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November 29, 2006

TO: Members of the MAG Air Quality Technical Advisory Committee

FROM: Stephen S. Cleveland, Goodyear City Manager, Chairman

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF TENTATIVE AGENDA

Thursday, December 7, 2006 - 1:30 p.m.
MAG Office, Suite 200 - Saguaro Room
302 North 1st Avenue, Phoenix

Please park in the garage underneath the building. Bring your ticket to the meeting; parking will be validated. For those using transit, the Regional Public Transportation Authority will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.

Pursuant to Title II of the Americans with Disabilities Act (ADA), MAG does not discriminate on the basis of disability in admissions to or participation in its public meetings. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Ann Wimmer at the MAG office. Requests should be made as early as possible to allow time to arrange the accommodation.

Members of the MAG Air Quality Technical Advisory Committee may attend in person, via videoconference or by telephone conference call. Those attending by videoconference must notify the MAG site three business days prior to the meeting. Those attending by telephone conference call are requested to call (602) 261-7510 between 1:25 p.m. and 1:30 p.m. on the date of the meeting. After the prompt, please enter the meeting ID number 27822 (on your telephone key pad) followed by the pound key. If you have a problem or require assistance, dial 0 after calling the number above.

Please be advised that under procedures approved by the MAG Regional Council, all MAG committees need to have a quorum to conduct the meeting. A quorum is a simple majority of the membership. If you are unable to attend the meeting, please make arrangements for a proxy from your entity to represent you.

----- A Voluntary Association of Local Governments in Maricopa County -----

City of Apache Junction ▲ City of Avondale ▲ Town of Buckeye ▲ Town of Carefree ▲ Town of Cave Creek ▲ City of Chandler ▲ City of El Mirage ▲ Fort McDowell Yavapai Nation ▲ Town of Fountain Hills ▲ Town of Gila Bend
Gila River Indian Community ▲ Town of Gilbert ▲ City of Glendale ▲ City of Goodyear ▲ Town of Guadalupe ▲ City of Litchfield Park ▲ Maricopa County ▲ City of Mesa ▲ Town of Paradise Valley ▲ City of Peoria ▲ City of Phoenix
Town of Queen Creek ▲ Salt River Pima-Maricopa Indian Community ▲ City of Scottsdale ▲ City of Surprise ▲ City of Tempe ▲ City of Tolleson ▲ Town of Wickenburg ▲ Town of Youngtown ▲ Arizona Department of Transportation

TENTATIVE AGENDA

COMMITTEE ACTION REQUESTED

1. Call to Order

2. Call to the Audience

An opportunity will be provided to members of the public to address the Air Quality Technical Advisory Committee on items not scheduled on the agenda that fall under the jurisdiction of MAG, or on items on the agenda for discussion but not for action. Members of the public will be requested not to exceed a three minute time period for their comments. A total of 15 minutes will be provided for the Call to the Audience agenda item, unless the Air Quality Technical Advisory Committee requests an exception to this limit. Please note that those wishing to comment on action agenda items will be given an opportunity at the time the item is heard.

3. Approval of the October 26, 2006 Meeting Minutes

4. Preliminary 2005 PM-10 Emissions Inventory

In accordance with the Clean Air Act, the Five Percent Plan for PM-10 is required to be based upon the most recent emissions inventory for the area. The Maricopa County Air Quality Department has prepared a new Preliminary 2005 PM-10 Emissions Inventory for the PM-10 Nonattainment Area. The inventory includes emissions from stationary point sources, area sources, nonroad sources and mobile sources. Please refer to the enclosed material.

5. Preliminary Projected 2007, 2008 and 2009 PM-10 Emissions Inventories

The Clean Air Act requires that the Five Percent Plan for PM-10 provide an annual five

2. For information.

3. Review and approve the October 26, 2006 meeting minutes.

4. For information and discussion.

5. For information and discussion.

percent reduction in PM-10 emissions from the date of plan submission until attainment of the standard. Three years of clean data at the air quality monitors is needed to be in attainment. The plan is required to be submitted to the Environmental Protection Agency by December 31, 2007.

Preliminary projected 2007, 2008 and 2009 emissions inventories have been prepared to use for the annual five percent reduction in emissions. If violations of the 24-hour PM-10 standard continue in 2007, a projected 2010 emissions inventory will need to be prepared and another five percent reduction in emissions for that year will be required. To date, there have been several exceedances of the 24-hour PM-10 standard in 2006. Please refer to the enclosed material.

6. Preliminary Draft Comprehensive List of Measures to Reduce PM-10 Particulate Matter

An important part of the preparation process for the Five Percent Plan for PM-10 is the consideration of air pollution control measures for possible implementation. To initiate this process, a Preliminary Draft Comprehensive List of Measures to Reduce PM-10 Particulate Matter has been developed. Comments and suggestions from the Committee are welcomed.

Based upon the discussion at the Committee meeting, information will be collected on the measures and a report will be prepared. The information will be presented at the February 1 and 15, 2007 meetings. It is anticipated that on March 1, 2007, the Air Quality Technical Advisory Committee would then recommend a Suggested List of Measures for the Five Percent Plan for PM-10 to the MAG Management Committee. Ultimately, following Regional Council approval, the Suggested List of Measures would be

6. For information and discussion.

considered by the State and local governments for implementation.

The Measure Selection Process and the Preliminary Draft Comprehensive List will be discussed at the meeting. Please refer to the enclosed material.

7. Evaluation of Potential Agricultural Control Measures to Reduce PM-10

The Governor's Agricultural Best Management Practices Committee is in the process of evaluating potential measures to further reduce PM-10 emissions from agriculture for consideration for the Five Percent Plan for PM-10. This Committee was established by law in 1998 (Arizona Revised Statutes, Title 49-457) to develop an agricultural PM-10 general permit that would address the need for controls on agricultural operations. A presentation will be given on the measures being evaluated. Please refer to the enclosed material.

8. Tentative 2007 Meeting Schedule for the MAG Air Quality Technical Advisory Committee

The Tentative 2007 Meeting Schedule for the MAG Air Quality Technical Advisory Committee has been prepared. Please refer to the enclosed material.

9. Call for Future Agenda Items

The next meeting of the Committee has been tentatively scheduled for **Thursday, January 11, 2007 at 1:30 p.m.** The Chairman will invite the Committee members to suggest future agenda items.

7. For information and discussion.

8. For information and discussion.

9. For information and discussion.

MINUTES OF THE
MARICOPA ASSOCIATION OF GOVERNMENTS
AIR QUALITY TECHNICAL ADVISORY COMMITTEE MEETING

Thursday, October 26, 2006
MAG Office
Phoenix, Arizona

MEMBERS PRESENT

Stephen Cleveland, City of Goodyear, Chairman
*Michael Powell, Avondale
Lucky Roberts, Buckeye
#Jim Weiss, Chandler
#Jamie McCullough, El Mirage
Lisa Taraborelli for Tami Ryall, Gilbert
Doug Kukino, Glendale
#Greg Edwards for Scott Bouchie, Mesa
Joe Gibbs for Gaye Knight, Phoenix
*Larry Person, Scottsdale
Antonio DeLaCruz, Surprise
Oddvar Tveit, Tempe
#Larry Crisafulli for Walter Bouchard, Citizen Representative
*Bill Pfeifer, American Lung Association of Arizona
#Barbara Sprungl, Salt River Project
Brian O'Donnell, Southwest Gas Corporation
*Jim Mikula, Arizona Public Service Company
*Gina Grey, Western States Petroleum Association
*Randi Alcott, Valley Metro
Dave Berry, Arizona Motor Transport Association
Jeannette Fish, Maricopa County Farm Bureau
*Russell Bowers, Arizona Rock Products Association
*Michelle Rill, Greater Phoenix Chamber of Commerce

Amanda McGennis, Associated General Contractors
*Connie Wilhelm-Garcia, Homebuilders Association of Central Arizona
*Stephen J. Andros, American Institute of Architects - Central Arizona
*Mannie Carpenter, Valley Forward
*Patrick Clay, University of Arizona - Cooperative Extension
Beverly Chenausky, Arizona Department of Transportation
Peter Hyde, Arizona Department of Environmental Quality
#Wienke Tax, Environmental Protection Agency
Jo Crumbaker, Maricopa County Air Quality Department
Duane Yantorno, Arizona Department of Weights and Measures
*Ed Stillings, Federal Highway Administration
*Judi Nelson, Arizona State University
#Christella Armijo for B. Bobby Ramirez, Salt River Pima-Maricopa Indian Community
*David Rueckert, Citizen Representative

*Members neither present nor represented by proxy.
#Participated via telephone conference call.
+Participated via video conference call.

OTHERS PRESENT

Lindy Bauer, Maricopa Association of Governments
Cathy Arthur, Maricopa Association of Governments
Dean Giles, Maricopa Association of Governments
Julie Hoffman, Maricopa Association of Governments
Paul Ward, Maricopa Association of Governments
Eric Anderson, Maricopa Association of Governments

Ranjith Dandanayakula, Maricopa Association of Governments
Ieesuck Jung, Maricopa Association of Governments
Taejoo Shin, Maricopa Association of Governments
Robert St. John, City of Glendale
Scott Di Biase, Pinal County
Diane Arnst, Arizona Department of Environmental Quality
Jody Noble, Environmental Stabilization Solutions

1. Call to Order

A meeting of the MAG Air Quality Technical Advisory Committee was conducted on October 26, 2006. Stephen Cleveland, City of Goodyear, Chair, called the meeting to order at approximately 1:35 p.m. Greg Edwards, City of Mesa; Jamie McCullough, City of El Mirage; Jim Weiss, City of Chandler; Christella Armijo, Salt River Pima-Maricopa Indian Community; Barbara Sprungl, Salt River Project; Wienke Tax, Environmental Protection Agency; and Larry Crisafulli, Citizen Representative, attended the meeting via telephone conference call.

2. Call to the Audience

Mr. Cleveland stated that, according to the MAG public comment process, members of the audience who wish to speak are requested to fill out comment cards, which are available on the table adjacent to the doorway inside the meeting room. Citizens are asked not to exceed a three minute time period for their comments. Public comment is provided at the beginning of the meeting for nonagenda items and nonaction agenda items. Mr. Cleveland noted that no public comment cards had been received.

3. Approval of the September 28, 2006 Meeting Minutes

Mr. Cleveland noted that the September 28, 2006 meeting minutes had been revised to reflect that Cynthia White, City of Chandler, attended the meeting by telephone. The revised minutes were provided at each place. Amanda McGennis, Associated General Contractors, indicated that there was a typographical error on page eight of the revised minutes. Ms. McGennis moved and Joe Gibbs, City of Phoenix, seconded and the motion to approve the September 28, 2006 meeting minutes as corrected carried unanimously.

4. CMAQ Project Evaluation Process

Eric Anderson, Maricopa Association of Governments, provided an overview of the Congestion Mitigation and Air Quality Improvement (CMAQ) Project Evaluation Process. He mentioned that the MAG Transportation Policy Committee (TPC) is the senior policy committee relating to transportation issues. Mr. Anderson stated that the TPC first met in September 2002 to begin work on the Regional Transportation Plan (RTP). The RTP was completed by the TPC in September 2003 and was approved by the MAG Regional Council in November 2003 following air quality conformity findings. Mr. Anderson expressed the importance of the RTP since it was the foundation for Proposition 400.

Mr. Anderson stated that Proposition 400, which was approved by voters in November 2004, extended the half-cent sales tax. He mentioned that the RTP includes the expected revenues from the 20 year extension of the half-cent sales tax and estimated 20 years of Arizona Department of Transportation funding. Mr. Anderson added that the RTP and fund allocations were approved by the State Transportation Board subsequent to Regional Council approval. He stated that the RTP also includes 5307 funds (federal transit formula funds), 5309 funds (discretionary grants from the Federal Transit Administration), Surface Transportation Program Funds (STP), and CMAQ funds.

Mr. Anderson mentioned that during deliberations of the TPC and subsequent approval of the Regional Council, the fund allocations were incorporated into the RTP. He stated that the projects listed in the RTP are commitments made to the voters in Proposition 400. Mr. Anderson indicated

that the fund allocations in the RTP could be changed with action by the TPC and Regional Council; however, it is important to respect the initial allocations. He added that the allocations for the sales tax extension are now in state law. Mr. Anderson mentioned that the RTP is a multimodal plan and the first plan approved by voters that provides significant funding for transit and intelligent transportation systems, bicycle and pedestrian programs, extensions/widening/improvements to existing freeways, construction of new freeways, and a major arterial street component.

Brian O'Donnell, Southwest Gas Corporation, inquired about the members of the TPC. Mr. Anderson replied that the TPC consists of 17 elected officials and six private sector representatives. Mr. O'Donnell referred to a situation where the Committee made a recommendation that was changed by another committee. Lindy Bauer, Maricopa Association of Governments, responded that the MAG Transportation Review Committee (TRC), a technical transportation committee, is primarily responsible for building the MAG Transportation Improvement Program (TIP). During the closeout process this year, the TRC changed a portion of the recommendation made by the Committee to fund the remaining street sweepers. The TRC recommendation removed the street sweepers that had a very small impact on PM-10. She added that the funds were put towards other projects that had a larger impact on PM-10.

Mr. O'Donnell indicated that the recommendation made by the Committee never went to the policy committee. He commented on the TRC providing an explanation for changing a recommendation made by another committee. Mr. Anderson replied that the TRC members consist of public works directors, transportation engineers, intergovernmental coordinators, and city managers. He described that the transmittal summary includes the recommendations from all committees as the agenda item moves through the MAG committee structure. Mr. Anderson stated that the minutes would include the explanation for changing the recommendation and that changes are typically mentioned during the presentation of the agenda item. He indicated that MAG will look into providing a written explanation of changes made to recommendations.

