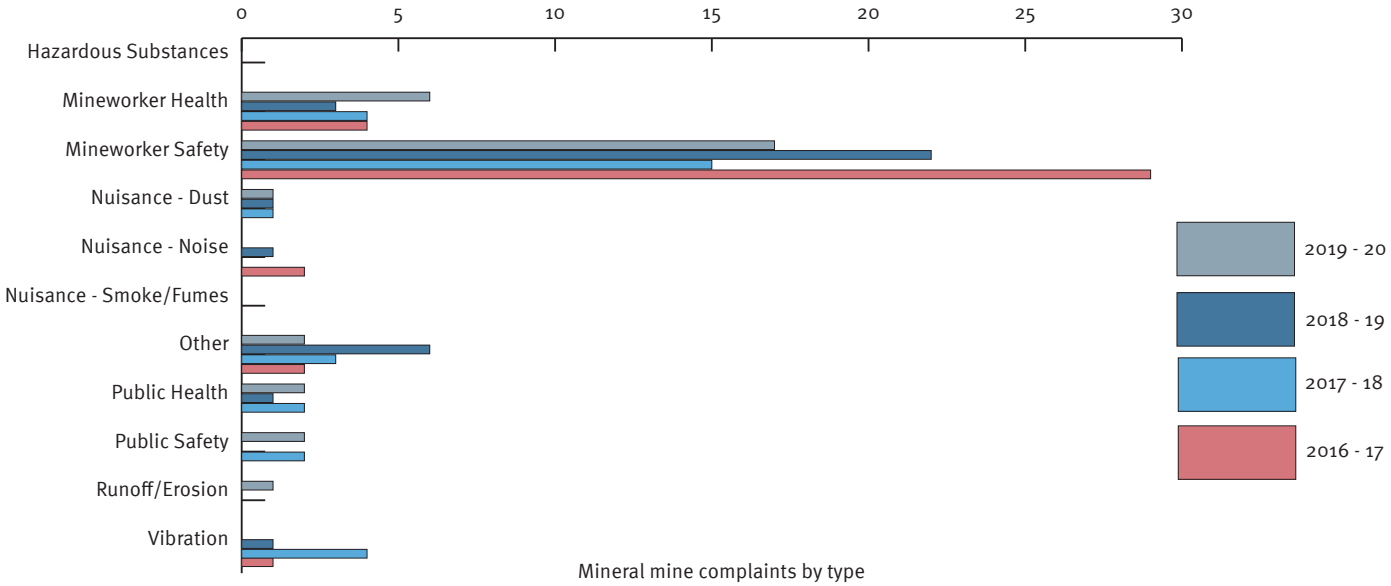


Figure 1-55 Mineral Mine Complaints by Type

46 complaints were received about quarries in the 2019-20 reporting period. Unlike the mining sector, the majority of complaints received (83 per cent) came from members of the public, generally noting public health and nuisance factors. 17 per cent of complaints came from workers.

