Controlling Air Emissions from Nonmetallic Mining Training Course

April 1999

WDNR Document Number: AM-286-98

About This Training Course

The Wisconsin Department of Natural Resources (DNR), Wisconsin Transportation Builders Association (WTBA), and the Aggregate Producers of Wisconsin (APW) worked cooperatively to develop a training course with a focus on the control of fugitive dust for the nonmetallic mining industry. The Wisconsin Asphalt Pavement Association (WAPA) has also contributed information for this training course. This material is intended to augment the training material used by the environmental trainer at the nonmetallic mining company. People completing this training will have fulfilled the training requirement for an "On-site Fugitive Dust Observer" as contained in the document, **Nonmetallic Mining Air Emissions Guidance For The Development Of The 1998 Air Emissions Inventory**.

Presentation

This training course is designed for presentation in one of three ways. These are:

1. The trainer can use this written document alone.
2. The trainer can use this written document and show the accompanying three minute videotape, "Pardon My Dust"
3. The trainer can use the three minute videotape, "Pardon My Dust", show the slides presented in the document using Microsoft Powerpoint 7.0, and use the written document as a reference source. (The written document could provide a reference for future questions. Module 4 of this training manual also contains 24 pictures of crushing spreads that view better using Microsoft 7.0 with the images projected on a movie screen.)

This written document is constructed in the same way as the Powerpoint 7.0 Presentation. All of the slides in the Powerpoint 7.0 presentation are included as part of this training manual.

Note: The Powerpoint 7.0 information and this training manual are available for download from the DNR's Internet Web-site. (You will need Microsoft Word 7.0 in order to print this training manual once you have uploaded it from DNR's web site.) The location of this information on the Internet is: http://www.dnr.state.wi.us/org/aw/air/emission/emissions.html. A copy of the videotape "Pardon My Dust" may be borrowed from people at the regional DNR offices and in Madison. The people that you may contact to borrow a copy of this videotape are:

Mike Griffin-Southeast Region-(414)263-8554
Ron Daggett-South Central Region-(608)273-5601
Raj Rao-Northeast Region-(920)492-5590
Eileen Ingwersen-West Central Region-(715)421-7842
Neal Baudhuin-Northern Region-(715)365-8958
Ralph Patterson-Central Office-(608)267-7546

Training Course Setup

The training course consists of four modules. Each module ends with a slide containing a STOP sign. We recommend the trainer review the material with the trainees up to the stop sign before continuing with the training material. The modules are as follows:

Module 1-Introduction. We suggest that the trainee show the videotape "Pardon My Dust" at the end of this module. "Pardon My Dust" is a three and a half-minute videotape developed by DNR, WTBA, WAPA, and APW. The videotape identifies fugitive dust sources in crushing spreads.

Module 2-Dust and the Reasons To Control Dust. This module presents information on how dust is defined. This module also supplies information on why it is in the best interest of the equipment operator and the company to control fugitive dust from the crushing spread.

Module 3-Regulations. This module contains information regarding New Source Performance Standards (NSPS), operation permits, site specific permits, and the air emission inventory.

Module 4-Dust Measurements, Opacity, and Plans. This section furnishes information on how dust is measured. This module also contains 24 pictures of different pieces of crushing equipment at different opacity levels. Finally, Module 4 presents information on Malfunction Prevention and Abatement Plans as well as Fugitive Dust Plans.

PLEASE NOTE

This training course *will not* replace visible emissions reader requirements. People must go to smoke school and pass the requirements at smoke school before they can become certified visible emissions readers.

Controlling Air Emissions From Nonmetallic Mining

Sue Courter-Michels Materials
Peter Tolsma-Payne and Dolan
Jerry Waters-DNR
Ralph Patterson-DNR

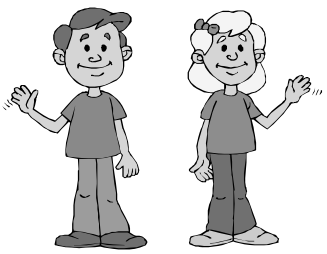
Other Contributors

- R. B. Willder - Wisconsin Transportation Builders Association
- Aggregate Producers of Wisconsin
- Wisconsin Asphalt Producers Association
- Anne Urbanski-DNR/Air Management
- Keith Pierce-DNR/Air Management
- Jeff Myers-DNR/Air Management
- Eileen Ingwersen-DNR/Air Management
- Kelly Mella-DNR/Communications and Education
- Lynda Wiese-DNR/Cooperative Environmental Assistance

The people responsible for the content of this document and the training course are listed above. The Training Subgroup of the Nonmetallic Mining Air Emissions Workgroup (NMAEW) are listed on the left. Other people from the DNR and industry that assisted in the writing of this document are listed on the right. The NMAEW consists of people from WDNR, APW, WTBA, a blaster and nonmetallic mineral miners with no affiliation to either WTBA or APW. The NMAEW and its predecessor groups have been working on nonmetallic mining air emissions issues since August 1995.

Training Course Organization

- **Module 1 - Introduction**
- **Module 2- Dust definition and reason to control**
- **Module 3-NSPS, Operation Permits, Emission Inventory**
- **Module 4-Dust Measurements, pictures, plans**



The Training Subgroup decided to present information regarding current air regulations and guidance to assist operators in controlling fugitive dust releases from nonmetallic mining equipment (i.e. primary crushers, jaw crushers, etc.). This document also contains a discussion on air permits as they pertain to the nonmetallic mining industry.

The training course is designed to give new operators an initiation into air issues and existing operators a refresher regarding these regulations and guidance. This training course is divided into four modules. Each module presents a different topic area.

Module 1

- Introduction

[Module 1 is an overview of "fugitive dust". We suggest ending Module 1 with showing the videotape entitled, "Pardon My Dust".]

The information contained in this training material is important not only to the company but also to the operator. If done correctly, fugitive dust control means savings to the company in air emission fees and potential forfeitures for violating air quality standards from DNR. Proper fugitive dust control decreases the amount of respirable particulates, for which there are health concerns, inhaled by site operators.

Purposes

- Educate people in the nonmetallic mining industry about applicable:
  - Air regulations
  - Guidance
  - Fugitive Dust Controls
- Help company trainer to train new and existing employees

Wisconsin controls the emissions of fugitive dust under NR 415.04, Wis. Adm. Code. Guidance documents pertaining to the nonmetallic mining industry have been written for 1995, 1996, 1997, and 1998 emission years. One of the purposes behind writing this training course was to make people aware of these regulations and guidance documents.

Information in Presentation

- Developed in joint industry and DNR meetings held from August, 1995 to present
- Designed to educate about requirements for general operation permit and air emission inventory
- Supplies information on potential health affects of fugitive dust
- Contains reasons to control fugitive dust from crushing spreads

DNR and the nonmetallic mining industry have discussed the control and the calculation of fugitive dust emissions since August 1995. The discussions have led to a series of guidance documents:

1. **1995 Particulate Emissions in the Crushing Industry**, WDNR, January 1996.

2. **New Source Performance Standards In the Crushing Industry**, WDNR, January 1997.
3. **What You Need to Know and Do For Determination of 1996 Particulate Emissions In the Crushing Industry**, WDNR, January, 1996.
4. **Nonmetallic Mining Air Emissions Guidance For The Development Of The 1997 Air Emissions Inventory**, WDNR, December, 1997.
5. **Nonmetallic Mining Air Emissions Guidance For The Development Of The 1998 Air Emissions Inventory**, WDNR, January, 1999.

