

Guide to Agricultural PM10 Best Management Practices

“Agriculture Improving Air Quality”

Crop Operations

**Maricopa County or Potential Moderate
Nonattainment Areas**



**Governor’s Agricultural
Best Management Practices Committee**

Third Edition, 2015

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Introduction:

Why is the Guide to Agricultural PM10 Best Management Practices needed?

The Federal Clean Air Act requires that emissions from all significant sources in areas not meeting the national ambient air quality standards be controlled through effective programs. Through a study conducted by the Arizona Department of Environmental Quality (ADEQ) in 1995, agricultural activities were identified as a source that contributes to the production of particulate matter (PM).

PM10 is particulate matter that is 10 micrometers or less in diameter. These particles are very small and can invade the natural defense mechanism of the human respiratory tract penetrating deep into the lungs (human hair is 70 micrometers in diameter). Consequently, PM can cause a wide variety of harmful health effects, especially for children, the elderly, and people with pre-existing respiratory or cardiovascular disease.

With this potential threat to human health, several groups in the Phoenix metropolitan area have developed and are implementing programs to help the area meet the Federal Clean Air Act standards for PM.

The intent of this guide is to:

- Provide agricultural operators with information and guidance on how to effectively implement individual best management practices (BMPs).
- Inform the general public about the efforts local farmers are implementing to improve air quality.
- Provide Natural Resource Conservation Districts (NRCD) and other farm organizations with background information regarding the Agricultural PM General Permit.
- Provide regulators with information and guidance on how to determine compliance with the Agricultural PM General Permit.

Why was the Agricultural PM General Permit created?

Currently, the EPA has agreed that the Phoenix metropolitan area has met the standards for the Clean Air Act. When the Clean Air Act was revised in 1990, the Phoenix metropolitan area did not meet the Federal Clean Air Act Standards for PM10. On June 10, 1996, the U.S. Environmental Protection Agency (EPA) re-designated the PM10 Regulated Area to serious for PM10, resulting in the need for emission reduction programs for previously unregulated sources, such as unpaved roads, unpaved parking lots, vacant lots and agriculture. On August 3, 1998, EPA issued a federal implementation plan (FIP) addressing these unregulated sources. The FIP included requirements to develop and enforce control measures for these source categories.

In an effort to address agriculture's contribution to PM10, the Governor's Agricultural Best Management Practices Committee was created by law in 1998 (Arizona Revised Statutes (A.R.S.) §49-457)). The committee is composed of five local farmers, the director of ADEQ, the director of Arizona's Department of Agriculture, the state conservationist for the Natural Resources Conservation Service (NRCS), the vice dean of the University of Arizona College of Agriculture and Life Sciences and a soil scientist from the University of Arizona. Because A.R.S. §49-457 was developed and adopted, EPA removed the portion of the federal implementation plan for agriculture on June 29, 1999 [64 Federal Register p. 34,726]. The committee's charge was to develop an agricultural PM10 general permit that would address the need for controls on agricultural operations. The committee was to identify BMPs that focused on feasible, effective

and common sense practices that minimized negative impacts on local agriculture. In the original program, the agricultural PM10 general permit required that at least one BMP be implemented to control PM10 for each of the following categories: tillage and harvest, non-cropland, and cropland.

In 2007 the Arizona State Legislature passed Senate Bill 1552, , which mandated the expansion of the Ag BMP program by changing the number of BMPs required from one to two per category in the Maricopa County nonattainment area and the Maricopa County portion of Area A.

In 2009, the Arizona State Legislature passed Senate Bill 1225, amending A.R.S. §49-457 to include animal agriculture in the PM10 general permit. This includes dairy operations, beef cattle feedlots, poultry, and swine facilities. It also provided for the addition of one person actively engaged in each of the following; beef cattle feed lot, dairy, poultry and swine, as well as one person from a county air quality department, to the Governor's Ag BMP Committee.

Who must comply with the Agricultural PM General Permit?

Any farmer who farms more than 10 contiguous acres of land located within a moderate PM Nonattainment Area designated after June 1, 2009, or a serious PM Nonattainment Area (Maricopa County PM10 Nonattainment Area and Maricopa County portion of Area A) must comply with the Agricultural PM General Permit.

What does the farmer have to do?

- As per Arizona Administrative Code R18-2-610.02, agricultural operations located in a **moderate** nonattainment area, farmers must implement and maintain at least **ONE** approved BMP (described later in this document) for each of the four categories: Tillage, Harvest, or Ground Operations; Non-cropland and Commercial Farm Roads; Cropland; and (**As necessary**) Significant Agricultural Earth Moving.
- As per Arizona Administrative Code R18-2-610.01, for agricultural operations located in **Maricopa County PM10 Nonattainment Area and Maricopa County portion of Area A**, farmers must implement and maintain at least **TWO** approved BMP (described later in this document) for each of the four categories: Tillage, Harvest, or Ground Operations; Non-cropland and Commercial Farm Roads; Cropland; and (**as necessary**) Significant Agricultural Earth Moving.
- Must keep records detailing the BMPs selected for each category. The commercial farmer may document the practice on the sample BMP Agricultural PM General Permit Record or develop a record that includes the information required by the Agricultural PM General Permit. The commercial farmer must make available the record to the ADEQ director within two business days of notice to the farmer.
- The committee recommends additional record keeping if implementation of the BMPs is not easily visible. Examples of additional record keeping include, but are not limited to, photographs, purchase records, receipts, job sheets, contractor invoices, employee timesheets, logs, narrative statements, individual farm policies, statements of understanding signed by employees or contractors, and training records.
- There is no fee associated with the agricultural PM General Permit.

When must the Agricultural PM General Permit be implemented?

A farmer engaged in agricultural activities before June 10, 2000 must comply with the Agricultural General Permit by December 31, 2001. Legislation enacted in 2007 requires that all farmers engaged in agricultural activities must comply with the Agricultural General Permit by December 31, 2007.

New legislation in 2015 will require all producers located in a designated PM Nonattainment area that engage in agricultural activities to be in compliance by January 1, 2016. Any person who commences a regulated agricultural activity after January 1, 2016 must be in compliance as soon as the activity begins.

What will happen if I do not comply with the Agricultural PM General Permit?

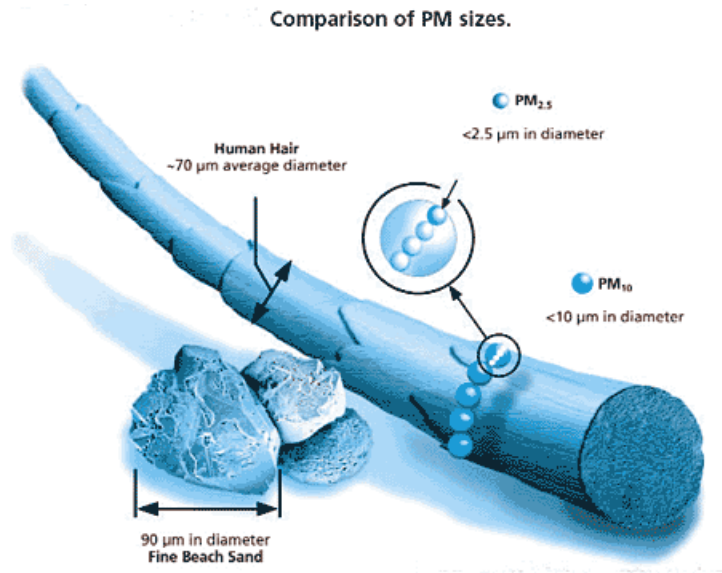
If the ADEQ Director determined that a commercial farmer is not in compliance with the agricultural PM General Permit, the following three-stage process would occur as per A.R.S. 49-457(I)(J)(K):

1. If the commercial farmer has not previously been subject to an agricultural PM General Permit related compliance order, the farmer will be required to submit a plan to the local Natural Resource Conservation District (NRCD) within a period that the director determines is reasonable, but is not less than 60 days. The plan must specify the BMPs that the facility will use to comply with the General Permit.
2. If the commercial farmer has previously been subject to an agricultural PM General Permit related compliance order, the farmer will be required to submit a plan to ADEQ within a period that the director determines is reasonable, but is not less than 60 days. The plan must specify the BMPs that the facility will use to comply with the General Permit.
3. If the commercial farmer fails to comply with the plan submitted to NRCD and ADEQ, the director of ADEQ may revoke the agricultural PM General Permit and require the farmer to obtain an individual fee based permit.

