

Mitigating mining dust

Four monitoring needs, two ways to meet them

Mining is central to economies around the world, supplying essential materials for the production of everything from microchips to luxury goods. But digging into the earth also produces a health hazard: dust.

Environmental insights are crucial to secure operational safety and continuity, and reduce mining emission exposure to communities. Insights on emissions and local weather are key for effectively targeting and tracking mitigation strategies. Here are four major parameters that mining organizations need to measure, plus the two most efficient and accurate ways to measure them.

Airborne particulate matter (PM) is a serious health hazard. Exposure to fine particles (<2.5 micrometers in diameter) causes millions of premature deaths every year, and a 10 microgram per cubic meter increase in $PM_{2.5}$ concentration shortens a person's life expectancy by 9 - 11 years.*

Current PM emission regulations

EU Ambient Air Quality Directive limits

- PM_{10} daily average 50 $\mu g/m^3$
- $PM_{2.5}$ = one year average 25 $\mu g/m^3$

US EPA limits

- PM_{10} = 24-hour average 150 $\mu g/m^3$
- $PM_{2.5}$ = 24-hour average 35 $\mu g/m^3$

Monitoring parameters

1 PM suspended in the atmosphere

Amounts of $PM_{2.5}$ and PM_{10} can have detrimental impacts on safety, operational continuity and environmental compliance, and can be hazardous for nearby communities.



2 Wind direction and speed

Local winds can carry particulates from mining operations, driving pathways to communities and other nearby sensitive areas.

3 Boundary layer height

The boundary layer, or mixing layer, fluctuates day and night. This layer defines atmospheric volumes where emissions mix, driving concentration patterns.



4 Other weather parameters

Temperature and precipitation, for example, can act in a predictable manner to trigger or stop dust.

Measurement solutions

1 Relative and qualitative observations: WindCube® Scan



Vaisala WindCube Scan performs 24/7 real-time wind and aerosol measurements and high-level data processing using Doppler pulsed lidar, providing comprehensive information on airborne dust levels, their travel and their exposure to nearby communities for an effective means of operational excellence through better air quality.

- Cutting-edge technology provides unambiguous information on the relative levels of dust at a specific location up to 10 km in range
- Wind information, boundary layer, relative levels of dust taken simultaneously with a single and compact piece of equipment

Key benefit:

Localize and identify dust emissions with clear insights on sources, hotspots and propagation pathways.

2 Absolute and quantitative observations: WindCube Scan and PM monitors

WindCube Scan is effective on its own for measuring wind, boundary layer and relative dust levels. Complemented with a network of PM monitors, mining organizations can track even more.

- The combination of WindCube Scan and PM monitors replaces hundreds of conventional sensors

Key benefit:

Accurately quantify dust contents and amounts when combined with conventional PM monitors.

Measure, analyze and act for a better world.

Get comprehensive air quality information with cutting-edge technology for actionable insight that enhances efficiency and safety.

Vaisala offers a full range of turnkey and customizable solutions that enable mining and other industries to monitor and manage emission mitigation and environmental compliance, while ensuring operational continuity in the face of severe weather. Contact us to start a conversation.

*World Health Organization, Mikael Skou Andersen, Ecological Indicators, Volume 79, August 2017, published by Elsevier.

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