

# **Guide to Agricultural PM10 Best Management Practices**

*“Agriculture Improving Air Quality”*

## **Irrigation Districts**



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

*First Edition, 2015*

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## ***Introduction:***

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

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

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

### ***The intent of this guide is to:***

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

### ***Why was the Agricultural PM General Permit created?***

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

In an effort to address agriculture's contribution to PM10, the Governor's Agricultural Best Management Practices Committee was created by law in 1998 (Arizona Revised Statutes (A.R.S.) §49-457)). The committee's charge was to develop an agricultural PM10 general permit that would address the need for controls on agricultural operations. The committee was to identify BMPs that focused on feasible, effective and common sense practices that minimized negative impacts on local agriculture. In 2009, the Arizona State Legislature passed Senate Bill 1225, amending A.R.S. §49-457 to include animal agriculture in the PM10 general permit. This includes dairy operations, beef cattle feedlots, poultry, and swine facilities. It also provided for the addition of one person actively engaged in each of the following; beef cattle feed lot, dairy, poultry and swine, as well as one person from a county air quality department, to the Governor's Ag BMP Committee. In 2010, the Arizona State Legislature passed Senate Bill 1408 on April 7, 2010, amending A.R.S. §49-457 to include irrigation districts in PM regulated areas established after June 2009 in the PM General Permit.

Pinal County's PM10 levels are among the worst in the country, based on 2009 – 2011 certified air quality data. Ambient levels of PM10 measured at air quality monitoring stations within Pinal County show widespread, frequent, and in some instances, severe, violations of the PM10 standard, 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. Arizona will be required to develop a plan to 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.

#### ***Who must comply with the Agricultural PM General Permit?***

An irrigation district located within a PM Regulated Area (reference map insert) must comply with the Agricultural PM General Permit. Maricopa, Yuma County irrigation districts, and tribal land are exempt from complying with the Agricultural PM General Permit.

#### ***What does the irrigation district have to do?***

- Implement and maintain at least **ONE** approved BMP (described later in this document) for each of the three categories: Unpaved Operation and Maintenance Roads, Canals, and Unpaved Utility Access Roads.
- Must keep records detailing the BMPs selected for each category. The irrigation district may document the practice on the sample BMP Agricultural PM 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 irrigation district.
- Beginning in Calendar year 2017, and no more than once every subsequent three calendar years, the irrigation district shall complete and submit a 3-Year Expanded Survey to the Arizona Department of Agriculture detailing the total miles of canals, unpaved operation, maintenance, utility access roads, and the BMPs selected in each of the categories. The first survey is due by 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?***

An irrigation district engaged in regulated activities before and after December 31, 2015 must comply with the Agricultural PM General Permit.

**New legislation will require all producers and irrigation districts located in a designated PM Nonattainment area that engage in regulated activities to be in compliance by January 1, 2016. Any person who commences regulated activities 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?***

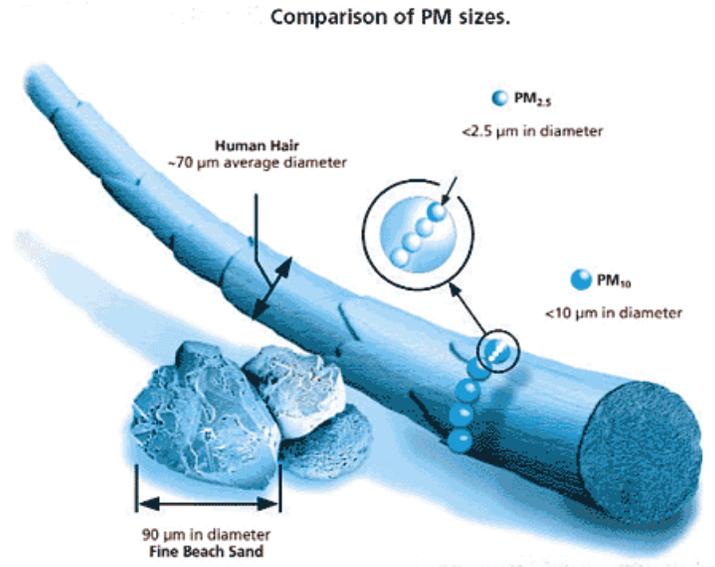
If the ADEQ director determines that an irrigation district is not in compliance with the Agricultural PM General Permit, the following three-stage process occur as per A.R.S. 49-457 (I)(J)(K):

1. If the irrigation district has not previously been subject to an agricultural general permit related compliance order, the farmer will be required to submit a plan to the local Natural Resource Conservation District (NRCD). The plan must specify the BMPs that the irrigation district will use to comply with the general permit.
2. If the irrigation district has previously been subject to an agricultural general permit related compliance order, the farmer will be required to submit a plan to ADEQ that specifies the BMPs that the irrigation district will use to comply with the general permit.
3. If the Irrigation district 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 irrigation district to obtain an individual fee based permit.