At each stage, the farmer would have the opportunity for a hearing.

Soils, PM10 and Air Quality

Soils consist of various particles including mineral matter, organic matter, air, and water. These particles vary in shape and size, ranging from large drops of liquid to microscopic dust particles. The mineral particles in soil are classified as sand, silt, or clay. Soils containing high amounts of clay coupled with large silt particles have a greater likelihood of generating PM10. The term PM10 is used to describe particles of 10 micrometers or less in aerodynamic diameter. By comparison, the diameter of the average human hair is 70 micrometers, making human hair about seven times the size of PM10.



When the natural soil structure is manipulated or disturbed by tillage, animals, weather, or vehicular traffic, the structure can be broken apart from larger pieces, or clods, into smaller pieces. This process significantly increases the potential for soil particles to become suspended in the air. Further manipulation of the soil increases the chance for smaller particles to become PM10.

Air quality problems occur when the amount of particles released into the air increase in concentration. Large concentrations of PM10 can potentially violate one of the federal air quality standards, or National Ambient Air Quality Standards (NAAQS), set for various air pollutants. The current NAAQS standard for PM10 is 150 micrograms/cubic meter averaged over 24 hours. This standard is a concentration by weight measure. PM10 emissions can also cause visibility impairment (e.g., Brown Cloud) as well as health impacts. The small particles can pass through nostril hairs and enter the lungs, penetrating deep into the lung tissue where it is lodged and not easily, if ever, expelled.

Two meteorological events have the potential to increase the impacts from high concentrations of PM10: high winds and inversions. Conditions for both of these events can occur in the Phoenix

area, one occurring predominantly in the warmer season, the other in the cooler season. Warm season high wind events are generally short (less than one hour) and are the result of the downdrafts from monsoon thunderstorms. The cool season events are longer (six to 12 hours) and are the result of strong pressure gradients associated with a trough or a cold frontal system. An inversion is a region in the atmosphere where the temperature increases with height. The presence of an inversion creates a very stable atmosphere and leads to very little mixing of the air, trapping pollutants close to the ground. An inversion is also produced whenever radiation from the surface exceeds the amount of radiation from the sun – commonly at night or in the winter when the angle of the sun is very low in the sky. Some of the best management practices outlined in this booklet address how to lower PM10 so these events do not increase PM10 concentrations.

Disturbed soil that is broken down into smaller particles can also become a soil conservation problem. Many of the best management practices outlined in this booklet are already used to prevent soil erosion. Other best management practices address ways of limiting particles from associated farming activities such as adjoining dirt roads or road shoulders on farmland. The manipulation or disturbance of soil is inherent to the practice of farming. Best management practices are not designed to eliminate particle emissions 100 percent, but they are designed to reduce the activities that can lead to the increased concentration of PM10.

Best Management Practices

As a result of discussions between the EPA, Arizona Department of Environmental Quality, and the Arizona Department of Agriculture, the Arizona State Legislator in 1999 enacted legislation with the full support of the Arizona agriculture community to create and implement a Best Management Practice Program. The Agricultural Best Management Practice Program allows growers a wide range of choices to reduce PM emissions within an established PM Regulated Area (reference map insert).

The Arizona Legislature has defined a BMP in A.R.S. 49-457(P)(3) for the PM Regulated Area (reference map insert) as a technique verified by scientific research that, is practical, economically feasible and effective in reducing PM on a case by case basis from a regulated agricultural activity. The following section summarizes the BMPs approved by the Governor's Agricultural Best Management Practices Committee to reduce PM for each of the three agricultural categories: tillage and harvest, non-cropland and cropland. A wide range of variation in soils and cropping systems exists within the PM Regulated Area (reference map insert) which can only be addressed by a wide range of flexible and adaptable management practices. Most methods for controlling PM and dust emissions parallel the controls for wind erosion. These methods are based on principles that contain or slow soil movement from fields. The BMPs are not designed to eliminate dust emissions 100 percent, but are expected to reduce wind erosion and associated PM. Not all of the BMPs will work equally well on every farm because of variations in wind, soils, cropping systems, moisture conditions and, in some cases, the management approaches of individual growers. Such factors should be considered by the individual farmer to ensure he or she implements effective BMPs. This guide represents the first step in helping farmers reduce PM emissions from farmlands located within a PM Regulated Area (reference map insert).

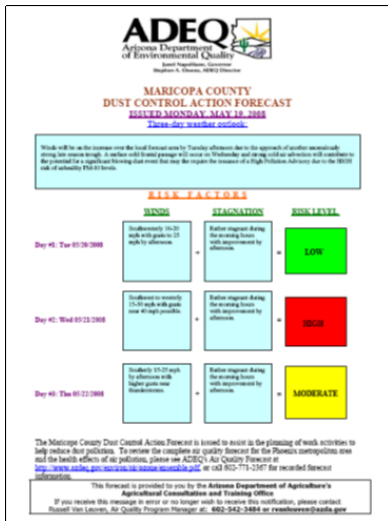
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CATEGORY I: Tillage, Harvest or Ground Operation

Any mechanical practice that physically disturbs the soil, which includes harvesting and any ground operation which involves equipment passing across the field.

Best management practices for use during tillage, harvest or ground operation

- Cessation of Night Tillage
- Chemical Irrigation
- Combining Tractor Operations
- Conservation Tillage
- Equipment Modification
- Green Chop
- Integrated Pest Management
- Limited Harvest Activity
- Limited Tillage Activity
- Multi-Year Crop
- Planting Based on Soil Moisture
- Precision Farming
- Reduced Harvest Activity
- Reduced Tillage System
- Tillage Based on Soil Moisture
- Timing of a Tillage Operation
- Transgenic Crops
- Transplanting
- Shuttle System/Large Carrier



Cessation of Night Tillage

Rule Definition

“Cessation of Night Tillage” means the discontinuation of tillage from sunset to sunrise on a day identified by the *Maricopa County Dust Control Forecast* as being high risk of dust generation.

Purpose

Cessation of night tillage decrease the concentrations of PM emissions at night when stagnant air conditions with little if any vertical mixing of the air occurs and a high pollution advisory has been given.

Suggestions for Implementation

An individual farm policy should be developed to ensure that no tillage activities occur during stagnant air conditions on high pollution advisory days. Employees should receive training in implementing the farm policy.

Chemical Irrigation

Rule Definition

“Chemical Irrigation” means reducing a minimum of one ground operation across a commercial farm by applying a fertilizer, pesticide, or other agricultural chemical to cropland through an irrigation system, which reduces soil disturbance and increases efficiency of application.



Purpose

Chemical irrigation reduces the number ground operations across a field with tractors, sprayers, fertilizer applicators and machinery. Reducing the number of field operations reduces the emissions associated with those activities.

Suggestions for Implementation

- All product application recommendations should be followed to ensure proper implementation.
- The field operations eliminated should be documented to demonstrate the implementation of the practice.

