

INVESTIGATION REPORT

# OPEN CUT COAL MINE WORKER CONTRACTS INTERSTITIAL LUNG DISEASE – WORKER D



**Document control**

Published by NSW Resources Regulator

Title: Open cut coal mine worker contracts interstitial lung disease – Worker D

First published: February 2021

Authorised by: Chief Investigator, Major Safety Investigations

CM9 reference: DOC20/771731

**AMENDMENT SCHEDULE**

Date	Version	Amendment

© State of New South Wales through Regional NSW 2021. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute Regional NSW as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing [December 2020] and may not be accurate, current or complete. The State of New South Wales (including Regional NSW), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

## Contents

1. Overview .....	4
2. The investigation.....	4
3. The worker.....	4
3.1. Work history.....	4
3.2. Personal history .....	6
3.2.1. Health .....	6
3.2.2. Lifestyle factors .....	6
3.2.3. Family history .....	6
4. Worker D’s stated dust exposure .....	7
4.1. Civil road construction work (1983 to 2003) .....	7
4.2. Open cut mine worker (1997 to 2013) .....	7
4.3. Operator at Maules Creek Coal (2014 to present) .....	8
5. Worker D: Health monitoring .....	8
6. Diagnosis.....	10
7. Nature of the diagnosed diseases .....	11
7.1. Chronic Obstructive Pulmonary Disease (COPD) .....	11
7.2. Interstitial lung disease (ILD).....	11
8. Findings.....	12
9. Recommendations.....	13
9.1. Mine operators .....	13
9.2. Workers.....	13
9.2.1. PPE.....	13
9.2.2. Medical assessment .....	13
9.2.3. Smoking.....	13
10. Further information.....	14

# 1. Overview

A 52-year-old worker (hereafter referred to as Worker D) with over 35 years' experience as a mobile plant operator in the mining and non-mining sectors was diagnosed with interstitial lung disease and emphysema.

The NSW Resources Regulator has investigated the circumstances of Worker D's illnesses.

# 2. The investigation

The Regulator's investigation involved:

- obtaining relevant medical reports
- conducting a detailed interview with Worker D to obtain his work and health history
- obtaining information from Worker D's general practitioner, treating specialist and Coal Services
- reviewing and analysing the information obtained.

# 3. The worker

## 3.1. Work history

Worker D spent approximately half of his career working as a mobile plant operator upon civil works projects, primarily in roadway construction. The remainder of his career has been spent working in the open cut coal mining sector, both in mine construction and the extraction of coal.

A summary of Worker D's work history is set out in Table 1.

Table 1 – Summary of Worker D’s work history

Date	Employer	Location(s)/work performed
1983-4/5	Constructor 1	Roadway construction on the Federal Highway.
1986-87	Constructor 2	Roadway construction on the Lake George bypass.
1987- 1996	Constructor 3	Roadway construction Marulan, Coolongolook, Murrurundi and Kim’s Creek. Power Station work.  Quarry work at Penrith Lake Scheme (Quarry).
1997-2003	Constructor 4	Construction work on the M2, M7, M5, Barton Hwy, north coast motorways, New England Highway and a NSW Mine.
Late 1990s	Constructor 5	Removal of contaminated soil and replacement with clean fill on the Homebush Olympic Stadium site.
1999	Constructor 6	Construction of Mine 1.
January 2006	Constructor 7	Mine 2 – primarily transporting coal on site.
2006	Constructor 8	Mine 3 – primarily stripping overburden.
2006-2008	Coal Mine Operator	Mine 4 – shutdown of the mine, coal extraction and rehabilitation work.  Mine 5 – mine construction.
2008	Constructor 9	Mine 6 – initially involved in the setup of the mine and, thereafter, moved to overburden removal and coal extraction.
2008/9 to 2012	Constructor 10	Mine 7 – open cut coal mining.
2013	Constructor 11	Mine 8 – open cut coal operator.
2014	Sole operator	Ross River Dam – earthworks using excavator.
Sep-Oct 2014	Constructor 12	Maules Creek Coal Mine – roadworks and pre-stripping.

Date	Employer	Location(s)/work performed
20 Oct 2014 to 6 Dec 20	Maules Creek Coal Pty Ltd	Maules Creek Coal Mine – primarily operated diggers and dozers. He was also an elected Site Safety and Health Representative between December 2016 and February 2019.

## 3.2. Personal history

### 3.2.1. Health

Until 2013 Worker D appears to have enjoyed good health. He did experience asthma, for which he was treated with medication, but did not appear to experience any significant medical issues until more recent years.