These guidance documents have become more complex from the beginning 1995 document to the current 1998 document.

The training course supplies information on both the nonmetallic mining general operation permit and the reporting requirements for the air emissions inventory. The permitting and the reporting of air emissions are dependent on the amount of stone produced each calendar year (for emissions inventory) and over a 24-month rolling average period (for a general operation permit). Very small companies are not required to report emission inventory information nor obtain an air permit. These exemption levels are discussed later in this training document.

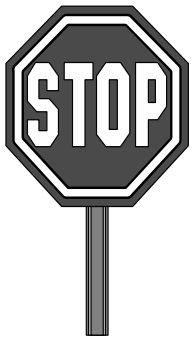
Who Does This Affect?

- Your company
- You

Fugitive dust has many affects. Excess amounts of fugitive dust can hamper visibility, affect the health of people operating the crushing spread, and affect the health of people downwind of the crushing spread. Excess fugitive dust can also result in forfeitures for violation of air quality standards. There are many good reasons to control fugitive dust.

Pardon My Dust

- Trainer, please show 3 minute 40 second "Pardon My Dust" video tape here



"Pardon My Dust" is a 3 minute 40 second videotape presentation designed to give operators an overview of the different processes at a spread that generate fugitive dust. The videotape discusses crushing equipment as well as haul roads.

Module 2

- Dust Definition
- Reasons To Control Dust

Not All Dust Is Equal

Not all dust is created equal.

Some dust is beneficial. Microscopic dust particles form the nucleus of raindrops and snowflakes. Without dust there would be no precipitation.

Some dust is harmful. Inhaled dust particles can increase the effects of asthma. Too much dust can also affect ordinary breathing.

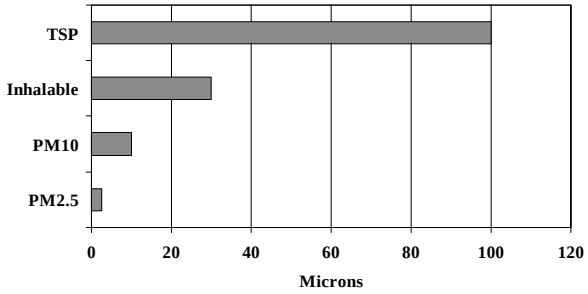
Air pollution dust terms vary according to the size of the particle. The different terms were set either by regulation or developed for air quality monitoring equipment. These terms are:

1. Total Suspended Particulate matter (TSP) includes all particles at or below 100 microns. USEPA set annual and 24-hour TSP standards in the early 1970's. These air quality standards were later replaced by USEPA through the PM10 national ambient air quality standards. Wisconsin has retained its 24-hour TSP standard.
2. Inhalable particulate-This term defines particulate at or below 30 microns. This term was developed by USEPA as a fugitive dust emission testing term. This term is commonly used in stack testing.
3. PM10-USEPA established 24-hour and annual PM10 standards in 1987. These standards apply to particles at or below 10 microns in size.
4. PM2.5- also known as PMfine. These particles are too small to see without a microscope. USEPA established new air quality regulations for this pollutant in July 1998

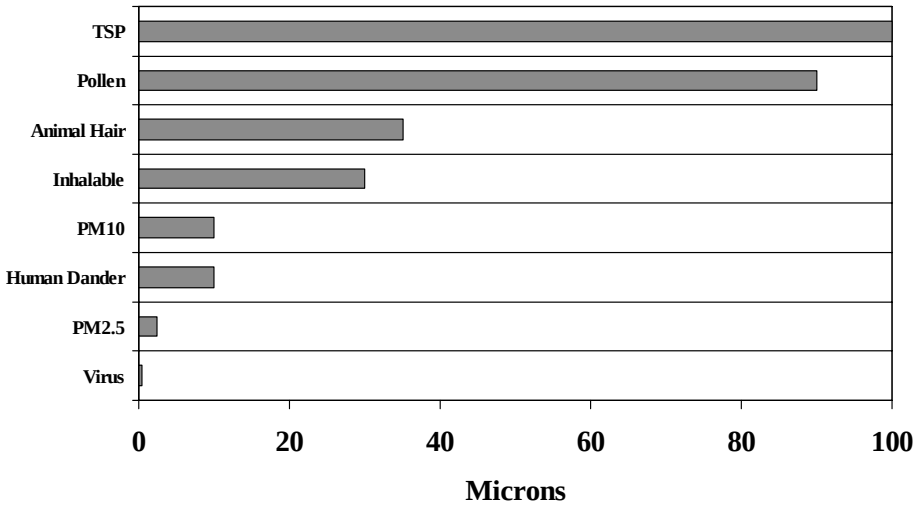
Dust Terms

- Total Suspended Particulate- at or below 100 microns
- Inhalable Particulate Matter- at or below 30 microns
- PM10-at or below 10 microns
- PM2.5-at or below 2.5 microns

Dust Term Particle Sizes



Comparison



This graph presents a size comparison of the different particulate matter sizes to common items. The graph shows the size of total suspended particulates, pollen, animal hair, inhalable particulate, PM10, human dander, PM2.5, and viruses.

Particulate Matter and Human Health

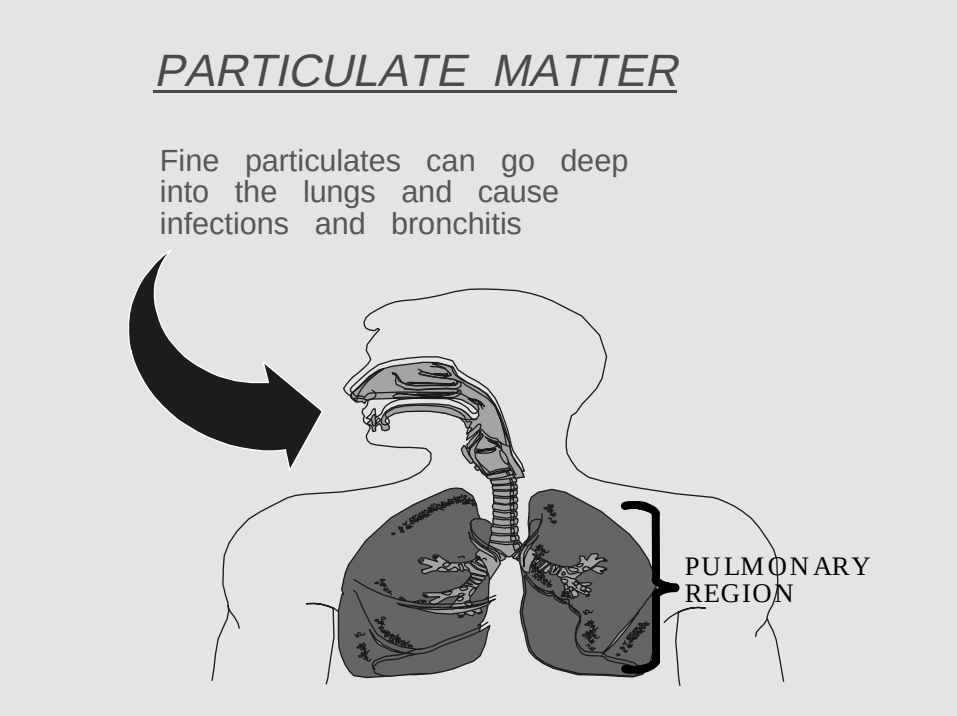
Controlling Dust Benefits Your Health

- Dust inhalation can cause:
  - Increase in asthma episodes for people with asthma
  - Infections
  - Bronchitis

Particulate matter is a mixture of solid particles and liquid droplets found in the air. USEPA regulates inhalable particles at or below 10 microns in size. There is now good scientific evidence that increases in PM2.5 (particles at or below 2.5 microns in size) and PM10 (particles at or below 10 microns in size) concentrations cause a wide variety of health affects. These health affects include increases in 1) hospitalization for lung and heart problems, 2) hospital emergency room visits for lung problems, 3) days of restricted activity in adults and school absenteeism in children, 4) reporting of symptoms that indicate mild respiratory illnesses, and 5) measured levels of decreased lung function.