**At each stage, the irrigation district would have the opportunity for a hearing.**

### *Soils, PM10 and Air Quality*

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



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

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

Two meteorological events have the potential to increase the impacts from high concentrations of PM10: high winds and inversions. Conditions for both of these events can occur in the Phoenix area, one occurring predominantly in the warmer season, the other in the cooler season. Warm season high wind events are generally short (less than one hour) and are the result of the downdrafts from monsoon thunderstorms. The cool season events are longer (six to 12 hours) and are the result of strong pressure gradients associated with a trough or a cold frontal system.

An inversion is a region in the atmosphere where the temperature increases with height. The presence of an inversion creates a very stable atmosphere and leads to very little mixing of the air, trapping pollutants close to the ground. An inversion is also produced whenever radiation from the surface exceeds the amount of radiation from the sun – commonly at night or in the winter when the angle of the sun is very low in the sky. Some of the best management practices outlined in this booklet address how to lower PM10 so these events do not increase PM10 concentrations.

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

### ***Best Management Practices***

As a result of discussions between the EPA, Arizona Department of Environmental Quality, and the Arizona Department of Agriculture, the Arizona State Legislator in 1999 enacted legislation with the full support of the Arizona agriculture community to create and implement a Best Management Practice Program. The Agricultural Best Management Practice Program allows growers a wide range of choices to reduce PM10 emissions within the established PM10 Regulated Area (reference map insert).

The Arizona Legislature has defined a BMP for the PM Regulated Area (reference map insert) as a technique verified by scientific research that, is practical, economically feasible and effective in reducing PM on a case by case basis from a regulated agricultural activity. The following section summarizes the BMPs approved by the Governor's Agricultural Best Management Practices Committee to reduce PM for each of the three irrigation categories: Unpaved operation and maintenance roads, canals, and unpaved utility access roads. 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 PM. Not all of the BMPs will work equally well on every operation or facility because of variations in wind, soils, cropping systems, moisture conditions and, in some cases, the management approaches of individual operators. Such factors should be considered by the individual facility to ensure he or she implements effective BMPs. This guide represents the first step in helping irrigation districts reduce PM emissions from farmlands located within the PM Regulated Area (reference map insert).

### ***CATEGORY I: Unpaved Operation and Maintenance roads***

***Any unpaved roadways that lay adjacent to canals, which provide access for irrigation district personnel and equipment for direct operation and maintenance of canals, and are under the control of the irrigation districts.***

#### **Best management practices for use during unpaved operation and maintenance roads**

Access Restriction

Apply and Maintain Aggregate Cover

Apply and Maintain Synthetic or Natural Particulate Suppressant

Apply and Maintain Water Before, During, and After Major and Minor Earth Moving Activities

Apply and Maintain Water When Grading Roadways

Install and Maintain a Track-out Control System

Install Signage to Limit Vehicle Speed to 25 mph

Install Supervisory Control System to Limit Vehicle Travel

Install Wind Barriers.

Limit Activity

Post Warning Signs for Unauthorized Use at Point of Entry to Roads

Reduce Vehicle Speed

Use Paved Non-district or Paved Public Roads to Access Structures

#### **Access Restriction**

##### **Rule Definition**

“Access Restriction” means reducing PM emission by reducing the number of trips driven on unpaved operation, maintenance and utility roads by restricting or elimination public access by the use of signs or physical obstruction at locations that effectively control access to roads.



##### **Purpose**

Reducing the number of trips driven on unpaved operation, maintenance and utility 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.

#### **Apply and Maintain 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 unpaved roads. The aggregate should be clean, hard and durable, and should be applied a depth sufficient to create soil stabilization in accordance with material specifications. A minimum depth of three inches is the standard in the absence of such specifications.

