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# Evaluating a Dust Control Technology

Given the recent NDRC 2026 regulation, companies are in the process of developing a "Dust Management Plan".

During the evaluation process the following should be considered:

- Engineering and design costs.
- Equipment costs.
- Installation costs.
- Operating costs:
- Power consumption.
- Maintenance.
- Safety.
- Disposal of material collected.

For mitigating dust generated during the material preparation and handling process there are three (3) technologies to consider.

- Dust suppression.
- Dust extraction utilizing air filtration or "Baghouse".
- Dust extraction utilizing a "Wet Scrubber".

Let's address below each of the three technologies identified.

**Dust Suppression**

There are two (2) technologies being utilized currently. One technology is wet suppression utilizing water, as well as water and surfactant both considered Wet Suppression, the other is Fogging Suppression utilizing water at a high pressure to generate small droplets or mist. Let's analyze each.

***Wet Suppression***

Wet suppression (water only) incorporates a delivery system that pumps water at the desired pressure and flow. Pressure and flow is determined by the number of application points and the spray design, and distance to each.

Let's discuss the advantages and disadvantages of Wet Suppression over extraction and Fogging Suppression:

*Advantages of Wet Suppression – water only*

- Engineering and design costs.
- Equipment costs for a water pump and associated piping and controls.
- Installation costs.
- Operating costs.
- Power consumption lower.
- Maintenance.
- Disposal.
- Safety.

*Disadvantages of Wet Suppression – water only*

- Given the surface tension of material being treated much higher amount of water needs to be applied for adequate suppression (as high as 3% moisture addition or 20 liters per ton treated).
- Power consumption given the volume of water pumped and added weight on the conveyor belt.
- Maintenance issues due to the amount of water being added causing spillages.
- Blocked chutes, and blockages.
- Tracking of conveyor belt due to material build up on the head pulley.
- Additional application points due to surface tension phenomenon.

*Advantages of Wet Suppression using surfactants with water over Wet Suppression water only*

- Minimize water consumption.
- Quality of material being treated by the addition of excess surface moisture.
- Reduced power consumption thus reducing operating costs.
- No maintenance and housekeeping issues.
- Reduced application costs.
- Safety, reducing the possibility of workers slipping on wet surfaces.

There is a third Wet Suppression technology that should be considered and that is Residual Wet Suppression. This technology utilizes a residual chemical that not only reduces the surface tension of the material being treated but also a chemical component that binds the dust and fines to the larger material and unlike water has a reduced evaporation rate lasting up to 30 days.

*Advantages of Wet Residual Dust Suppression*

- Reduced operating costs.
- Reduced application points.
- Residual properties that can minimize dust emissions during stakeout and fugitive dust off the stockpile thus a separate stockpile dust control system can be reduced or eliminated.
- Dust emissions control during the transportation, offloading and loading process thus eliminating separate control systems at these sites.
- Reduced capital requirements

***Fogging Suppression***

*Advantages of Fogging Dust Suppression Systems*

- Reduced capital costs over extraction technologies.
- Reduced water requirements.

*Disadvantages of Fogging Dust Suppression Systems*

- Not effective due to water droplets unable to wet the dust particle by overcoming the surface tension of the dust particle. This writer is not aware of any Fogging Wet Dust Suppression systems in operation.
- Not effective due to inadequate amount of moisture to bind the fines and dust particles to the larger material.
- Higher energy costs due to the system utilizing high pressure pumps.
- Constant maintenance due to the high-pressure design.
- Application at every transfer point.

**Baghouse and Wet Scrubbers**

A dry filtering system (baghouse) is an effective way to control dust emissions. Airborne dust is sucked up through ducting chutes above each transfer point. The dust is then collected via filtering of the air.

An alternative is to separate the air and dust via wet cyclone scrubbers.

However, capital expense and maintenance cost often make these options not viable in most cases:

- High capital cost – multiple extraction points required.
- Labour intensive and costly maintenance.
- Short lifespan.
- High energy cost.
- Waste product to deal with (collected fines).
- No lasting (downstream) benefit.