

Guide to Agricultural PM10 Best Management Practices

“Agriculture Improving Air Quality”

Crop Operations – Pinal County



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

First Edition, 2015

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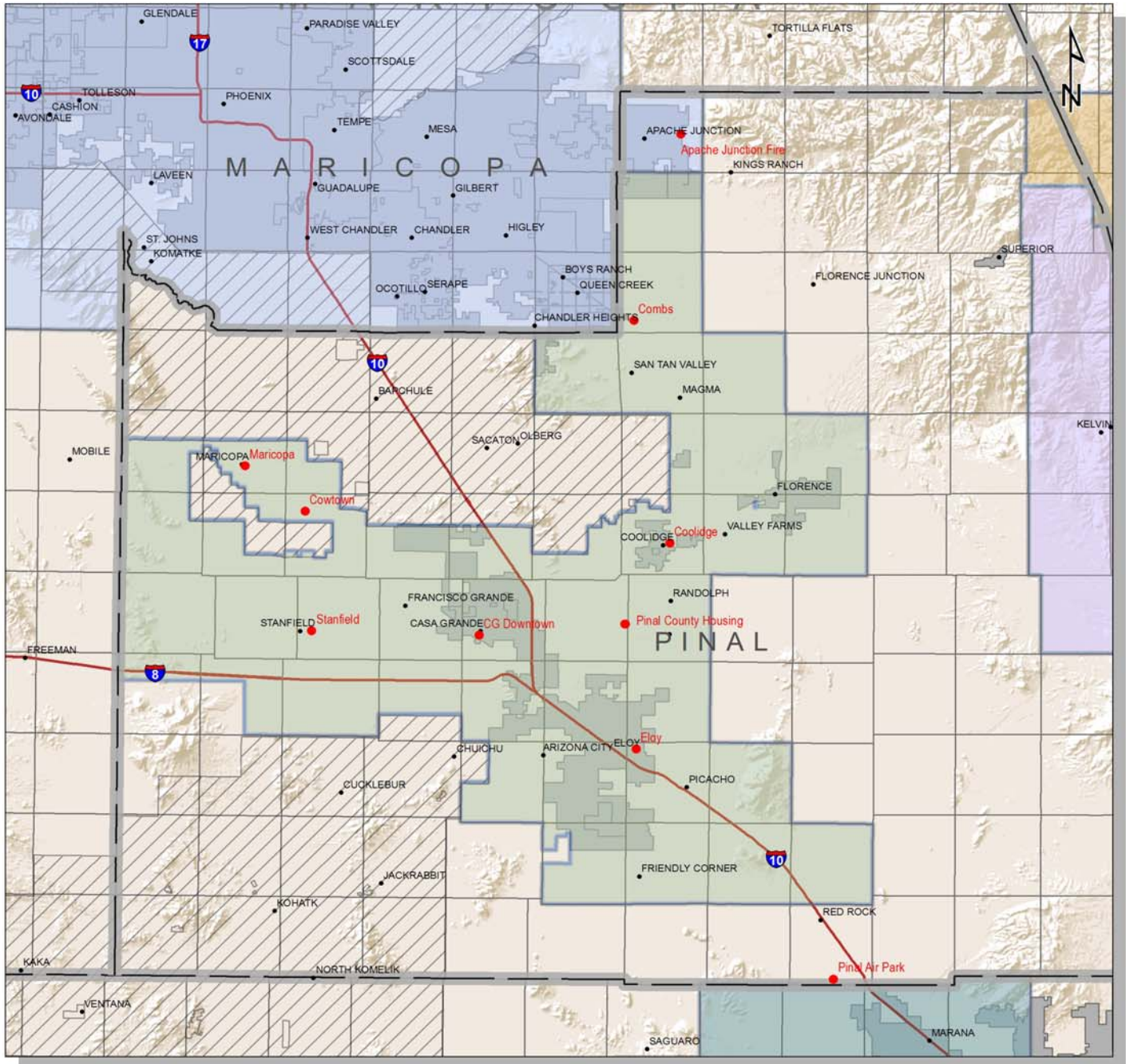
Why an Agricultural BMP Program in Pinal County?

