



Mines Safety Bulletin No. 157

Subject: Minimising dust generation during crushing, screening and conveying

Date: 18 January 2019

Background

Inspectors have recently observed that some mining operators are not operating, or do not have installed, adequate dust control systems for the crushing, screening and conveying circuits at processing plants.

Inspectors have been told by operators that dust control systems do not effectively suppress or control any dusts and that there is a reluctance to use existing systems because of fear of blocking the plant with wet materials.

Summary of hazard

The management of dust is critical. When small particles are inhaled they can deposit deep into the sensitive regions of the lungs, and small dust particles have the potential to cause serious harm to health.

Prolonged exposure to airborne dust can lead to breathing difficulties and lung diseases such as pneumoconioses, chronic obstructive pulmonary disorder and asthma. It may also lead to further complications for people suffering from other cardiovascular conditions.



Excessive dust emission at a primary crusher hopper

Contributory factors

Commonly observed factors that result in excessive airborne dust release include:

- crushing, screening and conveying circuits not designed to minimise spillage and dust generation
- inability to effectively recover or safely remove accumulated spillage due to poor design
- inadequate design of dust extraction or suppression systems
- dust suppression systems not installed or operating
- poor plant maintenance and operation, leading to spillage or uncontrolled dust generation
- performance of dust extraction or suppression systems not being monitored.

Actions required

It is recommended that the following actions are taken to reduce the hazards due to airborne dust.

Design the plant to minimise spillage and airborne contaminants. Some good practices include:

- placing materials in the centre of the belt at the same velocity as the receiving belt
- minimising free-fall heights of materials
- installing covers over conveyor belts to reduce the effects of wind
- ensuring dust extraction and dust suppression systems (sprays) are normally 'on' and require intervention to turn 'off' (rather than the other way around)
- adequate fines or carry-back management.

Install enclosures at both the head and tail ends of a conveyor, and over stockpiles.

Install adequate wet spray systems at the crusher feed hopper and transfer points.

Note: wet spray systems can be effective if designed well and by using appropriate spray nozzles with adequate water pressure. However, wet spray systems may not be feasible for high clay material as it may block the crusher and chutes. This is when dust exhaust systems should be considered/used.

