Section 5 – Detailed Evaluation of the Metropolitan Phoenix Serious Area PM-10 Plan

In this section, we present our provision-by-provision evaluation of the MAG plan's compliance with the CAA's requirements for attaining both PM-10 standards. For each provision, we discuss the applicable statutory and policy requirements, describe how the plan addresses each requirement, and our conclusion as to whether the plan meets the statutory and policy requirements.

Throughout this section we will cite elements of the Phoenix serious area PM-10 plan using the following conventions:

MAG plan: *Revised Maricopa Association of Governments 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area*, MAG, February 2000.

MAG TSD: "Revised Technical Support Document for Regional PM-10 Modeling in Support of the Revised MAG 1999 Serious Area Particulate Plan for PM-10 for the Maricopa County Nonattainment Area," MAG, December 1999, found in Appendix A, Exhibit 7 of the MAG plan.

ADEQ TSD: "Evaluation for Compliance with the 24-hour PM-10 Standard for the West Chandler and Gilbert Microscale Sites," ADEQ, June 1999, found in Appendix C, Exhibit 3 of the MAG plan.

BMP TSD: *Maricopa County PM-10 Serious Area SIP Revision for Agricultural Best Management Practices*, ADEQ, June 13, 2001

Ag Quantification TSD: URS Corporation and Eastern Research Group, *Technical Support Document for Quantification of Agricultural Best Management Practices*, Final, June 8, 2001 found in Enclosure 3, Attachment 5 of the June 13, 2001 BMP SIP submittal.

Microscale plan: *Final Plan for Attainment of the 24-hour PM-10 Standard - Maricopa County Nonattainment Area*, ADEQ, May 1997.

Microscale TSD: *Maricopa County PM-10 SIP, Microscale Approach Technical Support Document*, ADEQ, May 1997 found in Appendix A of the Microscale plan.

1994 Regional PM-10 Inventory: "1994 Regional PM-10 Emissions inventory for the Maricopa County Nonattainment Area, Draft Final Report," MAG, September 1997, found in Appendix A, Exhibit 6 of the MAG plan.

MSM Study: "Most Stringent PM-10 Control Measure Analysis," Sierra Research, May 13, 1998, found in Appendix C, Exhibit 4 of the MAG plan.

[Agency] Commitment: The set of commitments from the City, Town, County of Maricopa, ADOT, ADEQ, other agency to PM-10 control measures. These commitments can be found, grouped by agencies, in the four volumes that comprise Chapter 12 of the MAG plan and in the December 1997 submittal.

BASE YEAR PM-10 EMISSION INVENTORY

Requirement: CAA section 172(c)(3): Each nonattainment area plan shall include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant(s) in such area.
CAA section 189(b)(1)(A): PM-10 serious area plan shall include a demonstration, based on air quality modeling, that the plan provides for attainment as expeditiously as practicable.

Action: Approve

Proposal Cites: Base year: 65 FR 19964, 19970.

Primary Guidance Documents: *PM-10 Emission Inventory Requirements*, EPA, OAQPS, EPA-454/R-94-033 (September, 1994) available at http://www.epa.gov/ttn/chief.

Primary Plan Cites: 1994 Regional PM-10 Inventory found in Appendix A, Exhibit 6 of the MAG plan
Chapter 4 in the Microscale TSD
Chapter 3 in the ADEQ TSD

What are the statutory and policy requirements for emission inventories?

CAA section 172(c)(3) requires that nonattainment area plans include a comprehensive, accurate, and current inventory of actual emissions from all sources in the nonattainment area. Both a base year and a future (attainment) year inventory of actual emissions are needed to demonstrate how and when the NAAQS will be achieved. CAA section 172(c)(3).

Our policies require that the inventory be fully documented. PM-10 EI Requirements, section 4.1. Documentation is needed to assure us and the public of the reasonableness of the methodologies and assumptions used to create the estimates. The documentation should include the source of the emissions, emission factors, activity and growth data, and the control and rule effectiveness factors used to develop the inventory. PM-10 EI Requirements, p. 19. An EPA document that illustrates our expectation with regard to SIP inventory documentation is *Example Documentation Report For 1990 Base Year Ozone And Carbon Monoxide State Implementation Plan Emission Inventories*, EPA-450/4-92-007 dated March 1992 (which can be found on our website at the above Internet website).

How are these requirements addressed in the plan?

In the Phoenix nonattainment area, two different inventories are needed to accurately reflect the sources that are contributing to ambient levels of the 24-hour PM-10 standard. The first is the regional average annual day inventory which contains emission rates for all emission sources across the entire nonattainment area on an average day. This is the inventory required by CAA section 172(c)(3).

The second is an inventory of emission sources in the area directly around a monitor that exceeds the 24-hour standard on the day that records an exceedance. In Phoenix area, 24-hour exceedances are related to fugitive dust sources near the monitor; therefore, a subregional or "microscale" inventory is necessary to evaluate 24-hour exceedances. This microscale inventory is a modeling inventory and is not intended to satisfy the CAA section 172(c)(3) requirement.[1]

The Phoenix PM-10 plan describes annual and average annual day emissions for 1994 from point, area, nonroad, onroad, and nonanthropogenic sources in the Maricopa County portion of the 2,880 square mile nonattainment area. The inventory includes emissions of PM-10, PM-2.5, ammonia (NH_3), nitrogen oxides (NO_x), and sulfur oxides (SO_x). Inventoried are 73 point sources, re-entrainment from paved and unpaved roads, fugitive dust from agricultural tilling and harvesting, process fugitives from 214 facilities, wildfires, microbial activity in the soil, and emissions from many other source categories. The 1994 inventories did not include windblown fugitive dust emissions because an average day in Maricopa County was not windy. See 1994 Regional PM-10 Inventory, page 3-4 (Table 3-1).

MAG developed inventories for 1995 (the modeling base year), 2001 (impracticability demonstration) and uncontrolled and controlled 2006 (attainment year) and used them to develop the modeling inputs for the control strategy demonstration(s). The MAG inventories included windblown fugitive emissions. See MAG TSD, chapter VI.

ADEQ developed microscale and subregional inventories for 1995 (the modeling base year) for the West Chandler and Gilbert microscale sites. See Microscale TSD, Chapter 4 and ADEQ TSD, chapter 3. In the 1997 Microscale plan, ADEQ also developed 1995 inventories for the two other microscale sites, Maryvale and Salt River. See Microscale TSD, Chapters 4 and 6. We evaluated the 1995 inventories for all four sites as part of our action on the overall

[1] By design and need, the microscale inventory includes only sources within a small area around a monitor rather than all sources within the entire nonattainment area as required by CAA section 172(c)(3).

Microscale plan. See 62 FR 31025, 31030.

Trivial and Uninventoried Source Categories: Not included in the inventories are emissions from aircraft landings and take-offs (because emission factors are not available) and other unspecified trivial source categories. Emissions from all sources of volatile organic compounds (VOC) were deemed to not be a significant source of the aerosol measured as PM-10 (and PM-2.5). See MAG plan, page 3-2.

Point Source Emissions: Point source emissions were derived from individual operating permits. The base year inventory lists emissions for facilities which emit more than 5 tons per year of PM-10 or NH_3 and more than 10 tons per year of NO_x or SO_x. These emissions are for sources well under our required 70 ton/year cut-point for major point sources. Only two major stationary sources ($\geq$70 tons/year of PM-10) currently exist within the nonattainment area. One of these, Arizona Public Service (APS) - West Phoenix has converted to gas combustion, but was not in operation in the 1995-1998 period.

An Example of Documentation - Paved Roads: The silt content on paved roads was varied by roadway vehicular load (based on AP-42 and Engineering-Science references). The silt content (11.9%) was based on local data. EPA's PART 5 & MOBILE 5a were used (presumably with 49 state fuels), as was the KVB (1979, CARB) estimate of size speciation weight fractionation (see MAG plan, Appendix A of Exhibit A). The average weekday traffic volumes were multiplied by a factor of 0.91 to obtain average "total day" (daily) traffic volumes based on a 1992 reference. See 1994 Regional PM-10 Inventory, page 6-3.