Dave Berry, Arizona Motor Transport Association, commented on the possibility of having the Chairman at the meetings to discuss the Committee recommendation. He mentioned that after hearing the presentation by Mr. Anderson, reflecting on the September 28, 2006 meeting, and speaking with MAG staff, his enthusiasm to address PM-10 had caused him to forget about the fund allocations in the RTP. The motion made at the September 28, 2006 meeting goes against the fund allocations. Mr. Berry stated that some of the fund allocations in the RTP are set in statute and others are part of an agreement for the half-cent sales tax extension. Mr. Berry mentioned that the message is clear about having the funds go to the most effective projects at addressing PM-10. Also, to the extent there are very cost-effective measures that address PM-10, the Committee feels it is a high priority to find the funding. Mr. Berry made a motion to rescind the motion to recommend that the TPC consider reallocating funds in the TIP to air quality projects that address the dust control problem and invite more air quality projects to be submitted from the community. Doug Kukino, City of Glendale, inquired about the process for rescinding a motion. Mr. Cleveland stated that the first step is to rescind the motion. The next step would be to determine if any other actions were taken as a result of the motion. Mr. Kukino seconded the motion.

Peter Hyde, Arizona Department of Environmental Quality, referred to the fund allocation table from the RTP that was included in the agenda packet. He commented that 14.6 percent of CMAQ funds are for air quality. Ms. Bauer responded that there are also CMAQ projects within the other categories. She stated that all CMAQ projects either have an air quality or congestion mitigation

impact. The air quality projects are typically the demand management projects such as the rideshare programs, unpaved road projects, and street sweepers. Ms. Bauer mentioned that CMAQ can be used for transportation projects and programs that reduce transportation related emissions. She stated that CMAQ is allocated under freeways for the Freeway Management System, Intelligent Transportation Systems as part of the streets category, light rail transit, bicycle/pedestrian, and projects that are specific to the air quality plans.

Mr. Hyde stated that the percentage of CMAQ funds going toward projects that are effective at reducing PM-10 emissions is approximately five to ten percent of the CMAQ budget. He inquired about the flexibility for reallocating the funds. Mr. Anderson replied that the funds allocations in the RTP could be changed through the TPC and Regional Council as part of the annual plan update cycle. He mentioned a national debate about whether CMAQ funds should be used solely for air quality improvement or continue to be used for a combination of congestion mitigation and air quality projects. Mr. Anderson discussed the multimodal aspects of the RTP and stated that there are many benefits in addition to addressing PM-10. He added that changing the fund allocations in the RTP would be a big step that would require extensive discussion and that the region is in the first year of Proposition 400. He stated that the discussion would rest with the TPC and that the TRC was not involved in preparation of the RTP. The fund allocation recommendations were made by the elected officials and business representatives on the TPC. Mr. Berry commented that the RTP was incorporated into the vote to extend the half-cent sales tax, which makes reallocation tricky.

Mr. Anderson stated that the TRC met earlier in the day and did not take action on PM-10 Paving Unpaved Road Projects for FY 2008 and 2009 CMAQ funding. Since there was not enough CMAQ funding for all of the paving unpaved road projects, the TRC recommended that the communities with projects work together to determine if the amount of federal funding required could be reduced and the amount of local funding be increased so the CMAQ funds could go further. Mr. Anderson mentioned that the TRC heard the message from this Committee and are taking it seriously. He stated that the TRC will meet December 14, 2006 and there may be a modification to the recommendation that moves forward regarding paving unpaved road projects.

Mr. O'Donnell inquired about rescinding the motion to recommend that the TPC consider reallocating funds in the TIP to air quality projects that address the dust control problem and invite more air quality projects to be submitted from the community. Mr. Berry replied that the original motion would begin to break down the agreement embodied in Proposition 400. He stated that the motion needs to be rescinded from a process standpoint. Mr. Berry added that more work still needs to be done to address the problem and make sure the funds are allocated to the best projects to reduce PM-10.

Ms. McGennis inquired about the motion from the September 28, 2006 meeting. Mr. Gibbs stated that page four of the September 28, 2006 meeting minutes includes the vote on the motion to recommend that the TPC consider reallocating funds in the TIP to air quality projects that address the dust control problem and invite more air quality projects to be submitted from the community.

Wienke Tax, Environmental Protection Agency, asked if the percentages in the fund allocation table are a reflection of what was in Proposition 400. Mr. Anderson responded that the percentages are included in the RTP, which formed the foundation of Proposition 400. He stated that maps and projects from the RTP were included in the detailed information that went to the voters as part of the ballot information pamphlet. Mr. Anderson mentioned that the question on the ballot was to extend

the half-cent sales tax as indicated in the RTP. He added that there are projects in the RTP that would be funded from multiple sources. Mr. Anderson stated that having all of the sources in the RTP gives the region a very integrated plan.

Beverly Chenausky, Arizona Department of Transportation, referred to the fund allocation table and clarified that the voters approved the percentages in the half-cent sales tax column. She added that there are no funds allocated in the half-cent sales tax column of the table for bicycle/pedestrian projects; however, the RTP states that bicycle/pedestrian projects would be federally funded through CMAQ funds. Mr. Cleveland called for a vote on the motion to rescind the motion to recommend that the TPC consider reallocating funds in the TIP to air quality projects that address the dust control problem and invite more air quality projects to be submitted from the community. The motion carried with Mr. Hyde voting no.

Mr. Cleveland mentioned that the message is loudly stated that air quality is a significant issue. He added that this is the first year of a 20 year plan and there will be a lot of opportunities in the future. Mr. Berry stated that it would be beneficial to get guidance on how the Committee can move forward within the parameters. He discussed the need to stop the creation of new unpaved roads and inquired about the process for creating new unpaved roads. Mr. Cleveland asked if Maricopa County could provide information for the next meeting. Jo Crumbaker, Maricopa County Air Quality Department, discussed the sensitivity of the issue. She stated that new unpaved roads are primarily because of lot splits. Ms. Crumbaker provided background information on lot split regulation and mentioned that it is currently being discussed. She stated that she will report back on any information available. Mr. Cleveland stated that Ms. McGennis may want to share information from the Town Hall with Ms. Crumbaker regarding lot splits.

5. Dust Suppressant Information

Ms. McGennis presented a dust suppressant case study used in the Salt River area. She provided background information on the Associated General Contractors (AGC) and discussed AGC and Arizona Rock Products Association involvement in the case study. Ms. McGennis stated that the City of Phoenix resumed enforcing a Neighborhood Preservation Ordinance, Chapter 39 and that a section of the ordinance applied to a number of AGC members in the Salt River area. She mentioned that the ordinance requires some corrective action when parking and maneuvering vehicles on a nonpaved surface. Ms. McGennis provided the definition of dust proof paving in the ordinance and indicated that paving was too expensive for some members of the AGC.

Ms. McGennis stated that Environmental Stabilization Solutions (EnSSo) conducted test sections on a mine site in Pinal County using a product called EnSSo Emulsion. Ms. McGennis mentioned that the product is a tall oil pitch emulsion, 100 percent organic, biodegradable, nonwater soluble, and a lot less expensive than some of the alternatives. She also discussed the various types of applications. Ms. McGennis stated that based on the statistics at the mine site, AGC contacted EnSSo and requested test cases in the Salt River area. She noted that EnSSo paid for the product used in the test cases. Ms. McGennis discussed a test case conducted at Reuter Equipment.

Ms. McGennis mentioned that EnSSo Emulsion was also applied to the 27th Avenue right-of-way in the Salt River area. She indicated that EnSSo combined recycled asphalt with the product due to the amount of traffic use on the test section. She mentioned that the shoulder stabilization has eliminated dust, requires little to no maintenance for 3-5 years, and the annual maintenance coat will

maintain surface stability indefinitely. Ms. McGennis asked that if other communities are considering adopting ordinances similar to the City of Phoenix, that an approved paving technique other than asphaltic concrete, cement concrete, or seal coat be considered. She also discussed a test case where EnSSo Emulsion had been applied to a construction site.

Mr. Gibbs commented on how well the product worked on the 27th Avenue test case. He clarified that the City of Phoenix conducted a proactive targeted enforcement of the Neighborhood Preservation Ordinance, Chapter 39. Mr. Gibbs added that the City of Phoenix typically enforces the ordinance on a complaint only basis due to staffing restrictions. He also stated that alternative paving methods are being done in the context of the urban heat island effect. The issue faced is the durability of the products. Ms. McGennis stated that using recycled products along with the emulsion may prove to be great alternatives. She added that she appreciates that the City of Phoenix has taken a leadership role in addressing dust emissions in the Salt River area.

Mr. O'Donnell asked if recycled asphalt was used in the construction site test case. Ms. McGennis replied that there is not much traffic on that site so just the product was used for stabilization. Mr. O'Donnell inquired about situations where just the product could be used. Ms. McGennis responded that recycled asphalt would likely be needed if there is truck traffic.

Mr. Hyde asked if concrete or asphalt would be preferable in some instances when the cost of the lifetime of the surface is amortized. He inquired if a lifetime cost analysis has been completed. Ms. McGennis that she would report back to the Committee. She added that shoulders are a problem in the Salt River area and a lot of creative thinking is needed to address the issue within the budget.

Mr. Cleveland referred to the definition of dust proof paving in the ordinance that included the cost for the different methods of paving. He suggested that the AGC apply the cost for the different paving methods to the test cases and bring the information back to the Committee. Mr. Cleveland encouraged creative ideas being brought forward to the Committee. He mentioned the City of Phoenix Neighborhood Preservation Ordinance, Chapter 39 as something other communities may want to consider. Mr. Cleveland indicated that he needed to leave and that Mr. Kukino would be Acting Chair for the rest of the meeting.

6. MAG Biogenics Study

Taejoo Shin, Maricopa Association of Governments, provided the results of the MAG Biogenics Study. He stated that biogenic source emissions are background emissions in estimating ozone concentrations. Mr. Shin mentioned that MAG contracted with ENVIRON International, Inc. to develop a state-of-the-art biogenics modeling system for the Maricopa County eight-hour ozone nonattainment area. He added that Dr. Alex Guenther, National Center for Atmospheric Research, was the subcontractor for the study. Mr. Shin discussed the timeline for the study and presented the field study results.

Mr. Shin discussed the Model of Emissions of Gases and Aerosols from Nature (MEGAN) model. He presented the MEGAN emission rate formula and stated that there are eleven modules in the MEGAN model. He mentioned the MEGAN Driving Variables Processor and presented the MAG Air Quality Modeling Chain. Mr. Shin discussed the temperature sensitivity of MEGAN volatile organic compounds (VOC) emissions for the eight-hour ozone modeling domain. He presented the VOC emission comparison between MAGBEIS2, the biogenics model previously used by MAG, and MEGAN and indicated that MEGAN estimated approximately 60 percent higher VOC emissions

for the eight-hour ozone modeling domain than MAGBEIS2. Also, MEGAN estimated about 30 percent lower VOC emissions in the urban area than MAGBEIS2. Mr. Shin added that MEGAN estimated slightly lower nitrogen oxide (NOx) emissions than MAGBEIS2.

Mr. O'Donnell inquired about a temperature correction in the formula due to the high temperatures in the region. Mr. Shin replied that the emission rate should be higher at a higher temperature. Mr. O'Donnell asked if the MEGAN model is good for the region. Mr. Shin responded that the MEGAN model is state-of-the-science and based on the latest local observations. He mentioned that the field study conducted in Maricopa County as part of the MAG Biogenics Study measured emission rates during the summer of 2006. Mr. O'Donnell asked if the results were compared to the formula. Mr. Shin replied that the formula is developed based on the local measurements.

Mr. Hyde stated that biogenic emissions are mostly hydrocarbons from plants and that it is critical to determine how biogenic emissions vary by hour. Mr. Hyde commented on the metabolism of desert plants shutting down when the temperature reaches 100 to 105 degrees. He asked if any discussions on that issue occurred during the study. Mr. Shin responded that the MEGAN model requires the input of hourly temperature data.

Mr. Berry inquired about the certainty of the MEGAN model. Mr. Shin responded that the MEGAN model gives an approximation of biogenic emissions. Mr. Berry commented on the extreme sensitivity to temperature. Mr. Shin replied that higher biogenic source emissions are located in nonurban areas. Mr. Berry asked if the region should be reducing VOC emissions. Mr. Shin responded that is correct. He added that certain plant species produced higher VOC emissions.

Mr. Berry commented on balancing the heat island effect, greenhouse gases, and biogenic emissions. Mr. Kukino stated that biogenic emissions are part of the natural background and the study provided the region with an estimate of the biogenic emissions as part of the natural background. He mentioned that policy implications about what plant species to grow in backyards is another question. Mr. Kukino inquired about how the higher VOC emissions will impact air quality modeling and efforts to implement control measures to reduce air pollution.

Mr. Berry commented on the higher VOC emissions according to the study and inquired about the relationship between VOC and NOx emissions. Cathy Arthur, Maricopa Association of Governments, replied that the increase in VOC emissions is in the nonurban area. The MEGAN models shows 30 percent lower VOC emissions in the urban area. Ms. Arthur indicated that the MEGAN model, emission rates for VOC and NOx from urban sources, wind fields, and chemistry will all be incorporated into the modeling for the eight-hour ozone standard. She added that the information will be brought to the Committee to see the impact on eight-hour ozone in 2008. Mr. Berry inquired about the NOx waiver. Ms. Arthur replied that MAG is conducting tests to determine if NOx decreases will increase or decrease ozone. She added that this information will also be presented to the Committee in the future. Mr. Berry commented on the new diesel fuel that reduces NOx.