According to EPA, Pinal County's PM10 levels "are among the worst in the country", based on 2009 – 2011 certified air quality data¹. Ambient levels of PM10 measured at air quality monitoring stations within Pinal County show widespread, frequent, and in some instances, serve, violations of the PM 10 standard of 150 micrograms $\mu\text{g}/\text{m}^3$, dating back to 2002. Effective July 2, 2012, the U.S. Environmental Protection Agency re-designated a portion of western Pinal County from "unclassifiable" to "nonattainment" area for the 1987 24-hour PM10 National Ambient Air Quality Standards. As per Arizona Administrative Code R18-2-610.03, Pinal County growers will be required to develop a plan to help attain the air quality standard for PM10. The September 17, 2013 emission inventory for Pinal County indicated that significant emission reductions would be needed from agricultural activities to attain the PM10 Standard.

1. U.S. EPA Fact Sheet (May 22, 2012)

West Pinal County

PM 10 Nonattainment Area-Ambient Monitoring Network



PM10 Nonattainment Area

- Pinal County (part) West Pinal Planning Area
- Phoenix Planning Area
- Miami Planning Area
- Hayden Planning Area
- Rillito Planning Area
- Indian Lands
- Township/Range
- PM10 Monitor

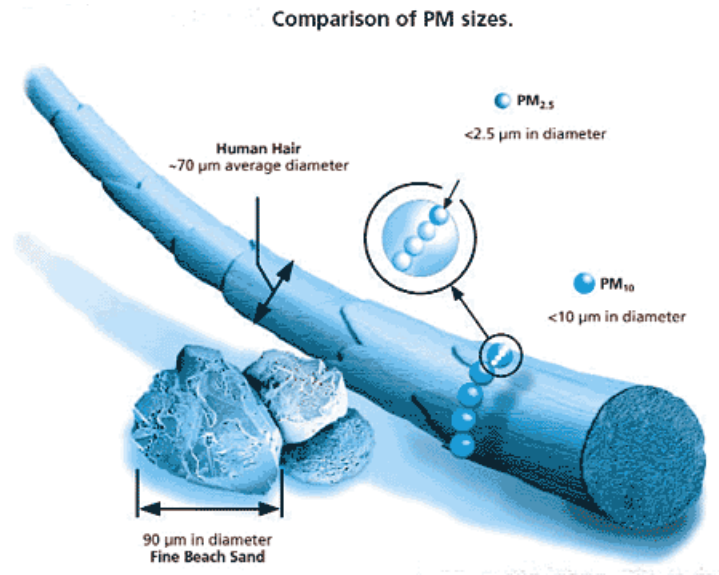


October 18, 2013 Author - N Caroli

What is PM10?

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 Pinal County 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.

What is an Agricultural Best Management Practice?

To comply with the requirement to reduce PM10 emissions, Arizona agriculture determined that the utilization of Best Management Practices would meet the need to reduce PM10.

Best Management Practices in Arizona is defined, by law in A.R.S. 49-457(P)(3), as “techniques verified by scientific research that on a case by case basis, are practical, economically feasible and effective in reducing PM10 particulate emission from a regulated agricultural activity.”

As a result of discussions between the EPA, the Arizona Department of Environmental Quality, the Arizona Department of Agriculture, the Arizona State Legislature in 1999 enacted legislation with the full support of the Arizona agriculture community to create and implement a Best Management Practice Program in the Maricopa County Non-attainment area. The Agricultural Best Management Practice Program allows growers a wide range of choices to reduce PM emissions within an established PM Regulated Area.

This guide summarizes the BMPs approved by the Governor's Agricultural Best Management Practices Committee to reduce PM10 in Pinal County. 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 PM10 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 PM10. 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 PM10 emissions from farmlands located within the PM10 Nonattainment Area (reference map insert).

Dust Control Measures

Unlike Maricopa County, Pinal County producers will be required to select a special dust control measure when the Pinal County Dust Control Program identifies those days which have the highest risk for dust generation (very windy or stagnant). Forecast take into consideration wind speed and direction, stagnation, recent and potential precipitation and existing concentrations of air pollution at the time of the forecast. Producers should sign up to receive a *Pinal County Dust Control Forecast* from either the Arizona Department of Environmental Quality or the Arizona Department of Agriculture. Such risks normally last a day and on average occur 23 days a year.