Combining Tractor Operations

Rule Definition

“Combining Tractor Operations” means reducing soil compaction and a minimum of one tillage or ground operation across a commercial farm by using a tractor, implement, harvester, or other farming support vehicle to perform two or more tillage, cultivation, planting, or harvesting operations at the same time. If equipment modification is also chosen as a BMP, and uses the same practices as described in this BMP, this action is considered one BMP.

Purpose

Combining tractor operations reduces the number of ground operations that a tractor, implement, harvester or other farming support vehicle makes across a field or unpaved surface, thereby reducing the amount of soil disturbed.

Suggestions for Implementation

- Combining tractor operations is most effective if implemented during the time of year when PM10 is most likely to be produced.
- Applying fertilizer and herbicide in a single pass.
- Cultivating and fertilizing in a single pass. Using specialized machinery to bury stalks and make new furrows in a single pass.
- Combining multiple heavy tillage operations in a single pass, for example, pulling a ring roller behind a disc.



Conservation Tillage

Rule Definition



“Conservation Tillage” means a tillage system that reduces a minimum of three tillage operations. This system reduces soil and water loss by planting into existing plant stubble on the field after harvest as well as managing the stubble so that it remains intact during the planting season.

Purpose

Conservation tillage is intended to reduce primary soil disturbance operations such as plowing, discing, ripping, and chiseling. The emissions come from the soil being disturbed by tractors and

their implements. Conservation tillage allows for ground operations to be reduced, therefore reducing PM emissions. Plant residue left on the soil surface reduces windblown PM.

Suggestions for Implementation

Examples of conservation tillage include ridge till, mulch till, strip till and minimum till. No-tillage, the strictest form of conservation tillage, uses no tillage of the soil except for minimal disturbance of the soil surface in the row during planting. The result of conservation tillage is that a minimum 30 percent of the surface of a planted field is covered with crop residue from the previous season.

Equipment Modification

Rule Definition

“Equipment Modification” means reducing PM emissions and soil erosion during tillage or ground operations by modifying and maintaining an existing piece of agricultural equipment, installing shielding equipment, modifying land planting and land leveling, matching the equipment to row spacing, or grafting to new varieties or technological improvements. If combining tractor operations is also chosen as a BMP, and uses the same practices as described in this BMP, this action is considered one BMP.

Purpose

Modifying and maintaining an existing piece of agricultural equipment or purchasing new equipment to prevent PM from becoming airborne during tillage or ground operations, which helps reduce PM and soil erosion.



Examples of Equipment Modification

- Shields or deflectors that redirect fan or vehicle exhaust sideways or upward. This can prevent PM from becoming airborne because exhaust is not blowing downward on the soil surface.
- Dust shrouds around tillage implements and harvesters.
- Spray bars that emit a mist to knock down PM.

Green Chop

Rule Definition

“Green Chop” means reducing soil compaction, soil disturbance and a minimum of one ground operation across a commercial farm by harvesting a forage crop without allowing it to dry in the field.

Purpose

Green chop reduces multiple equipment passes in-field as well as reduces soil disturbance and soil compaction.

Examples of Green Chop

- Alfalfa
- Winter forage
- Silage corn



Integrated Pest Management

Rule Definition

“Integrated Pest Management” means reducing soil compaction and a minimum of one ground operation across a commercial farm for spraying by using a combination of techniques including organic, conventional, and biological farming practices to suppress pest problems.



Purpose

Integrated pest management creates beneficial insect habitat that reduces the use of herbicides/ pesticides thereby reducing number of passes for spraying. It also reduces soil compaction and the need for additional tillage.

Examples of Integrated Pest Management

- Monitoring crop for pests to accurately and effectively apply control measures.
- Incorporate biological practices into farming operation to reduce need for spraying.

Limited Harvest Activity

Rule Definition

“Limited Harvest Activity” means performing no ground operations on a day identified by the *Maricopa County Dust Control Forecast* to be high risk for dust generation.

Purpose

Wind speed, temperature and relative humidity affect the distance that PM travels and the ability for PM to be suspended in the air. Limiting harvest activity during a high risk forecast day will reduce the transport of PM.

Suggestions for Implementation

- Producers should receive the *Maricopa County Dust Control Forecast* from either the Arizona Department of Environmental Quality or the Arizona Department of Agriculture.
- A device to measure wind speed should be available at the commercial farm site.
- An individual farm policy should be developed ensure that no harvest or soil preparation activities occur on a dust high risk forecast day.
- Employees and family members should receive training in implementing the farm policy.

Limited Tillage Activity

Rule Definition

“Limited Tillage Activity” means performing no tillage operations on a day identified by the *Maricopa County Dust Control Forecast* to be high risk for dust generation.

Purpose

Wind speed, temperature and relative humidity affect the distance that PM travels and the ability for PM to be suspended in the air. Limiting tillage activity during a high risk forecast day will reduce the transport of PM.



Suggestions for Implementation

- Producers should receive the *Maricopa County Dust Control Forecast* from either the Arizona Department of Environmental Quality or the Arizona Department of Agriculture.
- A device to measure wind speed should be available at the commercial farm site.
- An individual farm policy should be developed ensure that no harvest or soil preparation activities occur on a dust high risk forecast day.
- Employees and family members should receive training in implementing the farm policy.

Multi-Year Crop

Rule Definition

“Multi-Year Crop” means reducing PM emissions from wind erosion and a minimum of one tillage and ground operation across a commercial farm by protecting the soil surface by growing a crop, pasture, or orchard that is grown, or will be grown, on a continuous basis for more than one year.

Purpose

Surface covers such as crops, pastures and orchards that are grown and maintained for a long duration, protect the soil surface from erosive winds. The longer a crop or cover is protecting the soil surface, the less time the surface is susceptible to wind erosion.



Examples of Multi-Year Crops include

- Alfalfa
- Citrus
- Roses
- Livestock pastures
- Nuts (Pecans)
- Sod

Planting Based on Soil Moisture

Rule Definition

“Planting Based on Soil Moisture” means reducing PM emissions and wind erosion by applying water or having enough moisture in the soil to germinate the seed prior to planting. Soil must have a minimum soil moisture content of 60 percent of field capacity at planting depth. Compliance shall be determined by NRCS Estimating Soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions.)

Purpose

- Planting based on soil moisture reduces PM during the planting operation and is effective from the time of planting until crop establishment. Planting based on soil moisture is one of the most efficient practices to reduce PM between planting and crop emergence. Moisture causes soil to crust and therefore PM is not easily transported into the air.

Suggestions for Implementation

- Care should be taken to avoid over compaction of the soil, which could result in additional tillage operations.
- Irrigation should be applied as soon after soil preparation for planting as possible. After watering, a thin crust develops on the soil surface, which stabilizes it until planting.
- The time between bed lifting, irrigation and planting should be minimized as much as possible.

- Use the soil moisture “feel method” to determine adequate soil moisture. See the Natural Resource Conservation Service Publication #1619 “Estimating Soil Moisture by Feel and Appearance.” This publication is available at all NRCS offices.

Precision Farming

Rule Definition



“Precision Farming” means reducing the number of passes across a commercial farm by at least 12 inches per pass by using GPS to precisely guide farm equipment in the field.

Purpose

Precision farming reduces overlap and allows operations to occur during inclement weather conditions and at night thereby generating less PM.

Examples of Precision Farming

- Use GPS equipped tractors and other implements
- Install overlap reduction technology
- Pass markers
- Variable rate application technology

Reduced Harvest Activity

Rule Definition

“Reduced Harvest Activity” means reducing soil disturbance, soil and water loss, and the number of mechanical harvest passes by a minimum of one ground operation across a commercial farm, by means other than equipment modification or combining tractor operations.

Purpose

Any time an operation takes place in a field, the soil structure can be modified and some PM could be released into the air. Reducing the number of harvest activities can keep the soil structure intact and reduce PM.