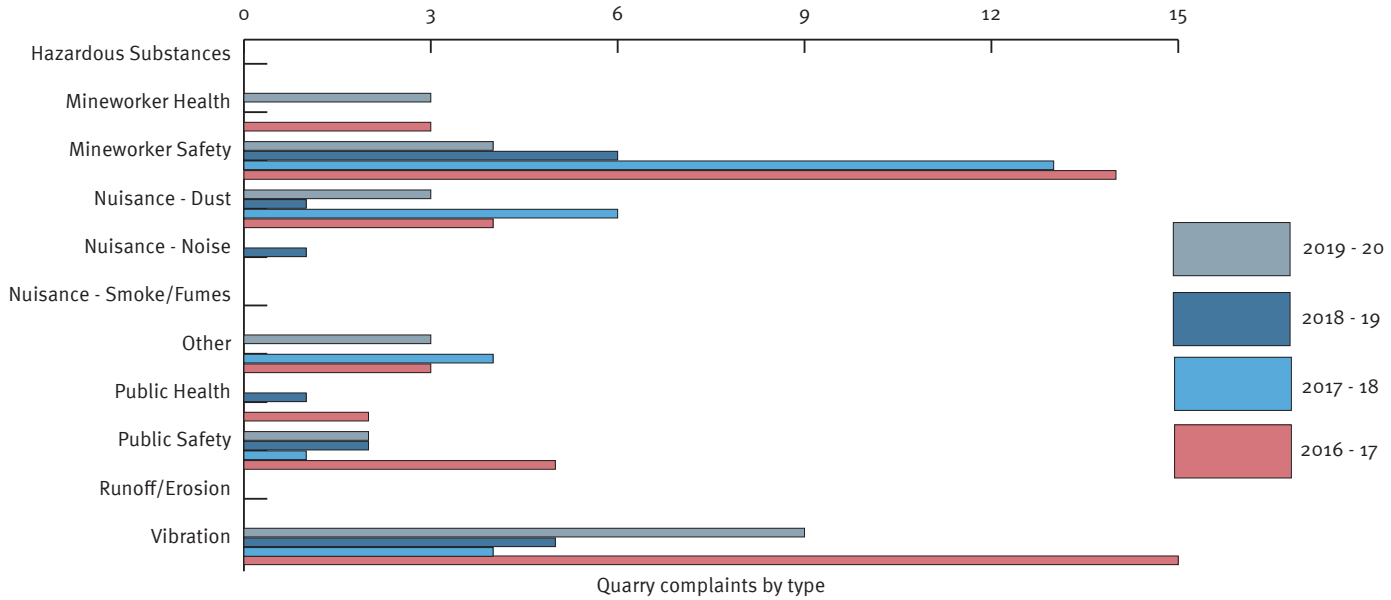


Figure 1-56 Quarry Complaints by Type

PROSECUTIONS

The regulator pursues prosecution when it is in the public interest to do so and there is sufficient evidence to secure a conviction. This may include cases of the most egregious conduct.

From 1 July 2020, the Work Health and Safety Prosecutor, established under the Work Health and Safety Act 2011, is the decision-maker about whether to prosecute serious offences under the resources safety acts.

In 2019-20 there were 11 prosecutions (or appeals resulting from prosecutions) before the courts, involving 27 defendants.

Six prosecutions against 14 defendants were commenced in the reporting year and remained on-going.

Two prosecutions against three defendants that commenced in 2018-19 remained on-going during the reporting period.

During the reporting period several appeals were finalised:

- appeals that had been commenced in 2018-19 were finalised with convictions upheld against two defendants
- appeals that had been commenced 2018-19 were upheld with 4 defendants acquitted
- prosecutions against 4 defendants were struck out following appeals that had been commenced 2019-20

At the end of the reporting period appeals relating to the acquittal of four defendants remain on-going and seven prosecutions against 17 defendants remain on-going.

Of the on-going prosecutions five of the prosecutions (involving 15 defendants) relate to fatalities in coal mines and quarries and two prosecutions (involving two defendants) relate to serious injuries in coal mines.

APPENDIX 1: Comparison of key performance indicators 2018-19 and 2019-20 by sector

The information in this report is sourced primarily from data returns submitted by mine and quarry operators. Data is collected in accordance with sections 198 and 279 of the *Coal Mining Safety and Health Act 1999* and section 195 and 259 of the *Mining and Quarrying Safety and Health Act 1999*.

The data collection is approved by the Chief Inspector of Mines under section 281 and 261 of the legislation. Due to publication deadlines, information received on or before 31 August 2020 for the 2019-20 financial year is included in the report.

Disabling injuries

	2018 - 2019	2019 - 2020	
Coal Surface	190	172	▼
Coal Underground	88	58	▼
Mineral Surface	80	40	▼
Mineral Underground	106	97	▼
Quarries	2	4	▲

Serious accidents

	2018 - 2019	2019 - 2020	
Coal Surface	59	35	▼
Coal Underground	31	29	▼
Mineral Surface	3	6	▲
Mineral Underground	9	7	▼
Quarries	8	7	▼

Permanent incapacities

	2018 - 2019	2019 - 2020	
Coal Surface	34	33	▼
Coal Underground	2	14	▲
Mineral Surface	0	1	▲
Mineral Underground	2	2	—
Quarries	0	2	▲

Fatalities

	2018 - 2019	2019 - 2020	
Coal Surface	2	2	■
Coal Underground	1	1	■
Mineral Surface	0	0	■
Mineral Underground	0	0	■
Quarries	2	0	▼

Comparison of key performance indicators 2018-19 and 2019-20 by sector cont.