Lucky Roberts, Town of Buckeye, asked if development teams should be encouraged to preserve desert areas instead of constructing green belts in order to reduce VOC emissions. Ms. Arthur replied that there are trade-offs. As was mentioned earlier, there is the heat island effect, greenhouse gases, and VOC emissions. Ms. Arthur stated that policies may differ. She mentioned that based on the MEGAN model, urbanization is reducing biogenic emissions.

Jamie McCullough, City of El Mirage, asked if the native desert plants are emitting more VOC emissions than the urban landscaped areas. Ms. Arthur responded that there are vegetation types in the desert that tend to be more dense in the nonurbanized area. She stated that if the same vegetation density were located in the urbanized area, it would emit the same amount of VOC emissions. Ms. Arthur added that there are plant species of urban landscaping that also emit VOC emissions. Mr. Kukino asked if the urban or nonurban area produces more VOC emissions. Ms. Arthur replied that the nonurban area produces more VOC emissions according to the MEGAN model.

Mr. Gibbs inquired if the amount of VOC emissions emitted from urban and nonurban plant species would be available. Ms. Arthur responded that the field study included urban and nonurban plant species and the emission rates are representative of both types of vegetation. Mr. Gibbs asked how someone would choose whether to plant native or nonnative plants to reduce VOC emissions. Ms. Arthur referred to a table that includes the plant species and corresponding VOC emission rates.

7. New Particulate Pollution Standards

Ms. Bauer gave an overview of the new particulate pollution standards. She indicated that the Environmental Protection Agency (EPA) issued the Final Revisions to the National Ambient Air Quality Standards for Particle Pollution (Particulate Matter) on September 21, 2006. Ms. Bauer stated that EPA retained the annual PM-2.5 standard and lowered the 24-hour PM-2.5 standard from 65 ug/m³ to 35 ug/m³. She mentioned that according to Maricopa County, the region does not violate the new 24-hour PM-2.5 standard. The region has recorded high concentrations per year; however, the 98th percentile of the three year average remains below the new 24-hour PM-2.5 standard. Ms. Bauer stated that EPA revoked the annual PM-10 standard and retained the 24-hour PM-10 standard. She mentioned that since the region violates the 24-hour PM-10 standard, the Five Percent Plan for PM-10 is still required.

Mr. Hyde inquired about including the annual PM-10 standard in the Five Percent Plan since the region violates the standard. Ms. Tax responded that the annual PM-10 standard does not need to be included in the Five Percent Plan. She added that the annual PM-10 standard will be revoked 90 days after the Final Revisions to the National Ambient Air Quality Standards for Particle Pollution (Particulate Matter) appears in the *Federal Register*.

8. Call for Future Agenda Items

Mr. Kukino announced that the next meeting of the Committee is tentatively scheduled for November 30, 2006. Mr. Berry suggested a presentation on recommendations of the Governor's Climate Change Advisory Group. Mr. Kukino inquired about when control measures for the Five Percent Plan will be brought to the Committee for discussion. Ms. Bauer replied that Maricopa County will be bringing forward the 2005 Emissions Inventory for PM-10 for the next meeting. She stated that in November, MAG staff will project the 2005 Emissions Inventory to 2007 for the Five Percent Plan, which will also be presented at the next meeting. In addition, a preliminary draft list of ideas for control measures for the Five Percent Plan will be on the next meeting agenda. Ms. Bauer stated that the list will serve as a starting point to begin discussions. She mentioned that this will lead up to a recommendation from the Committee for suggested measures to the implementing entities in February/March 2007. Ms. Bauer added that MAG staff will also provide an overview of the measure selection process. With no further comments, the meeting was adjourned.

Preliminary 2005 PM₁₀ Emissions Inventory Without Windblown Dust(for the PM₁₀ non-attainment area)

Source category	Method to develop preliminary 2005 emission estimates	2005 PM ₁₀ emissions (TPY)	% of total *
STATIONARY POINT SOURCES:	Individual facility surveys	988	1.1%
AREA SOURCES:			
-Industrial Processes:			
Chemical manufacturing	Grown from 2002 calculations	31	*
Commercial cooking	Restaurant permit data	1,530	1.8%
Grain handling/processing	Grown from 2002 calculations	8	*
Secondary metal production	"	7	*
Non-metallic mineral processes	"	95	0.1%
Mining and quarrying	"	25	*
Wood product manufacturing	"	158	0.2%
Rubber/plastic product mfg.	"	28	*
Fabricated metal products mfg.	"	1	*
Electrical equipment mfg.	"	1	*
State-permitted portable sources	"	122	0.1%
Industrial paved/unpaved road travel	"	76	0.1%
Engine testing	"	0	*
Crematories	"	2	*
Accidental releases	Individual facility surveys	0	*
Landfills	"	7	*
On-site incineration	"	1	*
Other industrial waste disposal	"	3	*
Industrial processes, NEC	"	26	*
-Subtotal, Industrial Processes:		2,121	2.5%
-Fuel Combustion:			
Industrial natural gas	Surveys of natural gas suppliers	16	*
Industrial fuel oil	Grown from 2002 calculations	61	0.1%
Commercial/institutional natural gas	Surveys of natural gas suppliers	60	0.1%
Commercial/institutional fuel oil	Grown from 2002 calculations	134	0.2%
Residential natural gas	Surveys of natural gas suppliers	63	0.1%
Residential wood	2003 Dept. of Energy data	231	0.3%
Residential fuel oil	2004 Dept. of Energy data	0	*
-Subtotal, Fuel Combustion:		565	0.7%
-Fires:			
Open burning	County burn permit data	35	*
Wildfires	AZ State Land Dept., GEOMAC data	537	0.6%
Prescribed fires	USDA-FS data	0	*
Structure fires	Fire Dept. surveys	23	*
Vehicle fires	Fire Dept. surveys	26	*
-Subtotal, Fires:		622	0.7%
-Agricultural Activities:			
Tilling	USDA AZ Ag. Statistics Svc. data	1,110	1.3%
Harvesting	USDA AZ Ag. Statistics Svc. data	52	0.1%
Travel on unpaved farm roads	URS/ERG approach	875	1.0%
Cotton ginning	Individual facility surveys	0	*
Livestock	USDA AZ Ag. Statistics Svc. data	132	0.2%
-Subtotal, Agricultural Activities:		2,169	2.5%

* indicates that a category comprises less than 0.05% of the total emissions inventory.

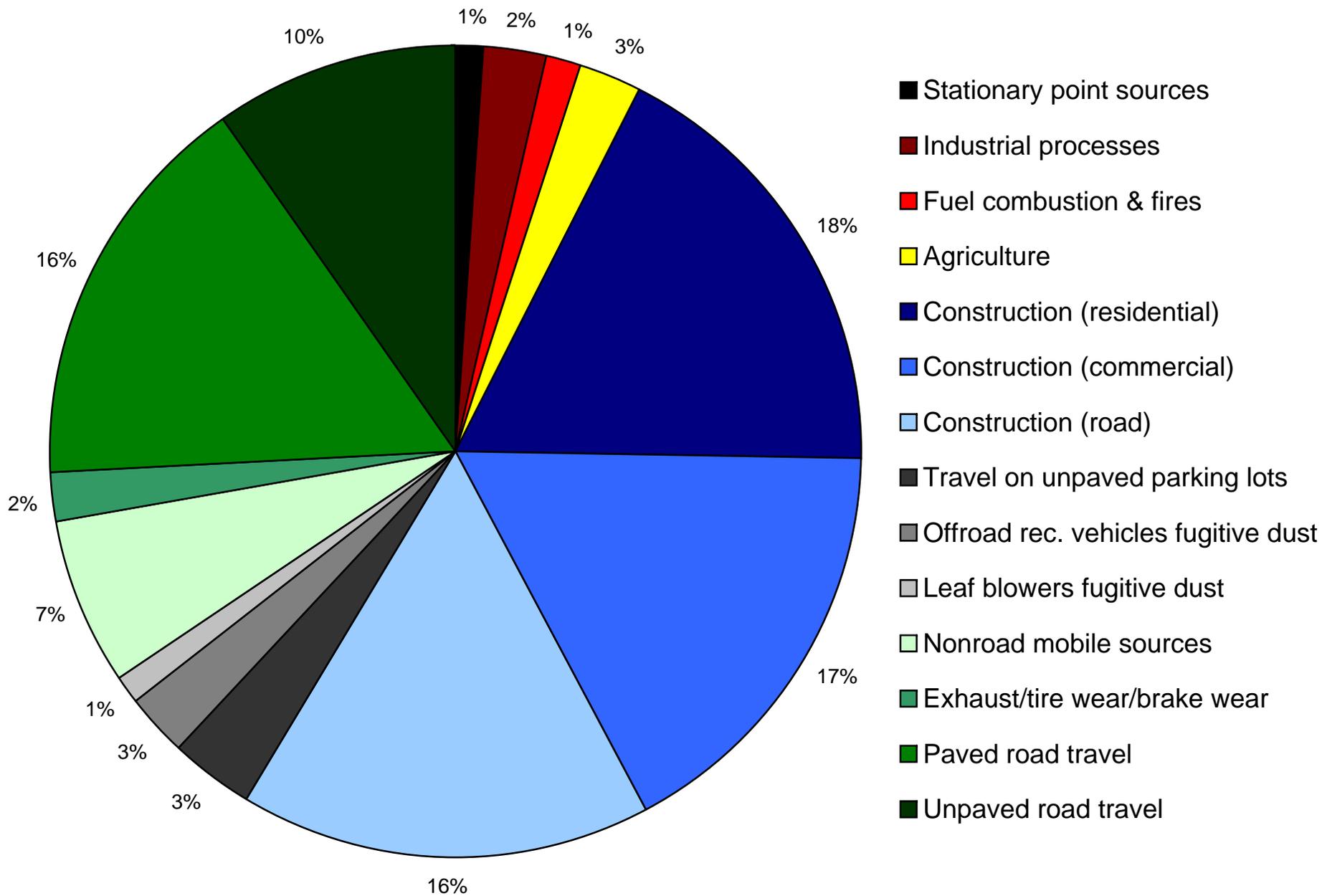
Preliminary 2005 PM₁₀ Emissions Inventory Without Windblown Dust
(for the PM₁₀ non-attainment area)

Source category	Method to develop preliminary 2005 emission estimates	2005 PM₁₀ emissions (TPY)	% of total *
AREA SOURCES (continued):			
-Construction:			
Residential (single- and multi-family)	Dust control permit data	15,191	17.6%
Commercial	"	14,816	17.2%
Road construction	"	13,928	16.2%
Trenching	"	33	*
Weed control	"	19	*
-Subtotal, Construction:		43,986	51.0%
-Miscellaneous Area Sources:			
Travel on unpaved parking lots	WRAP approach, MAG land use data	3,010	3.5%
Offroad rec. vehicles fugitive dust	NONROAD model activity data	2,159	2.5%
Leaf blowers fugitive dust	CE-CERT approach	843	1.0%
Windblown dust	(not included)	-	-
-Subtotal, Misc. Area Sources:		6,012	7.0%
TOTAL, ALL AREA SOURCES:		55,475	64.4%
NONROAD MOBILE SOURCES:			
Agricultural equipment	NONROAD model	19	*
Airport ground support equipment	Equipment activity survey (MAG)	16	*
Commercial equipment	NONROAD model	118	0.1%
Construction and mining equipment	"	1,356	1.6%
Industrial equipment	"	109	0.1%
Comm. & residential lawn/garden	"	177	0.2%
Logging equipment	"	0	*
Pleasure craft	"	9	*
Railway maintenance equipment	"	1	*
Recreational equipment	"	9	*
Aircraft	Airport activity surveys	3,857	4.5%
Locomotives	Locomotive activity surveys	38	*
TOTAL, NONROAD MOBILE:		5,711	6.6%
ONROAD MOBILE SOURCES:			
Exhaust	MOBILE 6.2 model	1,041	1.2%
Tire wear	"	305	0.4%
Brake wear	"	394	0.5%
Paved road fugitive dust	EPA AP-42	13,783	16.0%
Unpaved road fugitive dust	"	8,490	9.9%
TOTAL, ONROAD MOBILE:		24,013	27.9%
GRAND TOTAL, ALL CATEGORIES:		86,186	100.0%

* indicates that a category comprises less than 0.05% of the total emissions inventory.

Preliminary 2005 PM₁₀ Emissions Inventory Without Windblown Dust

(PM-10 Nonattainment Area Total = 86,186 TPY)



2006 EXCEEDANCES OF THE 24-HOUR PM-10 STANDARD THROUGH NOVEMBER 29, 2006*

Site	ug/m ³	Date
West 43 rd Avenue	190.4	January 10, 2006
	165.7	January 11, 2006
	169.8	January 12, 2006
	157.2	January 13, 2006
	184.0	January 19, 2006
	183.9	February 8, 2006
	204.6	February 9, 2006
	202.2	February 15, 2006
	260.8	March 10, 2006
	313.1	April 14, 2006
	191.6	April 15, 2006
	174.7	May 22, 2006
	160.0	June 2, 2006
	164.2	November 16, 2006
	175.1	November 17, 2006
	164.5	November 27, 2006
Durango	155.5	January 10, 2006
	169.2	January 11, 2006
	170.1	January 12, 2006
	183.8	January 19, 2006
	171.7	February 9, 2006
	157.5	February 15, 2006
	240.7	March 10, 2006
	253.7	April 14, 2006
	179.6	April 15, 2006
Higley	170.4	January 24, 2006
	222.0	April 14, 2006
	274.6	April 15, 2006
	156.1	June 6, 2006
	166.2	October 5, 2006
Buckeye	159.7	February 13, 2006
	272.9	February 14, 2006
	191.9	February 17, 2006
	221.9	April 14, 2006
Greenwood	166.5	March 10, 2006
	212.5	April 14, 2006
	170.6	April 15, 2006

* Based on preliminary data.