The Respiratory System

Particles having an aerodynamic diameter of 5 to 30 microns are largely deposited in the areas of the nasal passages and pharynx by impaction. Because of their size, impaction is an important mechanism for their removal from an air stream. The high air velocity and the many changes in direction the air stream experiences in the nose and pharynx air passages provide an ideal area for impaction of the particulate in the nose.



Particles having an aerodynamic diameter or 1 to 5 microns are deposited in the air tubes in the lungs regions by settling out. The slower air flows in this region allow the particulate to be deposited by gravitational forces. As the air sacs are approached, the velocity of the airflow decreases markedly, allowing even more time for settling out.

The smallest particles, generally less than 1 micron, that have penetrated to the air sacs are deposited primarily by diffusion. This is the principle mechanism by which sub-micron particles are deposited.

Breathing affects the amount of particles retained by the body. During quiet breathing, in which the tidal volume is only two to three times the volume of the dead space, a large proportion of the inhaled particles may be exhaled. During exercise, where larger volumes of air are inhaled at higher velocities, impaction in the large airways and settling out and diffusion in the smaller airways and alveoli will increase.

Small particles can lead to increase incidences of asthma and the likelihood of infectious diseases by lowering the effectiveness of the immune system. In addition, small inert particles (e.g., carbon or silica) can not always be cleared easily from the deep lung and this may result in the scarring of the lung tissue. Since the lung is able to withstand some scarring and still function, the lung damage at small exposures of these particles can go unnoticed. However, at higher exposures of these particles lung scarring can become significant and result in a shortness of breath and other respiratory problems.

Asthma

Asthma is a chronic disease characterized by inflammation of the airways and increased responsiveness to various stimuli commonly called asthma triggers. Increases in the amount of particulate matter may trigger asthma symptoms in some people.

Asthma

- Asthma is a chronic respiratory disease characterized by inflammation of the airways and increased responsiveness to various stimuli called asthma triggers.
- Asthma episodes involve progressively worsening shortness of breath, cough, wheezing, or chest tightness, or some combination.

Asthma (cont)

- The severity of asthma goes from mild to life-threatening.
- Asthma has increased 61 percent between 1982 and 1994
- More than 5,000 people die of asthma in the US annually
- The total estimated cost of asthma in 1993 was $12.6 billion

An estimated 14.6 million people in the United States have asthma. The Centers for Disease Control and Prevention reported a 61 percent increase in asthma rate between 1982 and 1994. According to the American Lung Association, more than 5,000 people die of asthma in the United States annually. This represents a 45.3 percent increase in mortality between 1985 and 1995. Among chronic illnesses in children, asthma is the most prevalent. Approximately 33 percent of asthma patients are under the age of 8.

Dust Control

Why Should You Control Dust Emissions At Your Spread?

There are many good reasons to control fugitive dust emissions from your spread. We discussed health reasons (yours and others near you) as one of the reasons. The control of fugitive dust is also a good idea from a business point of view.

Regulations

- The Clean Air Act regulates dust emissions by:
  - New Source Performance Standards
  - Construction Permits
  - General Operation Permits
- Open burning also has some restrictions

The first business reason is that emissions of particulate matter are regulated by state and federal law. The amended Clean Air Act of 1990 places restrictions on the amount of particulate emissions by different regulations. New Source Performance Standards apply to most types of processing equipment manufactured after August 31, 1983.

Certain size crushing spreads and quarry operations are required to obtain air pollution control operation permits from the DNR. Any crushing spread that is over 25 ton per hour capacity for a fixed plant and 150 ton per hour capacity for a portable plant is subject to permitting requirements.

Additionally, any ledge-rock quarry that produces over 25,000 tons per month of rock on a 12 month rolling average (300,000 tons per year) and having actual operation of more than 365 days in any 5 year period is subject to permitting requirements. Any industrial sand mine that produces over 2,000 tons per month on a 12 month rolling average (24,000 tons per year) is also subject to permitting requirements.

Open burning also generates fugitive dust. Operators should contact local authorities prior to conducting any open burning, as local regulations may vary.

Saves Your Company Money

- Lowers violation related costs
- Lowers annual air emission fee
- By protecting worker health, future health claims may also be minimized

The second good business reason is that it lowers cost to the company. Excess amounts of fugitive dust can cost your company money if the DNR finds your company violates an air regulation. The company lowers it annual air emission fees when fugitive dust is limited. Also by limiting fugitive dust, you are protecting your health and the health of your fellow workers.

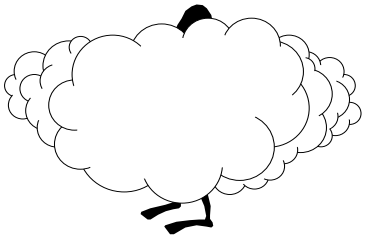
Public Relations

- Perceived as a good neighbor
- Fewer complaints about your operation

Finally, the control of fugitive dust can be used as a way to show the public that you are a good company. Operations that restrict fugitive dust are perceived as good neighbors. Because the people around you perceive your operation as a good neighbor, complaints about your operation decrease. This is beneficial to you, your company, your neighbors, and DNR.

Excess Dust Means

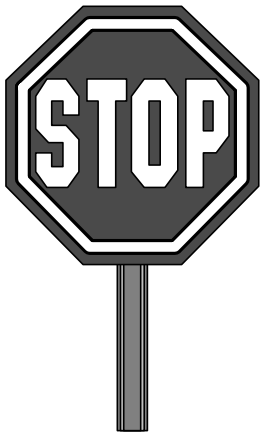
- More costs
- More complaints
- More irritable DNR or boss



In summary, limiting the amounts of dust from your operation benefits you and your company. Excess dust means increased costs, possible health concerns, and more complaints to the DNR.

Take a Break

- Discuss
  - DNR-industry interaction
  - Open Burning
  - Your company as a good neighbor



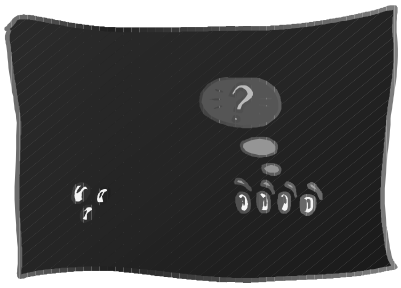
Module 3

- New Source Performance Standards
- Operation Permits
- Air Emission Inventory

Module 3 is designed to give a brief introduction to the air regulations that affect portable crushing facilities. These regulations may or may not affect your operation depending on the size and age of the equipment.

