Parliamentary Committees

# Inquiry into occupational respirable dust issues

## Report No. 4, 55th Parliament

### Coal Workers' Pneumoconiosis Select Committee

**September 2017**

## Coal Workers' Pneumoconiosis Select Committee

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|---|---|
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**Acknowledgements**

The committee acknowledges the assistance provided by the Department of Natural Resources and Mines, Queensland Treasury's Office of Industrial Relations, the Department of Environment and Heritage Protection, the Department of Science, Information Technology and Innovation, Queensland Health, the Office of Queensland Parliamentary Counsel, and the Queensland Parliamentary Library and Research Service.


[1] The Member for Greenslopes, Mr Joe Kelly MP, was a member of the committee until 14 June 2017. The Member for Mackay, Mrs Julieanne Gilbert MP, was appointed to the committee from 14 June 2017 onwards.

## Contents

## List of figures and images

## Abbreviations

| | |
|---|---|
| ABC | Australian Broadcasting Corporation |
| ACARP | Australian Coal Association Research Program |
| AIOH | Australian Institute of Occupational Hygienists |
| ALARA | As low as reasonably achievable |
| ANOVA | Analysis of variance |
| AS | Australian Standard |
| Authority | Mine Safety and Health Authority (proposed for Queensland) |
| *Black lung, white lies* report | Coal Workers' Pneumoconiosis Select Committee, *Report No. 2, 55th Parliament, Black lung, white lies: Inquiry into the re-identification of Coal Workers' Pneumoconiosis in Queensland*, Queensland Parliament, 29 May 2017 |
| BMA | BHP Mitsubishi Alliance |
| Cab | Cabin (i.e. open 'cabin' operator) |
| CCAA | Cement Concrete and Aggregates Australia |
| CFA | Coal fly ash |
| CFMEU | Construction, Forestry, Mining and Energy Union |
| CHO | Chief Health Officer |
| Clem7 | Clem Jones Tunnel |
| CMDLD | Coal Mine Dust Lung Disease |
| CMSHA | *Coal Mining Safety and Health Act 1999* (Qld) |
| CMSHR | Coal Mining Safety and Health Regulation 2017 (Qld) |
| Commissioner | Commissioner for Mine Safety and Health |
| Committee | Coal Workers' Pneumoconiosis Select Committee |
| COPD | Chronic obstructive pulmonary disease |
| CQCN | Central Queensland Coal Network |
| CT | Computed tomography |
| CWP | Coal workers' pneumoconiosis |

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|---|---|
| DEEDI | Department of Employment, Economic Development and Innovation |
| DEHP | Department of Environment and Heritage Protection |
| DJAG | Department of Justice and Attorney-General |
| DNRM | Department of Natural Resources and Mines |
| DWR | District Worker Representative |
| draft bill | Exposure draft Mine Safety and Health Authority Bill 2017 |
| ES | Exposure standard |
| EPP | Environmental Protection (Air) Policy 2008 (Qld) |
| eWoRLD | Work-Related Lung Disease Surveillance System (US) |
| DSITI | Department of Science, Information Technology and Innovation |
| GPC | Gladstone Ports Corporation |
| HPCT | Hay Point Coal Terminal |
| HSE | Health Services Executive (UK) |
| IARC | International Agency for Research on Cancer |
| Interim report | Coal Workers' Pneumoconiosis Select Committee, *Report No. 1, 55th Parliament, Inquiry into the re-identification of Coal Workers' Pneumoconiosis in Queensland – Interim Report*, Queensland Parliament, 22 March 2017 |
| ILO | International Labour Office |
| IPNRC | Infrastructure, Planning and Natural Resources Committee |
| ISHR | Industry safety and health representative |
| LLN | Lower limit of normal |
| MDLD | Mine Dust Lung Disease |
| Monash review | Monash Centre for Occupational and Environmental Health, Monash University, in collaboration with the School of Public Health, University of Illinois at Chicago, *Review of Respiratory Component of the Coal Mine Workers' Health Scheme for the Queensland Department of Natural Resources and Mines*, 12 July 2016. |
| MonCEOH | Monash Centre for Occupational and Environmental Health |
| MQSHA | *Mining and Quarrying Safety and Health Act 1999* (Qld) |

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|---|---|
| MQSHR | Mining and Quarrying Safety and Health Regulation 2017 (Qld) |
| MRE | Mine Record Entry |
| MSHA | Mine Safety and Health Authority (USA) |
| MUA | Maritime Union of Australia |
| NHEWS | National Hazard Exposure Workplace Surveillance |
| NIOSH | National Institute of Occupational Safety and Health (USA) |
| NORMS | National Occupational Respiratory Mortality System (US) |
| NSHARSW | National Standard for Health Assessment of Rail Safety Workers |
| NSW | New South Wales |
| NSW committee report | New South Wales Legislative Council Standing Committee on Law and Justice, *First review of the dust diseases and lifetime care and support schemes*, New South Wales Parliament, 24 August 2017 |
| NZ | New Zealand |
| OEL | Occupational exposure limit |
| OIR | Office of Industrial Relations |
| OQPC | Office of the Queensland Parliamentary Counsel |
| P&G Act | *Petroleum and Gas (Production and Safety) Act 2004* |
| PCBU | person conducting a business or undertaking (*Work Health and Safety Act 2011*, section 5) |
| PM | Particulate matter |
| $PM_{2.5}$ | Particulate matter less than 10 microns in diameter |
| $PM_{10}$ | Particulate matter less than 2.5 microns in diameter |
| PMF | Progressive Massive Fibrosis |
| PFP | Pre-cleaner, filter and pressurisation (cabin dust control unit) |
| PPE | Personal protective equipment |
| QLS | Queensland Law Society |
| QNU | Queensland Nurses Union |
| QR | Queensland Rail |

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|---|---|
| QRC | Queensland Resources Council |
| RCS | Respirable crystalline silica |
| RCS guideline | *Guideline for management of respirable crystalline silica in Queensland mines and quarries* (Qld) (effective 1 August 2017) |
| RDMP | Respirable dust management plan |
| RGTCT | RG Tanna Coal Terminal |
| RSNL | *Rail Safety National Law (Queensland)* (Qld) |
| RSNL Act | *Rail Safety National Law (Queensland) Act 2017* (Qld) |
| RPE | Respiratory protective equipment |
| SABRE | Surveillance of Australian Workplace Based Respiratory Events |
| SCP | Substandard Conditions or Practice |
| SEG | Similar exposure group |
| Senate committee | Federal Senate Select Committee on Health |
| Senate committee report | Senate Select Committee on Health, *Fifth Interim Report, Black Lung: "it has buggered my life"*, Commonwealth of Australia, April 2016 |
| SHMS | Safety and Health Management System |
| SIMTARS | Safety in Mines Testing and Research Station |
| SSE | Site Senior Executive |
| SSHR | Site Safety and Health Representative |
| SWA | Safe Work Australia |
| SWORD | Surveillance of Work-related Occupational Respiratory Disease (UK) |
| TBM | Tunnel boring machines |
| TEOM | Tapered element oscillating microbalance |
| TJH | Thiess Pty Ltd and John Holland Pty Ltd (Airport Link joint venture) |
| TSP | Total suspended particles |
| UK | United Kingdom |
| USA | United States of America |
| WCRA | *Workers' Compensation and Rehabilitation Act 2003* (Qld) |

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|---|---|
| WA | Western Australia |
| WHO | World Health Organization |
| WHS | Work health and safety |
| WHS Act | *Work Health and Safety Act 2011* (Qld) |
| WHS Regulation | Work Health and Safety Regulation 2011 (Qld) |
| WHSQ | Workplace Health and Safety Queensland |

## Chair's foreword

This report presents a summary of the Coal Workers' Pneumoconiosis Select Committee's inquiry into occupational respirable dust issues.

On behalf of the committee, we wish to extend our sincere thanks to those individuals and organisations who have provided input to the committee in relation to its extended terms of reference.

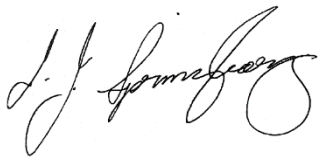
Thank you also to following government departments for their assistance: the Department of Natural Resources and Mines, Queensland Treasury's Office of Industrial Relations, the Department of Environment and Heritage Protection, the Department of Science, Information Technology and Innovation, and Queensland Health.

Finally, we would like to thank our fellow committee members, counsel assisting, and the committee secretariat for their support.

We commend this report to the House.

Jo-Ann Miller MP

Chair



Hon Lawrence Springborg MP

Deputy Chair

## Recommendations

# 1 Introduction

## 1.1 The committee and its role

In September 2015, Queensland's then Commissioner for Mine Safety and Health (Commissioner) reported the diagnosis of 'the first case of coal workers' pneumoconiosis in a Queensland coal miner in 30 years'.[2] The re-identification of this entirely preventable occupational lung disease – thought incorrectly to have effectively been eradicated in Australia – shocked and dismayed all involved in the coal industry. In the two years since, a further 21 cases of coal workers' pneumoconiosis (CWP) have been diagnosed in Queensland coal miners, making a total of 22 confirmed cases to date.[3]

The CWP Select Committee (committee) was established by the Queensland Parliament on 15 September 2016 to conduct an inquiry and report on the 're-emergence' of CWP amongst mine workers in Queensland.

The committee was initially due to report on its inquiry by 12 April 2017. The Parliament subsequently extended this reporting deadline to 29 May 2017. In addition, while the committee's initial terms of reference focussed only on coal mine workers, the Parliament also provided the committee with additional terms of reference in relation to other workforce cohorts and occupational respirable dust issues.

These extended terms of reference were an acknowledgement of evidence tendered to the committee which raised concerns about adverse health impacts resulting from coal dust exposure beyond the direct mining environment – including among rail workers and coal port terminal workers involved in the handling and transportation of coal, and among coal-fired power station workers. In addition, stakeholders questioned the adequacy of arrangements for the regulation and monitoring of exposure to respirable crystalline silica (or quartz dust), both as a component of coal mine dust and as an occupational hazard for other workers across the metalliferous mining and quarrying industries and in the tunnelling and construction sectors.

These broader occupational respirable dust issues are the focus of this report.

## 1.2 Terms of reference

### 1.2.1 Initial terms of reference

The committee was initially asked to consider:

(a) the legislative and other regulatory arrangements of government and industry which have existed in Queensland to eliminate and prevent CWP

(b) whether these arrangements were adequate, and have been adequately and effectively maintained over time

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2 Commissioner for Mine Safety and Health (Commissioner), *Queensland Mines Inspectorate Annual Performance Report, 2014-15*, Queensland Government, 2015, p 3.

3 As at 11 September 2017, the number of confirmed cases advised by the Department of Natural Resources and Mines (DNRM) stood at 26. This number was subsequently revised downward by DNRM to 22 after four diagnoses were re-classified as another type of Coal Mine Dust Lung Disease (CMDLD), or as mixed MDLD (Mine Dust Lung Disease) where more than one type of CMDLD has been identified. From 26 September 2017, DNRM will report on all confirmed cases of MDLD, rather than on CWP only, 'in order to have a complete picture of the prevalence of occupational lung disease in the mining industry'. See: Queensland Government, *Mine dust lung diseases,* website, 26 September 2017, available at: https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/accidents-incidents/mine-dust-lung-diseases

(c) the roles of government departments and agencies, mine operators, nominated medical advisers, radiologists, industry safety and health representatives and unions representing coal mine workers in these arrangements

(d) the study into CWP undertaken by Monash University and the findings of the Senate Select Committee on Health (Fifth Interim Report) and other relevant reports and studies

(e) the efficacy and efficiency of adopting methodologies and processes for coal mine dust measurement and mitigation, including monitoring regimes, engineering measures, personal protective equipment (PPE), statutory requirements, and mine policies and practices, including practices in jurisdictions with similar coal mining industries

(f) other matters the committee determines are relevant, including other respiratory diseases associated with underground mining.

In considering these matters, the committee was granted the power to call for persons, documents and other items.[4]

The committee tabled an interim report on 12 April 2017[5] and tabled its final report on these initial terms of reference, *Black lung, white lies*, on 29 May 2017.[6] The final report included 34 key findings and 68 recommendations for reform.

### 1.2.2 Extended terms of reference

The additional terms of reference established on 23 March 2017 extended the committee's remit to include inquiry into (and reporting on):

(a) occupational respirable dust exposure for:
  (i) coal port workers
  (ii) coal rail workers
  (iii) coal-fired power station workers
  (iv) other workers

(b) the legislative and other regulatory arrangements of government and industry which have existed in Queensland to prevent or reduce the harm caused by occupational respirable dust exposure to port, rail, power station, and other workers

(c) whether these arrangements were adequate, and have been adequately and effectively maintained over time

(d) the roles of government departments and agencies, industry, health professionals and unions in these arrangements

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4 Hon S J Hinchliffe MP (Leader of the House, Member for Sandgate), 'Coal Workers' Pneumoconiosis Select Committee, Order of Appointment; Membership', *Hansard*, 15 September 2016, p 3619.

5 CWP Select Committee, *Report No. 1, 55th Parliament, Inquiry into the re-identification of Coal Workers' Pneumoconiosis in Queensland – Interim Report* (Interim report), Queensland Parliament, 22 March 2017. Available at: http://www.parliament.qld.gov.au/Documents/TableOffice/TabledPapers/2017/5517T467.pdf

*All web references in this report are correct as at 28 September 2017

6 CWP Select Committee, *Report No. 2, 55th Parliament, Black lung, white lies: Inquiry into the re-identification of Coal Workers' Pneumoconiosis in Queensland* (*Black lung, white lies* report), Queensland Parliament, 29 May 2017. Available at: http://www.parliament.qld.gov.au/Documents/TableOffice/TabledPapers/2017/5517T815.pdf

The committee also tabled an executive summary version of this report, which can be accessed here: http://www.parliament.qld.gov.au/Documents/TableOffice/TabledPapers/2017/5517T816.pdf

*Where appropriate for ease of reference, this report includes some content from the committee's previous reports.

(e) the efficacy and efficiency of adopting methodologies and processes for respirable dust measurement and mitigation, including monitoring regimes, engineering measures, PPE, statutory requirements, and industry policies and practices, including practices in jurisdictions with similar industries

(f) other matters the committee determines are relevant to occupational respirable coal or silica dust exposure.

The committee was also granted the power to call for persons, documents and other items in relation to its consideration of these matters.

The committee was required to report on its extended terms of reference by 29 September 2017.[7]

### 1.2.3 Monitor and review role

As part of the additional terms of reference granted on 23 March 2017, the Parliament also established a role for the committee to monitor and review the implementation of recommendations made by the committee in its reports on both the initial and the extended terms of reference, including the development of a draft Bill for the consideration of the Legislative Assembly.

In keeping with the ongoing nature of this monitoring and review role, the Parliament determined that the committee's responsibilities in this regard would persist beyond any such reports by the committee, and 'until the Legislative Assembly is dissolved or the Legislative Assembly otherwise orders'.[8]

The committee tabled its first 'monitor and review' report, including an exposure draft Mine Safety and Health Authority Bill 2017 (draft bill), on 24 August 2017.[9] The draft bill, which would substantially give effect to the legislative recommendations of the *Black lung, white lies* report, was referred to the Infrastructure, Planning and Natural Resources Committee (IPNRC) for consideration and report. The IPNRC was required to conduct an inquiry into the draft bill as though it was a bill referred to that committee under Chapter 23 of the Standing Rules and Orders of the Legislative Assembly. The IPNRC was to report to the Parliament on the draft bill by 5 October 2017.[10]

## 1.3 The inquiry process

### 1.3.1 The initial terms of reference

During the inquiry into its initial terms of reference, the committee received 47 written submissions and held a total of 27 public hearings, 15 private hearings and one departmental briefing. A significant proportion of the hearings took place in 14 key regional mining centres[11] and were held at mine change-of-shift times, in order to best allow industry workers, their families, and community members to participate.

The committee also conducted site visits to Vale Australia's Carborough Downs underground mine[12], Anglo American's Grasstree underground mine[13], the Wiggins Island Coal Export Terminal at the Port

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7 Mrs JR Miller MP (Member for Bundamba), 'Coal Workers' Pneumoconiosis Select Committee, Reporting Date, Terms of Reference', *Hansard,* 23 March 2017, pp 870-871.

8 *Hansard,* 23 March 2017, p 871.

9 CWP Select Committee, *Report No. 3, 55th Parliament, A Mine Safety and Health Authority for Queensland, including the committee's draft Mine Safety and Health Authority Bill 2017*, Queensland Parliament, 24 August 2017. Available at: http://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2017/5517T1453.pdf

10 Hon SJ Hinchliffe MP (Leader of the House, Member for Sandgate), 'Referral to the Infrastructure, Planning and Natural Resources Committee', *Hansard,* 24 August 2017, p 2485.

11 The committee conducted hearings in regional centres and mining towns including Ipswich, Mackay, Rockhampton, Collinsville, Moranbah, Dysart, Middlemount, Tieri and Blackwater.

12 Carborough Downs mine is located approximately 20 kilometres east of Moranbah, in Central Queensland's Bowen Basin. Subsequent to the committee's visit, the mine was sold by Vale Australia to Fitzroy Australia Resources.

13 Grasstree underground mine is located approximately 25 kilometres south-west of Middlemount in Central Queensland's Bowen Basin.

of Gladstone, and the Dalrymple Bay Coal Terminal at the Port of Hay Point, to view and discuss measures put in place to mitigate coal dust generation and exposure.

Further, the committee visited the Department of Natural Resources and Mines' (DNRM) Safety in Mines Testing and Research Station (SIMTARS) at Redbank, and travelled to New South Wales (NSW) and to the United States of America (USA), to gather lessons and evidence in the jurisdictions respectively recognised as demonstrating Australia's and the world's best practice in relation to the monitoring and management of coal dust exposure and the health surveillance of workers.

The committee also issued over 60 summonses requiring the production of documents including from DNRM, the Construction, Forestry, Mining and Energy Union (CFMEU), and all operators of Queensland coal mines. The summonses required the production of Safety and Health Management System (SHMS) documents, dust monitoring results, directives and compliance notices, Mine Record Entries, minutes of meetings, correspondence, policies and procedures. This resulted in the provision to the committee of many thousands of documents.

All of the relevant evidence gathered by the committee during the inquiry into its initial terms of reference was also considered by the committee in relation to its extended terms of reference.[14]

### 1.3.2 The extended terms of reference

The committee wrote to relevant government departments seeking written briefings on the extended terms of reference and invited written submissions from the public.

The committee received 27 written submissions on its extended terms of reference. A list of the 27 submissions is at **Appendix A.**

The committee received written advice from each of the relevant government departments ahead of their appearances at two public briefings on 14 June 2017 and 9 August 2017, where the committee heard from representatives from DNRM, the Office of Industrial Relations (OIR), the Department of Environment and Heritage Protection (DEHP), the Department of Science, Information Technology and Innovation (DSITI), and the Chief Health Officer (CHO) and representatives from Queensland Health.

The committee also held three public hearings on 9 and 23 August 2017 and 4 September 2017, to receive evidence from key stakeholders and seek further information and clarification from DNRM and OIR (see **Appendix B** for a list of all witnesses at the briefings and hearings). At the request of the committee, DNRM and OIR also provided written responses to issues raised in submissions.

Committee representatives also attended key presentations on relevant topics at the Queensland Mining Industry Health and Safety Conference on 7 and 8 August 2017 and at the Australian Mine Ventilation Conference on 29 August 2017.

All of the material published by the committee in relation to this inquiry is available on the committee's inquiry webpage.[15]

### 1.3.3 Monitor and review role

Within the scope of its 'monitor and review role', a committee delegation travelled to regional centres and mining towns across central Queensland from 20 to 23 June 2017, to report back on the findings

[14] Where this report cites a submission made in relation to the committee's inquiry into its initial terms of reference, the reference clarifies that the submission was made to the 'CWP inquiry'.

[15] See: http://www.parliament.qld.gov.au/work-of-committees/committees/CWPSC/inquiries/current-inquiries/CWPSC-OccRespDust

and recommendations of the *Black lung, white lies* report, and consult with workers and community members on the reform measures proposed.[16]

On some occasions, this also included discussion of some of the broader occupational respirable dust issues considered in this report.

While the resulting draft bill was limited in its focus to the initial terms of reference, the committee will also monitor and review the implementation of the recommendations of this inquiry report, including any further proposed reforms, in accordance with the ongoing oversight responsibilities bestowed on the committee by the Parliament.[17]

## 1.4 Report structure

This report begins by first providing a background to this inquiry, including an overview of the health effects of respirable dust exposure and the incidence of associated health conditions, before outlining the regulatory frameworks which currently exist in Queensland to prevent or reduce the harm caused by such exposures (chapter 3). As per the committee's extended terms of reference, the report then considers the adequacy of these regulatory arrangements and associated industry and other practices in relation to each of:

- coal rail workers (chapter 4)
- coal port workers (chapter 5)
- coal-fired power station workers (chapter 6), and
- other workers, including those working in
    - tunnelling (chapter 7)
    - construction and manufacturing (chapter 8) and
    - metalliferous mines and quarries (chapter 9).

Chapter 10 provides some overall commentary regarding these regulatory frameworks and workplace protections and practices, including identifying a number of areas for further improvement.

Chapter 11 of the report addresses the adequacy of secondary preventive measures and medical responses to occupational lung disease, including clinical diagnosis, workers' compensation and treatment options.

Finally, chapter 12 examines the issue of environmental dust arising from workplaces and possible exposure and health risks – an area of concern for numerous stakeholders.

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16 The committee held nine regional public forums, in Collinsville, Moranbah, Dysart, Middlemount, Tieri, Emerald, Blackwater, Moura and Rockhampton. The committee also consulted privately with representatives from the Mining and Energy Division of the CFMEU and with representatives from the Queensland Resources Council (QRC) and major mining companies.

17 *Hansard,* 23 March 2017, p 871.

# 2 Background to the inquiry

*The recent identification of possible cases of coal mine workers pneumoconiosis supports the hypothesis that there has been a failure (or more likely many failures) in the systems implemented to control the exposure to respirable dust and to identify those exposed workers.*

*It is reasonable to assume that the system has also failed to identify adverse health effects from other hazardous exposures.*[18]

## 2.1 Inquiry into the re-identification of CWP in coal mine workers in Queensland and extended terms of reference

In early May 2015, DNRM confirmed what it believed to be the first case of CWP or 'black lung' disease in a coal mine worker in Queensland in thirty years.[19]

News of the 're-emergence' of the occupational lung disease, thought till then to have effectively been 'eradicated' in Australia, was quickly spread across industry by representatives from the Mining and Energy Division of the CFMEU, who sent a safety alert advising all Queensland coal mines of the development.[20] By September 2015, the news reached a broader audience, by way of an announcement from the Commissioner in the Mines Inspectorate's annual performance report.[21]

The announcements sent shockwaves through the industry, and as further cases were identified in subsequent months, it quickly became clear that this was no isolated incident.

Media outlets across Australia soon also responded with alarm, and on 1 December 2015, the ABC's 7:30 Report aired a special report on CWP which drew increased attention to the developments. By this time, the number of recently diagnosed cases had increased to four, with a series of further diagnoses pending. The program also reported an apparent backlog of thousands of unprocessed worker medical records, which had been stockpiled and haphazardly stored by the department.[22]

A series of significant reviews or inquiries have since followed, including:

- an independent review of the respiratory component of the coal mine workers' health scheme[23] (Monash review), which commenced in December 2015 and reported in July 2016[24]
- an inquiry into the 're-emergence' of CWP by the Federal Senate Select Committee on Health, which commenced in February 2015 and reported in April 2016[25] (Senate committee report), and

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18 Dr John Schneider, submission 9, p 4.

19 DNRM, CWP inquiry, submission 35, p 29.

20 CFMEU, CWP inquiry, submission 27, p 7.

21 Commissioner, *Queensland Mines Inspectorate Annual Performance Report, 2014-15*, Queensland Government, 2015, p 3; DNRM, *Queensland Mines and Quarries Safety Performance and Health Report, 1 July 2014 – 30 June 2015*, Queensland Government, 2015, p 1.

22 Senate Select Committee on Health, *Fifth Interim Report, Black Lung: "it has buggered my life"* (Senate committee report), Commonwealth of Australia, April 2016, pp xi-xii.

23 The coal mine workers' health scheme provides for the periodic assessment of the health of coal mine workers and for the processing of their medical records. Scheme requirements are specified under the Coal Mining Safety and Health Regulation 2017 (CMSHR).

24 Monash Centre for Occupational and Environmental Health (MonCEOH), Monash University, in collaboration with the School of Public Health, University of Illinois at Chicago, *Review of Respiratory Component of the Coal Mine Workers' Health Scheme for the Queensland Department of Natural Resources and Mines* (Monash review), 12 July 2016.

25 Senate committee report, April 2016.

- this select committee's inquiry into the re-identification of CWP amongst coal mine workers in Queensland, which commenced on 15 September 2016 and reported first on 12 April 2017 (interim report[26]) and finally on 29 May 2017 (*Black lung, white lies* report[27]).

All three of these review processes identified major system failures at multiple levels with respect to the design and operation of the regulatory framework established to protect the health of coal mine workers in Queensland[28], and accordingly recommended a range of necessary reforms.[29]

In sum, the reports revealed that CWP did not 're-emerge' in 2015, but was merely re-identified, 'after more than 30 years of responsible Queensland authorities failing to look for it or properly identify it'.[30]

Not only did a 2004 CWP diagnosis of a worker go unreported, but signs of pneumoconiosis were missed or overlooked in the x-rays of multiple workers who were given the 'all clear' and continued to work for a number of years, with devastating consequences.[31] In the absence of any such diagnoses to provide a crucial feedback measure to industry, it was falsely assumed that existing industry dust controls were adequate, despite sometimes significant deficiencies and inconsistencies in their application, and often infrequent or inaccurate monitoring of worker exposure to assess control effectiveness. Further, where exceedances of the regulated dust exposure limits were recorded – sometimes in a 'regular and gross' manner[32] – these exceedances often were not appropriately investigated or addressed by mining operators. In turn, the compliance actions of inspectors in turn were generally not commensurate with the seriousness of the human health risks associated with the respirable dust hazard.

At the time of finalising this report, the number of workers diagnosed with CWP had climbed to 22[33], of a broader total of 52 confirmed cases of various MDLD (mine dust lung diseases). Workers' compensation authorities advised that a further 27 claims for CWP have been lodged, for which diagnoses and/or claim outcomes are pending.[34]

Importantly, the 22 confirmed cases include four open-cut mine workers, at least two of whom worked exclusively in surface operations. This development challenged the long-standing assumption that only underground miners were susceptible to contracting the disease. This raised new questions about the nature and extent of the respirable coal mine dust hazard, prompting re-consideration of the possible levels and consequences of dust exposure for a broad range of other workers involved in the transportation and processing of coal.

Supported by unions and community members, a range of coal rail, port, and coal-fired power station workers attested to growing concerns that they might equally be affected, recounting histories of

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26 Interim report, March 2017.

27 *Black lung, white lies report*, May 2017.

28 See: Monash review, July 2016, p 16; Senate committee report, April 2016, p xii; *Black lung, white lies* report, May 2017, p 66.

29 The Monash review and Senate committee report respectively included 18 and eight recommendations for reform, some of which were incorporated into the 68 recommendations made by this committee in its *Black lung, white lies* report.

30 Interim report, March 2017, p 1.

31 Some worker x-rays were taken incorrectly by radiographers; other x-rays were incorrectly read by radiologists; and some identified signs of respiratory damage were attributed to other sources, due to general practitioners' lack of knowledge of occupational illnesses, failure to collect full medical histories reflecting the exposure risks of workers, or misdiagnosis as another respiratory complaint. See *Black lung, white lies* report, May 2017, pp 19-23, 59-60, 202-205.

32 Interim report, March 2017, p 11.

33 See footnote 3.

34 Ms Janene Hillhouse, Senior Director, Workers' Compensation Services, Office of Industrial Relations (OIR), Queensland Treasury, public hearing transcript, Brisbane, 4 September 2017, p 15.

working in dusty conditions with inadequate protections[35], and noting the apparent lack of knowledge as to the thresholds or exposure level required.[36]

The importance of exploring these concerns was affirmed by expert witnesses to the committee, including both Professor Malcolm Sim, who led the Monash Review of the coal mine workers' health scheme, and world-renowned US-based black lung expert Dr Robert Cohen.[37]

Dr Cohen stated:

> *… I think that workers who transport and handle coal are at risk, and that includes… railroad workers… and then the workers at our ports who are exporting coal. They have these conveyor belts that are loading and pouring mountains of coal into the hold of a ship and when it is falling it generates huge amounts of dust and those workers would be at risk and I think that we would have to do surveillance. Very early on in this process we had a saying in medical school that if you do not take a temperature you will not find a fever… The equivalent of that in public health is not having a good medical surveillance program. If you do not take the temperature of the population you will not find disease and you do not have to worry about it. I think these workers are exposed to a dust that we know can cause respiratory illness and we need to look at them and see if they are sick or not and then we can make more appropriate decisions.*[38]

Professor Sim similarly advised:

> *If there is potential for respirable dust from these operations they need to have some hygiene monitoring done and assessment of the jobs and weigh up the risks and whether they are at the same degree of risk as somebody who is in these other operations. I think all steps along the process here need to be looked at appropriately…to be able to decide on that.*[39]

The committee was also mindful that the appropriately heightened focus on CWP and coal mine dust should not detract from the treatment of other co-occurring or contributing respirable dust hazards, noting particular stakeholder concerns about respirable crystalline silica (RCS), which presents exposure risks both as a component of coal mine dust and as a distinct hazard in its own right.[40]

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35 For example: Mr Paul Harwood, private capacity, public hearing transcript, Middlemount, 23 November 2016, p 8; public hearing transcript, Mackay, 7 March 2017, pp 2, 6; Mr Greg Dalliston, Industry Safety and Health Representative (ISHR), CFMEU, public hearing transcript, Brisbane, 15 March 2017, pp 31, 33; Frederick 'John' Hempseed, CWP inquiry, submission 37; Maritime Union of Australia (MUA), CWP inquiry, submission 42; Richard Barry, CWP inquiry, submission 44; CWP inquiry, submission 46 (confidential).

36 Mr Greg Dalliston, public hearing transcript, Brisbane, 15 March 2017, p 31.

37 See also support in: Helen Gibson, CWP inquiry, submission 9, p 1, p 3; Dr Brian Plush, CWP inquiry, submission 15, p 3. BreatheSafe, CWP inquiry, submission 34, p 1. Further, the Monash review also reported: *More broadly, the findings of this review, the failures identified and the recommendations to improve the scheme have implications beyond the coal mining industry in Queensland. The coal mining industry in other Australian states, and other industries where (hazardous) respirable dust exposure, such as silica, occurs should also take note of our findings. Respiratory surveillance for their workers should be assessed and, where existing health assessment schemes are in place, these should be reviewed to ensure that their design, implementation and audit are best practice.* See: Monash review, July 2016, p 17.

38 Dr Robert Cohen, Director of Occupational Lung Disease, Division of Pulmonary and Critical Care Medicine, Feinberg School of Medicine, Northwestern University, public hearing transcript, Brisbane, 15 March 2017, p 10.

39 Professor Malcolm Sim, Director, MonCEOH, Monash University, public hearing transcript, Brisbane, 9 November, p 13.

40 For example, see: Emeritus Professor Odwyn Jones, CWP inquiry, submission 4, p 6; Bruce Ham, CWP inquiry submission 5.3, p 2; The Thoracic Society of Australia and New Zealand (TSANZ) and Lung Foundation Australian (LFA), CWP inquiry submission 6, p2; Queensland Nurses Union (QNU), CWP inquiry, submission 11, pp 3-4; Australian Institute of Occupational Hygienists (AIOH), CWP inquiry, submission 14, pp 3-5, 8-9; QRC, CWP inquiry, submission 14, p 16; Caledon Coal, submission 19, p 19; Breathe Safe, CWP inquiry, submission 24, p4; Duncan Chalmers, CWP inquiry, submission 40, p 2.

Dr Cohen explained in this regard:

> *… We do not say 'coal dust'. We say 'coal mine dust' because …the geology is not pure. When you are cutting in a coal seam it is often mixed with rock or other minerals and there are other contaminants in it [including silica], so it is coal mine dust…*
>
> *Coal dust is not benign. It is not healthy, but silica is 100 times more toxic, especially when it is freshly fractured silica. You take a rock and you blast it, you drill it, you break it. That particle has a very reactive surface and that surface reactivity adds to its toxicity and causes much more damage to the lungs.*[41]

Silica is present in materials encountered across a broad range of construction, manufacturing and other industries, meaning its exposure risk profile extends significantly beyond the mining sector, to a much larger workforce population.[42] Its health effects have generally been more widely recognised than those of coal dust (including CWP), particularly within the context of heightened awareness of associated industry hazards such as asbestos.[43] However, the committee's initial inquiry activities also highlighted a degree of complacency in the management of RCS, and a possible decline in vigilance with respect to respirable dust risks more broadly.

In addition to RCS exposure issues within the mining sector, the committee heard that workers engaged in the construction of tunnels in Brisbane in recent decades were exposed to silica dust levels that were up to six times the legal exposure limit applicable to coal mines at the time, and higher.[44] The protections and health surveillance for these workers, it was stated, may at times have been weaker than those for workers in coal and metalliferous mines.[45]

A recent increase in the number of workers presenting with non-asbestos-related occupational lung diseases was also flagged for professions including (but not limited to):

- tunnelers
- construction workers
- demolitionists
- stonemasons
- quarry workers
- glass, ceramic, brick and tile manufacturers
- sandblasters, and
- foundry workers.[46]

Maurice Blackburn Lawyers noted that while they 'are either currently or have represented individuals with progressive massive fibrosis (i.e. complicated silicosis), rheumatoid arthritis, occupational asthma and occupational COPD' (chronic obstructive pulmonary disease); 'by far the most common condition [they] encounter is silicosis'.[47]

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41 Dr Robert Cohen, public hearing transcript, Brisbane, 15 March 2017, p 8.

42 B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 26.

43 Monash review, July 2016, p 17; B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 23; LFA, *Silica fact sheet* (online), May 2017, available at: http://lungfoundation.com.au/wp-content/uploads/2017/07/Silica-fact-sheet.pdf; QRC, submission 12, p 1.

44 Mr Greg Dalliston, public hearing transcript, Brisbane, 15 March 2017, p 31. Mr Dalliston's evidence related specifically to the tunnels associated with Brisbane's Airport Link project, which ran from November 2008 to July 2010.

45 Mr Greg Dalliston, public hearing transcript, Brisbane, 15 March 2017, p 31.

46 Maurice Blackburn Lawyers, submission 10, pp 3-4.

47 Maurice Blackburn Lawyers, submission 10, p 4.

Further, Maurice Blackburn submitted:

> *As has been demonstrated through the CWP cases, it would be naïve to think that the historical rates of diagnosis of all other types of dust diseases in Queensland truly reflects reality. By way of example, we note that according to the Queensland Employee Injury Database, only six silicosis cases received compensation between 1992 and 2004. Given the thousands of workers who have worked in all types of above and below ground work in and around any type of silica containing rock, there are questions as to whether these rates are accurate… At a time when the coal mining industry is in crisis over CWP, it is our view that the light must firmly be shone on all types of dust diseases… Indeed, failure to do so in light of what has been revealed in relation to CWP would be to unfairly prejudice non-coal mine workers.*[48]

In view of these and other similar submissions, the committee's terms of reference were ultimately extended by the Parliament on 23 March 2017 to encompass consideration of the various coal and other industry workers and further dust risks identified by stakeholders.[49]

Subsequent to the commencement of the committee's extended terms of reference, an article published in the *Medical Journal of Australia* (May 2017) revealed that despite a downward global trend, 'new outbreaks of silicosis have recently been reported, with life-threatening silicosis occurring after exposure to a relatively new type of engineered stone product used for kitchen and bathroom benchtops'.[50]

Evidence tendered to a NSW parliamentary inquiry[51] in June 2017 also confirmed the 'huge problem' with 'silicosis from the manufactured stone industry' and the manufacture of 'Ceasarstone' benchtops in particular[52], noting that until recently it was viewed by many as 'an historical disease' to which people were 'exposed in the 1960s and 1970s'.[53] Medical professionals attested: 'Now we are seeing people who were exposed this year and last year'.[54]

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48 Maurice Blackburn Lawyers, CWP inquiry, submission 26, p 9.

49 *Hansard,* 23 March 2017, pp 870-871.

