NSW Resources Regulator

Investigation report

A reported case of mixed dust pneumoconiosis and complicated mass fibrosis in a NSW coal mine worker

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Title: A reported case of mixed dust pneumoconiosis and complicated mass fibrosis in a NSW coal mine worker

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Contents

Purpose of the report

This report has been prepared for the Secretary of the NSW Department of Planning and Environment (the department). It details the investigation into a diagnosed case of mixed dust pneumoconiosis by the Resources Regulator's Major Investigation Unit (MIU).

The purpose of the report is to assist the Secretary of the department, as the regulator of work health and safety at mines, to share safety information with industry and the community.

Introduction

Coal workers' pneumoconiosis

Coal workers' pneumoconiosis (CWP) is a disease of the lungs resulting from chronic exposure to coal dust, its inhalation and deposition, and the lung tissue immune response to its presence.[1] CWP is sometimes known as black lung disease because of the presence of charcoal dust causing the lungs to turn black in colour. The disease typically has a very long latency period (usually 10-20 years or more). Workers exposed to chronic levels of coal dust may not show symptoms of the disease for a very long time. In many cases, diagnosis does not occur until well after the coal mine worker has left the industry, making it essential that coal mine workers continue to undergo regular lung health checks post-employment.

Medical studies suggest that CWP mainly affects underground coal workers due to past mining techniques which created chronic levels of dust in a confined atmosphere. Over the past decades it was believed that CWP was eradicated from the NSW mining industry with the introduction of contemporary mining techniques, dust suppression systems, coal worker health monitoring, personal protective equipment and a greater medical and scientific understanding of the disease.

Mixed dust pneumoconiosis

As the name suggests, mixed dust pneumoconiosis is a disease of the lungs resulting from chronic exposure to more than one type of mineral dust. For coal miners, this dust mixture is generally coal dust and silica dust. There is some evidence to suggest the toxicity of mixed dust is greater than coal dust alone. This is because rapid progression and progressive massive fibrosis is more likely with silicosis than with CWP.[2]

This case, the first reported in NSW since the 1970s, was diagnosed as mixed dust pneumoconiosis.

[1] Wallaert, B. and Leroy, S. (2008) Clinical Respiratory Medicine (Third Edition) Chapter 64 – Silicosis and Coal Workers Pneumoconiosis, Mosby p 809.
[2] Laney, A. S., Petonsk, E. L., Attfield, M. D. (2010) Pneumoconiosis among underground bituminous coal miners in the United States: is silicosis becoming more frequent. Occup Environ Med p 652.

Progressive massive fibrosis

Progressive massive fibrosis (PMF) is the debilitating end-stage of mixed dust pneumoconiosis and CWP. Irreversible lung damage from silica and coal dust causes an inflammatory response within the lung tissue. This inflammatory response creates congestion and activates a range of immunological pathways. The inflammatory response is followed by a reparative phase, where growth factors stimulate tissue regeneration. During the regeneration phase, abnormal or uncontrolled regeneration of tissue can occur. This results in fibrotic nodules forming on the lungs.[3] The characteristics of these fibrotic nodules are characteristic of the mineral that initially caused the damage. Specialist radiologists who are trained in the appropriate techniques can distinguish between CWP and mixed dust pneumoconiosis.[4]

Symptoms

Symptoms of pneumoconiosis are similar to many other known lung diseases. A strong, persistent cough, a noticeable wheeze and shortness of breath can all be symptoms of pneumoconiosis. Unexplained weight loss, clubbed fingernails and breathlessness during mild or moderate exertion can be signs of a potential issue. Notably, during latency periods (10 - 20 years or more) no symptoms may be present, which means that workers should not rely on waiting until symptoms develop before they seek medical assistance. NSW coal workers should contact Coal Services or their GP for regular check-ups and discuss openly with their physicians the potential for dust exposure. Workers should also seek medical assistance if they are concerned they may be showing symptoms of the disease.

[3] Wallaert, B. and Leroy, S. (2008) Clinical Respiratory Medicine (Third Edition) Chapter 64 – Silicosis and Coal Workers Pneumoconiosis, Mosby p 809.
[4] Guidelines for the use of the ILO international classification of radiographs of pneumoconiosis (revised edition 2011) International Labour Office, Geneva.

Investigation parameters

The Major Investigations Unit (MIU)

The MIU investigates the nature, circumstances and cause of major incidents in the NSW mining, petroleum and extractives industry. The unit's role is to carry out a detailed analysis of incidents and report findings to enhance industry safety and to give effect to the department's Enforcement Policy.

Privacy considerations

Before his death, the worker expressed a wish that his privacy be maintained. Accordingly, the regulator will not disclose the identity or personal health records of the deceased worker. For the purpose of this report the worker will be referred to as Worker X.

Authority to investigate

The MIU had authority to investigate this matter because the alleged exposure to risks occurred at mining workplaces regulated by the department. The investigation was conducted under the *Work Health and Safety Act 2011* (WHSA) and the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* (WHSMPSA).