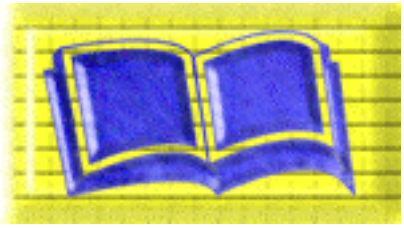
What Air Regulations Affect You While You Process Stone?

- New Source Performance Standards
- Operation Permits
- Air Emission Inventory



New Source Performance Standards

- **Applies to most equipment placed in operation after August 31, 1983**
- **Testing and operational requirements**
- **USEPA is very serious about companies meeting these requirements**



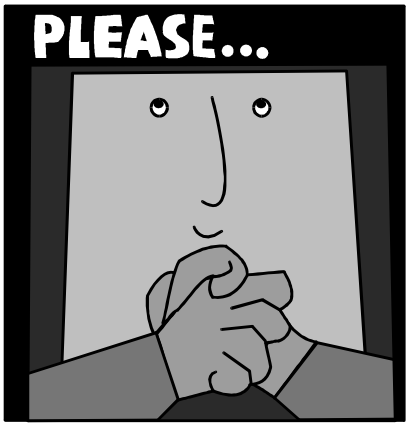
In a general sense, all crushing equipment manufactured after August 31, 1983 is regulated by New Source Performance Standards (NSPS) (40 CFR Part 60, Subpart OOO and Subpart A. (See the rule to determine which source is regulated and how at your crushing spread.)

NSPS establishes the designation of affected facilities, test methods, emission limits, reporting and record keeping. NSPS requires a 3-hour visible emission test.

In 1990, the Clean Air Act amendments dramatically changed the significance of the regulations by changing the enforcement and penalties associated with noncompliance. Each piece of equipment (crushing, screening, etc.) may be considered an affected "facility" under Subpart OOO. If caught, penalties can be computed based on the number of affected facilities times the daily penalty (up to $25,000 per day) times the length of time out of compliance (each day being a separate violation), resulting in extremely large potential penalties, with criminal penalties (felony) for knowing violations.

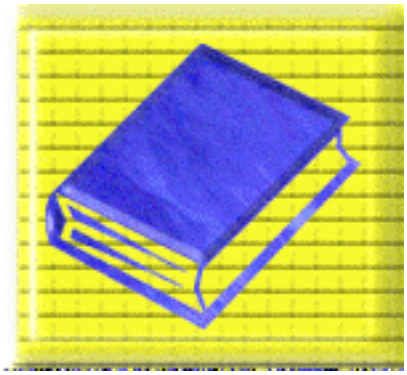
Trainer

- Hand out NSPS Information



Because NSPS is such an important regulation to the nonmetallic mining industry, we have furnished more detailed information with this training course as Appendix A to this training manual.

Operation Permits



- General Operation Permits (GOP) are applicable to all existing crushing spreads except those located in or within 2 km of certain areas in the Cities of Beloit, Milwaukee or Waukesha

Under Chapter NR 407, Wis. Adm. Code, portable nonmetallic mineral processing plants (plants which crush or grind stone – referred to as "plants") were required to apply for an operation permit. Most of these spreads were subject to an October 1, 1995 application deadline.

DNR issued GOPs to those facilities that submitted applications. These permits identify the different regulations, control measures, and record keeping requirements applicable to all air pollutant emission sources at the plant. The effective life of the GOP is five years after which it must be renewed.

Source Specific Operation Permits

- Needed for those spreads locating in or within 2 km of certain areas in Beloit, Milwaukee, Waukesha

The General Operation Permit (GOP) is an operation permit that is generic to a group of similar sources. The GOP is applicable to all sources with the exception of those located in a state particulate nonattainment area. (In Wisconsin there are three particulate nonattainment areas. These nonattainment areas are portions of the Cities of Beloit, Milwaukee, and Waukesha.) A source located, locating into, or locating within 2 kilometers of these areas is subject to site specific permitting requirements.

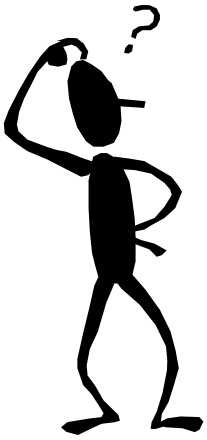
Your Spread Needs One Or The Other

- Any spread having a primary crusher is required to have either a GOP or site specific permit

The GOP for nonmetallic mining is specific to a primary crusher. By issuing a GOP, DNR does not need an operation permit for each individual piece of equipment.

What's the Difference?

- A site specific operation permit is tailored to the particular spread and location
- A GOP applies general requirements to crushing spreads across Wisconsin



How Do I Comply With The GOP?

- It depends on how much stone you produce per year. There are different record keeping requirements depending on the level of production. The levels of production are:
  - 50,000 tons per year or less
  - Greater than 50,000 tons and at or below 250,000 tons
  - Greater than 250,000 tons

GOPs are structured generically by amount of stone produced by the crushing plant. Plant sizes are broken into three categories:

1. Small-equal to or less than 50,000 tons stone produced per year
2. Medium-between 50,000 and at or below 250,000 tons stone produced per year
3. Large-greater than 250,000 tons

The GOP also limits crushed stone production to 200,000 tons per month, and diesel fuel use to 25,000 gallons per month.

Possible Requirements

1+1=3

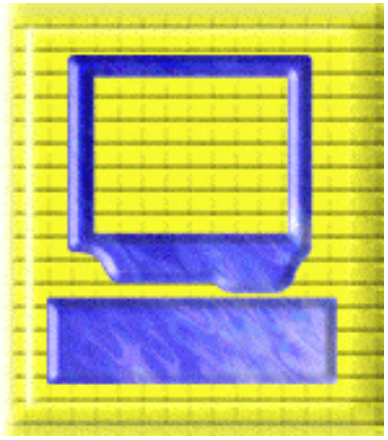
- **Visible emissions readings**
- **Record of throughput**
- **Fugitive Dust Control Plan**
- **Certification report required at all levels of production by March 1**
- **Fuel usage, if produce more than 300,000 tons rock**

It is difficult to generalize the specific requirements for a crushing spread because these requirements also include fuel use and other pieces of equipment at the plant. (See your GOP or site specific permit for details on all the requirements for your plant.) However, the table below serves as an illustration to show some of the differences in requirements by category for equipment:

Requirement	Small	Medium	Large
Compliance Demonstration	Keep records of throughput	Keep records of throughput. Develop and follow a fugitive dust control plan	Keep records of throughput. Develop and follow a fugitive dust control plan. All fugitive dust control plans must be completed by a trained person.
Methods and records	Keep all records for a minimum of five years	Keep all records for a minimum of five years.	Keep all records for a minimum of 5 years. Use USEPA Method 9 and NSPS opacity methods.