### **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.



## **Apply and Maintain Synthetic or Natural Particulate Suppressant**

### **Rule Definition**

“Synthetic or Natural Particulate Suppressant” means reducing PM emissions and wind erosion by providing a stabilized soil surface with organic material, such as muck, animal waste or bio-solids, or with a manufactured product such as liginosulfate, calcium chloride, magnesium chloride, an emulsion of petroleum product, an enzyme product, or polyacrylamide.

### **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 liginosulfonate (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.

## **Apply and Maintain Water Before, During, and After Major and Minor Earth Moving Activities**

### **Rule Definition**

“Major Earth Moving” means the mechanical movement of earth materials to reconstruct, relocate, reshape, reconfigure canals, including operation, maintenance and utility roads.

“Minor Earth Moving” means the mechanical movement of earth materials to repair and maintain the existing configuration, location, band slopes, or inclines of canals.

### **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 before, during, and after so the soil surface is visible moist during all major and minor earth moving activities.

### **Apply and Maintain Water When Grading Roadways**

#### **Rule Definition**

“Apply and Maintain Water” means reducing PM emissions and wind erosion by applying water to bare soil surfaces until the surfaces are visibly moist.



#### **Purpose**

Grading roadways is mechanically smoothing and compacting the roadway surface thus disturbing large amounts of soil and emitting PM into the air. Applying water when grading surfaces can help reduce PM emissions by compacting the soil so that it is not dispersed into the air.

#### **Suggestions for Implementation**

Before commencing grading of an unpaved road, make sure that a water truck, tractor, or other portable spray

system is utilized to apply water to soil surface until the surface is visible moist. This will help in compacting the soil while the grading process is taking place.

### **Install and Maintain a 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 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.

### **Install Signage to Limit Vehicle Speed to 25 mph**

#### **Rule Definition**

“Install Signage” means reducing PM emissions and soil erosion from the use of vehicles to limit speeds to 25 mph by installing speed limit signage.



#### **Purpose**

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

#### **Suggestions for Implementation**

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

- Posting speed limit signs within 100 feet of a paved public road.
- Informing all employees, contractors and sub-contractors of speed limits.
- Placing signs in all district vehicles stating the speed limits on district unpaved roads.

### **Install Supervisory Control System to Limit Vehicle Travel**

#### **Rule Definition**

“Supervisory Control System” means a system that allows the irrigation district to control operational structures from a remote computer location in order to reduce at least one trip made by vehicles to access structures for operational purposes.

#### **Purpose**

By controlling some operational functions from a remote computer or at a central location will reduce a vehicle trip for operational purposes. Each reduced trip will help to reduce PM emissions from unpaved roads.

#### **Suggestions for Implementation**

Install a system that can control an operational structure from a remote location that will eliminate a vehicle trip. A system can consist of accessing operational functions from a remote computer, or even combining trips to complete operational functions.



## Install 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

- Continuous board fences, burlap fences, crate walls, bales of hay and similar material can be used to control are 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.

## Limit Activity



### Rule Definition

“Limit Activity” means performing only critical operational or emergency activity on a day forecast to be high risk for dust generation as forecasted by the Pinal

County Dust Control Forecast.

### 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 activity during a high risk forecast day will reduce the transport of PM.

### Suggestions for Implementation

- The irrigation districts 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 irrigation district.
- A district policy should be developed ensure that limited activities occur when the wind speed reaches 25 mph.

## Post Warning Signs for Unauthorized Use at Point of Entry to Roads

### Rule Definition

“Unauthorized Use” means any travel or access by non-district personnel in non-district vehicles along roadways under the control of an irrigation district without the permission of the irrigation district.

**Purpose**

By keeping all unauthorized vehicles off of district roads and property will eliminate unnecessary vehicle traffic and reduce the amount of PM emissions.

**Suggestions for Implementation**

Post warning signs for all unauthorized use on district roads and property. Signs should be clearly posted to keep all unauthorized vehicles off the district road. You can install “no trespassing” signs at the point of entry to roads.

**Reduced Vehicle Speed****Rule Definition**

“Reduced Vehicle Speed” means reducing PM emissions and soil erosion from the use of vehicles owned or operated by the irrigation district on unpaved operation, maintenance, and utility access roads, at speeds not to exceed 25 mph. This can be achieved through worker behavior modifications, signage, or any other necessary means.