How Will the Pinal County Agricultural BMP Program Work?

Who must comply with the Agricultural PM General Permit?

Any farmer who farms more than 10 contiguous acres of land located within the Pinal County PM Nonattainment Area designated after June 1, 2009 must comply with the Agricultural PM General Permit.

What does the farmer have to do?

- For agricultural operations located in the Pinal County Nonattainment Area, farmers must implement and maintain on a daily basis at least **ONE** approved BMP (described later in this document) from Tillage, Ground Operations and Harvest, Non-cropland, Commercial Farm Roads and **TWO** BMPs from Cropland.
- On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast, a commercial farmer shall ensure implementation of **ONE** approved Dust Control Measure from the above categories. The Dust Control Measures have conditions in each category.
- 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.
- Beginning in Calendar year 2017 and no more than every subsequent three calendar years, the commercial farmer shall complete and submit a 3-year Expanded Survey to the Arizona Department of Agriculture detailing acreage and crop type during the report year, total miles of commercial farm roads, total acreage of non-cropland, and the BMPs selected in each of the categories including the BMPs selected for high risk days. The first survey is due January 31, 2018 and every three years thereafter.
- 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?

New legislation 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.

Best Management Practices by Category

Best Management Practices	Dust Control Measures
<p>I. Tillage</p> <ul style="list-style-type: none"> Cessation of Night Tillage Combining Tractor Operations Conservation Tillage Equipment Modification Multi-Year Crop Planting Based on Soil Moisture Precision Farming Reduced Tillage System Tillage Based on Soil Moisture Timing of a Tillage Operation Transgenic Crops Transplanting 	<ul style="list-style-type: none"> Conservation Tillage Limited Tillage Activity Multi-Year Crop Planting Based on Soil Moisture Reduced Tillage System Tillage Based on Soil Moisture
<p>II. Ground Operations and Harvest</p> <ul style="list-style-type: none"> Chemical Irrigation Combining Tractor Operations Equipment Modifications Green Chop Integrated Pest Management Multi-Year Crop Precision Farming Reduced Harvest Activity Shuttle System/Large Carrier Transgenic Crops 	<ul style="list-style-type: none"> Green Chop Integrated Pest Management Multi-Year Crop Limited Harvest Activity
<p>III. Non-Cropland</p> <ul style="list-style-type: none"> Access Restriction Aggregate Cover Critical Area Planting Organic Material Cover Reduced Vehicle Speed Synthetic Particulate Suppressant Watering Wind Barrier 	<ul style="list-style-type: none"> Aggregate Cover Critical Area Planting Organic Material Cover Synthetic Particulate Suppressant Watering on a High Risk Day Wind Barrier

Best Management Practices	Dust Control Measures
<p data-bbox="245 422 667 449">IV. Commercial Farm Roads</p> <ul style="list-style-type: none"> <li data-bbox="310 459 553 487">Access Restriction <li data-bbox="310 495 529 522">Aggregate Cover <li data-bbox="310 531 618 558">Organic Material Cover <li data-bbox="310 567 618 594">Reduced Vehicle Speed <li data-bbox="310 602 740 630">Synthetic Particulate Suppressant <li data-bbox="310 638 646 665">Track-out Control System <li data-bbox="310 674 431 701">Watering <p data-bbox="245 789 443 816">V. Cropland</p> <p data-bbox="310 825 443 852">Section A</p> <ul style="list-style-type: none"> <li data-bbox="310 861 508 888">Chips/Mulches <li data-bbox="310 896 467 924">Cover Crop <li data-bbox="310 932 565 959">Cross-Wind Ridges <li data-bbox="310 968 594 995">Residue Management <li data-bbox="310 1003 578 1031">Sequential Cropping <li data-bbox="310 1039 574 1066">Surface Roughening <li data-bbox="310 1075 483 1102">Wind Barrier <p data-bbox="310 1110 443 1138">Section B</p> <ul style="list-style-type: none"> <li data-bbox="310 1146 529 1173">Multi-Year Crop <li data-bbox="310 1182 537 1209">Permanent Cover <li data-bbox="310 1218 748 1245">Stabilization of Soil Prior to Plant <li data-bbox="342 1253 493 1281">Emergence 	<ul style="list-style-type: none"> <li data-bbox="872 459 1097 487">Aggregate Cover <li data-bbox="872 495 1182 522">Organic Material Cover <li data-bbox="872 531 1333 600">Roads are Stabilized as Determined by the Silt Content Test Method <li data-bbox="872 602 1305 630">Synthetic Particulate Suppressant <li data-bbox="872 638 1255 665">Watering on a High Risk Day <li data-bbox="872 674 1045 701">Wind Barrier <ul style="list-style-type: none"> <li data-bbox="872 825 1068 852">Chips/Mulches <li data-bbox="872 861 1024 888">Cover Crop <li data-bbox="872 896 1128 924">Cross-Wind Ridges <li data-bbox="872 932 1078 959">Multi-Year Crop <li data-bbox="872 968 1097 995">Permanent Cover <li data-bbox="872 1003 1154 1031">Residue Management <li data-bbox="872 1039 1312 1108">Stabilization of Soil Prior to Plant Emergence <li data-bbox="872 1110 1138 1138">Surface Roughening <li data-bbox="872 1146 1045 1173">Wind Barrier