Table EI-1 summarizes the 1994 average annual PM-10 inventory. Tables EI-2 through EI-4 summarize the 1995, 2001, and uncontrolled 2006 PM-10 modeling average day inventories. For all years, the inventory is dominated by construction-related fugitive dust and paved and unpaved road dust.

TABLE EI-1
REGIONAL 1994 AVERAGE ANNUAL DAY PM-10 INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER AVERAGE DAY	PERCENT OF OVERALL INVENTORY
Stationary point sources	3.93	2.7
Stationary area sources	8.74	6.1

TABLE EI-1
REGIONAL 1994 AVERAGE ANNUAL DAY PM-10 INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER AVERAGE DAY	PERCENT OF OVERALL INVENTORY
nonroad mobile exhaust	10.09	7.0
Construction fugitive dust/trackout	28.95	20.1
Paved road dust	56.40	39.1
Unpaved road dust	31.09	21.6
On-road vehicle exhaust	4.80	3.3
Wild fires	.07	0.1
Total	144.08	100

Source: 1994 Regional PM-10 Inventory, Table 2-3.

TABLE EI-2
REGIONAL 1995 AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Stationary point sources	2.9	1.5
Stationary area sources	14.6	7.7
nonroad mobile exhaust	8.2	4.3
Construction fugitive dust/trackout/windblown	73.7	38.7
Paved road dust	33.8	17.7

TABLE EI-2
REGIONAL 1995 AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Unpaved road dust	24.6	12.9
On-road vehicle exhaust	4.3	2.3
Windblown from vacant land, agricultural fields and fluvial channels	28.4	14.9
Total	190.6	100

Source: MAG TSD, Table II-1.

TABLE EI-3
REGIONAL 2001 UNCONTROLLED AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Stationary point sources	3.2	1.6
Stationary area sources	13.6	6.9
nonroad mobile exhaust	9.2	4.6
Construction fugitive dust/trackout/windblown	82.1	41.4
Paved road dust	39.3	19.8
Unpaved road dust	26.0	13.1
On-road vehicle exhaust	3.0	1.5

TABLE EI-3
REGIONAL 2001 UNCONTROLLED AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Windblown from vacant land, agricultural fields and fluvial channels	22.0	11.1
Total	198.4	100

Source: MAG TSD, Table II-2

TABLE EI-4
REGIONAL 2006 UNCONTROLLED AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Stationary point sources	3.4	0.7
Stationary area sources	13.1	6.2
nonroad mobile exhaust	10.2	4.8
Construction fugitive dust/trackout/windblown	92.2	43.8
Paved road dust	43.0	20.4
Unpaved road dust	27.5	13.1
On-road vehicle exhaust	2.7	1.3
Windblown from vacant land, agricultural fields and fluvial channels	18.4	8.7

TABLE EI-4
REGIONAL 2006 UNCONTROLLED AVERAGE ANNUAL PM-10 MODELING INVENTORY FOR THE MARICOPA COUNTY PORTION OF MARICOPA PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	PERCENT OF OVERALL INVENTORY
Total	210.5	100

Source: MAG TSD, Table II-3

Tables EI-5 through 7 show the design day (e.g., the 1995 modeling) emissions inventories at each microscale site. For all years, fugitive dust emissions from disturbed lands dominate the microscale emissions inventories.

TABLE EI-5
1995 DESIGN DAY MICROSCALE MODELING INVENTORIES FOR THE WEST CHANDLER AND GILBERT MONITORING SITES (METRIC TONS PER DAY)

SOURCE	WEST CHANDLER	GILBERT
Agriculture	19.378	--
Vacant land	6.188	--
Road Construction	4.397	--
Agricultural Apron	1.954	0.165
Unpaved Roads	0.049	0.002
Paved Roads	0.037	0.005
Cleared Areas (construction site)	--	0.076
Unpaved parking lots	--	0.19

Source: Microscale TSD, Tables 4-4 and 4-6

TABLE EI-6
1995 DESIGN DAY MICROSCALE MODELING INVENTORIES FOR THE MARYVALE MONITORING SITE

SOURCE	METRIC TONS PER DAY
Unpaved Roads	0.003
Paved Roads	0.009
Cleared Areas (construction site)	1.706

Source: Microscale TSD, Table 4-5

TABLE EI-7
1995 DESIGN DAY MICROSCALE MODELING INVENTORIES FOR THE SALT RIVER MONITORING SITE

SOURCE	METRIC TONS PER DAY
Land fill remediation (earthmoving)	0.745
Unpaved parking lots	0.691
Construction	0.588
Unpaved Roads	0.467
Primary paved roads	0.263
Surface mining	0.242
Industrial areas	0.144
Industrial haul roads	0.105
Industrial point sources	0.047
Secondary paved roads	0.028
Industrial yard activities	0.012
Paved parking lots	0.004

Source: Microscale TSD, Table 6-9

Does the plan meet the statutory and policy requirements for emission inventories?

For the reasons discussed below, we are approving, pursuant to CAA sections 172(c)(3), the 1994 Regional PM-10 Inventory found in Appendix A, Exhibit 6 of the MAG plan.

We are also accepting as adequate to support the regional air quality modeling required by CAA section 189(b)(1)(A), the controlled 1995 and the controlled and uncontrolled 2001 and 2006 regional PM-10 emission inventories found in the MAG TSD.

As part of our action on the Microscale plan, we previously reviewed and accepted the 1995 design day modeling inventories at each microscale site. See 62 FR 41856 and the TSD for that action.

Documentation: Generally the inventories are very well documented and in fact are better documented than most others received by this Regional Office. The documentation exceeds the EPA guidance policies.

Current. To evaluate whether the selected base year is current for the purposes of this plan, we must review it in the context of the plan's preparation. The base year emissions inventory is the foundation for any nonattainment plan and the first piece that must be prepared. The rest of the plan--the modeling, control measure analysis, attainment demonstrations, etc.--all are derived from or depend on the base year emissions inventory; therefore, it must be developed and fixed early in the planning process.

The Phoenix area was reclassified from moderate to serious in May, 1996. The reclassification established the date for submittal of the plan at 18 months after the reclassification, December 1997. In order to develop its attainment demonstration, which must be based on air quality modeling, MAG needed to take the base year inventory, revise it for input to the modeling, develop the model and validate it, evaluate potential controls, select and gain commitments for those controls, and then model the effectiveness of those controls on air quality. This process is a lengthy one. To make the December 1997 deadline, MAG needed to start development of the plan in early 1996.[2] Inventories themselves take about one year to develop,

[2] The fact that the final, complete plan was not submitted until June 1999 (and subsequently revised and resubmitted in February 2000) does not negate this analysis. The plan was not submitted in December 1997 because the modeling analysis showed that the State

so 1994 is the most current year that Phoenix plan could have used.

We believe that 1994 is a current base year for this plan given that the technical analysis for the plan started in 1996 and that the base year inventory was the necessary starting element for this analysis and thus needed to be available in early 1996.

Comprehensive: The plan's inventories are very complete, considering a few emission factors are unknown for some of the smaller sources of PM-10. Trivial emission categories are never listed in an inventory.[3] See additional comments, below. We concur with the finding that there is a negligible impact on ambient measurements of PM-10 from VOC aerosol and thus VOC source need not be inventoried for the PM-10 plan.

Accurate: In developing the inventory, MAG and MCESD closely followed our guidance relative to the use of emission factors, activity estimates, and growth and control factors, and the other source specific emission estimation methodologies (continuous emission monitoring, annual stack tests, and mass balance methods). Source specific methods were used to the maximum extent possible as they are inherently more accurate than emission factors. The relative accuracy of each estimate underwent the prescribed quality assurance procedures to eliminate all possible errors.

The accuracy of an inventory category estimate is directly related to how difficult it is to either obtain an emission estimate or to study the factors influencing the magnitude and frequency of the sources of PM-10. Much activity data is highly speculative and the accuracy of all emission factors is unknown. The rule effectiveness factor suggested for use by EPA (80 percent) relates to the degree of compliance, and high emission periods experienced during start-up and shut-down and under upset-breakdown conditions, with existing/future measures. In all cases, we recommends the use of local data and estimates whenever possible. Accounting for both over and under compliance is highly speculative at best. For all of the above reasons, plans are trial and error descriptions of how and when the contributing emissions will be reduced so as to attain and maintain the NAAQS.