**2006 EXCEEDANCES OF THE 24-HOUR PM-10 STANDARD
THROUGH NOVEMBER 29, 2006***

Site	ug/m³	Date
Central Phoenix	190.3	April 14, 2006
	187.5	April 15, 2006
West Phoenix	177.6	April 14, 2006

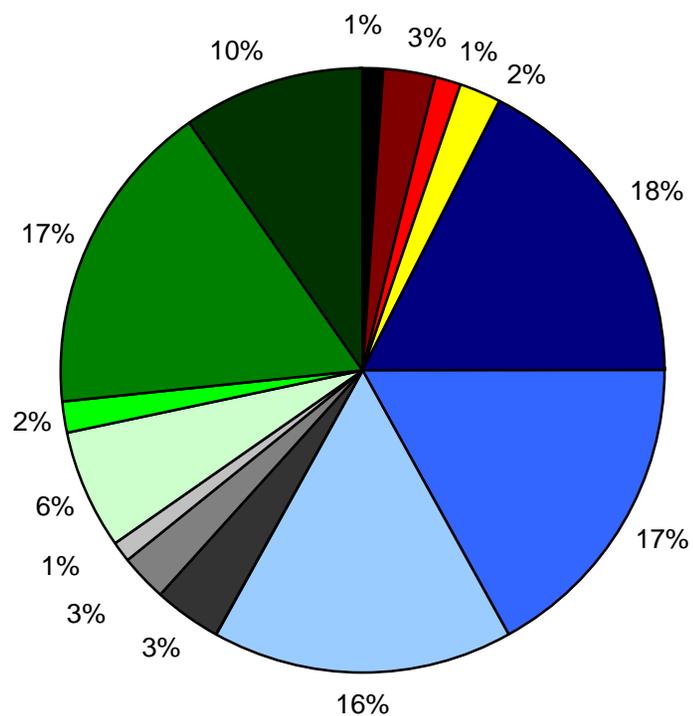
* Based on preliminary data.

Preliminary 2007, 2008 & 2009 PM-10 Emissions Without Windblown Dust in the PM-10 Nonattainment Area
(in tons/year)

Source Categories	2005 ¹	% of total	2007	% of total	2008	% of total	2009	% of total
Stationary point sources	988	1.1%	1,052	1.2%	1,085	1.2%	1,117	1.3%
Industrial processes	2,121	2.5%	2,259	2.6%	2,328	2.7%	2,398	2.7%
Fuel combustion & fires	1,187	1.4%	1,219	1.4%	1,236	1.4%	1,252	1.4%
Agriculture	2,169	2.5%	1,920	2.2%	1,810	2.1%	1,710	2.0%
Construction (residential)	15,191	17.6%	15,191	17.5%	15,191	17.5%	15,191	17.4%
Construction (commercial)	14,816	17.2%	14,816	17.1%	14,816	17.0%	14,816	17.0%
Construction (road)	13,928	16.2%	13,928	16.1%	13,928	16.0%	13,928	15.9%
Trenching & weed control	52	0.1%	52	0.1%	52	0.1%	52	0.1%
Travel on unpaved parking lots	3,010	3.5%	3,010	3.5%	3,010	3.5%	3,010	3.4%
Offroad rec vehicles fugitive dust	2,159	2.5%	2,283	2.6%	2,345	2.7%	2,407	2.8%
Leaf blowers fugitive dust	843	1.0%	891	1.0%	916	1.1%	940	1.1%
Nonroad mobile sources	5,709	6.6%	5,438	6.3%	5,308	6.1%	5,183	5.9%
Exhaust/tire wear/brake wear	1,740	2.0%	1,669	1.9%	1,624	1.9%	1,544	1.8%
Paved road travel	13,783	16.0%	14,540	16.8%	14,898	17.1%	15,304	17.5%
Unpaved road travel	8,490	9.9%	8,490	9.8%	8,490	9.8%	8,490	9.7%
Total PM-10 Emissions	86,186	100.0%	86,760	100.0%	87,036	100.0%	87,341	100.0%

¹Based on the MCAQD Preliminary 2005 PM-10 Emissions Inventory Without Windblown Dust, dated 11/29/06

Preliminary 2007 PM-10 Emissions Without Windblown Dust in the PM-10 Nonattainment Area



Total = 86,760 tpy

- Stationary point sources
- Industrial processes
- Fuel combustion & fires
- Agriculture
- Construction (residential)
- Construction (commercial)
- Construction (road)
- Travel on unpaved parking lots
- Offroad rec vehicles fugitive dust
- Leaf blowers fugitive dust
- Nonroad mobile sources
- Exhaust/tire wear/brake wear
- Paved road travel
- Unpaved road travel

**PRELIMINARY DRAFT COMPREHENSIVE LIST OF
MEASURES TO REDUCE PM-10 PARTICULATE MATTER**

November 28, 2006

**PRELIMINARY DRAFT COMPREHENSIVE LIST OF MEASURES
TO REDUCE PM-10 PARTICULATE MATTER**

MEASURE	FIVE PERCENT REDUCTION IN EMISSIONS	MODELING ATTAINMENT DEMONSTRATION	ATTAINMENT AT THE MONITORS	POTENTIAL IMPLEMENTING ENTITY
<p>Agriculture The Governor's Agricultural Best Management Practices Committee is in the process of evaluating potential measures to further reduce PM-10 emissions from agriculture for consideration for the Five Percent Plan for PM-10. This Committee was established by law in 1998 (Arizona Revised Statutes, Title 49-457) to develop an agricultural PM-10 general permit that would address the need for controls on agricultural operations. The potential agricultural measures will be presented to the MAG Air Quality Technical Advisory Committee for consideration.</p>				
Fugitive Dust Control Rules				
1. Public education and outreach (e.g., Clark County) with assistance from local governments	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	L	County, local govts
2. Extensive Dust Control Training Program (e.g., Clark County)	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	M	County, private sector
3. Core Dust Control Training Program with video provided to local governments and private sector	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	M	County, local govts, private sector
4. Dust Managers required at construction sites of 50 acres and greater (e.g., Clark County)	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	M	County
5. Dedicated coordinator for unpaved roads and vacant lots (e.g., Clark County)	H (increasing Rule 310.01 effectiveness)	H (increasing Rule 310.01 effectiveness)	M	County
6. Strengthen trackout provisions - reduce length that requires rapid cleanup (e.g., 25 feet cumulative from all exits) - increase size of gravel pad - require grizzly and gravel pad	H (increasing Rule 310 & 310.01 effectiveness)	H (increasing Rule 310 & 310.01 effectiveness)	H	County

MEASURE	FIVE PERCENT REDUCTION IN EMISSIONS	MODELING ATTAINMENT DEMONSTRATION	ATTAINMENT AT THE MONITORS	POTENTIAL IMPLEMENTING ENTITY
7. Increase fines for dust control violations and continue to publish the list of violators	H (increasing Rule 310 & 310.01 compliance)	H (increasing Rule 310 & 310.01 compliance)	H	County
8. Establish a certification program for Dust Free Developments to serve as an industry standard	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	L	State, County
9. Better defined tarping requirements in Rule 310 to include enclosure of the bed	H (increasing Rule 310 effectiveness)	H (increasing Rule 310 effectiveness)	M	County
Industry				
10. Implement Rule 316	L	L	H	County, private sector
11. Require private companies to use PM-10 certified street sweepers or water filtration system sweepers on paved areas including parking lots (e.g., Clark County)	L	L	H	State
12. Shift hours of operation during stagnant conditions in November through February	N/A	H	H	State
13. Model cumulative impacts for new or modified existing sources	L	L	M	State
14. Conduct night time and weekend inspections	L	M	M	County
Nonroad Activities				
15. Discourage use of leaf blowers on high pollution advisory days	L	L	L	State, County
16. Encourage use of leaf vacuums to replace blowers	L	L	L	State, County
17. Reduce off-road vehicle use in areas with high off-road vehicle activity (e.g., Goodyear Ordinance)	M	L	L	State, County, local govts

MEASURE	FIVE PERCENT REDUCTION IN EMISSIONS	MODELING ATTAINMENT DEMONSTRATION	ATTAINMENT AT THE MONITORS	POTENTIAL IMPLEMENTING ENTITY
18. Create a fund to provide incentives to retrofit nonroad diesel engines and encourage early replacements with advanced technologies	L	L	L	State
19. Update the statutes to require ultra-low sulfur diesel fuels for nonroad equipment	L	L	L	State
Paved Roads				
20. Sweep streets with PM-10 certified street sweepers	M	M	M	County, local govts
21. Retrofit onroad diesel engines	L	L	L	State, County, local govts
22. Pave or overlay with rubberized asphalt	L	L	L	State, County, local govts
Unpaved Parking Lots				
23. Pave or stabilize existing unpaved parking lots (e.g., Phoenix Parking Code)	M	M	M	County, local govts
Unpaved Roads				
24. Pave or stabilize existing dirt roads and alleys	H	N/A	L	County, local govts
24. Limit speeds to 15 miles per hour on high traffic dirt roads	H	N/A	L	County, local govts
26. Prohibit new dirt roads including those associated with lot splits	N/A	N/A	L	State, County
Unpaved Shoulders				
27. Pave or stabilize unpaved shoulders	H	M	M	County, local govts

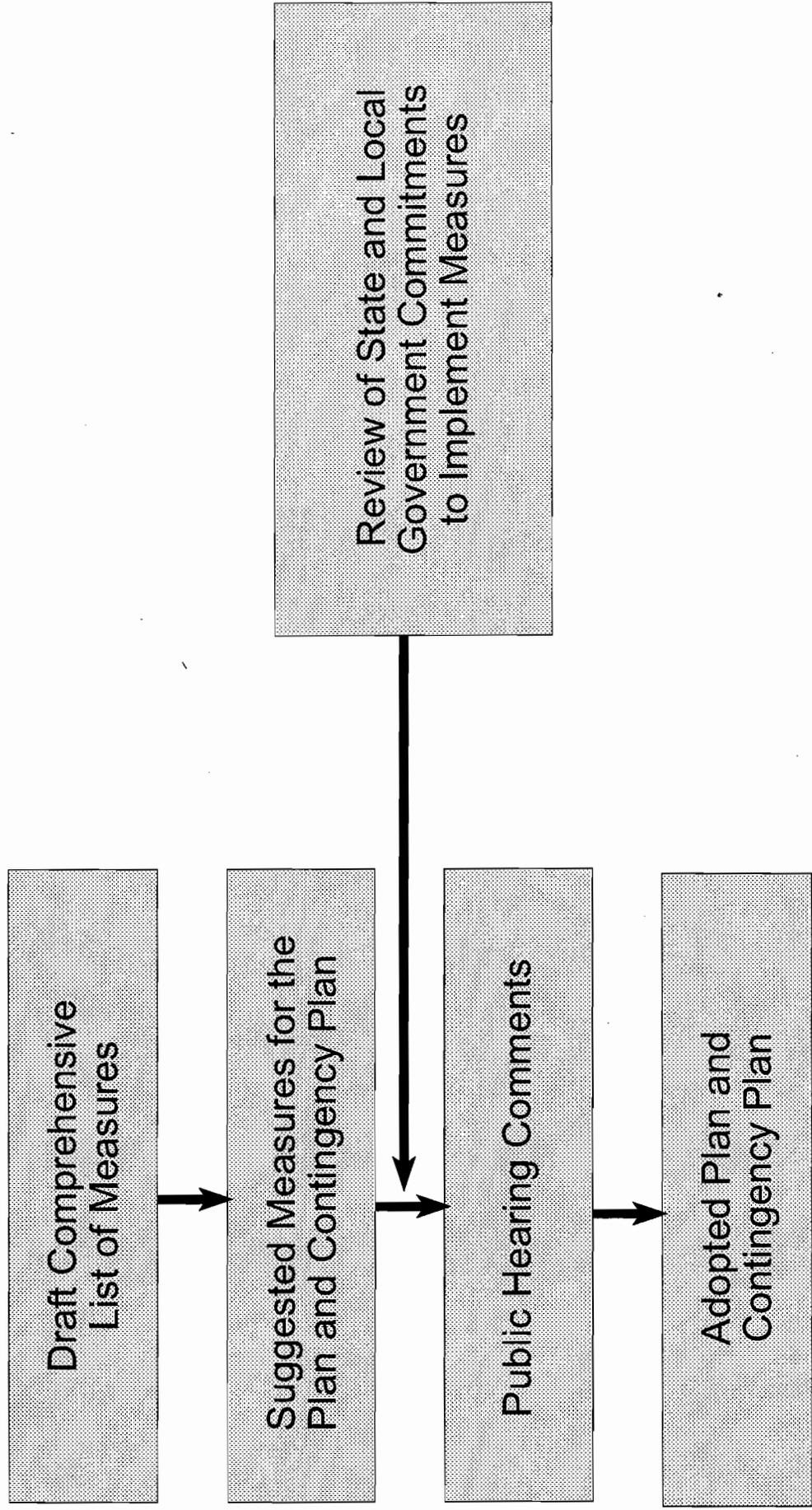
MEASURE	FIVE PERCENT REDUCTION IN EMISSIONS	MODELING ATTAINMENT DEMONSTRATION	ATTAINMENT AT THE MONITORS	POTENTIAL IMPLEMENTING ENTITY
Unpaved Access Points				
28. Pave or stabilize unpaved access to paved roads	M	M	M	County, local govts
Vacant Lots				
29. Strengthen and increase enforcement of Rule 310.01 for vacant lots	H (increasing Rule 310.01 effectiveness)	L	M	County
30. Restrict vehicular use and parking on vacant lots (e.g., Phoenix)	H (increasing Rule 310.01 effectiveness)	L	M	County, local govts
31. Enhanced enforcement of trespass ordinances and codes	H (increasing Rule 310.01 effectiveness)	L	M	County, local govts
32. Vacant lots stabilized by County if owners do not respond, liens put on property if necessary (e.g., Clark County)	H (increasing Rule 310.01 effectiveness)	H	M	State, County

Note: Low, medium, and high rankings are preliminary qualitative assessments and will be revised when the emissions inventory and modeling data are available.