High potential incidents (HPI)

	2018 - 2019	2019 - 2020	
Coal Surface	1305	1395	▲
Coal Underground	415	482	▲
Mineral Surface	180	175	▼
Mineral Underground	132	171	▲
Quarries	78	65	▼

Disabling Injury days*

	2018 - 2019	2019 - 2020	
Coal Surface	1305	1395	▲
Coal Underground	415	482	▲
Mineral Surface	180	175	▼
Mineral Underground	132	171	▲
Quarries	78	65	▼

** Number of disabling injury days include days on alternative duties*

Serious accident frequency rate

	2018 - 2019	2019 - 2020	
Coal Surface	0.9	0.5	▼
Coal Underground	2.3	2.0	▼
Mineral Surface	0.2	0.4	▲
Mineral Underground	0.7	0.6	▼
Quarries	2.8	2.4	▼

Permanent Incapacity frequency rate

	2018 - 2019	2019 - 2020	
Coal Surface	0.53	0.50	▼
Coal Underground	0.15	0.98	▲
Mineral Surface	0.00	0.06	▲
Mineral Underground	0.17	0.17	■
Quarries	0.00	0.69	▲

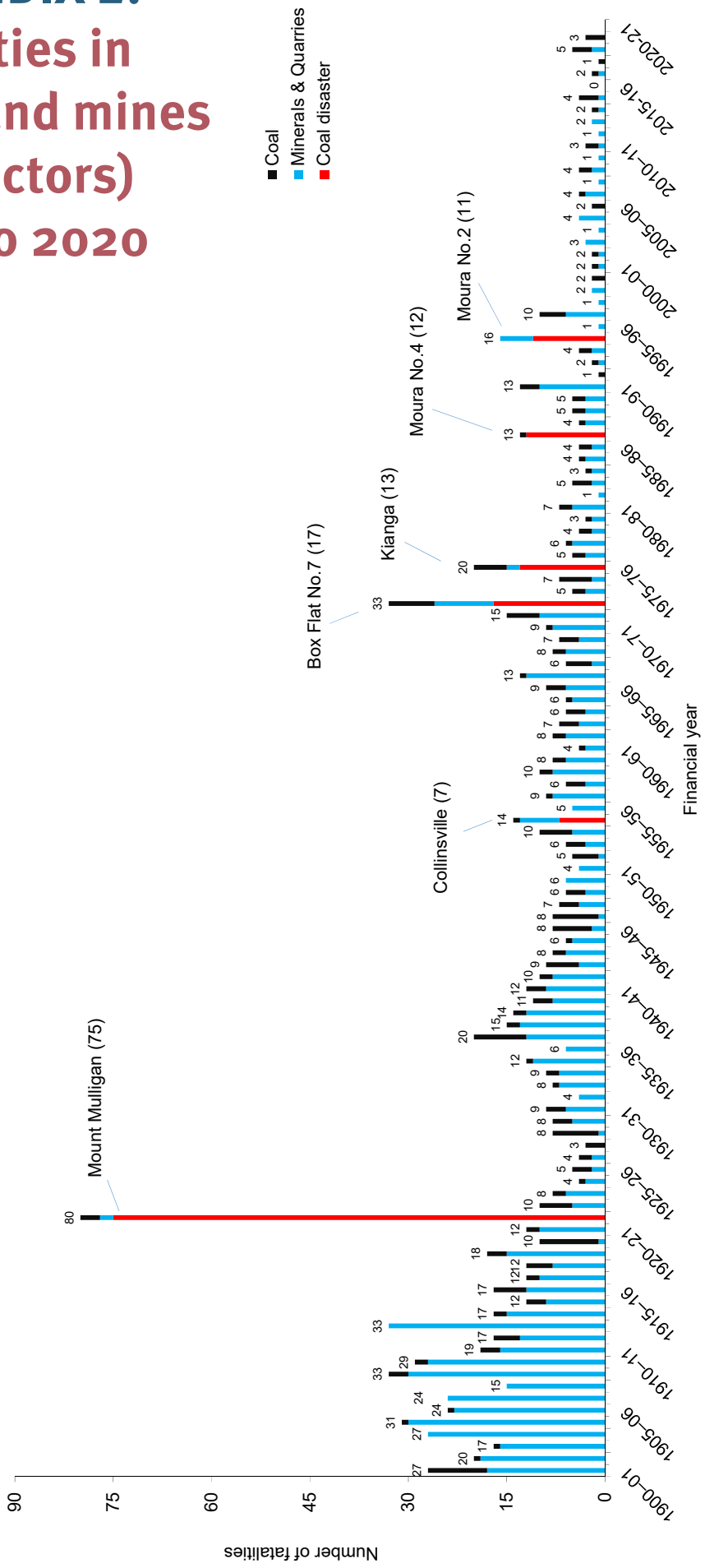
HPI frequency rate

	2018 - 2019	2019 - 2020	
Coal Surface	21	21	■
Coal Underground	30	34	▲
Mineral Surface	10	10	■
Mineral Underground	11	14	▲
Quarries	27	22	▼

Million hours worked

	2018 - 2019	2019 - 2020	
Coal Surface	63.6	66.6	▲
Coal Underground	13.7	14.4	▲
Mineral Surface	17.2	16.7	▼
Mineral Underground	12.1	12.0	▼
Quarries	2.9	2.9	■

APPENDIX 2: Fatalities in Queensland mines (all sectors) 1900 to 2020



APPENDIX 3: Comparison of key regulation indicators 2018-19 and 2019-20 by sector

Number of unannounced inspections*

	2018 - 2019	2019 - 2020	
Coal Surface	58	44	▼
Coal Underground	13	14	▲
Mineral Surface	68	55	▼
Mineral Underground	14	13	▼
Quarries	89	108	▲

Number of announced inspections

	2018 - 2019	2019 - 2020	
Coal Surface	208	277	▲
Coal Underground	86	110	▲
Mineral Surface	268	279	▲
Mineral Underground	156	129	▼
Quarries	367	390	▲