**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 district vehicles stating the speed limits on district roads.
- Installing speed bumps.

**Use Paved Non-district or Paved Public Roads to Access Structures****Rule Definition**

“Paved Non-district or Public Road” means the use of any paved roadways that are open to public travel and maintained by the City, County, or State.

**Purpose**

Pavement provides permanent protection between the soil and vehicle/equipment and reduces the amount of PM emissions generated. Pavement can also help prevent the buildup of particulate matter on vehicles and equipment by eliminating or reducing contact with loose soil.

**Suggestion for Implementation**

Use paved roads as much as possible to access district structures. Make sure to use caution not to track-out mud or soil onto paved roads, because this can generate PM emissions.

## **CATEGORY II: Canals**

*Facilities constructed for the sole purpose of control, conveyance, and delivery of water. These facilities may be either open earthen channels, lined or unlined, or buried pipelines, which are used to convey water uphill and under obstructions, such as roadways and wash and river channels. These facilities include, but are not limited to, gate, inlet, outlet, safety, and measuring structures required to control water along the canals and deliver water to irrigation district customers, as well as compacted earthen banks constructed to protect these facilities from storm runoff events.*

### **Best Management Practices for Canals.**

Apply and Maintain Water Before, During and After Major and Minor Earth Moving Activities  
Biological Control of Aquatic Weeds  
Dispose of Muck of Debris While Still Damp  
Dredge Canals While Muck or Debris is Still Wet  
Weed Management

### **Apply and Maintain Water Before, During, and After Major and Minor Earth Moving Activities**

#### **Rule Definition**

“Major Earth Moving” means the mechanical movement of earth materials to reconstruct, relocate, reshape, reconfigure canals, including operation, maintenance and utility roads.

“Minor Earth Moving” means the mechanical movement of earth materials to repair and maintain the existing configuration, location, band slopes, or inclines of canals.



#### **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 before, during, and after so the soil surface is visible moist during all major and minor earth moving activities.

### **Biological Control of aquatic weeds**

#### **Rule Definition**

“Biological Control” means reducing at least one trip, or to one trip if only one trip is needed, per treatment, made by vehicles for the purpose of removing aquatic weeds from canals by using fish, and other biological means, within the canal to control the growth of aquatic weeds that reduce operation capacities and create debris that causes other operational issues.

#### **Purpose**

Removing aquatic weeds from a canal will generate PM emissions from vehicle trips along the canal road. By removing at least one vehicle trip by applying biological controls to a canal will generate less PM emission.

### **Suggestions for Implementation**

Use fish or any other biological control to treat canals for aquatic weeds. Make sure you document that at least one vehicle trip was eliminated. The biological control must not be prohibited for use by any applicable federal, state, or local regulation.



### **Dispose of Muck or Debris While Still Damp**

#### **Rule Definition**

“Muck and Debris” means water that is saturated with mud, dirt, soil, trash, rubble, and other non-soil materials which accumulates over time along the bottom of canals.

#### **Purpose**

As muck and debris accumulate in canals over time, they need to be cleaned out. The mud and debris is piled up along the canal banks and as it dries out it can potentially generate PM emissions. The damp muck will not disperse into the air, thus reducing the possibility of PM emission.

#### **Suggestions for Implementation**

Have a policy or procedure to dispose of all muck and debris from the canals as soon as it is dredged not allowing it to dry out on the bank.

### **Dredge Canals While Muck or Debris is Still Wet**

#### **Rule Definition**

“Dredge Canal” means reducing PM emissions by mechanically removing muck, debris, and other foreign objects from canal while material is still wet or damp.



#### **Purpose**

As muck and debris accumulate in canals over time, they need to be cleaned out. The mud and debris is piled up along the canal banks and as it dries out it can potentially generate PM emissions. The damp muck will not disperse into the air, thus reducing the possibility of PM emission.

#### **Suggestion for Implementation**

Have a policy or procedure to dredge muck and debris from canal while it is still wet or

damp. Dispose of all muck and debris from the canal as soon as it is dredged not allowing it to dry out on the bank.

## **Weed Management**

### **Rule Definition**

“Weed Management” means reducing at least one trip made by vehicles for the purpose of removing weeds by using a combination of techniques, including organic, chemical, or biological means, to control weeds along canal banks and land surfaces not used for conveying water, excluding unpaved roadways.