**MEASURE SELECTION PROCESS FOR
THE MAG FIVE PERCENT PLAN FOR PM-10**

November 30, 2006

MEASURE SELECTION PROCESS FOR MAG AIR QUALITY PLANS



**TENTATIVE SCHEDULE FOR THE MEASURE SELECTION PROCESS FOR
THE MAG FIVE PERCENT PLAN FOR PM-10**

- **December 7, 2006** - MAG Air Quality Technical Advisory Committee (AQTAC) will review the Preliminary Draft Comprehensive List of Measures and new emissions inventories.
- **January 11, 2007** - Preliminary data from the MAG PM-10 Source Attribution and Deposition Study will be presented to the AQTAC.
- **February 1 and February 15, 2007** - Report describing the measures on the Draft Comprehensive List will be discussed with the AQTAC.
- **March 1, 2007** - AQTAC may recommend a Suggested List of Measures for the Five Percent Plan for PM-10 to the MAG Management Committee. Justification for measures not recommended may also be provided by the AQTAC (e.g., technologically and economically infeasible, otherwise unreasonable).
- **March 14, 2007** - MAG Management Committee may make a recommendation on the Suggested List of Measures to the MAG Regional Council.
- **March 28, 2007** - MAG Regional Council may approve the Suggested List of Measures for the Five Percent Plan for PM-10.
- **April - June 2007** - Local governments and the State may review the measures under their respective authorities for possible implementation. Each implementing entity determines which measures are feasible for implementation by that entity.
- **June 2007** - Commitments to implement measures from the local governments are due to be submitted to MAG for analysis and inclusion in the adopted plan.

MAG COMMITTEE STRUCTURE

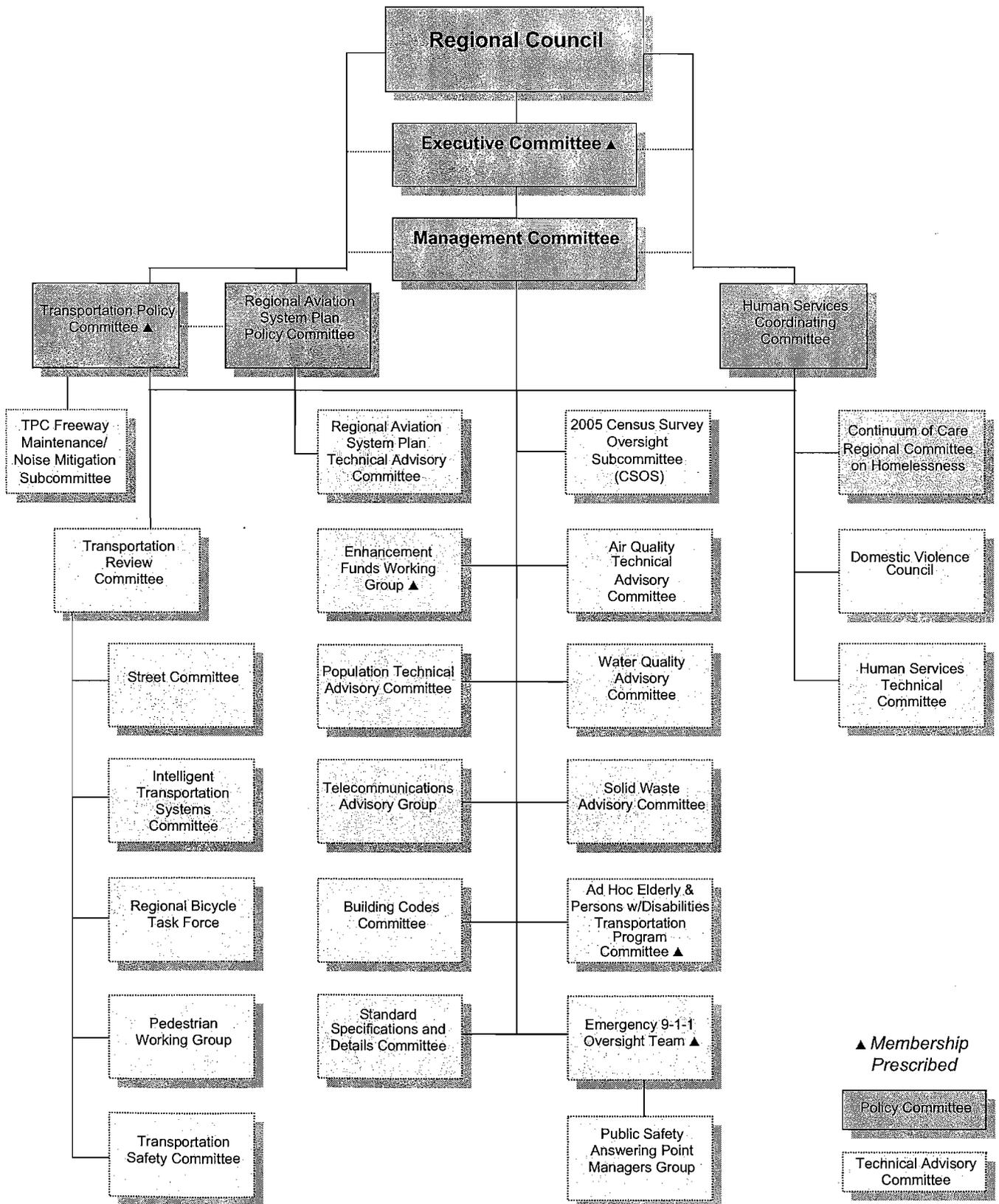


Figure 7: MAG Committee Structure
 Maricopa Association of Governments

HOW LOCAL GOVERNMENTS COMMIT TO IMPLEMENT MEASURES

STEP 1

MAG Regional Council approves a Suggested List of Measures

- State measures
- Local government measures

STEP 2

Each MAG member agency reviews local government portion of list and decides what measures to implement

STEP 3

Each Council passes resolution* describing the measures to be implemented

- Measure description
- Legal authority for implementation
- Funding for measure
- Enforcement

STEP 4

Each MAG member agency also describes reasons* for rejecting any local government measures

- Technologically or economically infeasible
- Otherwise unreasonable

STEP 5

Each MAG member agency submits the resolution and reasons for rejection to MAG for the plan

*Guidance will be provided by MAG staff.

Guide to Agricultural PM₁₀ Best Management Practices

Maricopa County, Arizona
PM₁₀ Non-Attainment Area



Governor's Agricultural
Best Management Practices Committee




Governor's Agricultural BMP Committee

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

Wade Accomazzo, Alfalfa Producer, Tolleson, Arizona

Sheldon R. Jones, Director, Arizona Department of Agriculture, Phoenix, Arizona

Alfred Lopez, Citrus Producer, Sun City, Arizona

Kevin G. Rogers, Cotton Producer, Mesa, Arizona

Will Rousseau, Vegetable Producer, Litchfield Park, Arizona

Eugene G. Sander, Vice Provost and Dean, College of Agriculture and Life Sciences, University of Arizona, Tucson, Arizona

(Designee Colin Kaltenbach, Director of Agricultural Experiment Stations, University of Arizona, Tucson, Arizona)

Jacqueline E. Schafer, Director, Arizona Department of Environmental Quality, Phoenix, Arizona

(Designee Nancy Wrona, Director, Air Quality Division, Arizona Department of Environmental Quality, Phoenix, Arizona)

Michael Somerville, State Conservationist, Natural Resources Conservation Service, Phoenix, Arizona

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

The intent of this guide is to provide information and guidance on how to effectively implement best management practices. It is based on the best information currently available; later publications may be issued to update this document. This guide represents the first step in helping farmers reduce PM₁₀ emissions from farmlands located within the Maricopa County PM₁₀ non-attainment area.

The Governor's Agricultural BMP Committee gratefully recognizes, thanks, and appreciates the input, review, suggestions, and overall support of many individuals and groups involved in this process.

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Dan Thelander, Grain Producer, Chandler, Arizona

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Many individuals were involved in capacities not associated with a formal work group; regardless, their contribution is worthy of gratitude.

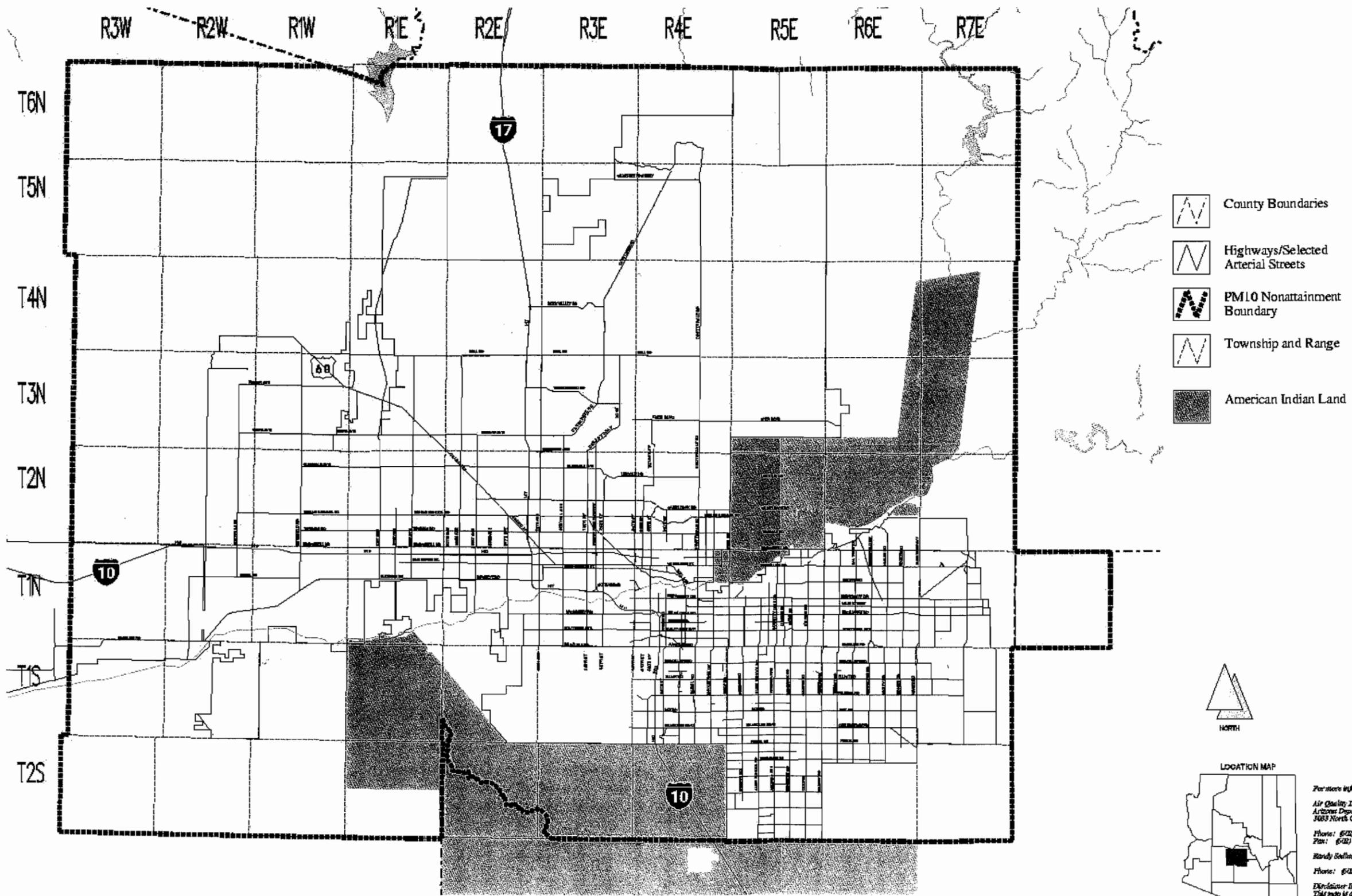
Ron Alvarado, Jennifer Anderson, Cathy Arthur, Daniel Blair, George Bluhm, Jim Briggs, Jo Crumbaker, Andrea Domanik, Ira Domsy, Mike George, Joe Gibbs, Cheryl Goar, John Hagen, Ron Hemmer, Macario "Mac" Herrera, Michael Kidd, Julia Lester, Marilyn Martin, Gary Neuroth, Cathy O'Connell, B. Bobby Ramirez, Shannon Reif, Chris Robbins, Rick Saylor, Don Walther, and members of the National Agricultural Air Quality Task Force.