Number of Audits

	2018 - 2019	2019 - 2020	
Coal Surface	42	82	▲
Coal Underground	18	14	▼
Mineral Surface	3	1	▼
Mineral Underground	4	4	—
Quarries	0	2	▲

Number of Investigations

	2018 - 2019	2019 - 2020	
Coal Surface	60	41	▼
Coal Underground	14	16	▲
Mineral Surface	20	12	▼
Mineral Underground	13	22	▲
Quarries	16	30	▲

Number of substandard conditions or practices (SCP)

	2018 - 2019	2019 - 2020	
Coal Surface	223	266	▲
Coal Underground	80	71	▼
Mineral Surface	300	223	▼
Mineral Underground	169	89	▼
Quarries	367	348	▼

*The inspectorate aims to perform 10-20% of inspections unannounced. This target was met for all areas other than underground mineral mines as inspectorate effort prioritised other sectors based on industry performance.

Comparison of key regulation indicators 2018-19 and 2019-20 by sector cont.

Number of directives

	2018 - 2019	2019 - 2020	
Coal Surface	101	90	▼
Coal Underground	43	50	▲
Mineral Surface	86	62	▼
Mineral Underground	40	46	▲
Quarries	165	120	▼

Number of accountability meetings (SSE level)

	2018 - 2019	2019 - 2020	
Coal Surface	0	0	—
Coal Underground	3*	0	▼
Mineral Surface	1*	0	▼
Mineral Underground	0	0	—
Quarries	0	0	—

* - Total includes 1 accountability meeting involving senior mine staff other than the SSE

Number of accountability meetings (SSE/operator level)

	2018 - 2019	2019 - 2020	
Coal Surface	0	0	—
Coal Underground	0	0	—
Mineral Surface	3	1	▼
Mineral Underground	1	0	▼
Quarries	1	2	▲

Number of complaints

	2018 - 2019*	2019 - 2020**	
Coal Surface	41	76	▲
Coal Underground	11	19	▲
Mineral Surface	18	18	—
Mineral Underground	5	20	▲
Quarries	27	46	▲

* - Total includes 2 complaints with no mine identified.
** - Total includes 9 complaints with no mine identified.