### **Purpose**

Removing weeds from a canal will generate PM emissions from vehicle trips along the canal road. By removing at least one vehicle trip by applying any combination of techniques to manage weeds along a canal will generate less PM emission.

### **Suggestion for Implementation**

Have a weed management policy in place that will eliminate at least one vehicle trip along a canal. Techniques for weed control include the use of herbicide, insects or any organic process. The biological or chemical control must not be prohibited for use by any applicable federal, state, or local regulation.

### ***CATEGORY III: Unpaved Utility Access Roads***

*Unpaved utility access roads are unpaved roadways used to provide access to canals, and also includes office and shop facilities, equipment yards, staging areas and other lands under the control of the irrigation district.*

#### **Best Management Practices for Unpaved utility access roads**

Access Restriction

Apply and Maintain Aggregate Cover

Apply and Maintain Pavement

Apply and Maintain Synthetic or Natural Particulate Suppressant

Apply and Maintain Water Before, During, and After Major and Minor Earth Moving Activities

Apply and Maintain Water When Grading Roadways

Install and Maintain a Track-out Control System

Install Signage to Limit Vehicle Speed to 25 mph

Install Wind Barriers.

Limit Activity

Post Warning Signs for Unauthorized Use at Point of Entry to Roads

Reduce Vehicle Speed

Use Paved Non-district or Paved Public Roads to Access Structures

#### **Access Restriction**

##### **Rule Definition**

“Access Restriction” means reducing PM emission by reducing the number of trips driven on unpaved operation, maintenance and utility roads by restricting or elimination public access by the use of signs or physical obstruction at locations that effectively control access to roads.

##### **Purpose**

Reducing the number of trips driven on unpaved operation, maintenance and utility 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.

#### **Apply and Maintain 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 unpaved roads. The aggregate should be clean, hard and durable, and should be applied a depth sufficient to create soil stabilization in accordance with material specifications. A minimum depth of three inches is the standard in the absence of such specifications.



##### **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.

### **Apply and Maintain Pavement**

#### **Rule Definition**

“Apply and maintain pavement” means reducing PM emission, wind erosion and stabilizing soil by applying and maintaining pavement to unpaved utility access roads.

#### **Purpose**

Pavement provides permanent protection between the soil and vehicle/equipment and reduces the amount of PM emissions generated. Pavement can also help prevent the buildup of particulate matter on vehicles and equipment by eliminating or reducing contact with loose soil.

#### **Suggestions for Implementation**

Pave access connection and utility roads.

### **Apply and Maintain Synthetic or Natural Particulate Suppressant**



#### **Rule Definition**

“Synthetic or Natural Particulate Suppressant” means reducing PM emissions and wind erosion by providing a stabilized soil surface with organic material, such as muck, animal waste or bio-solids, or with a manufactured product such as lignosulfate, calcium chloride, magnesium chloride, an emulsion of petroleum product, an enzyme product, or polyacrylamide.

#### **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.

### **Apply and Maintain Water Before, During, and After Major and Minor Earth Moving Activities**

#### **Rule Definition**

“Major Earth Moving” means the mechanical movement of earth materials to reconstruct, relocate, reshape, reconfigure canals, including operation, maintenance and utility roads.

“Minor Earth Moving” means the mechanical movement of earth materials to repair and maintain the existing configuration, location, band slopes, or inclines of canals.

### **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 before, during, and after so the soil surface is visible moist during all major and minor earth moving activities.

## **Apply and Maintain Water When Grading Roadways**

### **Rule Definition**

“Apply and Maintain Water” means reducing PM emissions and wind erosion by applying water to bare soil surfaces until the surfaces are visibly moist.

### **Purpose**

Grading roadways is mechanically smoothing and compacting the roadway surface thus disturbing large amounts of soil and emitting PM into the air. Applying water when grading surfaces can help reduce PM emissions by compacting the soil so that it is not dispersed into the air.

### **Suggestions for Implementation**

Before commencing grading of an unpaved road, make sure that a water truck, tractor, or other portable spray system is utilized to apply water to soil surface until the surface is visibly moist. This will help in compacting the soil while the grading process is taking place.

## **Install and Maintain a 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 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.

### **Install Signage to Limit Vehicle Speed to 25 mph**

#### **Rule Definition**

“Install Signage” means reducing PM emissions and soil erosion from the use of vehicles to limit speeds to 25 mph by installing speed limit signage.