50 E Matar, A Frankel, LK McCowan Blake, EJ Silverstone, A R Johnson and DH Yates, 'Complicated silicosis resulting from occupational exposure to engineered stone products', *Medical Journal of Australia,* vol. 206, no. 9, 2017, pp 385-386. See also: A Patty, 'New cases of silicosis in Australia linked to bathroom and kitchen stone products', *Sydney Morning Herald* (online), 2 July 2017, available at: http://www.smh.com.au/business/workplace-relations/forgotten-industrial-diseases-reappear-20170629-gx0yri.html; S Miles, 'Explainer: what is silicosis and why is this old disease making a comeback?', *The Conversation* (online), 7 August 2017, available at: https://theconversation.com/explainer-what-is-silicosis-and-why-is-this-old-lung-disease-making-a-comeback-80465

51 NSW Legislative Council Standing Committee on Law and Justice, *First review of the dust diseases and lifetime care and support schemes*, NSW Parliament, 24 August 2017 (NSW committee report).

52 Dr Anthony Johnson, Respiratory and Sleep Physician, NSW Occupational and Environmental Lung Disease Special Interest Group, Thoracic Society of Australia and New Zealand, in NSW Legislative Council Standing Committee on Law and Justice, *public hearing transcript*, First review of the dust diseases and lifetime care and support schemes, Sydney, 28 June 2017, p 13.

53 NSW Standing Committee on Law and Justice, *public hearing transcript*, Sydney, 28 June 2017, p 17.

54 NSW Standing Committee on Law and Justice, *public hearing transcript*, Sydney, 28 June 2017, p 17.

## 2.2 Respiratory health effects of workplace dust exposure

People may be exposed to a wide range of airborne contaminants in the workplace. These contaminants can occur in gaseous form (gases and vapours) or as aerosols, which include airborne sprays, mists, smokes, fumes[55] and – the focus of this inquiry – airborne dusts.[56]

Dust particles interact with the human respiratory system in different ways, depending on their characteristics.

Larger inhalable particles which may be visible to the naked eye are deposited in the nose, throat and upper respiratory tract.[57] These particles can be cleared from the body or removed naturally by the special defences of the lungs. While potentially harmful if in sufficient concentration or where toxic impurities are present (in which case inflammatory responses can be experienced[58]), they are generally considered to be a nuisance dust.[59]

The smallest of inhalable particles, known as 'respirable' dust particles (<10 microns in diameter[60]), are very slow to settle or dissipate and can pass through the body's natural respiratory filters to be taken deep into the gas exchange region of the lungs.[61] These fine particles are invisible to the naked eye, measuring just a fraction of the width of a human hair.[62]

While a proportion of respirable dust may be cleared from the lungs, if the amount of dust is large it can overwhelm clearance mechanisms and lead to the formation of scarring or fibrous lung tissue – a process known as pulmonary fibrosis, which hampers the functioning of the lung.[63]

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55 Within the mining context, diesel particulate matter and welding fumes have been singled out as key particulate fume hazards. Both of these airborne contaminants typically contain a mix of ultrafine droplets and solid particles which include metal or mineral dust. See: DNRM, 'Preventing dust-related lung diseases', *Mines safety bulletin*, no. 151, 30 October 2015, p 1; AIOH Exposure Standards Committee, *Diesel Particulate Matter & Occupational Health Issues: Position Paper,* AIOH, July 2013, p 7.

56 Kenelec Scientific, submission 26, p 2; OIR, *Interventions by the Office of Industrial Relations regarding exposure to respirable dust and fibres in non-tunnelling workplaces,* tabled paper, 14 June 2017, p 1.

57 Emeritus Professor Odwyn Jones, CWP inquiry, submission 4, p 2; AIOH, CWP inquiry, submission 14, p 3.

58 Irritant dust that settles in the nose may lead to inflammation of the mucus membrane (rhinitis), trachea (tracheitis), or the bronchi (bronchitis), depending on the depth of the airway penetration. While toxic dusts present the greatest risk, irritation of the eyes, nose and throat may also result from exposure to 'general dust', particularly where the worker has sensitivities or exposure is significant. In short, the AIOH advised: 'the human body's tolerance to airborne dust, regardless of its toxicity, is limited'. See: AIOH, CWP inquiry, submission 14, p 4; Canadian Centre for Occupational Health and Safety, *What are the effects of dust on the lungs?,* fact sheet (online), 2012, available at: http://www.ccohs.ca/oshanswers/chemicals/lungs_dust.html

59 M Jennings and M Flahive, *Review of Health Effects Associated with Exposure to Inhalable Coal Dust*, Coal Services Pty Ltd, 1 October 2005, pp 7-8; Coal Services Pty Ltd, *Protecting against airborne dust exposure in coal mines*, revised edition, 2016, p 10.

60 A micron is also known as a micrometre, and is a metric unit of measure for length equal to 0.001mm.

61 AIOH, CWP inquiry, submission 14, p 3; Breathe Safe, CWP inquiry, submission 24, p 3. Queensland Government, *Health and safety effects of dust,* website, available at: https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/hazards/dust/health-safety;

62 Coal Services Pty Ltd, *Protecting against airborne dust exposure in coal mines*, revised edition, 2016, p 10.

63 I Firth and A Rogers, *AIOH Position on Dusts Not Otherwise Specified (Dusts NOS) and Potential for Occupational Health Issues*, AIOH, May 2016, p 5; Department of Justice and Attorney-General (DJAG), Workplace Health and Safety Queensland (WHSQ), *Silica and the lung,* fact sheet (online), February 2013, available at: https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0015/83130/silica-lung-factsheet.pdf

In addition to pulmonary fibrosis, which is a condition common to various types of pneumoconiosis or 'dusty lung', the inhalation of respirable dusts in occupational settings can cause a range of other respiratory diseases including asthma, COPD, chronic bronchitis and lung cancer.[64]

The particular physiological effect depends on the toxicity and chemical composition of the particle, with the severity of disease typically intensifying with increasing magnitude and duration of exposure.

Toxic respirable dust hazards encountered in the workplace include:

- mineral dusts, such as those containing coal, crystalline silica (as quartz) and asbestos
- metallic dusts, such as lead, cadmium, nickel and beryllium dusts
- other chemical dusts, including bulk chemicals and pesticides
- organic and vegetable dusts, such as flour, wood, cotton and tea dusts and pollens, and
- biohazards, such as mould and spores.[65]

While some of these respirable dusts can occur naturally (for example, as pollens, as volcanic ash, and in sandstorms)[66], they are primarily generated by various work processes.

Processes such as cutting, sanding, carving, grinding, blasting, drilling, demolishing or polishing materials, and contemporary nanotechnology processes, can all generate respirable dusts both from the materials and tools being used. In addition, infectious organisms can attach to dust particles, such that when inhaled they may cause a range of infections.[67]

A summary of respiratory effects associated with worker exposure to airborne contaminants in various industries is provided in Figure 1 (see over page).

As this figure illustrates, while the committee's inquiry activities initially focussed on the coal industry and coal mine dust in particular, dust exposure issues are of concern not only for those engaged in the metalliferous and mineral extraction and processing industries, but also for those working in tunnelling, construction, manufacturing, and various occupations which involve handling or working with dry powders or other fine matter.[68]

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64 OIR, *Interventions by the Office of Industrial Relations regarding exposure to respirable dust and fibres in non-tunnelling workplaces,* tabled paper, 14 June 2017, p 1.

65 World Health Organisation (WHO), *Hazard prevention and control in the work environment: Airborne dust*, 1999, p ix; OIR, submission 24, p 2.

66 WHO, *Hazard prevention and control in the work environment: Airborne dust*, 1999, p ix.

67 OIR, *Interventions by the Office of Industrial Relations regarding exposure to respirable dust and fibres in non-tunnelling workplaces*, tabled paper, 14 June 2017, p 1; Health and Safety Laboratory, *On-tool controls to reduce exposure to respirable dusts in the construction industry: A review,* Health and Safety Executive (HSE) UK, 2012, available at: http://www.hse.gov.uk/research/rrpdf/rr926.pdf

68 I Firth and A Rogers, *AIOH Position on Dusts Not Otherwise Specified (Dusts NOS) and Potential for Occupational Health Issues*, AIOH, May 2016, p 5.

**Figure 1 Industry agents and associated respiratory effects**

| Agent | Industry/occupations | Lung condition |
|---|---|---|
| Asbestos | Mining and milling, building and construction, transport equipment manufacturing (shipbuilding, railway locomotive building and maintenance), asbestos product manufacture, power generation, carpenters and joiners, metal fitters, boilermakers | Pleural plaques, pleural thickening, pulmonary fibrosis (asbestosis), mesothelioma |
| Beryllium | Aerospace, nuclear power, computer, automotive electronics | Pulmonary fibrosis (berylliosis), emphysema, lung cancer |
| Barium | Petroleum industry | Pulmonary fibrosis (baritosis) |
| Coal | Coal industry | Simple CWP, progressive massive fibrosis (complicated CWP), centrilobular emphysema |
| Cadmium | Electronics, metal plating and batteries | Emphysema, lung cancer |
| Cotton dust | Cotton, flax and hemp workers | Bronchitis, byssinosis, hypersensitivity pneumonitis |
| Ionising radiation | Radiology, nuclear industry | Pneumonitis, pulmonary fibrosis, centrilobular emphysema |
| Irritant gases (ammonia, sulphur dioxide, chlorine) | Chemical industry, agriculture, fertilisers | Bronchitis, asthma |
| Isocyanates | Spray painting | Asthma, hypersensitivity pneumonitis |
| Mouldy hay (thermophilic actinomycetes) | Agriculture (farmers) | Bronchitis, hypersensitivity pneumonitis |
| Silica | Sandblasters, miners, tunnelers, millers, potters, glassmakers, foundry and quarry workers, stonemasons | Simple silicosis, silicoproteinosis, progressive massive fibrosis (complicated silicosis), COPD |
| Talc | Paint, ceramics, leather, paper | Pulmonary fibrosis (talc pneumoconiosis) |
| Wood dust | Milling, construction | Hypersensitivity pneumonitis, asthma |

Source: Amended version of cited figure: Dr Brian Plush, submission 17, p 6 (originally published in B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 24).

## 2.3 Occupational lung diseases

The classic diseases of 'dusty' occupations that have been the main focus of this committee's inquiries are captured by the general term 'pneumoconiosis'.[69]

There are three primary types of lung disease that are classified as pneumoconiosis:[70]

- *asbestosis, caused by the inhalation of asbestos dust particles*
- *silicosis, caused by the inhalation of silica dust particles, and*
- *CWP, caused by the inhalation of fine coal dust particles.*[71]

[69] Canadian Centre for Occupational Health and Safety, *What are the effects of dust on the lungs?,* fact sheet (online), 2012. See footnote 58.

[70] Although asbestos, silica and coal are the three work exposures which most commonly cause pneumoconiosis, it can also be caused by exposure to other mineral or metallic dust particles including aluminium, barium, beryllium, cadmium, chromium, cobalt, graphite, kaolin, mica, and talc. See: Safe Work Australia (SWA), *Occupational respiratory diseases in Australia,* Australian Government, Australian Safety and Compensation Council, April 2006, p 4; National Institute for Occupational Safety and Health (NIOSH), '*Pneumoconioses,* Center for Disease Control (USA), webpage, 24 August 2017, available at: https://www.cdc.gov/niosh/topics/pneumoconioses/default.html

[71] AIOH, CWP inquiry, submission 14, p 4; CFMEU, CWP inquiry, submission 27, p 5.

Where it has been identified that a worker has developed pneumoconiosis as a result of exposure to a combination of these or other toxic dust particles, their condition may also be described as 'mixed dust' pneumoconiosis.[72]

In each instance, disease develops from the deposition of dust particles and the adverse reaction of the lung tissue to the dust. The development of the disease may occur over a period of several years, and there are often limited symptoms in the early stages. When severe, it often leads to lung impairment, disability and premature death.[73]

In addition to pneumoconiosis, occupational dust exposure can give rise to various conditions associated with the disease state known as COPD. In contrast to the pathological processes associated with pneumoconiosis, COPD is characterised by the presence of airway obstruction due to chronic bronchitis, emphysema or chronic asthma.[74]

In some cases, dust exposures may also contribute to cardiovascular diseases and occupational cancers like mesothelioma, leukaemia and lymphoma.[75] Inhalable lead and other metallic dust can also be absorbed into the bloodstream and lead to systemic toxic effects, including damage to the central nervous system.[76]

As the majority of evidence submitted to this inquiry centred on CWP and silicosis, these particular conditions and their causative dust exposures are the primary focus of this report. However, the committee wishes to emphasise that the findings and recommendations outlined in this report have broader implications for all industries where different types of hazardous respirable dust exposure and occupational lung disease occur.

### 2.3.1 Coal workers' pneumoconiosis

CWP is caused by the inhalation of respirable coal dust. It is one of a range of conditions resulting from coal mine dust exposure that are broadly described as coal mine dust lung disease (CMDLD). Other CMDLDs include emphysema, chronic bronchitis, lung function impairment, and diffuse dust-related fibrosis.[77]

The development of CWP usually requires lengthy exposure to coal mine dust – typically after at least 10 years.[78] However, in sensitive individuals or in cases of intense exposure, the onset may occur sooner.[79]

Individuals with early-stage CWP are often asymptomatic, which complicates the identification of the condition. However, typical symptoms of CWP and other CMDLD include cough, the production of (sometimes black) sputum, wheezing and shortness of breath. In more developed cases, CWP manifests as progressive massive fibrosis (PMF), a debilitating and life-threatening condition characterised by the formation of large fibrous masses in the lungs.[80]

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72 NSW Department of Industry, Resources Regulator, 'Serious illness', Major Investigations and Emergency Response Unit information release, 22 March 2017, p 2, available at: http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0003/708825/IIR17-03-coal-workers-mixed-dust-pneumoconiosis.pdf

73 NIOSH, '*Pneumoconioses,* Center for Disease Control, webpage,24 August 2017. See footnote 70.

74 SWA, *Occupational respiratory diseases in Australia,* Australian Government, Australian Safety and Compensation Council, April 2006, p 9.

75 OIR, submission 24, p 2.

76 Queensland Government, *Health and safety effects of dust,* webpage, 13 July 2016. See footnote 51.

77 MonCOEH, *Coal mine dust lung disease – fact sheet for GPs* (online), DNRM, April 2016, available at: https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0009/352287/coal-mine-dust-lung-disease-info-gps.pdf

78 Private briefing, Brisbane, 7 November 2016.

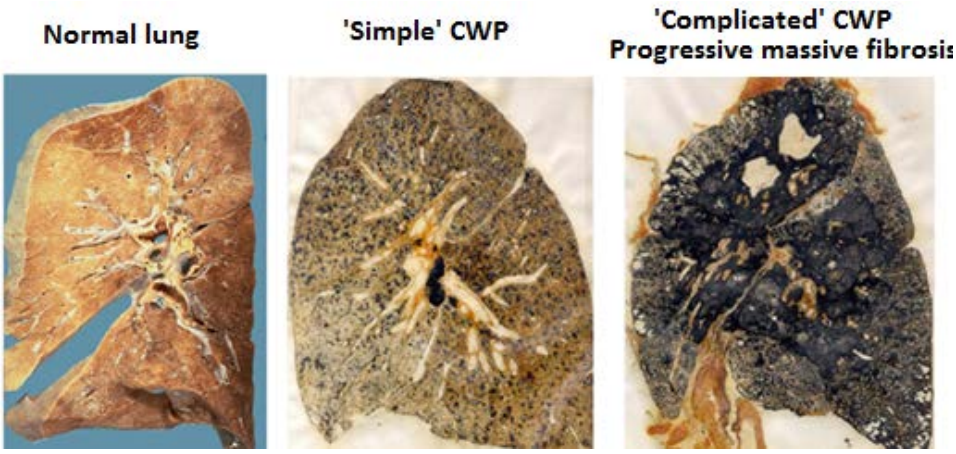
79 MonCOEH, *Coal mine dust lung disease – fact sheet for GPs* (online), DNRM, April 2016 (see footnote 77); Dr Robert Cohen, public hearing transcript*,* 15 March 2017, p 17.

80 MonCOEH, *Coal mine dust lung disease – fact sheet for GPs* (online), DNRM, April 2016. See footnote 77.

The disease is typically described according to its progression, as either 'simple' or 'complicated' (see also image 1):

- simple CWP: a form of the disease where coal macules are surrounded by fibrosis or scarring in the lung. Chest x-rays indicate small scars of less than 10mm. Symptoms may be none at all, or cough or some shortness of breath. Often associated with emphysema, simple CWP may stabilise with removal from further exposure to dust.
- complicated CWP or Progressive Massive Fibrosis (PMF). Symptoms include shortness of breath, black sputum, chronic cough, pulmonary hypertension, frequent pneumonia and heart problems. PMF is associated with fibrosis or scarring in the lung of 10mm or greater, associated with progressive symptoms and disease without further exposure to dust.[81]

**Image 1 Lung comparison showing progression of CWP**




Source: CWP select committee image collection.

The committee heard evidence from a number of former coal mine workers diagnosed with CWP about the impacts of the disease. Those diagnosed with complicated CWP reported gross physical impairment and fatigue, frequent bouts of pneumonia, and bleeding. Mr Percy Verrall, a retired miner with extensive experience in Queensland mines, experienced respiratory problems from 2003. He said of his general health: 'I have got that way that I cannot do anything. Some days I cannot even walk around my house'.[82]

### 2.3.2 Silicosis

Silicosis is caused by the inhalation of respirable silica or quartz dust, also known as RCS.

Silica is a very common mineral that constitutes a major part of the earth's crust. It exists in different forms in many types of rocks and soils and can therefore be present in a wide range of materials disturbed, extracted, or removed from the earth, including: coal mine dust and other extracted mineral and metal dusts or extraction by-products, asphalt, bricks, concrete, concrete and terracotta tiles and pavers, sandstone, granite, and to a lesser extent, cement.[83]

Respirable silica dust is considered to be more harmful to the lung than is respirable coal dust as it is a more fibrogenic material, meaning it results in a more marked tissue reaction for equivalent amounts

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81 TSANZ and LFA, CWP inquiry, submission 6, p 3; CFMEU, CWP inquiry, submission 27, p 5; Coal Services NSW, *Dust disease and you*, fact sheet (online), June 2016, available at: https://www.coalserviceshealth.com.au/MessageForceWebsite/Sites/338/Files/CO043%20Lung%20Disease%20Fact%20Sheet_P1.pdf;

82 Mr Percy Verrall, private capacity, public hearing transcript, Ipswich, 4 November 2016, p 4.

83 DJAG, WHSQ, *Silica and the lung,* fact sheet (online), February 2013. See footnote 63.

of dust. This is in part due to the macrophages in the lung (the scavenger or protective cells which digest foreign particles) releasing a toxic substance when they engulf RCS particles, speeding the formation of reactive fibrous or scar tissue.[84] Where coal mine workers have been exposed to coal mine dust with a high silica or silicate presence, this has also been implicated as a factor in rapidly progressive CWP.[85]

Silicosis is characterised by a similar disease progression to CWP, with both a 'simple' silicosis stage with milder respiratory symptoms and a more developed 'complicated' silicosis stage, where progressive massive fibrosis manifests.[86] As with CWP, silicosis may also take several years to develop, with little or no symptoms in the early stages of the disease.[87] However, some rapidly progressive forms of silicosis can occur after only short periods of intense exposure, through severe inflammation and an outpouring of protein into the lung.[88]

Workers with silicosis also have a tendency to tuberculosis of the lungs, autoimmune diseases and kidney disease, together with an increased risk of lung cancer.[89] The International Agency for Research on Cancer (IARC) has classified RCS as a carcinogenic to humans.[90] In addition, there is a substantial literature to indicate that RCS is a cause of COPD.[91]

Research suggests that the potency of silica dust can vary according to the type of silica, the presence of other minerals, and whether it has been freshly cut. Evidence suggests that dust generated from primary dust sources (e.g. freshly fractured by drilling, blasting, digging, crushing and grinding) is likely to be more active toxicologically than silica dust generated from secondary sources (e.g. resuspension of road dust or dust from packaging, distribution or transport of materials).[92]

## 2.4 Development and diagnosis of pneumoconiosis

As the initial physical signs of pneumoconiosis may be minimal, a comprehensive physical examination, including a detailed occupational and environmental history and lung function testing, is crucial to the assessment of potential disease.[93] In conjunction with these assessment processes, diagnosis is confirmed through chest imaging – typically, a chest x-ray interpreted using the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses, which provides a step-by-step method and criteria for describing and classifying the characteristic lesions that signal the

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84 Emeritus Professor Odwyn Jones, CWP inquiry, submission 4, p 3; Bernard Corden, submission 3, p 1.

85 Monash review, July 2016, p 22; AIOH, CWP inquiry submission 14, p 4.

86 The first symptoms of silicosis are often shortness of breath on exertion, a cough, occasional chest pain, loss of appetite and minor fatigue. As the disease progresses, the shortness of breath gets worse on minor exertion and can be present all the time, the cough is more severe and persistent, the chest pain can worsen, and there is associated fatigue, weight loss and night sweats. See: DJAG, WHSQ, *Silica and the lung,* fact sheet, February 2013. See footnote 53.

87 NSW CSHealth, *Coal workers pneumoconiosis and Silicosis*, webpage, March 2016, available at: www.cshealth.com.au

88 NIOSH, '*Pneumoconioses,* Center for Disease Control, webpage, 24 August 2017. See footnote 70.

89 DNRM, *QGLO2, Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries*, version 1.0, August 2017, p 17; M Jennings and M Flahive, *Review of Health Effects Associated with Exposure to Inhalable Coal Dust*, Coal Services Pty Ltd, 1 October 2005, p 19.

90 Dr John Schneider, submission 9, p 1; K Hedges, S Reed and F Djukic, 'Occupational exposure to respirable crystalline silica in Queensland quarries, exploration sites and small mines', conference paper, Queensland Mining Industry Safety and Health Conference, 2008, p 2.

91 Hedges et al., 'Occupational exposure to respirable crystalline silica in Queensland quarries, exploration sites and small mines', conference paper, Queensland Mining Industry Safety and Health Conference, 2008, p 2.

92 M Jennings and M Flahive, *Review of Health Effects Associated with Exposure to Inhalable Coal Dust*, Coal Services Pty Ltd, 1 October 2005, pp 17-18. See also Dr Robert Cohen, public hearing transcript*,* Brisbane, 15 March 2017, p 8.

93 B Tink (ed.),'Occupational lung diseases', *Australian Doctor* (online), 8 March 2013, p 26.

presence of disease.[94] High resolution computed tomography (CT) imaging and other related technologies[95] can also be used, and have been identified in recent literature as being more sensitive than chest x-rays in detecting pneumoconiosis.[96] However, as there is less data available to support their use for routine chest screening at this time, and higher associated costs,[97] these technologies may also be used for reproducible evaluation and confirmation of findings, and as a tool to improve patient management.[98]

All of these clinical processes are critical to correct diagnosis. Although chest imaging and lung function testing may provide a visual and physiological confirmation of impairment; without an occupational history, the link to workplace exposure may be overlooked. Consideration of pre-employment and other previous health assessment results, together with a broader environmental history (including personal sensitivities and lifestyle factors[99]), provide crucial context for this process, establishing a baseline and trajectory along which any changes in lung function can be identified.[100]

Effective diagnosis also relies on the physician having both a sound knowledge about the various pneumoconioses and a high index of suspicion.[101]

## 2.5 Treatment of pneumoconiosis

Once an individual is affected, there is no specific treatment aside from managing the symptoms – the scarring of the lungs cannot be reversed.[102] The focus is on primary care, and preventing any further exposure or development of disease. Importantly, workers who develop simple pneumoconiosis can be prevented from progressing to severe symptomatic disease if they are removed from dusty

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94 AR Jedynak et al, 'Imaging in Silicosis aand Coal Worker Pnuemoconiosis', *Medscape* (online), 15 November 2015, available at: http://emedicine.medscape.com/article/361778-overview

95 See: Cyclopharm, submission 16.

96 For example, Bhawna et al concluded 'though chest radiograph is the primary diagnostic tool, HRCT is the undisputed Gold Standard for evaluation of these patients'. S Bhawna et al., 'Spectrum of high resolution computed tomography findings in occupational disease: experience in a tertiary care institute', *Journal of Clinical Imaging Science,* vol. 31, no. 3, 2013, p 64. See also: T Tamura et al, 'Relationships (I) of International Classification of High-resolution Computed Tomography for Occupational and Environmental Respiratory Diseases with the ILO International Classification of Radiographs of Pneumoconioses for parenchymal abnormalities', *Industrial Health,* vol. 53, no. 3, pp 260-270; N Suganuma et al., 'Reliability of the Proposed International Classification of High-Resolution computed Tomography for Occupational and Environmental Respiratory Diseases, *Journal of Occupational Health,* vol. 51, 2009, p 211; DN Weissman, 'Role of chest computed tomography in prevention of occupational respiratory disease: review of recent literature', *Seminars in Respiratory and Critical Care Medicine,* vol. 36, no. 3, 2015, p 433.

97 DNRM, response to submissions, p v; See also: DN Weissman, 'Role of chest computed tomography in prevention of occupational respiratory disease: review of recent literature', *Seminars in Respiratory and Critical Care Medicine,* vol. 36, no. 3, 2015, p 433; J Champlin, R Edwards and S Pipavath, 'Imaging of Occupational Lung Disease', *Radiologic Clinics of North America*, vol. 54, no. 6, 2016, pp 1077-1078.

98 DN Weissman, 'Role of chest computed tomography in prevention of occupational respiratory disease: review of recent literature', *Seminars in Respiratory and Critical Care Medicine,* vol. 36, no. 3, 2015, p 433.

99 For example, the effects of smoking or asthma on vulnerability to dust exposure.

100 Unlike injury where there is usually a clear relationship between an incident and the workplace, most occupational diseases are multi-factorial in nature, with workplace exposures constituting one important part of the risk matrix. D Cliff, J Harris, C Bofinger and D Lynas, 'Managing occupational health in the mining industry', conference paper, Coal Operators Conference, University of Wollongong, 8-10 February 2017, p 298.

101 P Cullinan et al., 'Occupational lung diseases: from old and novel exposures to effective preventive strategies', *The Lancet Respiratory Medicine,* vol 5, no. 5, pp 445, 453.

102 AMA Queensland, CWP inquiry, submission 23, p 1; AIOH, CWP inquiry, submission 14, p 2.

environments, limiting further exposure.[103] As smoking can contribute to the condition, it is also strongly advised that the individual stops smoking.[104]

Other management options include:

- inhaled medications, antibiotics, pneumococcal vaccinations
- physiotherapy and pulmonary rehabilitation, consisting of special exercises and education, and
- supplemental oxygen when oxygen desaturation occurs.[105]

Treatment management plans must be developed to address the specific needs of individual patients.[106]

## 2.6 Incidence of disease and affected industries

In contrast to occupational injury - where there is usually a clear link between an incident and the workplace - the long latency period associated with occupational illnesses and the potential influence of other environmental variables together pose a significant challenge for the accurate estimation of the prevalence of disease.[107] As sufferers often will not present with symptoms until many years after their retirement from the industry in which they were exposed, the relationship between the development of lung disease and the workplace exposure may not be identified, especially where other personal disease risk factors may be present.[108]

It is generally acknowledged that there is a 'very significant' under-reporting of occupational diseases in workers' compensation databases.[109]

Current workers' compensation data for Queensland indicates that in the last 20 years there have been 151 claims made in relation to CWP and silicosis (see Figure 2, over page). Of these claims, 22 claimants have been found to have CWP and 30 have been found to suffer silicosis.

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103 Dr Gunther Paul, submission 11, p 1; B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 28.

104 DNRM, *Coal workers' pneumoconiosis,* fact sheet (online), 2016, available at: https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0010/383941/pneumoconiosis-facts.pdf

105 Dr Robert Cohen, public hearing transcript, Brisbane, 15 March 2017, pp 1, 12, 17, 19; B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 28.

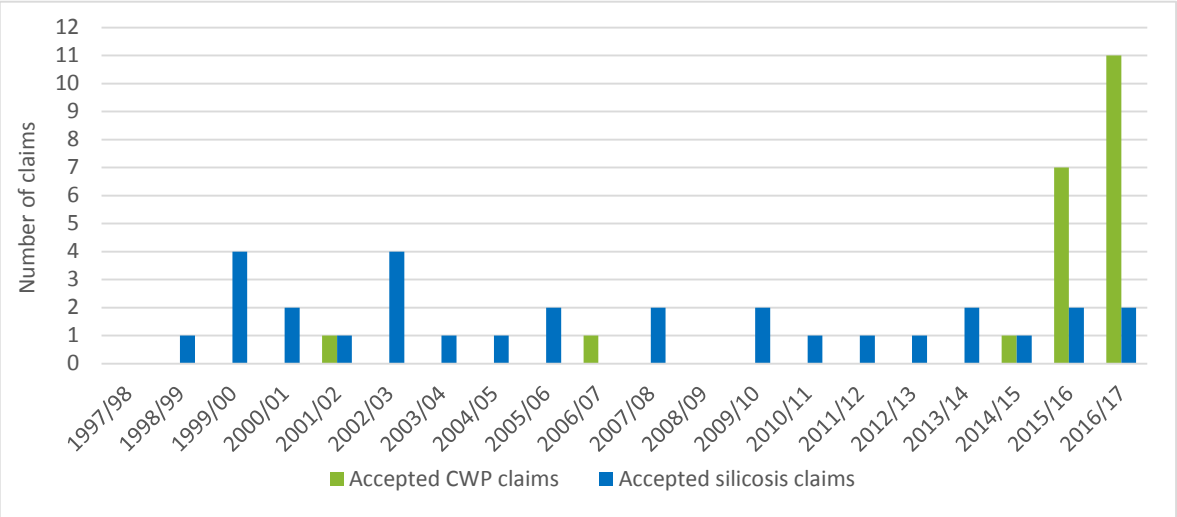
106 B Tink (ed.), 'Occupational lung disease', *Australian Doctor*, 8 March 2013, p 28.

107 D Cliff, J Harris, C Bofinger and D Lynas, 'Managing occupational health in the mining industry', conference paper, Coal Operators Conference, University of Wollongong, 8-10 February 2017, p 298.

108 TSANZ and LFA, CWP inquiry, submission 6, p 2.

109 AIOH, CWP inquiry, submission 14, p 4; Dr John Schneider, submission 9, p 1; Bernard Corden, submission 3, p 1.

**Figure 2 Accepted workers' compensation claims for CWP or silicosis, Queensland, 1997-98 to 2016-17**




**So far in 2017-18 (as at 31 August 2017), one claim for CWP has been accepted*

Source: Compiled by committee secretariat using data sourced from OIR, response to questions asked on 29 August 2017, p 3.

As at 31 August 2017, a further 24 CWP claims were still pending and 16 'report only'[110] claims have been lodged. For silicosis, a further five cases are pending and 28 'report only' claims have been lodged.[111] This represents a very small fraction of the tens of thousands of workers' compensation claims lodged in Queensland annually, but the economic and social costs of these diseases is significant.[112]

Hospitalisation data for patients with a diagnosis of 'pneumoconiosis due to dust containing silicosis' was also provided by Queensland Health (see below).

**Figure 3 Admitted patient episodes of care and distinct number of patients, 'Pneumoconiosis due to dust containing silicosis', public and private acute hospitals, Queensland, 2012-13 to 2016-17**

| Financial Year | Episodes | Distinct Patients |
|---|---|---|
| 2012/2013 | 20 | 14 |
| 2013/2014 | 18 | 11 |
| 2014/2015 | 15 | 9 |
| 2015/2016 | 23 | 9 |
| 2016/2017p. | 13 | 9 |
| Total | 89 | 52 |

**Notes:**
p. 2016/2017 data are preliminary, subject to change.
1. Data limited to ICD-10-AM diagnosis code of J62.8.
2. 'Distinct Patients' refers to individual patients by year of first admission over the five year period.
*Based on probabilistic linkage using master linkage file and name address checking.*
*Source: Queensland Hospital Admitted Patient Data Collection, Statistical Services Branch, Department of Health, Queensland*
*Prepared by: Statistical Reporting and Coordination Unit, Statistical Services Branch, Department of Health*
Date: 14 August 2017

Source: Queensland Health, response to questions taken on notice at a briefing on 9 August 2017, p 1.

110 Report only claims are common for latent onset diseases as they provide the means for a worker who has no injury but has been exposed to potentially harmful materials, to record the exposure event without lodging a formal claim for compensation. If the worker develops a latent onset injury at a future date, the insurer already has a record of exposure, and can progress a compensation claim more quickly. OIR, response to questions asked on 29 August 2017, p 4.

111 OIR, response to questions asked on 29 August September 2017, p 4.

112 P Cullinan et al., 'Occupational lung diseases: from old and novel exposures to effective preventive strategies', *The Lancet Respiratory Medicine,* vol 5, no. 5, pp 445-455.

It is likely that these figures exclude a wide range of other workers who have sought treatment for related respiratory symptoms, given the challenges of diagnosis and limitations of available data.[113]

> *… I think many physicians and the community do not realise… that coalmine dust causes obstructive lung disease. It causes emphysema, chronic bronchitis and lung function impairment in many ways very similar to tobacco smoke. If you had a miner who died of any of these diseases, they would not have taken into account the contribution of coalmine dust exposure to their lung disease and, therefore, again underestimated the proportion of the disease.*[114]

Further, as with all long latency diseases, the current prevalence rates are a result of exposures that occurred in the past, and do not necessarily reflect current working conditions.[115]

Although the incidence of pneumoconiosis has generally declined over the last two decades, the decrease in prominence of occupational disease can sometimes have the unfortunate effect of eroding awareness or vigilance over time. As the health conditions associated with these hazards are slow to develop, signals are delayed. It was submitted by some, for example:

> *I do believe that the focus on asbestos has had a blindsiding effect and that we would do well in all aspects of safety to develop culture knowledge and methodology that is aware of multiple arising issues.*
>
> *We can't go on being so reactive! …Many tradespeople do not even know about silicosis and many small employers are not providing any protection for employees. I believe the asbestos issue has blindsided the authorities to other respiratory dangers.*[116]

The rate of technological change and innovations across industries can also produce novel sources of exposure and resulting occupational disease, as the committee heard from Mr Paul Goldsbrough, Executive Director, Safety, Policy and Workers' Compensation Services, OIR:

> *…I think you have industrial cycles on things. One of the high-risk groups that Ms Nielsen has raised with me is kitchen benchtop stoneworkers. That was not an industry that was around 15 years ago. It was minor then, so I think those sorts of cycles also play into this …*[117]

These various challenges associated with occupational lung conditions can be detrimental to government decision making and policy-setting.[118] Improved understanding and monitoring of workers' exposure and health is critical for identifying trigger points to inform early action.[119]

Previous data from Safe Work Australia's (SWA) National Hazard Exposure Workplace Surveillance (NHEWS) survey has identified that occupational respiratory diseases are 'common' in a range of occupations:

> *For example, mining, farming, manufacturing and service work (e.g. hairdressing) have traditionally been high risk occupations (Ross and Murray 2004; Schenker 2005; Sigsgaard et al. 2010). Workers in construction, plastics and rubber manufacturing, textiles, spray painters and welders have high prevalences of COPD (Meldrum et al. 2005). Bakers have high and increasing rates of allergic asthma triggered by exposure to wheat flour and other cereal species (Houba*

113 TSANZ and LFA, CWP inquiry, submission 6, p 2; AIOH, CWP inquiry, submission 14, p 4.

114 Dr Robert Cohen, public hearing transcript, Brisbane, 15 March 2017, p 4.

115 AIOH, submission 14, p 4.

116 Private correspondence, 6 June 2017.

117 Mr Paul Goldsbrough, Executive Director, Safety, Policy and Workers' Compensation Services, OIR, public hearing transcript, 4 September 2017, p 18. See also: Maurice Blackburn Lawyers, submission 10, p 2.

118 Mr James Purtill, Director-General, DNRM, public briefing transcript, Brisbane, 14 October 2016, pp 2-3.

119 See further discussion in chapter 11.

*et al. 1998). 'Newer' professions such as public administration, education and cleaning are now also associated with high rates of occupational lung disease (Sigsgaard et al. 2010).*[120]

Workplace Health and Safety Queensland (WHSQ) further advised:

*Silica exposure occurs in construction related industries such as quarrying, tunnelling, civil construction, stonemasonry, cement manufacturing, concrete product fabrication, building demolition, high rise concrete construction, brick and tile manufacturing, concrete recycling, bench top manufacture and paving.*[121]

Industry-specific workers' compensation statistics also provide a broad indication of relative risk levels (Figure 4).

