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EnviroMist Dust Suppression Technology Application

EnviroMist has been providing high energy micro-mist dust suppression systems to Australian mining companies for the past 12 years.

Systems are installed in both above and below ground mines and have proven to significantly reduce dust emissions when compared to other dust suppression systems.

Due to the nature of EnviroMist high energy technology, EnviroMist dust suppression systems are able to work in environments and locations in which low pressure dust suppression systems are rendered ineffective or utilising very high volumes of water.

Examples of such systems applications are in large truck dump ROM bins, on underground continuous miners, on longwalls, off the end of large stacking conveyors and in process plants.

EnviroMist systems have been proven to use less water than low pressure dust suppression systems for the same application. For example, an iron ore ROM bin dust suppression system replaced an existing low pressure dust suppression system which used 250% more water.

The EnviroMist system not only used less water, it also significantly increased the dust suppression at the ROM bin, reducing dust levels over 90%.

EnviroMist systems:

- Give small (10-60 micron) water droplet size without the need to add air (ie compressed air dust fogging nozzles)
- Reduce the water droplet size to match that of the dust particles, increasing the chance of capture compared to large water droplets
- Produce large volumes of small droplets giving a much higher chance of water droplets hitting dust particles, and therefore capturing the dust
- Are able to work with normal mine water without any additives. Potable water is not required for operation.

In ROM bin systems, the energy behind the spray stream creates a pressure curtain which captures the majority of dust liberated

during dumping operations and thus keeps the dust within the dump pocket unlike low pressure dust fogging systems.

The captured air is contained for sufficient time to ensure all the dust liberated from the ore has been suppressed.

The photos below show before/after pictures of a ROM bin with an air enhanced dust fogging system compared with the same bin with EnviroMist system installed. The photos are taken at the same periods during the dumping cycle (see figures 1 and 2 below).

At BMC's South Walker Creek mine, EnviroMist was commissioned to install a dust suppression system around the ROM bin, feeders, crushers and transfers.

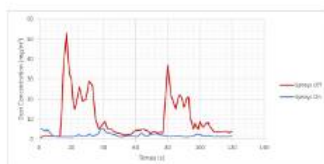
The ROM was found to have respiratory dust levels in excess of the legislative requirements and was five times in excess of the $2\text{mg}/\text{m}^3$ mass average allowable limit.

Following the introduction of EnviroMist Dust Suppression system, the dust levels were reduced to within legislative compliance. Testing confirmed a reduction in total dust particle mass from $10\text{mg}/\text{m}^3$ to $2\text{mg}/\text{m}^3$.

The graph below shows online testing data for the dumping operations.

The data spikes relate to the front-end loader dumping product into an empty bin and have been reduced from $52\text{mg}/\text{m}^3$ to $5.4\text{mg}/\text{m}^3$.

In addition, the reduction in air borne dust saw a marked reduction in cleaning with a further benefit of keeping the dust entrained in the product stream where it can be processed.



Dust concentration measured with and without the dust suppression system operating.

Early longwall production at Anglo-American Coal's Grosvenor mine highlighted areas of excess dust emissions.

Of particular concern was the BSL discharge point, where coal is loaded onto the longwall section belt.

Static monitoring conducted by both Grosvenor and GCG hygienists indicated that the BSL discharge contributed to the intake respirable dust concentration by up to $2\text{mg}/\text{m}^3/\text{shear}$.

Additionally, reduced visibility was significant and noted as becoming more prevalent as production increased to near nameplate capacity. Prior to commencement of the EnviroMist project, there were existing controls in place, including a scrubber and various water sprays; however, these systems were unable to completely eliminate the dust liberated. In response, a solution using EnviroMist's micro-mist technology was pursued.

The solution to the dust issues around the BSL was the application of EnviroMist's innovative high-energy micro-mist dust suppression technology.

These systems use specially developed nozzles operated at pressures in excess of 100 bar to produce a high-energy mist with controlled droplet size, velocity, water consumption, and spray angle.

A system such as this allows dust capture to be maximised whilst reducing negative side effects generally found such as belt flooding, overspray, and unwanted dust diversion.

The figure below demonstrates the high-density mist that is produced by the EnviroMist nozzles in comparison with a standard nozzle that is commonly used for dust suppression purposes.



The EnviroMist high-energy micro-mist system was installed, resulting in an immediate and significant reduction in dust around the BSL area.

Monitoring following the installation of the system showed the average respirable dust concentration due to the BSL discharge was reduced by approximately 75%, down to approximately $0.33\text{mg}/\text{m}^3/\text{shear}$.

Evidence from the main gate operators on shift following installation also supported the claim of such a dramatic dust reduction.

Maintenance

One main maintenance advantage of the EnviroMist system is that nozzles rarely block and the high-quality components last for years.

EnviroMist only use certified stainless steel in their spray blocks and nozzles, with the nozzle material selected for greater wear life. Experience with installed systems have shown that a correctly filtered system will result in nozzles that last for years without needing replacement.

EnviroMist nozzles are manufactured using the latest in machining technology and have never failed during operation.

EnviroMist dust suppression technology is currently being used in surface mining, underground mining, drill and blast operations, transfer chutes, materials processing plants and ship unloading operations.

Systems are individually designed for each task with 3D models produced to ensure the system is compatible with the existing equipment and to ensure clients understand the design prior to manufacture.

EnviroMist has numerous spray bar designs and is always developing new designs to improve the output or to meet specific space, material or site requirements.

For more information:
www.enviro-mist.com.au

AMR



Figure 1

Air enhanced dust fogging system during truck dumping – dust is escaping through the spray.



Figure 2

EnviroMist system during truck dumping at same time periods – the dust is contained.



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AN INDUSTRY LEADER IN DUST SUPPRESSION

We provide large scale dust suppression applications in iron ore and coal underground and above ground operations, with immediate and significant dust level reduction around material handling areas.

Our systems ensure maximum dust capture effectiveness through the control of droplet size, velocity, water consumption and spray angle based on CFD modelling techniques.

APPLICATIONS

- Stockpiles & ROM Bins
- Crushers & Conveyors
- Mining Machinery
- Ship Loaders & Unloaders
- Transfer Points & Chutes
- Construction Machinery

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