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needed to apply for an extension under section 188(e) and that additional substantial work needed to be done for this extension.

[3] For example, cigarette smoke was included in one inventory in the past, probably as the result of a public comment or litigation. Such source categories are truly trivial in compared to the magnitude of the other sources of the *ambient* air quality problem. An April 1988 final report by Radian Corporation, ARB Contract No. A5-147-32, *Evaluation of Emissions from Selected Uninventoried Sources in the State of California* makes just this point.

The Maricopa County inventory is as accurate as an inventory can get.

For additional information regarding the inventories, please see the emission inventory section in the response to comments section of this TSD.

This section prepared by Morris Goldberg and Frances Wicher.

AMBIENT AIR QUALITY SURVEILLANCE

Requirement:	CAA section 110(a)(2)(B): State must provide for the establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor, compile, and analyze data on ambient air quality and, upon request, make such data available to the Administrator. 40 CFR part 58 - Ambient Air Quality Surveillance
Action:	Not applicable.
Proposal Cites:	Discussed at 65 FR at 19971 and 66 FR at 50256
Primary Guidance Documents:	*Network Design and Optimum Site Exposure Criteria for Particulate Matter* (EPA-450/4-87-009, May 1987)
Primary Plan Cites:	MAG plan, p. 3-6 to 3-15

What are the statutory, regulatory and policy requirements?

The CAA requires States to establish and operate air monitoring networks to compile data on ambient air quality for all criteria pollutants. Section 110(a)(2)(B)(i). Our regulations in 40 CFR 58 establishes specific regulatory requirements for operating air quality surveillance networks to measure ambient concentrations of PM-10, including measurement method requirements, network design, quality assurance procedures, and in the case of large urban areas, the minimum number of monitoring sites designated as National Air Monitoring Stations (NAMS). We evaluate these four basic elements in determining the adequacy of an area's PM-10 monitoring network.

Under our regulations (40 CFR part 58), states are required annually to prepare and submit network evaluation reports. These report describe the monitoring network and how it meets our regulations. We use these annual reports to assure that state and local ambient air quality monitoring networks meet our regulations and the CAA. Annual reporting is necessary because networks need to be dynamic and sites may be relocated over time as changes in demographics and emission source locations occur in the planning area.

Nonattainment area plans developed under title I, part D of the Clean Air Act are not, in

general, required to address how the area's air quality network meets our monitoring regulations. These plans are submitted too infrequently to serve as the vehicle for assuring that monitoring networks remain current. We discuss the adequacy of the monitoring network in this TSD to support our finding that the plan appropriately evaluates the PM-10 problem in the Phoenix area. Reliable ambient data is necessary to validate the base year air quality modeling which in turn is necessary to assure sound attainment demonstrations.[4]

How are these requirements addressed in the plan?

The Phoenix serious area plan does not specifically address the adequacy of the PM-10 monitoring network in the Phoenix area. It does describe the network as of April, 1999 and provides monitoring results for 1994 to 1998. See MAG plan, pp. 3-16 to 3-15.

Does the PM-10 Monitoring Network meet the statutory and regulatory requirements?

Ambient Monitoring

PM-10 in the ambient atmosphere is measured using methods designated by us under the requirements of 40 CFR 53. All of the PM-10 methods used in the Phoenix area are designated as either reference or equivalent methods.[5] Both the MCESD and the ADEQ have Quality Assurance Plans in place that we have approved. These agencies also submit annual reports to us describing the overall ambient monitoring networks they operate in the Phoenix area and how they meet the relevant EPA requirements.

40 CFR 58, Appendix D details the requirements for designing an ambient monitoring network for PM-10. Further guidance is provided in the document "Network Design and Optimum Site Exposure Criteria for Particulate Matter", (EPA-450/4-87-009, May 1987).

In 1995 (the base modeling year for this plan), our regulations at 40 CFR 58, Appendix D required States to design and operate monitoring networks to address four basic monitoring

[4] Ambient networks do not need to meet all our regulations to be found adequate to support air quality modeling. A good spatial distribution of sites, correct siting, and quality-assured and quality-controlled data are the most important factors in determining whether an air quality monitoring network is adequate for air quality modeling.

[5] A reference method is an air sample collection and analysis method which follows the procedures detailed in the appendices to 40 CFR 50. An equivalent method is an air sampling collection and analysis method which does not follow the reference procedures in 40 CFR 50 but has been certified by us as obtaining "equivalent" results.

objectives. They are: 1) to determine the highest concentrations expected to occur in the area covered by the network; 2) to determine representative concentrations in areas of high population density; 3) to determine the impact on ambient pollution levels of significant sources or source categories; and 4) to determine general background concentration levels. In 1997 we revised those regulations to include two additional objectives: 5) to determine the extent of regional pollution transport among populated areas and in support of secondary [National Ambient Air Quality] standards; and 6) to determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

Closely associated with the monitoring objectives is the concept of "spatial scale of representativeness." The goal in siting monitoring stations is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring objective of the station. Thus, spatial scale of representativeness is described in terms of the physical dimensions of the air parcel nearest to a monitoring station throughout which actual pollutant concentrations are reasonably similar. The six spatial scales defined in our regulations are as follows:

> Microscale - defines an area up to 100 meters from the PM-10 sampler.
> Middle Scale - defines an area ranging from 100 meters to 0.5 kilometers from the sampler.
> Neighborhood Scale - defines an area ranging from 0.5 to 4.0 kilometers from the sampler.
> Urban Scale - defines an area ranging from 4 to 50 kilometers from the sampler. This scale usually requires more than one site for definition.
> Regional Scale - defines usually a rural area of reasonably homogenous geography and extends from tens to hundreds of kilometers.
> National and Global Scales - these measurement scales represent concentrations characterizing the nation and the globe as a whole.

For the purposes of this SIP review we will focus on the first three spatial scales and to a lesser extent, the urban scale.

The relationship between the four monitoring objectives and the scales of representativeness that are generally most appropriate for that objective are summarized in MON-1:

TABLE MON-1
RELATIONSHIP AMONG MONITORING OBJECTIVES AND SCALE OF REPRESENTATIVENESS

MONITORING OBJECTIVE	APPROPRIATE SITING SCALES
Highest Concentration	Micro, Middle, Neighborhood
Representative Concentrations	Neighborhood, Urban
Source Impact	Micro, Middle, Neighborhood
Background	Neighborhood, Urban, Regional
Regional Transport*	Urban, Regional
Welfare Impacts*	Urban, Regional

* Objective added in 1997

The final regulatory requirement concerns the number of monitors in a network. The ambient monitoring networks operated by State and local agencies are referred to as SLAMS (State and Local Air Monitoring Station) networks. A subset of the SLAMS sites are also designated as National Air Monitoring Stations (NAMS). NAMS sites are selected to provide data for national policy analyses and trends and for reporting to the public on air quality in major metropolitan areas. NAMS sites are selected with an emphasis given to urban and multi source areas. Areas required to have designated NAMS sites are selected based on urbanized population and pollutant concentration levels. Generally, a larger number of NAMS sites are needed in more polluted and urban and multi source areas. The primary objective for siting NAMS is to monitor in the areas where the pollutant concentration and the population exposure are expected to be the highest.

While our regulations do require a minimum number of NAMS sites in certain urban areas, our regulations contain no criteria for determining the total number of stations in SLAMS networks. The optimum size of a particular SLAMS network involves trade offs among data needs and available resources that we believe can best be resolved during the network design process.

The last type of monitoring site is referred to as a Special Purpose Monitor (SPM) site. SPM are monitoring sites which may or may not meet all of our requirements. State and local agencies generally designate monitors as SPM when conducting special studies or when agencies are trying to determine the evaluate the representativeness new monitoring locations. They can also be sited temporarily to study a source's compliance or gather data for permitting or modeling

purposes. Generally, we do not consider SPM locations when evaluating whether or not an ambient network meets our regulation since by their nature they are considered short term monitoring sites; however, data collected at SPM sites which meet all of our siting and quality assurance regulations are valid for use in regulatory actions, including validating modeling, with some exceptions.[6] In the case of the Phoenix area, many of the SPM sites operated by the MCESD in 1995 have since been designated as SLAMS. See Table MON-2.