Suggestions for Implementation

An example of reduced harvest activity is the elimination of a harvest or rood pass from a cotton harvest. More PM is emitted during a normal cotton harvest season because the process requires several harvest passes to remove most of the crop from the plant. The rood process produces a significant amount of PM because of the nature of the operation.



Reduced Tillage System

Rule Definition

“Reduced Tillage System” means reducing soil disturbance, soil and water loss, by using a single piece of equipment that reduces a minimum of three tillage operations, by means other than equipment modification or combining tractor operations.



Purpose

Any tillage operation in a field can modify the soil structure and possibly release PM into the air. Reducing the number of tillage activities can maintain the soil structure and help reduce PM.

Suggestions for Implementation

- Single-pass/multiple operation equipment
- Minimum tillage system*
- Mulch tillage system*
- Reduced tillage system*

*Consult NRCS Standard and Specifications, 329 and 344, Residue Management. This document is available at all NRCS offices.

Shuttle System/Large Carrier

Rule Definition

“Shuttle System/Large Carrier” means reducing one out of every four trips across a commercial farm by using multiple or larger bins/trailers to haul commodity from the field.

Purpose

Any time an operation takes place in a field, the soil structure can be modified and some PM could be released into the air. Using multiple or larger bins/trailers allows a farmer to haul larger amounts of commodity per trip, which reduces the number of total trips necessary to remove all of the commodity from the field. Reducing the number of haul trips on a field can prevent soil disturbance and reduce PM emissions

Examples

- Bulk movement of commodity from the field.
- Cotton modules verses trailers.
- Boll buggies
- Multiple trailers



Tillage Based on Soil Moisture

Rule Definition

“Tillage Based on Soil Moisture” means reducing PM emissions by irrigating fields to the depth of the proposed cut prior to soil disturbances or conducting tillage to coincide with precipitation. Soil must have a minimum soil moisture content of 40-60 percent of field capacity at planting depth. Compliance shall be determined by NRCS Estimating Soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions).

Purpose

Moisture binds soil particles and helps reduce the amount of PM released into the air. Fine dry soil can easily erode with increased wind speeds. Sufficient moisture levels can be achieved by

irrigating before tillage or tilling after rain. Moisture can also allow large soil clods to form, after tillage, which reduces wind erosion.

Suggestions for Implementation

- Fields should be irrigated to the depth of proposed cut prior to soil disruption, or tillage should be conducted to coincide with precipitation.
- The application of moisture or the date of tillage that coincided with precipitation should be documented.
- The soil moisture “feel method” should be used as a way to determine adequate soil moisture. See the Natural Resource Conservation Service publication #1619 “Estimating Soil Moisture by Feel and Appearance”. This publication is available at all NRCS offices.

Timing of a Tillage Operation

Rule Definition

“Timing of a Tillage Operation” means reducing wind erosion and PM emissions by performing tillage operations that minimize the amount of time within 45 days.

Purpose

Adjusting the time of tillage operations can minimize the amount of time the soil surface is susceptible to wind erosion and generation of PM. When a field's surface is smooth, dry, and consists of finer grained soil particles, the field is most susceptible to wind erosion, resulting in PM.

Suggestions for Implementation

- Reducing time between leveling (land planing) and bedding, which is when the beds act as miniature windbreaks. For example, a cotton production system where fields are tilled in the fall, land planed, and then bedded, would be less susceptible to wind erosion and PM.
- Leaving the field surface with large soil clods for as long as possible prior to preparation of seed beds.

Transgenic Crops

Rule Definition

“Transgenic Crops” means reducing a minimum of one tillage or ground operation, the number of chemical spray applications, or soil disturbances by using plants that are genetically modified.



Purpose

Transgenic crops reduce need for tillage or cultivation operations, as well as reduces soil disturbance. Can also reduce the number of chemical applications.

Examples of Transgenic Crops

- Genetically altered seed
- Nematode resistant rootstock
- Grafting

Transplanting

Rule Definition

“Transplanting” means reducing a minimum of one ground operation across a commercial farm and minimizing soil disturbance by utilizing plants already in a growth state as compared to seeding.

Purpose

Transplanting is the practice of taking young plants that have been started in pots or a nursery and moving them to a larger production field. Any time an operation takes place in a field, the soil structure can be modified and some PM could be released into the air. Transplanting reduces the number of cultivations necessary compared to growing crops from seed.

Examples of Transplanted Crops

- Onions
- Garlic
- Lettuce
- Vegetables

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CATEGORY II: Non-Cropland and Commercial Farm Roads

Any commercial farm land that:

- *Is no longer used for agricultural production.*
- *Is no longer suitable for production of crops.*
- *Is subject to a restrictive easement or contract that prohibits use for the production of crops.*
- *Includes a ditch, ditch bank, equipment yard, storage yard, or well head.*
- *Includes roads that are unpaved, owned by a commercial farmer, and is used exclusively to service a commercial farm.*

Best management practices for use on non-cropland and commercial farm roads

Access Restriction

Aggregate Cover

Critical Area Planting

Organic Material Cover

Reduce Vehicle Speed

Synthetic Particulate Suppressant

Track-out Control System

Watering

Wind Barrier

Access Restriction

Rule Definition

“Access Restriction” means reducing PM emissions by reducing the number of trips driven on agricultural aprons and access roads by restricting or eliminating public access to non-cropland or commercial farm roads with signs or physical obstruction at locations that effectively control access to the area.

Purpose

Reducing the number of trips driven on agricultural aprons and access roads can reduce that area's susceptibility to PM.

Examples of methods to restrict access include, but are not limited to:

- Installing physical barriers such as gates, fencing, posts, signs, shrubs, trees or other physical obstructions to prevent or control access to the area.
- Installing “no trespassing” or “limited use area” signs.



Aggregate Cover



Rule Definition

“Aggregate Cover” means reducing PM emissions, wind erosion, and stabilizing soil by applying and maintaining gravel, concrete, recycled road base, caliche, or other similar material to non-cropland or commercial farm roads. The aggregate should be clean, hard and durable, and should be applied and maintained to a depth sufficient to reduce PM emissions.

Purpose

Applying an aggregate cover to unpaved farm roads, parking areas and canal banks helps reduce the amount of soil particles exposed to the surface, thus helping to reduce the generation of PM. Aggregate cover acts as a surface barrier to erosive forces like wind or vehicle traffic.

Suggestions for Implementation

- The aggregate should be one inch or larger in diameter.
- The aggregate should be applied a minimum of three inches deep.

Critical Area Planting**Rule Definition**

“Critical Area Planting” means reducing PM emissions and wind erosion by planting trees, shrubs, vines, grasses, or other vegetative cover on non-cropland in order to maintain at least 60 percent ground cover. Compliance shall be determined by the Line Transect Test Method, NRCS National Agronomy Manual, Subpart 503.51, Estimating Crop Residue Cover, amended through February 2011 (and no future editions).

Purpose

Critical area plantings helps control soil movement and protect the soil surface when adequate cover does not exist. Ground covers reduce dust and wind erosion by shielding the soil with vegetation and anchoring the soil with roots.

Suggestions for Implementation

This practice applies to field aprons, equipment parking areas, turn rows, canal banks and bare areas where vegetation is difficult to establish by usual planting methods. The planted area should consist of any vegetative cover that maintains more than 60 percent ground cover.

Organic Material Cover**Rule Definition**

“Organic Material Cover” means reducing PM emissions and wind erosion and preserving soil moisture by applying and maintaining cover material such as animal waste or plant residue, to a soil surface to reduce soil movement. Material shall be evenly applied and maintained to a depth sufficient to reduce PM emissions and coverage should be a minimum of 70 percent.