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Guide to Agricultural PM₁₀ Best Management Practices

Table of Contents

Maricopa County PM₁₀ Nonattainment Boundary Map	2
Introduction	3
Why is this Guide to Agricultural PM ₁₀ Best Management Practices needed?	3
Why was the agricultural PM ₁₀ general permit created?	3
Who must comply with the agricultural PM ₁₀ general permit?	4
What does the farmer have to do?	4
When must the agricultural PM ₁₀ general permit be implemented?	4
What will happen if I do not comply with the agricultural PM ₁₀ general permit?	4
Where does the agricultural PM ₁₀ general permit apply?	5
Winds in Maricopa County	5
Where can I learn more?	5
How Soils Can Become PM₁₀	6
Best Management Practices	8
Tillage and Harvest	9
Chemical Irrigation	9
Combining Tractor Operations	9
Equipment Modification	10
Limited Activity during a High-Wind Event	10
Multi-Year Crop	11
Planting Based on Soil Moisture	11
Reduced Harvest Activity	12
Reduced Tillage System	12
Tillage Based on Soil Moisture	12
Timing of a Tillage Operation	13
Non-cropland	14
Access Restriction	14
Aggregate Cover	15
Artificial Wind Barrier	15
Critical Area Planting	15
Manure Application	16
Reduce Vehicle Speed	16
Synthetic Particulate Suppressant	16
Track-out Control System	17
Tree, Shrub or Windbreak Planting	18
Watering	18
Cropland	19
Artificial Wind Barrier	19
Cover Crop	19
Cross-Wind Ridges	20
Cross-Wind Strip-Cropping	20
Cross-Wind Vegetative Strips	21
Manure Application	21
Mulching	22
Multi-Year Crop	22
Permanent Cover	23
Planting Based on Soil Moisture	23
Residue Management	23
Sequential Cropping	24
Surface Roughening	25
Tree, Shrub or Windbreak Planting	25
Sample Agricultural BMP General Permit Record	inside back cover



LOCATION MAP

For more information about this map contact:
 Air Quality Division, CES Mapping Staff
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Disclaimer: This map is a PRELIMINARY DOCUMENT. It is designed for presentation and discussion and is subject to change and further refinement.

Maricopa County PM₁₀ Non-Attainment Area Boundary

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 producing 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.

With this potential threat to human health, several groups in the Phoenix metropolitan area have developed and are implementing programs to help the area meet the Federal Clean Air Act standards for PM₁₀.

The intent of this guide is to:

- ♦ Provide agricultural operators with information and guidance on how to effectively implement individual best management practices (BMP).
- ♦ Inform the general public about the efforts Maricopa County farmers are

implementing to improve air quality.

- ♦ Provide Natural Resource Conservation Districts (NRCD) and other farm organizations with background information regarding the agricultural PM₁₀ general permit.
- ♦ Provide regulators with information and guidance on how to determine compliance with the agricultural PM₁₀ general permit.

Why was the agricultural PM₁₀ 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) redesignated the Maricopa County non-attainment 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 feasi-



ble, effective and common sense practices that minimized negative impacts on local agriculture. This agricultural PM₁₀ general permit requires that at least one BMP be implemented to control PM₁₀ for each of the following three categories: tillage and harvest, non-cropland and cropland. The committee is composed of five local farmers, the director of ADEQ, the director of Arizona's Department of Agriculture, the state conservationist for the Natural Resources Conservation Service (NRCS), the vice dean of the University of Arizona College of Agriculture and a soil scientist from the University of Arizona.

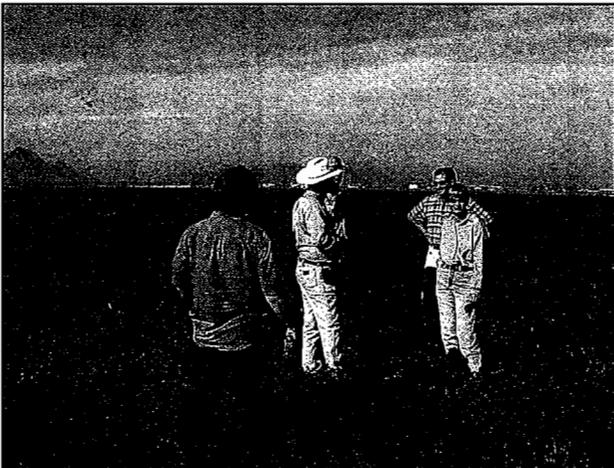
Because A.R.S. §49-457 was developed and adopted, EPA removed the portion of the federal implementation plan for agriculture on June 29, 1999 [64 Federal Register p. 34,726].

Who must comply with the agricultural PM₁₀ general permit?

Any farmer who farms more than 10 contiguous acres of land located within the Maricopa County PM₁₀ non-attainment area must comply with the agricultural PM₁₀ general permit. (See map on page two.)

What does the farmer have to do?

- ♦ Implement and maintain at least one approved BMP (described later in this document) for each of the three categories: tillage



and harvest, non-cropland and cropland.

- ♦ Keep a record detailing the BMPs selected for each category. The commercial farmer may document the practice on the sample BMP agricultural PM₁₀ permit record (see inside back cover) or develop a record that includes the information required by the agricultural PM₁₀ general permit. The commercial farmer must make available the record to the ADEQ director within two business days of notice to the farmer.
- ♦ The committee recommends additional record keeping if implementation of the BMPs is not easily visible. Examples of additional record keeping include, but are not limited to, photographs, purchase records, receipts, job sheets, contractor invoices, employee timesheets, logs, narrative statements, individual farm policies, statements of understanding signed by employees or contractors, and training records.
- ♦ There is no fee associated with the agricultural PM₁₀ general permit.

When must the agricultural PM₁₀ general permit be implemented?

A farmer engaged in agricultural activities before June 10, 2000 must comply with the agricultural PM₁₀ general permit by December 31, 2001. A commercial farmer who engages in agricultural activities after December 31, 2000 has 18 months to comply with the agricultural PM₁₀ general permit.

What will happen if I do not comply with the agricultural PM₁₀ general permit?

If the ADEQ director determines that a commercial farmer is not in compliance with the agricultural PM₁₀ general permit, the following three-stage process occurs. (At each stage, the farmer will have the opportunity for a hearing.)

- ♦ If the farmer has not previously been subject to an agricultural general permit relat-

ed 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 farmer will use to comply with the general permit.

- ◆ If the farmer has previously been subject to an agricultural PM₁₀ general permit related compliance order, the farmer will be required to submit a plan to ADEQ that specifies the BMPs that the farmer will use to comply with the general permit.
- ◆ If the farmer fails to comply with the plan submitted to NRCD and ADEQ, the director of ADEQ may revoke the agricultural PM₁₀ general permit and require the farmer to obtain an individual fee based permit.

Where does the agricultural PM₁₀ general permit apply?

Any agricultural operation greater than 10 contiguous acres within the Maricopa County PM₁₀ non-attainment area, except on tribal lands, must comply with the agricultural PM₁₀ general permit. (See map on page two.)

Winds in Maricopa County

Research shows that winds in Phoenix generally blow from the east during the night and early morning hours, then reverse so they blow from the west during the afternoon. This is in part related to Central Arizona terrain. The higher land areas (mountains) to the east heat up and cool off faster than the valleys. This creates air movement – toward the mountains during the day and toward the valleys at night.

Because of global climate patterns, the prevailing winds are from the west at Arizona's latitude of 30 degrees. Add in the local westerly winds and wind speeds can approach 20 mph in the afternoon during warmer months.

From October through April, storm systems enter Arizona from the Pacific Ocean. The

Where can I learn more?

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

Arizona Department of Environmental Quality
3003 N. Central Ave., T5109B
Phoenix, AZ 85012
Air Quality Planning Section (602) 207-2375
Air Compliance Section (602) 207-2328
(800) 234-5677
Fax (602) 207-2366

For copies of the agricultural PM₁₀ general permit, visit the ADEQ Air Quality Division home page at www.adeq.state.az.us/environ/air/plan/pcp.html. Hard copies are available at:

Maricopa County Farm Bureau
4001 E. Broadway, Suite B9
Phoenix, AZ 85040
(602) 437-1330

Maricopa County Cooperative Extension
4341 E. Broadway Road
Phoenix, AZ 85040
(602) 470-8086
www.ag.arizona.edu/extension/counties/maricopa

Natural Resources Conservation Service
3003 N. Central Ave. Suite 800
Phoenix, AZ 85012
(602) 280-8801
www.az.nrcs.usda.gov

Natural Resource Conservation Districts (NRCD) can provide technical assistance regarding the selection, adoption and implementation of BMPs.

Agua Fria-New River Natural Resource Conservation District
3150 N. 35th Avenue, Suite 7
Phoenix, AZ 85017
(602) 353-0378
www.az.nrcd.org/aguafria/nrcd1.htm

East Maricopa Natural Resource Conservation District
18256 E. Williams Field Road, Suite 1
Higley, AZ 85236
(480) 988-1078

surface winds ahead of these cold fronts typically blow from the south or southwest and can be quite gusty – up to 40 mph. After frontal passage, the winds typically shift and can also be strong from the west or northwest.

During the summer months – usually July through September – monsoon thunderstorms can cause strong surface winds, again 40 mph or

stronger. Downdrafts from the clouds can cause the winds to come from any direction, although south and southeast winds are common.

Any of these high wind conditions can increase the amount of particulate matter in the air.

How Soils Can Become PM₁₀

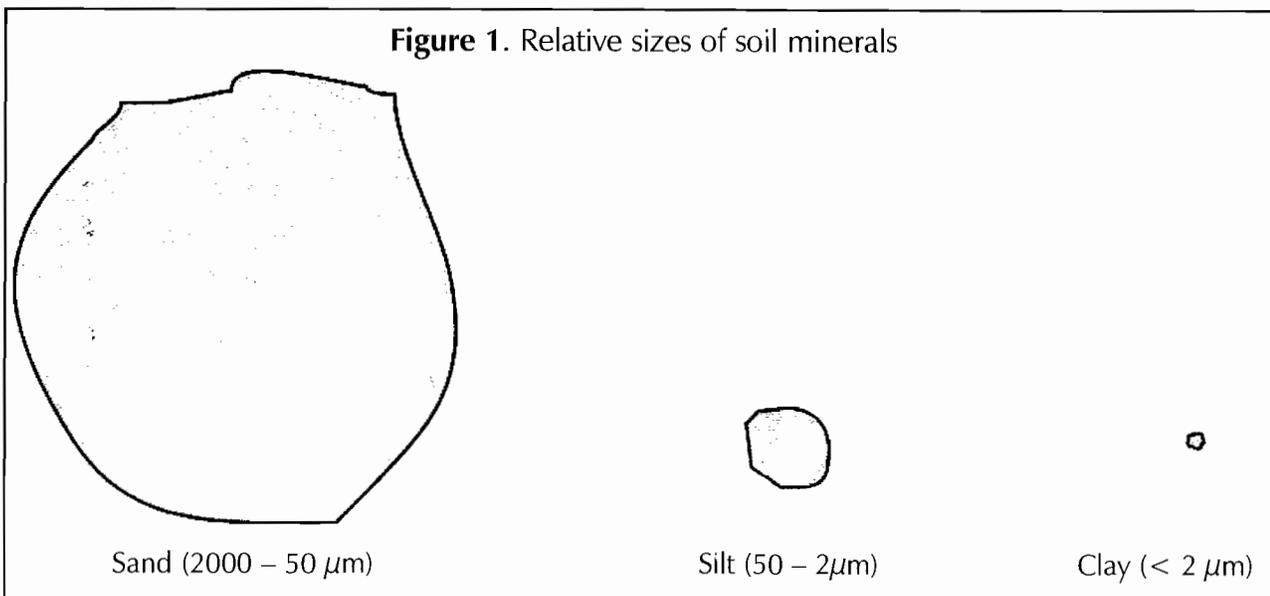
Particulate matter is finely divided solid or liquid material with an aerodynamic size smaller than 100 micrometers (μm). This is commonly known as dust or even fugitive dust.

Specifically, particulate matter consists of solid or liquid substances that are visible as well as invisible. These particles vary in shape and size, ranging from large drops of liquid to microscopic dust particles to tobacco smoke to aerosols. The particles affect visibility and can be transported for long distances by winds. The small particles can be dangerous to human health because their size makes it possible to pass through nostril hairs and enter the lungs. The smaller the particle, the deeper it can penetrate into the lungs where it can

become lodged and not easily, if ever, expelled.

The potential for soil to release dust into the atmosphere depends largely on the soil particle, its size and the condition of the soil surface. Suspensible particles exist in most natural soils, although particles in the PM₁₀ size range are often bonded tightly to other particles making large aggregates. Energy (usually in the form of increased wind speed and/or traffic over the soil surface) is needed to break the aggregates into smaller sized particles. The destruction of those bonds can give way to the generation of fugitive dust. PM₁₀ can be suspended, while particles greater than 80 μm rarely stay in suspension because they are too heavy.

Figure 1. Relative sizes of soil minerals



Sand (2000 – 50 μm)

Silt (50 – 2 μm)

Clay (< 2 μm)

Soils have four main constituents: mineral matter, organic matter, air and water. Minerals are the major constituent in Arizona soils and are derived from the parent material by weathering. Organic matter is derived mostly from decaying plant material that is broken down and decomposed by animals and microorganisms living in the soil. Arizona soils generally contain relatively small amounts of organic matter due to limited plant growth and rapid decomposition of dead plant matter. Air and water fill the pore spaces found between the mineral and organic matter in soils.