**Figure 4 Australia-wide incidence of claims for occupational respirable diseases by industry**

**Number and incidence rate (claims per million employees) by industry, 2000–01 to 2014–15 combined****

| Industry | Claims* | Incidence rate (per million employees) |
|---|---|---|
| Construction | 55 | 5.8 |
| Manufacturing | 36 | 2.6 |
| Electricity, Gas, Water and Waste Services | 34 | 20.2 |
| Mining | 27 | 11.7 |
| Public Administration and Safety | 24 | 2.5 |
| Professional, Scientific and Technical Services | 5 | 0.5 |
| Transport, Postal and Warehousing | 5 | 0.7 |
| **TOTAL** | **203** | |

**Note: Only industries with five or more claims are included and therefore the number of claim do not add to the total.*

**Number of accepted workers' compensation claims by industry sub-group, 2000–01 to 2014–15 combined****

| Industry sub-group | Claims |
|---|---|
| Water supply, sewerage and drainage services | 24 |
| Land development and site preparation services | 23 |
| State government administration | 13 |
| Construction material mining | 12 |
| Non-residential building construction | 10 |
| Heavy and civil engineering construction | 10 |
| Electricity generation | 8 |
| Defence | 7 |
| Other construction services | 6 |
| Coal mining | 6 |
| Structural metal product manufacturing | 5 |

*** Note: Conditions include pneumoconioses, chronic bronchitis and emphysema*

Source: SWA, submission 19, pp 3-4.

120 SWA, *National Hazard Exposure Worker Surveillance: Exposure to dust, gases, vapours, smoke and fumes and the provision of controls for these airborne hazards in Australian workplaces,* July 2010, p 7.

121 WHSQ, *Occupational dust and silica conditions in some Queensland construction and related industries: A report supporting the Work-related disease strategy 2012-2022*, Queensland Government, August 2013, p 2.

In relation to silicosis specifically, OIR advised that of the 30 silicosis claims accepted in Queensland over the last twenty years, 11 were related to employment in manufacturing, 10 to employment in mining, and three to employment in the construction industry. For six claims, the worker's industry is 'unknown'.[122]

**Figure 5 Claims made in relation to silicosis, all industries, Queensland – 1 July 1997 to 31 August 2017**

| | Accepted | Common law only | Denied | Pending | Report only | Total |
|---|---|---|---|---|---|---|
| Construction | 3 | 1 | | | 2 | **6** |
| Education and Training | | | 1 | | 1 | **2** |
| Manufacturing | 10 | 2 | 3 | | 10 | **25** |
| Mining | 11 | 4 | 4 | 1 | 3 | **23** |
| Professional, Scientific and Technical Services | | | | 4 | 1 | **5** |
| Public Administration and Safety | | | | | 5 | **5** |
| Unknown | 6 | 3 | 2 | | 6 | **17** |
| **Total** | **30** | **10** | **10** | **5** | **28** | **83** |

Source: OIR, response to questions asked on 29 August 2017, p 4.

[122] Source: OIR, response to questions asked on 29 August 2017, p 4.

# 3 Regulatory frameworks for protecting and reducing harm from occupational dust exposure

Queensland has a number of key pieces of legislation which govern the management of occupational dust exposure and other workplace health and safety issues within the state. The primary legislation is the *Work Health and Safety Act 2011* (WHS Act) and associated Work Health and Safety Regulation 2011 (WHS Regulation), which are administered by WHSQ, within the Queensland Treasury's OIR.[123]

The WHS Act generally regulates the health and safety of all coal rail, coal port and coal-fired power station workers, together with a range of other Queensland workers who are not covered by industry-specific health and safety legislation (including those in the tunnelling and construction sectors).

In so doing, it acknowledges the operation of other Acts, including the *Rail Safety National Law (Queensland) Act 2017* and the *Transport Operations (Marine Safety) Act 1994,* which are respectively relevant to coal rail and coal port workers.[124]

Workers in coal mines, in metalliferous mines and quarries, and in parts of the petroleum and gas sectors respectively are covered by a separate regulatory framework. [125] This is established under the:

- *Coal Mining Safety and Health Act 1999* (CMSHA) and associated Coal Mining Safety and Health Regulation 2017 (CMSHR)
- *Mining and Quarrying Safety and Health Act 1999* (MQSHA) and associated Mining and Quarrying Safety and Health Regulation 2017 (MQSHR) , and
- *Petroleum and Gas (Production and Safety) Act 2014* (P&G Act) and associated Petroleum and Gas (Production and Safety) Regulation 2004.[126]

Further, some workplaces – including some offshore port areas – may fall within the jurisdiction of the *Work Health and Safety Act 2011* (Cwth) and Work Health and Safety Regulation 2011 (Cwth), which are administered by federal work health and safety regulator Comcare.[127]

There are times when an incident occurs and various regulators need to work together to determine which legislation applies and which agency should investigate and take any enforcement action.[128]

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123 OIR, submission 24, pp 1.

124 OIR, submission 24, pp 1.

125 Section 2 of the WHS Act clarifies that the WHS Act does not apply to a coal mine to which the CMSHA applies; a mine to which the MQSHA applies; or operating plant under the P&G Act other than specified P&G Act authorised activity.

126 The P&G Act is the primary safety legislation for significant facilities or operating plant (e.g. wells, drill rigs, pipelines, gas plants); for places where specific activities occur (e.g. geophysical surveys, LPG delivery networks, tanker deliveries, underground gasification activities, and other petroleum or gas transport and storage, etc); and for authorised activities for a tenure (e.g. for an authority to prospect – exploration and testing and any incidental activities). However, various other non-petroleum-related activities/plant that are often be positioned on petroleum tenures (e.g. towns, homesteads and unrelated infrastructure) are not subject to the safety management plan obligations required by the P& G Act. Further, the WHS Act generally also applies: during construction stages of the operating plant; for activities relating to major hazard facilities and hazardous chemicals; and for authority-authorised activities. See: DNRM, *Guideline to what is Operating Plant under the Petroleum and Gas Production and Safety Act 2004 and interaction with the Work Health and Safety Act 2011,* Queensland Government, February 2014.

127 The functions of Comcare as a work health and safety regulator are to monitor and enforce compliance of relevant duty holders, which includes the Commonwealth Government, Commonwealth authorities and non-Commonwealth licensees. See: OIR, submission 24, pp 1-2.

128 OIR, submission 24, pp 1-2.

Where a worker sustains a work-related injury or illness, including an occupational lung disease, the Queensland workers' compensation regime provides for the worker to access benefits and injury management to support their treatment, rehabilitation, and as far as possible, return to work.[129]

## 3.1 *Workplace Health and Safety Act 2011*

The WHS Act and WHS Regulation give effect, in large part, to national model work health and safety (WHS) laws developed through a review process completed in January 2009.

One of the objects of the WHS Act is to protect workers and other persons against harm to their health, safety and welfare through the elimination or minimisation of risks arising from work or from particular types of substances or plant.[130] In so doing, the WHS Act specifies that 'regard must be had to the principle that workers and other persons should be given the highest level of protection against harm to their health, safety and welfare from hazards and risks arising from work or from particular types of substances or plant as is reasonably practicable'.[131]

Various persons have different health and safety duties which reflect the degree of influence or control they have in relation to eliminating or minimising exposure to the risk.[132] However, the primary duty of care rests with a person conducting a business or undertaking (PCBU), which includes an employer or a self-employed person.[133]

A PCBU is required to ensure, as far as reasonably practical, that the health and safety of workers and other persons is not put at risk from work carried out as part of the conduct of the business or undertaking. This includes ensuring: the provision and maintenance of a work environment that is without risks to health and safety; the safe use, handling and storage of plant and substances; and the monitoring of the health of workers and the conditions at the workplace for the purpose of preventing illness or injury arising from the conduct of the business or undertaking.[134]

The WHS Act establishes roles for workplace health and safety representatives, union WHS entry permit holders and WHS inspectors to secure compliance with the Act at Queensland workplaces. This includes providing for compliance actions such as the issuing of provisional improvement notices, improvement notices and prohibition notices; and the use of court injunctions or prosecutions to halt or penalise non-compliant behaviour.

A range of associated offences and penalties are also established under the WHS Act. Penalties associated with the three categories of offences range from $500,000 to $3 million for a corporation.[135]

The WHS Act also sets out requirements for incident notification to WHSQ where the conduct of a business or undertaking results in the death, serious injury or serious illness of a person or involves a dangerous incident.[136] However, these provisions focus on immediate safety risks (e.g. explosion or structure collapse) or incidents involving immediate injuries or health threats requiring medical treatment within 48 hours of exposure. Due to the latency period associated with dust-related disease, respirable dust exposure events generally do not meet the criteria for incident notification.[137]

The WHS Regulation provides further detail regarding the discharge of duties under the WHS Act, including in relation to the management of airborne hazards and the provision of health monitoring. Further guidance is also provided in various codes of practice, standards and guidelines.

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129 *Workers Compensation and Rehabilitation Act 2003* (Qld), s 5.

130 *Work Health and Safety Act 2011* (Qld) (WHS Act), s3(1(a)).

131 WHS Act, s3(2).

132 OIR, submission 24, p 3.

133 OIR, submission 24, p 3.

134 WHS Act, s19(3).

135 OIR, submission 24, p 7.

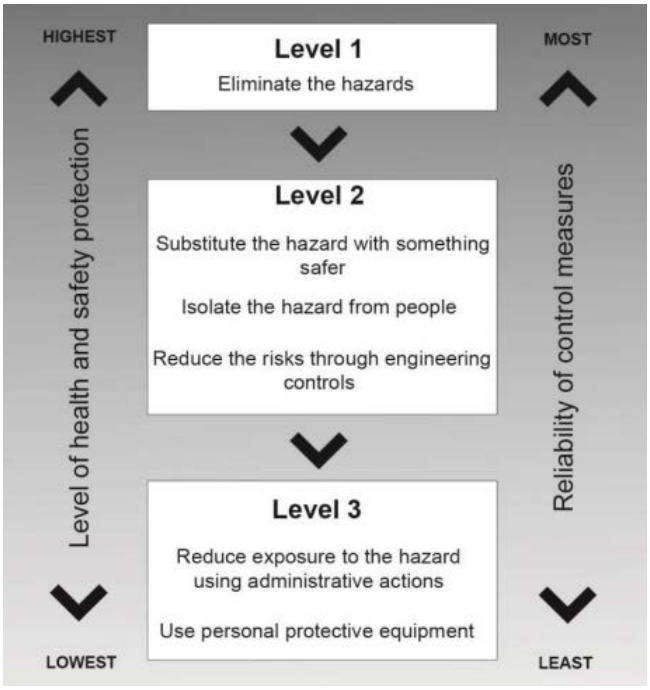
136 OIR, supplementary response to questions asked on 29 August 2017, p 3.

137 OIR, supplementary response to questions asked on 29 August 2017, pp 3.4.

### 3.1.1 Work Health and Safety Regulation 2011

The WHS Regulation stipulates that when managing health and safety risks, duty holders must follow a hierarchy of controls, such that the control measures to be used are prioritised according to the efficacy of their protection and reliability.[138] Elimination of the hazard is the highest level of protection, and the use of personal protective equipment (PPE), including respiratory protective equipment (RPE), is the lowest (see Figure 6).[139]

**Figure 6 Hierarchy of controls for risk management under the WHS Regulation**




Source: OIR, WHSQ, *How to manage work health and safety risks – Code of practice 2011*, 1 January 2012, p 14.

In relation to the management and monitoring of risks from airborne contaminants, the regulation further specifies that a PCBU must ensure that:

- no person at the workplace is exposed to a substance or mixture in an airborne concentration that exceeds the exposure standard for the substance or mixture[140]
- air monitoring is carried out to determine whether the airborne concentration of a substance or mixture at the workplace exceeds the relevant exposure standard or if monitoring is necessary to determine whether there is a risk to health[141]
- the results of air monitoring are recorded and kept for thirty years after the record is made, and made readily accessible to persons at the workplace who may be exposed.[142]

The 'exposure standard' means an exposure standard in the *Workplace Exposure Standard for Airborne Contaminants,*[143] which is produced by SWA – the Commonwealth body responsible for developing

138 Work Health and Safety Regulation 2011 (Qld) (WHS Regulation), s36.

139 OIR, submission 24, p 6.

140 WHS Regulation, s49.

141 WHS Regulation, s50.

142 WHS Regulation, s418.

143 WHS Regulation, Schedule 19. See also: SWA, *Workplace Exposure Standards for Airborne Contaminants,* 18 April 2013.

evidence-based policy to support the implementation of national model WHS and workers' compensation laws.[144] The document currently contains exposure standards for 644 substances, including:

- coal dust – 3.0 mg/$m^3$ (milligrams per cubic metre), and
- RCS – 0.1 mg/$m^3$.[145]

These two standards are time-weighted averages for an eight-hour shift period, and must be adjusted for shifts exceeding this duration, to account for the cumulative effect of additional exposure time.

SWA is currently reviewing all 644 exposure standards, a process expected to be finalised by the end of 2018.[146] Whilst mindful of this review process, this committee has previously recommended that the exposure standards for coal dust and silica be lowered to 1.5 mg/$m^3$ and 0.05 mg/$m^3$ respectively, in keeping with international best practice.[147]

Chapter 7 of the WHS Regulation also prescribes duties for the PCBU in relation to:

- the management of hazardous chemicals, including the generation of hazardous substances at a workplace,[148] and
- the provision of health monitoring to workers carrying out ongoing work using, handling, generating or storing hazardous chemicals where there is a significant risk to the worker's health because of exposure to a chemical mentioned in Schedule 14 of the WHS Regulation.[149]

Schedule 14 requires health monitoring for crystalline silica, through methods such as standardised respiratory function tests and chest x-rays. It is the responsibility of the PCBU to determine whether the risk to workers is significant and whether health monitoring is required, since the PCBU has the best understanding of the work that is or will be carried out at the workplace. In some instances the PCBU may seek expert advice, for example from a medical practitioner, to assist in determining the level of risk, based on the nature and severity of the hazard and the degree of exposure in the workplace.[150] Such determinations should include consideration of workplace processes and practices, the adequacy of existing control measures, and the results of air monitoring for airborne contaminant levels.[151]

Although coal dust is not included in Schedule 14, SWA advised that as it is a hazardous chemical where it exists in a workplace, a PCBU would be required to deal with its risk to workers and other persons:

> *Given there are valid techniques available to detect effects on worker health, a health monitoring program in relation to coal dust, may be a reasonably practicable measure that is required to be implemented by a person conducting a business or undertaking under the model WHS laws.*[152]

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144 SWA, *About us,* July 2017, webpage, available at: https://www.safeworkaustralia.gov.au/about-us#functions

145 Dr Simon Blackwood, Deputy Director-General, OIR, Queensland Treasury, public briefing transcript, Brisbane, 14 June 2017, p 21.

146 SWA, submission 19, p 6; Mrs Jacqueline Shepherd, Acting Director, Occupational Hygiene, Safe Work Australia (SWA), *public hearing transcript,* Brisbane, 9 August 2017, pp 17-19; OIR, submission 24, p 8.

147 *Black lung, white lies* report, recommendation 19.

148 WHS Regulation, ss 328(1)(a), 351-354, 357.

149 WHS Regulation, ss 368-378.

150 OIR, submission 24, p 5.

151 OIR, submission 24, p 5.

152 SWA, submission 19, p 6.

Where health monitoring is carried out, the regulation requires that:

- the PCBU pays for the costs of health monitoring[153] and provides information on the history of the worker's exposure, including the work tasks which have prompted the health monitoring[154]
- the monitoring is carried out by or under the supervision of a registered medical practitioner with experience in health monitoring[155]
- the PCBU takes all reasonable steps to obtain a health monitoring report from the registered medical practitioner[156] and provide a copy to the worker as soon as practicable[157]
- if the report contains advice that test results indicate the worker may have contracted a disease, illness or injury as a result of the work exposure or any recommendation that the PCBU take remedial measures, the PCBU must provide a copy of the report to the regulator[158] and other relevant PCBUs,[159] and
- health monitoring reports must be retained for at least thirty years.[160]

More specific monitoring requirements are prescribed in relation to asbestos and lead dust.[161]

The WHS regulation prescribes a range of different penalties applicable where a PCBU (or other relevant duty holder) fails to meet their statutory obligations for risk management, airborne exposure monitoring and health monitoring.

### 3.1.2 Codes of Practice

Queensland has adopted 20 of 23 model codes of practice under the national model WHS laws, in addition to 21 preserved codes of practice where there is no equivalent model code of practice or the codes support a number of regulations that were carried across from the now repealed Workplace Health and Safety Regulation 2008.[162] The adopted codes of practice are admissible in legal proceedings as evidence of whether or not a duty or obligation under the WHS Act has been complied with.[163]

OIR submitted that 'the following codes of practice are relevant to managing exposure to the risks from airborne contaminants at work':

- *Abrasive Blasting Code of Practice 2013*
- *Foundry Industry Code of Practice 2004*
- *How to Manage and Control Asbestos in the Workplace Code of Practice 2011*
- *How to Manage Work Health and Safety Risks Code of Practice 2011*
- *How to Safely Remove Asbestos Code of Practice 2011*
- *Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013*

153 WHS Regulation, s 372.

154 WHS Regulation, s 373.

155 WHS Regulation, s 371(1).

156 WHS Regulation, s 374(1).

157 WHS Regulation, s 375.

158 WHS Regulation, s 376.

159 WHS Regulation, s 377.

160 WHS Regulation, s 378(1).

161 WHS Regulation, ss 392-418; 419-529.

162 The adopted codes, as approved on the notice of the Minister, are listed in Schedule 1 of the Work Health and Safety (Codes of Practice) Notice 2011, which is subordinate legislation under the Act. See: WHS Act, s 274.

163 WHS Act, s 275.

- *Spray Painting and Powder Coating Code of Practice 2013*
- *Welding Processes Code of Practice 2013.*[164]

Also relevant is the national model *Excavation Work Code of Practice 2013,* which commenced on 1 December 2013, having replaced Queensland's former *Tunnelling Code of Practice 2007.*[165] This code is augmented by the more detailed and specific guidance outlined in the *Guide for Tunnelling Work,* developed by SWA in consultation with jurisdictions.[166]

In addition to these codes of practice, OIR advised that 'there is a wide range of guidance material on WHSQ's website regarding managing the risks from exposure to airborne contaminants'.[167]

### 3.1.3 *Rail Safety National Law (Queensland)* and National Standard for Health Assessment of Rail Safety Workers

For rail operators, rail workers and other persons engaged or interacting with rail operations, the *Rail Safety National Law (Queensland)* (RSNL) and its enabling *Rail Safety National Law (Queensland) Act 2017*[168] (RSNL Act) also apply.[169]

The provisions of this legislation are generally consistent with the WHS legislation, requiring the implementation of a safety management system and comprehensive risk assessment and risk management processes, and requiring that a health and fitness management program be in place.[170]

The health and fitness program must comply 'with the prescribed requirements relating to health and fitness programs'[171], which are outlined in the National Standard for Health Assessment of Rail Safety Workers (NSHARSW).[172] This includes a requirement for a pre-placement health assessment, periodic health assessments, and for triggered health assessments in the case of particular concerns about a worker's health, or to aid diagnosis or monitoring of a particular condition.[173] These assessments must be completed by an 'authorised health professional' with relevant qualifications, competencies and knowledge and understanding of the rail environment.[174]

The frequency and nature of periodic assessments required under the NSHARSW varies according to the worker's rail safety work risk category. Workers categorised as 'Safety Critical' must have a

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164 OIR, submission 24, p 3.

165 The Work Health and Safety (Codes of Practice) Amendment Notice (No. 1) 2013 set out the Attorney-General and Minister for Justice's approval of the *Excavation Work Code of Practice 2013*, and revoked the *Tunnelling Code of Practice 2007*. See: Work Health and Safety (Codes of Practice) Amendment Notice (No. 1) 2013, Explanatory Notes for SL 2013 No. 259 made under the Work Health and Safety Act 2011, 2013, pp 1-2.

166 OIR, submission 24, p 9. Note: The *Guide for Tunnelling Work* states that it should be read together with other codes of practice relevant to tunnelling work. See: SWA, *Guide for Tunnelling Work,* November 2013, p 5.

167 OIR, submission 24, p 3.

168 The *Rail Safety National Law (Queensland) Act 2017* (RSNL Act) applies the *Rail Safety National Law (Queensland)* (RSNL) – the state's modified version of the Rail Safety National Law – as a law of Queensland. The RSNL Act repeals the previous *Transport (Rail Safety) Act 2010* (Qld) and provides various transitional provisions and definitional guidance to aid in the interpretation of the RSNL. See: Explanatory Notes, Rail Safety National Law (Queensland) Bill 2016, 2016, p 2.

169 Where there is any inconsistency, the occupational health and safety legislation prevails to the extent of the inconsistency. See: WHS Act, Schedule 1, Division 3, s 5; *Rail Safety National Law 2017* (Qld), s48.

170 RSNL, e.g. ss52, 53, 99-103, 114.

171 RSNL, s114.

172 BHP, response to questions taken on notice at the hearing on 9 August 2017, p 3.

173 National Transport Commission, *National Standard for Health Assessment of Rail Safety Workers,* 2017 edition, February 2017, p 34.

174 National Transport Commission, *National Standard for Health Assessment of Rail Safety Workers,* 2017 edition, February 2017, p 25.

health assessment prior to commencement; every five years to age 50; then every two years to age 60; and on an annual basis thereafter.[175]

For Safety Critical worker health assessments, this includes a health questionnaire, a clinical examination, and for the highest-risk workers in this category, additional pathology tests relating to cardiac risk levels and other conditions that might result in sudden incapacity or collapse.[176]

As the NSHARSW does not prescribe any requirements for assessment of respiratory health, the WHS legislation applies in this regard. BHP Mitsubishi Alliance (BMA) advised that under the risk-based approach to health assessment under the WHS Act, which is to be informed by airborne exposure monitoring results, 'our exposure monitoring indicates a low risk of dust exposure, which means that respiratory health tests are, as a general rule, not warranted'.[177]

#### 3.1.4 Transport Operations (Marine Safety) Act 1994

The *Transport Operations (Marine Safety) Act 1994* (Qld) imposes a general safety obligation on all owners, operators, masters and crew of a ship in a pilotage area or port in Queensland[178] to operate vessels safely at all times, including making sure the ship is safe, properly equipped and maintained, and operated in a safe manner.[179]

The Act confers powers on shipping inspectors to investigate contraventions under the WHS Act.[180]

### 3.2 Mining and petroleum industry safety and health legislation

Queensland's mining industry WHS legislation is largely consistent with the structure and content of the general WHS legislation, but contains provisions to address the unique hazards and greater risks associated with mining and establishes an associated compliance regime and inspectorates.[181]

The committee's previous inquiry considered in detail the provisions of the CMSHA, CMSHR and associated statutory instruments and guidance, as they relate to the prevention and reduction of harm to coal mine workers from coal dust exposure (as per the scope of the initial terms of reference). Here, the committee focussed on the relevant regulatory protections for workers in the metalliferous mining and quarrying sector, as outlined in the MQSHA and its associated regulation and guidance.

#### 3.2.1 Mining and Quarrying Safety and Health Act 1999

The MQSHA was developed in tandem with the CMSHA, as a result of an extensive tripartite process between government, industry and unions over the six years following the fatal explosions at Moura No. 2 mine in 1994.[182] Like the CMSHA, the MQSHA is based on risk-management principles which require each mineral mine and quarry to have an SHMS in place to identify and control the specific

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175 BHP, response to questions taken on notice at the hearing on 9 August 2017, p 3.

176 National Transport Commission, *National Standard for Health Assessment of Rail Safety Workers,* 2017 edition, February 2017, p 30.

177 BHP, response to questions taken on notice at the hearing on 9 August 2017, pp 3-4.

178 *Transport Operations (Marine Safety) Act 1994* (Qld), s11(1)(b).

179 Queensland Government, *General safety obligation*, webpage, 6 June 2017, available at: https://www.msq.qld.gov.au/Safety

180 Utilities, Science and Innovation Committee, *Report no. 12, 55th Parliament, Transport Operations (Marine Safety) and Other Legislation Amendment Bill 2015*, February 2016, p 12.

181 N Gunningham, 'Evaluating Mine Safety Legislation in Queensland', Working Paper 42, National Research Centre for Occupational Health and Safety Regulation and Regulatory Institutions Network, Australian National University, 2015, pp 6- 7.

182 Hon T McGrady (Minister for Mines and Energy and Minister Assisting the Deputy Premier on Regional Development), Second Reading Speech, Coal Mining and Quarrying Safety and Health Bill, Cognate Debate, *Hansard,* 24 March 2016, p 733.

risks to health and safety from its operations to within limits which are acceptable and as low as reasonably achievable (ALARA).[183]

While the MQSHA establishes safety and health obligations for all workers and other persons who may affect operations, the Site Senior Executive (SSE) – the most senior officer responsible for and located at or near a mine or quarry – is the officer primarily responsible for the establishment and implementation of the SHMS. Mines and quarries must also have a supporting management structure including key statutory officers (certified as competent by a board of examiners).[184]

Site Safety and Health Representatives[185] (SSHR) and District Worker Representatives[186] (DWR) have an important role in reviewing, auditing or inspecting the SHMS and its application, similar to the roles of workplace health and safety representatives and union WHS permit holders under the WHS Act.

However, primary compliance responsibilities rest with mines inspectors and inspection officers, whom the MQSHA empowers to:

- monitor and audit the effectiveness of the SHMS and associated procedures in controlling safety and health risks
- investigate complaints, serious accidents and high potential incidents and other matters that affect the management of risk to persons, and
- take appropriate action where unsafe practices or conditions are detected to ensure timely corrective or remedial action.[187]

Where a mine is not managing a hazard to an acceptable level of risk, available compliance actions include stopping and securing plant and equipment, issuing directives, directing the mine's SSE or senior management to attend a compliance meeting, or recommending prosecution under the Act. The Mines Inspectorate may also issue a notice of Substandard Conditions or Practice (SCP) which outlines any advice given to mine operators, SSEs or other obligation-holders about how to manage risk to an acceptable level.[188] In addition, a range of offences and penalties apply.

The MQSHA also acknowledges the role of the Commissioner for Mine Safety and Health to monitor and report on the implementation of the legislation, including chairing industry committees and advising the Minister generally on matters of mine safety and health.[189]

### 3.2.2 Mining and Quarrying Safety and Health Regulation 2017

The MQSHR elaborates on the provisions of the MQSHR by setting out more specific detail on ways of achieving an acceptable level of risk, including establishing requirements in relation to dust control and monitoring and the health assessment and surveillance of workers.

Where a hazard has the potential to cause a significant adverse effect, the SSE is required to carry out a health assessment prior to the worker being exposed to the hazard, and periodically as necessary to

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183 *Mining and Quarrying Safety and Health Act 1999* (Qld) (MQSHA), ss 6, 26.

184 DNRM, written briefing, 8 June 2017, p 2.

185 The SSHR is an employee of the mine or quarry, selected by other employees to inspect and review safety matters, and investigate certain complaints about safety.

186 Industry safety and health representatives are district workers' representatives who are elected by unions and appointed by the Minister to inspect and review safety matters and to investigate certain complaints about mine safety.

187 MQSHA, ss125-126. The MQSHA also provides for the appointment of 'authorised officers' with similar functions. See: MQSHA 126A-126D.

188 DNRM, written briefing, 8 June 2017, p 6. Section 125(d) of the MQSHA identifies that the functions of inspectors and inspection officers include helping persons achieve the purposes of the Act by providing advice and information on how the purposes are to be achieved.

189 MQSHA, ss 68-69, 26, Schedule 2, etc.

assess changes in the worker's tolerance. The SSE must also carry out appropriate health assessments for visitors and keep records of health assessments.[190]

Hazard controls are required to be applied according to the hierarchy of control[191] (Figure 5), with the SSE to provide PPE if necessary to reduce exposure and to ensure it is used competently and is effective in reducing the worker's exposure.[192] The control measures are to be implemented so as to ensure that a worker's exposure to the hazard does not exceed the 'applicable' exposure limit and is as low as reasonably achievable.[193] The applicable limit could be either:

- the defined occupational exposure limit (OEL), which for silica is 0.1mg/m$^3$ (time-adjusted for an eight-hour shift), reflecting the SWA exposure standard[194] and consistent with WHS legislation, or
- a lower limit based on the worker's health assessment and personal factors.[195]

The regulation also clarifies that the time-weighted exposure limit must be adjusted for non-standard work cycles, including work cycles in variance to an 8-hour workday with 40 per week, cycles that decrease the available time for a worker to recover from the adverse effect of the hazard, and cycles involving strenuous work that may increase the effects of a hazard.[196]

The SSE is required to ensure worker exposure to the respirable dust is regularly monitored and the monitoring results analysed in accordance with *Australian Standard 2985, Workplace atmospheres – Method for sampling and gravimetric determination of respirable dust.*[197]

In addition, the SSE must arrange health surveillance if the SSE believes or ought to reasonably believe that exposure may result in an adverse health effect, the effect may happen under work conditions, and a valid monitoring procedure is available to detect the health effect (e.g. clinical tests, etc). The health surveillance must be done by or under the direction of an appropriate doctor, and the SSE must ask the doctor to give the health surveillance report to the SSE and the worker. The SSE must keep surveillance reports for 30 years for hazards with a cumulative or delayed effect or otherwise for seven years. If mine operations cease, the SSE must seek and comply with directions from the Chief Executive regarding the storage of health surveillance reports.[198]

Where a worker suffers adverse effects from exposure to a hazard, the SSE must remove the worker from, and ensure the worker does not resume, work that would increase effects or prevent effects from decreasing.[199]

### 3.2.3 Guidelines and guidance notes

In addition to the regulatory guidance provided in the MQSHR, the MQSHA provides for the Minister to make guidelines for safety and health that identify ways to achieve an acceptable level of risk to persons arising out of operations.[200] Similar to the situation in relation to codes of practice under the

190 Mining and Quarrying Safety and Health Act Regulation 2017 (MQSHR), ss131-132.

191 MQSHR, s8. Section 140 of the MQSHR sets out requirements for the provision and use of PPE if a person's exposure to a hazard at a mine cannot be prevented or reduced other than by using PPE (i.e. all other reasonable measures in the hierarchy have been deployed).

192 DNRM, written briefing, 8 June 2017, p 4.

193 MQSHR, s 135.

194 DNRM, written briefing, 8 June 2017, p 3.

195 MQSHR, ss 133, 135.

196 MQSHR, s 134.

197 MQSHR, s 136.

198 DNRM, written briefing, 8 June 2017, p 4.

199 DNRM, written briefing, 8 June 2017, p 3.

200 MQSHA, ss 62-63.

WHS Act, the risk can be managed in a different way to that outlined in the guideline, but only if it can be shown that the method utilised is at least as effective as the method utilised in the guideline.[201]

There are currently two guidelines and 21 guidance notes pertaining to metalliferous mines and quarries in Queensland. This includes the new *Guideline for management of respirable crystalline silica in Queensland mines and quarries* (RCS guideline), which commenced on 1 August 2017.[202]

The new RCS guideline requires that:

- workers are made aware of potential RCS hazards at the mine as part of induction and refresh training, and when it is a known hazard for a particular task
- an exposure monitoring program is developed in consultation with an occupational hygienist for activities identified as having an RCS exposure risk, providing for assessment of groups of workers with similar exposure as a result of their work tasks (similar exposure group or SEG)
- exposure monitoring is undertaken periodically to ensure hazard controls remain effective
- any exceedances of the applicable OEL are investigated and are notified to the inspectorate within 28 days (including identifying the worker and exposure level, cause of the exceedance, control measures implemented to prevent recurrence and action taken to confirm the effectiveness of control measures), and
- an occupational hygienist conducts statistical analysis on the exposure data every two years.[203]

The guideline provides information to help operators determine the minimum number of samples required and the minimum frequency of periodic monitoring for each workgroup or SEG.[204]

## 3.3 Workers' compensation legislation

The *Workers' Compensation and Rehabilitation Act 2003* (Qld) (WCRA) and the associated Workers' Compensation and Rehabilitation Regulation 2014 provide the framework for managing workers' compensation and rehabilitation in Queensland, including establishing WorkCover as a statutory agency to provide workers' compensation insurance for employers.[205]

Under the legislation, all employers must be insured for work-related injuries sustained by an employee either under a WorkCover policy or under a licence as a self-insurer.

Where employees (or certain other individuals) sustain an injury in relation to their work, the legislation sets out entitlements to compensation and access to damages, as well as providing for:

- management of compensation claims by insurers
- injury management, emphasising rehabilitation of workers particularly for return to work

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201 MQSHA, s34(3), 45(1)(b).

202 Queensland Government Business Queensland, Mining, Safety and Health, *Recognised standards, guidelines and guidance notes*, webpage, 18 August 2017, available at: https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/legislation-standards/recognised-standards

203 Mr Mark Desira, Inspector of Mines, Occupational Hygiene, DNRM, *public hearing transcript,* Brisbane, 4 September 2017, pp 3-4, 6; DNRM, *QGLO2, Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries*, version 1.0, August 2017, available at: https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0006/1263669/qgl02-guideline-mines-quarries.pdf

204 DNRM, *QGLO2, Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries*, version 1.0, August 2017, p 11. See also: Mr Mark Stone, Executive Director, Mine Safety and Health, DNRM, *public hearing transcript,* Brisbane, 4 September 2017, p 7.

205 WorkCover Queensland, *Workers' Compensation and Rehabilitation Act 2003*, website, 29 June 2015, available at: https://www.worksafe.qld.gov.au/laws-and-compliance/workers-compensation-laws/laws-and-legislation/workers-compensation-and-rehabilitation-act-2003

- procedures for assessment of injuries by appropriately qualified persons or by independent medical assessment tribunals, and
- rights of review of, and appeal against, decisions made under the Act.[206]

The regime has recently been enhanced by government reforms implemented to address shortcomings identified through this committee's inquiry process and by a stakeholder reference group.[207] The reforms, passed by the Parliament on 23 August 2017, included amendments to improve the claims process and compensation entitlements for pneumoconiosis sufferers (CWP, silicosis and asbestosis), including allowing for workers who experience disease progression to 're-open' a claim and access further benefits under the scheme.[208]

The Workers' Compensation Regulator is responsible for undertaking reviews of decisions and managing appeals under chapter 13 of the WCRA.[209]

### 3.4 Proposed legislative reforms

On 7 September 2017, the Minister for State Development and Minister for Natural Resources and Mines, Hon Dr Anthony Lynham MP, introduced the Mines Legislation (Resources Safety) Amendment Bill 2017 in the Queensland Parliament. The bill proposes amendments including:

- new requirements for ventilation officers at underground mineral mines
- ongoing statutory certificates to maintain a high standard of professional competence
- new powers for the chief executive to suspend or cancel individuals' statutory certificates of competency and SSE notices if they fail to meet their safety and health obligations
- new civil penalties for mining companies that fail to meet their safety and health obligations to workers
- better protection for contract mine workers, and
- upgrades to safety and health at mines or quarries with 11 or fewer workers.[210]

The bill was referred to the IPNRC for consideration and report by 23 October 2017.

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206 WorkCover Queensland, *Laws and Legislation,* 27 January 2016, available at: https://www.worksafe.qld.gov.au/laws-and-compliance/workers-compensation-laws/laws-and-legislation

207 Workers' Compensation and Rehabilitation (Coal Workers' Pneumoconiosis and Other Legislation Amendment Bill 2017, Explanatory Notes, p 1; Minister for Employment and Industrial Relations, Minister for Racing and Minister for Multicultural Affairs, Hon G Grace MP, 'Stronger workers comp protections for black lung sufferers', Ministerial media statement, 23 August 2017, available at: http://statements.qld.gov.au/Statement/2017/8/23/stronger-workers-comp-protections-for-black-lung-sufferers

208 *Workers' Compensation and Rehabilitation (Coal Workers' Pneumoconiosis and Other Legislation Amendment Act 2017* (Qld), assented to on 31 August 2017.

209 WorkCover Queensland, *Reviews and appeals,* website, 28 June 2017, available at: https://www.worksafe.qld.gov.au/rehab-and-claims/reviews-and-appeals

210 Minister for State Development and Natural Resources and Mines, Hon Dr A Lynham MP, 'New laws to crack down on mine health & safety', Ministerial media statement, 7 September 2017, available at: http://statements.qld.gov.au/Statement/2017/9/7/new-laws-crack-down-on-mine-health--safety

# 4 Coal rail workers

## 4.1 Background

In the course of hearing from witnesses giving evidence to the committee's initial inquiry into CWP, the committee heard evidence of exposure to coal dust among rail workers involved in the transportation of coal.[211] In its *Black lung, white lies* report, the committee expressed a preliminary view that:

> *Evidence from hearings and research to date suggests that current monitoring practices, engineering controls and coal dust suppression methods likely do provide an effective means for reducing workers' exposure. Measured coal dust concentrations do not appear to exceed air quality guidelines for health or national exposure standards for airborne contaminants in occupational environments, and there is as yet no evidence of CWP or other respirable conditions relating to coal dust among these workers.*[212]

At the same time, the evidence before the committee gave some cause for concern, and the committee observed:

> *Given the re-identification of CWP among coal mine workers, further investigation may be required into the adequacy and effectiveness of monitoring technologies and monitoring programs along coal rail corridors, at coal export terminals, and at coal fired power stations.*[213]

In its *Black lung, white lies* report, the committee concluded that:

> *… continued health surveillance is necessary for any worker on the coal supply chain involved in the handling and transportation of coal. The committee warns against complacency due to the apparent low risks of exposure to current rail and port workers. The committee was concerned to hear of the more dusty conditions that previously prevailed at coal loadout points, in unsealed train cabins, at rail receiving stations, in the stock piles and around ship loaders. Whilst more recent times have seen the advent of greater use of automated machinery and processes and adequate dust mitigation strategies, the committee is concerned that long term and retired rail and port workers who have worked in these high risk areas may have been exposed to elevated levels of coal dust over a prolonged period of time. The health surveillance of these workers needs to include high-quality chest x-ray imaging with interpretation and classification of that imaging by a physician who is trained and competent in the ILO system*.[214]

The committee made the following two recommendations in that report:

> ***Recommendation 65***
>
> *An expanded or additional category of workers, defined as 'coal worker', should be established to include workers involved in the transportation and handling of coal outside a 'coal mine' including rail workers (e.g.: coal train loaders and drivers), port workers (e.g.: dozer, stacker/reclaimer, and ship loader operators), power station workers, and maritime workers (e.g.: tug and line boat crew).*
>
> ***Recommendation 66***
>
> *The definition of 'coal worker' for these purposes should ensure these workers are protected by the legislated OEL; their working environments are subject to mandatory atmospheric*

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211 *Black lung, white lies* report, p 243, and see the references to evidence listed at that page.

