Clean Air Facts

Dust, Smoke, and Fumes—Particulate Matter Emissions

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Wisconsin's Department of Natural Resources (DNR) regulates dust, smoke and fumes as Particulate Matter Emissions (PM) under chapter NR 415, Wis. Adm. Code. These requirements cover not only emissions from processes inside industrial buildings, but also those from outside activities. This summary will explain your responsibilities for preventing particulate matter emissions.

Who is Affected by the Rule?

Any business creating enough dust, smoke, or fumes to be a noticeable source of air pollution must control those emissions. The following are examples of activities that would create particulate matter emissions:

- ✦ large trucks transporting materials along a dirt road
- ✦ grinding, sanding, painting, welding, sandblasting activities, indoors or out
- ✦ piles of materials stored on site—like sand, gravel, coal, dirt, etc.
- ✦ unpaved parking lots
- ✦ dry materials used in an industrial process that are not collected in some fashion—by baghouse, cyclone(s), wet scrubber, etc.

This is just a short list of the possible activities that create particulate matter emissions. Contact the Small Business Clean Air Assistance Program (SBCAAP) if you have any questions about whether you have a particulate matter emissions source.

What are the Requirements?

Any business that creates particulate matter emissions must do as much as possible to control those emissions and keep them from escaping into the environment.

- ✦ For **roads or storage piles**, this may mean using water or chemicals to prevent dust plumes. Paving roads will reduce dust. Storage piles can be kept within a three-sided building to minimize emissions.

- ✦ If you **grind, sand, paint or weld** outside, do so on a day with low wind and make sure residential areas are upwind of the activity. Indoors, use available methods to capture emissions from these activities.

- ✦ Mechanical collection devices like cyclones and dry filters are effective, low cost ways to control particulate matter emissions from **indoor processes**. A baghouse can be a very high efficiency control option but is slightly more expensive than the others. Higher collection efficiency in any type of equipment can often mean higher costs.

Emissions from a Process

Sometimes, because of the type and amount of dust created by a process, a series of collection devices may be necessary to control particulate matter emissions. Particulate matter emissions from a process are set at specific levels.

Certain processes have a specific level of allowable emissions, based on the amount of material that passes through the process. These "process weight rate" limits vary depending on when the process was

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constructed or modified. The specific limits are in the rule under s. NR 415.05, Wis. Adm. Code.

Processes constructed on or before April 1, 1972 must meet the most restrictive limits. One type of limit is set based on pounds of particulate matter per 1,000 pounds of exhaust gas for specific types of processes. Depending on the process, the limits range from 0.01 to 0.04 pound of particulate matter per 1,000 pounds of exhaust gas. These limits also depend on the maximum airflow coming from the process. The second limit is the same as those for processes constructed after April 1, 1972.

Processes constructed after April 1, 1972 must meet one of two equations, depending on the maximum amount of raw materials (process throughput) used in the process.

❶ If your process throughput is **up to 60,000 pounds per hour**, then you have a limit of 3.59 multiplied by your process weight in tons per hour (P), raised to the power of 0.62. That looks like: $E = 3.59(P)^{0.62}$, where E is the allowable emission rate in pounds per hour.

❷ If your process throughput is **more than 60,000 pounds per hour**, the limit is 17.31 multiplied by process weight rate in tons per hour (P), raised to the power of 0.16, or $E = 17.31(P)^{0.16}$.

These equations do require a scientific calculator to perform the calculations. Standard calculators will not have a "y^x " (or y raised to the power of x) button on them. For example, if your process weight rate is 2,500 lb/hr of parts plus the paint applied, you would use the first equation and calculate your "allowable emission rate" as follows:

$P = 2500 \text{ lb/hr} / 2000 \text{ lb/ton} = 1.25 \text{ ton/hour}$
$E = 3.59 \times (1.25)^{0.62} = 3.59 \times 1.148 = 4.12 \text{ lb/hr}$

In other words, your process is only allowed to emit 4.12 pounds of particulate matter emissions per hour.