Mineral particles range in size from 2,000 μm to less than $2\mu\text{m}$ and are the bases upon which soil texture is determined. Soil mineral particles can be classified as sand (2000 to $50\mu\text{m}$), silt (50 to $2\mu\text{m}$) or clay ($< 2\mu\text{m}$) (see Figure 1).

The textural class of a soil is determined by estimating the particle size distribution in the field by the "feel method" or analytically through laboratory measurement. Once the percentages of soil particles are decided, the soil textural triangle (see Figure 2) is used to classify the soil further. It is interesting to note that field determinations are commonly within 3 percent of laboratory derived values. Local soil surveys made available by the Natural Resources Conservation Service contain these textural classes.

PM_{10} originating from soil is composed of clay particles and large silt particles. Soils with high amounts of these particles have a strong potential to generate PM_{10} . High clay soils always have the potential to generate PM_{10} under the right conditions. The quantity of PM_{10} that is actually generated is closely linked to the management of those soils or the amount of mechanical disturbance. Soil disturbance changes soil structure. Soil structure is an important physical

characteristic of any soil. It is produced by the aggregation of particles of sand, silt and clay into larger units called "peds." A soil with a large amount of clay particles may generate low levels of PM_{10} if disturbance is limited or soil moisture levels are elevated. However, a soil with low clay and silt contents could generate high levels of PM_{10} if frequently disturbed under dry conditions by traffic or tillage equipment.

When the natural soil structure is manipulated or disturbed by tillage, animals, weathering or vehicular traffic, the structure can be destroyed, which allows particles less than $10\mu\text{m}$ in size to be suspended in the air easily. As soil aggregates break away from larger aggregates and become smaller, their ability to be suspended in the air increases significantly. Increased traffic or soil surface manipulation increases the potential for those smaller particles to become fugitive dust. Clay content, relative humidity, soil moisture, wind speed and direction, as well as other elements, can affect the bonding strength between particles, which, in effect, determines the amount of PM_{10} generated.

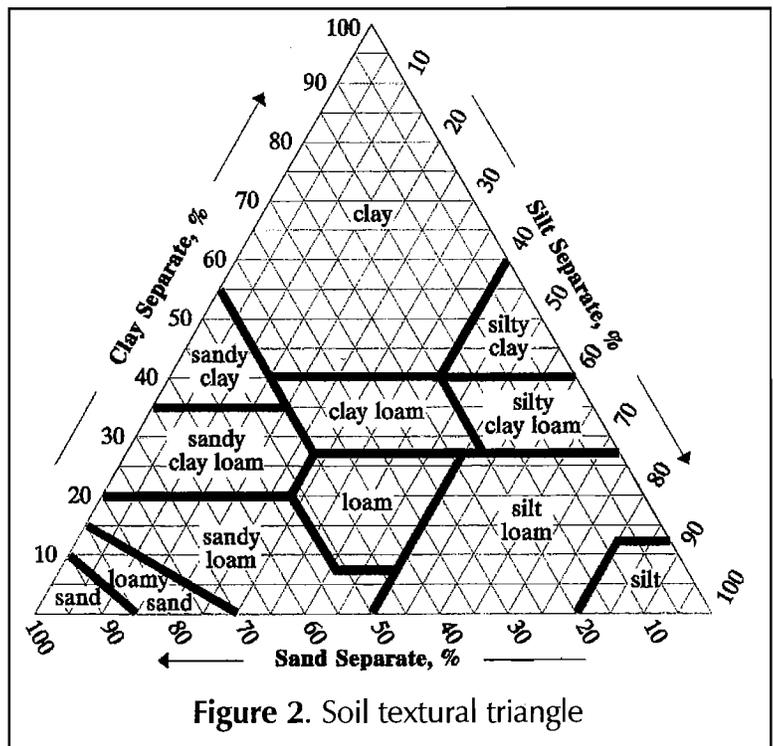


Figure 2. Soil textural triangle

The Arizona Legislature has defined a BMP for the Maricopa County PM₁₀ non-attainment area as a technique verified by scientific research, that, on a case-by-case basis is practical, economically feasible and effective in reducing PM₁₀ from a regulated agricultural activity. The following section summarizes BMPs approved by the Governor's Agricultural Best Management Practices Committee to reduce PM₁₀ for each of the three agricultural categories: tillage and harvest, non-cropland and cropland.

A wide range of variation in soils and cropping systems exists within the Maricopa County PM₁₀ non-attainment area, which can only be addressed by a wide range of flexible and adaptable management practices. Most meth-

ods 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 Maricopa County PM₁₀ non-attainment area.

Any mechanical practice that physically disturbs cropland or crops on a commercial farm.

Best management practices for use during tillage and harvest

Chemical irrigation
Combining tractor operations
Equipment modification
Limited activity during a high-wind event
Multi-year crop
Planting based on soil moisture
Reduced harvest activity
Reduced tillage system
Tillage based on soil moisture
Timing of a tillage operation

Chemical Irrigation

Rule Definition

“Chemical irrigation” means applying a fertilizer, pesticide, or other agricultural chemical to cropland through an irrigation system.

Purpose

Chemical irrigation reduces the number of passes 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 performing two or more tillage, cultivation, planting, or harvesting operations with a single tractor or harvester pass.

Purpose

Combining tractor operations reduces the number of passes or trips 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 PM_{10} 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.

Equipment Modification

Rule Definition

“Equipment modification” means modifying agricultural equipment to prevent or reduce particulate matter generation from cropland.

Purpose

Modifying and maintaining an existing piece of agricultural equipment or purchasing new equipment to prevent PM_{10} from becoming airborne during tillage and harvest operations, which helps reduce PM_{10} and soil erosion.

Examples of Equipment Modification

- ♦ Shields or deflectors that redirect fan or vehicle exhaust sideways or upward. This can prevent PM_{10} 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_{10} .

Limited Activity During a High-Wind Event

Rule Definition

“Limited activity during a high-wind event” means performing no tillage or soil preparation activity when the measured wind speed at 6 feet in height is more than 25 mph at the commercial farm site.

Purpose

Because this BMP falls within the tillage and harvest category, it also applies during harvest time. Wind speed, temperature and relative humidity affect the distance that PM_{10} travels and the ability for PM_{10} to be suspended in the air. Limiting activity during a high-wind event will

reduce the transport of PM_{10} . Reducing farm operations during a high wind event, as well as when the wind speed is less than 25 mph, can significantly help reduce PM_{10} emissions.

Suggestions for Implementation

- ♦ A device to measure wind speed should be available at the commercial farm site.
- ♦ An individual farm policy should be developed to ensure that no tillage or soil preparation activities occur when the wind speed reaches 25 mph. Employees and family members should receive training in implementing the farm policy.



Multi-Year Crop



Rule Definition

“Multi-year crop” means 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, pasture 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 applying water to soil before performing planting operations.

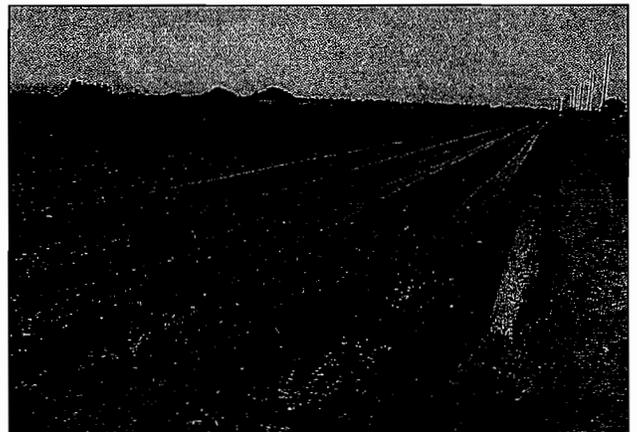
Purpose

Planting based on soil moisture reduces PM_{10} 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_{10} between planting and crop emergence. Moisture causes soil to crust and therefore PM_{10} 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 NRCD offices.



Reduced Harvest Activity

Rule Definition

“Reduced harvest activity” means reducing the number of harvest passes using a mechanized method to cut and remove crops from a field.

Purpose

Any time an operation takes place in a field, the soil structure can be modified and some PM₁₀ could be released into the air. Reducing the number of harvest activities can keep the soil structure intact and reduce PM₁₀.

Suggestions for Implementation

An example of reduced harvest activity is the elimination of a harvest or rood pass from a cotton harvest. More PM₁₀ 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 PM₁₀ because of the nature of the operation.

Reduced Tillage System



Rule Definition

“Reduced tillage system” means reducing the number of tillage operations used to produce a crop.

Purpose

Any tillage operation in a field can modify the soil structure and possibly release PM₁₀ into the air. Reducing the number of tillage activities can maintain the soil structure and help reduce PM₁₀.

Suggestions for Implementation

- ♦ Minimum tillage system*
- ♦ Mulch tillage system*
- ♦ Reduced tillage system*

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

Tillage Based on Soil Moisture

Rule Definition

“Tillage based on soil moisture” means applying water to soil before or during tillage, or delaying tillage to coincide with precipitation.

Purpose

Moisture binds soil particles and helps reduce the amount of PM₁₀ 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 NRCD offices.

Timing of a Tillage Operation

Rule Definition

“Timing of a tillage operation” means performing tillage operations at a time that will minimize the soil's susceptibility to generate PM_{10} .

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_{10} . 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_{10} .

Some examples of timing of tillage operations to reduce PM_{10} generation include:

- ◆ 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, then bedded, would be less susceptible to wind erosion and PM_{10} .
- ◆ Leaving the field surface with large soil clods for as long as possible prior to preparation of seed beds.

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, or**
- ◆ **includes a private farm road, ditch, ditch bank, equipment yard, storage yard or well head.**

Best management practices for use on non-cropland

Access Restriction

Aggregate Cover

Artificial Wind Barrier

Critical Area Planting

Manure Application

Reduce Vehicle Speed

Synthetic Particulate Suppressant

Track-out Control System

Tree, Shrub, or Windbreak Planting

Watering

Access Restriction

Rule Definition

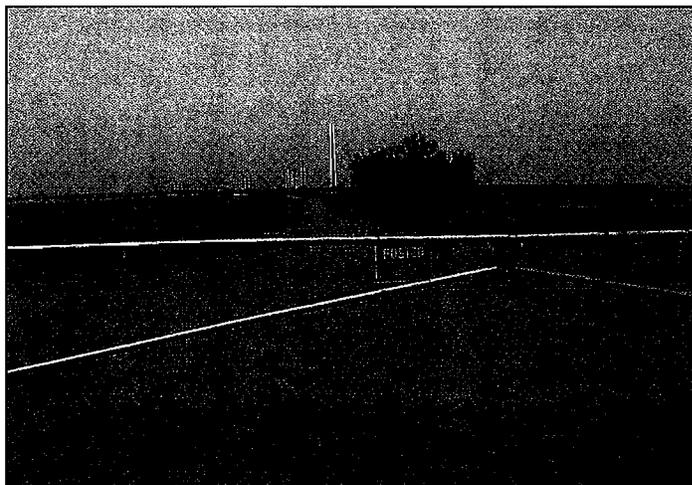
“Access restriction” means restricting or eliminating public access to non-cropland with signs or physical obstruction.

Purpose

Reducing the number of trips driven on agricultural aprons and access roads can reduce that area's susceptibility to PM_{10} .

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 gravel, concrete, recycled road base, caliche or other similar material applied to non-cropland.

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 PM₁₀. 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 four inches deep.
- ♦ The aggregate material should be clean, hard and durable.

Artificial Wind Barrier

Rule Definition

“Artificial wind barrier” means a physical barrier to the wind.

Purpose

Artificial wind barriers disrupt the erosive flow of wind over unprotected areas thus helping to reduce PM₁₀.

Suggestions for Implementation

- ♦ Continuous board fences, burlap fences,

crate walls, bales of hay and similar material can be used to control air currents and blowing soil.

- ♦ 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.
- ♦ The distance of 10 times the barrier height is considered the protected area downwind of the barrier.

Critical Area Planting

Rule Definition

“Critical area planting” means using trees, shrubs, vines, grasses, or other vegetative cover on non-cropland.

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. This practice applies to field aprons, equipment parking areas, turn rows, canal banks, canal excavation spoil piles and bare areas where vegetation is difficult to establish by usual planting methods.

Suggestions for Implementation

- ♦ Critical area planting consists of any vegetative cover that maintains more than 60 percent ground cover.

Manure Application

Rule Definition

“Manure application” means applying animal waste or biosolids to a soil surface.

Purpose

Applying manure to maintain or improve chemical and biological condition of the soil can help reduce wind erosion and PM₁₀.

Suggestions for Implementation

- ◆ If the application or storage of manure 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 manure to ensure that state and local regulations are not violated.
- ◆ Caution should be used when certain manures are applied as they can volatilize and contribute to odor and ammonia emissions.
- ◆ Manures should be incorporated as quickly as possible to reduce odor and ammonia emissions, and to preserve nutrient value if the area is to be cropped in the future.

Reduce Vehicle Speed

Rule Definition

“Reduce vehicle speed” means operating farm vehicles or farm equipment on unpaved private farm roads at speeds not to exceed 20 mph.

Purpose

Reduced speeds can decrease the amount of PM₁₀ 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 a manufactured product such as lignosulfate, calcium chloride, magnesium chloride, an emulsion of a petroleum product, an enzyme product, and polyacrylamide that is used to control particulate matter.

Purpose

Synthetic particulate suppressants provide a surface barrier or bind soil particles together to retard PM₁₀ on unprotected areas, such as unpaved roads, rights-of-way and abandoned fields.

