

Grasstree Development Team Dust Suppression

Anglo American – Grasstree Mine

The Problem

Coal workers' pneumoconiosis is a potentially life threatening disease which was thought to have been eliminated in Australia. Between May 2015 and July 2016 there have been 22 confirmed cases in Queensland.

Personal sampling occurs as a constant effort to measure and verify exposure limits in the work place. The Queensland underground coal mining industry recognised that some form of intervention and improvement was required. Grasstree Mine was no different and embarked on reducing respirable dust across all of its processes: Longwall, Development and Outbye. During 2016, prior to any remedial action, there were a total of 150 personal dust samples in the Development panels with 13 exceeding the equivalent exposure limit.

The Solution

The basic principle of the dust suppression solution on the continuous miners is to implement engineering controls that isolate the workers from the source of dust; thereby forming a safe working area during the production sequence.

Internal engineering resources were used to design and draft technical drawings to send to an external manufacturer to manufacture hydraulic circuits and foam mixing boards. The initial design challenge faced was fitting all components into a small space on a continuous miner at Grasstree. This was resolved by refining the circuit and redesigning all valves into one manifold block and one mixing chamber. The hydraulic circuit was designed on site.

Implementation of the foam addition to the continuous miner began by testing the initial mixing board on the surface to establish effectiveness of the system in terms of actual volumetric foam production that could be applied for dust reduction. Initial testing results were positive and results were further enhanced by refinement of the mixing board. It was then fitted to the miner underground and further testing was successful.

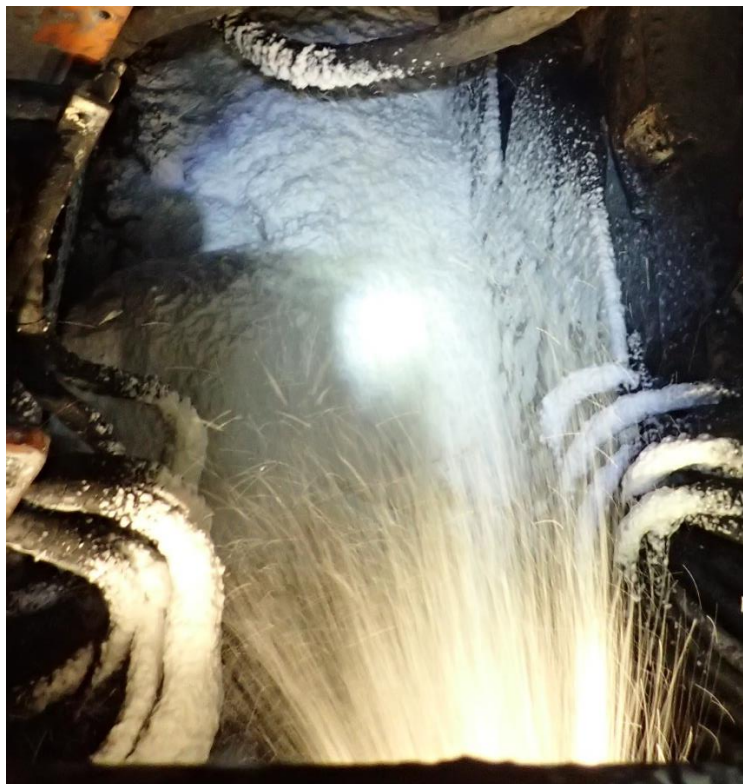
After initial testing provided merit, the first cumbersome component board design was refined further to consist of a foam board unit and standalone tank fitted onboard the miner. The design and implementation of this extra componentry does not interfere or impede with production or maintenance tasks.

The hierarchy of control for dust suppression on the continuous miner has been applied through both engineering and administrative controls. The engineering controls consist of the curtain spray, high pressure sprays and the design and implementation of the foam board system to eliminate respirable dust between 20 and 2.5 micron. Administrative

controls have been implemented via the introduction of designated standing areas during specific modes in the sequence. The PPE control is the mandatory use of a P2 dust mask or better while in production.