APPENDIX 4: Safety Alerts issued in 2019-20

Safety AlertNo.	Title	Description
Mine Safety Alert 364	Fatal incident when excavator engulfed after pit wall failure	On 26 June 2019 a 55 year old Coal Mine Worker was fatally injured while he was operating an excavator at an open cut coal mine in Queensland's Bowen Basin. The coal mine worker was operating an excavator when an adjacent pit wall approximately 40 metres high suddenly failed. This resulted in fallen material engulfing the excavator and partially crushing the excavator's cabin.
Mine Safety Alert 365	Serious injury to worker involving a mobile screening plant	Serious injury to worker involving a mobile screening plant. ... This incident is still under investigation. Work performed on the mobile screening plant has allowed the incline conveyor to move down trapping the worker between the rear of the conveyor
Mine Safety Alert 366	Retractable Access Ladders	An operator was fatally injured when he became entangled between the movable part of an excavator's access ladder and the wall of the engine room.
Mine Safety Alert 367	Worker receives flash burns while repairing fuel tank on loader	A mine worker recently received burns to their neck and arm, following a flash fire, while preparing to fix a fuel tank on a loader. The loader was fitted with dual diesel fuel tanks on each side of the rear, which were both integrated into the sub-frame.
Mine Safety Alert 368	Inrush from Ventilation Shaft	An inrush occurred when developing a roadway connecting a ventilation shaft to the underground workings. When the roadway broke through into the shaft, a quantity of mud and water still contained in the shaft flowed into the roadway.
Mine Safety Alert 369	Fire on explosive charge vehicle while at a charged face	An explosives charge vehicle containing explosives, caught fire while at a charged face. When trying to move a charge unit from a heading after charging the face, the charge crew found the machine unserviceable. An injector unit pump was found protruding about 1cm from the engine block of the vehicle as a result of broken clamp down bolts.
Mine Safety Alert 370	Coal Mine Worker struck by Load Haul Dump	A Coal Mine Worker was seriously injured when he was struck by an Eimco Load Haul Dump bucket. As the Eimco articulated it momentarily pinned him between the side of the bucket and the rib. This resulted in crush injuries due to the impact from the Eimco bucket.
Mine Safety Alert 371	Track Press Cylinder Failure	A serious accident occurred whilst Coal Mine Workers were undertaking track repairs on a Hitachi EX1900 excavator at a mine site. The workers were preparing to use a 360 tonne track press. Whilst aligning the track press in preparation to press out a track pin, the pressurised cylinder head plate failed catastrophically. The failed component struck a worker causing serious arm injuries. He was airlifted to a Brisbane hospital, and has required multiple operations and ongoing rehabilitation.

SAFETY ALERTS ISSUED IN 2019–20 cont.

Safety AlertNo.	Title	Description
Mine Safety Alert 372	Miner struck by rock fall at an open stope draw-point while preparing for secondary firing	Two people were injured by a rock fall while placing explosives at the brow in preparation for bombing of the drawpoint. Approximately 50 kg of rocks fell from the backs around five metres from the brow. The ground had been damaged during previous draw point bombing. The mesh was badly damaged and rocks were bagging in it. One person received abrasions and the other a fractured thumb, however the rock fall had the potential to cause more serious injuries.
Mine Safety Alert 373	Fake disposable respiratory protective equipment (RPE) supplied to Queensland Coal Mines	Due to the current COVID-19 pandemic, the demand for disposable P2 respiratory protective equipment (RPE) has put extreme pressure on the available supply of these devices for use at coal mines, mineral mines, quarries and in other industries. As a result of these supply shortages, many sites have had to source alternative RPE, in some cases relying on international quality certification schemes other than Australian Standard (AS/NZS 1716:2012). Many of these standards/schemes are similar to AS/NZS 1716 and can provide an acceptable alternative until supplies of AS/NZS 1716 RPE becomes available. This should be done in accordance with the site's change management process.
Mine Safety Alert 374	Uncontrolled Release of Energy - Polyethylene Pipe	There has been a recent increase in reported incidents of Coal Mine Workers being struck by polyethylene pipe as a result of stored energy being released suddenly and uncontrolled. These incidents have resulted in five individual Coal Mine Workers receiving a fractured lower leg in separate incidents since 31 October 2018.