212 *Black lung, white lies* report, p 244.

213 *Black lung, white lies* report, p 243.

214 *Black lung, white lies* report, p 244.

*monitoring of respirable dust and mandatory reporting of the results of that monitoring; and the Coal Workers' Health Scheme.*[215]

As already noted, the committee's terms of reference were later expanded on 23 March 2017 to specifically include coal rail workers (as well as coal port workers and power station workers, considered later in this report.)

## 4.2 Industry overview

Coal haulage in Queensland involves a number of operators.

Aurizon, Australia's largest rail freight operator, is the largest coal hauler in Queensland, operating the above-rail haulage of over 220 million tonnes of coal, and also operating the four Central Queensland coal networks (Newlands, Goonyella, Blackwater, Moura), servicing approximately 50 mines, and coal terminals at five deep-sea ports in Queensland and two in New South Wales.[216] Aurizon also transports coal in the south-west system from the Darling Downs to the Port of Brisbane.

BHP operates BMA Rail, a rail haulage operation, consisting of four trains (comprising three locomotives and 126 wagons), which operates on Aurizon's Goonyella Rail Network.[217]

Pacific National conducts coal haulage in Central Queensland only, from the mine operations to the export ports, employing 283 drivers and associated front-line staff.[218]

Queensland Rail operates the West Moreton coal haulage system with a total coal haulage of about 6.5 million tonnes per annum.[219]

## 4.3 Dust hazards and exposure risks

Concerns arise as to whether airborne coal dust is being breathed in by coal rail workers, and whether it is causing any harm. The dust arises in this way:

> *As a train approaches and moves past a fixed point it pushes air ahead of it, stirring up dust from the ground. With coal trains, some dust may also be blown from the top of the load or from coal remnants in unloaded wagons. As this type of dust is not generated by coal combustion, it will be larger than 2.5 µm* [microns] *in size (PM2.5), and often larger than PM10* [10 microns] *…*
>
> *For trains pulled by diesel locomotives, engine exhaust emissions are another source of particles. Most of these particles would be in the PM2.5 size range.*[220]

## 4.4 What the committee heard

The committee did receive some evidence of concerns regarding poor dust management practices in moving coal by rail. However, very few current or past workers in these areas provided direct feedback to the committee in this regard, which limited the committee's further exploration of these concerns.

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215 *Black lung, white lies* report, p 244.

216 Mr Ed McKeiver, Vice-President, Coal Customers, Aurizon Holdings Ltd, public hearing transcript, Brisbane, 22 March 2017, evening, p 5.

217 Ms Bobbie Foot, Head, Business Partnering Health, Safety and Environment, BHP Billiton Mitsubishi Alliance, public hearing transcript, Brisbane, 9 August 2017, p 10.

218 Mr Brett Lynch, General Manager, Queensland Coal and Bulk, Pacific National, public hearing transcript, Brisbane, 22 March 2017 (evening), p 11, 13. Mr Lynch explained that Pacific National does not own any of the infrastructure or loading/unloading facilities. It has only been operating in Queensland for six or seven years but has been operating in New South Wales in the coal environment for decades.

219 Mr Greg Fill, General Manager, Safety, Assurance and Environment, Queensland Rail, public hearing transcript, Brisbane, 22 March 2017 (evening), p 1. This is Australia's smallest coal supply chain, carrying about three per cent of Queensland's coal exports.

220 DEHP, *Rail corridor coal dust monitoring,* fact sheet (online), March 2014, p 1, available at: https://www.ehp.qld.gov.au/management/coal-dust/pdf/dust-monitoring-fact-sheet.pdf

While the Mining and Energy Division of the CFMEU assisted the committee in many ways – including by disseminating information to workers and providing assistance to facilitate their participation where requested – the same could not be said for other unions. Notably, both the Transport Workers Union and the Rail, Bus and Tram Union failed to provide any input to the inquiry. It was communicated privately to the committee that while some workers held concerns, there was a reluctance among the current workforce, and lack of support from some unions, to participate.

Noting this, those workers who did provide evidence to the committee are to be commended.

One submitter stated:

> *The drivers or driver's assistants of these trains were once required to spend the entire loading or unloading time in the coal loadouts to monitor the loading / unloading which was at least several hours per shift. During this time they were exposed to fine coal dust from the loading / unloading process. This dust used to get through the air conditioner filters where supplied and was evident as a fine dust throughout these loadouts and more importantly the respirable content too small to observe. While the trains were* en route *to or from the ports they are constantly crossing other trains and travelling through a cloud of fine coal dust blown from the wagons of the loaded trains train and would contaminate the Drivers cabins, engine rooms and all work areas.*
>
> *The coal train drivers were / are exposed to this dust every time they go to work and in most cases for many years.*[221]

The committee also received, on a confidential basis, some evidence of reports of dust intrusions into locomotive cabins, these reports being made in 2009 and 2010.[222]

In the context of unloading coal at ports, WHS permit holder and CFMEU District Vice-President, Southern Regions, Mr Shane Brunker, also told of cabins lacking positive pressure sealing, and a failure of door seals and hinges to probably seal the rooms.[223]

Maurice Blackburn Lawyers told the committee:

> *More recently, we have fielded numerous enquiries from coal port workers and coal rail workers in relation to CWP, occupational COPD occupational asthma and lung cancer. Most of these workers have shared concerns with us not only about themselves, but also for the hundreds of other men and women they worked alongside over the course of their working lives.*
>
> *These workers were exposed to coal dust during the loading and transporting of coal. Anecdotally, we have heard stories of coal rail workers covered from head to toe in coal dust released from open coal cars as they travelled from pit to port. On this basis, we believe there is a pressing need to consider these workers and their exposure to respirable dust.*[224]

## 4.5 Current industry practices

Risks of harmful dust exposure to rail workers have been addressed in a number of ways, including:

- dust suppression techniques, including veneering (the application to the surface of coal wagon loads of a thin biodegradable polymer layer to minimise dust lift-off)

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221 Jeff Cross, submission 27.

222 CWP inquiry, submission 46 (confidential).

223 Shane Brunker, submission 25, p 4. See also Mr Richard Barry, CWP inquiry, submission 44, regarding the history of unloading practices at coal port terminals. These issues are discussed further in chapter 5 regarding coal ports.

224 Maurice Blackburn Lawyers, submission 10, p 3.

- isolating workers from dust exposure, through practices such as automation, physical removal, and use of sealed working cabins
- monitoring of dust levels, and
- regular health checks for workers.

The hazard, and thus also the dust controls, are focussed at the points where coal trains are loaded and unloaded.[225]

Some examples of these techniques are outlined below.

### 4.5.1 Veneering and profiling

Aurizon has in place a coal dust management plan for its Central Queensland Coal Network (CQCN) and a similar plan for its South West system.[226] Aurizon undertakes veneering of coal wagons at every loading point on its five coal systems. The veneer forms a crust over the load which has been shown, when implemented with wagon profiling, to reduce coal dust lift off by up to 75 per cent in the CQCN.[227]

Similarly, 'the surface of every loaded coal wagon travelling on the Western-Metropolitan rail line is sprayed with a bio-degradable polymer coating to suppress coal dust emissions'.[228]

Another dust suppression technique utilised by Aurizon is the profiling of loaded coal wagons at the loading point. The profile of the loaded coal wagon refers to the shape of the exposed surface of coal on the top of in the wagon. A flat surface with gradually sloping sides is a tried and proven method of dust suppression.[229]

BHP reported that:

> *…. we have strong dust management controls in place throughout the logistics chain which connects our mine, rail and port operations. Before coal is sent to the Hay Point Coal Terminal from a BMA or BMC mine, the surface of the wagons is sprayed with a veneering product that bonds to the coal and restricts the generation of dust. Further, the moisture level of all coal transported to Hay Point Coal Terminal is monitored to ensure it remains above the dust extinction moisture content below which it would be more prone to create dust.*[230]

### 4.5.2 Isolating workers from exposure

Aurizon advised that its locomotives are all fitted with seals and recirculating air conditioning systems. In respect of unloading, Aurizon advised that their train crews were:

> *… out of the firing line. They are not permitted to be outside of the cabin at that point in time. They put the train in automatic and they creep through the unloading process at about 0.7 kilometres an hour in the air-conditioned cab.*[231]

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225 See, for example, Dr Cohen on his United States experience, public hearing transcript, Brisbane, 15 March 2017, p 42. See further the discussion in the coal ports workers chapter of this report.

226 These are available at: http://www.aurizon.com.au/sustainability/environmental-management/dust

227 Aurizon, *Coal Dust Management*, webpage, 2017, available at: http://www.aurizon.com.au/sustainability/environmental-management/dust

228 DEHP, *Rail corridor coal dust monitoring,* fact sheet (online), March 2014. See footnote 220.

229 Connell Hatch, *Environmental Evaluation of Fugitive Coal Dust Emissions from Coal Trains Goonyella, Blackwater and Moura Coal Rail Systems*, Queensland Rail Limited, 31 March 2008, pp 28, 38.

230 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 12.

231 Mr Ed McKeiver, public hearing transcript, Brisbane, 22 March 2017 (evening), p 7.

Similarly, Pacific National advised:

> *Our train drivers obviously operate through the loading process and unloading process and then out on the network. When they do so, in the same manner as described by Aurizon, they are sitting in an air-conditioned cab with filters at the front of the train. The trains are 1½ to two kilometres long. They* [the drivers] *are sitting well away from either the loading or the unloading process.*[232]

BHP told the committee:

> *The overall exposure to coal dust for a BMA Rail operator is very low. Train crew conduct a majority of their tasks within an air conditioned, positive pressure cabin which is part of the pressurised body of the locomotive and further isolated from the locomotive body by a sealed door. Train crew operate all three locomotives in the train from the first locomotive, which is followed by a series of wagons carrying coal.*[233]

### 4.5.3 Exposure and health monitoring

In terms of exposure monitoring, Pacific National noted:

> *In 2014 we commenced a program of occupational exposure monitoring through air sampling, targeting similar exposure groups in order to verify that our workplace controls are working ...*
>
> *The group that I mentioned is a group of workers that have the same general exposure profile for coal dust in this situation because of the similarity and frequency of the tasks. … the two groups that have exposure are drivers and workshop workers or maintainers. The monitoring program has been in accordance with the Australian standard for workplace atmospheres. The results of this monitoring program have been compared against the occupational exposure standard for coal dust, which is three milligrams per cubic metre. The results of our sampling over the last three years are as follows. Our driver group have recorded a mean exposure of 0.05 against the standard of three. Our maintenance group have recorded an exposure of 0.12 against the standard of three parts.*
>
> *We have had no examples that we have exceeded those standards in any of that testing. Just to be clear, we have had no-one go near that level of three.*[234]

BHP reported:

> *Our approach for ensuring the health and safety of our workers in port and rail is made up of the following elements. First, we apply the same risk based monitoring approach for workers at our port and rail operations as we do for our mines. That is designed and overseen by occupational hygienists. As you know, in 2012 BHP set an internal occupational exposure limit for coal dust of two milligrams per cubic metre across our operations, and this includes port and rail. BHP is currently reviewing its internal OEL. We support a government review of the current regulatory limit, and we would be happy to provide any assistance with this. BHP periodically reviews its internal OELs in accordance with the latest science. We also periodically review our activities to ensure the effectiveness of our dust control measures.*
>
> *… In addition, when a worker is required to work in close proximity to the coal-handling equipment, their exposure to coal dust is controlled through the use of personal protective equipment.*
>
> *Thirdly, monitoring at our port and rail operations demonstrates that dust exposure at these operations is low, consistently below both our internal OEL and the regulatory OEL, and we have*

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232 Mr Brett Lynch, public hearing transcript, Brisbane, 22 March 2017 (evening), p 11.

233 BHP, submission 15, p 8.

234 Mr Brett Lynch, public hearing transcript, Brisbane, 22 March 2017 (evening), p 11.

*previously shared these results with this committee. As these results are below 50 per cent of our internal OEL, periodic respiratory health surveillance is not required for these workers. However, we have offered a free respiratory health assessment to all employees at our port and rail operations who may have concerns, and to date 11 employees have taken up this offer. We understand that none of those workers has been diagnosed with CWP.*[235]

BHP advised the committee that it had:

*… advertised a free screening program … for all retired BMA, BMC and BHP employees including port and rail employees. Advertisements highlighting this service ran in a number of Queensland media outlets from March to May 2017. So far more than 100 people have contacted this service. We are not aware of any retired workers who have been diagnosed with CWP following their free health assessments.*[236]

A total of 11 port and rail workers, out of about 200 employees—about 400 employees and contractors had taken up the offer. BHP's understanding was that none of those workers has been diagnosed with CWP.[237]

Regarding the West Moreton system, QR advised:

*Following the introduction of the West Moreton coal dust management plan in 2013, initial and ongoing air quality monitoring has occurred. The studies show that coal dust deposits in general around the community have reduced by 79 per cent through that - the veneering with the polymer on to the wagons as well as improved profiling, where they flatten it out and minimise the surface area of the coal.* [238]

QR further advised:

*The latest information at the sites that are still being monitored is: before the veneering commenced, the research showed that there was a maximum of 20 per cent of dust that is around that may be coal dust. That was fairly similar to even areas where the coal trains did not go through. Since the veneering has commenced, as well as profiling and some other elements that are within the plan there, that is reduced to a maximum of five per cent.* [239]

Aurizon told the committee:

*With 5,500 people employed in the company, of course, many of them live and work in regional Queensland and are involved in the coal haulage business. We monitor their health and safety through a number of programs, including pre-employment health checks and routine health assessments in accordance with the National Standard for Health Assessment of Rail Safety Workers. What may be of particular relevance today is that Aurizon maintains the health records of its employees for 30 years, as required in that standard, after their employment with the company ends. This is partly to assist with monitoring latent onset diseases, such as coal workers' pneumoconiosis, industrial deafness, asbestosis and so on.*

*We have conducted a search of these records and there is no evidence of silicosis or coal workers' pneumoconiosis that have been presented by past, let alone present or future, employees of the company through a latent process. Given our workers compensation obligations, we would*

235 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 12.

236 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 13.

237 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 14.

238 Mr Greg Fill, public hearing transcript, Brisbane, 22 March 2017 (evening), p 3.

239 Mr Greg Fill, public hearing transcript, Brisbane, 22 March 2017 (evening), p 3.

*certainly have expected that if there had been an exposure somewhere in history there would have been a single case, given our scale and the length of time that we have been in business.* [240]

In expressing its opposition to one of this committee's recommendations in its *Black lung, white lies* report (recommendation 65 regarding expanding the definition of coal worker to include coal rail workers), Pacific National stated:

*As a business we have determined the risk profile of our rail workers in the coal supply chain. Through this process Pacific National is confident in the low risk delegation of our workforce in the context of exposure to respirable coal dust and respirable crystalline silica.* [241]

## 4.6 Conclusions and possible improvements

The committee did not receive a lot of evidence of poor practices in coal rail handling. Collectively, many of the concerns that were raised in evidence related to past practices. The introduction in recent years of various practices aimed at reducing workers' exposure to respirable dust and monitoring their health appears to have gone a long way towards alleviating concerns regarding the exposure of coal rail workers.

The committee's further investigations have confirmed its initial view expressed in its *Black lung, white lies* report (and noted at the start of this chapter) that the systems put in place in recent years, including monitoring, engineering controls and coal dust suppression, do provide an effective means for reducing workers' exposure. The committee affirms the comments and recommendations regarding rail workers made in that report.[242]

At the same time, it is important to remain vigilant. Accordingly, the committee harks back to the caution from Dr Robert Cohen quoted at page 9 of this report: 'that if you do not take a temperature you will not find a fever' and that if 'you do not take the temperature of the population you will not find disease and you do not have to worry about it'. [243]

Moreover, it must also be borne in mind that this is an area that can involve diseases with long latency periods, and therefore given poor past practices it is essential that the health of workers – both former and current - be carefully monitored on an ongoing basis.

240 Mr Ed McKeiver, public hearing transcript, Brisbane, 22 March 2017 (evening), p 5.

241 Pacific National, CWP inquiry, submission 40, p 3.

242 *Black lung, white lies* report, pp 243-4.

243 Dr Robert Cohen, public hearing transcript, Brisbane, 15 March 2017, p 10.

# 5 Coal port workers

## 5.1 Background

As noted previously, the committee gave some consideration to the issue of health impacts of coal dust on coal port workers in its *Black Lung White Lies* report.[244] We refer to the discussions under paragraph 4.1 above, where we set out recommendations 65 and 66 from the *Black Lung White Lies* report. Those recommendations apply to coal port workers as well as to coal rail workers.

## 5.2 Industry overview

There are six coal port terminals in Queensland:

- Abbot Point Coal Terminal, Bowen
- Dalrymple Bay Coal Terminal, Mackay
- Hay Point Coal Terminal, Mackay (HPCT)
- Wiggins Island Coal Terminal, Gladstone
- R.G. Tanna Coal Terminal, Gladstone
- Fisherman Island Coal Terminal, Brisbane

A total of approximately 1,830 persons, including contractors, work at the coal terminals.[245]

## 5.3 Dust hazards and exposure risks

In simple terms, there are three main stages of the coal process at ports: unloading of coal trains, stockpiling of coal, and loading coal onto ships. Mr BJ Davison (a coal industry safety, health and management consultant) gave a very helpful outline of the processes at coal ports. It is useful to set out Mr Davison's explanation at some length, particularly as it not only details the usual coal port processes, but also, where relevant, refers to the appropriate engineering or other controls that ought to be in place at various stages of that process:

> *The sub-processes will vary from port to port. The first stage is unloading, where the trains end up at the port and they unload the coal. Typically this is done by entering a dump station and then there are mechanical triggers that trigger the doors under the belly of the coal wagon and the coal falls through a grate into a vault. Then it leaves the vault via conveyors to go out to the stockyard. What is typically done now in probably all the ports is that that process is controlled by an operator in a sealed control room with glass windows right beside the grate. It is a sealed control room that is air-conditioned.*
>
> *From there, the coal goes by way of conveyors and transfer points from the vault—that is the inloading section—out into the stockyard. Typically that conveyor system will be underground obviously because it is picking up coal from the vault. It will elevate the coal up out of the ground through an enclosed conveyor system and then into an open air conveyor system as it reaches daylight. It will then head towards the stockyard and it will transfer to a conveyor that runs across the end of the stockyard…*
>
> *... When it does that, it goes through transfer points … It may be another area of exposure concern or certainly an area to talk about, because you have a lot of coal fines develop and build up in those areas from coal that is dropping from one conveyor to another. The more you handle it the more you are going to pulverise it and the more coal fines are going to build up. Typical controls at this point in the process are things like good housekeeping, having a regime of making sure that the coal fines are continuously hosed into sumps and then reclaimed.*

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244 *Black Lung White Lies* report, pp 243-4.

245 OIR, response to questions asked on 29 August 2017, p 8.

*When coal gets to the stockyard it will be stacked in either a conical or a chevron shaped stockpile, depending on how they do things at a particular port. Often it is done by a bucket wheel stacker with a drop conveyor attached to the machine. There are various forms of it. Usually in one form or another it is simply a conveyor that drops from a height on to the ground. They really are no-go zones and you typically do not have workers anywhere near where that coal is hitting the ground. Really your main control is restricted areas and obviously not having people where coal is falling in the stockyard.*

*When it comes to reclaiming that coal to send it towards the ships, … there are definite variations from port to port. If we take Abbot Point, for example, that coal is picked up by a bucket wheel excavator. That bucket wheel is automated and it is controlled by someone in a control room 500 metres away. There is no risk of personnel coughing up a gutful of coal dust in that format. You do have other ports where that machine is manned. Again, it should be an air-conditioned positive pressure cab, meaning a cab where the pressure inside is higher than outside, therefore repelling the ingress of dust. Certainly at Abbot Point, for example, they still have cabs on the machines. If they need to be manually operated, they can be.*

*I will talk a little bit more about the cabs on machines in general. With other port operations the reclaim process might involve dozers pushing into a coal valve or pushing into a big grate in the ground that then has conveyors under it - almost like the dump station process where you are pushing into a vault and the coal gets picked up again by a conveyor. There are operations where they do that. Gladstone is one example where they might have 20 or 30 dozers pushing coal. They really are working right in amongst it. There is a lot of mechanical movement -large dozers pushing a lot of coal, a lot of coal getting pulverised, a lot of coal being mechanically moved by people who are right in it. The main controls in those cases are the ventilation protection systems.*

*In the cabs of reclaimed machines or in the cabs of dozers or loaders, there needs to be positive pressure and they need to be checked. The maintenance crew can do a smoke bomb test. Whether or not in their maintenance regime they have that done regularly is something that could be considered. Often there is a second stage filtration process where there is more filtering of the air than on a typical dozer which might involve carbon filters and whatnot. Between the sealed air-conditioned cab with positive pressure and adequate filtration, if that is done properly, you can probably reduce the risk quite substantially at that point.*[246]

The possible causes of exposure are similar to those mentioned in chapter 4 regarding coal rail workers.

### 5.4 What the committee heard – concerns raised

The committee did receive some evidence of instances of poor dust management practices. Some of that evidence was contested.

Mr Shane Brunker, CFMEU, outlined poor practices with respect to both train unloading and stockpiling and dust controls on conveyor belts. Regarding unloading practices, he stated:

*… the current operators cabins don't have positive pressure sealing, most door seals and hinges fail to seal the rooms, there is always dust on work surfaces and window sills. Some have Air conditioner which are just a window rattler style that has black staining around the intake and cool air blow area. I have one report of a cabin which was just a "lean to" against the wall inside the shed that had a window rattler style air conditioner that drew its air from inside the shed. It had zero dust seals and was always dusty inside.*

[246] Mr William (BJ) Davison, Independent Coal Industry Safety, Health and Management Consultant, public hearing transcript, Brisbane, 1 February 2017, p 2. See also the description provided by BHP of operations at its Hay Point Coal Terminal: BHP, submission 15, p 9.

*Previous to this "workers" were unprotected inside the unloading shed, minimal dust suppression was used, this doesn't stop dust, it merely reduces it and only functions when the operator initiates it. It's not unusual to open a coal wagon door and have the shed fill with dust.*[247]

Regarding stockpiles and conveyor belts, he stated:

*… during the 1990's and into the 2000's extended stockpile dozing was required due to increase port "through put" at most sites and often with open cab bulldozers in the early years. The pushing out and pushing in resulted* [in] *very dry and dusty coal. There are occasions when pushing coal stockpiles when the dozer comes across a dry or warm pocket in the coal that large amounts of dust are sucked up and blown up through the radiators of the bulldozers. Some of the bulldozers are fitted with high pressure air systems but they are often not functional. In more recent times we now see dust suppression systems in the newer conveyors and stacker/reclaimers. But the more remote locations do not have any stockpile area dust suppression. Some sites attempted to use a water truck on stockpile access roads during windy periods with little success*.

*… At another site I visit the coal stockpiles have water sprays along each side to attempt to keep the dust down. These sprays are connected to a local weather station and run in sequence along the stockpiles on windy days. They can also be turned on manually on very dry windy days although not all sprays can run together as the pump station does not have sufficient capacity. The roadways along the conveyors still become dusty when vehicles are driving along them as the water sprays only wet the stockpiles.*

*(iv) Conveyor systems: "workers" are exposed to dusty situations in conveyor galleries and tunnels, from cleaning up spillage and maintenance work. Coal dust layering is visible on cable trays, buildings/structures and electrical junction boxes. In addition, some sites use open cab Bobcats to clean drains and conveyor transfer stations.*[248]

Mr Brunker elaborated on the content of his written submission in oral evidence before the committee.[249] In response, OIR advised the committee:

- *The condition of cabins (and the air-conditioning filters) will be checked as part of the port audits currently underway.*
- *The OIR is arranging a meeting with Mr Brunker to discuss issues raised in his evidence to the Committee on 23 August 2017.*[250]

Mr Richard Barry told the committee:

*… operators were exposed to the elements, including coal dust from the rail unloading process. To compound the dust exposure problem operators were originally required to manually open the coal wagon doors, this required 2 operators, one to open doors, the other to close the doors and also a third operator to manually jackhammer wagon to remove coal when required… Due to the nature of the coal types and characteristics, manual Jackhammering was sometimes required to release coal from wagons. This required the operator to operate a manual suspension pneumatic jackhammer and walk beside coal wagon while performing jackhammering, while being exposed to excessive amounts of coal dust from the unloading process.(After Quik Drop system was implemented that removed the requirement for operators to manually open and close wagon doors)*.[251]

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247 Mr Shane Brunker, submission 25, p 4.

248 Mr Shane Brunker, submission 25, p 5.

249 Mr Shane Brunker, public hearing transcript, Brisbane, 23 August 2017, p 3.

250 OIR, response to submissions, 8 September 2017, p 33.

251 Richard Barry, CWP inquiry, submission 44, p 1.

The committee heard oral evidence from Mr Mark Zerner, a worker at Gladstone Port for 28 years. Mr Zerner stated:

> *In the history of the port, we used to stand beside the trains in a dusty environment to unload the trains. Then they built cabins beside the trains so we could sit in a cleaner environment. In the last six to eight months, they have moved and built another building completely away from the pits to get us out of that environment, but we still have to go into that environment to jackhammer trains or clean down and do things like that, so there are still a lot of dust issues.* [252]

Regarding use and provision of protective equipment when jackhammering coal out of trains, Mr Zerner told the committee:

> *It has not been mandatory, but there has been the old paper dust masks. If you wish to go and get another mask it is up to the individual, but years ago that was not - and even today - a requirement. They do advertise safety glasses, helmets and stuff like that, but there are no actual masks to go into those environments… It is individual choice. They have not made it a policy that when you go into these areas you have to wear it.* [253]

Further, Mr Zerner also stated:

> *All of our coal is dusty. Years ago we did not have environmental sprays and sprinklers, but the GPC has improved that and since the re-emergence of black lung they have tried to improve it more. We have issues with customers with high-moisture coals, but it is very dry and dusty. They do not like to buy water—they prefer to buy their product—so we have to limit watering it, but we do have misting sprays, overhead sprinklers on the gantries and also ground sprinklers. We have a lot of trouble with prevailing winds and those sprinklers getting to the areas of need.*
>
> *The seals on the dozers only get replaced at the mid life of the dozer. They do not get replaced every service, which causes issues. We have air conditioner filters, but they get clogged regularly. We also have evidence in the crib rooms and offices of coal dust in the fans. It is everywhere we go within the environment. We are trying to eliminate it, but there is still room for improvement. As I said, years ago—over my 28 years of employment—a lot of those things were not around and you just went into an area.* [254]

In response, Gladstone Ports Corporation (GPC) advised:

> *GPC Management has identified a number of points raised in the verbal submission of Mr Zerner that require clarification…*
>
> *Mr Zerner mentioned that despite the new dump station control room being located away from the dump stations, employees were still required to access the dump station to jackhammer trains and clean down the area:*
>
> - *It should be noted that jack hammering of the trains [is] only required for wet /sticky coal, which typically [does] not result in significant dust generation due to the coal being wet / sticky.*
> - *It should be noted that the wash down with water of the dump station only occurs once the train has finished unloading and as such the employees are not exposed to any significant amount of coal dust.*
>
> *Mr Zerner mentioned that air released from the train brakes when they come into the pit stirs up dust:*
>
> - *The trains present to the dump station and remain outside of the dump station until unloading is ready to commence. This is away from our employees' work area. In addition, the dump*

252 Mr Mark Zerner, public hearing transcript, Brisbane, 23 August 2017, p 8.

253 Mr Mark Zerner, public hearing transcript, Brisbane, 23 August 2017, p 8.

254 Mr Mark Zerner, public hearing transcript, Brisbane, 23 August 2017, p 10.

*station is controlled from a building remote from the dump station, as such there are generally no people in the vicinity of an unloading training unless jack hammering is required.*

*Mr Zerner claimed that GPC did not have a policy mandating respiratory protection:*

- *GPC has PPE requirements in place and [has] done so for many years. These requirements are documented and reviewed regularly with the most recent review occurring in April 2016. This PPE Standard details the minimum PPE requirements for the site and specifies that additional PPE such as respirators may be required once a pre-task risk assessment is completed. GPC does not mandate respirators in the dump stations because the conditions do not always warrant the use of a respirator, this is why the pre-start risk assessment needs to assess the hazards present at the time and then determine the required level of protection. All tasks must be risk assessed prior to starting and all employees are trained in performing risk assessments.*

*Mr Zerner mentioned that GPC only has one (1) water truck at the RG Tanna Coal Terminal (RGTCT):*

- *GPC owns one (1) water cart that operates at RGTCT, but also has a contract in place with a contract water cart who operates at RGTCT five days a week.*

*Mr Zerner stated that the coal customers do not like water in their coal and that they only want to buy their product, not water:*

- *GPC manages the product to ensure it complies with its environmental licence requirements. GPC will and has ceased loading / unloading activities or added water to product to ensure it continues to comply with all of its licence requirements and to ensure the health and safety of its people.* [255]

Maurice Blackburn Lawyers told the committee:

*More recently, we have fielded numerous enquiries from coal port workers and coal rail workers in relation to CWP, occupational COPD occupational asthma and lung cancer. Most of these workers have shared concerns with us not only about themselves, but also for the hundreds of other men and women they worked alongside over the course of their working lives.*

*These workers were exposed to coal dust during the loading and transporting of coal. Anecdotally, we have heard stories of coal rail workers covered from head to toe in coal dust released from open coal cars as they travelled from pit to port. On this basis, we believe there is a pressing need to consider these workers and their exposure to respirable dust.* [256]

## 5.5 Current industry practices

BHP (responsible for the HPCT, through its ownership by BMA and operation by Hay Point Services) told the committee that in addition to applying moisture controls prior to the coal's arrival at the HPCT:

*Once the trains carrying coal arrive at Hay Point Coal Terminal they are unloaded and transferred to stockpiles through a highly automated process. This allows the majority of operators to be separated from the working environment in control centres. In addition, when a worker is required to work in close proximity to the coal-handling equipment, their exposure to coal dust is controlled through the use of personal protective equipment.* [257]

*…. monitoring at our port and rail operations demonstrates that dust exposure at these operations is low, consistently below both our internal OEL and the regulatory OEL, and we have*

255 Gladstone Ports Corporation (GPC), correspondence, 13 September 2017.

256 Maurice Blackburn Lawyers, submission 10, p 3.

257 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 12.

*previously shared these results with this committee. As these results are below 50 per cent of our internal OEL, periodic respiratory health surveillance is not required for these workers.*[258]

BHP added regarding monitoring:

… [We] *are committed to doing absolutely everything that we can to care for our workers and assist them with their concerns. Our controls are certainly quite strong at the port. As we said, they manage exposures to less than half of our internal OEL which, as you know, is already lower than the regulatory limit.*[259]

GPC also advised of a number of steps it takes to monitor dust exposure, which include:

- *Sampling of personal exposure to coal dust and crystalline silica dust at the GPC RG Tanna Coal Terminal (RGTCT) occurred in 2008 and again in 2015*
- *In 2008, independent occupational health and safety consultants were engaged to undertake the monitoring*
- *In 2015, GPC safety professionals obtained the samples and sent these onto a laboratory for analysis.* [260]

GPC provided a summary of results data which showed that no measurements exceeded OELs.[261]

GPC advised that it had engaged an occupational physician and an occupational hygienist in May 2016 to conduct a current state assessment of coal dust and crystalline silica dust exposure. The assessment included the review and analysis of the coal dust and crystalline silica dust data collected in 2008 and 2015. The assessment concluded:

- The averages of the samples collected for the production and maintenance workers were less than 10 per cent of the OEL.
- 'The risk of over exposure to respirable coal dust and RCS for personnel working at the RG Tanna site is considered insignificant compared to their respective OELs'.[262]

GPC advised of the following measures taken to manage the exposure to coal dust and RCS:

<u>*Unloading the train in the dump station:*</u>

- Dust is mitigated by keeping the hoppers as full as possible to limit free fall distance.
- Personal exposure to dust is mitigated by:
    - positively pressurising the dump station control cabins (this has been further mitigated recently by constructing a new control room for the dump stations away from the dump stations).
    - restricting access into the dump station while train unloading.
    - prohibiting maintenance work from being conducted in the dump stations when a train is unloading.
    - assessing the condition of the dump station after each train has finished unloading and hosing down coal build up as required. [263]

<u>*Unloading the coal onto the stockpiles via the gantry conveyor trippers:*</u>

- Dust is mitigated by suppression sprays at most transition points along the conveyor process, by water misting sprays on unloading conveyor gantries, by water cannons strategically placed

258 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 12.

259 Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 14.

260 GPC, correspondence, 13 September 2017.

261 GPC, correspondence, 13 September 2017.

262 GPC, correspondence, 13 September 2017.

263 GPC, correspondence, 13 September 2017.

around the stockpile areas, and by stockpile management techniques to keep the stockpile as high as possible prior to pushing the coal out with the dozer.

- Personal exposure to dust is mitigated by:
  - having all dozer cabins positively pressurised. The air conditioning system includes a pre-cleaner and a cabin filter, which are changed regularly by either dozer operators or air conditioning technicians. Filters are stored in fuel bays and training in how to change these filters out is a part of dozer induction.
  - visually checking dozer cabin seals every 250 hours, using smoke bombs every 2,000 to 4000 hours to check the integrity of cabin seals, and replacing door seals every 14,000 hours. The seals are also replaced following any defect report being raised on the seals.[264]

*Reclaiming the coal from the stockpiles via the reclaim conveyors:*

- Dust is mitigated by activating the conveyor belt wetting spray, by an automatic under-conveyor spray cleaning system (auto-clean) for tunnels that cannot be accessed by a bobcat for cleaning of spilt coal, by regular maintenance of conveyor rubber skirts to reduce coal spillage and dust release.
- Personal exposure to dust is mitigated by not scheduling any maintenance work to occur down the reclaim tunnels while the belt is operational (isolations required for the majority of work prevent most tasks being performed while the conveyor is operational), by prohibiting access to reclaim tunnels that have an operating conveyor belt. The only activity performed in a reclaim tunnel with the belt operating is short duration inspection, where the pre-task risk assessment determines whether a respirator is required; and by performing a pre-start risk assessment to determine whether a respirator is required for the task. Respirators are readily available.[265]

*Loading coal into the ship's hatch*:

- Dust is mitigated by automatic water sprays at most transitional chutes onto the five series conveyor belts.
- Personal exposure to dust is mitigated by:
  - use of positive pressure ship loader cabins. Vacuum cleaners are also positioned in each ship loader cabin for operators to use.
  - the ship loader cabin being positioned several metres away from the ships hatch and the point where coal is discharged into the ship's cargo hatch.
  - no personnel being allowed within hatch while loading is occurring.

GPC advised that in addition to the aforementioned mitigation strategies, it also:

- uses water carts to drench roadways to ensure dust generation from vehicle movement is minimised
- has a designated work crew who clean up coal spills, and
- performs ongoing occupational monitoring of coal dust and crystalline silica dust exposure to ensure controls remain effective at managing exposure levels.[266]

[264] GPC, correspondence, 13 September 2017.

[265] GPC, correspondence, 13 September 2017.

[266] GPC, correspondence, 13 September 2017.

