

BREATHING EASY IN THE WORKPLACE- ENCLOSED CABINS OF MOBILE AND FIXED PLANT



Re-occurrence of Pneumoconiosis / Respiratory Disease is not just in the Coal Mining Industry

Workplace respiratory disease in a day and age where smoking (particulate $>0.5\mu$), is barred from work and public places, industry still seem to be ignorant about the extent and ramifications of Airborne Particulate and Fibre Exposure of harmful / carcinogenic “dust” in the Workplace.

Numerous news / media releases since late 2015 have reported the re-occurrence (“never wiped out”- The Australian- March 2016) of Black Lung Disease in the Australian Coal Industry and “**around 16% of Queensland Coal Miners alone may have symptoms of miner’s pneumoconiosis according to the CFMEU**” ([ABC News March 2016](#)).



Is Respiratory Disease only in the Coal Mining?

No! What is not known or misunderstood is that pneumoconiosis (workplace respiratory disease) is prevalent and far more reaching in many other industries where “dust” ensues in the workplace environment, such as in Metalliferous Mining, Drilling, Quarrying, Earthmoving, Ports (concrete / tyre rubber dust), Sandstone Cutting, Concrete / Cement / Brick Manufacturing, Construction, Road building, Agriculture, Timber, Tunnelling and many others.

Respiratory Disease – is it really that Bad?

As reported in the [Conversation April 21st 2016](#), there were 25,000 deaths from Black Lung reported in the [Global Burden of Disease Study 2013 \(GBD 2013\)](#). However, what was not mentioned is that the same study / report also stated morbidity rates for other types of Particulate & Fibre exposure were far higher and NOT related to Coal Mining:

- 46,000 – [Silicosis](#).
- 24,000 – [Asbestosis](#).
- 164,000 – Other Pneumoconiosis effects.

So how serious is the issue of [Pneumoconiosis](#)?

Studies and reports are indicating that it is very serious indeed. As an example – reported in [Reuters May 2016](#) up to 500,000 Metalliferous Miners in South Africa have successfully lodged a class action suite against Gold Mining Companies (Metalliferous Mining) for the contraction of Silicosis, which has wider ramifications across the world.

Workplace Respiratory Disease – Australia?

The Cancer Council Australia state those who work around diesel fumes are 40 per cent more likely to get lung cancer.

Experts say “exposure to diesel fumes is Australia’s second most prevalent work-based cancer-causing agent.” The Council has issued a warning to those who work with diesel-powered engines, vehicles and machinery to be aware of the associated risks of lung cancer.

According to the Council [>130 Australian workers are diagnosed every year with lung cancer](#) as a result of being exposed to diesel fumes in the work place. Cancer Council Australia’s Occupational / Environmental Cancer Committee chair Terry Slevin ([Owner Driver Oct 2016](#)) reportedly says “that while the risks of working in the sun or in demolition are well known, the effects of working on heavy vehicles aren’t as commonly known by the community. Awareness of the risks of exposures like asbestos and UV radiation is increasing, and is reflected in gradual improvements in work safety practices”.



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[The Cancer Council states in their WA Occupational Exposure to Carcinogens in Australia Report – 2015](#) some of the key issues are:

- Occupational exposures to carcinogens are estimated to cause over 5,000 new cases of cancer in Australia each year.

- Approximately 3.6 million Australians could be exposed to one or more carcinogens at work.
- The number of occupationally caused cancers compensated each year equates to less than eight percent of the expected number.

Other Health Issues

Silicosis is the most common workplace cause of pneumoconiosis. Along with DPM (Diesel Particulate Matter / Exhaust), Asbestoses (carcinogens) there are chronic bronchial / tracheal diseases and other health issues such as workplace asthma, kidney disease, etc due to workplace exposure and absorption.

According to the [Asthma Council Australia April 2008 Report](#) >15% of Asthma is attributed to Occupational Exposure.

Enclosed Cabins on Fixed/Mobile Plant

Whilst an Enclosed Cabin on Fixed / Mobile Plant provides some protection, there is a proliferation of field studies that clearly depict that the internal Cabin Environment can be more harmful than external to the Cabin. These studies have been completed for decades around the world by OH&S Regulators / Authorities, Universities, Industry – not only in regard to Particulate / Fibre Exposure but also other Cabin Environmental factors such as CO₂ Concentration (fatigue, drowsiness), Cabin Pressurisation, Recirculation Air Filtration, etc.

The [CDC / NIOSH in the USA](#) (where much of Australia's OH&S Standards are derived), have completed extensive field studies / reports on exposure of workers in Enclosed Cabins. In Australia, the Queensland Mines Inspectorate – Health Surveillance Unit (2009) has conducted comprehensive field studies proving the effects upon occupants in an Enclosed Cabin.