APPENDIX 5: Safety Bulletins issued in 2019-20

Safety Bulletin No.	Title	Description
Safety Bulletin 183	Use of compressed air for cleaning	Legislative changes introduced in 2017 require all mines to develop and implement a dust monitoring program in accordance with Recognised Standard 14. In addition, sites are required to report any dust exposures that exceed levels specified in s89 of the Coal Mining Safety and Health Regulation 2017. In 2017, approximately 50 per cent of respirable dust and respirable crystalline silica exceedances that occurred in surface coal mines, related directly to the use of compressed air for cleaning down enclosures and equipment during maintenance activities.
Safety Bulletin 184	Storm Season 2019	The Bureau of Meteorology tropical cyclone forecasts have concluded for the season, outlooks will resume on 1 November 2019. Recent severe weather events worldwide have again highlighted the destructive potential and call for a high level of preparedness.
Safety Bulletin 185	Serious accidents involving retractable hydraulic access ladders on mobile mining equipment	A serious accident involving the death of a Coal Mine Worker in 2019 has been investigated and the findings will be made available to industry. The findings from this incident and two other related incidents in other states have resulted in serious accidents. The findings from the last three incidents suggests that similar circumstances may exist across the industry requiring operators to audit their equipment and operating practices and ensure the lessons learnt are not forgotten. This bulletin addresses safety issues involved with three incidents and one potential incident.

APPENDIX 6: News Flashes issued in 2019-20

Date	Title	Description
08-Jul-19	Fatal accident as CMW found entangled in Excavator Access Ladder	On Sunday 7 July 2019, at approximately 2.00am, a 27 year old coal mine worker was found entangled in an excavator access ladder at Baralaba coal mine. The coal mine worker was recovered by emergency responders and was unable to be resuscitated.
03-Sep-19	Structural failure - Overburden Drill Mast	A steel plate 3.3m long x 0.50m wide x 3 mm, weighing approximately 50kg, was positioned on a drill mast to retain the hose travel guides. The plate has detached and fallen approximately 5m off the drill mast striking blast peg basket before landing on the drill bench below.
10-Oct-19	Track Press Cylinder failure	On Tuesday 5th October 2019 a CMW sustained serious injuries whilst using a track press to remove a link pin from a track chain on a 180t excavator. The CMW sustained significant injuries to the arm and wrist area. High pressure hydraulic oil also sprayed into the CMW's face causing abrasive cuts and bruising.
18-Oct-19	Head on collision of Rear Dump Trucks	On Tuesday 15 October 2019 an empty Rear Dump Truck lost traction and control causing it to veer into the path of a loaded Rear Dump truck making heavy contact primarily on the POS 2 side.
18-Oct-19	Nose to tail collision of Rear Dump Trucks	On Tuesday 15 October 2019 while two Rear Dump Trucks were queueing to be loaded, the rear truck has rolled forward into the dovetail of the other parked truck. The impact has caused damage to the handrails and cabin of the truck making the contact. Neither operator was injured as a result of the collision.
24-Oct-19	Structural failure - Roof Bolter on Continuous Miner	Two employees were setting a Continuous Miner up for scheduled daily inspections. When attempting to align the Left Hand inner roof bolting rig, the retaining bolts on the roof bolter mount failed allowing the roof bolter to fall between the two CMW's. No injuries were sustained.
01-Nov-19	Heat Stress	A coal mine worker was hospitalised with suspected heat stress. He had been working in an Opencut coal mine and had been exposed to the sun for several hours. Temperatures on the day were in excess of 36 Celsius. Each year in Queensland there have been serious incidents of heat stress involving hospitalisation. Risk management should be used to manage heat exposure in the mining and exploration industry, and known individual and medical factors that can cause heat stress need to be included in the risk assessment.
01-Nov-19	Structural failure - Overburden Drill Mast Walkway	A steel plate, 200mm x 200mm, has fallen approximately 10 metres from a mesh walkway making contact with the rig stairs and then fallen a further 2 metres to the ground. The operator of the rig was inside the cabin at the time of the incident, there were no injuries sustained.
26-Nov-19	Fatal accident on a longwall face	A fall of coal from the longwall face has fatally injured a coal mine worker on Monday 25th November 2019. At the time he was conducting work activities on the face side of the longwall AFC. The causes of the fall of coal are unknown at this time.