## 5.6 Compliance actions

OIR advised the committee of a number of initiatives being undertaken or proposed by WHSQ. This included details of a recent review:

> *Information was sought from coal port/terminal operators regarding their occupational hygiene practices for the purpose of informing future compliance activities. An occupational hygienist reviewed the supplied information and made the following interim findings.*
>
> *All six coal terminals in Queensland are included in the review.*
>
> - *Dust control - control measures to reduce dust are reported to be in place at all terminals. Generally dust controls include covered/enclosed conveyor belts; water sprays along gantries and conveyors; enclosed transfer points; closed operator cabins; and remotely operated coal handling plant.*
> - *Occupational exposure monitoring program – all terminals have an occupational exposure assessment process in place and carried out risk assessments in relation to dust exposure. Dust exposure sampling has been carried out by all facilities for respirable dust/coal dust and respirable crystalline silica. Three coal terminals have carried out statistical analysis on dust exposure sampling data to determine the level of worker exposure. One coal terminal has not carried out statistical analysis on dust exposure sampling data and the status is unknown for the other two coal terminals. The OIR will evaluate whether the statistical analysis used meets relevant occupational hygiene practice and standards.*
> - *Significant risk to health – All terminal operators have indicated they consider there are no workers whose health is at significant risk due to respirable dust or respirable crystalline silica exposure. However, the OIR intends to validate these conclusions as part of its assessment of coal port dust control methods.*
> - *Health monitoring is currently provided by five of the six sites at various intervals. Four terminals provide pre-employment health checks that include respiratory health. Four terminals have confirmed free respiratory health assessments are being provided to current and former workers.*
>
> *The information was used to inform site surveys by an occupational hygienist. These surveys commenced at Fisherman Island Coal Terminal, Brisbane on 28 August 2017 and are scheduled for completion by the end of September 2017.*[267]

The committee was further advised of a current project regarding coal ports:

*Project Plan – Coal Ports*

> *This project is in response to the information provided to the Parliamentary committee. WHSQ has a history of interaction with the coal ports in Queensland as major employers. Interactions have been both proactive and in response to specific issues and events. WHSQ will seek to understand the risk exposure of workers at Queensland coal ports by:*
>
> - *Identifying PCBUs engaged at the coal ports*
> - *Conducting a visual walkthrough by an occupational hygienist to identify risk areas*
> - *Obtaining dust monitoring data from the PCBUs and identified similar exposure groups (SEGs)*
> - *Confirming the risk assessment (if any) performed by the PCBU for SEG at risk*
> - *Taking enforcement action (including performing any dust sampling required as necessary)*
>
> *The condition of cabins (and the air-conditioning filters) will be checked as part of the port audits currently underway.*

[267] OIR, response to questions asked on 29 August 2017, p 8.

OIR provided the committee with data for the period from 1 July 2008 to 29 August 2017, extracted from its Compliance and Investigation System regarding what it describes as 'events', 'assessments', 'notices' and 'field activity' at coal terminals, mineral ports and power stations in Queensland.[268]

Regarding coal terminals, in summary, the data shows from the period from 1 July 2008 to 29 August 2017 there has been:

- a total of 56 events notified to OIR, comprising 16 complaints and 40 incident notifications
- a total of 103 assessments conducted by OIR
- a total of 110 field/site visits conducted by OIR
- a total of eight statutory notices issue, including seven improvement notices and one prohibition notice regarding a coal terminal/port (the latter issued in 2008-09).[269]

## 5.7 Conclusions and possible improvements

Dr Brian Plush submitted that a range of steps ought to be taken to enhance the management of dust at Queensland ports:

- *For each coal loading facility in Queensland and around Australia, to ascertain the risk potential for lung disease from coal dust to workers and surrounding communities, the following research must be undertaken to quantify the existing risk, and understand the risk to past workers:*
  - *identify sources of high risk of exposure to harmful respirable dust for employees, and*
  - *establish a benchmark respirable dust production per tonne of coal handled from the identified source.*
  - *Quantify the efficiencies of installed controls or processes implemented to mitigate respirable dust production.*[270]

Dr Plush further proposed that once the research has been completed and analysed a comprehensive report detailing findings, results and recommendations can be created which will include the following:

- *Identification of respirable dust hazardous zones during the coal transportation process on the site*
- *Establishment of a benchmark respirable dust production at each identified source of respirable dust generation*
- *Quantification of the efficiency of installed engineering controls for the mitigation of respirable dust*
- *Development of a Respirable Dust Management Plan (RDMP) for the Coal Terminal, which will include, but not be limited to the following:*
  - *identification of respirable dust hazardous zones relative to the coal handling process*
  - *development of a risk matrix for each of the identified sources which will include the risk potential based on the benchmark respirable dust production, the risk potential with*

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268 OIR, response to questions asked on 29 August 2017, p 14, and attached tables. For these statistics, note the following definitions: 1) An 'event' is a notified incident (injury), dangerous event or complaint received by OIR, include both WHSQ and Electrical Safety Office. 2) A 'complaint' is where a complaint about health and safety conditions at the workplace was made. 3) An 'incident' is where an injury to a person was sustained, or where there was a dangerous event or electrical incident where there was no injured party. 4) An 'assessment' is where OIR has undertaken an activity or activities to measure compliance against the legislation. Any given assessment may involve one or many 'site visits'. 5) 'Field Activities' are a count of those activities recorded which involved a physical site visit by OIR.

269 OIR, response to questions asked on 29 August 2017, p 14.

270 Dr Brian Plush, submission 17, p 3.

*installed controls operating and the risk potential if improved engineering controls are installed*

- *recommended improvements if installed engineering controls are not mitigating respirable dust as designed; recommended continual dust measurement strategy*
- *development of TARPS (Trigger Action Response Plans) in case of identified increases in respirable dust production at any identified hazardous dust zone*
- *recommended documents for continual measurement and data harvesting of respirable dust production during the transport cycle.* [271]

In the course of the committee's earlier inquiry into CWP, the Maritime Union of Australia (MUA) proposed these recommendations:

- *We recommend that it be mandatory for workers involved in the transportation of coal to be provided with, and wear PPE, including suitable dust masks. We would expect consultation with the MUA to be had in terms of the appropriate dust mask to be provided to workers. That said, PPE should always be considered the final step in mitigating any risk as per the industry standard hierarchy of control.*
- *We recommend a health screening program be implemented which moves away from the traditional 'fitness for work' model, and toward a model based on workers' health and early detection/prevention.*
- *It is our recommendation that workers who are involved in the transportation of coal are provided with a mandatory medical assessment at the commencement of their employment, with a specific focus on determining whether there is any evidence of coal dust exposure.* [272]

In terms of monitoring worker exposure, BHP representatives were asked what impact an extension of the current requirements for dust monitoring under the CMSHR would have on their operations at the HPCT.[273] In response, BHP advised that this would not have any impact on the way their monitoring is done because their current monitoring regime is already aligned with the these requirements, though there might be some difference in the reporting requirements for the information.

Queensland is yet to adopt the national *Model Code Of Practice For Managing Risks In Stevedoring*, which was finalised in December 2016. Activities covered in this code of practice include the loading and unloading of vessel cargo, stacking and storing on the wharf, as well as receiving and delivering cargo within a terminal or facility. This includes specifying that a risk assessment should be carried out and relevant control measures implemented where emissions from plant and substances in ships' holds and storage may affect health and safety, due to the likelihood of reduced air quality from contaminated atmospheres. The model code refers to the related code for *Managing Risks of Hazardous Chemicals in the Workplace* for further guidance in this regard.

The MUA submitted to the committee that this model code should be adopted in Queensland.[274]

As with coal rail issues, many, though certainly not all, of the concerns raised with the committee related to incidents, or alleged incidents, that went back some years. One specific concern in this regard is that older (and retired) workers who were involved and exposed to coal dust at those times, might have ongoing health issues. To quote Mr Davison again:

> *The risks there are particularly perhaps with some older guys who have worked in the industry for a while and back then they used to manually open the wagon door. When that coal drops from the wagons down into the vault, you get these big plumes of coal dust that come up through the grate. You can imagine the guys -plenty of them are still around - who manually opened*

[271] Dr Brian Plush, submission 17, p 3.

[272] MUA, CWP inquiry, submission 44, p 4.

[273] Ms Bobbie Foot, public hearing transcript, Brisbane, 9 August 2017, p 15.

[274] MUA, correspondence, 20 September 2017.

*those wagon doors with a lever. They are the ones I am a little concerned about. We still have guys in the industry who will have spent all day opening those wagon doors and getting covered in coal dust*.[275]

[275] Mr BJ Davison, public hearing transcript, Brisbane, 1 February 2017, p 2.

# 6 Coal-fired power station workers

## 6.1 Industry overview

Queensland currently has nine coal-fired power plants in operation across six power stations, the most southerly of which is the Millmerran power station in the Darling Downs region, and the most northern of which is the Stanwell power station located just southwest of Rockhampton.[276]

The Collinsville power station (Collinsville) and Swanbank B power station (Ipswich) were both closed in 2012. A number of other coal-fired power stations were also decommissioned or converted to other generation sources in previous decades.[277]

A total of approximately 1,020 workers, including contractors, are currently engaged at coal-fired power stations in Queensland.[278]

**Figure 7 Coal-fired power plants operating in Queensland**


| Name | Operator | Year | Capacity (MW) |
|---|---|---|---|
| Callide A | CS Energy | 1965 | 30 |
| Callide B | CS Energy | 1988 | 700 |
| Callide C | IG Power/Callide | 2001 | 840 |
| Gladstone | NRG Gladstone Operating Services | 1976 | 1680 |
| Kogan Creek | CS Energy | 2007 | 744 |
| Millmerran | Millmerran Operating Co | 2003 | 852 |
| Stanwell | Stanwell | 1993 | 1,447 |
| Tarong | Stanwell | 1986 | 1,415 |
| Tarong North | TN Power | 2003 | 450 |

Source: Compiled by CWP Select Committee secretariat using data from: DNRM, *Power Plants Map of Queensland,* updated 1 August 2017, available at: https://maps.dnrm.qld.gov.au/electricity-generation-map/; Australian Energy Market Operator, *Interactive Map,* Electricity, September 2017, available at: http://www.aemo.com.au/aemo/apps/visualisations/map.html

276 DNRM, *Power plants map of Queensland,* updated 1 August 2017, available at: https://maps.dnrm.qld.gov.au/electricity-generation-map/

277 DNRM, *Power plants map of Queensland* (Data), updated 1 August 2017. See above.

278 OIR, response to questions asked on 29 August 2017, p 6.

## 6.2 Dust hazards and exposure risks

Workers in coal-fired power stations engage in a range of work tasks or processes which may involve handling or exposure to coal mine dust or coal fly ash. Coal fly ash (CFA) is a by-product of the coal combustion processes used to generate energy.[279]

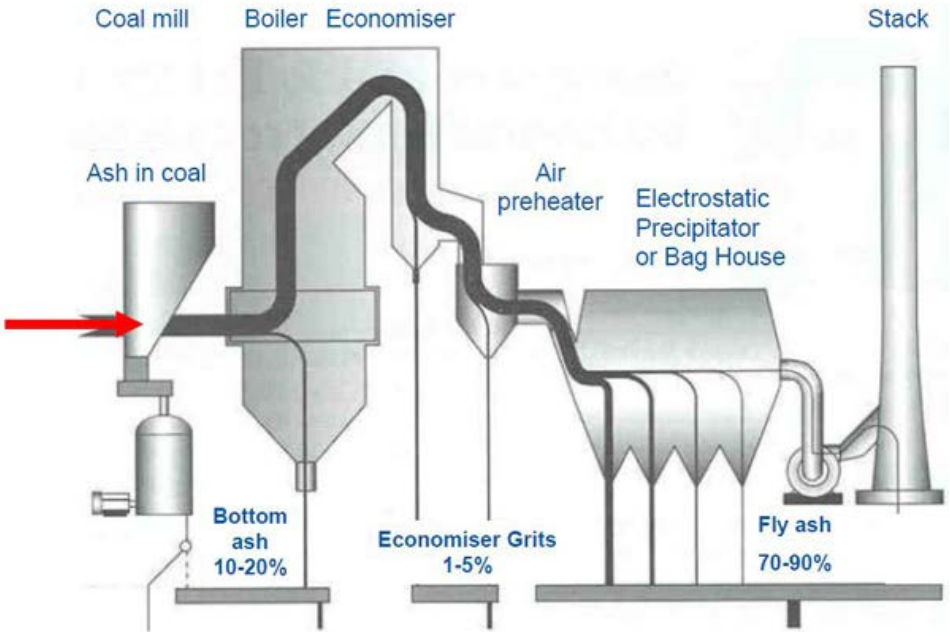
Mr Shane Brunker explained that 'by the time the coal has reached the generators it has been exposed to many processes including re-sizing, crushing, milling, transportation (various methods including belts, rail, and or trucks), all of which affects the composition of the coal'.[280]

Once at the generator:

> *The coal… undergoes a milling process to be pulverised and then pressurised which … is fine respirable dust powder pressurised for injection into burner rows or the burner furnace for combustion.*[281]

The combustion process, in addition to producing steam for power generation, also produces CFA and bottom ash, collectively known as coal ash, as waste. This coal ash is then transferred to a coal ash dam, from where it may subsequently be supplied as a material for cement production.[282]

**Figure 8 Process of bottom ash and CFA production at a power station**




Source: OIR, tabled paper, 4 September 2017; OIR, response to questions taken on notice at a hearing on 4 September 2017, Attachment 1, p 35.

While bottom ash is a relatively coarse ash product, CFA is a fine grey powder, with particles ranging from two microns to 60 microns in diameter – and therefore, a percentage of particles in the respirable range (<10 microns). The composition of CFA includes crystalline silica, aluminium, iron, calcium,

279 Dr Brian Plush, submission 17, p 5; Shane Brunker, submission 25, p 7; Mr Shane Brunker, public hearing transcript, Brisbane, 23 August 2017, p 1.

280 Shane Brunker, submission 25, p 2.

281 Shane Brunker, public hearing transcript, Brisbane, 23 August 2017, p 1.

282 OIR, response to questions asked on 29 August 2017, Attachment 1, p 34.

inorganic metals and hydrocarbons. The type of coal influences the crystalline silica content and the metal content, with implications for the toxicity of the CFA dust.[283]

The literature regarding the adverse human health effects of CFA is less conclusive than the equivalent literature on coal mine dust. A number of toxicology studies have determined CFA to be of lower toxicity than coal dust and RCS in relation to silicosis and lung cancer.[284] However, such studies have also concluded that there is potential for lung tissue injury from inflammatory responses at high levels of exposure, and OIR has acknowledged that 'it is possible that the hazard classification for fly ash does vary significantly between products based on the type of coal and extent of production'.[285]

Safety data sheets for CFA as an input to cement production accordingly acknowledge the respiratory health hazard associated with its inhalation[286], including statements such as the following:

> *High chronic toxicity - irritant. Over exposure to dust may result in mucous membrane irritation of the respiratory tract. Chronic exposure to crystalline silica may result in silicosis (lung fibrosis). Crystalline silica is classified as carcinogenic to humans…*
>
> *In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.*[287]

Previous studies of coal-fired power station workers have concluded that day-to-day operational exposures are likely to be low, which limits the extent to which a health effect is likely to be observed. There are some activities that are associated with airborne concentrations of RCS above exposure standards, such as:

> *… maintenance and cleaning activities that require workers to enter areas where CFA has accumulated in large quantities, for example inside boilers, economisers, flue conveyance ducts, baghouses, electrostatic precipitators and ash silos, and the handling and transport of CFA.*[288]

However, researchers have also noted that such 'exposure to dusty areas and tasks is likely to be confined to short periods broken by prolonged periods of little or no exposure, with the pattern variable from week to week and even day to day'.[289] Further:

> *Although tasks conducted at coal-fired power stations are associated with high levels of respirable crystalline silica, a health effect is not likely if sufficient dust exposure controls are in place.*[290]

That being said, Maurice Blackburn advised:

> *Over the past thirty years our firm has represented many coal-fired power station workers who have been diagnosed with occupational lung diseases, particularly mesothelioma, asbestos-related pleural disease, asbestosis and occupational Chronic Obstructive Pulmonary Disease (COPD). These workers were exposed to extremely high levels of coal and asbestos dust while*

283 OIR, response to questions asked on 29 August 2017, Attachment 1, pp 35-36.

284 OIR, response to questions asked on 29 August 2017, Attachment 1, p 34.

285 OIR, response to questions taken on notice at a hearing on 4 September 2017, p 24.

286 Shane Brunker, submission 25, confidential attachments. See also OIR, response to questions asked on 29 August 2017, Attachment 1, pp 36-37.

287 Shane Brunker, submission 25, confidential attachments. See also OIR, response to questions asked on 29 August 2017, Attachment 1, pp 36-37.

288 OIR, response to questions asked on 29 August 2017, Attachment 1, p 37.

289 OIR, response to questions asked on 29 August 2017, Attachment 1, p 37.

290 OIR, response to questions asked on 29 August 2017, Attachment 1, p 34.

*working inside the confines of notoriously dusty power stations. Sadly, it is not uncommon to hear stories of power stations where more than half of a former workforce has succumbed to mesothelioma, lung cancer or asbestosis. Given the latency periods attached to coal dust and asbestos related conditions, we expect to continue to see high levels of occupational lung disease in these workers in the future.*[291]

## 6.3 Management of dust exposure risks at power stations in Queensland

The committee understands that all Queensland power stations currently have controls in place to prevent worker exposure to hazardous dust. While these controls vary between facilities, examples include:

- dust suppression systems on coal conveyors
- mechanical ventilation and extraction systems
- regular inspection and maintenance to address leaks and prevent accidental release
- maintenance and cleaning regimes involving dry vacuuming and wet washing
- use of appropriate respiratory protection, and
- transport of CFA using a wet disposal process which involves the transport of the CFA to ash dams via pipe, as slurry.[292]

OIR advised that all six power stations have also carried out dust exposure monitoring of workers for respirable dust/coal dust and RCS (fly ash), and provide health monitoring at various intervals.[293]

However, evidence received by the committee suggests there are serious shortcomings in the implementation of controls at some plants. Further – as OIR advised – 'overall, the exposure assessment processes at coal-fired power stations vary in scope from limited to comprehensive'.[294]

A series of inspection reports and images submitted by Mr Shane Brunker (CFMEU), covering the period from mid-2015 to early 2017, depict widespread deficiencies in cleaning regimes and frequent backlogs in system maintenance, resulting in significant accumulations of coal dust and CFA across plant and equipment and surrounding work areas (see images in Figure 9, over page).

The reports indicate that at some power stations, concerns have been flagged repeatedly about delays in carrying out engineering repairs and general complacency around the treatment of dust build-up over time. Issues highlighted over consecutive inspections of the same work areas include:

- a lack of prioritisation of engineering controls to prevent dust build up, including delays in addressing system defects and leaks
- excessive build-up of coal around the belt system, rollers and surrounding walkways
- 'heavy layering' of coal dust in and around the bunkers and boiler house
- an instance in which a ramp made from timber was being used to assist workers in mucking out excessive coal dust with a bobcat, and use of a barricade to prevent access to areas with extreme dust hazard due to dust build-up, as opposed to improving housekeeping regimes, and
- fly ash coating equipment and structures and accumulating across several levels.[295]

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291 Maurice Blackburn Lawyers, submission 10, p 3.

292 OIR, response to questions asked on 29 August 2017, Attachment 1, p 37; Stanwell, submission 14, pp 3-4.

293 OIR, response to questions asked on 29 August 2017, pp 6-7.

294 OIR, response to questions asked on 29 August 2017, p 7.

295 Shane Brunker, submission 25, confidential attachments.

The supplied reports include consistent advice to operators that immediate attention is required to bring dusty areas up to an acceptable standard, recommending their 'immediate vacuum/washdown' and that the PCBU also 'educate employees on standards required for housekeeping and the hazards of airborne contaminants (fly ash)'. Some reports also reference images of fly ash dust clouds supplied by workers, and note discussions with workers that suggest that insufficient time and energy is invested in housekeeping.

**Figure 9 Images of dust build-up in coal-fired power stations in Queensland**

Source: Images supplied by Mr Shane Brunker, CFMEU, on 23 August 2017.

One report stated:

> *… I must place on record that the levels of dust I witnessed on my inspection are as high if not higher than my experiences when I worked underground [in coal mining]. To assist us to determine the extent of the exposure to coal dust I would recommend* [the company] *supply employees with dust monitoring units ASAP and develop some historical data on this matter.*
>
> *… from my observations across the Generation Industry and discussions with workers… there is a significant lack of man hours devoted to cleaning in the coal section… to maintain an acceptable level of risk.*[296]

In further testimony to the committee, Mr Brunker said that 'at most generators you can see these fine dust clouds drifting through the plant'.[297] In relation to coal dust in particular, he said:

> *That dust is just like talcum powder, because it has been through all the belt systems, the crushers, the re-sizers. That is the powder that falls off the belt system. As soon as there is a gust of wind, that just spirals out of control.*[298]

In relation to CFA, Mr Brunker stated that 'the carefree attitude the generation companies take' is of great concern:

> *Generators representatives acknowledge the issue in conversations yet still only rely on PPE as a control measure for the "workers" health, I have been bashing my head against the wall trying to get "real time" dust monitoring and health checks done to no avail. The extremely fine "pf" dust particles and "fly ash" are allowed to blow around the Plants with the potential to cause respiratory illness to "workers". When maintenance workers are working on the mill next to the leaking mills their exposure could be up to 12 hours a day for* [one week] *to weeks at a time. This exposure time is significant.*[299]

Additionally:

> *… when I notify generator station managers I am coming to site in accordance with the workplace health and safety legislation—I have to give them 24 hours notice for an inspection—the management team hastily organises a clean-up with the industrial cleaners. Management forgets that the cleaners are our members and I am tipped off. They conduct spot clean-ups, but within a couple of days the station returns back to the same standard. I regularly witness production and maintenance workers going about their daily duties at the generators oblivious to the dangers of the PF and the fly-ash leaks.*[300]

### 6.4 Compliance actions and improvements

OIR has advised that WHSQ inspectors have been looking more closely at coal-fired power stations following an explosion at Callide Power Station in 2015. While initial inspections concentrated primarily on explosive atmospheres,[301] this focus has subsequently been expanded to encompass a comprehensive audit of dust controls, exposure monitoring and health assessments at the stations.

In early 2017, audit inspections were carried out at all six coal-fired power stations. OIR advised that a number of issues were identified, with each power station provided with feedback and the overall results presented to the industry association.[302] Each facility committed to rectify or improve matters

296 Shane Brunker, submission 25, confidential attachments.

297 Shane Brunker, public transcript, Brisbane, 23 August 2017, p 1.

298 Shane Brunker, public transcript, Brisbane, 23 August 2017, p 4.

299 Shane Brunker, submission 25, p 4.

300 Shane Brunker, public transcript, Brisbane, 23 August 2017, p 2.

301 Shane Brunker, public transcript, Brisbane, 23 August 2017, p 16.

302 OIR, response to questions asked on 29 August 2017, pp 6-7.

identified in the audits, and compliance has been monitored on an ongoing basis to ensure corrective actions are implemented.

In relation to dust monitoring, OIR advised that the audits found 'an inconsistent approach to the use of personal and atmospheric dust monitoring'. All facilities were requested to provide further details of their monitoring and any data, and a WHSQ occupational hygienist is 'reviewing each data-set and engaging with the PCBU on next steps'.[303]

Interim findings of this review process have acknowledged that monitoring is currently being carried out and two power stations have carried out statistical analysis on exposure sampling data to determine the level of exposure. Further, health monitoring is being provided by all power stations to some extent. More particularly:

> *Two power stations indicated pre-employment health checks that include respiratory health assessment are provided. Two power stations have confirmed free respiratory health assessments are being provided to current and former workers. One power station indicated annual health assessments are voluntary.*[304]

Informed by analysis of the supplied data-sets, by November 2017 each power station will be inspected by an occupational hygienist to examine the following:

- *The adequacy of the dust exposure monitoring and statistical treatment of the data.*
- *The identification of workers exposed to levels of dust considered as being a significant risk to health.*
- *The adequacy of controls for workers exposed to levels of dust assessed as a significant risk to health, for example, if respiratory protective equipment (RPE) required only after engineering controls are exhausted, and if the selected RPE is appropriate and supported.*
- *The adequacy of arrangements for health monitoring.*[305]

OIR has also committed to meeting with Mr Brunker to address the significant issues raised in his evidence to the committee.[306] OIR advised that in addition to the finalisation of the audit project, the Minister for Employment and Industrial Relations and Minister for Racing and Minister for Multicultural Affairs is considering the development of guidance material for managing coal dust exposure in coal fired power stations, in consultation with representatives of employers and workers.[307]

OIR stated:

> *This material will be informed by the findings of our inspections of the six coal fired power stations in Queensland, and also evaluation of coal and fly ash dust controls used in similar power stations across Australia and overseas, and including guidance material promoted by government occupational health and safety authorities such as the National Institute for Occupational Safety and Health, Occupational Safety and Health Administration (United States of America) and the Health and Safety Executive (United Kingdom).*[308]

The committee expects that these combined activities should lead to much needed refinement and improvement of industry practices, enhancing the protections available to workers.

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303 OIR, response to questions asked on 29 August 2017, p-7.

304 OIR, response to questions asked on 29 August 2017, p-7.

305 OIR, response to questions asked on 29 August 2017, p-7.

306 OIR, response to questions asked on 29 August 2017, pp 8-9.

307 OIR, response to questions asked on 29 August 2017, p-7.

308 OIR, response to questions asked on 29 August 2017, p-7. See also: Mr Paul Goldsbrough, public hearing transcript, Brisbane, 4 September 2017, p 18.

However, in saying this, the committee considers that it is also important to acknowledge that some operators have already demonstrated a proactive commitment to addressing dust issues at their facilities.

For example, Stanwell advised that it has 'an established dust-monitoring program that has been continually improved over time and we have available dust-monitoring equipment at both coal-fired sites', engaging specialist external providers to conduct testing.[309]

In response to the identification of CWP in the Queensland coal industry, the company engaged a specialist occupational physician to perform an independent review and risk assessment of its health surveillance program.[310] This included 'site visits by occupational hygienists at Tarong Power Station to understand the nature of the exposure and review the existing dust-monitoring data'.[311]

Mr Michael Joy, Manager of Health and Safety at Stanwell Corporation Limited, advised that the rates of exceedance at the station have been 'infrequent, if we have any', noting that controls are implemented to manage risks associated with known tasks and environments where increased dust levels are recorded, and that instances of 'overexposure' are followed up. However:

> *The outcomes of this assessment were a refined list of similar exposure groups and recommendations to implement increased randomised sampling schedules for both Stanwell and Tarong power stations. These increased testing programs are underway.*[312]

Additionally, Mr Joy advised:

> *Acknowledging the lag with dust monitoring from time of sampling to results, Stanwell has recently purchased two real-time dust monitors with a view that this can further enhance our program. The devices provide immediate indicative feedback on the effectiveness of controls on work and environment conditions and we are currently in the process of implementing those devices.*
>
> *With regard to health surveillance, Stanwell currently requires the completion of an annual health assessment for all employees exposed to noise and dust hazards at its generation sites. This includes a respiratory health questionnaire and spirometry lung function tests. Tests are compared to previous results and any abnormalities or degradations in results are referred for further testing and follow-up. While we continue to review our current dust management and health surveillance programs, we have also implemented a black lung awareness program and ... a voluntary respiratory assessment program offering a voluntary respiratory health assessment with a specialist occupational medical provider to employees who have had previous coal dust exposure or are concerned about their health. Based on the outcome of this consultation, the occupational physician may refer the employee for further investigation or management, such as a chest X-ray or an appointment with a respiratory specialist.*[313]

The committee provides further commentary on the regulation of respirable dust risks in the industry in chapter 10.

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309 Mr Michael Joy, Manager, Health and Safety, Stanwell Corporation Limited, public hearing transcript, Brisbane, 9 August 2017, p 9.

310 Stanwell, submission 14, p 4.

311 Mr Michael Joy, public hearing transcript, Brisbane, 9 August 2017, p 9.

312 Mr Michael Joy, public hearing transcript, Brisbane, 9 August 2017, p 9.

313 Mr Michael Joy, public hearing transcript, Brisbane, 9 August 2017, p 9.

# 7 Other workers – tunnel workers

## 7.1 Industry overview

There have been three major tunnelling projects in Brisbane in the last decade – the Clem Jones Tunnel (Clem7), Airport Link, and Legacy Way. These projects have all involved underground tunnelling using a combination of tunnel boring machines (TBMs), road headers (see Figure 10), and cut and construction near surface connections where tunnelling was close to the surface.[314]

Early works are now also underway for the city's Cross River Rail project, with a range of demolition activities and bore drilling scheduled for coming months.[315] Additionally, construction of the Inland Rail Project, which will also involve tunnelling works, is due to start later this year.[316]

**Figure 10 Tunnel boring machines and road headers used in the construction of Airport Link and Legacy Way**

TBM 'Rocksy' in the cavern of the Airport Link Tunnel

Legacy Way TBMs 'Annabell' and 'Joyce'

Road headers at work on the Airport Link tunnel

Source: CWP image collection; R Brake, *Airport Link Dust Review,* December 2010, p 24 (bottom right).

Many other significant infrastructure projects may also require a degree of tunnelling work, with recent examples including the Santos GLNG (gas to liquefied natural gas) project, which links pipelines

314 OIR, confidential tabled paper, 14 June 2017.

315 Premier and Minister for Arts, Hon A Palaszczuk MP and Deputy Premier, Minister for Transport and Minister for Infrastructure and Planning, Hon J Trad MP, 'Early works underway for Cross River Rail', Ministerial media statement, 29 August 2017, available at: http://statements.qld.gov.au/Statement/2017/8/29/early-works-underway-for-cross-river-rail

316 The Inland Rail Project will establish a rail freight connection between Melbourne and Brisbane, via regional Victoria, NSW and Queensland. OIR advised that WHSQ is in the process of providing feedback on the terms of reference for the project proponent. OIR, confidential tabled paper, 14 June 2017.

from the Bowen Basin through to gas facilities on Curtis Island near Gladstone;[317] the construction of Brisbane's inner-city busways;[318] and the Gold Coast desalination plant (marine tunnels).[319]

## 7.2 Dust hazards and exposure risks

The work processes involved in tunnelling, such as the cutting, drilling and blasting of rock faces, can generate considerable dust, including RCS – the industry's primary dust hazard of concern.[320] Dust can also be generated during loading of spoil onto conveyors or haulage trucks for removal, and be disturbed by moving traffic – particularly when dust dries out. [321]

As the loosening of the earth is the primary aim of the activity and cannot be eliminated or substituted, risk is generally controlled by a combination of ventilation (extraction and cabin control), dust suppression (water sprays and surfactants), and the use of appropriate respiratory protection (rated for concentration and duration of exposure).[322] These controls must be supported by appropriate education and training in the procedures for implementation, and the health hazards associated with RCS and other respirable dust.

Importantly, given the enclosed nature of the space within which works are carried out – much like in underground mining – 'it is paramount that the primary control provided by the extraction ventilation be constantly organised for optimal performance in order to permit the secondary RPE control to be effective'.[323]

There is also an added imperative associated with the monitoring of worker exposure and any adverse health effects, given 'the working population in the tunnelling industry is partly itinerant, moving from one tunnelling job to another', including interstate.[324]

In relation to the workforce for Brisbane's roadway tunnels WHSQ noted in 2010:

> *Tunnelling for roadway traffic on a large scale is a relatively new operation for Queensland workplaces and, over a period of a decade or more, will employ some thousands of different workers on the several major programs which are currently being undertaken or are being*

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317 The Santos GLNG project involved excavation of a 4.3 kilometre tunnel to complete a 420km pipeline from the Bowen Basin gas fields to the Curtis Island liquefied natural gas (LNG) plant. See: M Pattison-Snowden, 'GLNG's 420km gas transmission project in its final stages', *The Gladstone Observer* (online), 28 March 2010, available at: https://www.gladstoneobserver.com.au/news/tunnels-completion-still-in-pipeline/2212697/

318 The Boggo Road Busway and eastern Busway Project required the construction of a 430m long driven tunnel beneath the heritage-listed Boggo Road Jail and Dutton Park. See: Australian Tunnelling Society, *Boggo Road Busway,* webpage, 2017, available at: http://www.ats.org.au/portfolio-items/boggo-road-busway/

319 As well as the reverse osmosis desalination plant, the project saw workers excavate 4.2 kilometres of tunnels in just over eight months, for the installation of marine inlet and outline tunnels and associated network infrastructure. See: Premier Hon A Bligh MP and Deputy Premier and Minister for Infrastructure and Planning, Hon Paul Lucas MP, 'Green energy challenge for desalination plant', Ministerial media statement, 15 March 2008, available at: http://statements.qld.gov.au/Statement/Id/57072

320 OIR, confidential tabled paper, 14 June 2017.

321 OIR, confidential tabled paper, 14 June 2017.

322 SWA, *Guide for Tunnelling Work,* Australian Government, November 2013, pp 51-52.

323 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control*, version 1, 9 July 2010, , p 8.

324 For example, WHSQ reported that some tunnel workers had worked on projects in Sydney or Melbourne prior to commencing work in the Brisbane tunnels, and professional engineering staff also typically move from project (though not typically placed in the conditions of potential extreme dust that can be regularly experienced by workers at the excavation face). See: DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, pp 5-6.

*planned. Considering this, tens of thousands of Queensland's industrial workforce remain at risk from exposure to silica.*[325]

## 7.3 Management of dust exposure risks in tunnelling operations

Information submitted to the committee in relation to tunnel workers centred on Brisbane's three major tunnelling projects – the Clem7, Airport Link, and Legacy Way.

As previously flagged in this report (see chapter 2.1), the committee was first alerted to possible deficiencies in the management of RCS in tunnelling work by testimony provided during the committee's inquiry into its initial terms of reference.

CFMEU coal mining ISHR Mr Greg Dalliston advised that during the construction of the Airport Link specifically, he and another mining safety and health representative, who was then working on the tunnel project, organised with the chief inspector of mines to visit a tunnel site and 'see what it was like'.[326] Mr Dalliston stated:

*When we went out we went through the dust. It was pretty dusty. When we asked for the silica records they showed the levels of silica they were picking up were six times the legal limit that we had for coalmining at the time - plus higher... They had readings over one milligram per cubic metre…*

*When we raised it with Thiess and with the safety manager, the safety manager did not last much longer after that. He was either moved or left and we were not allowed to go back. We did not get back to have a look… Workplace health and safety look after those…*

*… these blokes were working in it pretty consistently. It was a big area with slow ventilation as well. Those tunnels were big tunnels and there was not much air movement so it made it worse.*[327]

Unfortunately, the committee was not provided with any further information or first-hand accounts from tunnel workers or their union representatives. The Australian Workers Union – the union which represents the majority of Australia's tunnel workers – declined the opportunity to provide input to the inquiry, despite being invited to do so on multiple occasions. [As noted at section 4.4, this was in contrast to the Mining and Energy Division of the CFMEU, which readily and regularly engaged with the committee over the course of the inquiry, including disseminating information amongst members and supporting their participation when requested].

The information in this chapter has been drawn primarily from information provided by OIR, including various exposure monitoring results, WHSQ inspectorate records, and expert reviews of workplace practices.

### 7.3.1 Clem Jones Tunnel (Clem7)

Construction on the 4.8 kilometre Clem7 commenced in September 2006 and continued through till March 2010. The project's dust management practices and worker exposure levels, as reflected in data from WHSQ sampling at three sites between May 2007 and June 2009, were the subject of an 'intervention report' published by WHSQ in July 2010. The report advised:

*Present and planned tunnelling operations for road and perhaps rail transport in the Brisbane metropolitan area are, and will all be, dusty operations in their commencement phases using road heading machines. The current survey has shown that RCS air concentrations to which workers are potentially exposed, and created principally by road heading machines, are excessive. Concomitant use of RPE and extraction ventilation is absolutely essential for all tasks*

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325 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 3.

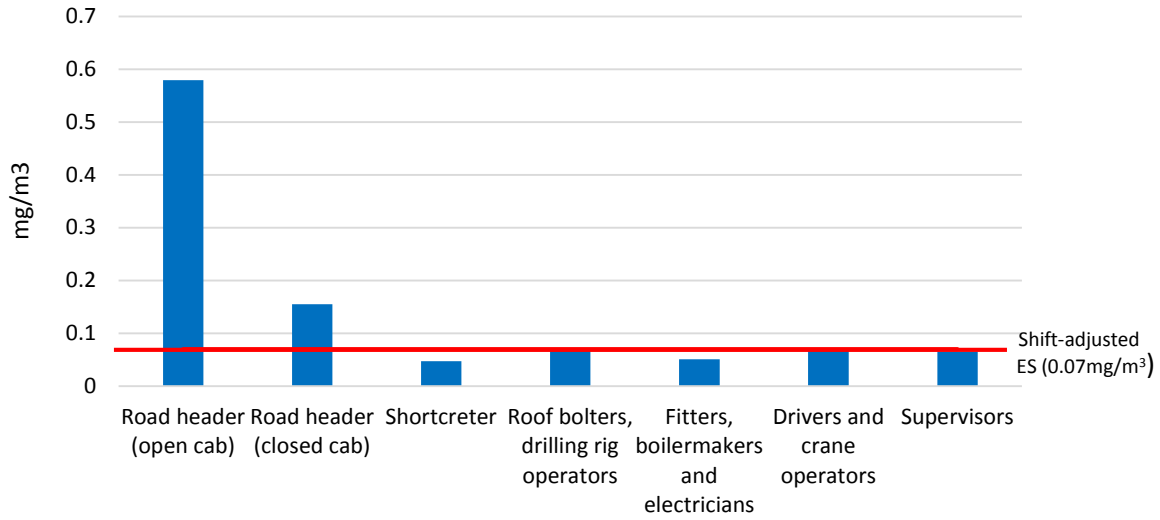
326 Mr Greg Dalliston, public hearing transcript, Brisbane, 15 March 2017, p 31.