#### **Purpose**

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

#### **Suggestions for Implementation**

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

- Posting speed limit signs within 100 feet of a paved public road.
- Informing all employees, contractors and sub-contractors of speed limits.
- Placing signs in all district vehicles stating the speed limits on district unpaved roads.

### **Install 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**

- Continuous board fences, woody vegetation such as trees, 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.

### **Limit Activity**

#### **Rule Definition**

“Limit Activity” means performing only critical operational or emergency activity on a day forecast to be high risk for dust generation as forecasted by the Pinal County Dust Control Forecast.

#### **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 activity during a high risk forecast day will reduce the transport of PM.

#### **Suggestions for Implementation**

- The irrigation districts 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 irrigation district.
- A district policy should be developed ensure that limited activities occur when the wind speed reaches 25 mph.

### **Post Warning Signs for Unauthorized Use at Point of Entry to Roads**

#### **Rule Definition**

“Unauthorized Use” means any travel or access by non-district personnel in non-district vehicles along roadways under the control of an irrigation district without the permission of the irrigation district.

#### **Purpose**

By keeping all unauthorized vehicles off of district roads and property will eliminate unnecessary vehicle traffic and reduce the amount of PM emissions.

#### **Suggestions for Implementation**

Post warning signs for all unauthorized use on district roads and property. Signs should be clearly posted to keep all unauthorized vehicles off the district road. You can install “no trespassing” signs at the point of entry to roads.

### **Reduced Vehicle Speed**

#### **Rule Definition**

“Reduced Vehicle Speed” means reducing PM emissions and soil erosion from the use of vehicles owned or operated by the irrigation district on unpaved operation, maintenance, and utility access roads, at speeds not to exceed 25 mph. This can be achieved through worker behavior modifications, signage, or any other necessary means.

#### **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 district vehicles stating the speed limits on district roads.
- Installing speed bumps.

**Use Paved Non-district or Paved Public Roads to Access Structures**

**Rule Definition**

“Paved Non-district or Public Road” means the use of any paved roadways that are open to public travel and maintained by the City, County, or State.



**Purpose**

Pavement provides permanent protection between the soil and vehicle/equipment and reduces the amount of PM emissions generated. Pavement can also help prevent the buildup of particulate matter on vehicles and equipment by eliminating or reducing contact with loose soil.

**Suggestion for Implementation**

Use paved roads as much as possible to access district structures. Make sure to use caution not to track-out mud or soil onto paved roads, because this can generate PM emissions.

**20\_\_ Agricultural Best Management Practices General Permit Record**  
**Irrigation District Operations**

Name of Irrigation District: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Name of Irrigation District Representative: \_\_\_\_\_ Email: \_\_\_\_\_  
 Mailing or Physical Address of Irrigation District: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

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

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

<p><b>CATEGORY I: Unpaved operation and maintenance roads</b>  <i>Select at least one of the following:</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Access restriction</li> <li><input type="checkbox"/> Apply and maintain aggregate cover</li> <li><input type="checkbox"/> Install supervisory control system to limit vehicle travel</li> <li><input type="checkbox"/> Limit activity</li> <li><input type="checkbox"/> Install signage to limit vehicle speed to 25 mph</li> <li><input type="checkbox"/> Post warning signs for unauthorized use at point of entry to roads</li> <li><input type="checkbox"/> Reduce vehicle speed</li> <li><input type="checkbox"/> Install and maintain a track-out control system</li> <li><input type="checkbox"/> Apply and maintain synthetic or natural particulate suppressant</li> <li><input type="checkbox"/> Use paved non-district or paved public roads to access structures</li> <li><input type="checkbox"/> Install wind barriers</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Apply and maintain water before, during, and after major and minor earth moving activities</li> <li><input type="checkbox"/> Apply and maintain water when grading roadways</li> </ul> <p><b>CATEGORY II: Canals</b>  <i>Select at least one of the following:</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Dredge canals while muck or debris is still wet</li> <li><input type="checkbox"/> Dispose of muck or debris while still damp</li> <li><input type="checkbox"/> Weed management</li> <li><input type="checkbox"/> Biological control of aquatic weeds</li> <li><input type="checkbox"/> Apply and maintain water before, during and after major and minor earth moving activities</li> </ul> <p><b>CATEGORY III: Unpaved utility access roads</b>  <i>Select at least one of the following:</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Access restriction</li> <li><input type="checkbox"/> Apply and maintain aggregate cover</li> <li><input type="checkbox"/> Limit activity</li> <li><input type="checkbox"/> Install signage to limit vehicle speed to 25 mph</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Post warning signs for unauthorized use at point of entry to roads</li> <li><input type="checkbox"/> Reduce vehicle speed</li> <li><input type="checkbox"/> Install and maintain a track-out control system</li> <li><input type="checkbox"/> Apply and maintain pavement</li> <li><input type="checkbox"/> Apply and maintain synthetic or natural particulate suppressant</li> <li><input type="checkbox"/> Apply and maintain water before, during and after major and minor earth moving activities</li> <li><input type="checkbox"/> Apply and maintain water when grading roadways</li> <li><input type="checkbox"/> Use paved non-district or paved public roads to access structures</li> <li><input type="checkbox"/> Install wind barriers</li> </ul>
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Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## *Where can I learn more?*