One such study of an Excavator in the Sandstone Quarry proved the benefits of implementing correctly designed and certified Engineering Mitigation Controls to provide a healthy / safe Cabin environment.

Examples of Enclosed Cabins are for Mobile Plant are Earthmoving / Mining machines, Light Vehicles, Service Trucks, Drill Rigs, Cranes, etc. For Fixed Plant are Maintenance Offices, Crusher Cabins.

Over the years, the use of Stockpile Buildings for raw materials has increased to reduce loss of product and to reduce / eliminate inundation of the public area.

However, whilst mitigating one risk another is created as this also presents an increased risk for occupants of Machine Cabins operating in these environments, which are “saturated” with Airborne Particulate (especially DPM).



Compliance Standards – Workplace Exposure?

Under the [Safe Work Australia Guide to WHS Act 2012](#) there is an onus of accountability on all of us to ensure a Duty of Care as PCBU's (Person Conducting a Business or Undertaking)

Some current [Standards / Guidelines in Australia](#) relating to Workplace Airborne Exposure Particulate / Fibre are:

- **2012 – ISBN 978-0-642-78409:** A Guide to the Model Safework Health & Safety Act.
- **2012/2013 – ISBN 978-1-74361-048:** Guide on the Interpretation of Workplace Exposure Standards for Airborne Contaminants.
- **2013 – ISBN 978-1-74361-055:** Workplace Exposure Standards for Airborne Contaminants.
- **2011 – ISBN 978-0-642-33315:** How to Manage & Control Asbestos in the Workplace.
- **2012 – SB13-03:** Safety Bulletin Diesel Emissions in Mines.

- **2010 – ISBN 978-0-642-33092:** Australia National Workplace Surveillance Report.
- **2020 – ISO 23875:** Mining- Air quality control systems for operator enclosure- performance requirements & test methods

Some significant aspects of the Standards / Guidelines:

- A Worker / Workplace Environment must be frequently sampled and the results kept for 30 years.
- Frequency of sampling workers varies and depends on level of exposure.
- A PCBU under the Safe Work WHS Act is those in the CoR (Chain of Responsibility / Accountability) for ensuring Workers Safety and Health. This includes not just the Industry Operator but also Suppliers, Importers, OEM's, Designers, Installers, etc and severe penalties are pursuant under the Act.

It is the Dust that we do not see!

It is the “dust” we do not see that is more of an issue. With this in mind, and depending on the conditions, it is usually fair to assume that a dust cloud that is visible to the naked eye may represent a hazard. However, it should not be assumed that the lack of a visible cloud represents “safe” conditions. A Particle (or Fibre) size of <40 micron can not be seen in a glass of water held to the sunlight with the naked eye.

[The Standards for Exposure Compliance](#) also denotes not only the Size of the Particulate / Fibre but also Concentration levels. For a 12 hour shift, exposure for RCS is calculated (derated) 0.025 mg / m³ of Air breathed TWA (time weighted average). Also, the filtration of the Particles (eg RCS) is to be >0.3 micron in Size, at a Filtration arrestance of 99.97% (HEPA) efficiency.

Protection of your Human / Plant Assets

The best protection against exposures is a certified Cabin Pressuriser / Filtration System.

Care must be taken in the design of the system and that it is applied correctly, compliant and will mitigate effectively.

Some aspects that a Cabin Pressuriser / Filtration design should consider are:

- Correct function of the HVAC System to maintain proper thermal comfort of the occupants.
- Filter Media type and arrestance efficiency for Exposure of Particulate / Fibre component.

- Recirculation Air filtration – entrapped particulate / fibre increases concentration inside the Cabin due to agitation / vibration, occupants clothing, boots, opening of doors (ingress / egress).
- Correct Cabin Pressurisation – negative pressurisation of the Cabin will actually “draw” in dust.
- CO₂ concentration (lack of External Air / Ventilation). If the HVAC system is operated on 100% Recirculation Air and / or if the External Filter is blocked then CO₂ concentration will occur quickly (<5 minutes) which will cause sleepiness, loss of concentration / alertness, fatigue and acidosis. According to [AIRHA](#), Co₂ exposure should not exceed >700ppm inside the Cabin.

Cost downs / Productivity

It is well known that one of the highest asset cost is maintaining HVAC System of Mobile / Fixed Cabins.

By providing a compliant Cabin Environment then not only are your Human Assets protected but also:

- Extends HVAC Service Life – no more blocked Evaporators.
- Extends service life and operation of Electrical / Electronic components.
- Operator Concentration / Productivity.
- Less Downtime / Production loss.