327 Mr Greg Dalliston, public hearing transcript, Brisbane, 15 March 2017, p 31.

*around the face. From the personal samples obtained from all SEGs, 59 per cent exceeded an RCS ES [Exposure Standard] adjusted of 0.07 mg/m³ [milligrams per cubic metre].*[328]

Open cabin (cab) road header operators recorded the highest average personal dust concentrations for both respirable dust and RCS, with RCS exposure averaging 0.58 mg/m³ over a standard 10-hour shift – approximately eight times the adjusted exposure standard' (see Figure 11). One average daily RCS concentration was estimated at 4 mg/m³.[329]

**Figure 11 Average RCS concentrations for each of the seven SEGs for the period from 2007-2009**




Source: Compiled from data published in DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, Appendix A1, p 11.

While the risk from dust hazards was significantly reduced for closed cab operators due to the operation of pressurised, air-filtered cabin systems;[330] the average RCS concentration for these operators was also still almost twice the adjusted exposure standard. The report noted, however, that high variance in recorded measurements for this group had served to inflate the average RCS concentration for the period, suggesting that some of the cabin systems were not operating optimally during the program (in some instances doors were left open and/or door seals were poor).[331]

Results for all other worker groups were below the adjusted exposure standard, such that WHSQ advised:

*Contaminant concentrations measured on some shifts where there was little or no road header operation helped bring the overall average dust conditions down. Judged over the two-year period of time that this program operated, the management of risk, on average, could nonetheless be judged as compliant.*[332]

328 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 8.

329 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, pp 7-8.

330 Closed cab operation provided an 80 percent reduction in average dust and RCS concentrations compared with open cab machines. DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control (summary report),* version 1, 9 July 2010, p 3.

331 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 7.

332 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 8.

The report noted that the actual level of workers' exposure would be significantly lower, once the protection factor of PPE (typically ranging from a protection factor of 10, up to 50), is taken into account. That is, where a worker exposed to an average RCS concentration of 0.5 mg/m$^3$, for example, is wearing RPE with a protection factor of 10 (fully functioning and correctly fitted), their actual exposure may be reduced to as low as 0.05 mg/m$^3$. However, it was also acknowledged that 'peak exposures to RCS remain a concern for the development of disease' due to the potential for the protection factor of RPE to be 'temporarily grossly exceeded' and for the exposure to 'overwhelm the respiratory system's defences'.[333] Further:

> *The extent of adherence to RPE usage and the effectiveness of RPE fit testing or fit checking protocols were not assessed.*[334]

The report also stated that while at the time, health surveillance was not strictly required under the state's legislation,[335] it was recommended in the applicable *Tunnelling Code of Practice 2007*, and 'because of the potentially high levels of exposure, workers who make this kind of work a long-term occupation should be considered as candidates for health surveillance for RCS'.[336]

### 7.3.2 Airport Link

Construction on the Airport Link project commenced in November 2008 and continued until July 2012. The tunnelling aspect of the project involved construction of a 6.7km toll road, which is primarily underground and involves twin tunnels and connections at three main interchanges. The size and nature of the project (then the largest transport infrastructure project of its kind in Australia) intensified some of the challenges around the management of its health and safety hazards.[337]

The project was designed, operated and maintained by an unincorporated joint venture between Thiess Pty Ltd and John Holland Pty Ltd (TJH). John Holland is a self-insurer and at the time of the project, was required to comply with federal occupational health and safety legislation, administered by Comcare. Thiess, as the nominated principal contractor for the project, was subject to Queensland jurisdiction and required to comply with the then 1995 WHS Act.[338]

While OIR advised that 'WHSQ commenced proactive engagement with TJH upon their appointment to the Airport Link project', dust issues appear to have become a particular focus of attention in October 2010, at which time an inspectorate group reported concerns about a number of deficient practices observed on site.[339] These concerns were heightened on the inspectorate group's review of the recent respirable dust and RCS monitoring for the project, which prompted WHSQ to:

- issue Thiess with an improvement notice,[340] and
- commence an investigation into possible exposure of workers to RCS, with a view to potential prosecution for a risk-based offence.

The improvement notice provides some insight into conditions on project sites, citing the results of SIMTARS surveys conducted for the company at various sites from August 2010 to October 2010, which

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333 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 9.

334 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 8.

335 *Workplace Health and Safety Act 1995* (Qld), repealed.

336 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control,* version 1, 9 July 2010, p 9.

337 Dr Blackwood, public briefing transcript, Brisbane, 14 June 2017, p 24.

338 Dr Blackwood, public briefing transcript, Brisbane, 14 June 2017, p 24.

339 OIR, confidential tabled paper, 14 June 2017.

340 Comcare also issued a similar notice to John Holland at this time. See: Dr Blackwood, public briefing transcript, Brisbane, 14 June 2017, p 24.

indicated that respirable dust and RCS levels were 'equal to or exceeded regulatory limits on numerous occasions' and that PPE 'was not always worn at all times by all employees'.[341]

Additionally, while TJH representatives had advised WHSQ that a range of control measures were in place, including sealed cabins on plant, ventilation systems and PPE, the notice reveals that the inspectorate group observed a range of failures in their implementation. This included, for example, the removal of a window on a sealed cabin, the pinning back of a door on a road header, a failure to empty dust collection bags for certain ventilation plant, and lapses in use of PPE by some employees.[342]

In a subsequent report produced in November 2010, WHSQ occupational hygiene expert Dr David Grantham further advised of the project's risk management practices:

> *It is not known how long the road header operations still have to run but it may extend into 2011. To the date of issuing the Improvement Notice, WHSQ had been in receipt of dust results for only 8 monitoring shifts covering just two months of the entire operational life of the Airport Link After some pressing, more data have been recently provided, but it is not included in the immediate analysis. In the environment of these tunnelling operations it has been shown just from the 8 reports provided to WHSQ, there is an overwhelming demonstration of many high to very high dust and silica dust concentrations. Clearly the contractors have not yet properly categorised which operations are going to result in high dust and silica exposures or when...*
>
> *Thiess have taken some measures over the two or so years of operation to use air monitoring to provide feedback on controlling the dust and respirable crystalline silica exposures. During the first 12 months in 2009, the average exposure was reported to be around 0.1 mg/$m^3$ … During the period from August to October 2010, the simple arithmetic average respirable crystalline silica exposure has risen to 0.25mg/ $m^3$, averaged across different face and non-face operations. Sixty seven (67) percent of the respirable crystalline silica monitoring dust concentrations during the August to October 2010 period exceeded the adjusted exposure standard. The highest daily exposures (reported by Simtars) during the latter period ranged between 10 and to an estimated 20 times the adjusted exposure standard for respirable crystalline silica for some road header operators. In these situations, equipment mounted air supplied respiratory protection has to be mandatory. The respirator masks in the cabins observed by members of the inspection team were filthy suggesting that some of these masks may not have been in use, and/or that they lacked maintenance.*[343]

Independent subsurface ventilation expert Dr Rick Brake was commissioned by WHSQ to review and report on the management of RCS across the project.[344] Dr Brake also noted with respect to monitoring data that only about 15 per cent of samples were taken on road headers/operators (traditionally the highest risk work group/area), with the remaining 85 per cent of samples taken in other work areas.[345] Despite this, Dr Brake noted, more than half of those 'remaining samples' still exceeded the allowable limit: 'It can therefore be deduced that RCS is a chronic problem generally in the tunnels and not just on the roadheaders'.[346]

Dr Brake's final report, dated 8 December 2010, also included more detailed commentary on the project's engineering controls, referring to the design and operation of the ventilation system as 'defective' and 'both under-designed and inadequate to control all risks':

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341 OIR, confidential tabled paper, 14 June 2017.

342 OIR, confidential tabled paper, 14 June 2017.

343 OIR, confidential tabled paper, 14 June 2017.

344 OIR, response to questions taken on notice at a briefing on 14 June 2017, p 13.

345 R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 18 (OIR, response to questions taken at a briefing on 14 June 2017, Appendix G).

346 R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 18.

*This is evidenced by the consistently high RCS dust concentrations, low air speeds in many areas (including dead spots, flow reversals and dust roll-back), working in unventilated areas and recirculation...*

*The defects in the design include: insufficient total airflow allowance, the set-up of the primary ventilation circuits themselves, the choice and sufficiency of equipment (e.g. scrubbers), the surface intake and exhaust arrangements, and the operation of the secondary ventilation systems (insufficient flows and recirculation).*[347]

In relation to RPE usage on the project, Dr Brake noted that on one occasion an operator was observed smoking while operating a road header outside the cabin – 'a serious cause for concern at any time but especially on a weekday dayshift'.[348] The incident, he suggested, was an example of a broader problem with RPE non-compliance, which he estimated to be at an incidence rate of about five to 10 per cent.[349]

**Image 2 Road header operator out of sealed cabin in close proximity to the dust cloud, *Airport Link* construction**

Source: R Brake, Airport Link Dust Review, WHSQ, 8 December 2010, p 25. Dr Brake noted that the operator was also 'frequently at the control position in front of the cabin, even closer to the dust cloud'.

[347] R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 27.

[348] Dr Brake noted: 'I do not know how long this operator had been employed on this project but it seems unlikely to me that he would have only recently started smoking while operating the machine'. See: R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 34.

[349] R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 34.

Dr Brake also highlighted that SIMTARS had on a number of occasions recommended the mandatory use of RPE for all personnel conducting any work in the tunnel, until dust levels could be reduced through effective engineering controls – advice that did not appear to be implemented:

> *Assuming these comments were not simply repeated from one month to the next, there does not appear to be much effective action taken against these SIMTARS recommendations.* [350]

Dr Grantham similarly reported in this regard:

> *There is little confidence that workers would know just when they would have to use the additional protection afforded by the use of respirators as its application is not mandatory throughout the underground operations…*
>
> *… Only a program with mandatory use of RPE can provide the surety of protection which has been failing the workers in the current system.* [351]

### 7.3.3 Legacy Way

Construction of Legacy Way began in April 2011 and continued to June 2015. The 4.6 kilometre long tunnel, which links the Western Freeway at Toowong to the Inner City Bypass at Kelvin Grove, was constructed by Transcity, a joint venture between BMD Constructions, Acciona and Ghella (an Italian company specialising in tunnelling).[352]

Informed by experiences with the Clem7 and Airport Link projects, WHSQ engaged in 'extensive' pre-planning and consultation with Transcity, to ensure the establishment of preconditions for a safe working environment and proactive risk management:

> *This involved identifying critical tunnelling safety issues (including exposure to RCS), establishing a multi-disciplinary team of inspectors and specialists, ascertaining and resolving jurisdictional issues, determining contractual relationships within the joint venture, and liaising with external experts.* [353]

OIR advised that it was decided during the planning phase that the conventional approach of having materials excavated and transported by trucks to offsite storage areas would not be used, because of the likely increased hazards (truck movements, dust, noise etc.) both in the tunnel and in the surrounding community. Taking into account the proximity of works to the Mount Coot-tha Quarry, 'Transcity designed a conveyor to transport the spoil directly to the quarry' and ultimately 'further refined this design' to adopt a tunnel conveyor system instead of an above-ground conveyor system'.[354]

The majority of tunnelling work was completed using two double-shield TBMs, which simultaneously excavated rock (which passed through the machine and onto the conveyor to be taken to the quarry) and lined the tunnel with concrete segments that formed the walls of the tunnel. This reduced the reliance on road headers and other drilling equipment, which were employed primarily in excavating the cross-passages between the two main tunnels.[355]

Initial dust monitoring results for October 2012 showed nine out of 56 samples analysed were above the adjusted occupational exposure standard for RCS. Following WHSQ's subsequent engagement with Transcity around the refinement of control measures to manage exposure to respirable dust and RCS, further monitoring was conducted by WHSQ in February 2013 across workers engaged in different

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350 R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 18.

351 OIR, confidential tabled paper, 14 June 2017.

352 OIR, confidential tabled paper, 14 June 2017.

353 OIR, Response to questions taken on notice at a briefing on 14 June 2017, p 14.

354 OIR, confidential tabled paper, 14 June 2017.

355 OIR, response to questions taken on notice at a briefing on 14 June 2017, p 14.

aspects of tunnel operations. OIR advised of the samples taken at this time: 'All results were low and could have been conditionally judged as compliant, even without RPE'.[356]

## 7.4 Compliance actions and improvements

The committee's review of evidence provided in relation to these three tunnelling projects revealed some significant historical shortfalls in the WHS legislation itself and raised associated questions about the adequacy of WHSQ's enforcement actions to ensure appropriate management of respirable dust hazards over time. The committee holds significant concerns about possible adverse health impacts for workers who had been engaged on these projects particularly as road header operators, and especially those who worked on Airport Link over an extended period of time.

At the same time, the committee notes that the cumulative narrative across these projects is one of ongoing improvement. WHSQ appears to have appropriately progressed its treatment of these issues to accommodate lessons from each of these projects, adopting a more proactive approach to engaging with project contractors and refining the statutory guidance provided to industry over time.

OIR advised that during construction of Clem7, WHSQ held a number of meetings with the principal contractor to provide advice and direction about the appropriate implementation of controls and the applicable shift-adjusted exposure standard for monitoring. WHSQ inspectors and occupational hygienists also conducted regular safety inspections in the tunnel, over 45 of which dealt specifically with dust-related issues.[357] This does not include the range of additional specific-purpose visits carried out by WHSQ to conduct static and personal monitoring for respirable dust and RCS across three Clem7 sites between May 2007 and June 2009.[358]

Prior to these sampling visits, there had been no previous monitoring by WHSQ of respirable dust or RCS exposure levels in tunnelling. Accordingly, WHSQ flagged that the monitoring results and associated inspection activities and interventions could serve to identify the magnitude, locations and work processes of greatest risk, to inform improved control strategies and provide a baseline against which WHSQ could examine emerging trends in respirable dust or RCS concentrations in tunnelling.[359]

Unfortunately, it seems that the overlap between the conclusion of the Clem7 project and the commencement of Airport Link tunnelling works may have prevented a more proactive early application of these lessons from Clem7.

While tunnelling for the Airport Link commenced in March 2009 and escalated to 24-hour tunnelling in May 2009, the submitted evidence suggests that it was not until October 2010 – some four months after the publication of the Clem7 intervention report – that any significant intervention in relation to Airport Link dust exposure issues was undertaken. This was despite even the very limited early monitoring data provided to WHSQ by Thiess having indicated exceedance issues, and feedback from inspections as late as November 2010 advising that 'dust levels were often visibly very high including in the general body of air well back from face operations'.[360]

Noting this delay, by December 2010, most of the ventilation and design problems Dr Brake identified were 'at this point in the project's life… very difficult and expensive to rectify', and many options for improved controls had 'a lead time for implementation that probably makes them impractical or irrelevant, given almost all of the road headers will have finished operation by January 2011'.[361]

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356 OIR, response to questions taken on notice at a briefing on 14 June 2017, p 14.

357 OIR, confidential tabled paper, 14 June 2017.

358 OIR, response to questions taken on notice at a briefing on 14 June 2017, Appendix I.

359 DJAG, WHSQ, *Report – Tunnelling road deader and related operations: dust conditions and their control*, Queensland Government, version 1, 9 July 2010, p 5.

360 R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 33.

361 R Brake, *Airport Link Dust Review,* WHSQ, 8 December 2010, p 27.

That being said, once the extent and consequences of non-compliance across the project were recognised, WHSQ does appear to have moved quickly to intervene – initiating an investigation with a view to prosecute for a risk-based offence, and issuing an improvement notice to Thiess to manage the risk, within the space of a week. Further, the commissioning of Dr Brake to review and report on the management of RCS across the project also stood to offer definitive guidance in relation to a number of matters that had been contested by Thiess in response to the improvement notice.[362]

Following consideration of Dr Brake's report, and various other inspectorate memoranda and exchanges with Thiess, WHSQ took the approach of directing escalating improvement notice compliance requirements to executive officers personally.[363] Concurrently, in conducting its legal investigation, WHSQ took statements from SIMTARS and road header operators and required Thiess to produce documents in relation to the management of RCS on the project, including plans of the tunnels showing the location and type of ventilation systems, and information regarding health surveillance requirements for workers who may be exposed to dust.[364]

OIR advised that at the conclusion of the risk-based investigation, WHSQ received legal advice that prospects of a successful prosecution were unlikely, and accordingly chose not to pursue legal proceedings. Instead, WHSQ relied on a series of compliance meetings, including engaging with senior project management and their counsel on a legally privileged (without prejudice) basis, 'so as to enable a full and frank exchange about the compliance issues of concern to WHSQ and to resolve any compliance related disputes'.[365] WHSQ also 'continued to closely monitor compliance in inspections carried out through to the completion of construction in July 2012'.[366]

Dr Brake's report notably included a number of recommendations for changes to the *Tunnelling Code of Practice 2007.* These were subsequently approved by the Minister in 2011, following consultation with key stakeholders, and within the scope of the new WHS Act (which replaced the former *Workplace Health and Safety Act 1995*).

OIR advised that 'the relevant key changes made in the code', which came into effect on 31 March 2012 (prior to the August 2012 commencement of tunnelling works for Legacy Way), included:

- *Additional guidance on respiratory protective equipment to clarify:*
  - *RPE should be provided to persons who could be exposed to harmful atmospheric contaminants, such as siliceous dust and it should comply with AS/NZS 1716 – Respiratory protective devices and*
  - *persons using respiratory protective equipment must be provided information, instruction and training of use of the equipment (for example for the equipment to be effective a person needs to be clean shaven).*
- *Additional information on how exposure standards should be applied where a non-standard work roster is employed (i.e. a roster that is not 5 x 8 hour shifts each 7 calendar days) then the exposure standard must be adjusted to suit the hours of work.*
- *Improved ventilation measures for air quality including a requirement for:*
  - *ventilation design to ensure there are no dead spots, low air speed areas, flow reversals, dust concentration or recirculation;*
  - *air velocity of not less than 0.5 metres per second (m/s) of uncontaminated air to be provided in all tunnel sections.*
- *Updating of monitoring air quality requirements to be consistent with the Work Health and Safety Regulation 2011.*

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362 OIR, response to questions taken on notice at a briefing on 14 June 2017, p 13.

363 OIR, confidential tabled paper, 14 June 2017.5.

364 OIR, confidential tabled paper, 14 June 2017.

365 OIR, confidential tabled paper, 14 June 2017.

366 OIR, confidential tabled paper, 14 June 2017.

- *Additional guidance on control measures for silica dust including requirements for contaminated clothing being washed daily in an approved manner to avoid spread of silica around the work site, or off-site, or contributing to individual doses; and a prohibition on cleaning of people and plant using compressed air blow-down.*
- *Updating of health monitoring for hazardous substances requirements to be consistent with the Work Health and Safety Regulation 2011, including guidance that the need for health monitoring is determined by the level of risk resulting from the exposure to respirable crystalline silica.*[367]

Informed by this statutory guidance, and in contrast to the experiences with Clem7 and Airport Link, the approach taken in relation to Legacy Way appears to have been consistent with WHSQ's now current 'driving approach', which emphasises upfront engagement with contractors to ensure optimal design and system planning and to establish a clear understanding of compliance requirements, long before tunnel workers set foot on site.

Early engagement with contractors in this context appears to have contributed to a number of initiatives which reduced the hazard footprint and helped diminish the generation of dust at its source. Dr Simon Blackwood, Deputy Director-General, OIR, advised of these interactions:

> *They met with us a number of times. We had discussions, worked through what would be the best way to move the soil, for instance, and a number of things. They complied.*
>
> *… we were more confident as a result of that experience. We were happy with how Legacy Way went. That will be driving our approach to working with anybody else who builds a tunnel in this state now.*[368]

WHSQ commenced regular inspections when works commenced in August 2012, and maintained a regulatory presence – including conducting inspections and dust monitoring and requiring various remedial actions be undertaken – until construction was completed in June 2015.[369]

During the course of construction, the *Tunnelling Code of Practice 2007* was revoked and replaced with the SWA national model *Excavation Work Code of Practice 2013* and associated national *Guide for Tunnelling Work,* developed in consultation with jurisdictions.[370] Consistent with the content and detail of the repealed 2007 code, 'the national guide has practical advice on managing health and safety risks associated with tunnelling work including a section on air quality, ventilation, managing dusts and silica, air monitoring and respirators'.[371]

In relation to future tunnelling projects in the state, OIR advised:

> *Over the past decade, WHSQ has learnt that the key to maintaining best practice safety standards in tunnelling is pre-project planning and ongoing consultation with industry and experts. The objective on any tunnelling project should be to reduce the respirable dust in the air to a point that mandatory RPE is not required.*[372]
>
> *... getting it right at the front of those projects with the right code will ensure that people will not be exposed to the risk. That is the key from our point of view…*

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367 OIR, response to questions taken on notice at a briefing on 14 June 2017, pp 15-16.

368 Dr Blackwood, public briefing transcript, Brisbane, 14 June 2017, pp 24-25.

369 OIR, confidential tabled paper, 14 June 2017.

370 See footnote 165.

371 OIR, submission 24, p 9.

372 OIR, confidential tabled paper, 14 June 2017.

> *As we did in relation to the other tunnels, we will be meeting with the contractors prior to and during the planning implementation stage, obviously advising them about our expectations in relation to the requirements and then looking at their planning in relation to ventilation and making clear any requirements that we believe would ensure it meets best practice.*[373]

The committee makes further comment on these issues in chapter 10.

[373] Dr Blackwood, public briefing transcript, Brisbane, 14 June 2017, p 25.

# 8 Other workers – construction and manufacturing

In addition to the range of information, compliance and enforcement activities carried out within the tunnelling sector, OIR advised that WHSQ engages in a broad range of activities addressing various other types of work-related exposure to dust and fibres. For example:

> *Asbestos is obviously a big area of activity and concern for us and will continue to be of concern at least for the next 10 years as we work through those issues. There is respirable crystalline silica in terms of construction tasks and the manufacture of stone benchtops … Others include lead, which has been with us a long time…; Q fever; wood dust; and nanotechnology.*[374]

The committee was constrained in its examination of these areas by the information it received. Beyond flagging possible issues in numerous sectors, few witnesses or submitters tendered any evidence regarding either the adequacy of industry practices or WHSQ actions to address them.

That being said, submissions from OIR, which included certain exposure data and reports on WHSQ's targeted intervention activities in recent decades, provide some insights into the historical management of dust in key high-risk sectors.

Of particular interest were the results of proactive dust monitoring campaigns carried out by WHSQ in industries such as:

- foundries – RCS – 1981-2002 and 2009
- radiator repair workshops – inorganic lead dust – 2003-2004
- construction industry – RCS – various construction projects – 2009-2012
- timber-related industries – wood dust – 2009-2010, and
- road traffic controllers – diesel particulate matter – 2015.[375]

Focussing on RCS in particular, data from foundries was collected at 11 ferrous (iron) foundries between 1981 and 2002 and at 12 ferrous foundries (of 18 in total) during 2009.[376] Within such workplaces, 'silica as moulding sand is a fundamental component in the production of metal casting moulds for iron and steel', and 'there is no substitute for this material'.[377]

Between the first and second surveys, the trend of most average and individual RCS exposures was downward, and even with the 2004 lowering of the exposure standard for RCS from 0.2mg/m$^3$ to the current level of 0.1mg/m$^3$, rates of non-compliance with the exposure standard also declined (see Figure 12, over page).[378]

Use of RPE increased markedly between the two survey periods. However, 'not all those with the highest exposures were properly protected, and some workers were recorded wearing no RPE in conditions where exposures ranged up to more than three times the exposure standard for respirable crystalline silica'.[379] In its feedback report to industry, WHSQ noted:

> *Overall, the Queensland foundry industry has recorded some significant improvement in both the exposure conditions over the last 30 years and in the uptake in use of respiratory protection.*

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374 Dr Blackwood, public briefing transcript*,* Brisbane, 14 June 2017, p 23.

375 OIR, submission 24, pp 23; Appendix J, p 6.

376 OIR, submission 24, Appendix J, p 2.

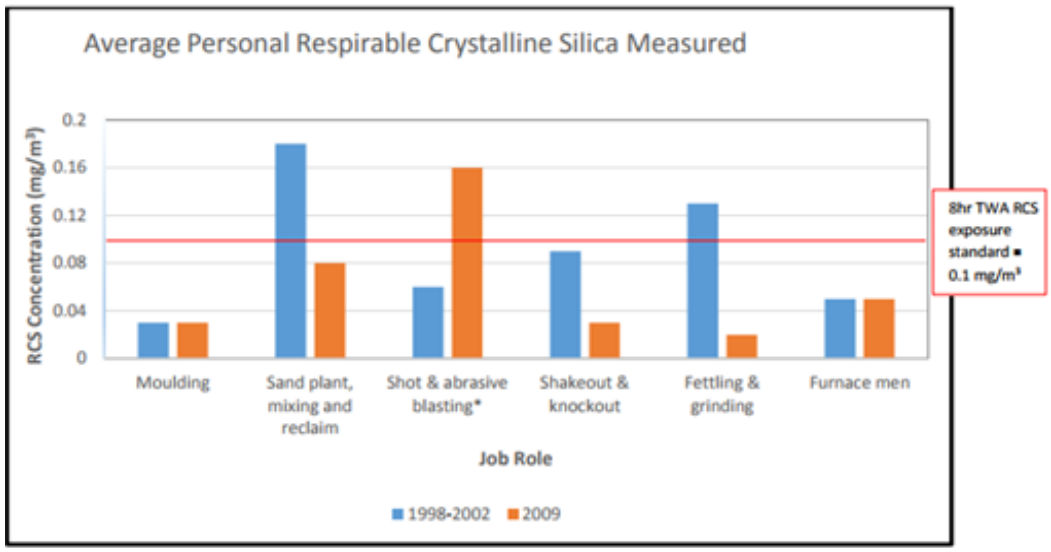
377 OIR, submission 24, Appendix J, p 2.

378 DJAG, WHSQ*, Controlling dust exposures in the Queensland foundry industry 2009: A report supporting the Occupational Disease Strategy 2007-2010,* version 2, 24 March 2011, p 8.

379 DJAG, WHSQ*, Controlling dust exposures in the Queensland foundry industry 2009: A report supporting the Occupational Disease Strategy 2007-2010*, version 2, March 2011, p 8.

*However, the lowering of the exposure standard for RCS in recent years has increased the need for competent control for those who are overexposed and unprotected, currently around 15 per cent.*[380]

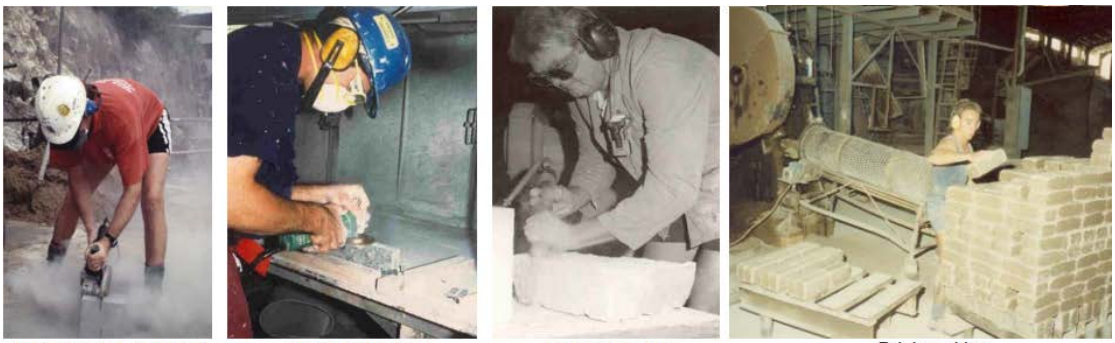
**Figure 12 Personal exposure monitoring data for ferrous foundries, Queensland, 1998-2002 and 2009**




OIR, submission 24, Appendix J, p 2.

In the construction industry, 'one of the largest groups of silica exposed workers in the community'[381], WHSQ's three-year-long intervention program encompassed 20 distinct monitoring interventions across industrial or construction sites engaging in varied operations. Many of these operations involved tasks 'based on sand or products with high silica content'.[382]

**Figure 13 Typical industries and tasks with risks of worker exposure to dusts containing RCS**




Source: DJAG, WHSQ, *Silica – Technical guide to managing exposure in the workplace: Work-related disease strategy 2012-2022,* version 2, February 2013, p 6.

Of a total of 92 workers sampled, 14 per cent were exposed at levels in excess of the workplace exposure standard. All of these workers were found 'in the six dustiest sub-sectors: manual demolition, bench top production, stone masonry, in or below ground construction, concrete block production' (See Figure 14, over page).[383]

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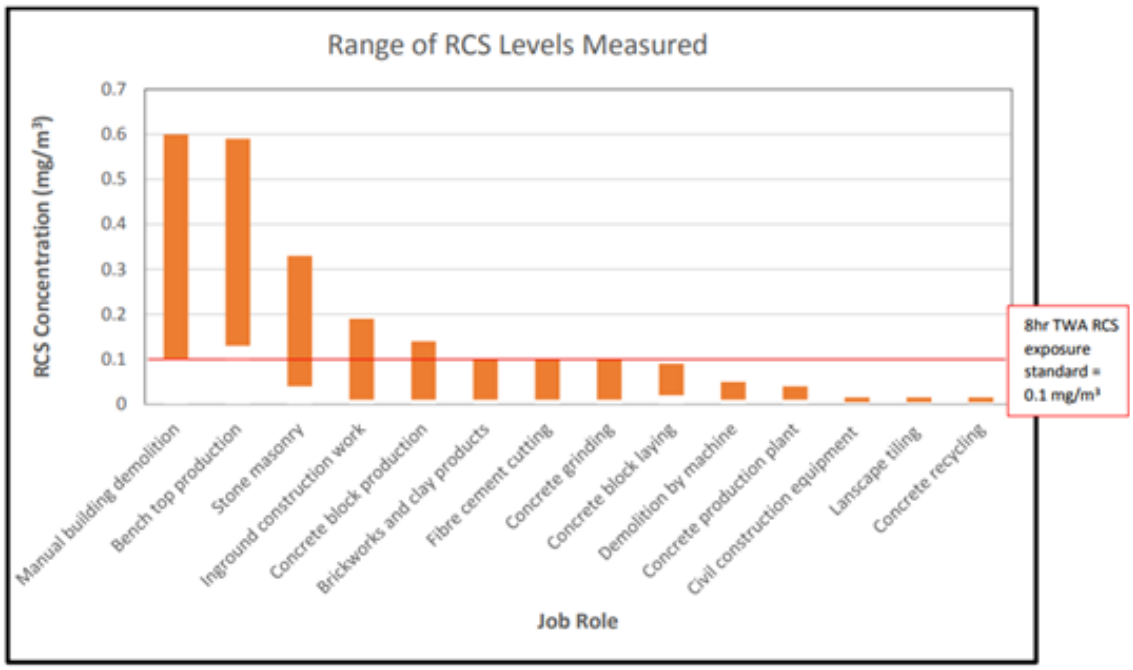
380 DJAG, WHSQ, *Controlling dust exposures in the Queensland foundry industry 2009: A report supporting the Occupational Disease Strategy 2007-2010*, March 2011, p 8.

381 DJQG, WHSQ, *Occupational dust and silica conditions in some Queensland construction and related industries: A report supporting the Work-related disease strategy 2012-2022*, version 1, August 2013, p 2.

382 DJQG, WHSQ, *Occupational dust and silica conditions in some Queensland construction and related industries: A report supporting the Work-related disease strategy 2012-2022*, August 2013, p 4.

383 OIR, submission 24, Appendix J, p 2.

**Figure 14 Personal exposure monitoring data for various construction operations, 2009-2012**




OIR, submission 24, Appendix J, p 1

In its feedback to industry, WHSQ advised:

> *This survey indicated that many of the excessive exposure conditions were restricted to some relatively small sectors (bench top manufacture, manual demolition, stone masonry) or to indoor or restricted space operations ... Within the top 6 dustiest non-tunnelling work tasks surveyed, 28 per cent of those workers were exposed at greater than and up to five times the nominal eight-hour WES-TWA [work exposure standard –time weighted average] for RCS, and with one exception, without adequate protection. Most workers on civil construction earthwork projects outdoors experienced low RCS exposures.*
>
> *Apart from use of water sprays for suppression, where protection against dust exposure is required, it has to be provided by RPE. However, as many construction and related workplaces rarely undertake any independent dust monitoring, the risk assessment process which would have informed on the need to implement more rigorous controls has been largely absent… The results of this survey indicate that some sectors need far more deliberate application of controls to achieve compliance, and probably closer regulatory attention.*[384]

These monitoring intervention programs and their associated evaluations of workplace dust controls have resulted in a number of recommendations and further guidance to industry on: improving engineering controls and system maintenance; increasing the frequency of monitoring; and ensuring uptake of good quality and task-appropriate RPE.

Moving forward, WHSQ advised that it has adopted the Australian Work Health and Safety Strategy, which establishes a preventative intervention framework focussing on priority disorders and priority industry sectors. Within the scope of Queensland's associated *Priority Disorders Strategy* and *Priority*

[384] DJQG, WHSQ, *Occupational dust and silica conditions in some Queensland construction and related industries: A report supporting the Work-related disease strategy 2012-2022*, August 2013, pp 8-9.

*Disorders Action Plan*, WHSQ has earmarked dust-related disease as one of the state's priority disorder areas for specific intervention.[385]

Current and ongoing interventions in this respect include:

- **Stone benchtop manufacture operations, June – December 2017:** a targeted intervention including dust monitoring and evaluation of dust controls at 10 sites and a review of health monitoring arrangements, with subsequent recommendations and complementary information materials to be provided to industry.[386]
- **Construction and major projects, August 2017 onwards:** WHSQ is currently devising a dust management program for the construction industry as a whole, and has assigned inspectors to design and implement surveillance of projects valued in excess of $1 billion or involving particular community sensitivities, including Commonwealth Games developments and Cross River Rail.
- **Minerals processing, late 2017:** WHSQ plans to engage with 'a significant minerals processor on the management of a number of toxic dusts'.[387]

In relation to the ongoing schedule of construction and significant project interventions, OIR advised that dedicated inspectors would be 'blitzing' major sites with a focus on RCS and with mostly unannounced visits, 'having already established an expectation of surveillance'. Over the course of the intervention program:

- assessment tools will be tested and further developed for use by the general inspectorate and industry, and
- awareness of the issues and the appropriate controls will be enhanced by targeting key industry stakeholders, and providing information and tools on the website.[388]

As of early September 2017, OIR advised:

> *Eighteen audits across eight construction projects have been completed to date at the following sites:*
>
> - *Probuild – Queen's Wharf redevelopment*
> - *Multiplex – Brisbane Quarter (304 George Street)*
> - *Hutchinson Builders – Brisbane Sky Tower (222 Margaret Street)*
> - *Mirvac – Ascot Green (230 Lancaster Road, Ascot)*
> - *Multiplex – Jewel (Old Burleigh Road, Broadbeach)*
> - *Meriton – International beach resort (Surfers Paradise)*
> - *Watpac – RBWH demolition project (Bowen Hills)*
> - *Multiplex – Gurner (155 Alfred Street, Fortitude Valley)*
> - *Nexus – Second Range Crossing (Toowoomba).*[389]
>
> *… inspectors have issued 11 improvement notices and one prohibition notice:*
>
> - *eight issued regarding fit-testing of tight-fitting respirators*
> - *one issued regarding failure to ensure respiratory protective equipment was used properly*
> - *one issued for failing to provide a safe system of work for a dust-generating task, and*
> - *one issue to a principal contractor over supervision of sub-contractors.*[390]

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385 OIR, 'Interventions by the Office of Industrial Relations regarding exposure to respirable dust and fibres in non-tunnelling workplaces'tabled paper, 14 June 2017, p 5.

386 OIR, submission 24, p 24.

387 OIR, submission 24, p 23.

388 OIR, submission 24, p 24.

389 OIR, response to questions asked on 29 August 2017, p 9.

390 OIR, response to questions asked on 29 August 2017, p 9.

Further to this ongoing work, OIR also advised that 'subject to Ministerial approval', the department intends to develop a code of practice for managing risks from airborne contaminants, in consultation with representatives of employers and workers:

> *Development of the code will be informed by consultation with various parties including the Australian Institute of Occupational Hygienists (AIOH), WHS regulators in other jurisdictions and representatives of employers and workers. In addition, the code will include learnings from the Construction dust: Stage 1 and Stage 2 project. It is proposed a draft of this code be developed by mid-2018 for comment and OIR will seek for the code to be considered for adoption nationally through Safe Work Australia.*[391]

The committee provides further commentary on these and other WHSQ activities in chapter 10.