1995 Monitoring Network

As we noted before, we are discussing the adequacy of the Phoenix area monitoring network in this TSD to support our finding that the Phoenix serious area plan appropriately evaluates the PM-10 problem in the Phoenix area. Reliable ambient data is necessary to validate the base year air quality modeling. The base year for the Phoenix PM-10 plan is 1995; therefore, we have evaluated the Phoenix area monitoring network (including SPM sites) as of 1995.

In 1995, there were 16 monitoring sites collecting PM-10 data in the Phoenix area, three designated as NAMS, five designated as SLAMS and eight designated as SPM. All of the sites were operated in accordance with our regulations in 1995. Figure 3-2 in the MAG plan lists the names of the sites and their locations in the Phoenix area as of April 1999.

Table MON-2 lists the PM-10 monitoring sites in the Phoenix area and their associated monitoring objective and spatial scale.

TABLE MON-2
PM-10 MONITORING SITE IN THE PHOENIX AREA

MONITORING SITE	OPERATING AGENCY	SITE DESIGNATION 1995/2000	MONITORING OBJECTIVE	SPATIAL SCALE
West Phoenix	MCESD	NAMS/NAMS	Population Exposure	Neighborhood
South Scottsdale	MCESD	NAMS/NAMS	Population Exposure	Neighborhood
Chandler	MCESD	NAMS/NAMS	Population Exposure	Neighborhood
Glendale	MCESD	SLAMS/NAMS	Population Exposure	Neighborhood

[6] See the *memorandum*, John S. Seitz, Director, Office of Air Quality Planning and Standards to Regional Air Directors, "Agency Policy on the Use of Special Purpose Monitoring Data," August 22, 1997.

TABLE MON-2
PM-10 MONITORING SITE IN THE PHOENIX AREA

MONITORING SITE	OPERATING AGENCY	SITE DESIGNATION 1995/2000	MONITORING OBJECTIVE	SPATIAL SCALE
North Phoenix	MCESD	SLAMS/SLAMS	Population Exposure	Neighborhood
Mesa	MCESD	SLAMS/SLAMS	Population Exposure	Neighborhood
South Phoenix	MCESD	SLAMS/NAMS	Population Exposure	Neighborhood
Central Phoenix	MCESD	SLAMS/NAMS	Population Exposure	Neighborhood
Maryvale	MCESD	SPM/SLAMS	Population Exposure	Neighborhood
Gilbert	MCESD	SPM/SLAMS	Population Exposure	Neighborhood
West Chandler	MCESD	SPM/SLAMS	High Concentration	Neighborhood
Greenwood	MCESD	SPM/SLAMS	Population Exposure	Neighborhood
Durango Complex*	MCESD	---/SLAMS	Maximum Concentration	Middle
Higley	MCESD	SPM/SPM	Max. Concentration/ Population Exposure	Neighborhood
Salt River Service Center	MCESD	SPM/SPM	Max. Concentration/ Source Impact	Middle
Surprise*	MCESD	---/SPM	Population Exposure	Neighborhood
Goodyear/Estrella Park*	ADEQ	---/SPM	Regional Transport	Urban
ASU West*	ADEQ	---/SPM	Population Exposure	Neighborhood
Phoenix/ Supersite	ADEQ	SPM/SPM	Population Exposure	Neighborhood
Tempe*	ADEQ	---/SPM	Population Exposure	Neighborhood
Palo Verde	ADEQ	SPM/SPM	Background	Regional

*Site not part of network in 1995.

Table MON-2 also shows how the 1995 PM-10 monitoring network in the Phoenix area met all four of the required monitoring objectives, including monitoring for general background

concentrations. The purpose of a general background monitoring site is to establish what the ambient PM-10 levels are in an area in the absence of any anthropogenic or man-made sources.

Most of the PM-10 monitoring sites in the Phoenix area were and are sited as neighborhood scale with an objective of assessing population exposure. Given the nature of the emission sources in the Phoenix area, which are mostly local fugitive dust sources, we believe this is an appropriate focus of the network.

It is important to understand that when an agency designs a monitoring network it is not feasible to monitor at every location that may have elevated levels of a particular pollutant. One of the goals in designing monitoring networks is to choose sites which are representative of similar areas. The PM-10 monitoring network in the Phoenix area has sites which represent PM-10 concentrations in the urban core, older, existing neighborhoods, industrial areas, and developing suburban areas. For example, while there are many stationary sources located throughout the Phoenix area there is only one site at this time which assesses stationary source impacts, the Salt River Service Center site. This site is located in an area adjacent to the Salt River Basin which contains a high concentration of PM-10 stationary sources. We believe the Salt River Service Center site adequately monitors PM-10 levels that are representative of these stationary source categories. That being said, the County is attempting to locate additional monitoring sites with the same objective of assessing contribution from specific sources or source categories. Two areas being evaluated are industrial zones on the east and west sides of the Phoenix metropolitan area.

The 24-hour attainment demonstration in the Phoenix serious area plan relies, in part, on showing attainment at four specific monitoring sites. These sites were appropriately chosen as representative of the type of sources thought to be contributing to high 24-hour levels of PM-10: Salt River for its proximity to industrial sources; West Chandler for its nearby highway construction, Maryvale for its residential area coupled with land disturbing activities due to the construction of a park; and Gilbert for its proximity to agricultural land. In 1995 these sites recorded the highest and most frequent exceedances of the 24-hour PM-10 standard. As discussed in the previous paragraph, they are also representative of similar areas in the Phoenix area that may not have monitoring sites.

MCESD and ADEQ continue to improve the PM-10 monitoring network in the Phoenix area. As shown in Table MON-2, the PM-10 network grew to 21 monitoring sites in 2000, six designated as NAMS sites, seven designated as SLAMS sites, and eight designated as SPM sites. Five of the SPM sites are operated by ADEQ. More importantly, the MCESD and the State continually reassess the adequacy of the network and its representativeness and the network continues to expand to include developing areas at the urban fringe. The 2000 network also includes a site located to assess regional transport, one of the monitoring objectives added to our

regulations in 1997. Regarding the other new objective, ADEQ does monitor for welfare impacts, which for PM-10 are principally visibility, through it urban haze monitoring program. In the Phoenix area, ADEQ monitors for visibility at two point locations and operates a transmissometer. See ADEQ, Annual Report 2000, Appendix 1, Air Quality Report, p. 54.

The increase in the number of sites designated as NAMS in 2000 compared to 1995 is because EPA regulations base the required number of NAMS sites on population and severity of PM-10 concentrations (See 40 CFR 58, Appendix D, section 3.7.1. Based on the average PM-10 concentrations in the Phoenix area during the years 1998 - 2000, EPA regulations require a minimum of six sites be designated as NAMS. MCESD has met this requirement by designating six sites as NAMS.

Based on our evaluation, we find that the monitoring network operated by the MCESD and ADEQ in 1995 was adequate to support the technical evaluation of 24-hour PM-10 nonattainment problem in the Phoenix area. The network utilizes EPA reference or equivalent method monitors. Both agencies have EPA-approved quality assurance plans in place.

This section prepared by Bob Pallarino

BACT FOR MAJOR STATIONARY SOURCES OF PM-10 PRECURSORS

Requirement: CAA section 189(e): BACT must be applied to major stationary sources of PM-10 precursors if these sources contribute significantly to PM-10 exceedances in the area.

Action: Approve

Proposal Cites: Annual: 65 FR 19971
24-Hour: 66 FR 50257

Primary Guidance Documents: *General Preamble*, pp. 13539-13540 and 13541-15343
Addendum, p. 42011 and p. 42014

Primary Plan Cites: MAG Plan, p. 3-6
MAG TSD, p. III-41

What are the statutory and policy requirements?

Under CAA section 189(e), a State must also apply the control requirements applicable to major stationary sources of PM-10 to major stationary sources of PM-10 precursors, unless we determine such sources do not contribute significantly to PM-10 levels in excess of the NAAQS in the area. For the serious area plan, a "major source of PM-10 precursors" is one that emits or has the potential to emit over 70 english tons per year of SOx, NOx, or ammonium.