Purpose

Applying manure to maintain or improve chemical and biological condition of the soil can help reduce wind erosion and PM. Applying manure or mulch to unpaved farm roads, parking areas and equipment storage yards helps protect the surface of the soil and reduces generation of PM.

Suggestions for Implementation

- If the application or storage of organic material, animal waste, or bio solids is near a water source, precautions should be taken to prevent accidental leakage, spillage or runoff that will result in undesirable effects on soil, water and plants.
- Caution should be used when applying organic material, animal waste, or bio solids to ensure that state and local regulations are not violated.
- Caution should be used when certain organic materials, animal waste, or bio solids are applied as they can volatilize and contribute to odor and ammonia emissions.



Reduce Vehicle Speed

Rule Definition

“Reduce Vehicle Speed” means reducing PM emissions and soil erosion from the operation of farm vehicles or farm equipment on non-cropland or commercial farm roads at speeds not to exceed 15 mph. This can be achieved through installation of engine speed governors, signage, or speed control devices.

Purpose

Reduced speeds can decrease the amount of PM generated by vehicles or equipment on unpaved farm roads.

Examples of methods to reduce vehicle speed include, but are not limited to:

- Posting speed limit signs.
- Informing all employees, contractors and sub-contractors of speed limits.
- Placing signs in all farm vehicles stating the speed limits on farm roads.
- Installing speed bumps.



Synthetic Particulate Suppressant

Rule Definition

“Synthetic Particulate Suppressant” means reducing PM emissions and wind erosion by providing a stabilized soil surface on non-cropland or commercial farm roads with a manufactured product such as lignosulfate, calcium chloride, magnesium chloride, an emulsion of a petroleum product, an enzyme product, or polyacrylamide that is used to control particulate matter.

Purpose



Synthetic particulate suppressants provide a surface barrier or bind soil particles together to retard PM on unprotected areas, such as unpaved roads, rights-of-way and abandoned fields.

Examples of synthetic particulate suppressant include, but are not limited to:

- Calcium chloride (CaCl)
- Soybean feedstock (SBF) processing byproducts
- Calcium lignosulfonate (lignin)
- Polyvinyl acrylic polymer emulsion (PVA)
- Polyacrymide (PAM)
- Emulsified petroleum resin

Differences in traffic type and volume, soil types, roadway surface characteristics and topography between sites requiring dust control can cause product performance to vary. Consult the NRCS office or a dust control contractor for specific recommendations. All products should be applied strictly in accordance with manufacturers’ specifications.

Track-out Control System

Rule Definition

“Track-out Control System” means minimizing any and all material that adheres to and agglomerates on all vehicles and equipment from non-cropland or commercial farm roads and or falls onto paved public roads or shoulders to paved public roads by using a device or system to remove mud or soil from a vehicle or equipment before the vehicle enters a paved public road. Devices such as a grizzly, a gravel pad or a wheel wash system can be used.

Purpose

Using a track-out control system helps remove mud and soil from the tires of farm equipment and vehicles before they enter a paved public road, where the mud or soil can be crushed into fine particles and easily suspended in the air by passing vehicles.



Suggestions for Implementation

Some examples of track-out control systems are:

- Grizzly - a device similar to a cattle guard, which is used to dislodge mud, dirt or debris from the tires and undercarriage of equipment and vehicles prior to leaving a farm.
- Gravel pad - a pad of crushed stone, coarse gravel or recycled road base located at the point of intersection of a paved public roadway and a farm entrance.

It is recommended that:

- a) The stone or gravel is one inch or larger in diameter.
 - b) The gravel pad is applied a minimum of four inches deep.
 - c) The gravel pad is the full width of the farm entrance.
 - d) The gravel pad is a minimum of 50 feet long.
- Pavement – an area of asphalt, concrete or similar material applied to a farm road at the intersection of a paved public roadway and a farm entrance.

It is recommended that:

- a) The pavement is the width of the farm road.
- b) The pavement is a minimum of 100 feet long from the point of intersection with a paved public roadway.

The farm entrance should be maintained in a condition that will prevent tracking of mud and soil onto paved public roads. The farmer should conduct periodic inspections, maintenance, re-application of gravel and cleaning of paved access road surfaces to accomplish track-out control.

Watering

Rule Definition

“Watering” means reducing PM emissions and wind erosion by applying water to non-cropland or commercial farm road bare soil surfaces during period of high traffic until the surfaces are visibly moist.



Purpose

Applying water from a truck, tractor or other portable spray system to bare soil surfaces, such as unpaved roadways and equipment yards where high traffic areas exist, can help reduce PM. Watering the soil surface tends to compact the soil so that it is not dispersed into the air.

Suggestions for Implementation

Watering is effective during peak usage times, such as silage harvest time.

- Apply water so that the surface is visibly moist.

Wind Barrier

Rule Definition

“Wind Barrier” means reducing PM emissions and wind erosion by constructing a fence or structure, or providing a woody vegetative barrier by planting a row of trees or shrubs perpendicular or across the prevailing wind direction to reduce wind speed by changing the pattern of air flow over the land surface. For fences and structures, the wind barrier shall have a density of no less than 50 percent and height of the wind barrier must be proportionate to the downwind protected area. The downwind protected area is considered ten times the height of the wind barrier. For vegetative barriers, compliance shall be determined by NRCS Conservation Practice Standard, Code 380, Windbreak/Shelterbelt Establishment, amended through August 21, 2009 (and no future editions).

Purpose

Barriers placed perpendicular to the wind direction can reduce wind speeds by changing the pattern of airflow over the land surface, which helps reduce wind erosion and PM.

Suggestions for Implementation

- Plant a row of trees or shrubs. Recommended species for planting can be obtained at all NRCS offices.
- Continuous board fences, burlap fences, crate walls, bales of hay and similar material can be used to control air currents and blowing soil.
- The distance of 10 times the barrier height is considered the protected area downwind of the barrier.
- Barriers should be aligned across the prevailing wind direction. While 90 degrees or perpendicular is preferred, benefits can still be realized when barriers are aligned as close to perpendicular as possible.



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CATEGORY III: Cropland

Land on a commercial farm that:

- *Is within the timeframe of final harvest to plant emergence, but does not include tillage activities.*
- *Has been tilled in a prior year and is suitable for crop production, but is currently fallow, or*
- *Is a turn-row.*

Best management practices for use on cropland

Chips/Mulches

Cover Crop

Cross-Wind Ridges

Multi-Year Crop

Permanent Cover

Residue Management

Sequential Cropping

Stabilization of Soil Prior to Plant Emergence

Surface Roughening

Wind Barrier

Chips/Mulches

Rule Definition

“Chips/Mulches” means reducing PM emissions and soil movement and preserving soil moisture by applying and maintaining nontoxic chemical or organic dust suppressants to a depth sufficient to reduce PM emissions. Materials shall meet all specifications required by federal, state, or local water agencies, and is not prohibited for use by any applicable regulations.

Purpose

Applying organic material to maintain or improve chemical and biological condition of the soil can help reduce wind erosion and PM.

Suggestions for Implementation

- If the application or storage of the organic material is near a water source, precautions should be taken to prevent accidental leakage, spillage or runoff that will result in undesirable effects on soil, water and plants.
- Caution should be used when applying organic material to ensure that state and local regulations are not violated.
- Caution should be used when certain organic materials are applied as they can volatilize and contribute to odor and ammonia emissions.



Cover Crop

Rule Definition

“Cover Crop” means establishing cover crops that maintain a minimum of 60 percent ground cover. Native or volunteer vegetation that meets the minimum ground cover requirement is acceptable. Compliance shall be determined by the Line Transect Test Method, NRCS National Agronomy Manual, Subpart 503.51, Estimating Crop Residue Cover, amended through February 2011 (and no further editions).