There is evidence of Worker D experiencing some breathing difficulties from 2011 onwards but it is not known if these early breathing difficulties are attributable to his asthma or other factors.

### 3.2.2. Lifestyle factors

Worker D appears to have maintained a good level of fitness throughout his childhood and into his twenties.

Worker D smoked cigarettes all of his adult life until around October 2019. He decided to stop smoking because Maules Creek Coal was a smoke-free workplace and, under site rules, he was not permitted to smoke at work.

### 3.2.3. Family history

The investigation did not identify any factors in Worker D’s family history which made him predisposed to lung disease.

## 4. Worker D's stated dust exposure

### 4.1. Civil road construction work (1983 to 2003)

Worker D stated that he was subjected to significant dust exposure during this period, particularly in the earlier part when the design of mobile plant was less advanced. He stated that the places at which he worked were extremely dusty and there was no focus on dust management.

Worker D stated that the mobile plant he operated in the earlier part of this period had open cabins. He did not wear dust masks or any other personal protective equipment and when he went home of an evening his nose was congested with black dust.

Worker D stated that toward the end of this period his employers began to acquire mobile plant that had enclosed cabins and air conditioning systems, however, the air conditioning units often became clogged and stopped working. As a result Worker D would operate the mobile plant with windows down.

### 4.2. Open cut mine worker (1997 to 2013)

In the late 1990s and early 2000s Worker D undertook construction work at a range of coal mines in NSW. The work involved using mobile plant to construct roadways and build pads for various types of structures. From the mid-2000s onward Worker D performed work as an open cut mobile plant operator working with overburden and coal. He undertook this work both as an employee of the mine operator and as the employee of contractors and subcontractors to the mine operator. He operated excavators, dozers, graders and trucks.

Worker D stated that:

- he experienced vast differences in the commitment to dust management practices between sites
- at a number of the workplaces there was a strong message about dust protection during the induction process, however, in practice it was ignored
- he never wore a dust mask in this period and was never asked to wear one
- the condition of the mobile plant that he operated also varied from site to site. At some locations he operated brand new equipment that was well maintained. At others he operated equipment with poorly maintained seals and ineffective or non-operational air conditioning units

- when he worked for a contractor Worker D would be assigned old or poorly maintained mobile plant with the newer and better maintained equipment assigned to the mine’s employed workforce.

### 4.3. Operator at Maules Creek Coal (2014 to present)

On 20 October 2014 Worker D commenced employment as a mobile plant operator with Maules Creek Coal. He stated that he primarily operated excavators and dozers.

Conflicting evidence obtained during the investigation about the effectiveness of dust management and maintenance practices at Maules Creek Coal, including the condition of roadways and mobile plant, prevented an affirmative finding on those matters being made.

Coal Services undertook sampling for atmospheric respirable dust and silica at Maules Creek between 2015 and 2019. Fifty-seven workers were sampled during that period. Of these samples, workplace exposure standards were found to have been exceeded on two occasions. Both instances related to exceeding the exposure standard that existed at that time for crystalline silica of 0.1 mg/m<sup>3</sup> (0.12 and 0.25). Worker D was not sampled during this period.

The Resources Regulator conducted repeated assessment activity in relation to dust management at Maules Creek Mine between 2018 and 2020. Site assessments conducted by inspectors in August and December 2020 resulted in the mine operator reviewing its dust management risk assessments. The updated risk assessments included additional controls which had been implemented on site but were not captured in the original assessments.

## 5. Worker D: Health monitoring

Worker D underwent regular health monitoring from 2011 which was conducted by Coal Services.

*Table 2: Summary of Worker D’s health monitoring:*

Date	Type	Spirometry	Imaging	Outcome
Aug 1997	Pre-employment	Not conducted	Not conducted	Nil health concerns noted. Worker was assessed as fit for the proposed position.
Jan 2006	Pre-employment	Not conducted	Chest X-ray	The x-ray report states that the worker’s lung fields were well expanded and appeared clear. Nil health concerns noted. Worker was assessed as fit for the proposed position.