"Significantly" is not defined in either the Act or in the *General Preamble*. Rather the determination is to be made on a case-by-case basis. 57 FR at 13539. In the *Addendum*, we have suggested a criteria for a significant contribution as 5 $\mu g/m^3$ to 24-hour levels at a location exceeding the 24-hour standard and 1 $\mu g/m^3$ annually to a location exceeding the annual standard. *Addendum* at 42011. These criteria are suggested and not fixed. What constitutes a "significant contribution" in a given nonattainment area depends on the unique circumstances of that nonattainment area

How are these requirements addressed in the plan?

The plan does not include controls on major sources of PM-10 precursors.

The Phoenix PM-10 plan does not directly provide information on the impact of major

precursor sources on PM-10 levels in the area; however, it does provide sufficient information on the contribution of total secondary particulate to PM-10 levels and the inventory of major sources to estimate that impact.

Ambient data collected in 1995 at the Phoenix Supersite shows that nitrates contribute on an annual basis 1.27 $\mu g/m^3$ to PM-10 levels, with a maximum daily 24-hour value of 5.3 $\mu g/m^3$. MAG TSD, p. III-40. During wintertime, these values increase as temperature and humidity conditions (cool and wet) support formation of secondary particulate. The average wintertime 24-hour levels (9/25-1/22) range from 2.9 $\mu g/m^3$ to 4.4 $\mu g/m^3$ depending on the site (all figures are 1989/90). MAG TSD, p. III-41.

Inventory information for 1995 show that there were nine sources with NOx emissions over 70 tpy with total NOx emissions of 4,486.4 mtpy. 1994 Regional PM-10 Inventory, Table B3-1. Total annual NOx emissions in 1995 were 102,163.8 mt with the bulk of that coming from on-road motor vehicles (56 percent) and nonroad engines (33.6 percent). 1994 Regional PM-10 Inventory, Table 2-2. Major stationary sources account for just 4.4 percent of the NOx inventory.

Ambient data collected in 1995 at the Phoenix Supersite shows that sulfates contribute on an annual basis 1.88 $\mu g/m^3$ to PM-10 levels, with a maximum 24-hour value of 3.99 $\mu g/m^3$. MAG TSD, p. III-40. The average wintertime levels (9/25-1/22) range from 1.1 $\mu g/m^3$ to 1.4 $\mu g/m^3$ depending on the site (all figures are 1989/90). MAG TSD, p. III-41. However, unlike nitrates, sulfates level are highest during the summer.

Inventory information for 1995 show that there was one source with SOx emissions over 70 mtpd year with total SOx emissions of 391.1 mtpy. 1994 Regional PM-10 Inventory, Table B3-1. Total annual SOx emissions in 1995 were 4032.3 mtpd with the bulk of that coming from nonroad engines (69.3 percent). 1994 Regional PM-10 Inventory, Table 2-2. Major stationary sources account for just 9.7 percent of the SOx inventory.

Ambient data collected in 1995 at the Phoenix Supersite shows that ammonia contributes on an annual basis 0.64 $\mu g/m^3$ to PM-10 levels, with a maximum 24-hour value of 1.95 $\mu g/m^3$. MAG TSD, p. III-40. The average wintertime levels of ammonium sulfate and ammonium nitrate combined (9/25-1/22) range from 5.4 $\mu g/m^3$ to 7.3 $\mu g/m^3$ depending on the site (all figures are 1989/90). MAG TSD, p. III-41. Like nitrates, ammonium levels tend to be highest during the winter.

Inventory information for 1995 show that there are no major stationary sources of ammonia. 1994 Regional PM-10 Inventory, Table B3-1. Essentially, all ammonia in the inventory, 99.9 percent, comes from livestock. 1994 Regional PM-10 Inventory, Table 2-2.

Inventory information for 1995 show that there are no major stationary sources of ammonia. 1994 Regional PM-10 Inventory, Table B3-1. Essentially, all ammonia in the inventory, 99.9 percent, comes from livestock. 1994 Regional PM-10 Inventory, Table 2-2.

Does the plan meet the statutory and policy requirements?

As shown in Tables PRE-1 and PRE-2, major stationary sources contribute at most 0.24 $\mu g/m^3$ to annual PM-10 levels and 0.61 $\mu g/m^3$ to 24-hour PM-10 levels in the Phoenix area. We calculated these contributions by assuming that the major stationary sources' contribution to secondary levels is proportional to their presence in the inventory. We believe that this assumption is reasonable given the very small presence of major stationary sources in the precursor inventory and the small contribution total secondaries make to PM-10 levels in Phoenix. Moreover, secondary particulate takes hours to form from its precursors, by which time the precursors are well mixed in the ambient air, so localized, disproportionate impacts by major sources of PM-10 precursors are very unlikely.

These contributions are well below our proposed 1 $\mu g/m^3$ significance level for the annual standard and 5 $\mu g/m^3$ for the 24-hour standard.[7] However, independent of this fact, we believe that such small contributions–less than 0.5 percent of the annual PM-10 standard and 0.4 percent of the 24-hour PM-10 standard–are truly insignificant by any measure for the Phoenix area. PM-10 levels above the annual and 24-hour standards in Phoenix are almost exclusively caused by a few large source categories of fugitive dust, and it is BACM-level controls on these sources that are the key to expeditious attainment and not controls on small contributors such as major stationary sources of PM-10 precursors.

Based on their negligible impact on ambient PM-10 levels, we have determined that major sources of PM-10 precursors do not contribute significantly to PM-10 levels which exceed either the annual or 24-hour standards in the Phoenix area and therefore BACT need not be applied to major sources of PM-10 precursors.

[7] The plan demonstrates that the 1 $\mu g/m^3$ and 5 $\mu g/m^3$ are the appropriate levels for determining which categories are significant in the BACM analysis; therefore, we believe that it is an appropriate level for us to adopt here. We note that the analyses of annual and 24-hour exceedances in the Phoenix area as presented in the Phoenix serious area plan clearly demonstrate that fugitive dust sources are, by far, the dominate contributors to annual and 24-hour violations. These analyses add additional support to our finding that major stationary sources of PM-10 precursor do not contribute significantly to either annual or 24-hour PM-10 levels above the standards in the Phoenix area.

TABLE PRE-1
CONTRIBUTION OF MAJOR SOURCES TO ANNUAL SECONDARY PARTICULATE LEVELS

SECONDARY POLLUTANT	MEASURED ANNUAL IMPACT IN 1995 (UG/M^3)	NUMBER OF MAJOR SOURCES IN 1995	TOTAL EMISSIONS FROM MAJOR SOURCES IN 1995	EMISSIONS FROM MAJOR SOURCES AS PERCENT OF INVENTORY	CALCULATED IMPACT OF MAJOR SOURCES (UG/M^3)
NOx	1.27	9	4486	4.4	0.06
SOx	1.88	1	391	9.7	0.18
NH4	0.64	0	0	0	0
Total	3.79	10	4,877	4.4	0.24

TABLE PRE-2
CONTRIBUTION OF MAJOR SOURCES TO 24-HOUR SECONDARY PARTICULATE LEVELS

SECONDARY POLLUTANT	MAXIMUM DAILY IMPACT IN 1995 (UG/M^3)	NUMBER OF MAJOR SOURCES IN 1995	TOTAL EMISSIONS FROM MAJOR SOURCES IN 1995	EMISSIONS FROM MAJOR SOURCES AS PERCENT OF INVENTORY	CALCULATED IMPACT OF MAJOR SOURCES (UG/M^3)
NOx	5.3	9	4486	4.4	0.23
SOx	3.99	1	391	9.7	0.38
NH4	1.95	0	0	0	0
Total	9.17 *	10	4877	4.4	0.61

* Because peak 24-hour impacts of the individual secondary particulates occurred on different days, NOx and NH4 on January 3 and SOx on August 31, simply summing the concentrations would not result in the peak daily concentration. The 9.17 µg/m^3 value is the peak 24-hour concentration of all secondaries recorded in 1995. See MAG TSD, p. III-40.