Air Emissions Inventory

- **Credit based on dust control and record keeping**
- **Three tiers**
  - **50%**
  - **75%**
  - **> 90%**
- **Company charged per calculated ton of particulate matter each year**



Section NR 438.03(1), Wis. Adm. Code, requires, in part, Aany person owning or operating a facility which emits an air contaminant in quantities above reporting levels listed in Table 1, except indirect sources of air pollution, to annually submit to the Department an emission inventory report of annual, actual emissions, or, for particulate matter, PM_{10}, sulfur dioxide, nitrogen dioxides, carbon monoxide and volatile organic compounds, throughput information sufficient for the Department to calculate its annual, actual emissions.≅

Generally, a nonmetallic mining operation is required to report air emissions if it emits more than 10,000 pounds of particulate matter, 10,000 pounds of PM_{10}, or 10,000 pounds of nitrogen oxides in a calendar year. The primary source of particulate matter and PM_{10} emissions originates from rock crushing operations (e.g. primary crushers, secondary crushers, screens, etc.). The primary source of nitrogen oxide emissions originates from fuel burning operations typically associated with diesel engines and generators, but not from mobile equipment, such as loaders and haul-out trucks.

In August, 1995, representatives from Wisconsin=s aggregate producers, the Wisconsin Road Builders Association (WRBA) [now the Wisconsin Transportation Builders Association (WTBA)], and the Aggregate Producers of Wisconsin (APW) met with the DNR=s Bureau of Air Management to express concern regarding the calculation of air emissions in the Wisconsin nonmetallic mining industry. The industry expressed concern about the consistency of the calculation of their annual air emissions.

DNR agreed to convene a work group consisting of DNR and industry representatives to review emission inventory issues pertaining to the nonmetallic mining industry. This work

group and a subsequent work group developed five documents (four regarding emission inventory and one New Source Performance Standards). The first work group disbanded after publication of **What You Need to Know and Do For Determination of 1996 Particulate Emissions In the Crushing Industry**.

The two documents developed by the first work group and directed at the calculation of air emissions were different, although they were written at the same time and issued in January 1996. Because the 1995 operational year for the nonmetallic industry was completed at the time the 1995 agreement was finalized, the 1995 agreement addressed only the calculation of air emissions. The 1996 agreement introduced a three tiered structure for identifying control efficiencies for particulate matter sources, the main air pollutant emission for this industry. Pieces of equipment at each crushing spread were assigned control efficiencies based on the amount of dust control at the piece of equipment and the training of on-site personnel. Companies were automatically given a 50% control for each piece of equipment and could request a 75% or greater than 90% control efficiency based on criteria set in the 1996 agreement.

The second work group developed the 1997 and 1998 emissions inventory guidance documents. These two documents further refined the emission calculations used in the emission inventory documents written for the 1995 and 1996 data years.

DNR currently calculates emissions based on information contained in the document, **Nonmetallic Mining Air Emissions Guidance For The Development Of The 1998 Air Emissions Inventory**, WDNR, January, 1999.

Sections 285.69, Wis. Stats., and NR 410.04, Wis. Adm. Code, set the fee charged for air emissions. The emission fee for 1998 calendar year emissions is $33.19 per ton. [Emission fees for subsequent years are calculated based on the increase in the Consumer Price Index in each year.] Any direct source required to obtain a permit which emits 5 or more tons of total billable air contaminants per year, is required to pay these emission fees.

Air emission fees are assessed each May based on emissions reported for the previous calendar year. Air emission fees are assessed to portable crushing plants, stationary crushing plants, and permitted quarry sites. Permitted quarry sites are those that produce greater than or equal to 25,000 ton of rock per month on a rolling 12 month average, and actually operate more than 365 days per 5 year period.

Record Keeping Because ...

- Calculated emissions based on production data
- Annual report of production data to DNR

Because of the various guidance documents and agreements between DNR and the industry, record keeping should be a number one priority at each portable or stationary crushing site. Records of annual throughput must be kept each year and reported to DNR by March of the following year. For spreads wanting more than 50% control credit, records of training, visible emissions readings completed during a work shift, and water (whether it be precipitation or water used to wet the rock) should be maintained. The requirements for each control tier are specific and the next section discusses each of the three control tiers.

50% Control Credit

- Climatic Conditions in Wisconsin

General Requirements

All processes and operations that generate particulate matter (with the exception of fuel burning equipment) are automatically assigned a 50% control efficiency (Tier 1 Control Efficiency). DNR recognizes that moisture inherent to the climatic conditions present in Wisconsin would allow for some control beyond the uncontrolled (without wet suppression) emission factors published in the applicable AP-42 section. An estimation of 50% control is assigned.

Personnel Training Requirements

There are no personnel training requirements for Tier 1.

75% Control Credit

- Climatic Conditions in Wisconsin
- On-site Fugitive Dust Observer
- Active Dust Control Measures

General Requirements

If a facility meets specific housekeeping, record keeping, and control equipment requirements then the facility is entitled to a 75% control efficiency for the process. The 75% control efficiency is used to modify the AP-42 uncontrolled emission factor for the process. The emissions (with the exception of fuel burning equipment) are calculated by multiplying the plant throughput times the AP-42 uncontrolled emission factor for the process times one minus .75. The 75% control efficiency is achieved by the operator upon demonstration to the DNR air contact that the facility meets the training requirements per the table in Appendix G of the 1998 guidance document.

Personnel Training Requirements

Under Tier 2, there must be an "On-site Fugitive Dust Observer" as defined in Section 12 of the 1998 guidance document, on-site during the nonmetallic mining operation or the operation is not eligible for the 75% control efficiency. The on-site fugitive dust observer must participate in a training course developed by DNR in cooperation with the WTBA and APW, or complete another DNR approved training program to recognize when fugitive dust control measures need to be taken, and what measures are appropriate. All on-site fugitive dust observers should complete and sign the table printed on perforated paper in Appendix F on the 1998 guidance document. This training should be completed once every year.

Greater Than 90% Control Credit

- **Climatic Conditions in Wisconsin**
- **On-site Fugitive Dust Observer**
- **Visible Emissions Reader**
- **Active Dust Control Measures**
- **Little or no visible emissions**

General Requirements

If a facility has a AVisible Emission Reader≅ assigned to its operation and an "On-site Fugitive Dust Observer," as defined in Section 12 of the 1998 guidance document, and it meets specific housekeeping, record keeping, and control equipment requirements, then the facility is entitled to a greater than 90% control efficiency for the process (with the exception of fuel burning equipment). If a Awet≅ AP-42 emission factor is available, then this emission factor is assigned to the process without adjustment because the Awet≅ AP-42 emission factor is based on actual testing information. If a Awet≅ AP-42 emission factor does not exist, then a control efficiency of 91% is assigned to the process and then this control efficiency is used to adjust the AP-42 uncontrolled factor for the process. Please refer to Appendix G of the 1998 guidance document for the requirements for greater than 90% control efficiency.

Personnel Training Requirements

Under Tier 3, the facility must have a certified Visible Emission Reader, as defined in Section 12 of the 1998 guidance document, assigned to its operation in addition to an "On-site Fugitive Dust Observer", as defined in Section 12 of the 1998 guidance document, or the facility is not eligible for greater than 90% control. (Note: The Visible Emission Reader and the On-site Fugitive Dust Observer can be the same person. One Visible Emission Reader per company is acceptable for a company that owns multiple

plants.)