MIU investigators are appointed as government officials under the WHSMA and, therefore, are deemed to be appointed as inspectors for the purposes of the WHSA and have the powers of an inspector under that Act. The regulator has also delegated some additional functions to inspectors, including exercising the power to obtain information for the purposes of monitoring compliance with the WHSA.

Notification of the diagnosis

On 19 December 2016, NSW Coal Services Pty Ltd notified the regulator that Worker X was diagnosed with mixed dust pneumoconiosis. Worker X retired in 2014 after more than 30 years working in the open cut coal mining industry.

Worker X was employed at various open cut operations in NSW. The onset of Worker X's disease was rapid, with his health deteriorating significantly between 2015 and 2016.

This caused Worker X to seek medical assistance from his general practitioner. Worker X then contacted the CFMEU and subsequently Coal Services for assistance.

On 16 January 2017, a formal investigation was commenced by the MIU.

The MIU contacted all mining work places where Worker X had worked during his career.

On 22 March 2017, the MIU published an information release about the investigation.

Investigation activities

The MIER investigation activities included:

- conducting an interview with Worker X
- identifying the mining workplaces where Worker X was employed
- identifying the timeframes Worker X was employed at those workplaces
- issuing statutory notices to all mine operators of those workplaces to produce information and documents
- obtaining Coal Services dust monitoring records and data for those workplaces
- analysing information and records obtained during the investigation
- identifying controls that may have prevented the exposure from occurring
- engaging an Occupational and Industrial Hygienist to provide a report to the regulator in relation to this matter.
- referring the Occupational and Industrial Hygienist's report to NSW Coal Services to assist them with their duties under the *Coal Industry Act 2001*.
- Analysing autopsy results following the death of Worker X.

Worker X

Employment history

Worker X was born in 1965 and was raised in Muswellbrook NSW. His father, an electrical fitter, worked at the adjacent Muswellbrook Coal Mine, which supplied coal to Muswellbrook power station. His family house was provided by the mining company and was located near Muswellbrook number one underground coal mine where his father worked.

At the age of 16, Worker X left school and took up employment with an electrical wholesaler between 1981 and 1983.

Between 1983 and 1984, Worker X was employed as a storeman at the Bayswater Power Station.

Between 1985 and 1999, Worker X was employed at Muswellbrook Coal as an operator in the open cut mine and undertook duties such as haul truck operator and dozer operator. His duties included transporting coal and over burden and cross ripping sandstone and other inter-burden materials.

Between 2000 and 2005, Worker X was employed as a contractor at several Hunter Valley open cut mines where he primarily worked as a haul truck operator.

Between 2005 and 2011, Worker X was employed at Ashton Coal open cut coal mine primarily as a haul truck operator.

Between 2011 and 2014, Worker X undertook contract work at several Hunter Valley open cut mines as a haul truck operator.

Progression of the disease

Worker X was a non-smoker.

Worker X undertook regular health monitoring as part of his employment.

Worker X did not notice any symptoms of respiratory disease until 2014. During this time, he noted some shortness of breath and was not initially concerned.

In 2016, Worker X became concerned after noticing changes in his health. Symptoms included significant and unexplained weight loss, shortness of breath and difficulty with day-to-day activities such as walking, climbing stairs and physical exertion.

Worker X visited his general practitioner and was referred for an X-ray. The results indicated the possible presence of coal workers' pneumoconiosis. Worker X was referred for a CT scan, which determined the diagnosis as complicated pneumoconiosis.

Worker X was provided with ongoing support and medical treatment by Coal Services Health.

In January 2018, Worker X succumbed to the disease and died.

Investigation findings

Coal Services Health

In November 2016, Coal Services Health was notified of the diagnosis. Coal Services Health referred Worker X to a respiratory specialist for further assessment. The specialist concluded that Worker X had developed complicated pneumoconiosis, compatible with his past occupational exposure to coal dust and mixed dusts including silica. [5]

Coal Services Health and the respiratory specialist assessed Worker X to determine how his condition developed to such a serious state in a relatively short time. The respiratory specialist opined that while not considered a normal progression of the disease, it was not unprecedented.

The specialist noted that there were documented cases in the United States of coal mine workers progressing from a seemingly normal medical condition to serious illness in as little as three years. The specialist also noted that individuals are different and some individuals may be more susceptible to respiratory disease for no apparent reason.

Occupational hygienist

The regulator retained an occupational hygienist to assist the investigation. Dust monitoring data was obtained and provided to the occupational hygienist for analysis.

Following and analysis of the data and risk factors for CWP the occupational hygienist said:

> "*The rapid onset and progression of the medical symptoms and radiological evidence from Worker-X do not fit comfortably with the tasks undertaken as listed in the employment*

[5] *Name redacted* (2016) *Medicolegal report* p5

history, they do not fit comfortably with the associated measured exposures for haul truck operators in the Singleton district, they do not fit comfortably with the various risk estimates for pneumoconiosis, do not fit comfortably with the findings of Coal Services medical surveillance program, and do not fit comfortably with the published epidemiological studies on coal miners. Alternative aetiology is likely." [6]

A copy of occupational hygienist's report is provided at Appendix A of this report.