This section prepared by Frances Wicher

BACT FOR SIGNIFICANT STATIONARY SOURCES OF PM-10

Requirement: CAA section 189(b)(1)(B): BACT must be applied to significant sources of PM-10

Action: Approve

Proposal Cites: Not applicable.

Primary Guidance Documents: *Addendum*, p. 42009 and p. 42014

Primary Plan Cites: Letter, Albert F. Brown, Director, MCESD, to Jacqueline E. Schafer, ADEQ, March 31, 2000.

What are the statutory, regulatory and policy requirements?

Under CAA section 189(b)(1)(B), a state must apply BACM to all significant source categories and BACT to significant stationary sources of PM-10. *Addendum* at 42009.

BACT is to be determined on a case-by-case basis using analytical methodology established in the reviewing authorities current PSD program. *Addendum* at 42014.

How are these requirements addressed in the plan?

We have reviewed the Phoenix serious area plan to evaluate if BACT has been placed on major stationary sources of directly-emitted PM-10. A major source of PM-10 in a serious nonattainment area is any stationary source that emits or has the potential to emit over 70 english tons per day of PM-10. See CAA section 189(b)(3). Based on the 1994 Regional PM-10 Inventory, there were 3 major sources of PM-10. Appendix B3, Table B3-1. These facilities and their current control status are listed Table BACT-1

TABLE BACT-1 CONTROL STATUS OF STATIONARY SOURCES THAT WERE MAJOR FOR PM-10 IN 1994	
SOURCE	**STATUS**
APS West Phoenix Power Plant	Source modified its cooling tower drift eliminator in 1997. The plant's fuel is natural gas with fuel oil backup. Additional restrictions limiting the sulfur content of the fuel oil to 0.05% and developing corresponding PM-10 emissions limits for each fuel have been incorporated into its permit, will be issued by September 2001.
M.E. West (formerly Capitol Casting, Inc.)	Source became a synthetic minor with emissions less than 70 tpy by taking permit limits. Permit issued in December, 2000.
Magotteaux Castings, Chandler	Facility closed.

Source: Brown Letter, March 31, 2000, updated July, 2001.

Does the plan meet the statutory and policy requirements?

We find that all major sources of PM-10 will have enforceable BACT limits in place.

This section prepared by Frances Wicher

BACM ANALYSIS – STEP 1, DEVELOP AN EMISSION INVENTORY

Requirement:	CAA section 189(b)(1)(B): Provide for the implementation of BACM no later than June 10, 2000
Action:	Approve
Proposal Cites:	Annual: 65 FR 19971 24-Hour: 66 FR 50257
Primary Guidance Documents:	*Addendum*, pp. 42010-42014
Primary Plan Cites:	MAG plan, Appendix B, Exhibit 5, Chapter 3.0 and Appendix A.
Other Cites:	Desert Research Institute, "The 1989-90 Phoenix PM-10 Study", April 1991 Sierra Research, "Particulate Control Measure Feasibility Study," January 24, 1997. Microscale plan

What are the statutory, regulatory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this is June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) area-wide source category. *Addendum* at 42011.

Step 1 in the BACM analysis is to develop a detailed emission inventory of PM-10 sources and source categories that can be used in the second step of the BACM analysis, modeling to determine the impact of the various sources and source categories on ambient air quality. *Addendum* at 42012.

How are these requirements addressed in the plan?

In preparing the Phoenix serious area PM-10 plan, Arizona did not perform the first three steps of the BACM analyses separately for the 24-hour standard and the annual standard.

The plan relies on results from three modeling studies to identify significant source categories. One of these studies evaluated significant sources using chemical mass balance (CMB) modeling performed on monitoring samples collected at 6 sites in 1989-1990. The two other studies evaluated significant sources using dispersion modeling of sources around 7 monitoring sites. We discuss these studies in more detail in our discussion of step 2 of the BACM analysis.

In CMB modeling, the primary "emissions" data are source profiles. Source profiles are essentially the chemical signature of a source, that is the percentage of each chemical species present in a source's emissions. These source profiles do not include information on the rate at which sources emit.

Desert Research Institute (DRI) performed the CMB modeling. See DRI, "The 1989-90 Phoenix PM-10 Study," April 1991. DRI relied primarily on source profiles derived from samples taken in the Phoenix area during the same period that the monitoring data analyzed in the CMB modeling was being gathered. See DRI study, p. 4-2.

Sierra Research performed the first set of dispersion modeling. See, Sierra Research, "Particulate Control Measure Feasibility Study," January 24, 1997. It used EPA's AP-42 emission factors combined with local information on dust loadings and silt content to calculate emission rates for the modeling. See Sierra Research study, Appendix A.

ADEQ performed the second set of dispersion modeling. See the Microscale plan. ADEQ did field surveys and used aerial photographs of each of the four monitoring sites to determine which sources needed to be inventoried and the size of each source. It also reviewed Maricopa County permit records for earthmoving operations at the Salt River site. ADEQ used emission equations developed for previous PM-10 inventories for the Maricopa County Area, and EPA emission inventory guidance to calculate actual emissions. See Microscale Plan, Chapters 4 and 6.

The plan uses the base year inventory to determining that railroad, aircraft, and agricultural harvesting are insignificant sources. See Particulate Control Measure Feasibility Study, Volume I, section 3.3 and Appendix B found in Appendix B, Exhibit 5 of the MAG plan. It also uses the projected 2001 modeling inventory to evaluate the impact of the proposed de minimis sources. See MAG plan, pp. 9-11.

Does the plan meet the statutory and policy requirements?

Whether the Phoenix serious area plan meets the section 189(b) requirement for the implementation of BACM depends on the results of the overall BACM analysis and not on the

results of any one step in that analysis. We, therefore, defer the issue of compliance with the statutory requirement for BACM until we have completed our review of the complete BACM analysis in the MAG plan.

Although the plan does not separately address each PM-10 standard in this step of the BACM analysis, it does look at inventory data germane to the annual standard as well as inventory data germane to the 24-hour standard. We believe the results provide sufficient information to begin the BACM analysis for both standards. We, therefore, find that the plan does provide a sufficiently detailed "inventory" to use as a basis for its determination of significant sources for the 24-hour standard.

The source profiles used in the CMB modeling date from 1990 or earlier but remain valid for the area. With the exception of motor vehicle exhaust, source profiles for wood and vegetative burning and for soil samples from construction sources, unpaved roads, desert, and agriculture are unlikely to have changed between then and now.

The motor vehicle exhaust profile, which is a composite of gasoline- and diesel-powered engines, may have changed somewhat given the new vehicle emission standards and fuels introduced since 1990. However, for the purposes of the BACM analysis, these changes would be important to consider only if the original CMB modeling had eliminated motor vehicle exhaust as a significant source. If so, then the Phoenix PM-10 plan would have needed to evaluate whether revisions to the motor vehicle exhaust profile would have resulted in the source category becoming significant. The changes, however, are not important because the CMB modeling did find motor vehicle exhaust to be a significant contributor to elevated PM-10 levels and the plan considers it a significant source category for the purposes of the BACM analysis.

The modeling inventories in the Sierra Research study are consistent with our emission procedures and are based on worst case assumptions regarding source activity and emission rates, that is they assume the highest potential level of emissions. These assumptions are conservative because they are likely to result in more sources being considered significant than less conservative assumptions.

We have already accepted the emission inventories underlying the microscale plan's determination of significant source categories. See 62 FR 31025, 31030 (June 6, 1997).

The plan makes limited use of the 1994 Regional Inventory in its determination of significant source categories. Most of the evidence gathered to date on the PM-10 problem in the Phoenix area indicates that the causes of elevated 24-hour PM-10 levels are often localized; therefore, an analysis of significant sources that only looks at the regional scale is likely to miss important contributors to the 24-hour PM-10 exceedances. Also, as noted above, the plan does

use the projected 2001 modeling inventory to demonstrate that a proposed set of de minimis sources are truly de minimis. See MAG plan, pp. 9-11. Since a source category that is not de minimis is significant, this demonstration also validates the MAG plan's findings regarding which source categories are significant.