Purpose

Cover crops help control soil movement and protect the soil surface between crops. Cover crop reduces wind erosion by shielding the soil with vegetation and anchoring the soil with roots.

Suggestions for Implementation

It is recommended that:

- Cover crops consist of any vegetative cover that maintains more than 60 percent ground cover.
- Short-term cover be grown between major crops. Plants are then tilled into the soil prior to or during major crop planting.
- Longer-term cover may be maintained by periodic mowing to maintain at least 60 percent cover.
- Specific information on cover crops can be obtained from the Cooperative Extension Service or the NRCS office.



Cross-Wind Ridges

Rule Definition

“Cross-Wind Ridges” means stabilizing soil and reducing PM emissions and wind erosion by creating soil ridges in a commercial farm by tillage or planting operations. Ridges should be at least four inches in height, and be aligned as perpendicular as possible to the prevailing wind direction.

Purpose

Ridges formed by tillage operations create protective windbreaks that disrupt the erosive forces of high winds.

Suggestions for Implementation

It is recommended that:

- Ridges formed by tillage or planting should be aligned across the prevailing wind direction.
 - While 90 degrees or perpendicular is preferred, benefits can still be realized with ridges as close to perpendicular as possible.
 - If ridges deteriorate and become ineffective due to weathering or erosion, they should be reestablished, unless doing so would damage a growing crop.
 - This practice is best adapted on soils that are stable enough to sustain effective ridges, such as clayey, silty and sandy loam soils. It is not well adapted on unstable soils, such as sands, loamy sands and certain organic soils



Multi-Year Crop

Rule Definition

“Multi-Year Crop” means reducing PM emissions from wind erosion and a minimum of one tillage and ground operation across a commercial farm, by protecting the soil surface by growing a crop, pasture, or orchard that is grown, or will be grown, on a continuous basis for more than one year.

Purpose

Surface covers such as crops, pastures and orchards that are grown and maintained for a long duration, protect the soil surface from erosive winds. The longer a crop or cover is protecting the soil surface, the less time the surface is susceptible to wind erosion.

Examples of Multi-Year Crops are:

- Alfalfa
- Citrus
- Roses
- Livestock pastures
- Nuts (Pecans)
- Sod



Permanent Cover

Rule Definition

“Permanent Cover” means reducing PM emissions and wind erosion by maintaining a long-term perennial vegetative cover on cropland that is temporarily not producing a major crop. Perennial species such as grasses and/or legumes shall be used to establish at least 60 percent cover. Compliance shall be determined by the Line Transect Test Method, NRCS National Agronomy Manual, Subpart 503.51, Estimation Crop Residue Cover, amended through February 2011 (and no future editions).

Purpose

Maintaining a long-term (perennial) vegetative cover on cropland that is temporarily not producing a major crop protects the soil surface from erosive winds.



Suggestions for Implementation

It is recommended that:

- Perennial species of grasses and/or legumes be used to establish at least 60 percent cover.
- When perennial species are used, maintenance by periodic mowing or swathing/baling is encouraged.

Specific information on permanent cover types can be obtained from the Cooperative Extension Service or all NRCS offices.

Residue Management

Rule Definition

“Residue Management” means reducing PM emissions and wind erosion by maintaining a minimum of 60 percent ground cover of crop and other plant residues on a soil surface between the time of harvest of one crop and the commencement of tillage for a new crop. Compliance shall be determined by the Line Transect Test Method, NRCS National Agronomy Manual, Subpart 503.51, Estimation Crop Residue Cover, amended through February 2011 (and no future editions).

Purpose

Leaving crop and other plant residues on the soil surface can protect the soil between the time of harvest of one crop and emergence of a new crop, thus helping reduce wind erosion and the generation of PM.

Suggestions for Implementation



Many different residue management systems have been developed. Some examples include:

- Reduced tillage systems, such as mulch-till, which partially incorporate surface residues and involve no plowing.
- No-till, this involves planting directly into the soil without any alteration to the seedbed. One example is planting a new crop directly into the grain stubble.
- Soil protection by crop residues can be increased by leaving residues on the soil surface as long as

possible (e.g. by delaying tillage operations until just before planting).

It is recommended that:

- Stubble be left standing at six inches or more.
- Tillage be limited during this period to undercutting tools, such as blades, sweeps or deep tillage implements, such as a ripper or subsoiler.
- Loose residue be uniformly distributed on the soil surface.
- Residues from previous crops be left to maintain 60 percent ground cover.
- Specific information on determining small grain residue equivalents can be obtained from the Cooperative Extension Service or all NRCS offices. Consult NRCS Standard and Specification for Residue Management, # 329 and 344. This document is available at all NRCS offices.

Sequential Cropping

Rule Definition

“Sequential Cropping” means reducing PM emissions and wind erosion by growing crops in a sequence or close rotation that limits the amount of time bare soil is exposed on a commercial farm to 30 days or less.

Purpose

By reducing the amount of time bare soil is exposed, sequential cropping helps reduce the window of time that the cropland is susceptible to PM erosion.

Some examples of sequential cropping include:

- Planting a winter grain crop between final harvest of a cotton crop and the planting of the next cotton crop.
- Close rotations of vegetable crops.

Suggestions for Implementation

It is recommended that:

- The amount of time bare soil is exposed be limited to 30 days or less.
- Rotations be provided for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons.

Stabilization of Soil Prior to Plant Emergence

Rule Definition

“Planting Based on Soil Moisture” means reducing PM emissions by applying water to soil prior to crop emergence in order to cause the soil to form a visible crust.

Purpose

Applying water prior to planting reduces PM emission that may result from the time of planting operations until crop emergence and establishment. Stabilizing the soil by applying water is one of the most efficient practices to reduce PM between planting and crop emergence. Moisture causes soil to crust and therefore PM is not easily transported into the air.



Suggestions for Implementation

- Care should be taken to avoid over compaction of the soil, which could result in additional tillage operations.
- Irrigation should be applied as soon after soil preparation for planting as possible. After watering, a thin crust develops on the soil surface, which stabilizes the soil until planting
- The time between bed lifting, irrigation and planting should be minimized as much as possible.
- Use the soil moisture “feel method” to determine adequate soil moisture. See the Natural Resource Conservation Service publication #1619 “Estimating Soil Moisture by Feel and Appearance.” This publication is available at all NRCS offices.

Surface Roughening

Rule Definition

“Surface Roughening” means reducing PM emissions or wind erosion by manipulating a soil surface by means such as rough discing or tillage in order to produce or maintain clods on the land surface. Compliance shall be determined by NRCS Practice Code 609, Surface Roughening, amended through November 2008 (and no future editions).

Purpose

The formation of clods helps disrupt the erosive force of the wind over an unprotected soil surface. Soil clods can be formed by tillage implements under appropriate soil moisture conditions.

Suggestions for Implementation

- Not all soils are able to form clods. Review the local soil survey or contact the NRCS office to help determine a specific field’s soil type.



- Caution should be used to determine the most opportune time to roughen the soil surface while considering the tillage needed prior to planting, crop to be grown, and irrigation water management needs (surface roughening can dry the upper soil profile more rapidly than not disturbing the soil).

Wind Barrier

Rule Definition

“Wind Barrier” means reducing PM emissions and wind erosion by constructing a fence or structure, or providing a woody vegetative barrier by planting a row of trees or shrubs perpendicular or across the prevailing wind direction to reduce wind speed by changing the pattern of air flow over the land surface. For fences and structures, the wind barrier shall have a density of no less than 50 percent and height of the wind barrier must be proportionate to the downwind protected area. The downwind protected area is considered ten times the height of the wind barrier. For vegetative barriers, compliance shall be determined by NRCS Conservation Practice Standard, Code 380, Windbreak/Shelterbelt Establishment, amended through August 21, 2009 (and no future editions).