Autopsy Report

Following the death of Worker X, an autopsy was performed by a qualified Pathologist. The autopsy results found no evidence of black pneumoconiosis. Rather, the results suggest an alternative diagnosis of idiopathic pulmonary fibrosis (IPF) may be likely.

IPF is a debilitating and life limiting disease that causes irreversible scarring of the lung tissue. The cause of IPF is not known. The scarring continues to worsen over time, making it difficult to breathe. The diagnosis of IPF can be challenging because it can be confused with other lung conditions. [7]

Conclusion

No evidence was identified to support a finding that Worker X was exposed to hazardous levels of atmospheric contaminant (silica or coal dust) at any of his workplaces. Airborne dust level data at the workplaces was found to be generally less than the specified regulatory exposure standards in effect at the time. As such, no breaches of the work health and safety legislation were identified during the investigation.

The Occupational Hygienist's findings and the autopsy results support the conclusion that Worker X had a spontaneous, also known as idiopathic, form of lung disease known as IPF, and not mixed dust pneumoconiosis as first diagnosed.

Therefore, based on the available information and in the absence of further medical evidence, the Regulator does not consider Worker X's death to be workplace related.

Health and Dust Monitoring

Risk to other workers

Even though the occupational hygienist's report showed there was a low likelihood of similar exposure groups contracting the disease, all coal mine workers should remain vigilant to symptoms of this disease.

Both existing and former coal mine workers are remined to consult regularly with their health care professional, physician and/or Coal Services Health in relation to their ongoing respiratory health.

[6] Rogers A (2017) *Worker X Respirable dust exposure and the associated risk of pneumoconiosis* Alan Rogers OH&S Pty Ltd p3
[7] Lung Foundation Australia, 2018, https://lungfoundation.com.au/patient-support/rarelung/idiopathic-pulmonary-fibrosis-ipf/

Contemporary risk controls measures

Contemporary risk controls such as particle matching sprays, dust filtering, enclosed cabs, housekeeping, operator positioning, road maintenance, ventilation and improved dust extraction on drilling equipment can assist to control of respirable dust.

The ongoing maintenance of dust-related controls is important as effectiveness of the controls may be diminished if they are not properly maintained. Mine operators are reminded that management systems must consider ongoing control maintenance as part of their assessment of risk in the workplace.

Effective dust monitoring programs such as those identified in Order 42 must be implemented.

Operators should consult with industry experts such as Coal Services and the standing dust committee to ensure that effective monitoring programs are in place to highlight potential issues.

Regulatory activities

Targeted assessment reports by the regulator

In September 2017, the regulator published a fact sheet highlighting the risks associated with airborne contaminants in open cut coal mines (Appendix B).

The fact sheet identified the exposure standards for respirable coal dust and silica as well as identifying health risks, elimination and control measures and obligations of duty holders. The fact sheet also identified the regulatory program for the control of airborne contaminants in open cut coal mines.

> *Over the next 12 months, the Resources Regulator will be conducting targeted assessments at open cut coal mines and associated coal processing plants to ensure these workplaces are employing a range of measures to control the exposure risks of workers.*
>
> *The assessments will focus on how the mine prevents worker exposure to harmful airborne dust in respirable fraction, specifically coal and crystalline silica.*
>
> *Key categories assessed are:*
>
> *1. identification, assessment and risk controls for airborne contaminant hazards;*
>
> *2. preventative controls (controlling dusts at the source);*
>
> *3. mitigating controls (controlling exposure to airborne contaminants);*
>
> *4. monitoring (worker exposure); and*
>
> *5. verifying the effectiveness of controls.*[8]

The targeted assessment program (TAP) began in March 2016 providing a planned, intelligence-driven and proactive approach to assess how effectively mine operators were managing the principal hazards

[8] NSW Resource Regulator (2017) *Airborne Contaminants – Open cut coal mines* p2

defined in the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (WHS (M&PS) Regulation).

The TAP is an in-depth look at the control measures for airborne contaminants and their implementation. The TAPs are undertaken by a multi-disciplined team of inspectors using both desktop and on-site assessments.[9]

The regulator has conducted TAPs at underground coal mines (Appendix C) and underground metalliferous mines (Appendix D).

Although the work environment differs significantly from open cut mines, these TAPs provide general guidance about effective elimination and control of airborne hazards in open cut coal mines.

Appendices

A) Rogers A (2017) *Worker X Respirable dust exposure and the associated risk of pneumoconiosis* Alan Rogers OH&S Pty Ltd

B) NSW Resource Regulator (2017) *Airborne Contaminants – Open cut coal mines*

C) NSW Resource Regulator (2017) *Targeted Assessment Program Consolidated report – Worker exposure to respirable dust, NSW underground coal mines, final report*

D) NSW Resource Regulator (2018) *Targeted Assessment Program Consolidated report – Airborne contaminants in underground metalliferous mines*

[9] NSW Resource Regulator (2018) *Targeted Assessment Program Consolidated report – Airborne contaminants in underground metalliferous mines* p3