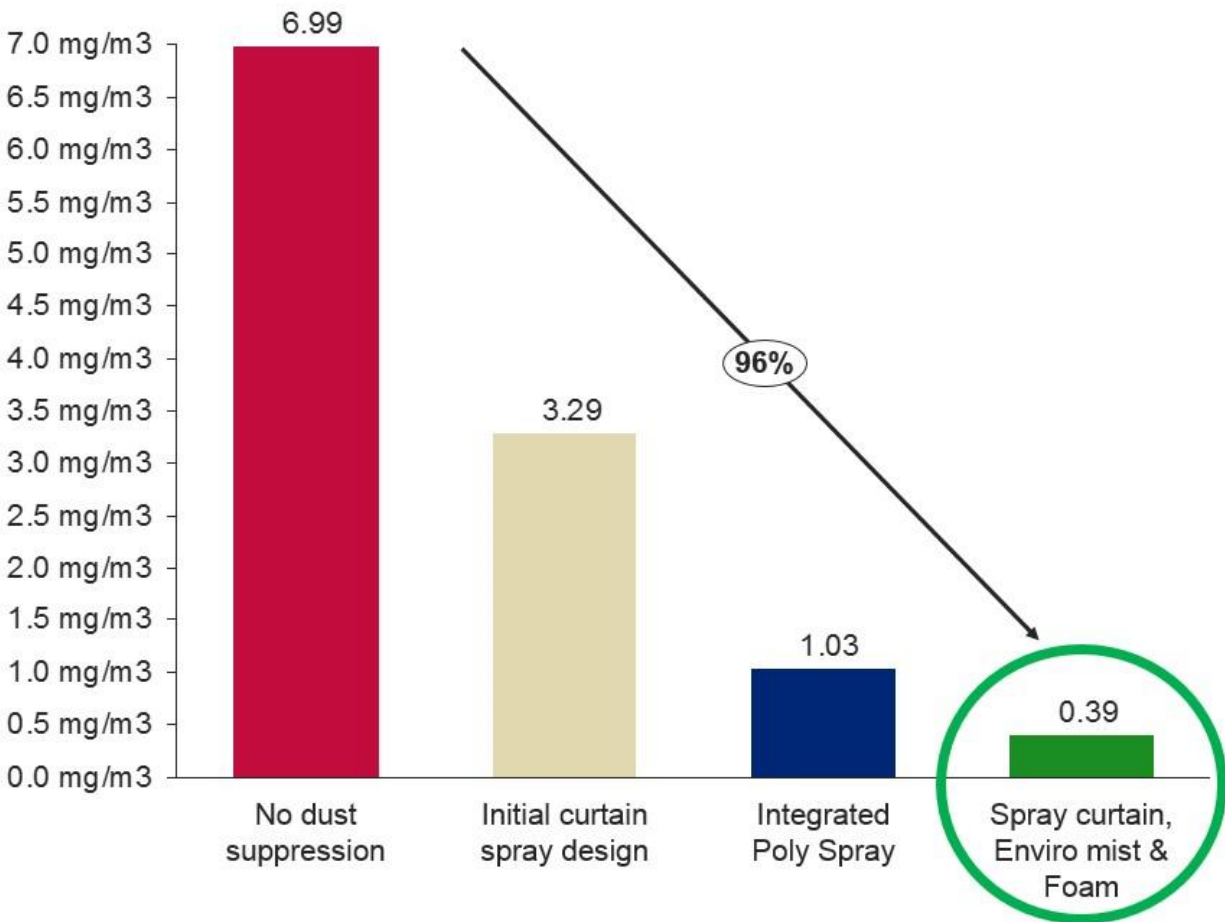
Photograph 1:
Foam spray – rear
of continuous
miner



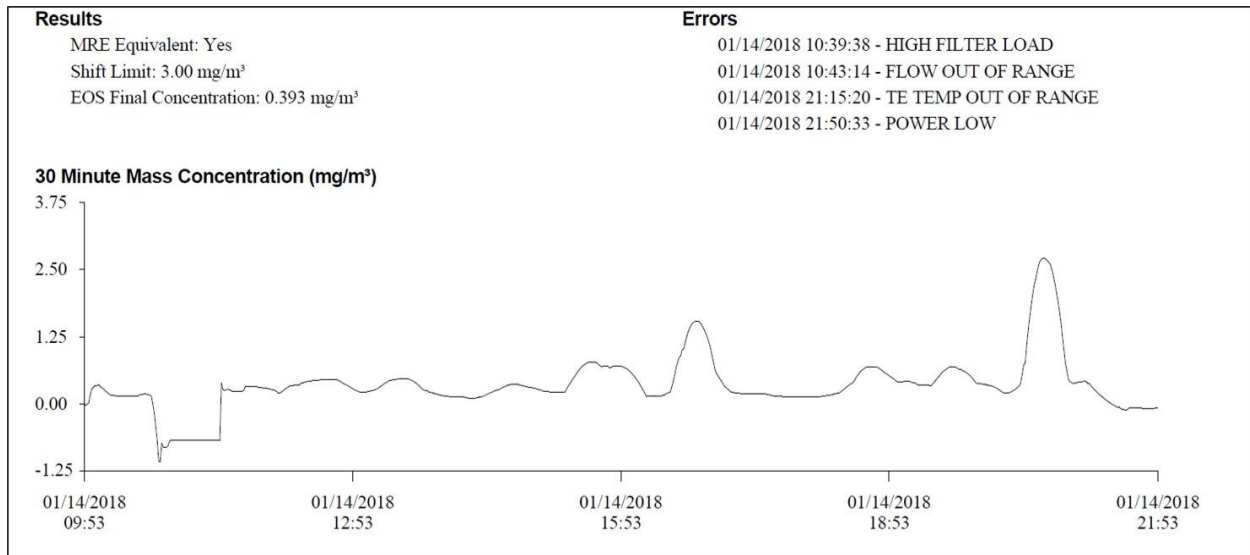
Photograph 2:
Foam spray on
front of miner

Benefits/Effects

Testing of Grasstree's continuous miner fleet proved inadequate dust suppression systems were fitted to the miners from OEM specification. Action had to be taken to remedy this. This has evolved into a miner with an integrated curtain spray on the shovel of miner, an enviro-mist high pressure spray system and the foam board system as shown in the graph below. The results have exceeded both the current exposure limits and our expectations on site. The system has been fitted to the entire continuous miner fleet at Grasstree Mine.



Graph 1: Staged implementation and testing of the dust suppression solutions on the Grasstree Continuous Miner Fleet. The green circle indicates current results.



Graph 2: Real time monitoring during a production shift with all dust suppression solutions operational.

Transferability

Foam is currently used in the Longwall and Development. Grasstree has plans to implement foam at all belt transfer points and breaker feeders. This foam set-up can be fitted at any mine that has a respirable dust issue. Other industries where the transfer of material creates respirable particles can also implement this foam system.

Innovation

No information could be found on a reliable dust control system that could fit into the confines of Grasstree's continuous miner fleet. The project commenced from scratch by trialing a similar system that was oversized that would never fit the machines to ensure reliability and effectiveness. Refinements had to be made to fit the machines on site.

Approximate Cost

The initial procurement cost of purpose-built tank and foam board was \$23,000. Ongoing operational costs, which consist of using 1 litre of neat solution per metre equates to a cost of \$6 per metre produced.