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

**Arizona Department of Agriculture**  
Agricultural Consultation & Training  
1688 W. Adams St.  
Phoenix, AZ 85007  
602-542-3484  
800-294-0308  
[www.agriculture.az.gov](http://www.agriculture.az.gov)

**Arizona Department of Environmental Quality**  
Air Quality Division  
1110 W. Washington St.  
Phoenix, AZ 85007  
602-771-2300  
800-234-5677  
[www.azdeq.gov/environ/air/index.html](http://www.azdeq.gov/environ/air/index.html)

**Eloy - NRCB**  
520 N. Camino Mercado  
Suite 2F  
Casa Grande, AZ 85222  
520-836-1960 Ex 3

**Florence-Coolidge - NRCB**  
520 N. Camino Mercado  
Suite 2F  
Casa Grande, AZ 85222  
520-836-1960 Ex 3

**West Pinal – NRCB**  
520 N. Camino Mercado  
Suite 2F  
Casa Grande, AZ 85222  
520-836-1960 Ex 3

**Central Arizona Irrigation & Drainage District**  
231 S. Sunshine Blvd.  
Eloy, AZ 85131  
520-466-7336

**Hohokam Irrigation & Drainage District**  
142 S. Arizona Blvd.  
Coolidge, AZ 85228  
520-723-7751

**Maricopa-Stanfield Irrigation & Drainage District**  
41630 W. Louis Johnson Dr.  
Maricopa, AZ 85138  
520-424-3344

**New Magma Irrigation & Drainage District**  
34630 N. Schnepf Rd.  
Queen Creek, AZ 85242  
480-987-3461

**San Carlos Irrigation & Drainage District**  
120 S. 3<sup>rd</sup> St.  
Coolidge, AZ 85128  
520-723-5408

***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, Florence, Arizona

***Ag BMP Technical Work Group:***

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

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

Philip Bashaw, Arizona Farm Bureau Federation, Gilbert, Arizona

Brian Betcher, Maircopa-Stanfield Irrigation and Drainage District, Maricopa, Arizona

Brett Cameron, Arizona Department of Agriculture, Phoenix, Arizona

Rick Lavis, Arizona Cotton Growers Association, Phoenix, Arizona

Ron McEachern, Central Arizona Irrigation and Drainage District, Eloy, Arizona

Nick Simonetta, Pivotal Policy Consulting, Phoenix

Sydney Smith, Hohokam Irrigation and Drainage District, Coolidge, Arizona

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

Mike Urton, San Carlos Irrigation and Drainage District, Coolidge, Arizona

Bill Van Allen, New Magma Irrigation and Drainage District, Queen Creek, Arizona

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

***Staff assigned to Governor's Ag BMP Committee:***

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

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

## **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  
Central Arizona Irrigation & Drainage District  
Hohokam Irrigation & Drainage District  
Maricopa County Farm Bureau  
Maricopa-Stanfield Irrigation & Drainage District  
Natural Resource Conservation Districts  
New Magma Irrigation & Drainage District  
Pinal County Air Quality Department  
San Carlos Irrigation & Drainage District  
USDA Natural Resources Conservation Service  
US Environmental Protection Agency Region IX  
University of Arizona - College of Agriculture and Life Sciences  
Western Growers Association