CATEGORY I: Tillage

Any mechanical practice that physically disturbs the soil, and includes preparation for planting, such as plowing, ripping, or discing.

A commercial farmer shall implement at least ONE of the following on a daily basis:

Cessation of Night Tilling
Combining Tractor Operations
Conservation Tillage *
Equipment Modification
Multi-year Crop
Planting Based on Soil Moisture
Precision Farming
Reduced Tillage System *
Tillage Based on Soil Moisture
Timing of a Tillage Operation
Transgenic Crop
Transplanting

**** If a commercial farmer implements the Conservation Tillage or Reduced Tillage System best management practice for the Tillage Category as a Super BMP, they DO NOT have to implement a best management practice from both Ground Operations and Harvest; and Cropland Categories.***

Cessation of Night Tilling

Rule Definition

Means the discontinuation of tillage from sunset to sunrise on a day identified by the Maricopa or Pinal 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.

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.

If a commercial farmer implements the Conservation Tillage or Reduced Tillage System best management practice for the Tillage Category, they DO NOT have to implement a best management practice from both Ground Operations and Harvest; and Cropland Categories

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.



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
- Pass markers
- Variable rate application technology
- Install overlap reduction technology

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

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

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



If a commercial farmer implements the Conservation Tillage or Reduced Tillage system best management practice for the Tillage Category, they DO NOT have to implement a best management practice from both Ground Operations and Harvest; and Cropland Categories.

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

SUPER TILLAGE BMP

*If a commercial farmer implements the Conservation Tillage or Reduced Tillage System best management practice for the Tillage Category, they **DO NOT** have to implement a best management practice from both Ground Operations and Harvest; and Cropland Categories.*

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.

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

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

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



Tillage Dust Control Measures

A commercial farmer shall ensure implementation of at least ONE of the following BMPs on the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast (very windy or stagnant). The same BMP from Category I Tillage can be chosen.

Conservation Tillage
Limited Tillage Activity *
Multi-year Crop
Planting based on soil moisture
Tillage based on soil moisture
Reduced Tillage System

*** If limited tillage activity is chosen, only needs to be implemented on the day of a forecast to be a high risk for dust generation.**

Limited Tillage Activity

Rule Definition

“Limited Tillage Activity” means performing no tillage operations on a day identified by the *Pinal 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 *Pinal 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.



CATEGORY II: Ground Operations and Harvest

Any agricultural operation that is not a tillage operation, which involves equipment passing across the field. A ground operation includes harvest activities. A pass through the field may be a subset of a ground operation.

Harvest activities is the time after planting up through harvest, including gathering mature crops from a commercial farm, as well as all actions taken immediately after crop removal, such as cooling, sorting, cleaning, and packing.

A commercial farmer shall implement at least ONE of the following on a daily basis:

Chemical Irrigation
Combining Tractor Operations
Equipment modification
Green Chop
Integrated Pest Management
Multi-year Crop
Precision Farming
Reduced Harvest Activity
Shuttle System/Large Carrier
Transgenic Crops

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 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.

