Dust control testing at Pascua Lama

Abdul Samad* reports on the recent trial of a customised dust suppression solution at Barrick's high altitude mine on the Chile/Argentina border

In the March 2012 issue of ***IM***, the impact of dust control in mines and the associated regulations were covered, as well as the broad types of dust suppression methods used. Customised solutions for dust suppression were referred to, which are part of the latest trend in haul road dust treatment. There is no off the shelf solution, however, and in developing customised dust suppression solutions, the soil is tested in the lab and the soil characteristics closely studied before a suitable solution is designed and tested to check whether all the objectives of the test have been met, otherwise modifications may be required.

The following outlines a case study of a customised dust suppression trial at the Barrick Pascua Lame operation, located between 3,800 and 5,200 m on the Chile-Argentina border. It is well known that mines in this region face water shortages and any solutions to dust that can reduce water consumption are a major priority. During the test, Chile's HSEC (Health, Safety, Environment, and Community) targets were used as a basis for establishing key performance indicators (KPIs) such as:

- Reduction of dust emissions
- Cut back of water usage
- Decrease of operating cost through cost/benefit analysis
- Reduction of occupational health exposures (eg silica)
- Reduction of soil and water contamination resulting from the use of outdated and toxic dust suppressants.

The field test was performed from March 26, 2012 to April 5, 2012 to evaluate the ability of the Earth Alive dust suppressant to control dust emission at Pascua Lama. The dust suppressant was applied on March 28, 2012 on a 200 m x 33 m surface of a mine haul road located in Sector KL "Superior" of the operation at about 5,100 m.

The dust emissions levels after the application of the dust suppressant were monitored on April 5, 2012, 8 days after the application of the dust suppressant and again on April 22, 2012, almost a month (25 days) after the application. Between these two dates, no maintenance and measurements could be done because of severe weather conditions.

Equipment and method used

Real-time dust monitoring was performed using a DUSTTRAK DRX Aerosol Monitor 8533 which can simultaneously measure size-segregated mass fraction concentrations corresponding to PM1 (particulate matter of diameter 1 micron), PM2.5, respirable (PM10) and total PM size fractions. The aerosol concentration range of the monitor is 0.001 to 150 mg/m^3 (or ppm). Dust emissions were measured using two different types of measurement:

1. Mobile monitoring: Having the monitor installed at the back of a pick-up truck
2. Static monitoring: A Komatsu 930E mine truck passing at about 1.5 to 2.5 m of the monitor located on side of the road.

The most important results can be summarised through the average (Figures 1 and 2) and maximum (Figures 3 and 4) concentrations of dust measured as PM 2.5, PM 10, and Total PM for each road monitored. The results clearly indicate that although the dust emission is reduced by about 50% by the application of water on road, the application of Earth Alive dust suppressant is more efficient, the average concentrations were calculated as 0.2, 0.2, and 0.1 respectively for Total PM, PM 10, and PM2.5.

Average Dust Concentrations

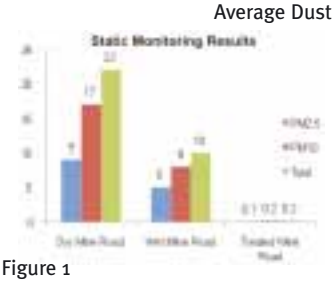

Figure 1

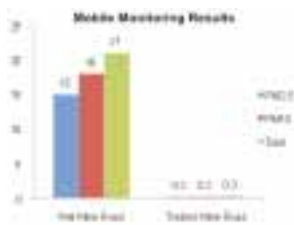

Figure 2

Maximum Dust Concentrations

Figure 3

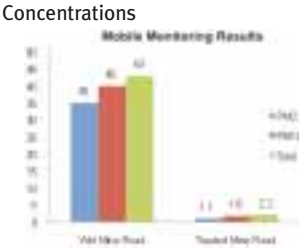

Figure 4

Conclusion

Applying water is the most obvious way of dust management and there are water carts, sprinklers, and nozzles available for this purpose. However, the extent of dust suppression achieved is insufficient and the effect is short term, as indicated by the high dust concentration measured on wet mine road (26-43 mg/m^3), which usually exceed the usual dust-emission standards in workplaces. In addition, with water shortages in some areas and the expense involved in frequent application of water on roads, customised dust suppressants such as those offered by Earth Alive can represent an effective dust control alternative that is effective and economical.

Controlling dust emissions in this way may help to minimise the dust concentration in the air and mitigate the associated risk of increased melting of Andean glaciers straddling the Argentine-Chilean border, which are hugely important water sources for thousands of small farms in the Huasco Valley. The use of the Earth Alive dust suppressant may also help to increase productivity and cost savings in mining operations. High levels of dust can undermine operation profitability and productivity by posing a threat to the moving parts of mining equipment required to operate the mine, which can lead to expensive repairs and downtime, or by reducing the visibility for workers which forces vehicles travelling on dusty haul roads to drive much slower.

The microbial technology component of the Earth Alive dust suppressant formulation offers additional expected benefits over a longer term such as bioremediation, soil regeneration, vegetation regrowth and improved "stickiness" providing stronger and better binding of roads. The dust suppressant is an environmentally respectful formulation of agriculturally derived complex organic polymers, with an added hydrocarbon-degrading microbial technology. ***IM***

Types of roads monitored

Types of Roads Monitored	
Dry Mine Road	• Dust emission monitored using static monitoring
Wet Mine Road	• Sprayed with water, some hours prior to dust measurement
	• Dust emission monitored using static and mobile monitoring
Treated Mine Road	• Treated with the Earth Alive dust suppressant
	• Dust emission monitored using static and mobile monitoring

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This article is an edited summary of a 2012 report by entitled "Evaluation of the Earth Alive Dust Suppressant" by Viviane Yargeau, Associate Professor at McGill University