NEWS FLASHES ISSUED IN 2019-20 cont.

Date	Title	Description
14-Jan-20	Tyre Fatality	On Sunday 12 January 2020 a 33yr old contract tyre fitter was fatally injured whilst changing a large wheel assembly (tyre and rim) on a rear axle expanding low loader at an open cut coal mine in Queensland's Bowen Basin. The tyre fitter was found trapped underneath a wheel assembly.
27-Feb-20	Compressed Air - Energy Release Uncontrolled	Three coal mine workers (CMWs) were carrying out housekeeping in a roadway at an underground mine. The task was removing redundant hoses and other equipment. Whilst recovering a 4" flexible hose, a CMW was standing on the base of a fines bin and tapped on the Victaulic clamp with a shifting spanner. At this time the clamp and the 4" flexible hose released and moved around uncontrollably. All three CMWs were contacted by the hose and one individual sustained a fractured left foot.
01-Apr-20	Access Entrapment	A High Potential Incident involving machine access occurred at a mine in the northern Bowen Basin on the 28th March 2020. A maintainer was completing post service checks whilst seated in a grader with the cabin door open. The grader was fitted with a dynamic rotating access ladder. On completion of testing, the maintainer has initiated a machine shutdown and the ladder has activated, swinging up. The maintainer was caught half out of the cabin when the ladder struck his foot pinning him to the walkway. In this incident, the maintainer was able to activate the emergency stop.
14-Apr-20	Frictional Ignition Events	An underground coal mine experienced two frictional ignition events on a longwall face. The events occurred approximately eight days apart, with both being extinguished successfully.
01-May-20	Fire Suppression System Failure	Upon manual activation of an fire suppression system during routine servicing at an open cut coal mine, the system failed to actuate as per design. Upon further investigation it was found that the dimensions of the "cylinder discharge valve shuttle assembly" were outside of tolerances causing it to not seat or actuate correctly. The Department have been made aware that this fault has been identified on several machines.
01-May-20	Truck Collision (Failure to Give Way at a T-intersection)	Two rear dump trucks collided at a haul road T-intersection in a mine. Both trucks were travelling at speed when the collision occurred. Significant damage was caused to the front of one truck and the left hand side of the other truck. The truck drivers were fortunate not to be physically injured. Right of way belonged to the loaded truck approaching the intersection on the left hand side of the other truck. The headboard of the loaded truck hit the tray of the empty truck about a metre or so behind the driver's cab. The unloaded truck failed to give right of way to the loaded truck and both trucks were travelling above the nominated speed limit when the collision occurred.
07-May-20	Serious Accident - Gas Ignition Event Underground	Five coal mine workers received serious burn injuries during a gas ignition event on a longwall face in an underground mine near Moranbah. The workers are receiving hospital treatment for their injuries. The cause of the ignition event is under investigation. The mine has been evacuated and secured to prevent persons entering the mine until gas monitoring analysis and re-entry risk assessment determines it is safe to do so.

NEWS FLASHES ISSUED IN 2019-20 cont.

Date	Title	Description
11-Jun-20	Explosion protected diesel engine exhaust conditioner corrosion	Internal inspections of a number of exhaust conditioner inlets have shown reduced integrity over time from corrosion and/or cracking of the internal gussets that support the exhaust inlet pipe. After the gussets crack, they no longer support the welded connection between the inlet pipe and the lid. The weld in this location, which separates the inlet exhaust gas from the outlet conditioned exhaust gas, can crack from lack of support.
12-Jun-20	Metal Shard Projectile from Excavator Track Sprocket	Following an undercarriage track change on an excavator, a metal shard was ejected from the track sprocket. The metal shard travelled 35 meters breaking a side window and entering the cabin of a parked service truck. In this incident, the metal shard ejected in line with the track frame, however, metal shards may be ejected at any angle from the tracks. Whilst no injuries were reported on this occasion, coal mine workers have suffered serious injuries from flying metal shards in cases reported to the Mines Inspectorate. The track sprocket was a refurbished sprocket and not an original OEM sprocket.