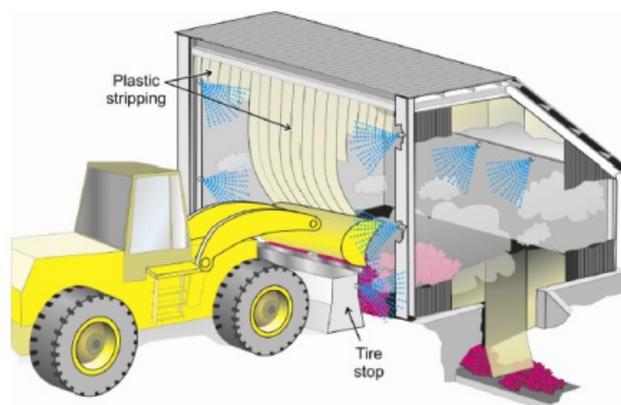
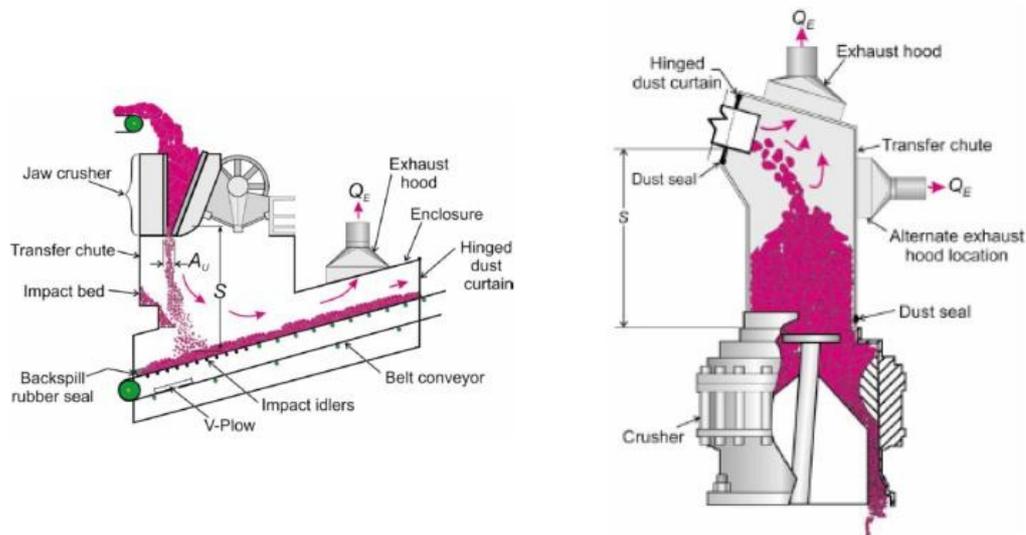
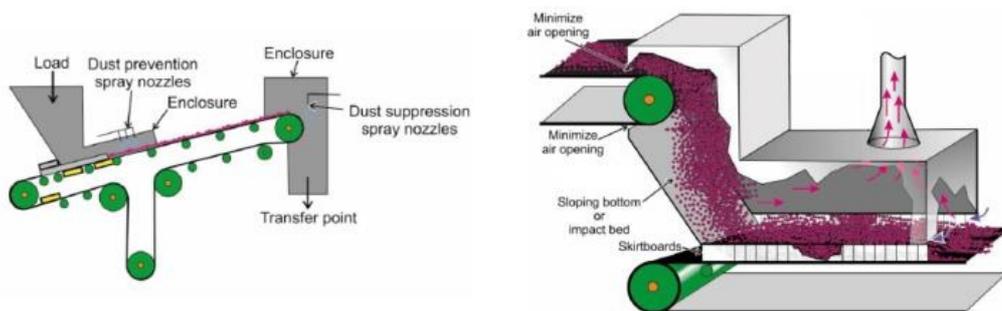


Illustration of a wet spray system at a primary crusher hopper

Install effective dust exhaust systems at crusher feed and discharge, screens and transfer points. This is achieved by using extraction ventilation to create a negative air pressure inside the controlled space relative to the outside area. The system must create conditions that prevent the escape of dust to areas occupied by workers. Good engineering design should be applied to ensure an effective system.



Illustrations of a dust exhaust system: primary crusher discharge (left) and secondary crusher feed (right)



Illustrations of enclosure and wet spray system (left) and dust exhaust system (right) at transfer points

Operate the dust control systems when the crushing plant is running.

Maintain the plant, including the dust control systems, based on the manufacturer's recommendations, observed component wear, system performance measures and exposure sampling results.

Maintenance of dust control systems is critical to ensure continuing worker protection. Crushers and screens are subject to constant vibration when in use and this can cause accelerated wear on components. Even small openings from worn seals, missing fasteners and damaged flexible connectors can cause unwanted air leaks or degrade capture velocity.

Monitor the performance of the dust control systems regularly.

Operators should document baseline parameters of an effectively functioning dust control system including, for example:

- inflow velocity at enclosure openings
- static pressure in ducts
- velocity pressure in ducts and at hood entry points
- water pressure and flow in wet systems.

Results of periodic checks should be compared to the baseline values. Significant deviations from the baseline values should be investigated, and corrective action implemented.

Check the exhaust from the dust control system discharges to a safe location and does not expose hazards to people.

Further information

- Department of Mines, Industry Regulation and Safety
Guidance about dusts and other airborne contaminants
dmp.wa.gov.au/Safety/Guidance-about-dusts-and-other-6856.aspx
- National Institute for Occupational Safety and Health (NIOSH)
Dust control handbook for industrial minerals mining and processing
www.cdc.gov/niosh/mining/userfiles/works/pdfs/2012-112.pdf
- Australian Standard AS4024.3610:2015 Safety of machinery – Part 3610: Conveyors – General requirements and Part 3611: Conveyors – Belt conveyors for bulk materials handling

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