Date	Type	Spirometry	Imaging	Outcome
Aug 2006	Pre-employment	Not conducted	Not conducted	Nil health concerns noted. Worker was assessed as fit for the proposed position.
Feb 2011	Pre-employment	Conducted – normal function	Chest X-ray	The worker stated that he used an Asmol Inhaler for asthma. He described suffering from abnormal shortness of breath in the questionnaire that accompanied the assessment. Nil health concerns noted. Worker was assessed as fit for the proposed position.
Mar 2013	Pre-employment	Normal	Not conducted	During the assessment, the worker described being troubled by shortness of breath when hurrying on level ground or walking up a slight hill. He described having a cough, wheeze and tight chest when running or climbing stairs quickly.
Jul 2013	Pre-employment	Normal	Chest x-ray	The x-ray report stated the worker’s lungs and pleural spaces appeared clear and there was no evidence of diffuse interstitial pulmonary fibrosis or inhalational lung disease.
Aug 2014	Pre-employment	Normal	Not conducted	The assessment concluded that the worker was medically fit in relation to the occupational demands of the role of operator.
Oct 2014	Pre-employment	Normal	Not conducted	The worker undertook a functional capacity evaluation and was certified to be fit to undertake the role of operator.
Feb 2017	Periodic	Normal range *	Not conducted	The worker stated that he would cough if running or climbing stairs fast. States that he brings up phlegm most mornings in winter. (* see May 2017 entry.)
May 2017	Follow up – x-ray referral	N/A	Not conducted	The referral was given because of changes to spirometry results. It appears that the x-ray was not performed.

Date	Type	Spirometry	Imaging	Outcome
Feb 2019	Follow up – x-ray	N/A	Chest x-ray	No parenchymal or pleural abnormalities were noted but there were mild increased bronchovascular markings.
Feb 2020	Follow up x-ray	N/A	Chest x-ray	Emphysematous changes demonstrated, with multiple small bullae predominantly upper lobar distribution. There is no mass like pulmonary density. Mild generalised bronchial wall thickening.

## 6. Diagnosis

The worker suffered a medical episode at work on 6 December 2019 when he experienced a rapid heart rate caused by breathing difficulties. During his subsequent hospitalisation he was diagnosed as having contracted interstitial lung disease (pulmonary fibrosis) and emphysema (a form of Chronic Obstructive Pulmonary Disease).

In January 2020, Worker D was reviewed by a Respiratory and Sleep Physician who, in June 2020, provided the following information to the Regulator about Worker D’s diagnoses:

- Worker D has contracted emphysema. The predominant cause is cigarette smoking but it is likely that his “dust exposure at work made a contribution to the development of his emphysema.”
- Worker D has contracted interstitial dust disease. The cause of his disease is not definite but is believed to be coal and silica dust exposure. This is due to “his history of significant dust exposure, CT appearances and absence of any other likely cause.”

The worker was examined by a thoracic specialist in May 2020. The specialist stated that Worker D will need long term treatment for his chest including the provision of medication, physical therapy and oxygen treatment. He is presently unfit for any type of work.

## 7. Nature of the diagnosed diseases

### 7.1. Chronic Obstructive Pulmonary Disease (COPD) <sup>1</sup>

COPD is an umbrella term for a group of progressive lung conditions including:

- emphysema
- chronic bronchitis
- chronic asthma.

The condition causes narrowing of the bronchial tubes in the lungs (sometimes called bronchi or airways) and this makes it difficult to breathe.

### 7.2. Interstitial lung disease (ILD) <sup>2</sup>

The interstitium is the tissue through which oxygen from the lung's tiny air sacs (the alveoli) passes to enter the lung's small blood vessels (capillaries). It also provides a framework to maintain the lung's shape. A large group of different diseases can damage the interstitium and together these diseases are termed "interstitial lung disease". When the interstitium is damaged, the major effect is to reduce the lung's normal ability to deliver oxygen to the bloodstream. ILD can distort the lungs' shape, generally making them smaller and stiffer, and change the shape of the airways that pass through damaged areas of lung. The scarring of the lung that is caused by ILD is called pulmonary fibrosis. The thoracic specialist who examined Worker D stated that diffuse dust related pulmonary fibrosis can occur through exposure to coal and silica dust.