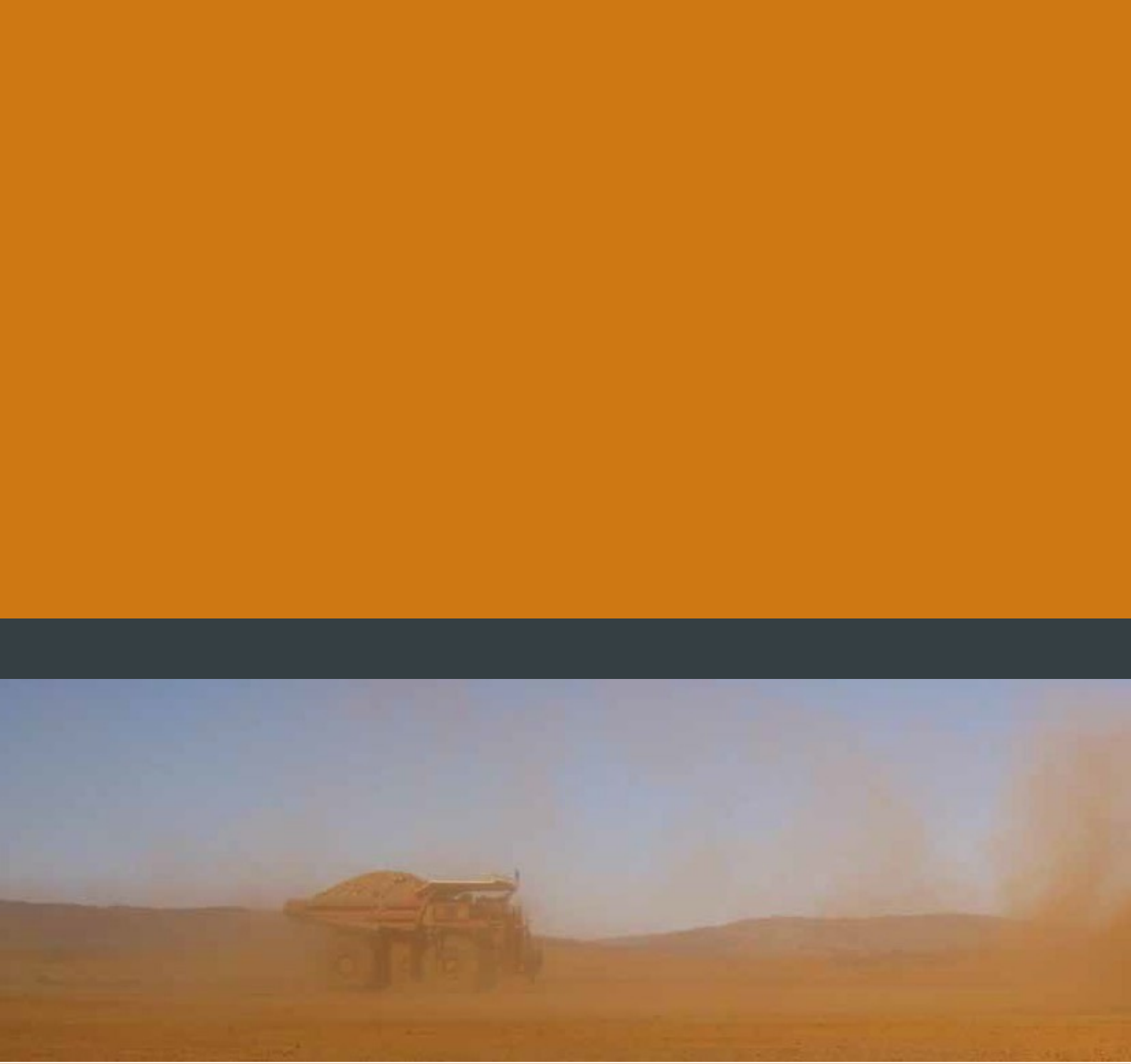
LSM Technologies – Specialists

LSM Technologies primary objectives are to be proactive in offering >2 decades of experience, expertise, research and mitigation control technology. As well as working with Industry Professionals / Regulators and our clients to meet compliance to current Australian / International Standards (ISO 23875) and Guidelines, extend the service life of their equipment and enhance productivity.

Our RESPA® Environmental Systems are the only Cabin Pressuriser / Filtration Technology field tested and certified by an [Australian OH&S Regulator – Queensland Mines Inspectorate, CDC / NIOSH](#) in the USA and thousands of clients are using our product technologies and technical services.



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LSM Technologies as an industry champion committed to the on- going development of OH&S Technologies / Systems to continually improving our client's objectives of enhanced Safety (Health), Equipment Damage Control and Productivity.

For copies of Studies, Compliance Standards and further information on their technology – please contact us or see www.lsmtechnologies.com.au



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