If you have a fuel burning unit—whether a boiler, steam generator, or heat treating furnace, etc.—separate limits apply. These limits are based on construction date and the size of the unit in terms of million BTU per hour heat input rating. Refer to the rule in s. NR 415.06, Wis. Adm. Code, for the specific limits.

Requirements in a Permit

An air permit will include the value of your process-specific particulate matter emissions limit and control methods, and records or testing required to show you meet those limits. If you have outdoor sources of particulate matter emissions, such as gravel piles or vehicle traffic, you may also have control techniques to follow and records to maintain periodically.

If your Maximum Theoretical Emissions (MTE) from a process are greater than the emission limit specified in the rule, then you may be required to install an add-on control device. For an explanation of MTE, refer to the ***MTE and PTE Calculation Examples*** fact sheet published by the Small Business Clean Air Assistance Program (SBCAAP).

Another scenario is that modeling done during a permit review may show that the emission limit from the rule still exceeds the National Ambient Air Quality Standard (NAAQS) for particulate matter. You may have to reduce emissions from a process sufficiently to meet the NAAQS, which may require installation of an add-on control device. For an explanation of the modeling process, refer to the ***Modeling Emissions for Air Pollution Permits*** fact sheet also published by the SBCAAP.

Control Device Options

If you cannot meet the limits for your process emissions, you will likely need to install a control device on the exhaust to capture particulate matter. The following are brief descriptions of some control devices available for particulate matter collection.

Cyclones and Inertial Separators
Devices that knock particles out of an air stream by using inertia will generally collect the medium to large sized particles. Because such devices usually have simple construction and no moving parts, capital and maintenance costs are lower than for other particle collection devices.

In cyclones, particles are collected when the exhaust gas is forced to spin in a vortex through a tube. Cyclones can be used singly or in a multiple unit arrangement for larger air volumes. Cyclones are utilized by industries like:

- chemical (dry form)
- coal handling
- metal working
- rock crushing
- plastics
- wood working
- grinding, sanding, blending, machining, crushing or similar activities

Wet Scrubbers
A more efficient device that still uses the principle of inertia is the wet scrubber. Other physical principles are also involved in a wet scrubber besides inertia. In general, the weight of water added to the particle allows it to be collected.

Wet scrubbers are often found in processes with:

- sticky, wet, corrosive or liquid particles that are not easily removed in dry conditions
- explosive or combustible characteristics

v simultaneous control of soluble gases (SO_2)

A "water-wash wall" is often found in paint application booths to collect paint overspray. Wet scrubbers have higher capital and maintenance costs than cyclones. One maintenance cost is disposal of the wastewater created.

Fabric Filters
Devices such as a baghouse or a wall of flat filters are most often used for their high collection efficiency but are in the middle range for capital and maintenance costs. High-tech baghouses for collecting particles from gases containing acids or caustics will involve higher costs.

Baghouses can be used in a wide range of industries. A filter wall is often found in paint application booths and fiberglass reinforced plastics molding booths to collect the overspray.

Electrostatic Precipitators
The electrostatic precipitator (ESP) uses electrical forces to move particles from the gas stream to collector plates. Particles are collected from the plates either by knocking them loose or by washing the plates with intermittent or continuous streams of water. These units have very high collection efficiencies but will have higher capital and maintenance costs. They are most often found at utilities that use coal boilers to generate steam.

Assistance
With such a variety of particulate matter control device options available, you may need a consultant to help you determine the most efficient and cost-effective option for your business. The SBCAAP has fact sheets to help, including a list of consultants serving small businesses in Wisconsin and some key questions to ask when hiring a consultant.

Contacts for More Information or Assistance
The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608-264-6153, Tom Coogan at 608-267-9214, or Jean Beckwith at 608-261-2517.

SMALL BUSINESS ENVIRONMENTAL ASSISTANCE PROGRAMS
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For further information on particulate matter emissions, locate the appropriate contact at DNR by location or name at **http://dnr.wi.gov/org/aw/air/staff/AMstaffdir.pdf** or by topic at **http://dnr.wi.gov/org/aw/air/staff/AMsubjects.pdf**. You will need Adobe Reader to view these documents.