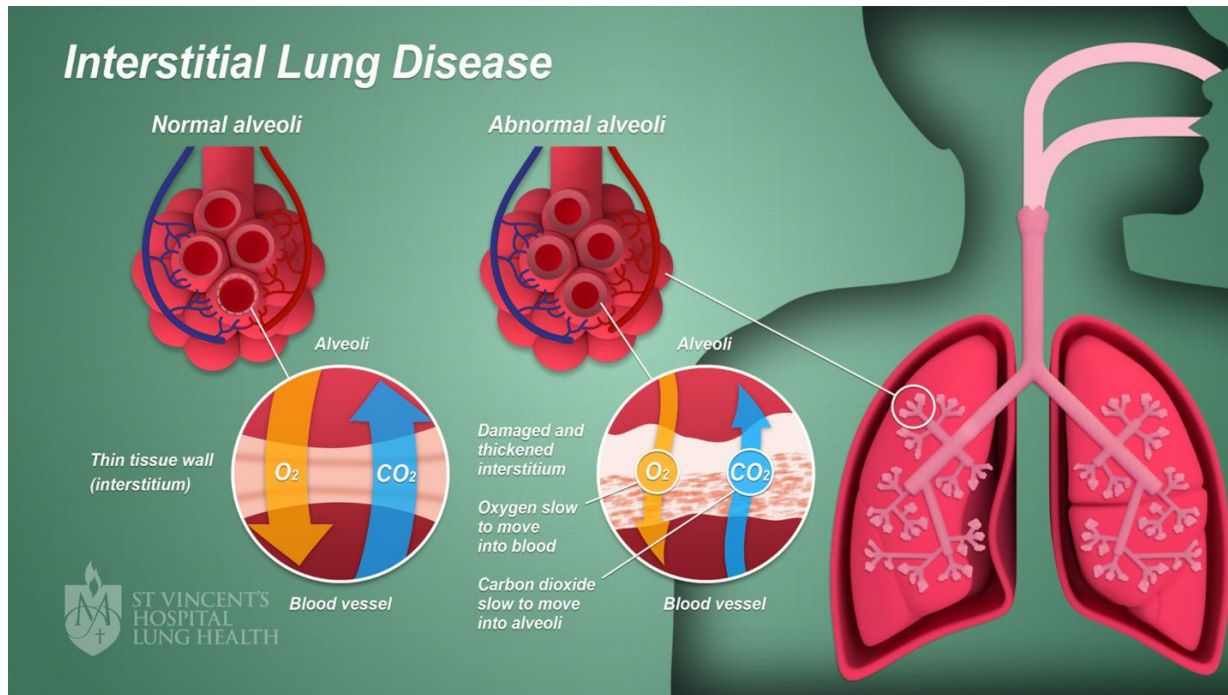
Most commonly, people with ILD notice breathlessness. Initially breathlessness often occurs only during exertion but, with more advanced disease, it occurs even during rest. People with ILD often also suffer cough, particularly when the ILD pattern is based around the lungs' airways. Although these symptoms vary amongst individuals, they can be severe and disabling.

---

<sup>1</sup> <https://lungfoundation.com.au/patients-carers/living-with-a-lung-disease/copd/overview/>

<sup>2</sup> <https://lungfoundation.com.au/wp-content/uploads/2018/09/Fact-sheet-Interstitial-Lung-Disease-Adult-Nov2015.pdf>

Figure 1 Interstitial Lung Disease (Credit: St Vincents Hospital Lung Health)



## 8. Findings

- Worker D has been exposed to dust at multiple workplaces in the mining and non-mining sectors during a 45-year career as a plant operator.
- Worker D has contracted emphysema. The predominant cause is cigarette smoking but dust exposure at work may have contributed to the development of this disease.
- Worker D has contracted interstitial dust disease. The cause of his disease is not definite but is believed to be coal and silica dust exposure.
- Worker D never wore respiratory protective equipment in the workplace (It is noted that respiratory protective equipment is the last line of defence in the control of airborne dust inhalation, as per the hierarchy of control).
- It cannot reasonably be determined, based on the available evidence, whether Worker D contracted the disease as a consequence of exposure while working at a particular mine or construction site or the extent to which any one particular workplace was a contributory cause of the disease. Although Worker D's breathlessness has increased in the past 2 years the underlying exposure to dusty workplaces and cigarette smoke existed for many years prior to that period.

## 9. Recommendations

### 9.1. Mine operators

Mine operators should review and verify the adequacy of their principal hazard management plan for airborne contaminants and act vigilantly to ensure it is implemented in practice.

The review should include consideration of:

- the hierarchy of controls
- all dust suppression measures including the method of mining
- mine ventilation to remove dust
- all personal protective equipment (PPE) supplied to filter dust
- atmospheric monitoring
- worker monitoring
- worker education and supervision.

### 9.2. Workers

#### 9.2.1. PPE

Workers must utilise the lower order control of wearing respiratory protective equipment (**RPE**) to complement higher order controls in the workplace.

#### 9.2.2. Medical assessment

Existing and former mine workers are encouraged to attend periodic health screening and to contact their medical practitioner if they have any concerns about their respiratory health.

#### 9.2.3. Smoking

In addition to the well-known health issues it produces, smoking may exacerbate the effects of silica exposure. Mine workers are encouraged to seek assistance in order to stop smoking.

## 10. Further information

Further information about airborne contaminants and dust is available on the Resources Regulator's [website](#).

Coal Services has the following guidance material available:

- [Prevention of pneumoconiosis in NSW - information for workers in the NSW coal mining industry](#)
- [Protecting against airborne dust exposure in coal mines](#)