Purpose

Barriers placed perpendicular to the wind direction can reduce wind speeds by changing the pattern of airflow over the land surface, which helps reduce wind erosion and PM.

Suggestions for Implementation

- Plant a row of trees or shrubs. Recommended species for planting can be obtained at all NRCS offices.
- Continuous board fences, burlap fences, crate walls, bales of hay and similar material can be used to control air currents and blowing soil.
- The distance of 10 times the barrier height is considered the protected area downwind of the barrier.
- Barriers should be aligned across the prevailing wind direction. While 90 degrees or perpendicular is preferred, benefits can still be realized when barriers are aligned as close to perpendicular as possible.



CATEGORY IV: Significant Agricultural Earth Moving Activities

Significant Agricultural Earth Moving Activities are defined as one or both of the following:

- ***Significant Agricultural Land Leveling: leveling activities conducted on a commercial farm that disturb the soil more than 4 inches below the surface.***
- ***Creation, maintenance and relocation of: ditches, canals, ponds, irrigation lines, tail water recovery system (agricultural sumps) and other water conveyances, not to include activities performed on cropland for tillage, ground operations, or harvest.***

**** While this BMP is not considered a required BMP, it is required when a commercial farmer is moving a significant amount of ground to avoid the creation of large plumes of dust.***

Best management practices for Significant Agricultural Earth Moving Activities:

Apply water or time activities to coincide with precipitation.

Apply water during activities.

Limit activities during a high risk dust generation day.

Conduct activities to minimize the number of ground operations.

Apply water or time significant agricultural earth moving activities to coincide with precipitation.

Rule Definition

Apply water **prior** to conducting significant agricultural earth moving activities and/or time significant agricultural earth moving activities to coincide with precipitation. Soil must have a minimum soil moisture content of 50 percent of field capacity. Compliance shall be determined by NRCS Estimation soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions).

Purpose

Significant agricultural earth moving activities can generate PM emissions by disturbing large amounts of soil. Applying water from a truck, tractor or other portable spray system to bare soil surfaces where significant agricultural earth moving activities will occur can help reduce PM. Watering the soil surface tends to compact the soil so that it is not dispersed into the air.

Suggestions for Implementation

- Apply water prior to scheduled activities so the soil remains moist when activities begin.
- Time activities when precipitation is likely or forecasted to occur so the soil is moist when activities begin.

Apply water during significant agricultural earth moving activities.

Rule Definition

Apply water **during** significant agricultural earth moving activities. Soil must have a minimum soil moisture content of 30 percent of field capacity. Compliance shall be determined by NRCS Estimating Soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions).

Purpose

Significant agricultural earth moving activities can generate PM emissions by disturbing large amounts of soil. Applying water from a truck, tractor or other portable spray system to bare soil surfaces during significant agricultural earth moving activities can help reduce PM emissions. Watering the soil surface tends to compact the soil so that it is not dispersed into the air.

Suggestions for Implementation

Apply water prior so the soil surface is visibly moist during significant agricultural earth moving activities.

Limit significant agricultural earth moving activities during a high risk dust generation day.

Rule Definition

Limit significant agricultural earth moving activities on a day identified by the Maricopa County Dust Control Forecast to be high risk for dust generation

Purpose

Significant agricultural earth moving activities can generate PM emission by disturbing large amounts of soil. Limiting earth moving activities during high-wind events will reduce air contact with disturbed soil and the generation of PM emissions.

Suggestions for Implementation

An individual farm policy should be developed to limit significant agricultural earth moving activities during high-wind events or on a day forecasted as high risk for generating dust.

Employees should receive training in implementing the farm policy.

Conduct significant agricultural earth moving activities to minimize the number of ground operations.

Rule Definition

Conduct significant agricultural earth moving activities in a manner to reduce a minimum of one ground operation across a commercial farm by using equipment that is the most efficient means of moving the soil.

Purpose

Significant agricultural earth moving activities can generate PM emission by disturbing large amounts of soil. Limiting earth moving activities during high-wind events will reduce air contact with disturbed soil and the generation of PM emissions.

Suggestions for Implementation

When practicable, use equipment that is the most efficient for moving soil in order to reduce the number of equipment passes over the soil.

20 *Agricultural Best Management Practices General Permit Record*
Crop Operations - Maricopa County PM10 Non-attainment Area

Name of Commercial Farm: _____ Phone: _____
 Name of Commercial Farmer: _____ Email: _____
 Mailing or Physical Address of Commercial Farm: _____
 City: _____ State: _____ Zip: _____

Complete Form annually by March 31st and retain on farm. Provide Form within two business days of notice to the Arizona Department of Environmental Quality only when requested.

Select Best Management Practices (BMP) as indicated by Category. Refer to the *Guide to Agricultural PM10 Best Management Practices* for BMP information and definitions.

CATEGORY I: Tillage, Harvest or Ground Operation

- Select at least two of the following:*
- Chemical Irrigation
 - Combining Tractor Operations
 - Equipment Modification
 - Green Chop
 - Integrated Pest Management
 - Limited Harvest Activity
 - Limited Tillage Activity
 - Multi-year Crop
 - Cessation of Night Tillage
 - Planting Based on Soil Moisture
 - Precision Farming
 - Reduced Harvest Activity
 - Reduced Tillage Activity
 - Tillage Based on Soil Moisture
 - Timing of Tillage Operation
 - Transgenic Crops
 - Transplanting
 - Shuttle System/Larger Carrier
 - Conservation Tillage

CATEGORY II: Non-cropland and Commercial Farm Roads

- Select at least two of the following:*
- Access Restriction
 - Aggregate Cover
 - Wind Barrier
 - Critical Area Planting
 - Organic Material Cover
 - Reduce Vehicle Speed
 - Synthetic Particulate Suppressant
 - Track-out Control System
 - Watering

CATEGORY III: Cropland

- Select at least two of the following:*
- Wind Barrier
 - Cover Crop
 - Cross-wind Ridges
 - Chops/mulches
 - Multi-year Crop
 - Permanent Cover
 - Stabilization of Soil Prior to Plant Emergence
 - Residue Management
 - Sequential Cropping
 - Surface Roughening

CATEGORY VI: Significant Agricultural Earth Moving Activities

- (Required only when moving a significant amount of ground. See *Guide to Agricultural PM10 Best Management Practices* for more information.)
- Select at least two of the following:*
- Apply Water Prior to Significant Agricultural Earth Moving Activities and/or Time to Coincide with Precipitation
 - Apply Water During Significant Agricultural Earth Moving Activities
 - Limit Significant Agricultural Earth Moving Activities on a Day Identified by Pinal County Dust Control Forecast to be high risk for dust generation
 - Conduct Significant Earth Moving Activities in a Manner to Reduce a Minimum of One Ground Operation by Using Equipment that is the Most Efficient Means of Moving the Soil

Signature: _____ Date: _____

20 __ Agricultural Best Management Practices General Permit Record
Crop Operations - Moderate PM10 Non-attainment Area

Name of Commercial Farm: _____ Phone: _____
 Name of Commercial Farmer: _____ Email: _____
 Mailing or Physical Address of Commercial Farm: _____
 City: _____ State: _____ Zip: _____

Complete Form annually by March 31st and retain on farm. Provide Form within two business days of notice to the Arizona Department of Environmental Quality only when requested.

Select Best Management Practices (BMP) as indicated by Category. Refer to the *Guide to Agricultural PM10 Best Management Practices* for BMP information and definitions.