Facility Responsibility

1. Any facility seeking to obtain acknowledgment of greater than 90% control efficiency is required to have an "On-site Fugitive Dust Observer" and at least one person designated by the facility who is certified at least once every twelve months as a Visible Emission Reader.

2. Call the DNR air contact responsible for the plant when a change in control efficiency is desired from a lower control efficiency (50% or 75%). The DNR air contact may visit the site to confirm the facility meets the greater than 90% control criteria.

3. Utilize annual refresher training for plant operators, and include in the training:

   A. Explanation of opacity
   B. Discussion of facility equipment and normal and alternative dust control procedures
   C. View slides/video of proper methods to evaluate opacity.

4. Whatever tier level the facility operators elect, they must operate to meet all applicable compliance requirements, including visible emissions limits.

DNR Air Management Responsibility

The DNR air contact will complete a Facility Contact Report (Form 4500-94) which includes the preliminary indication of the compliance status before the inspector leaves the site.

Take a Break

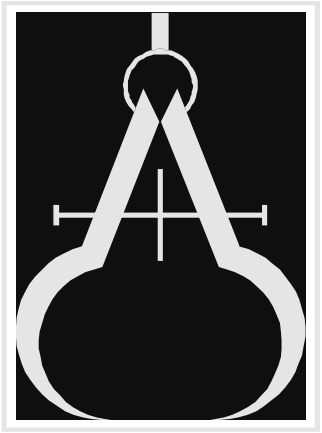
- Discuss
  - **GOPs and specific site permits**
  - **Air Emission Inventory**

Module 4

- Dust Measurements
- Opacity Pictures
- Plans

Module 4 supplies information on dust measurements, presents pictures of different opacities at different pieces of equipment, and then discusses fugitive dust plans.

How Do You Measure Dust?

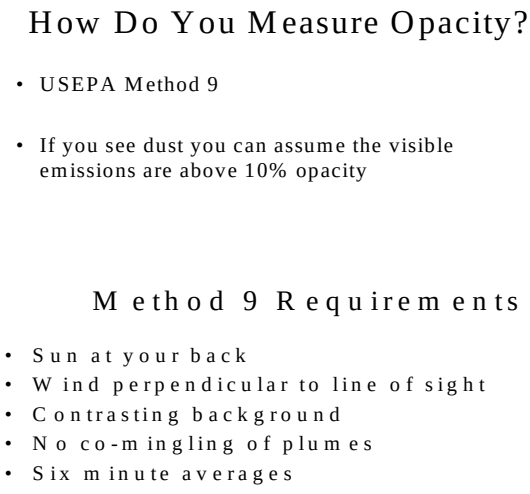


Dust can be visible or invisible. The measurement of this dust can determine whether your operation is complying or out of compliance with air regulations. How is this dust measured?

Dust Is Measured Through...

- Visible Emissions Readings that Measure Opacity
  - Opacity is a measure (quantitative assessment) of the dust emitted into the air

Visible emissions readings are a means of showing compliance with opacity standards. Opacity readings are taken at either the stack or a fugitive dust source using EPA Method 9-Visible Determination of the Opacity of Emissions from Stationary Sources. Opacity reading using Method 9 requires a certified reader. A certification is valid for up to six months can be obtained at a DNR sponsored "Smoke School" in either Milwaukee or Ladysmith. Opacity readings should be taken once per shift, and a person who has been certified at least once during the previous 12 months must be on the crusher operator's staff, in order to obtain the greater than 90% emission inventory control credit.



Do you need to be a certified reader to assess the amount of fugitive dust at your site? No. If you can see the dust, you can assume the opacity is above 10%. Companies need to keep the dust below 10% opacity to obtain the greater than 90% emission inventory control credit.

You must be trained to complete Method 9 visible emissions readings correctly. Some of the Method 9 requirements are listed above.

Opacity Pictures

PLEASE NOTE

- The following pictures are for discussion purposes only.
- Do not use these pictures to make opacity measurements
- Viewing of these pictures does not meet the requirements for passing visible emissions certification

The following section presents 24 pictures of different pieces of equipment with different opacities at a quarry in Waukesha. ***This information is presented for informational purposes only and cannot be used for passing visible emissions certification.*** As you view the pictures you may or may not be able to see the amount of opacity the picture claims (this is especially true if this training manual is printed in black and white). The purpose of supplying this information is to give the reader a feeling for the various degrees of opacity.

Picture 1-Visible Emissions 0%

- Primary Crusher: Impactor
- Method 9 Wet (spray bar on crushing spread)
- Overall shot
- Haze in sky due to cumulus clouds

Picture 2-10% Visible Emissions

- Primary crusher
- Method 9 Wet
- Look for
  - **10% Visible Emissions obscuring grizzly at left**

Picture 3-20% Visible Emissions

- Primary with grizzly
- Method 9 Wet
- Loading Grizzly
  - **20% visible emissions just above hopper lid**
  - **Cumulus clouds to right**

Picture 4-Visible Emissions 30%

- Primary with grizzly
- Backlit, wet
- Mixture of grizzly loading dust, primary dust, and haul road dust

Picture 5-Visible Emissions 40%

- Primary
- Backlit, wet
- Backlit dust from primary

Picture 6-Visible Emissions 0%

- Screen
- Method 9, wet
- Conveyor transfer points shrouded

Picture 7-Visible Emissions 0%

- Screen
- Method 9, wet
- Detail of screen shows no Visible Emissions

Picture 8-Visible Emissions 0%

- Conveyor
- Method 9, wet
- Shrouding

Picture 9-Visible Emissions 40%

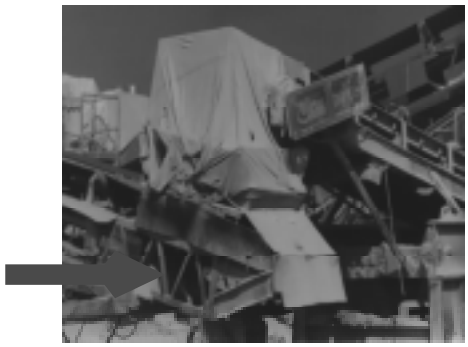
- Conveyor
- Method 9, wet
- Instantaneous

Picture 10-Visible Emissions 0%

- Tertiary Crusher
- Method 9, wet
- Haze in sky

Picture 11-Visible Emissions 5%

- Conveyor
- Method 9, wet



Picture 12-Visible Emissions 5%

- Tertiary Crusher
- Method 9, wet
- Visible emissions can be noticed against sky

Picture 13-Visible Emissions 40%

- Conveyor
- Backlit, wet
- Visible emissions obscure trees

Picture 14-Visible Emissions 20%

- Tertiary Crusher
- Backlit,wet
- Apparent 20% Opacity obscuring trees

Picture 15-Visible Emissions 30%

- Primary
- Backlit, wet

Picture 16-Visible Emissions 60%

- Primary
- Backlit, wet
- Occurs during loading

Picture 17-Visible Emissions 70%

- Primary
- Backlit, wet
- Occurs during loading

Picture 18-Visible Emissions 0%

- Primary
- Method 9, dry

Picture 19-Visible Emissions 15%

- Primary
- Method 9, dry
- 15% Opacity in center of photograph

Picture 20-Visible Emissions 20%

- Conveyor
- Method 9, dry
- 20% opacity where aggregate strikes stockpile

Picture 21-Visible Emissions 15%

- Conveyor
- Method 9, dry
- 15% Opacity at shaded area in lower right center of photograph

