

Maintaining Dust Control Equipment

Preventive Maintenance is the Key to Compliance.

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Maintaining dust control equipment is the key to compliance. But these days it's tough enough to maintain production equipment much less dust controls. Poor maintenance is the largest contributing factor to non-compliance and the major cause of citations and fines.

Dust control equipment for aggregate processing can be divided into three categories: enclosures to contain it, spray systems to suppress it, and baghouses to collect it. These deserve the same level of preventive maintenance as your crushers, screens and conveyors. If you think your spray system isn't a piece of production equipment, read your operating permits. They stipulate that the plant cannot be operated unless dust controls are in good operating condition. Operating with a broken down spray system or baghouse will put health and safety at risk and expose the plant to fines up to \$25,000 per day. If you think regulators will let you slide, just ask the owners of a major east coast quarry that was shut down for a month this year until dust control equipment was restored to good operating condition.

Dust Enclosures

Dust enclosures include chutes, covers, skirts, curtains and the like. Maintenance of dust enclosures is critical to protect employees from respirable silica-containing dust. Dust and spillage that leaks has to be cleaned up. Workers who have to sweep, shovel or bobcat it can get a nose full of dust so make sure workers have access to respirators and use them. Fabric masks offer little or no protection against respirable dust. Whenever possible, use hoses or vacuums to flush down or pick up spillage.

Leaks in chutes, worn skirting, and torn curtains need to be repaired promptly. Much of this work can be done with in-house labor and materials. Old conveyor belting can be used for curtains, scrap steel for patches and covers.



Workers get their greatest exposure to silica-containing dust when they have to clean up spillage resulting from inadequate enclosure.

Spray Systems

Water spray systems are the principal control device at most quarries and are pretty simple to maintain. The two most important maintenance items are:

1. Spray nozzles. Nozzles should be inspected daily. Nozzles that are easy to see and easy to reach are easy to maintain. Nozzles that can't be seen or are hard to reach don't get inspected and cleaned. Nozzles can plug from the inside-out due to suspended or dissolved solids (scale) in the water supply or from the outside-in due to deposition on spray bars.

2. Water filters. Water filters and strainers need to be inspected regularly and cleaned or replaced as necessary. The spray system should be equipped with a pressure gauge. A decline in spray pressure indicates a dirty strainer and will provide maintenance personnel with a metric for frequency of inspection.

Most conventional spray systems use centrifugal pumps are that self-lubricating and do not require any regular maintenance. If you have a "fog" system that uses a positive displacement pump, they will require regular oil changes and are much more susceptible to wear.



Deposition on spray bars is a common cause of nozzle pluggage.

It's also a good idea to have a spare pump and motor on hand in case of a mechanical failure or freeze damage.

Solenoid valves can be another sore point, particularly when the water supply is dirty or contaminated with sand. Dirt and grit that builds up on the valve seat can prevent it from closing properly. If spray nozzles keep on running or dripping after they have been shut off, that's a good indication that the solenoid is dirty and needs to be cleaned or replaced.

If you are thinking about installing a spray system, here are some guidelines to reduce spray system maintenance:

1. Use heavy duty components designed to operate in an abusive environment.
2. In cold weather climates, house the pump in a heated enclosure.
3. Use the cleanest water possible. Using dirty pond or river water will make nozzle, filter and pump maintenance a nightmare.
4. Install drain valves at all the low points. Frozen lines can delay start-up on cold morning and that means lost production.
5. Put nozzles where they can be seen and are easy to access. Out of sight is out of mind.
6. Consolidate all moving parts in a central location with the pump. Solenoids and filters out in the plant are more likely to be damaged or freeze and take more time to inspect and maintain.
7. Most nozzle pluggage occurs from the outside-in due to deposition of wet fines that blow back onto the nozzle – particularly at crusher discharges. Install nozzles so that they are out of the way of this “blowback” or put a dust curtain in front of them with a small hole that nozzles can spray through.
8. Keep a list of all nozzles and their location to facilitate ordering and replacement.

Baghouses

Most modern baghouses are “pulse-jet” that periodically and sequentially pulse reverse air through the filter media to keep them clean.

The differential pressure across the filter bags as measured by a magnehelic or photohelic gauge is the best indicator of performance. High differential pressures indicate that bags are caked up or blinded. Low differential pressure can indicate that bags are torn or missing.

If visible dust emissions are observed at the baghouse exhaust, this is also a pretty good indicator that bags are torn or missing.

Inspect the hopper discharge for any material build-up. If not discovered in time, dust can fill a hopper to its inlet and plug the unit. Whether a rotary valve, screw or pneumatic conveyor is used to empty the hopper, it should be inspected frequently.

Exhaust fans should be inspected semi-annually. Loose or worn belts or an imbalanced impeller, will reduce the fan's performance. Any time unusual vibration or squealing is observed, the unit should be thoroughly inspected.

The filter media is the most important element of the baghouse and periodic inspection should be mandatory. Inspect the clean air side of the baghouse for any leaks or tears in the filter media.

Ductwork should also be inspected for any leaks or deposition. If the exhaust fan is not able to maintain the air velocity in the duct of at least 3500 fpm, dust will settle out and restrict air flow. Eddies in sharp bends can also result in deposited dust that restricts air flow.

If you are going to install or refurbish a baghouse, here are some guidelines to keep maintenance costs down:

1. Make sure they are designed for heavy-duty service.
2. Specify materials of construction that are corrosion resistant. Using cheap metal will result in corrosion that eats holes in ductwork.
3. Avoid sharp bends in ducts that will quickly wear through. This is particularly true if the plant processes hard, abrasive rock like sandstone or granite.
4. Select filter media that will hold up to your specific stone. Again, abrasive dust will require more resistant media. If the rock contains any sulfides that can produce acidic corrosion when exposed to moisture, you'll need a filter media that is up to the task.
5. Avoid long-multiple intake ducts. To save money, many plants install a single big baghouse with tentacles of ductwork that extend to multiple sources. It is almost impossible to balance air flows with such an arrangement and you'll be much better off installing multiple baghouse with fewer and shorter intake ducts.

Preventive Maintenance - Don't wait 'til it breaks!

Whether you use wet suppression systems, dry collectors or a combination of both, institute a routine program of preventive maintenance and make sure that the plant pursues it with the same alacrity that they do for production equipment. The program should include a daily inspection recording spray system pressure and/or baghouse differential pressure as well as a log of any maintenance or repair work. Pollution control equipment may not put more tons into trucks, but it does protect the health and safety of your employees that do.

Photos



Worn skirts and leaks in chutes allow dust and spillage to escape



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Deposition on spray bars is a common cause of nozzle pluggage.



Protect nozzles from deposition that can plug them up by installing a dust curtain that protects them from the "blowback" of mist and wet fines.



Install spray nozzles so that they are easy to see and easy to reach.



Spray system pumps and components should be housed in heated enclosures to protect them freezing.



Filter media should be inspected and replaced regularly to keep a baghouse operating at high efficiency.



If air velocity in baghouse intakes falls below the minimum require to keep dust in suspension it will settle out and restrict air flow even more.