[391] OIR, response to questions asked on 29 August 2017, p 11.

# 9 Other workers – metalliferous mine and quarry workers

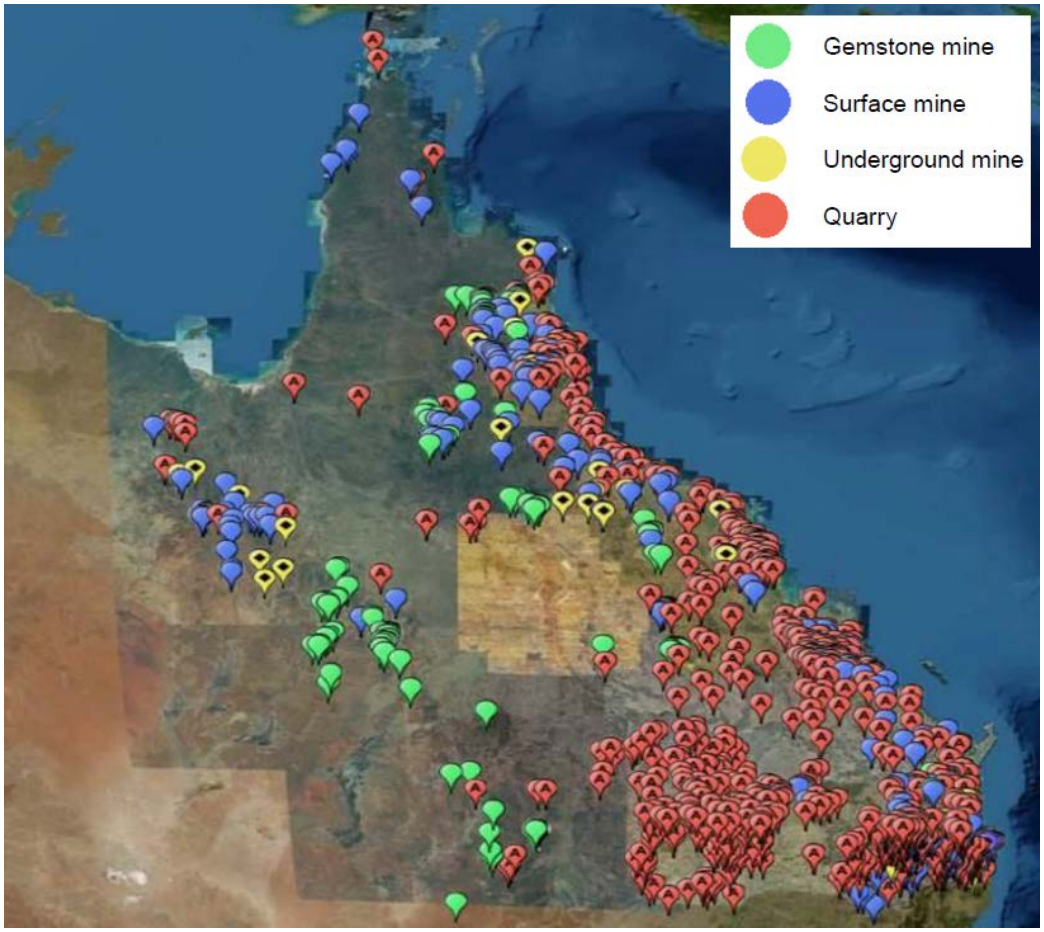
## 9.1 Industry overview

The Queensland mineral mines and quarries sector is a broad sector in terms of both the diverse nature of its operations and their geographical spread.[392]

The state is an important producer of metals including copper, silver, lead, zinc, gold and aluminium, and also produces a range of industrial minerals – most notably, phosphate rock, mineral sands, silica sand, limestone, marble and magnesite.[393] Various gemstones are also mined in Queensland, and the state has known resources of rare earths and metals of strategic importance, which have been flagged for future development.[394]

Many of the state's large metalliferous mines occur throughout central and northern Queensland, but are particularly concentrated in the north-west, around Mount Isa (the North West Queensland Mineral Province). Smaller quarries are found in all regions with particular concentrations in certain areas, such as the central Queensland gemfields or southern Queensland.[395]

**Figure 15 Queensland's mineral mines and quarries**




Source: DNRM, written briefing, 8 June 2017, Appendix A.

392 Mr Phil Goode, Chief Inspector of Mines, Mineral Mines and Quarries, DNRM, public hearing transcript, Brisbane, 14 June 2017, p 14.

393 DNRM, *Queensland's metalliferous and industrial minerals 2016,* Queensland Government, 2017, p 7, available at: https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0009/374859/metalliferous-industrial-minerals.pdf

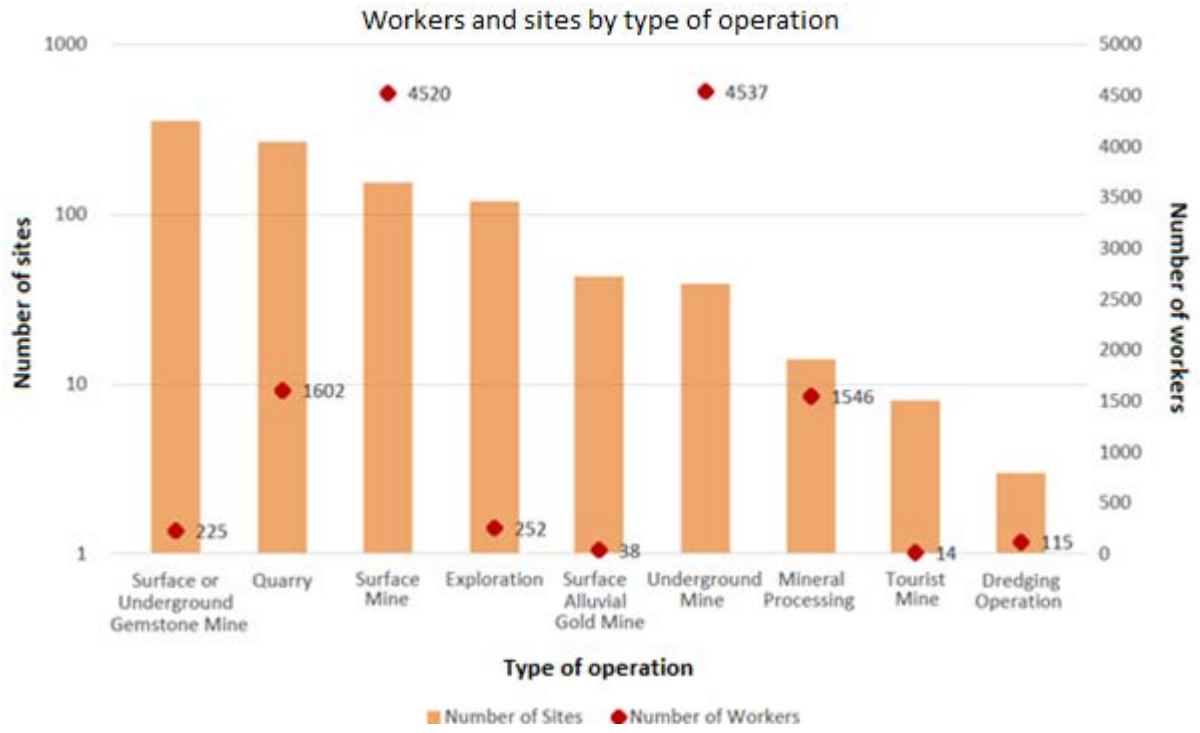
394 DNRM, *Queensland's metalliferous and industrial minerals 2016,* Queensland Government, 2017, p 7.

395 Queensland Ombudsman, *The Regulation of Mine Safety in Queensland: A review of the Queensland Mines Inspectorate*, June 2008, p 7.

As at July 2017, Queensland's mineral mine and quarrying operations numbered 1,609 in total, with a workforce of 13,869. The size of these operations varies significantly, from small family businesses with only one or two workers, to some of the largest mining operations in Australia, with more than 1,000 workers on site.[396] In fact, while the majority of workers (around 7,500 or 55 per cent) are distributed across the 13 largest operations, approximately 70 per cent of operations (around 5000 in number) had five workers or less. A significant number of sites (943) are 'infrequent operators'.[397]

**Figure 16 Number of workers and number of sites, Queensland mineral mines and quarries, June 2017**

| number of workers at site | number of sites | number of workers |
|---|---|---|
| 1 to 3 | 402 (60.4%) | 622 (4.5%) |
| 4 to 5 | 74 (11.1%) | 323 (2.3%) |
| 6 to 10 | 79 (11.9%) | 618 (4.5%) |
| 11 to 15 | 28 (4.2%) | 360 (2.6%) |
| 16 to 20 | 14 (2.1%) | 242 (1.7%) |
| 21 to 30 | 17 (2.6%) | 440 (3.2%) |
| 31 to 40 | 9 (1.4%) | 318 (2.3%) |
| 41 to 50 | 6 (0.9%) | 278 (2.0%) |
| 51 to 100 | 12 (1.8%) | 900 (6.5%) |
| 101 to 150 | 3 (0.5%) | 381 (2.7%) |
| 151 to 200 | 5 (0.8%) | 839 (6.0%) |
| 201 to 250 | 4 (0.6%) | 888 (6.4%) |
| 251 to 300 | 5 (0.8%) | 1,360 (9.8%) |
| 301 to 400 | 1 (0.2%) | 388 (2.8%) |
| 401 to 500 | 1 (0.2%) | 457 (3.3%) |
| 501 to 1000 | 4 (0.6%) | 2,667 (19.2%) |
| more than 1,000 | 2 (0.3%) | 2,788 (20.1%) |
| **Total** | **1,609** | **13,869** |




Source: DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, pp 2; DNRM, written briefing, 8 June 2017, Appendix B.

396 Mr Mark Stone, public hearing transcript, Brisbane, 4 September 2017, p 1; DNRM, written brief, 8 June 2017, p 5.

397 DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, pp 2-3.

## 9.2 Dust hazards and exposure risks

The various processing and transportation activities (including blasting, drilling, cutting, excavating, crushing, screening, and bagging) that take place at metalliferous mines and quarries (and exploration sites) are dusty operations which have the potential to expose workers to respirable dust, including RCS.[398] The level of risk posed to workers will differ depending on the concentration of silica in the rock source, and how the site is designed and operated.[399]

Not all rock types contain silica, and therefore not every site may be affected.[400] For example, Mr Aaron Johnstone, Queensland State Director of Cement and Concrete Aggregates Australia (CCAA), advised that the proportion of hard rock quarries in Queensland that contain quartz, 'is in the order of 50 per cent'.[401] The highest concentrations are typically found in rock/stone, sands, clay, shale, and gravel (see Figure 17 below), and accordingly, in those sites characterised by the presence of these higher-content silica rock sources.

**Figure 17 Silica content of minerals and rocks**

| ***Mineral/rock*** | **Silica content** |
|---|---|
| Sandstone/quartzites | >70% |
| Shale | 40 – 60 % |
| Slate | Up to 40% |
| Granite | Up to 30% |
| Clays | 6 – 30% |
| Basalt/dolerite | Up to 5 % |
| Limestone/Marble | Up to 2 % |

**Note – these minerals and rocks can contain layers with differing mineral makeup.*

Source: DNRM, written briefing, 8 June 2017, Attachment 7 ('Silica Dust – Controlling the Risk', presentation, Department of Mines and Energy, 2010).

In Western Australia, analysis of 82,830 personal exposure measurements for RCS which were collected from June 1986 to January 2015 and systematically recorded in a mining exposure database, revealed the highest levels of exposure were observed for base metal operations, followed by exploration and gold mining.[402]

Those engaged in underground mines rather than surface operations tend to be at higher risk of exposure due to the enclosed nature of the work environment, which makes it more difficult for dust to naturally disperse.[403] Further, exposure risks also vary according to the worker's proximity to the 'face' or dust generation source at the site, which is often dependent on the worker's role and work tasks, and tempered by the application of dust controls.

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398 Hedges et al., 'Occupational exposure to respirable crystalline silica in Queensland quarries, exploration sites and small mines', 2008, p 2; Queensland Government, *Sources of dust and contributing factors,* webpage, 26 February 2016, available at: https://www.business.qld.gov.au/industries/mining-energy-water/resources/safety-health/mining/hazards/dust/sources

399 Cement Concrete and Aggregates Australia (CCAA), submission 13, p 1.

400 CCAA, submission 13, p 1; Mr Aaron Johnstone, State Director Queensland, CCAA, public hearing transcript, Brisbane, 9 August 2017, pp 2-3.

401 Mr Aaron Johnstone, public hearing transcript, Brisbane, 9 August 2017, pp 2-3.

402 S Peters, R Vermeulen, L Fritschi, AB Musk, A Reid and N de Clerk, 'Trends in exposure to respirable crystalline silica (1986-2014) in Australian mining', *American Journal of Industrial Medicine,* vol. 60, 2017, p 674.

403 CCAA, submission 13, p 1.

CCAA submitted in relation to quarrying:

> *Quarrying requires few workers to operate at the 'face' with the large majority of these workers enclosed in air-conditioned cabins operating heavy mobile equipment. Crushing and screening plants are generally operated remotely from a control room; meaning that workers for the majority of their tasks, are separated from dust generated on site.*[404]

The review of WA exposure data from 1986 to 2015 found that the jobs or tasks with the highest RCS exposures included underground winding and hoisting operators, exploration drillers and ore samplers.[405]

### 9.3 Management of dust exposure risks at metalliferous mines and quarries

Until recently, the mining industry in Queensland has not been required to provide its exposure monitoring data to DNRM in any systematic fashion. Although inspectors have long been able to review data within the scope of their audit and inspection activities, it has not been collated centrally, so that any industry-wide analysis of historical trends in measured RCS exposure levels has been limited.

The re-identification of CWP in Queensland has informed changes to reporting requirements under the CMSHA, such that all coal mines are now required to submit their monitoring data to the mines inspectorate for inclusion in a comprehensive dust database, and must immediately notify the inspectorate of any recorded exceedances of the statutory OEL. Under the MQSHA, for metalliferous mines and quarries, only the latter requirement for 'trigger' reporting of exceedances has been introduced, as is required under the new RCS guideline which commenced on 1 August 2017 (see also chapter 3.2.3). Prior to this, there was no requirement whatsoever for metalliferous mines and quarries to report the results of any exposure monitoring to the inspectorate.

Notwithstanding the absence of any central longitudinal dataset, over the last decade the inspectorate has carried out a number of sampling exercises and surveys which provide considerable insight into the management of the RCS hazard at metalliferous mines and quarries.

Most recently, at the 2017 Queensland Mining Industry Safety and Health Conference, mines inspector and occupational hygienist Mr Mark Desira presented the results of a recent survey of industry, which asked SSEs to advise the number of samples collected in the last five years, and the relative proportions of these samples: less than 0.025mg/m$^3$; from 0.025mg/m$^3$ to 0.05mg/m$^3$; from 0.05mg/m$^3$ to 0.1mg/m$^3$; and greater than 0.1mg/m$^3$. Data was provided by 36 operations, representing coverage of an aggregate of 8,500 workers, or 62.5 per cent of the industry. Of the approximately 4,500 exposure results collected, 97 per cent were found to be below the nominal OEL[406] (Figure 18).[407]

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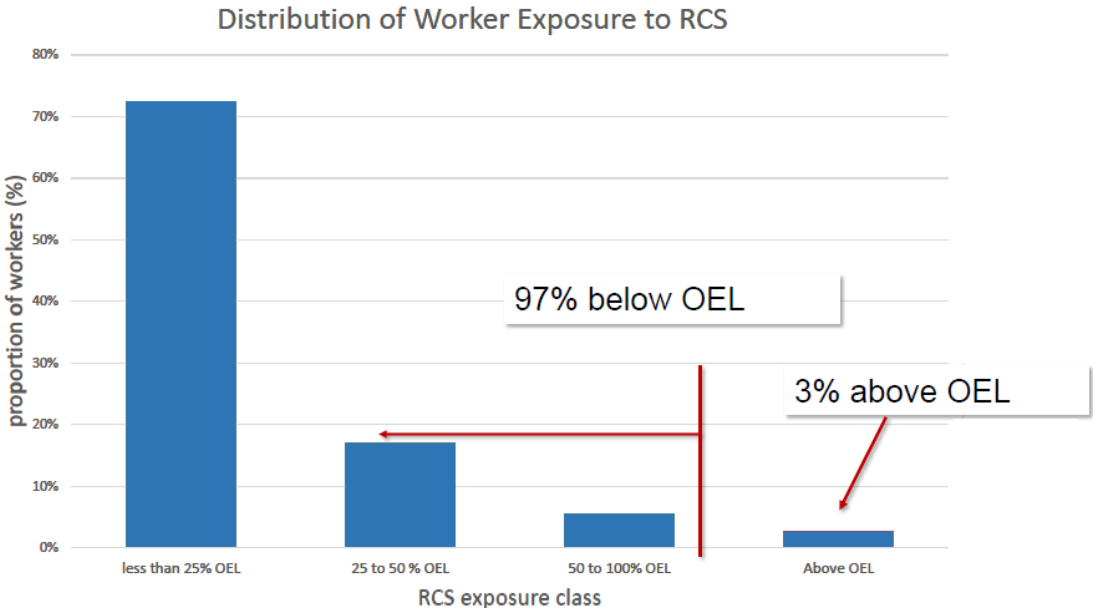
404 CCAA, submission 13, p 2.

405 Peters et al, 'Trends in exposure to respirable crystalline silica (1986-2014) in Australian mining', *American Journal of Industrial Medicine,* vol. 60, 2017, pp 674-675.

406 For each site, an adjusted limit would be applicable in most instances, to account for shifts of over eight hours.

407 M Desira, 'Occupational health thresholds for mine sites: The status of Lead and RCS regulation', conference presentation, Queensland Mining Industry Health and Safety Conference, Gold Coast, 7-9 August 2017 (DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, Attachment).

**Figure 18 Recent levels of worker exposure to RCS, Queensland metalliferous mines and quarries**




Source: M Desira, 'Occupational health thresholds for mine sites: The status of Lead and RCS regulation', conference presentation, Queensland Mining Industry Health and Safety Conference, Gold Coast, 7-9 August 2017 (DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, Attachment).

These results generally suggest there is broad compliance across industry. However, previous studies have raised questions as to whether instances of non-compliance may be disproportionately concentrated at sites with a typically higher silica concentration and concomitant health risks.

In particular, the results of a targeted study of the RCS exposure measurements and lung function tests of 47 Queensland quarry and dimension stone (sandstone) workers with a range of different exposure profiles, published in 2016, found:

> *… about one in four workers were exposed to RCS above the SWA-ES [Safe Work Australia Exposure Standard], and more than one in ten were being exposed at a concentration of more than twice this limit.*[408]

The health effects of such exposures were found to be significant:

> *A major finding for those workers exposed to RCS at the SWA-ES was loss of lung function greater than 20%. The increased loss of lung function was positively correlated with jobs associated with increased RCS exposure. When similar exposure groups were combined into three RCS exposure ranges categorised as high (≥ 0.09 - ≤ 0.20 mg/m$^3$), medium (≥ 0.04 - ≤ 0.08 mg/m$^3$) and low (< 0.04 mg/m$^3$), analysis of variance (ANOVA) confirmed that the loss of lung function below the lower limit of normal (LLN) at the current SWA-ES, is significant ($p < 0.05$).*
>
> *Abnormal lung function patterns were also more pronounced for smokers who were exposed to RCS ≥ 0.04 mg/m$^3$ and not as obvious for smokers exposed to RCS < 0.04 mg/m$^3$. This demonstrated that both smoking and RCS had a combined impact resulting in poor lung health.*[409]

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408 K Hedges, *Assessment and Control of Respirable Crystalline Silica in Quarries and Dimension Stone Mines,* PhD thesis, School of Science and Health, Western Sydney University, May 2016, p iv.

409 K Hedges, *Assessment and Control of Respirable Crystalline Silica in Quarries and Dimension Stone Mines,* PhD thesis, School of Science and Health, Western Sydney University, May 2016, p v.

The study, which was a follow-up of a 2011 review presented at the annual AIOH conference, also noted the results of testing for ingress of respirable dust into operator cabins for vehicles fitted with standard heating, ventilation and air-conditions systems, compared with newer RESPA™ pre-cleaner, filter and pressurisation (PFP) units (air cleaning technology, produced under the registered trademark 'RESPA'). Evaluation of the effectiveness of the newer technology, 'demonstrated up to a four-fold reduction in RCS entering the cabin, when compared with standard air-conditioning systems'.[410]

In sum, it was concluded:

> *… typical operator cabin air-conditioning technology will not reduce exposure to RCS where silica is present in dusty workplaces. The study also demonstrates the importance of health surveillance, to identify gaps, raise awareness about primary prevention, and drive timely intervention.*[411]

Various 'self-assessment' surveys completed by industry – including the recent 2017 dust management survey and previous surveys conducted in 2008 and 2009, provide a more comprehensive picture of the risk assessment and risk management process at industry sites, and gradual improvements in practices over time. Key results from the 2008 and 2009 surveys are presented in Figure 19.

**Figure 19 Survey responses, dust management and risk monitoring in Queensland mines and quarries, 2008-09**

| | **2008 survey** | **2009 survey - Metals** | **2009 survey - Quarries** |
|---|---|---|---|
| Operations surveyed (questionnaire sent to) | 420 (177 quarries, 188 small to medium mines, 30 coal exploration sites and 25 non-coal exploration sites) | 37 metal mines (those listed in the *Queensland Mines and Quarries Safety Performance and Health Report 2007-08*) | 68 quarries (quarries listed in the *Queensland Mines and Quarries Safety Performance and Health Report 2007-08*) with > 10 workers) |
| % respondents (response rate) | 31% | 86% (32 mines) | 93% (63 quarries) |
| **Survey item** | | | |
| Personal exposure monitoring is conducted | 52% | 78% | 76% |
| Personal exposure monitoring includes contractors | Not specified | 88% | 61% |
| Ongoing health surveillance | 46% | | 73% |
| Training on dust management | 63% | 92% | 84% |
| RPE program in place | Not specified | 63% | 27% |
| Clean shaven policy | Not specified | 34% | 22% |
| Fit testing of RPE | 32% | 34% | 24% |
| Most common dust control listed | Air-conditioned vehicle cabins (90%) | Air-conditioned vehicle cabins (91%) | Air-conditioned vehicle cabins (90%) |
| Effectiveness of controls is reviewed | Not specified | 59% | 65% |

Source: DNRM, 'Management of dust containing crystalline silica (quartz), Mines safety bulletin, no. 88, 23 February 2010 (online), available at: https://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/management-of-dust-containing-crystalline-silica-quartz; Department of Employment, Economic Development and Innovation (DEEDI), *Dust Self Assessment Feedback Report, Part B – Metal*, State of Queensland, 2010; Department of Employment, Economic Development and Innovation (DEEDI), *Dust Self Assessment Feedback Report, Part C – Quarries*, State of Queensland, 2010

410 K Hedges, *Assessment and Control of Respirable Crystalline Silica in Quarries and Dimension Stone Mines,* PhD thesis, School of Science and Health, Western Sydney University, May 2016, p v.

411 K Hedges, *Assessment and Control of Respirable Crystalline Silica in Quarries and Dimension Stone Mines,* PhD thesis, School of Science and Health, Western Sydney University, May 2016, p vi.

The 2017 survey results, while offering only a summary version of these much more detailed prior questionnaires (the survey was conducted 'to ensure the Committee is provided with up-to-date information on dust management plans, controls and results'), reveal:

- 93 per cent of workers undergo/undertake exposure monitoring (compared to 78 per cent and 76 per cent respectively for mines and quarries in 2009), and
- 91 per cent of workers undergo periodic health surveillance (compared to 78 per cent and 76 per cent respectively for mines and quarries in 2009).[412]

Other key findings include:

- 90 per cent of workers work at a site that has a management plan for dust or RCS
- 44 per cent of workers undergo exposure monitoring monthly, others undergoing monitoring quarterly (18 per cent), annually (9 per cent), every two years (17 per cent) , every five years (2 per cent) and once in a period over five years (3 per cent)
- 95 per cent of workers underwent/undertook RCS exposure monitoring in the past year
- Of the 91 per cent of workers who undergo periodic health surveillance, 3 per cent undergo annual monitoring, with others undergoing monitoring every two years (38 per cent), every three years (36 per cent) and every five years (14 per cent), and
- 55 per cent of workers undergo health surveillance involving spirometry and a chest x-ray against the ILO standard; 31 per cent undergo spirometry only, and 9 per cent undergo spirometry and a chest x-ray that is not conducted against the ILO standard.[413]

Overall, these results would seem to indicate that industry is generally working well to address RCS hazards but inadequate practices still persist within some operations. Consistent with this, industry groups submitted:

> *Despite the greater degree of risk it represents, cases of silicosis within the Queensland mining and quarrying industries still appear to be relatively uncommon. This probably reflects the fact that the danger associated with silica has been more front of mind than was the case for coal dust.*
>
> *Silicosis is a term that is quite widely understood in the community, whereas to the relatively few Queenslanders who knew before 2015 what CWP was, it was simply a disease of the past.*[414]
>
> ***
>
> *… the issue of silicosis and managing silica risk has always been an issue of importance for the industry. I would argue that we have been focused on the issue probably more than others may have focused on coal workers' pneumoconiosis, partly because people thought coal workers' pneumoconiosis had gone away. …. We did not have that same situation in the quarrying industry. Silicosis has always been an issue so we have always been managing it. We have been managing it over some time.*[415]
>
> ***
>
> *CCAA's view is that the incidence of RCS in the cement, concrete and quarry industries has reduced in recent decades, and given the general extractive industry improvement in, and understanding of, dust risks and controls, it is expected to remain at low levels. However, if this was found not to be correct, the industry would move to put into place any appropriate measures needed to ensure the health and safety of its workforce.*[416]

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412 DNRM, response to questions taken on notice at a briefing on 14 June 2017, p iii.

413 DNRM, response to questions taken on notice at the briefing on 14 June 2017, p iii.

414 QRC, submission 12, p 2.

415 Mr Aaron Johnstone, public hearing transcript, Brisbane, 9 August 2017, pp 5-6.

416 CCAA, submission 13, p 2.

## 9.4 Compliance actions and improvements

As is reflected in the various industry surveys undertaken over the last decade, the mines inspectorate generally appears to have taken an active role in seeking to raise awareness of the RCS hazard and appropriate control strategies to minimise risks associated with dust. In each instance, the findings of surveys and recommendations for industry were relayed through a series of presentations, reports and mines safety bulletins, which emphasised the importance of implementing a hierarchy of controls and 'provided clear guidance on how monitoring should be carried out to determine baseline exposure levels for particular jobs and tasks'.[417] In addition, DNRM advised:

> *In 2010, the Mines Inspectorate also published results from a trial of pre-cleaner, filter and pressurisation (PFP) units at sandstone mines, the 'RESPA™ Trial 2009' … The trial confirmed the efficacy of PFP units to reduce exposure to RCS. The Mines Inspectorate issued a directive requiring all operators in sandstone cutting operations to wear suitable respiratory protection equipment, measure RCS exposure levels, and take action to remediate any overexposure.*[418]

DNRM submitted that these activities have been part of a broader strategy of ongoing engagement, education and enforcement to support 'continuous safety and health improvement in Queensland mineral mines and quarries, including in respect of dust-related hazards'.[419]

To further document these activities, the department provided the committee with mine record entries (MREs) of the inspectorate's various audits, inspections (announced and unannounced), site visits, meetings and investigations pertaining to dust management, dust monitoring and the health assessment of workers over time. These MREs covered the period from February 2008 to June 2017.

The committee completed an analysis of the provided MREs, to examine the nature and frequency of these activities, including identifying common issues at sites, and whether enforcement action commensurate to any listed shortcomings was undertaken. Following its completion of this analysis, the committee identified that written briefing materials provided by DNRM had referenced a more comprehensive set of records, stretching back to February 2000.

This full set of MREs for the period from February 2000 to June 2017 has only recently been provided to the committee, precluding any systematic review of these records. However, the committee is able to make a number of broad observations from its review of these materials.

On the whole, the MREs reflect a relatively consistent pattern of engagement and intervention on dust issues dating back to 2000, with uptakes in activity around the time at which key dust surveys were carried out. A significant number of inspection MREs explicitly state that the purpose of the inspection was to review the management of RCS risk at the site, and include notes detailing reviews of occupational hygiene monitoring results; RPE usage, maintenance and fit testing; inductions and training on respirable dust hazards; and health assessments and surveillance (including whether chest x-rays are included and the frequency with which they are conducted). Some records also include details of various toolbox talks and question and answer sessions in relation to RCS risks and management, particularly at sites involving newer operations.

Where inspectors have identified that a site has not undertaken dust monitoring either for some period or at all, or where occupational hygiene monitoring practices have not be finalised at a new sites, the MREs frequently note that inspectors either raised the option of the mines inspectorate conducting a round of monitoring in order to evaluate the effectiveness of controls, or directly undertook to schedule monitoring of the site. This is consistent with advice provided by DNRM that the inspectors recognise they may need to take a more active role in the sector in this regard, particularly in relation

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417 DNRM, written briefing, 8 June 2017, p 5.

418 DNRM, written briefing, 8 June 2017, pp 5-6.

419 DNRM, written briefing, 8 June 2017, p 1.

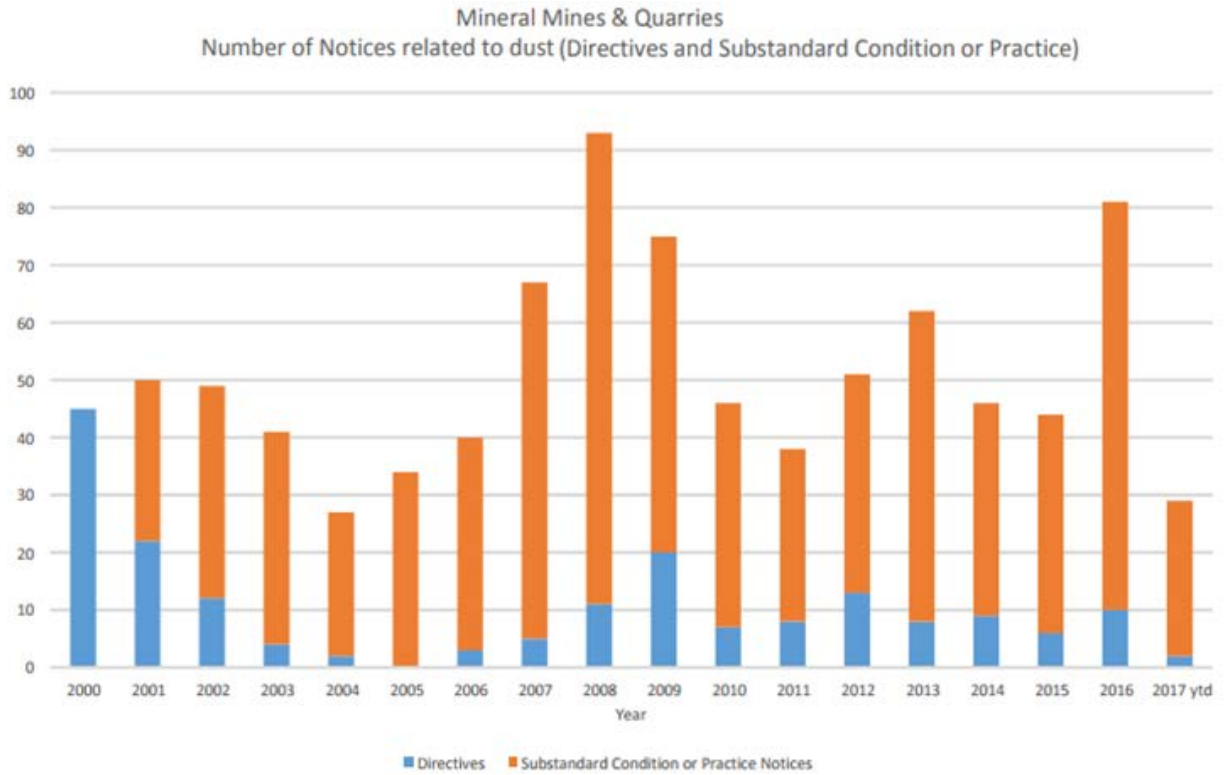
to small-scale operations who may lack the financial wherewithal and motivation to commission monitoring, or the technical capacity to interpret or analyse results.[420]

Where 'necessary and proportionate to risks on site', the inspectorate has engaged its various regulatory powers to ensure compliance with dust-related provisions in the legislation, including 'issuing directives, directing the mine's SSE or senior management to attend a compliance meeting', and issuing various notices of substandard conditions of practice (SCPs).[421]

For the documented period, DNRM advised that a total of 178 directives and 731 SCPs were issued in relation to issues with dust in mineral mines and quarries (see Figure 20). Issues addressed by these actions include deficiencies of practice (and required corrective actions) in relation to:

- the efficacy of area-specific dust controls or particular equipment
- worker exposure to RCS (repeated exceedances or control issues)
- exposure monitoring
- methodology for exposure monitoring (including inadequate sampling and failure to identify appropriate SEGs)
- use of respiratory protection
- storage and maintenance of RPE
- medical assessment of workers (including whether a risk-based assessment program in place and whether contractors are covered)
- periodic health surveillance (frequency and coverage), and
- dust exposure management plans (whether a comprehensive plan is in place).

**Figure 20 Directives and SCPs issued to mineral mines and quarries in Queensland, February 2000 to June 2017**




Source: DNRM, written briefing, 8 June 2017, p 1.

420 Mr Mark Stone, public hearing transcript, Brisbane 4 September 2017, p 7.

421 DNRM, written briefing, 8 June 2017, p 1.

For the 2016-17 year, the DNRM advised that the mines inspectorate has 'prioritised inspections at underground metalliferous mines and sandstone mines, based on their dust-related risk profiles'.[422]

This follows the inspectorate's implementation of a discrete 'dust management plan for sandstone mines in the last 18 months or two years' to address the particular hazards involved in sandstone mining;[423] and the commencement of the new RCS guideline on 1 August 2017, which will mean that:

> *… the Mines Inspectorate will receive notification of every RCS exceedance at a mineral mine and quarry by exception rather than receiving* [all] *exposure monitoring results that are below the occupational exposure limit (OEL).*[424]

The committee notes that this guideline has come 'on the back of about a year's work from the inspectorate in terms of baselining respirable crystalline silica management at sites',[425] including an estimated 359 staff hours invested in its development by officers of DNRM,[426] and considerable consultation with industry stakeholders and experts.[427]

While this reporting requirement will no doubt provide the inspectorate with valuable intelligence which could be used to support strategic compliance interventions, the committee notes that it reflects an approach to the oversight of dust monitoring and health assessments in mineral mines and quarries sector that is generally a more 'hands-off approach' than that maintained in relation to the coal industry.

In the coal industry operators are required to supply all monitoring results to DNRM and all health assessments are similarly retained by the Health Surveillance Unit of the department under the statutory 'coal workers' health assessment scheme'. There are no similar mechanisms of centralised collection and oversight of these records for metal mines and quarries. The implications of this were discussed at the public briefing on 14 June 2017:

> ***CHAIR:*** *But you do not have access to those records, do you—the health surveillance records?*
>
> ***Mr Desira:*** *No.*
>
> ***Mr Goode:*** *We could request them if we wanted to…they have a responsibility to keep those records for 30 years.*
>
> …
>
> ***Mr McMILLAN:*** *Are you able to tell the committee today what proportion of workers in Queensland mineral mines and quarries have been subject to any form of health surveillance?*
>
> …
>
> ***Mr Goode:*** *It is not immediately available to the department. We do not request it.*
>
> ***Mr McMILLAN:*** *Because there is no requirement for operators to report?*
>
> ***Mr Goode:*** *That is correct.*[428]

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422 DNRM, written briefing, 8 June 2017, p 1.

423 Mr Phil Goode, public hearing transcript, Brisbane, 14 June 2017, p 16.

424 DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, p 1.

425 Mr Mark Desira, Inspector of Mines, Occupational Hygiene, DNRM, public hearing transcript, Brisbane, 4 September 2017, p 2.

426 DNRM, response to questions taken on notice at a hearing on 4 September 2017, p 3.

427 Mr Mark Stone testified that this'included the Australian Workers Union, the CCAA or Cement Concrete and Aggregates Australia, the Institute of Quarrying Australia and QRC industry representatives'. See: public hearing transcript, Brisbane, 4 September 2017, p 3. See also: Mr Alan Rogers, Founding Member, AIOH, public hearing transcript, Brisbane, 9 August 2017, p 22; CCAA, submission 13, p 3.