ABBREVIATIONS AND DEFINITIONS

Asbestosis	A preventable, dust lung disease (a pneumoconiosis) involving scarring of lung tissue caused by inhaling large amounts of asbestos fibres or asbestos dust over a long period. Asbestosis is a notifiable dust lung disease.
Chronic obstructive pulmonary disease (COPD)	A preventable, progressive lung disease which causes damage to the small airways in the lungs. COPD is an umbrella term for a group of disorders, with a range of causes, of which exposure to inorganic dust may be a contributor. Includes chronic bronchitis and emphysema. Chronic obstructive pulmonary disease, when caused wholly or in part by occupational exposure to inorganic dust, is a notifiable dust lung disease.
Coal Workers' Pneumoconiosis (CWP)	A preventable, irreversible and progressive dust lung disease (a pneumoconiosis) arising from the inhalation of coal dust over a period of years. Also known as black lung disease. Coal workers' pneumoconiosis is a notifiable dust lung disease.
Confirmed case	A notification or report about a notifiable dust lung disease given to the NDLD Register during the 2019-20 financial year which contains the following information/core data fields: • patient's family and first name, date of birth and gender • date of diagnosis • the type of notifiable dust lung disease, as prescribed in regulation • occupational exposure to inorganic dust in Queensland. and is given to the NDLD Register by: • an authorised notifier i.e. a prescribed medical practitioner, RSHQ (previously DNRME) or OIR. Excludes a notification or report of respiratory lung disease classified as either a 'duplicate', an 'out of scope', an 'unconfirmed' or an 'other' notification or report"
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).
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.
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.
DPM	Diesel particulate matter
High potential incident (HPI)	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.
ILO Classification	International Classification of Radiographs of Pneumoconiosis
Incidence	The number of new cases (of disease) occurring during a given period.

ABBREVIATIONS AND DEFINITIONS cont.

Inorganic dust	Small solid particles consisting of inorganic matter. Inorganic dust is the type of dust prescribed in regulation. It includes silica, coal, asbestos, natural stone, tungsten, cobalt, aluminium and beryllium.
Mesothelioma	A preventable, dust lung disease (a cancer) typically related to exposure to asbestos that affects the lining (mesothelium) of the lungs. Mesothelioma is a notifiable dust lung disease.
Mine dust lung disease (MDLD)	Mine dust lung disease is caused by mine dust exposure, and comprises a group of occupational lung diseases that result from the cumulative inhalation of respirable mine dust over several years.
Mixed-dust pneumoconiosis	A preventable, dust lung disease (a pneumoconiosis) resulting from chronic exposure to more than one type of mineral dust, such as coal and silica dust. Mixed-dust pneumoconiosis is a notifiable dust lung disease.
Multiple MDLD	Individual has more than one MDLD. This figure may include cases of CWP, silicosis and mixed dust pneumoconiosis.
Notifiable dust lung disease (NDLD)	"In relation to a person, any of the following respiratory diseases, when wholly or partly caused by occupational or work-related exposure to inorganic dust, as prescribed by regulation: i. Cancer ii. Chronic obstructive pulmonary disease, including chronic bronchitis and emphysema iii. Pneumoconiosis, including asbestosis, coal workers' pneumoconiosis, mixed-dust pneumoconiosis and silicosis."
Notification	Information about a person with a diagnosis of a notifiable dust lung disease given to the NDLD Register, during the financial year, in the approved form by a prescribed medical practitioner (specialist), pursuant to s279AF of the Public Health Act 2005. A notification may include a person diagnosed with more than one notifiable dust lung disease.
Occupational exposure	Exposure of a person to a disease causing agent (i.e. inorganic dust) occurring, wholly or partly, in the course of a person's work.
Other MDLD	Another type of MDLD or the specific type of lung disease is to be confirmed (cases in this category may be re-classified over time as additional information is provided to RSHQ)
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 incapacity 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

ABBREVIATIONS AND DEFINITIONS cont.

SCP	Substandard conditions or practice
Serious accident	An accident at a mine that causes – • the death of a person; or • a person to be admitted to a hospital as an in-patient for treatment for the injury.
Similar exposure group (SEG)	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.
Site senior executive (SSE)	The most senior officer employed or otherwise engaged by the mine or quarry operator who is located at or near the mine or quarry and has responsibility for the mine or quarry.