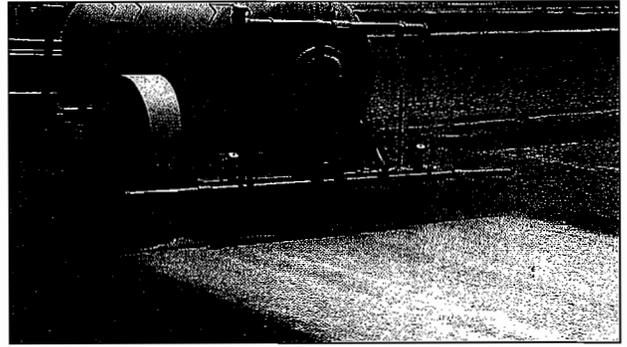
Examples of synthetic particulate suppressant include, but are not limited to:

- ◆ Calcium chloride (CaCl)
- ◆ Soybean feedstock (SBF) processing by-products
- ◆ Calcium lignosulfonate (lignin)
- ◆ Polyvinyl acrylic polymer emulsion (PVA)
- ◆ Polyacryamide (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.



Track-Out Control System

Rule Definition

"Track-out control system" means a device to remove mud or soil from a vehicle before the vehicle enters a paved public road.

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.

Tree, Shrub, or Windbreak Planting

Rule Definition

“Tree, shrub, or windbreak planting” means providing a woody vegetative barrier to the wind.

Purpose

Barriers placed perpendicular to the wind direction can reduce wind speeds by changing the pattern of air-flow over the land surface, which helps reduce wind erosion and PM_{10} .



Suggestions for Implementation

- ◆ The distance of 10 times the barrier height is considered the protected area downwind of the barrier.
- ◆ Single row plantings are most popular in field windbreaks because they use less water and occupy the least amount of land area for the amount of protection derived.
- ◆ Recommended species for planting can be obtained at all NRCD offices.
- ◆ The planting should be done at a time and manner to ensure survival and growth of selected species.
- ◆ Moisture conservation or supplemental watering should be provided for plant establishment and growth, as well as the use of drought tolerant species.
- ◆ Windbreaks should be aligned across the prevailing wind direction. While 90 degrees or perpendicular is preferred, benefits can still be realized when windbreaks are aligned as close to perpendicular as possible.
- ◆ The interval between windbreaks should be determined using current approved wind erosion technology, available at all NRCD offices.

Watering

Rule Definition

“Watering” means applying water to non-crop-land.

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_{10} . Watering the soil surface tends to compact the soil so that it is not dispersed into the air.

Suggestions for Implementation

- Watering can be effective during peak usage times, such as silage harvest time.
- ◆ Apply water so that the surface is visibly moist.

Cropland

Land on a commercial farm that:

- ◆ is within the timeframe of final harvest to plant emergence,
- ◆ has been tilled in a prior year and is suitable for crop production, but is currently fallow, or
- ◆ is a turn-row.

Best management practices for use on cropland

Artificial Wind Barrier
Cover Crop
Cross-Wind Ridges
Cross-Wind Strip-Cropping
Cross-Wind Vegetative Strips
Manure Application
Mulching
Multi-Year Crop
Permanent Cover
Planting Based on Soil Moisture
Residue Management
Sequential Cropping
Surface Roughening
Tree, Shrub, or Windbreak Planting

Artificial Wind Barrier

Rule Definition

“Artificial wind barrier” means a physical barrier to the wind.

Purpose

Artificial wind barriers disrupt the erosive flow of wind over unprotected cropland fields thus helping to reduce PM₁₀.

Suggestions for Implementation

- ◆ Continuous board fences, burlap fences,

crate walls, bales of hay and similar material can be used to control air currents and blowing soil.

- ◆ 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.
- ◆ The distance of 10 times the barrier height is considered the protected area downwind of the barrier.

Cover Crop

Rule Definition

“Cover crop” means plants or a green manure crop grown for seasonal soil protection or soil improvement.

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 NRCD office.

Cross-Wind Ridges

Rule Definition

“Cross-wind ridges” means soil ridges formed by a tillage operation.

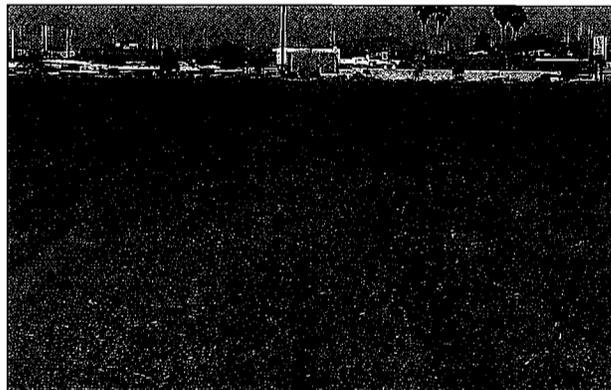
Purpose

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, which 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.

Cross-Wind Strip-Cropping

Rule Definition

“Cross-wind strip-cropping” means planting strips of alternating crops within the same field.

Purpose

Growing crops or managing residue as a protective cover in strips across the prevailing wind direction can break the effects of high wind events.

Suggestions for Implementation

It is recommended that:

- ◆ A cross-wind strip-cropping system consist of at least two crop or residue cover alternating strips.
- ◆ Strip widths be at least 25 feet but no more than 330 feet.
- ◆ Strips should be aligned across the prevailing wind direction. While 90 degrees or

perpendicular is preferred, benefits can still be realized when the strips are oriented as close to perpendicular as possible.

- ◆ Protective cover includes, but is not limited to a growing crop, grasses, legumes, grass-legume mixtures, standing stubble or tilled residue with enough surface cover to provide protection.

Cross-Wind Vegetative Strips

Rule Definition

“Cross-wind vegetative strips” means herbaceous cover established in 1 or more strips within the same field.

Purpose

Herbaceous cover creates a protective wind-break that disrupts the erosive forces of high winds, especially during critical wind erosion periods.

Suggestions for Implementation

It is recommended that:

- ◆ Herbaceous cover be composed of perennial or annual vegetation, growing or dead.
- ◆ Strips consist of at least one row of plants, providing the porosity can be achieved

with a single row that contains no gaps.

- ◆ When two or more rows are required to achieve the required porosity and to avoid gaps, the rows should be spaced no more than 36 inches apart.
- ◆ Annual vegetation strips be composed of more than one row.
- ◆ Strips designed for this purpose have a minimum expected height of two feet.
- ◆ Strips designed for this purpose achieve a minimum porosity of 40 to 50 percent.
- ◆ Spacing between strips (not within row) not exceed 12 times the expected height of the herbaceous cover.
- ◆ Spacing between strips be adjusted to accommodate widths of farm equipment to minimize partial or incomplete passes.

Manure Application

Rule Definition

“Manure application” means applying animal waste or biosolids to a soil surface.

Purpose

Applying manure to maintain or improve chemical and biological condition of the soil can help reduce wind erosion and PM₁₀.

Suggestions for Implementation

- ◆ If the application or storage of manure 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 manure to ensure that state and local regulations are not violated.
- ◆ Caution should be used when certain manures are applied as they can volatilize and contribute to odor and ammonia emissions.
- ◆ Manures should be incorporated as quickly as possible to reduce odor and ammonia emissions, and to preserve nutrient value if the area is to be cropped in the future.

Mulching

Rule Definition

“Mulching” means applying plant residue or other material that is not produced on site to a soil surface.

Purpose

Adding a protective layer to the soil surface reduces soil movement in high wind events. This practice also conserves soil moisture, which can reduce surface movement of soil.

Suggestions for Implementation

It is recommended that:

- ◆ This practice can be used after low residue producing crops, like cotton, are harvested.
- ◆ Materials for mulching be acquired as

waste products from other enterprises.

These include, but are not limited to, wood bark, chips, shavings, and saw dust; food processing wastes; and small grain straw/chaff.

- ◆ Mulches be applied by blowers, hydro applicators, disk type straw punchers and spreaders.
- ◆ When small grain straw is used, spread at least 4,000 pounds straw per acre, distribute evenly and partially incorporate into the soil.
- ◆ When wood fibers are used, spread at least 2,000 pounds per acre or achieve 80 percent cover.

Multi-Year Crop

Rule Definition

“Multi-year crop” means 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, pasture 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 a perennial vegetative cover on cropland.

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 NRCD offices.

Planting Based on Soil Moisture

Rule Definition

“Planting based on soil moisture” means applying water to soil before performing planting operations.

Purpose

Planting based on soil moisture reduces PM_{10} 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_{10} between planting and crop emergence. Moisture causes soil to crust and therefore PM_{10} is not easily transported into the air.

Suggestions for Implementation

- ◆ Care should be taken to avoid over com-

paction 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 NRCD offices.

Residue Management

Rule Definition

“Residue management” means managing the amount and distribution of crop and other plant residues on a soil surface.

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_{10} .

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, which 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 NRCD offices.

- ◆ Consult NRCS Standard and Specification for Residue Management, # 329 and 344. This document is available at all NRCD offices.

Sequential Cropping

Rule Definition

“Sequential cropping” means growing crops in a sequence that minimizes the amount of time bare soil is exposed on a field.

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 PM₁₀ 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 manipulating a soil surface to produce or maintain clods.

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 NRCD 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).



Tree, Shrub, or Windbreak Planting

Rule Definition

“Tree, shrub, or windbreak planting” means providing a woody vegetative barrier to the wind.

Purpose

Barriers placed perpendicular to the wind direction can reduce wind speeds by changing the pattern of airflow over the land surface, which helps to reduce wind erosion and PM₁₀.

Suggestions for Implementation

- ◆ The distance of 10 times the barrier height is considered the protected area downwind of the barrier.
- ◆ Single row plantings are most popular in field windbreaks because they use less water and occupy the least amount of land area for the amount of protection derived.

- ◆ Recommended species for planting can be obtained at all NRCD offices.
- ◆ The planting should be done at a time and manner to insure survival and growth of selected species.
- ◆ Moisture conservation or supplemental watering should be provided for plant establishment and growth, as well as the use of drought tolerant species.
- ◆ Windbreaks should be aligned across the prevailing wind direction. While 90 degrees or perpendicular is preferred, benefits can still be realized when windbreaks are aligned as close to perpendicular as possible.
- ◆ The interval between windbreaks should be determined using current approved wind erosion technology available at all NRCD offices.

Agricultural Best Management Practices General Permit Record

The following is an example of a form that you can use or duplicate. You are not required to use this form.

Name of commercial farmer _____

Date _____

Mailing or physical address of the commercial farm _____

City _____ State _____ Zip _____

Selected Best Management Practices. A commercial farmer must implement at least one practice from each category.

Tillage and Harvest

- Chemical irrigation
- Combining tractor operations
- Equipment modification
- Limited activity during a high-wind event
- Multi-year crop
- Planting based on soil moisture
- Reduced harvest activity
- Reduced tillage system
- Tillage based on soil moisture
- Timing of a tillage operation

Notes: _____

Non-Cropland

- Access restriction
- Aggregate cover
- Artificial wind barrier
- Critical area planting
- Manure application
- Reduce vehicle speed
- Synthetic particulate suppressant
- Track-out control system
- Tree, shrub, or windbreak planting
- Watering

Notes: _____

Cropland

- Artificial wind barrier
- Cover crop
- Cross-wind ridges
- Cross-wind strip cropping
- Cross-wind vegetative strips
- Manure application
- Mulching
- Multi-year crop
- Permanent cover
- Planting based on soil moisture
- Residue management
- Sequential cropping
- Surface roughening
- Tree, shrub, or windbreak planting

Notes: _____

Signature _____

Stakeholders and Collaborating Partners

Agua Fria - New River Natural Resource Conservation District
Arizona Cotton Growers Association
Arizona Department of Agriculture
Arizona Department of Environmental Quality
Arizona Farm Bureau Federation
Arizona Nursery Association
East Maricopa Natural Resource Conservation District
Maricopa Association of Governments
Maricopa County Environmental Services Department
Maricopa County Farm Bureau
USDA Agricultural Research Service
USDA Natural Resources Conservation Service
US Environmental Protection Agency Region IX
University of Arizona - College of Agriculture and Life Sciences
University of Arizona - Cooperative Extension, Maricopa County
Western Growers Association

**TENTATIVE MEETING SCHEDULE FOR THE
MAG AIR QUALITY TECHNICAL ADVISORY COMMITTEE**

JANUARY - DECEMBER 2007

Saguaro Conference Room

Thursday, January 11, 2007 - 1:30 p.m.

Thursday, February 1, 2007 - 1:30 p.m.

Thursday, February 15, 2007 - 1:30 p.m.

Thursday, March 1, 2007 - 1:30 p.m.

TUESDAY, March 6, 2007 - 1:30 p.m.

IF NECESSARY (to complete the recommendation for Suggested Measures for the Five Percent Plan for PM-10)

Thursday, March 29, 2007 - 1:30 p.m.

Thursday, April 26, 2007 - 1:30 p.m.

TUESDAY, May 22, 2007 - 1:30 p.m.

Thursday, June 28, 2007 - 1:30 p.m.

Thursday, July 26, 2007 - 1:30 p.m.

Thursday, August 23, 2007 - 1:30 p.m.

IF NECESSARY

TUESDAY, September 25, 2007 - 1:30 p.m.

Thursday, October 25, 2007 - 1:30 p.m.

Thursday, December 6, 2007 - 1:30 p.m.

IF NECESSARY

Note: This schedule is subject to change. Flexibility is needed to meet federal Clean Air Act mandates and changes in guidance from the Environmental Protection Agency.