CATEGORY I: Tillage, Harvest or Ground Operation

Select at least one of the following:

- Chemical Irrigation
- Combining Tractor Operations
- Equipment Modification
- Green Chop
- Integrated Pest Management
- Limited Harvest Activity
- Limited Tillage Activity
- Multi-year Crop
- Cessation of Night Tillage
- Planting Based on Soil Moisture
- Precision Farming
- Reduced Harvest Activity
- Reduced Tillage Activity
- Tillage Based on Soil Moisture
- Timing of Tillage Operation
- Transgenic Crops
- Transplanting
- Shuttle System/Larger Carrier
- Conservation Tillage

CATEGORY II: Non-cropland and Commercial Farm Roads

Select at least one of the following:

- Access Restriction
- Aggregate Cover
- Wind Barrier
- Critical Area Planting
- Organic Material Cover
- Reduce Vehicle Speed
- Synthetic Particulate Suppressant
- Track-out Control System
- Watering

CATEGORY III: Cropland

Select at least one of the following:

- Wind Barrier
- Cover Crop
- Cross-wind Ridges
- Chops/mulches
- Multi-year Crop
- Permanent Cover
- Stabilization of Soil Prior to Plant Emergence
- Residue Management
- Sequential Cropping
- Surface Roughening

CATEGORY VI: Significant Agricultural Earth Moving Activities

(Required only when moving a significant amount of ground. See *Guide to Agricultural PM10 Best Management Practices* for more information.)

- Select at least one of the following:
- Apply Water Prior to Significant Agricultural Earth Moving Activities and/or Time to Coincide with Precipitation
 - Apply Water During Significant Agricultural Earth Moving Activities
 - Limit Significant Agricultural Earth Moving Activities on a Day Identified by Pinal County Dust Control Forecast to be high risk for dust generation
 - Conduct Significant Earth Moving Activities in a Manner to Reduce a Minimum of One Ground Operation by Using Equipment that is the Most Efficient Means of Moving the Soil

Signature: _____ Date: _____

Where can I learn more?

If you do not know whether your agricultural operation resides within the PM Regulated Area, or if you have questions regarding compliance or specific components of the agricultural PM10 general permit, contact:

Arizona Department of Agriculture

Agricultural Consultation & Training

1688 W. Adams St.

Phoenix, AZ 85007

602-542-3484

800-294-0308

www.agriculture.az.gov

Arizona Department of Environmental Quality

Air Quality Division

1110 W. Washington St.

Phoenix, AZ 85007

602-771-2300

800-234-5677

www.azdeq.gov/environ/air/index.html

Arizona Farm Bureau

325 S. Higley Rd.

Suite 210

Gilbert, AZ 85296

480-635-3600

Buckeye Valley NRCD

104 W. Baseline Rd.

Buckeye, AZ 85326

602-386-4631

Arizona Cotton Growers Association

4139 E. Broadway Rd.

Phoenix, AZ 85040

602-437-1344

rickclavis@gmail.com

East Maricopa NRCD/NRCS Field Office

805 E. Warner Rd.

Suite 104

Chandler, AZ 86225

480-988-1078

Arizona Nursery Association

1430 W. Broadway Rd.

Suite #110

Tempe, AZ 85282

480-966-1610

www.azna.org

NRCS/FSA Avondale Field Office

Maricopa County Farm Service Agency

12409 W. Indian School Rd.

Building B Suite 201

Avondale, AZ 85323

623-535-5055

Agua-Fria/New River NRCD

16251 W. Glendale Ave.

Litchfield Park, AZ 85340

602-771-4162

Maricopa County Cooperative Extension

4341 E. Broadway Rd.

Phoenix, AZ 85040

602-470-8086

www.cals.arizona.edu/maricopa/

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Governor's Agricultural BMP Committee:

Dan Thelander (Committee Chair), Grain Producer, Chandler, Arizona

Wade Accomazzo, Alfalfa Producer, Tolleson, Arizona

Shane Burgess, Vice Provost and Dean, College of Agriculture and Life Sciences, University of Arizona, Tucson, Arizona

(Designee Jeff Silvertooth, Associate Dean, College of Agriculture and Life Sciences, University of Arizona)

Don Butler, Director, Arizona Department of Agriculture, Phoenix, Arizona

(Designee Brett Cameron, Assistant Director, Agricultural Consultation and Training, Arizona Department of Agriculture, Phoenix, Arizona)

Glen Curtis, Citrus Producer, Yuma, Arizona

Henry Darwin, Director, Arizona Department of Environmental Quality, Phoenix, Arizona

(Designee Eric Massey, Director, Air Quality Division, Arizona Department of Environmental Quality, Phoenix, Arizona)

Glenn Hickman, Poultry Operations, Buckeye, Arizona

Earl Petznick Jr., Beef Cattle Feedlot Operations, Maricopa, Arizona

Kevin G. Rogers, Cotton Producer, Mesa, Arizona

Will Rousseau, Vegetable Producer, Litchfield Park, Arizona

Marguerite Tan, Swine Operations, Snowflake, Arizona

Keisha Tatem, State Conservationist, Natural Resource Conservation Service, Phoenix, Arizona

Tom Thompson, Dairy Operations, Buckeye, Arizona

James L. Walworth, Soil Scientist, College of Agriculture and Life Sciences, University of Arizona, Tucson, Arizona

(Nominee) Michael Sundblom, Director, Pinal County Air Quality Control District, Florence, Arizona

Ag BMP Technical Work Group:

Kevin G. Rogers (Co-Chair), Cotton Producer, Mesa, Arizona

Dan Thelander (Co-Chair), Grain Producer, Chandler, Arizona

Bas Aja, Arizona Cattlemen's Association, Phoenix, Arizona

Mike Billote, United Dairymen of Arizona, Tempe, Arizona

Brett Cameron, Arizona Department of Agriculture, Phoenix, Arizona

Jeannette Fish, Maricopa County Farm Bureau, Phoenix, Arizona

Cheryl Goar, Arizona Nursery Association, Phoenix, Arizona

Ana Kennedy, Arizona Farm Bureau Federation, Gilbert, Arizona

Rick Lavis, Arizona Cotton Growers Association, Phoenix, Arizona

Paco Ollerton, Cotton Producer, Casa Grande, Arizona

Earl Petznick Jr., Beef Cattle Feedlot Operations, Maricopa, Arizona

Jeff Sandquist, Veridus LLC, Phoenix, Arizona, United Dairymen of Arizona, Tempe, Arizona

Robert L. Shuler, Western Grower's Association, Phoenix, Arizona

Joe Sigg, Arizona Farm Bureau Federation, Gilbert, Arizona

Nick Simonetta, Pivotal Policy Consulting, Phoenix, Arizona

Chris Udall, Arizona Agribusiness and Water Council, Mesa, Arizona

Russell Van Leuven, Arizona Department of Agriculture, Phoenix, Arizona

Greg Wuertz, Cotton Producer, Casa Grande, Arizona

ADEQ Staff assigned to Governor's Ag BMP Committee:

Danielle M. Hazeltine, Rules Specialists, Air Quality Division, Arizona Department of Environmental Quality, Phoenix, Arizona

Lisa Tomczak, Environmental Program Specialist, Air Quality Division, Arizona Department of Environmental Quality, Phoenix, Arizona

Emily Bonanni, Arizona Department of Environmental Quality, Phoenix, Arizona

**First Edition 2001
Second Edition 2008
Third Edition 2015**

Stakeholders and Collaborating Partners

Arizona Agribusiness and Water Council
Arizona Cotton Growers Association
Arizona Department of Agriculture
Arizona Department of Environmental Quality
Arizona Farm Bureau Federation
Arizona Nursery Association
Maricopa Association of Governments
Maricopa County Air Quality Department
Maricopa County Farm Bureau
Natural Resource Conservation Districts
USDA Agricultural Research Service
USDA Natural Resources Conservation Service
US Environmental Protection Agency Region IX
University of Arizona - College of Agriculture and Life Sciences
University of Arizona - Cooperative Extension, Maricopa County
Western Growers Association