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 of 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.

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

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
- Pass markers
- Variable rate application technology
- Install overlap reduction 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.



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

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

Ground Operations and Harvest Dust Control Measures

A commercial farmer shall ensure implementation of at least ONE of the following BMPs on the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast (very windy or stagnant). The same BMP from Category II Ground Operations and Harvest can be chosen.

Green Chop
Integrated Pest Management
Multi-year Crop
Limited Harvest Activity *

*** If limited harvest activity is chosen, only needs to be implemented on the day of a forecast to be a high risk for dust generation.**

Limited Harvest Activity

Rule Definition

“Limited Harvest Activity” means performing no ground operations on a day identified by the *Pinal 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 *Pinal 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.



CATEGORY III: Non-cropland

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.***

A commercial farmer shall implement at least ONE of the following on a daily basis:

Access Restriction

Aggregate Cover

Critical Area Planting

Organic Material Cover

Reduced Vehicle Speed

Synthetic Particulate Suppressant

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 commercial farm 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.
- The aggregate material should be clean, hard and durable.

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 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 NRCD office or a dust control contractor for specific recommendations. All products should be applied strictly in accordance with manufacturers’ specifications.

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.



Non-cropland Dust Control Measures

A commercial farmer shall ensure implementation of at least ONE of the following BMPs on the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast (very windy or stagnant) on a non-cropland area that experiences more than 20 vehicle trips per day from 2 or more axle vehicles. The same BMP from Category III Non-cropland can be chosen.

Aggregate Cover
Critical Area Planting
Organic Material Cover
Synthetic Particulate Suppressant
Wind Barrier
Watering on a high risk day *

*** If watering on a high risk day is chosen, only needs to be implemented on the day of a forecast to be a high risk for dust generation.**

Watering on a High Risk Day

Rule Definition

“Watering on a high risk day” means reducing PM emissions and wind erosion by applying water to commercial farm road bare soil surface until the surfaces are visibly moist, on a day forecast to be high risk for dust generation by the *Pinal County Dust Control Forecast*.

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 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 or cotton harvest.

- Apply water so that the surface is visibly moist.

CATEGORY IV: Commercial Farm Roads

Any road that is unpaved, owned by a commercial farmer, and is used exclusively to service a commercial farm.

A commercial farmer shall implement at least ONE of the following on a daily basis:

Access Restriction
Aggregate Cover
Organic Material Cover
Reduce Vehicle Speed
Synthetic Particulate Suppressant
Track-out Control System
Watering

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 commercial farm 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.

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 commercial farm roads helps to 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 commercial 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 or and 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 noncropland or commercial farm road bare soil surface during period of high traffic until the surface is 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.

Commercial Farm Roads Dust Control Measures

A commercial farmer shall ensure implementation of at least one of the following BMPs on the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast (very windy or stagnant) on a commercial farm road that experiences more than 20 vehicle trips per day from 2 or more axle vehicles. The same BMP from Category IV Commercial Farm Roads can be chosen.

Aggregate Cover

Organic Material Cover

Roads are stabilized as determined by the silt content test method

Synthetic Particulate Suppressant

Watering on a high risk day *

Wind Barrier

*** If watering on a high risk day is chosen, only needs to be implemented on the day of a forecast to be a high risk for dust generation.**

Roads Stabilized as Determined by the Silt Content Test Method

Rule Definition

See Title 18; Chapter 2; Article 6; Appendix 2 (Test Methods and Protocols) of Arizona Administrative Code.

Purpose

The purpose of this test method is to estimate the silt content of the trafficked parts of commercial farm roads. The higher the silt content, the more fine dust particles that are released when cars and trucks drive on commercial farm roads.

CATEGORY V: 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.**

A commercial farmer shall implement at least TWO of the following on daily basis. ONE must be from section A and ONE from section B.

Section A

Chips/mulches

Cover Crop

Cross-wind Ridges

Residue Management

Sequential Cropping

Surface Roughening

Wind Barrier

Section B

Multi-year Crop

Permanent Cover

Stabilization of Soil Prior to Plant Emergence

SECTION A

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.



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.

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.

SECTION B

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.

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.