This section prepared by Frances Wicher

BACM ANALYSIS – STEP 2, MODEL TO IDENTIFY SIGNIFICANT SOURCES

Requirement: CAA section 189(b)(1)(B): Provide for the implementation of BACM no later than June 10, 2000

Action: Approve

Proposal Cites: Annual: 65 FR 19971
24-Hour: 66 FR 50257

Primary Guidance Documents: *Addendum*, p. 42010-42014

Primary Plan Cites: MAG plan, pp. 9-6 through 9-15

Other Cites: Sierra Research, "Particulate Control Measure Feasibility Study", Volume 1, Chapter 3 and Appendix A (found in MAG plan, Appendix B, Exhibit 5) Desert Research Institute, "The 1989-90 Phoenix PM-10 Study", April 1991 The Microscale plan

What are the statutory, regulatory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this is June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) area-wide source category. *Addendum* at 42011.

Step 2 in the BACM analysis is to model to evaluate the impact on PM-10 concentrations over the standards of the various sources and source categories to determine which are significant.

We have established a presumption that a "significant" source category is one that contributes 1 $\mu g/m^3$ or more of PM-10 to a location of annual violation and 5 $\mu g/m^3$ or more of PM-10 to a location of 24-hour violation. *Addendum* at 42011. However, whether the threshold should be lower than this in any particular area depends upon the specific facts of that area's nonattainment problem. Specifically, in areas that are demonstrating attainment by December 31, 2001, it depends on whether requiring the application of BACM on source categories below a

proposed de minimis level would meaningfully expedite attainment. In areas that are claiming the impracticability of attainment by December 31, 2001, it depends upon whether requiring the application of BACM on source categories below a proposed de minimis level would make the difference between attainment and nonattainment by the serious area deadline of December 31, 2001.

How are these requirements addressed in the plan?

In order to have sufficient lead time to evaluate and adopt control measures, MAG needed to identify potential significant source categories well before it completed the base year air quality modeling. To do this, it turned to existing studies on source impacts in the Phoenix area. These studies are:

1. Desert Research Institute, "The 1989-90 Phoenix PM-10 Study," April 1991. (DRI study).

   This study applied the chemical mass balance receptor model to ambient data from three urban and non urban sites to estimate the contributions to PM-10 from motor vehicle exhaust, geological material, vegetative burning, and secondary ammonium nitrate. The three urban monitors are South Scottsdale, Central Phoenix, and West Phoenix and the three non-urban sites are Estrella park, Gunnery Range, and Pinnacle Peak.[8] Data was gather from September 25, 1989 to January 21, 1990.

   The study identified primary geological material as the major contributor to all six sites and suggested that at the urban sites much of this was from re-entrained road dust. The study was unable to further differentiate the contributions of the various fugitive dust sources. DRI study, Vol. 2, page S-3. The study also identified three significant non-fugitive dust sources at the urban sites: motor vehicle exhaust with a least a 50% contribution from diesel vehicles (however, no distinction was made between nonroad and on-road sources), residential wood combustion, and precursor sources of secondary ammonium nitrate. DRI study, Vol. 2, page S-4.

[8] South Scottsdale has never exceeded the annual standard and has only exceeded the 24-hour standard once. Central Phoenix exceed the annual standard in 1989 but had incomplete data recovery in 1990, so it is not possible to determine if it exceeded in that year. It has not exceeded the annual standard since 1991 and has only exceeded the 24-hour standard once. West Phoenix exceeded annual standard in 1989 but has not since then. West Phoenix exceed the 24-hour standard twice in 1989 and once in 1997 but at no other time. See AIRS summary report on Phoenix 1989-2001 PM-10 data.

The DRI study evaluated significance only for the 24-hour standard and only during fall and early winter.

2. Sierra Research, "Particulate Control Measure Feasibility Study," January 24, 1997. (Sierra Research Study)

This study applied dispersion modeling to evaluate source contribution at three monitors: South Phoenix, Chandler, and Salt River.[9] Sierra Research Study, p. 3-6.

Several sources at each site were designated as potentially significant sources of PM-10 to be evaluated in the dispersion modeling. These sources were:

Chandler: agricultural tilling and construction site preparation
South Phoenix: re-entrained road dust (from track out)
Salt River: industrial paved road use and unpaved road use

Sierra Research Study, p. 3-7.

The Sierra Research study concluded that each of these sources, with the exception of re-entrained road dust, has the potential to be significant for the 24-hour or annual standard, although only two sources, industrial paved road use and unpaved road use, showed potential to exceed the 1 $\mu g/m^3$ threshold for the annual standard. Sierra Research Study, p. 3-8 and Table 3-2.

The Sierra Research study did not evaluate the contribution of windblown fugitive dust nor did it evaluate construction site activities such as trenching, material delivery, and employee parking. Sierra Research Study, p. 3-8.

3. ADEQ's Microscale plan

This plan evaluated 24-hour exceedances at four monitoring sites during 1995. The four sites are Salt River, West Chandler, Gilbert, and Maryvale. MAG plan, Table 3-3. Eight significant source fugitive dust source categories were identified:

[9] South Phoenix last exceeded the annual standard in 1989. South Phoenix exceeded the 24-hour standard in the number of years. West Chandler is a new site established in 1995. It has not exceeded the annual standard but has exceeded the 24-hour standard in several times. Salt River has exceeded the annual standard and 24-hour standards since the site was established in 1995. See AIRS summary report on 1989-2001 data.

West Chandler: windblown dust from agricultural fields, agricultural aprons, construction
Gilbert: windblown dust from agricultural aprons and vacant disturbed land, unpaved parking lots
Salt River: earthmoving, unpaved roads, haul roads
Maryvale: windblown dust from disturbed land (related to construction)

Based on these three studies, the Phoenix serious area PM-10 plan listed these eight source categories as significant (from MAG plan, Table 9-1):

1. Paved road travel
2. Unpaved road travel (includes unpaved parking lots)
3. Industrial paved road travel
4. Construction site preparation (includes disturbed vacant land)
5. Agricultural tilling (includes all agricultural activities)
6. Residential wood combustion
7. On-road and nonroad motor vehicle exhaust[10]
8. Secondary ammonium nitrate

[10] We do not agree that on-road and nonroad motor vehicle exhaust constitute a single source category. In fact, we believe it constitutes at least four if not more distinct categories of emissions: gasoline on-road, diesel on-road, gasoline nonroad, and diesel nonroad. Each of these individual categories may or may not be significant itself. The broad source category "on and nonroad motor vehicle exhaust" was identified as significant in the 1989-1991 CMB study by Desert Research Institute (DRI). At the time of the DRI study, limitations in the available data prevented distinguishing between on and nonroad motor vehicle emissions. See MAG, "The 1999 Brown Cloud Project for the Maricopa County Area," Draft Report, October, 1999, p. 4-9. Thus, the study could not split the very broad "engine exhaust" grouping into more appropriate source categories.

This inability to distinguish between sources with similar emission profiles is a limitation of the CMB model. This limitation is most graphically demonstrated by the fact that the model cannot distinguish between various sources of "primary geological material" which can include fugitive dust emissions from such diverse sources as paved road, unpaved road, construction sites, agricultural fields, and sand and gravel operations, all of which are considered distinct source categories. See Receptor Model Technical Series, Volume II: Chemical Mass Balance (EPA-450/4-81-016b, July 1981).

The following categories were determined not to be significant (MAG plan, Table 9-a):

1. Stationary point sources
2. Fuel combustion (excluding residential wood combustion)
3. Waste/open burning
4. Agricultural harvesting
5. Cattle feedlots
6. Structural/vehicle fires
7. Charbroiling/frying meat
8. Marine vessel exhaust
9. Airport ground support exhaust
10. Railroad locomotive exhaust
11. Windblown dust from fluvial channels
12. Wild fires

In its final list of significant sources, the plan does not distinguish between those source categories that are significant for the 24-hour standard and those that are significant for the annual standard.

Annual Standard

The Phoenix serious area plan demonstrates that selected significance threshold of 1 $\mu g/m^3$ is appropriate for determining which sources are de minimis for the annual standard by showing that control on the de minimis source categories would not make the difference between attainment and nonattainment of the annual standard by 2001. According to the plan, total emissions in the area need to be reduced to 130 mtpd to attain the annual standard by 2001. After application of BACM, total emissions are reduced to 152 mtpd. MAG plan, p. 9-11. The 12 de minimis sources categories contribute in total 10.32 mtpd. MAG plan, Table 9-a. Totally eliminating these source categories would reduce total regional emissions to 142 mtpd, 12 mtpd shy of attainment. MAG plan, pp. 9-10 thru 9-12. The plan notes that several of the de minimis source categories are subject to control or will be controlled in the future.