Picture 22-Visible Emissions 15%

- Tertiary Crusher
- Method 9, dry
- 15% Opacity at shaded area at bottom center of photograph

Picture 23-Visible Emissions 15%

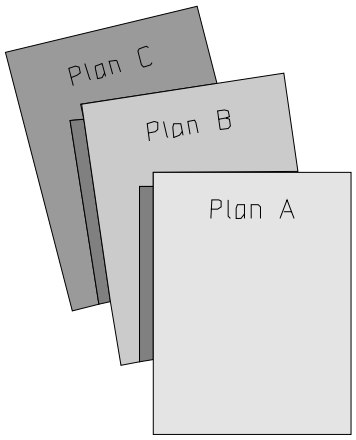
- Screen
- Method 9, dry
- 15% Opacity at transfer point to screen at top of photograph

Picture 24-Visible Emissions 10%

- Screen
- Method 9, dry
- 10% Opacity at transfer point to screen at top of photograph

Plans You Need At Spread

- Malfunction Prevention and Abatement Plan
- Fugitive Dust Control Plan



There are two plans that you should keep at your spread for reference: 1) malfunction prevention and abatement, and 2) fugitive dust control. We will briefly discuss both plans.

Malfunction Prevention and Abatement Plan

- Plan informs operators what to do when dust control breaks (i.e. spray bars break, water to controls not available, etc.)
- Each spread should have a plan

A Malfunction, Prevention, and Abatement Plan documents how a crushing plant will prevent, detect and correct malfunctions or equipment failures which may cause applicable air emission limitations to be violated or which may cause air pollution. s. NR 439.11, Wis. Adm. Code, requires this plan be prepared by any plant that emits more than 15 pounds in any day or 3 pounds in any hour of particulate matter.

The plan should include a description of the corrective measures taken should a failure occur, intervals for inspection and maintenance, a listing of materials and spare parts that will be maintained in the inventory, and the calibration of any device which monitors air pollution at the facility.

Any control systems should have a malfunction prevention and abatement plan prepared noting spare parts kept on-site, notification, and response actions in the event of a malfunction that causes an emission limit violation (including the visible emission limitation).

Scheduled inspections of air pollution devices can easily be incorporated into the safety check which accompanies equipment set-up at each location, and are a good tool for identifying and maintenance or inventory needs.

Fugitive Dust Control Plan

- **States what company agrees to do to control fugitive dust emissions at crushing spread and/or site**
- **Each spread needing a permit must have one to address equipment conditions**
- **Each quarry site needs a separate fugitive dust control plan**
- **The site and the equipment plan can be combined on occasion.**

Portable crushing plants consist of an assortment of individual equipment which are used to physically reduce, size and/or separate earth materials. Any combination of equipment can be used for a particular project. Plant set-up in any one gravel pit or quarry is determined by the physical layout of the site, the native geology, and the specifications of the requested material (i.e. road gravel, clear stone).

At a gravel pit or quarry, dust will become entrained by wind and/or machine movement. Factors affecting emissions from either source category include the amount of activity at the site (drilling, blasting, dumping, crushing, hauling), the type and moisture content of the stone being processed, the type of equipment and operating practices employed, and topographical and climatic factors. The fugitive dust control plan should identify the potential fugitive dust emission sources, the plants options to control the fugitive dust, the people responsible for controlling the fugitive dust, and the record keeping or other documentation that the plant will keep to record its fugitive dust control activities.

In Summary

- You will save company money from air emission fees and potential fines
- You will cut down on dust complaints
- You will protect yourself from respiratory diseases associated with the dust
- You will make Wisconsin's air cleaner

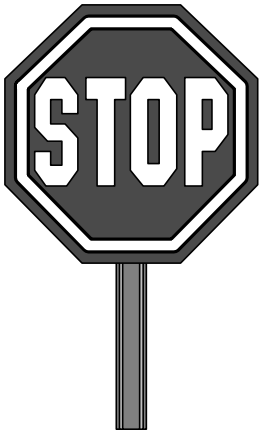
We hope you obtained information from this training manual. We believe that the control of fugitive dust is in the best interest of DNR and the nonmetallic mining producers. The control of fugitive dust benefits the company by saving the company money. The control of fugitive dust benefits DNR by insuring that the air remains clean.

Dustless Scene

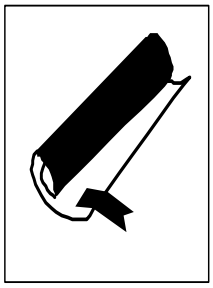
We believe that DNR and the Wisconsin nonmetallic mining companies seek to keep Wisconsin's air clean. We hope that scenes like the one above remain part of Wisconsin.

Take a break

- Discuss Malfunction Prevention and Abatement Plan
- Discuss other ways to control fugitive dust on spread particular to your company



Your Certificate For Training



Thank You For Taking This Course From ….

- DNR
- WTBA
- APW
- WAPA

Thank You!

By completing this training course, you have met the requirements for the "On-site Fugitive Dust Observer" listed in the **Nonmetallic Mining Air Emissions Guidance For The Development Of The 1998 Air Emissions Inventory**. The four groups responsible for developing this training course would like to thank you for reading this training manual and increasing your knowledge of the control of fugitive dust.

Appendix A

New Source Performance Standards (NSPS) for Nonmetallic Mineral Processing Plants

Written by the Wisconsin Department of Natural Resources

December 1998

Publication #: PUBL-AM-288-98

What are New Source Performance Standards?

New Source Performance Standards (NSPS) are federal standards established under section 111 of the Clean Air Act (42 USC 7411). New Source Performance Standards (NSPS) reflect the degree of emission limitation available through application of the best adequately demonstrated technological system of continuous emission reduction, taking into account the cost of achieving such emission reduction, any non-air quality health and environmental impacts, and energy requirements. The EPA has written many NSPS for many different industries. The federal NSPS for Nonmetallic Mineral Processing Plants is listed in 40 CFR Part 60, Subpart OOO. (CFR is an abbreviation for Code of Federal Regulations).

Wisconsin typically adopts the federal NSPS into its regulations. The NSPS for Nonmetallic Mineral Processing Plants is contained in section NR 440.688, Wis. Adm. Code.

Purpose of this document

This document gives you a broad overview of the NSPS for Nonmetallic Mineral Processing Plants -- you are encouraged to read it and to contact the Department's staff. For a more thorough discussion of this issue, please contact your regional air engineer.

If you own or operate one or more crushing or grinding plants, you may be affected by this NSPS. This NSPS is not intended for stand-alone screen or wash plants, pits, or quarries. This NSPS does not apply to any plant that does not have the capability to crush or grind.

This NSPS applies to you only if and when you process nonmetallic minerals. The definition of nonmetallic mineral includes sand and gravel and crushed and broken stone. Most asphalt and concrete contains more than 50% nonmetallic mineral by weight and such materials are also classified as a nonmetallic mineral and so this NSPS also applies to these operations.