Cropland Dust Control Measures

A commercial farmer shall ensure implementation of at least one of the following BMPs on the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast (very windy or stagnant). The same BMP from Category V Cropland can be chosen.

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

Significant Agricultural Earth Moving Activities (As Necessary)

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 is not considered a required BMP, it is required to implement ONE BMP from below when a commercial farmer is disturbing the soil more than 4 inches below the surface.*

1. 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 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 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.

2. 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.

3. **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.

4. **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 - Pinal 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. (Underlined BMPs also count as high risk day BMPs in each specified category.). Refer to the *Guide to Agricultural PM10 Best Management Practices* for BMP information and definitions.

CATEGORY I: Tillage

Super Tillage BMP:
 Selecting Reduced Tillage System or Conservation Tillage will eliminate the requirement of selecting BMPs in Category II (Ground Operations and Harvest) and Category V (Cropland).

- Reduced Tillage System
- Conservation Tillage

Otherwise select at least one of the following:

- Combining Tractor Operations
- Equipment Modification
- Multi-year Crop
- Cessation of Night Tillage
- Planting Based on Soil Moisture
- Precision Farming
- Tillage Based on Soil Moisture
- Timing of Tillage Operation
- Transgenic Crops
- Transplanting

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories I is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Limited Tillage Activity*

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY II: Ground Operations and Harvest

Select at least one of the following:

- Combining Tractor Operations
- Equipment Modification
- Chemical Irrigation
- Green Chop
- Integrated Pest Management
- Multi-year Crop
- Precision Farming
- Reduced Harvest Activity
- Transgenic Crops
- Shuttle System/Larger Carrier

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories II is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Limited Harvest Activity*

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY III: Non-cropland

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
- Watering

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories III is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Watering on a High Risk Day*

*Implemented only on the day forecast to be high risk for dust generation.

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CATEGORY IV: Commercial Farm Roads

Select at least one of the following:

- Access Restriction
- Reduce Vehicle Speed
- Track-out Control System
- Aggregate Cover
- Synthetic Particulate Suppressant
- Watering
- Organic Material Cover

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories IV is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Watering on a High Risk Day*
- Roads are stabilized as determined by the silt content test method
- Wind Barrier

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY V: Cropland

Select at least one of the following:

- Wind Barrier
- Cover Crop
- Cross-wind ridges
- Chips/mulches
- Sequential Cropping
- Residue Management
- Surface Roughening

And select at least one of the following:

- Multi-year Crop
- Permanent Cover
- Stabilization of soil prior to plant emergence

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: _____

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.

ARIZONA Agricultural Best Management Practices
2017 CROP OPERATION Mandatory Three Year Expanded Survey

Name of Commercial Farm: _____

Name of Commercial Farmer: _____

Mailing Address: _____

City/State/Zip Code: _____

Physical Location of Farm Office (if different from above): _____

Email Address: _____

Phone: _____ Fax: _____

Complete the Agricultural Best Management Practices Survey and return to the Arizona Department of Agriculture via mail 1688 W. Adams St., Phoenix, AZ 85007, email XXXX@azda.gov, or fax (602)XXX-XXXX. Submit by _____.

.....

I certify that my operation complied with the requirements of the Agricultural Best Management Practices.

Signature of Commercial Farmer: _____ Date: _____

Updated: 5/1/15

ARIZONA Agricultural Best Management Practices
2017 CROP Mandatory Three Year Expanded Survey

Mark the Best Management Practices (BMP) implemented by Category for the previous crop year. (Underlined BMPs are also classified as high risk day BMPs in each specified category.)

Refer to the *Guide to Agricultural PM10 Best Management Practices* for additional BMP information and definitions.

CATEGORY I: Tillage

Super Tillage BMP:

Selecting Reduced Tillage System or Conservation Tillage will eliminate the requirement of selecting BMPs in Category II (Ground Operations and Harvest) and Category V (Cropland).

