



# MINING: WHY MONITORING MATTERS

**According to the World Coal Association, there are around 892 billion tonnes of coal reserves worldwide; coal production is showing no signs of slowing down. Ensuring the global workforce of coal miners are protected against workplace exposures should be a priority for employers, particularly in regions with high coal production such as Australia, America, India, South Africa and some parts of Europe.**

Monitoring solutions have been enforced for many years, originally in the form of background samplers which captured dust in the general work environment. Modern methods such as long wall mining - a mechanised process allowing whole chunks of the wall to be mined in a single slice - provide speed, convenience and higher volumes of coal but as a result, dust in the atmosphere can reach an alarming level. Although more efficient, such modern methods expose workers to harmful substances increasing their risks of developing debilitating or fatal diseases such as Pneumoconiosis, commonly known as, 'black lung.'

## In Control

Historically, methods of monitoring dust exposures globally began with the use of background samplers. A single device hung in the mine to capture dust levels in the general workplace that worked in line with relevant government regulations, varying from country to country. Later, in the 1950s and 1960s, the concept of personal monitoring through personal sampling pumps was developed, with findings from the UK Atomic Energy Authority revealing flaws with the background monitoring system and its ability to measure an individual's exposure. The positive effect of flow pulsation - the measure of the difference in air flow between cycles - in personal sampling pumps was confirmed in the 1970's by US scientists.

In a further bid to enhance methods of monitoring dust exposure and improve workplace regulations through solutions, the UK Respiratory Dust Regulations were replaced in the 1980's by the prominent Control of Substances Hazardous to Health Regulations (COSHH) that stipulated frequent reviews of technology, inspection, accurate reporting arrangements and mine operators to report hazardous risks.

Over time, The Australian Government has enforced similar regulations and, with the 2013 Health & Safety Mines Act, the Government pledged that 189 pneumoconiosis cases and 945 chronic bronchitis cases would be prevented over a 35-year period. In New South Wales, this required mine operators to undergo more stringent examinations of health and safety in the workplace. To do this, it was mandatory for employers to conduct regular audits and compile health monitoring and reports for individual employees.

## Black Lung

Fatal, debilitating and linked to the long term exposure of coal dust; miners have been at risk of black lung since mining started nearly 5,000 years ago in China. Dating back to 1831, British researchers began serious scientific investigations into the effects of black lung disease. There is no cure for the illnesses which, in some cases, is developed after 10-20 years of exposure from coal dust that builds up in the lungs stopping the process of oxygen, expelling carbon dioxide.

Despite ongoing monitoring solutions, worker health can still be impacted. The Australian Government's mission to eradicate the disease was believed to be effective, and the condition was thought to be eliminated. In 2015 this changed when a single case was reported, followed by a further 15 cases in 2016. Investigations were conducted to identify the source of high dust levels, revealing open cut mining (a surface mining technique) and long wall mining to be the cause. The Queensland Government released a five-point action plan to tackle this re-emergence.

## Made to Measure

Personal sampling pumps are a technological innovation and exist to measure individual's exposures to a variety of substances, including dust. It is important that the pumps are used with the correct sampling head and in the case of respirable dust a cyclone and filter, which collects the particulate. This allows for additional investigations if necessary, including the measurement of silica content within the dust. This provides the industry with further knowledge that will help change working habits whenever dust levels exceed the limits. As the filter loads, the pump senses the change in pressure and works harder to maintain the flow rate.

If personal sampling pumps do not give a constant flow rate, functionality can be limited.

With this in mind, improvements have been made to different elements of personal sampling pumps over time. Battery technology, back pressure capability, accurate flow control, minimised pulsation, data download and the ability to be intrinsically safe are have all been improved, ensuring measurement of an individual's exposure to harmful substances

is as accurate as possible. Understanding these factors in which the personal sampling pump needs to operate effectively will allow employers to choose the most effective device suited to their working environment

## Standards

The latest International Standardisation Organisation (ISO) ISO13137 which covers the recognised standard for personal sampling pumps stipulates the latest requirements for personal sampling devices in the mining industry to achieve the current pulsation criteria of 10%, which many tested devices exceed, reaching over 25% pulsation. The ISO standard includes 24 different countries, and to attain the correct measure of data, discussions are underway to determine whether the ISO criterion should be increased for maximum effectiveness. This type of monitoring is essential to keep a track of worker's exposures and prevent issues such as the recent increase in black lung in Australia from happening around the world.

## Bridging the Gap

Coal mine workers complete their duties in a grueling environment and despite the industry exercising proactive measures to control occupational diseases since the 1950's, continuing cases of health complications reveal that monitoring must evolve in accordance to the changing production methods.

The industry recognises the complex matter of dealing with employee health through various methods, above and beyond monitoring solutions, requiring all miners to undergo a pre-employment health assessment, as well as providing individual's health screenings once every five years of employment. There is nothing currently for retired miners and there is scope for growth in this area to be able to monitor long latency effectively.

The coal mining industry is moving in a positive direction to control diseases that develop as the result of exposures. All necessary components in a health and safety management programme in this environment must work together to be effective and ensure worker health.

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