There are certain other NSPS regulations that might affect businesses in the aggregate industry. These include the NSPS for Metallic Mineral Processing (s. NR 440.525, Wis. Adm. Code) and the NSPS for Calcining or Drying of certain minerals such as feldspar, industrial sand, lightweight aggregate, roofing granules and other specific minerals (40 CFR, Part 60, Subpart UUU).

Where do these regulations apply?

The Nonmetallic Mineral Processing Plant NSPS requirements apply to most types of processing equipment manufactured after August 31, 1983. The manufacturer could be a typical manufacturer such as Allis-Chalmers. The manufacturer could be you if, for example, you built a storage bin. For this NSPS, equipment means each crusher, grinding mill, screening operation, grizzly, bucket elevator, transfer point (transfer to or from a conveyor), bagging operation, storage bin, enclosed truck or railcar loading station.

This NSPS also applies to equipment that was manufactured on or before August 31, 1983 and was either modified or reconstructed after August 31, 1983. An increase in production rate of equipment involving a capital expenditure, replacing a control device with another system which is less efficient, or converting from wet to dry operation are probably the most likely ways a modification would cause an existing piece of equipment to become subject to this NSPS. Reconstruction of equipment means the replacement of components (over a 2-year period) to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost of comparable new equipment.

What equipment is subject to NSPS?

This NSPS applies to equipment that is listed above. It does not apply to vehicles such as trucks or front-end loaders. It also does not apply to the use of diesel engines either in generator sets or directly in the processing equipment.

Truck dumping of nonmetallic mineral into any screening operation, feed hopper or crusher is exempt from the opacity requirements. Care must be taken during opacity compliance determinations to exclude opacity observations made during truck dumping to such equipment. Also, grizzlies associated with truck dumping are exempt from opacity requirements and test requirements.

Equipment that is operated at the following plants is not subject to the NSPS:

1. Fixed sand and gravel plants and crushed stone plants with capacities (as defined in this NSPS) of 25 tons per hour or less; or,

2. Portable sand and gravel plants and crushed stone plants with capacities (as defined in this NSPS) of 150 tons per hour or less.

This NSPS defines capacity as the cumulative rated capacity of all initial crushers that are part of the plant (the initial crusher means any crusher or grinder into which material can be fed without prior crushing or grinding in the plant, see s. NR 440.688(2)(n), Wis. Adm. Code). Cumulative means that you add up the capacities of all initial crushers at the plant. Note that if the crusher is onsite and is capable of being operated, its rated capacity must be included.

Rated capacity means the manufacturer's rated capacity at a wide open setting, open circuit with clean rock. It does not mean the capacity at which you typically operate.

This NSPS defines a portable plant to mean there is no processing equipment (equipment specified in this NSPS) that is attached by a cable, chain, turnbuckle, bolt or other means (except electrical connections) to any anchor, slab, or structure including bedrock.

Also, when a piece of equipment is replaced by one of equal or smaller rated capacity having the same function as the existing equipment, the new equipment may be exempt from this NSPS

except for some requirements to notify the Department and the EPA. Refer to s. NR 440.688, Wis. Adm. Code, for the details of this exemption and the notification requirements. Note that this does not apply if all equipment in a production line is replaced.

> "production line" means all pieces of equipment which are directly connected or are connected together by a conveying system
>
> "conveying system" means equipment used for transporting materials from one piece of equipment or location to another location and includes feeders, conveyors, elevator or pneumatic systems. It does not include mobile units like trucks or loaders.

Also this replacement exemption can only be used for a one-for-one replacement (for example replacing one 100 ton per hour piece of equipment with two 50 ton per hour pieces is not exempt).

What are the NSPS requirements?

There are four types of requirements in the NSPS. These include notification, record keeping, and emission standards and test requirements. This document only covers the fugitive dust requirements. If you use a baghouse or a scrubber or a similar device you should review the requirements for that piece of equipment.

What are the NSPS notification and record keeping requirements?

You must submit written notification to DNR and keep written records of the following:

initial start-up:	postmarked within 15 days of startup
anticipated date of testing:	postmarked not less than 30 days prior to testing and at least 20 business days prior to the test
start of reconstruction:	postmarked no later than 30 days after reconstruction is started
start of modification:	postmarked 60 days or as soon as practicable before the modification is started

What emission standards for fugitive dust are in this NSPS?

You must meet opacity emissions standards. These standards are as follows:

10% opacity for all NSPS equipment (screens, transfer points, etc.) except crushers.
15% opacity for crushers.
No visible emissions from wet (saturated) screening and subsequent screening, bucket elevators and belt conveyors that process saturated material in the production line up to the next crusher, grinder or storage.
No visible emissions from screening, bucket elevators and belt conveyors that process saturated material in the production line downstream from wet mining operations (at or below the water table) and where the mineral is saturated up to the first crusher, grinder or storage bin in the production line.

"saturated" means to soak or load to or beyond capacity.

"opacity" refers to the density of the cloud of dust that is emitted from the NSPS equipment or transfer point. Basically, the easier it is to see through the cloud of dust the lower the opacity. Opacity needs to be determined by a certified visible emissions reader.

Opacity limits apply to any inlet and any outlet of any piece of equipment

What are the NSPS test requirements?

Within 60 days after achieving the maximum production rate at which the equipment will be operated, but not later than 180 days after initial start-up of the equipment, you must conduct performance tests and furnish the department a written report of the results of the performance tests. Initial start up does not mean you have to test every time you move your equipment or each new construction season.

This is a one-time test. It does not need to be done every year and usually does not need to be repeated when there is a change in ownership of the equipment (if the test was done out of state check with your region Department representative). Be sure to obtain and keep copies of NSPS testing for your equipment.

Please refer to the previous section regarding opacity requirements.

What options do I have regarding the NSPS test requirements?

Your options include hiring a consultant or performing the test yourself. (A list of possible consultants is available from the Department of Commerce. You can call their fax line and have forms sent to your fax machine. Dial (608) 264-6154 and follow the directions. Request forms numbered 918 and 603).

If you want to complete NSPS testing yourself, there are basically four steps you need to take if you want to do the test yourself. The steps are very briefly described below. You can obtain sample forms and more information from the air management program at either your region office or the Bureau of Air Management in Madison.

Step 1 Send some staff to Smoke School to obtain certification in the EPA method of reading opacity. It is up to each company to determine how many individuals should be certified at Smoke School. Smoke School is a two-day exercise that is provided every April and October. Contact the Minnesota Air Pollution Control Agency (test site is in the Minneapolis area; fee is required) or Wisconsin DNR -- Andy Seeber at (608)267-0563 (test sites are Milwaukee and Ladysmith; it's free) to register. Both states offer classroom training session the day before the two day smoke school (Minnesota has a fee for this).

Step 2 Prepare a Test Plan and send it to DNR. This must be done at least 20 business days and postmarked at least 30 days prior to the test. This furnishes DNR notification so that DNR can witness the test, if it so chooses.

Step 3 Do the test. Do the test according to the NSPS and EPA Method 9 requirements and keep records that are needed to describe the plant operation and layout at the time of opacity observations.

Note that the duration of the test may be reduced from three hours to one hour if no individual readings are greater than the applicable standard and no more than three readings are at the opacity standard (either 10% or 15%)

Step 4 Prepare the test report and submit it to the DNR.

Who do I call if I need further information regarding NSPS?

Call Keith Pierce of the DNR's Bureau of Air Management at 608-267-0562.