428 Public hearing transcript, Brisbane, 14 June 2017, pp 19-20.

In light of the high-risk nature of the sector, and the evident failings of monitoring and assessment unearthed during the committee's inquiry into CWP, the committee considers that the continuation of this differential approach is unfortunate and short-sighted. The committee notes that the AIOH has expressed its concern over this 'arms-length' approach (which reflects a more reactive model of compliance management), particularly given demonstrated shortcomings in sampling regimes:

> *We are concerned because of self-regulation and the advent of huge consultancy companies. They tend to take on areas that they are not actually expert in. Some of the monitoring that is done, particularly in areas other than coal, because it is a little bit more controlled, is actually done by people who are not experienced in those areas.*[429]

The AIOH has emphasised the importance of independent audit and review of the monitoring and dust controls, recommending 'third party or peer review via an independent appropriately resourced industry panel'.[430] Notably, this committee's proposed Mine Safety and Health Authority, as detailed in the third of its reports to parliament[431] offers a clear model under which such a review mechanism could operate.

Mr Mark Stone, Executive Director of Mine Safety and Health at DNRM, advised that while the department has considered requiring all monitoring results to be reported, 'there are a few reasons why we felt that it was more appropriate to commence the guideline and start this new process of single-sample exceedance and build on the inspections and guidance':

> *... When we turn to mineral mines and quarries…The sheer number and geographic distribution and other challenges such as the practicality of a lot of these smaller sites with regard to reporting literacy, computer literacy and the ability to undertake sampling for a small site with just a few employs would probably not be practical… many sites—hundreds of sites—simply are not there today and it will take a period of time for them to become compliant and to understand their obligations. We believe it is appropriate to commence the guideline because the majority of the hazard and the exposure to individuals is in a minority of sites. I think that is clearly borne out in the charts and in our inspections generally… We just felt it was appropriate to get all sites reporting single exceedances and then build on that.*[432]

DNRM further advised that review of data collected from 35 mineral mines and quarries had identified 'in excess of 500 SEGs', with many subtle variations in nomenclature, task-based groupings, and variation in tasks across the course of the day contributing to a lack of consistent, comparable groupings.[433]

> *In order to comparatively evaluate the performance across sites, SEGs must be comparable; hence, a nomenclature for MMQ SEGs has to be developed…*
>
> *Compulsory reporting of every exposure monitoring result would require a substantial amount of groundwork including the development of list of MMQ* [Mineral mines and quarries] *SEGs and cleansing of data to map current SEGs to the new SEGs.*[434]

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429 Mr Alan Rogers, public hearing transcript , 9 August 2017, p 22.

430 AIOH, CWP inquiry, submission 14; AIOH, submission 14.

431 CWP Select Committee, *Report No. 3, 55th Parliament, A Mine Safety and Health Authority for Queensland, including the committee's draft Mine Safety and Health Authority Bill 2017*, Queensland Parliament, 24 August 2017. Available at: http://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2017/5517T1453.pdf

432 Mark Stone, Public hearing transcript, Brisbane, 4 September 2017, p 10.

433 DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, p 3.

434 DNRM, response to question raised at Queensland Mining Industry Health and Safety Conference 2017, pp 3-4.

Whilst acknowledging these challenges associated with this work, the committee also notes the following commentary:

> ***Mr McMILLAN**: I understood the answer you gave earlier in terms of describing the smaller operators particularly as having perhaps immature systems, if I can describe it that way—some difficulties perhaps around computer literacy and so on. That all makes sense to me. If that smaller operator is going to achieve an acceptable level of risk by complying with the guideline then they are going to have to source those skills externally in order to undertake the monitoring that is required by the guideline, aren't they?*
>
> ***Mr Desira:** That is not dissimilar to what happens with electrical where you bring that resource from externally into your operation. It still remains the obligation for the SSE to manage their risk.*
>
> ***Mr McMILLAN:** Once they have achieved that by gathering those external resources, having the monitoring done in accordance with the guideline so that they have achieved an acceptable level of risk, the only barrier then to those results being reported to the inspectorate is the resources of the inspectorate, is it not?*
>
> …
>
> ***Mr Stone:** I would say that there is no barrier there. The inspectorate and the officers, for example, who have developed the respirable dust database and are receipting, processing and interpreting the results for coal and single exceedances for coal and metalliferous are very well resourced. I think the challenge is, as you described it, with those small operators in sourcing certified occupational hygiene expertise during the year to conduct sampling at their sites. Once that has been done, we are well resourced to process that and to understand that. I think it will be part of the education and advice to play it back to the sites to explain to them how they are performing…*
>
> ***Mr McMILLAN:** Just to be clear, this guideline does not require any mineral or mine operator or quarry to conduct monitoring. It prescribes a way that they can achieve an acceptable level of risk which will discharge their obligation under the regulation. There is a distinction there, isn't there?*
>
> ***Mr Stone:** That is correct.*
>
> ***Mr McMILLAN:** They do not have to do this monitoring. If they can work out another way to achieve an acceptable level of risk, they are welcome to have a go at it, aren't they?*
>
> ***Mr Stone:** We will happily receive that.*[435]

The committee considers that work to establish SEGs for Queensland's mineral mines and quarries should be prioritised. Notably, the feedback reports outlining the results of the 2009 industry dust survey included suggested SEGs for mineral mines and quarries were included as appendices for consideration, indicating some preliminary work has been done in this area.

The progression of this work, to support the implementation of systemic reporting requirements for monitoring data, will help to ensure that occupational hygiene matters are addressed as standard items of business for mining operators, and thereby also help prevent any future 'risk normalisation' and deterioration in dust control.

The committee makes further commentary on these issues in chapter 10.

[435] Public hearing transcript, Brisbane, 4 September 2017, pp 7-8.

# 10 Enhancing management of exposure risks

Each of Queensland's legislative frameworks for WHS is underpinned by principles of risk management that require workplaces to develop appropriate systems to assess and manage the risks associated with particular hazards, including respirable dust.

In theory, these frameworks should offer an appropriately robust system of protections, in keeping with their enounced guiding principles that workers be offered the highest possible level of protection, and risks be managed to levels that are acceptable and as low as is reasonably achievable.

In eschewing previous, more prescriptive approaches to WHS regulation in favour of a more flexible and responsive regulatory regime, it was envisaged that duty holders could continuously adapt their risk management systems and activities over time, to accommodate the changing site conditions and new developments in technology and WHS best practice.

At many workplaces, this may well be the case. The committee was encouraged by testimony from a number of business operators and health and safety representatives who demonstrated a committed and proactive approach to addressing dust and other workplace hazards.

However, in leaving the assessment of risk open to wide interpretation as to the types of protections and measures which might be considered acceptable or reasonably achievable, this legislative framework is also vulnerable to deviations and deteriorations in workplace practices over time.

As the committee previously articulated in its *Black lung, white lies* report:

> *Regulations are only effective if the responsibilities and requirements encompassed within them are clearly articulated to relevant parties, and reinforced through appropriate oversight and guidance around the measures necessary for statutory obligations to be met.*[436]

For many of the various industries examined in this report, it was clear that the development of more precise and detailed statutory guidance, together with the increased engagement of compliance officers with industry to ensure its implementation in practice, has and will be critical to ensuring more consistent and effective management of respirable dust hazards. This, in turn, will better safeguarding the respiratory health of workers.

The committee considers that the development of guidance material for managing coal dust and fly ash exposure is an important step required to provide surety and clarify legislative obligations within the coal-fired power generation industry. Regarding coal port workers, the same can be said for the adoption of the national model code of practice for managing risks in stevedoring

Within the metalliferous mining and quarrying sector, the committee acknowledges the enhanced guidance and monitoring and reporting requirements outlined in DNRM's RCS guideline. While the exceedance reporting requirements should help provide the inspectorate with necessary intelligence to support appropriate risk-based interventions, the committee considers that *all* exposure monitoring data should be centrally reported and collected, as befits the higher level of oversight required for this higher-risk industry. This should help to ensure that monitoring is conducted routinely as required, and should more promptly alert the inspectorate to any shortcomings in this regards.

The committee notes DNRM's submissions that there are difficulties associated with the characterisation of SEGs due to the large and varied types of operations across the industry, which may limit the usefulness of collected data for any comparative or trend analysis. However, the committee also notes that 'suggested' SEGs for the industry were published by the department as early as 2009, and that such difficulties have not proved insurmountable in Western Australia, where reporting requirements and an associated exposure monitoring database have long been in place.

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[436] *Black lung, white lies* report, pp 42, 142.

It is the view of the committee that the primary obstacle to the finalisation of this process, and any ancillary preparatory work, appears to be an issue of resourcing.

The committee's recommendations for enhancing current regulatory arrangements to better protect workers from occupational dust exposure and any adverse health impacts, are listed below.

**Recommendation 1**

The committee recommends the development of a code of practice on the management of respirable dust hazards in coal-fired power stations, to be informed by international best practice and consultation with industry stakeholders.

**Recommendation 2**

The committee recommends that the Minister approve the national model code of practice for managing risks in stevedoring as a code of practice under section 274 of the *Work Health and Safety Act 2011* (Qld).

**Recommendation 3**

The committee recommends that the *Guideline for Management of Respirable Crystalline Silica in Queensland Mineral Mines and Quarries* be amended to require that all exposure monitoring data is reported to the Mines Inspectorate, consistent with the requirements for coal mines set out in *Recognised standard 14: Monitoring respirable dust in coal mines.*

# 11 Medical responses and worker support

The committee has previously received a wide range of evidence about shortcomings in the diagnosis and treatment of pneumoconiosis in Queensland, including instances of incorrectly taken chest x-rays, improperly administered spirometry, a failure to examine or collect a work history, and broader shortfalls in clinical understanding and advice regarding occupational lung conditions and their treatment.

Workers with pneumoconiosis have also reported experiencing significant difficulty in navigating the workers' compensation scheme, including issues accessing fair and appropriate entitlements and available treatment options, and receiving prompt reimbursement of expenses associated with their ongoing assessment and treatment.

These issues were substantially canvassed in the committee's *Black lung, white lies* report, and have led to actions to improve clinical expertise and to reform:

- the approvals, processes and procedures involved in the administration of the health scheme for coal mine workers
- the claims process and compensation entitlements for pneumoconiosis sufferers.

The committee received limited evidence regarding the efficacy or otherwise of medical responses, rehabilitation and support for workers in relation to its extended terms of reference.

Importantly, while the requirements for health assessments and ongoing monitoring are consistent across all WHS frameworks in Queensland – including requirements for assessments to be carried out by accredited medical professionals – there is no specific health scheme or oversight mechanism equivalent to the coal mine workers' health scheme for the occupational groups canvassed in this report.

Accordingly, ongoing engagement between DNRM, OIR, Queensland Health and peak medical bodies is crucial to supporting continuous professional development and clinical expertise in occupational medicine. This is particularly the case given the tendency for the symptoms of occupational disease to manifest after workers have retired or otherwise left the industry, such that their primary interactions with medical providers may be within a broader public health rather than occupational health context. As was emphasised by Dr John Schneider, 'health professionals can only play a useful part in the process if they are appropriately trained and provided with all of the relevant information including exposure data'.[437]

The committee has previously made recommendations regarding the notification of diagnosed cases of CWP to the state's Chief Health Officer and associated annual reporting.[438] Within the context of the much broader workplace exposures and conditions considered in this inquiry (and in light of the limited oversight of health surveillance), the committee considers that a mechanism for systematic reporting of occupational respiratory disease should be explored, particularly given acknowledged underreporting in workers' compensation data and the tendency for hospitalisation presentation data to be included in categories that contain diseases not related to work.[439]

The committee notes the submission of the Lung Foundation Australia and the Thoracic Society of Australia and New Zealand, that a national physician notification scheme and registry for occupational lung disease be developed.[440] Such registers operate in a number of overseas countries, and include the US Work-Related Lung Disease Surveillance System (eWorld) and National Occupational

[437] Dr John Schneider, submission 9, p 4.

[438] See *Black lung, white lies* report, recommendations 59 and 60.

[439] TSANZ and LFA, CWP inquiry, submission 6, pp 2-3.

[440] TSANZ and LFA, CWP inquiry, submission 6, pp 2-3.

Respiratory Mortality System (NORMS), and the UK's SWORD (Surveillance of Work-Related Occupational Diseases), which has been reporting since 1989.[441] Further, the committee also notes the example of Victoria's SABRE scheme (Surveillance of Australian Workplace Based Respiratory Events), which provides for voluntary physician reporting of occupational respiratory disease in Victoria (and which has also helped inform the development of a similar reporting mechanism through the Dust Diseases Board in NSW).[442] Such systems can support the more informed tracking of the prevalence and severity of occupational lung disease over time, including allowing identification and dissemination of trend information for use in public health and disease prevention.[443]

At the same time, the committee also acknowledges that any such efforts should be balanced with the need for investment in more preventive efforts and understanding of the development of disease. For example, Cliff et al have noted:

> *In* [occupational] *safety there is a strong recognition of the advantages of leading indicators such as high potential incidents, in addition to lagging indicators, to demonstrate management of an issue. In occupational health, there remains a nearly total reliance on lagging indicators, such as the incidence of disease, to determine the effectiveness of the management of occupational health issues.*[444]

This view was echoed by Mr Bruce Ham in his submission to the inquiry:

> *A step-change in thinking is required to effectively manage chronic disease risks associated with occupational exposures including dust. Modern health and safety management systems are generally based around risk management where a monitoring program provides data to signal an intervention when evidence of increases in risk is indicated. Unfortunately, in the area of occupational exposure, there is a high, but ineffective reliance in the outdated prescriptive based regulation.*
>
> *Dust related respiratory disease in workers needs to be considered as a dose-response phenomenon. The effects may be either progressive or delayed. This is a key factor in developing trigger points in establishing a safety management system using personal cumulative occupational exposure. My view is that a priority should be to back analyse both the health and exposure data to identify whether there were trigger points that provided an early warning*.[445]

Dr Brian Plush further submitted:

> *It is absolutely critical that a safe level of respirable dust and silica dust exposure be determined through robust scientific research. This research has to identify at what point interstitial fibrosis commences in the lung and this can only occur by replicating the amount of respirable dust and silica dust that enters the lungs during a normal operating shift. This can only occur through a quantifiable and empirical process which is linked to production, as dust is mainly produced during production. All sampling, measurements, testing and research should be linked to tonnes of coal, not a time weighted average.*

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441 NIOSH, *Occupational respiratory disease surveillance,* webpage, 21 June 2017, available at: https://www.cdc.gov/niosh/topics/surveillance/ords/default.html; Monash University, *SABRE – Surveillance of Australian Workplace Based Respiratory Events,* webpage, 2017, available at: https://www.monash.edu/medicine/sphpm/coeh/researchprogram/sabre

442 Monash University, *SABRE – Surveillance of Australian Workplace Based Respiratory Events,* webpage, 2017. See above.

443 NIOSH, *Occupational respiratory disease surveillance,* webpage, 21 June 2017. See footnote 442.

444 D Cliff, J Harris, C Bofinger and D Lynas, 'Managing occupational health in the mining industry', conference paper, Coal Operators Conference, University of Wollongong, 8-10 February 2017, p 299.

445 Bruce Ham, submission 8, p 2.

> *Once the mg/tonne of respirable dust and silica dust is known, rodent trials can be commenced to expose the rodents to this dust load. The rodents will inhale the dust and it will be possible to determine when fibrosis commences. This will be related directly to the amount of coal dust they have been exposed to, which will in term identify the number of tonnes that a worker can be exposed to before lung damage occurs.*[446]

Submitters also noted the importance of further research around the characterisation of dust components and their effects on toxicity, noting that some minerals and compounds – including reactive pyrite – have, like silica, been associated with more rapid onset of disease.[447]

The committee considers that all of these valid and important areas of research are lines of enquiry that could be appropriately examined by the dedicated health research division of its proposed Mine Safety and Health Authority.

[446] Dr Brian Plush, submission 17, p 8.

[447] Dr Gunther Paul, submission 11, p 5. See also B Beamish, 'Products of reactive pyrite oxidation in the mine environment – implications for coal workers' pneumoconiosis' conference paper (no. 38), Australian Mine Ventilation Conference 2017, Brisbane, 28-30 August 2017.

# 12 Inhalable dust and communities

## 12.1 Introduction

The committee's terms of reference relate to occupational issues regarding respirable dust. Matters regarding the impact of inhalable dust on communities are, strictly speaking, outside the committee's terms of reference.

Nonetheless, in the course of its examination of respirable dust in occupational settings, it was almost inevitable that the committee would hear of concerns about the impacts of industry dust generation on communities, and steps taken in response. Concerns related to coal dust in rail corridors, near coal ports and coal-fired power stations, and also in residential communities near mines and quarries. Some community groups and individuals raised their concerns in written submissions to the committee.[448] Specific issues raised in these written submissions related primarily to coal dust in communities adjacent to rail corridors and dust from quarrying operations. An example of the concerns is the following extract from one submission:

> *Uncovered coal wagons are being hauled through townships, Ipswich, which is an unmonitored underground station (the only one in Australia, we think) and used daily by many children and adults. It is also hauled through Brisbane suburbs, now densely populated near the stations, thanks to government legislation. This public maybe at risk from this coal freight haulage.*
>
> *This haulage is done by old and dirty, unfiltered diesel locomotives, both engines and wagons emitting a plume of toxic chemicals including carcinogens. Coal dust itself contains highly toxic minerals, as well as irritating the respiratory system. This situation is unsuitable for the vulnerable, in the short term, exacerbating anybody's pre-existing respiratory conditions.*[449]

## 12.2 Monitoring dust levels in communities

Much of the written material provided to the committee in responses to issues raised within its terms of reference also supplied information regarding monitoring of dust in communities.

The Science Division within DSITI provides air quality monitoring services for the Queensland Government. DSITI operates 24 air quality monitoring stations (for particulates) throughout Queensland, primarily on behalf of DEHP. The committee notes that of those 24 stations, there is one located in a metals mining community (Mount Isa) and one in a coal mining community (Moranbah). A further 22 industry-operated monitoring stations (including some in Mount Isa) also report data to DSITI.

Measurements from monitoring stations are compared to state and national air quality guidelines. The stations continuously measure a number of different air pollutants and meteorological observations. Monitoring air quality helps to identify long-term trends across regions, and assesses the effectiveness of air quality management strategies.

Aside from detecting the wide range of airborne particles that occur both naturally and as a result of human activity (bushfires, control burns, combustion of fossil fuels), the department uses continuous measurement equipment to detect total suspended particles (TSP), $PM_{10}$ (particulate matter <10 microns) and $PM_{2.5}$ (particulate matter <2.5 microns).[450] Continuous measurement equipment

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448 See for example, Campbell Staines (submission 1); James Prentice, submission 2; Luke and Jean Dalgleish, submission 5; Clean Air Wynnum, submission 6; Anthony Moloney, submission 7; and CWP inquiry submissions 13 (Clean Air Wynnum) and 30 (Ian Matthews). See also the evidence from Cr Peter Ramage, public hearing transcript, Collinsville, 21 November 2016, p 1.

449 James Prentice, submission 2, p 2.

450 See footnote 60.

employs a tapered element oscillating microbalance (TEOM) technique to provide a measure of continuous output of mass concentration of particles in the air.

Live air quality data updates from the air monitoring network are published on DEHP's website[451] and updated hourly. DSITI also publishes monthly bulletins with detailed data about air quality in South East, Central and Northern Queensland.

### 12.3 Coal dust impacts on communities in rail corridors

There are no specific regulatory requirements in Queensland for the management of coal dust along rail lines. There is a regulatory framework for the management of air quality. Air contains many types of particles and for this reason most air pollution laws treat particles collectively as 'particulate matter' (PM) rather than regulating for specific types of particles.[452]

In Queensland the Environmental Protection (Air) Policy 2008 (EPP) was established under the *Environmental Protection Act 1994* (Qld). It specifies environmental values for the air environment including qualities conducive to human health and wellbeing (s 7).

The National Environment Protection (Ambient Air Quality) Measure sets out national standards for key air pollutants including particulate matter. The standards are binding on each level of government and are prescribed under Queensland's air quality objectives in the EPP.

Aurizon told the committee:

> *Rail coal dust monitoring is undertaken on each of the five coal systems in Queensland… an opacity monitoring station is located on each of the four coal systems in the CQCN. Aurizon monitors every train that passes the monitoring point on both the inbound (to Port) and outbound (from the Port) coal train services … Aurizon has systems in place to follow up with the mine if the threshold agreed with the regulator is exceeded. Exceedances are investigated with the mine and as part of this process, Aurizon works with the mine to understand why the exceedance has occurred and how it can be remedied. This process would establish if the mine was experiencing any issues with the veneering of coal wagons.*
>
> *On the South West System, which transits through Brisbane, Aurizon along with the Queensland Resources Council and the South West System Users Group has funded a dust monitoring program on the rail corridor by the Department of Science, Information Technology and Innovation since 2013. The monitoring is another key component of the South West System's Coal Dust Management Plan.*
>
> *…. results have consistently shown that dust generated in the rail corridor is well within Queensland's air quality guidelines (both pre and post implementation of veneering on the system). In addition, the studies have shown that in samples of black dust taken from near the rail corridor, coal dust is rarely the major component and that on average, coal makes up about 10% of black dust, which also contains soil, soot, black tyre rubber and mould.*
>
> *As part of the monitoring undertaken on the South West System, an assessment of the human health risk posed by the particle concentrations measured during the initial monitoring period in 2013 was undertaken by the Queensland Department of Health. Queensland Health concluded that, for people living along the rail corridor, the overall dust concentrations from all particle sources measured during the investigation are unlikely to result in any additional adverse health effects.*[453]

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451 DEHP, *Hourly Air Quality data*, webpage, available at: http://www.ehp.qld.gov.au/air/data/search.php

452 Katestone Environmental Pty Ltd, *Literature Review of Coal Train Dust Management Practices –Prepared for NSW Environment Protection Authority*, December 2014, p 29. See also South West System, *Coal Dust Management Plan: South West System*, November 2013, p 25.

453 Aurizon, CWP inquiry, submission 41 (confidential).

As mentioned in the discussion on coal rail workers (see chapter 4), monitoring has shown the positive impacts of veneering on coal dust deposits in rail corridors. For example, in relation to the West Moreton system, QR advised:

> *Following the introduction of the West Moreton coal dust management plan in 2013, initial and ongoing air quality monitoring has occurred. The studies show that coal dust deposits in general around the community have reduced by 79 per cent through that - the veneering with the polymer on to the wagons as well as improved profiling, where they flatten it out and minimise the surface area of the coal… The latest information at the sites that are still being monitored is: before the veneering commenced, the research showed that there was a maximum of 20 per cent of dust that is around that may be coal dust. That was fairly similar to even areas where the coal trains did not go through. Since the veneering has commenced, as well as profiling and some other elements that are within the plan there, that is reduced to a maximum of five per cent.*[454]

According to the DEHP:

> *A review of air quality monitoring studies in rail corridors and around rail systems in southern Queensland has shown that while coal dust and the influence of coal trains on dust levels has been detected, the levels of total dust (including coal dust) are well below air quality objectives for the protection of human health and amenity impacts. Additional dust mitigation measures implemented by all coal companies from 2014 have been, and continue to be, effective in reducing the loss of coal dust from loaded rail wagons during transport.*
>
> *Monitoring has shown no evidence of the passage of coal trains having an adverse impact on dust levels adjacent to the rail corridor. Most rail transport-related dust comes from re-suspension of particles from ground surfaces within the rail corridor by the air turbulence generated by passing trains of all types, not just coal trains.*
>
> *Dust (from all sources) settling out adjacent to rail corridors in urban areas is made up primarily of mineral dusts (soil and rock) at levels of 50% or more. While early dust samples contained up to 20% coal, this has declined following implementation of the additional dust mitigation measures by coal producers and transporters. Coal dust is now rarely detected in dust samples taken adjacent to the rail corridor and any coal present comes predominantly from re-suspension of coal particles already in the soil in the rail corridor rather than direct loss from coal wagons.*
>
> *Other dust types, typically found in the dust samples, include up to 10% black rubber dust from motor vehicle tyre wear, and biological dusts (plant and insect fragments) at 10–30%.*[455]

## 12.4 Workers and environmental dust risks

Dr Gunther Paul notes that workers in the coal transport chain or in coal powered plants are exposed to environmental *and* occupational coal dust and, as for miners, 'the combined dose of particle exposure needs to be established and considered in setting a standard' and 'no epidemiological data is currently available in this regards'.[456] Dr Paul recommended the inclusion of:

> *… environmental exposure measurements for the revised Mine Health and Safety Scheme, in a holistic Health Safety Environment perspective…; considering interaction and superposition effects of combined occupational and environmental exposures for an effective overall dose of dust exposure,* [considering] *potentially elevated environmental exposure in mining communities, and* [revising] [DEHP] *regulations to consider the elevated risk from dust exposure*

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454 Mr Greg Fill, public hearing transcript, Brisbane, 22 March 2017 (evening), p 3.

455 DEHP, *Air quality monitoring of coal dust in rail corridors*, webpage, 6 January 2017, available at: https://www.ehp.qld.gov.au/management/coal-dust/monitoring.html

456 Dr Gunther Paul, submission 11, p 5.

*in mining communities by increasing the density of environmental surveillance in relevant locations.*[457]

For those living in mining communities, similarly:

*In addition to dust exposure while working, it is likely a miner's habitat will be exposed to increased levels of coal and mineral dust. This increased respirable dust particle dose exposure will have to be considered in determining a healthy OEL. Currently this is not the case.*

*… the combined dose of particle exposure needs to established and considered in setting a standard. No epidemiological data is currently available in this regards.*[458]

## 12.5 Quarrying operations

CCAA acknowledged community concerns regarding quarrying operations:

*The issue of dust with quarries and residents being located close to those quarries is always an issue that the industry needs to manage. Based on the evidence that we have, most recently done by the department of science and technology in relation to some quarries in Ormeau, as well as a range of other studies that have been done, such as Mount Cotton and a range of other studies in other states, there has been no danger to the local communities from those local quarrying operations. The local quarrying operations need to meet very tight environmental considerations. As you would appreciate, whilst some of those neighbours might be close to the quarries, they are not as close to the generators and that dust as the workers are. There is a health and safety issue and an environmental issue… in terms of the immediate community, it is mainly the environmental nuisance dust that needs to be taken into account. There has been no evidence that I am aware of, most recently over 2015-16 when residents raised concerns around quarries in the Ormeau region, where there was a study done on whether or not that dust was unhealthy for the community and was above environmental and health and safety standards. The department of science, engaged by the department of environment, said there was no danger and it was well within limits.*[459]

CCAA submitted:

*State and Australian Government environmental requirements and modern quarrying practices require that dust generation and dust emissions be kept at a minimum.*

*Quarries in Queensland and other Australian states are controlled by various Government authorities and regulations designed to ensure that quarry dust and other risks to the community and to workers are controlled…*

*Queensland quarries are also required to hold an Environmental Approval issued and administered by the Department of Environment and Heritage Protection. These approvals generally contain fugitive dust generation limits that also contribute to reducing respirable dust generated on site.*[460]

## 12.6 Mining communities

The committee heard from community members of concerns with the impacts on mining townships of airborne dust from the nearby coal mining operations. These were highlighted to the committee during a number of regional public forums during June 2017, particularly in the community of Dysart, and also in formal proceedings.[461]

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457 Dr Gunther Paul, submission 11, p 12.

458 Dr Gunther Paul, submission 11, p 5.

459 Mr Aaron Johnstone, public hearing transcript, Brisbane, 9 August 2017, p 3.

460 CCAA, submission 13, p 2.

461 For example, see evidence from Cr Peter Ramage, public hearing transcript Collinsville, 21 November 2016, p 1.

Dr Brian Plush submitted:

> *Production from coal mining in Australia has increased remarkably over the last several years. This increased productivity has meant that more dust is being produced and controlling respirable and inhalable dust continues to present the greatest ongoing challenge for coal mine operators and the surrounding environment. A report by the Director of Mine Safety Operations Branch of Industry and Investment NSW, Rob Reagan, has found that there is an increasing level of inhalable dust being produced in New South Wales, potentially leading to long-term health problems (ILN, 2010). This increased exposure level can be directly attributed to the increase in coal production and the continued development of mines in Australia.*
>
> *Queensland communities surrounding open cut mining activities will be facing the same issues identified in these articles. The inquiry has also heard supporting evidence by members of North Queensland communities.*
>
> *These communities require quantifiable measurement of the respirable dust that they are exposed to, and this can only occur through at the source measurement of dust production, before it gets in to the atmosphere and can disperse over hundreds of kilometres.*[462]

## 12.7 Conclusion

Given the limits of its terms of reference, the committee felt precluded from engaging in a more fulsome examination of these issues. At the same time, the committee was sympathetic to the concerns raised by stakeholders, which in the very least suggest the need for improved communication and engagement with affected communities, on the part of both industry operators and regulators.[463]

The committee also notes the work of the Senate Community Affairs Reference Committee in its 2013 Inquiry on Impacts on health of air quality in Australia.[464] That committee observed that buffer zones are already used in some jurisdictions for various industrial developments, in particular noting that 'Queensland has a mandated buffer zone on coal mines of two kilometres from towns with greater than one thousand inhabitants'. That committee recommended that buffer zones be used to protect populated areas from large point-source emitters.

> *The use of buffer zones to protect communities from large point-sources of pollution such as coal mines, power plants, ports and transport corridors is not a new idea. Having considered the evidence before it, the committee is of the view that buffer zones – taking into account local conditions and requirements – are an important tool in protecting communities from poor air pollution. Importantly, buffer zones are physical control measures that the community can see and authorities can accurately verify.*[465]

The committee acknowledges some stakeholder reports of significant shortcomings in the planning and zoning schemes used by councils, including general failures to implement appropriate buffer zones.[466] The committee notes the recommendations of the Senate Community Affairs Reference Committee and brings this issue to the attention of the Minister for Local Government.

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462 Dr Brian Plush, submission 17, p 5.

463 As an example, the Senate Community Affairs Reference Committee heard from representatives from Moranbah who 'argued that the lack of information about population exposure is as much a concern for residents as the exposure itself'. See Senate Community Affairs Reference Committee *Impacts on health of air quality in Australia*, Commonwealth of Australia, August 2013, p 27.

464 The Senate Community Affairs Reference Committee's final report and other inquiry details are available at: http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Completed_inquiries/2010-13/airquality/report/index

465 Senate Community Affairs Reference Committee, *Impacts on health of air quality in Australia*, Commonwealth of Australia, August 2013, pp 24-5.

466 Such issues were highlighted to the CWPSC during a number of regional public forums during June 2017, particularly in the community of Dysart.

The committee is also of the view that consideration ought be given to:

- commissioning research into the impacts of environmental exposure on occupational exposure tolerance and thresholds, to support more informed risk assessment and management, including appropriate tailoring of exposure limits and controls
- a review of the positioning of environmental air quality monitoring stations across Queensland by the Department of Environment and Heritage Protection
- an increased level of activity by the Department of Environment and Heritage Protection in its engagement with and provision of information to communities affected by industrial dust, including regarding the detected levels of community exposure and associated risks to human health or otherwise.

Accordingly, the committee makes the following recommendations.

**Recommendation 4**

The committee recommends that the Minister for Local Government conduct a review of the use of buffer zones in local government planning schemes to protect Queensland communities from large point-source dust emissions.

**Recommendation 5**

The committee recommends that the Queensland Government consider:

- commissioning research into the impacts of environmental dust exposure on occupational dust exposure tolerance thresholds
- conducting a review of the positioning of environmental air quality monitoring stations across Queensland, and
- increasing the level of engagement with communities affected by industrial dust in relation to the levels of community dust exposure and any health effects or otherwise.

## Appendix A – List of submissions

| Sub # | Submitter |
|---|---|
| 001 | Campbell J Staines |
| 002 | James Prentice |
| 003 | Bernard Corden |
| 004 | Stewart Rach |
| 005 | Luke and Jean Daglish |
| 006 | Clean Air Wynnum |
| 007 | Anthony Moloney |
| 008 | Bruce Ham |
| 009 | Dr John Schneider |
| 010 | Maurice Blackburn Lawyers |
| 011 | Dr Gunther Paul |
| 012 | Queensland Resources Council |
| 013 | Cement Concrete and Aggregates Australia (CCAA) |
| 014 | Stanwell Corporation Limited |
| 015 | BHP |
| 016 | Cyclopharm Limited |
| 017 | Dr Brian Plush |
| 018 | Queensland Law Society |
| 019 | Safe Work Australia |
| 020 | Pacific National |
| 021 | Department of Environment and Heritage Protection |
| 022 | ALP Port Curtis and Hinterland Branch |
| 023 | Australian Institute of Occupational Hygienists Inc (AIOH) |
| 024 | Office of Industrial Relations, Queensland Treasury |
| 025 | Shane Brunker |
| 026 | Kenelec Scientific |
| 027 | Jeff Cross |

## Appendix B – List of witnesses

**Private briefing**

**24 May 2017, Brisbane**

- Mr Paul Goldsbrough, Executive Director, Queensland Treasury, Office of Industrial Relations
- Mr Bradley Bick, Acting Senior Director, Workers' Compensation Services, Queensland Treasury, Office of Industrial Relations
- Ms Janene Hillhouse, Acting Executive Director, Safety, Policy and Workers' Compensation Services Queensland Treasury, Office of Industrial Relations

**Public briefings**

**14 June 2017, Brisbane**

- Dr Faiz Khan Chief Scientist, Environmental Policy and Legislation, Department of Environment and Heritage Protection
- Mr Geoff Robson, Executive Director, Strategic Environment and Waste Policy, Department of Environment and Heritage Protection
- Mr Laurie Hodgman, Director, Environmental Policy and Legislation, Department of Environment and Heritage Protection
- Ms Melissa Wells, Director, Business Centre Coal, Department of Environment and Heritage Protection
- Mr Justin Cagney, Program Manager, Compliance, Coal and Central Qld Compliance, Department of Environment and Heritage Protection
- Mr David Wainwright, Director, Air Quality Sciences, Science Division Department of Science, Information Technology and Innovation
- Mr Mark Stone, Executive Director, Mine Safety and Health, Department of Natural Resources and Mines
- Mr Phil Goode, Chief Inspector of Mines (Mineral Mines and Quarries), Department of Natural Resources and Mines
- Mr Mark Desira, Senior Principal Occupational Hygienist, Department of Natural Resources and Mines
- Dr Simon Blackwood, Deputy Director-General, Queensland Treasury, Office of Industrial Relations
- Ms Janene Hillhouse, Acting Executive Director, Safety, Policy and Workers' Compensation Services, Queensland Treasury, Office of Industrial Relations
- Ms Julie Nielsen, Executive Director, Compliance and Business Engagement, Queensland Treasury, Office of Industrial Relations
- Mr Bradley Bick, Acting Senior Director, Workers' Compensation Services, Queensland Treasury, Office of Industrial Relations
- Ms Shoena Messner, Director, Hazardous Industries and Chemicals Branch, Queensland Treasury, Office of Industrial Relations
- Dr Peter McGarry, Chief Advisor Asbestos and Manager, Asbestos Unit, Queensland Treasury, Office of Industrial Relations

**9 August 2017, Brisbane**

- Dr Jeanette Young, Chief Health Officer and Deputy Director General, Prevention Division, Queensland Health
- Ms Sophie Dwyer, Executive Director, Health Protection Branch, Queensland Health

**Public hearings**

**9 August 2017, Brisbane**

- Mr Aaron Johnstone, State Director, Queensland, Cement Concrete and Aggregates Australia (CCAA)
- Mr Ian Gilbar, Acting Chief Operating Officer, Stanwell Corporation Limited
- Mr Michael Joy, Manager Health and Safety, Stanwell Corporation Limited
- Ms Bobbie Foot, Head of Business Partnering HSE at BHP Billiton Mitsubishi Alliance (BMA), BHP
- Mr Peter Hanrahan, Head of Finance Business Partnership Risk, BHP
- Mrs Jacqueline Shepherd, Acting Director - Occupational Hygiene, Safe Work Australia (SWA)
- Mr Alan Rogers, Founding Member, Australian Institute of Occupational Hygienists (AIOH)

**23 August 2017, Brisbane**

- Mr Shane Brunker, District Vice-President, Southern Regions, CFMEU
- Mr Mark Zerner, Gladstone Port, CFMEU

**4 September 2017, Brisbane**

- Mr Mark Stone, Executive Director, Mine Safety and health, Department of Natural Resources and Mines
- Mr Mark Desira, Inspector of Mines (Occupational Hygiene), Department of Natural Resources and Mines
- Ms Julie Nielsen, Executive Director, Compliance and Business Engagement, Queensland Treasury, Office of Industrial Relations
- Mr Paul Goldsbrough, Executive Director, Queensland Treasury, Office of Industrial Relations
- Ms Janene Hillhouse, Acting Executive Director, Safety, Policy and Workers' Compensation Services, Queensland Treasury, Office of Industrial Relations