- Reduced Tillage System
- Conservation Tillage

Otherwise select at least one of the following:

- Combining Tractor Operations
- Equipment Modification
- Multi-year Crop
- Cessation of Night Tillage
- Planting Based on Soil Moisture
- Precision Farming
- Tillage Based on Soil Moisture
- Timing of Tillage Operation
- Transgenic Crops
- Transplanting

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories I is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Limited Tillage Activity*

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY II: Ground Operations and Harvest

Select at least one of the following:

- Combining Tractor Operations
- Equipment Modification
- Chemical Irrigation
- Green Chop
- Integrated Pest Management
- Multi-year Crop
- Precision Farming
- Reduced Harvest Activity
- Transgenic Crops
- Shuttle System/Larger Carrier

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories II is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Limited Harvest Activity*

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY III: Non-cropland

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
- Watering

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories III is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Watering on a High Risk Day*

*Implemented only on the day forecast to be high risk for dust generation.

Continue on Back

CATEGORY IV: Commercial Farm Roads

Select at least one of the following:

- Access Restriction
- Reduce Vehicle Speed
- Track-out Control System
- Aggregate Cover
- Synthetic Particulate Suppressant
- Watering
- Organic Material Cover

High Risk Dust Generation Days BMP:

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast a farmer must ensure that one of the above underlined BMP's in Categories IV is selected and is being implemented. If not implementing one of the underlined BMPs, then the BMP below must be select and implement on a Pinal County high risk dust generation forecast:

- Watering on a High Risk Day*
- Roads are stabilized as determined by the silt content test method
- Wind Barrier

*Implemented only on the day forecast to be high risk for dust generation.

CATEGORY V: Cropland

Select at least one of the following:

- Wind Barrier
- Cover Crop
- Cross-wind ridges
- Chips/mulches
- Sequential Cropping
- Residue Management
- Surface Roughening

And select at least one of the following:

- Multi-year Crop
- Permanent Cover
- Stabilization of soil prior to plant emergence

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

Crop acreage for previous calendar year. (Please indicate as applicable)

Miles of Commercial Unpaved Farm Roads: _____	Fallow Acreage: _____
Acres of Unpaved Vehicle/Equipment Area: _____	
Annual Crop Acreage:	
<input type="checkbox"/> Alfalfa _____ <input type="checkbox"/> Cotton _____ <input type="checkbox"/> Bermudagrass _____ <input type="checkbox"/> Sorghum _____ <input type="checkbox"/> Wheat _____ <input type="checkbox"/> Barley _____ <input type="checkbox"/> Corn (silage) _____ <input type="checkbox"/> Corn _____	<input type="checkbox"/> Trees Citrus _____ <input type="checkbox"/> Trees Fruit _____ <input type="checkbox"/> Trees Nuts _____ <input type="checkbox"/> Vegetables _____ <input type="checkbox"/> Melons _____ <input type="checkbox"/> Ornamentals _____ <input type="checkbox"/> Other _____ <input type="checkbox"/> Other _____

Pinal County Producer Advisors

**Dan Thelander
Greg Wuertz
Paul “Paco” Ollerton**

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, Pinal County Air Quality Control District, Director, Florence, Arizona

Ag BMP Technical Work Group:

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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
Cheryl Goar, Arizona Nursery Association, Phoenix, Arizona
Ana Kennedy, Arizona Farm Bureau Federation, Gilbert, Arizona
Rick Lavis, Arizona Cotton Growers Association, Phoenix, Arizona
Paul "Paco" Ollerton, Cotton Producer, Casa Grande, Arizona
Earl Petznick Jr., Beef Cattle Feedlot Operations, Maricopa, Arizona
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Joe Sigg, Arizona Farm Bureau Federation, Gilbert, Arizona
Nick Simonetta, Pivotal Policy Consulting, Maricopa-Stanfield Irrigation and Drainage District, Central Arizona Irrigation and Drainage District, Hohokam Irrigation and Drainage District, San Carlos Irrigation and Drainage District, New Magma Irrigation and Drainage District, Phoenix, Arizona
Chris Udall, Arizona Agribusiness & Water Council, Mesa, Arizona
Russell Van Leuven, Arizona Department of Agriculture, Phoenix, Arizona
Greg Wuertz, Cotton Producer, Casa Grande, Arizona

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

Michael Smith, Arizona Department of Environmental Quality, Air Quality Compliance Section, Compliance Officer

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
Natural Resource Conservation Districts
Pinal County Air Quality Department
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, Pinal County
Western Growers Association