24-Hour Standard

The plan also demonstrates that selected significance threshold of 5 $\mu g/m^3$ is appropriate for determining which sources are de minimis for the 24-hour standard by showing that control on the de minimis source categories would not make the difference between attainment and

nonattainment of the 24-hour standard by 2001 regional and at either the West Chandler or Gilbert sites.[11]

West Chandler: The microscale modeling explicitly identified seven categories that contributed to the April 9, 1995 exceedance at the West Chandler site. ADEQ TSD, p. 3-12. These categories are agricultural fields, agricultural aprons, road construction, housing construction, vacant lands, (local) paved roads, and (local) unpaved roads. None of these categories are considered de minimis for the BACM analysis in the Phoenix PM-10 plan.[12]

Not explicitly identified in the microscale modeling were those source categories that contributed to background PM-10 levels at the site. To determine the effect of BACM controls on the source categories contributing to background levels, the background was split between wind-blown emissions and non-wind blown emissions--April 9, 1995 being a windy day. No sources contributing to the wind-blown background were assumed to be de minimis.[13] All de minimis sources were assumed to be in the non-wind background, in fact the non-wind background was assumed to be entirely due to emissions from de minimis sources. MAG plan, p. 9-14. This assumption grossly exaggerates the contribution of de minimis sources by leaving out any contribution to non-wind background levels by on-road and nonroad engines, paved and unpaved roads outside of the microscale area, construction activities outside the microscale area, and natural background levels of PM-10.[14]

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[11] We have already approved the attainment demonstrations at the Salt River and Maryvale sites which did not rely on controls on de minimis source categories and therefore they do not enter into this analysis. 62 FR 41856 (August 4, 1997)

[12] Although three categories--housing construction, paved roads, and unpaved roads--had a less that 5 $\mu g/m^3$ at the West Chandler site. However, because these categories were either significant at another microscale site or significant for the annual standard, they were considered significant for the BACM analysis.

[13]A good assumption because only three categories of identified de minimis sources categories have a windblown component--cattle lots, agricultural harvesting, and fluvial (river) channels. None of these sources were close enough to the West Chandler monitor to have any measurable effect on PM-10 levels at that site in 1995.

[14] Even in the absence of human activity, there would a measurable level of PM-10 in the ambient air. This level is called the natural background. For the Phoenix area, the natural background is estimated to be from 11 and 22 $\mu g/m^3$ depending on the season. MAG TSD, p. III-

The plan showed that BACM on the significant source categories including those in the wind-blown background would reduce the modeled exceedance at the West Chandler monitor to 314.6 $\mu g/m^3$. MAG plan, p. 9-13. Total elimination of the non-wind background of 21.8 $\mu g/m^3$ would reduce this level to 292.8 $\mu g/m^3$, still almost double the 24-hour standard of 150 $\mu g/m^3$. MAG plan, p. 9-14. Given the initial assumption that the non-wind background is entirely due to de minimis sources, eliminating the non-wind background is the equivalent of zeroing out all emissions from these de minimis sources. Even if this level of control were possible--and it is not-- controls on the de minimis sources would not make the difference between attainment and nonattainment at the West Chandler monitor by December 31, 2001.

Gilbert: The microscale modeling explicitly identified five categories that contributed to the April 9, 1995 exceedance at the Gilbert site. ADEQ TSD, p. 3-11. These categories are agricultural aprons, vacant lands, unpaved parking lots, (local) paved roads, and (local) unpaved roads. None of these categories are considered de minimis for the BACM analysis in the Phoenix serious area plan.[15]

Not explicitly identified in the microscale modeling were those source categories that contributed to background PM-10 levels at the site. To determine the effect of BACM controls on the source categories contributing to background levels, the background was split between wind-blown emissions and non-wind blown emissions--April 9, 1995 being a windy day. No sources contributing to the wind-blown background were assumed to be de minimis. All de minimis sources were assumed to be in the non-wind background, in fact the non-wind background was assumed to be entirely due to emissions from de minimis sources. MAG plan, p. 9-15. This assumption grossly exaggerates the contribution of de minimis sources by leaving out any contribution to non-wind background levels by on and nonroad engines, paved and unpaved roads outside of the microscale area, construction activities outside the microscale area, and natural background levels of PM-10.

The plan showed that BACM on the significant source categories including those in the wind-blown background would reduce the modeled exceedance at the Gilbert monitor to 205.5 $\mu g/m^3$. MAG plan, p. 9-15. Total elimination of the non-wind background of 21.8 $\mu g/m^3$ would

16.

[15] Although two categories--paved roads and unpaved roads--had a less that 5 $\mu g/m^3$ at the Gilbert site. However, because these categories were either significant at another microscale site or significant for the annual standard, they were considered significant for the BACM analysis.

reduce this level to 183.7 µg/m^3, still substantially above the 24-hour standard of 150 µg/m^3. MAG plan, p. 9-15. Given the initial assumption that the non-wind background is entirely due to de minimis sources, eliminating the non-wind background is the equivalent of zeroing out all emissions from these de minimis sources. Even if this level of control were possible--and it is not--controls on the de minimis sources would not make the difference between attainment and nonattainment at the Gilbert monitor by December 31, 2001.

Does the plan meet the policy requirements?

Significant Source Categories

We find that the Phoenix serious area PM-10 plan has not excluded any source categories that should be considered significant from its list of significant source categories. The plan presents acceptable modeling to evaluate the impact of various PM-10 sources and source categories on PM-10 levels and to derive a comprehensive and conservative list of significant source categories.

Two of the modeling studies, DRI and Sierra Research, do not use recent emission inventory or ambient air quality data.[16] We, however, do not believe this adversely affects the identification of significant source categories in the MAG plan, first because the identified significant source categories include the vast majority, 94 percent, of emissions in the 1994 base year inventory[17, 18] and second because the plan does use recent inventory data, the inventory used

[16] We also note, except in very limited instances, the monitors used in these two studies did not exceed the PM-10 standards. We define a significant source as one that contributes significantly to a location that *exceeds* the PM-10 standard. *Addendum* at 42011. Therefore, these studies can only reliably indicate which source categories contribute more than incidentally to ambient PM-10 concentrations in the Phoenix area and not which source categories are significant contributors to PM-10 exceedances. However, as we will discuss we do not consider this a flaw in identifying significant source categories.

[17] In the 1994 base year average day inventory 135.5 metric tons per day (mtpd) is in significant source categories and only 8.5 mtpd are in de minimis source categories. The total average day inventory, not including windblown emissions, is 144.1 mtpd; therefore, significant sources account for 135.5/144.1 or 94 percent of the total inventory.

[18] The 1994 base year inventory is an average annual day inventory and does not include windblown emissions because an average day in the Phoenix area is not windy. If windblown

to model 2001, in its demonstration that the proposed de minimis source categories are truly de minimis. MAG plan, p. 9-10, ftn 12.

Our finding here does not mean that we believe all the source categories identified as significant in the plan need to be considered significant for the BACM requirement. We find that the plan is conservative in its selection of significant source categories, that is, it may have included more source categories in its significant source list than is strictly needed. Thus our use of negative wording in our finding: no significant source categories were excluded as opposed to the only the right categories were included. In our 1998 FIP, we derived a slightly different list of significant sources. For example, we did not include consider either diesel or gasoline-powered on-road mobile sources to be significant. 63 FR 15920, 15932 (Table 2 and text).

De Minimis Source Categories

We also find that the Phoenix serious area PM-10 plan correctly excludes certain source categories from the BACM analysis because of their de minimis impact on PM-10 levels in the Phoenix area.

In areas that are claiming the impracticability of attainment by December 31, 2001, determining whether source categories are truly de minimis depends on determining if the application of BACM-level controls on the proposed de minimis source categories would make the difference between attainment and nonattainment by the serious area deadline of December 31, 2001.

The Phoenix PM-10 plan identifies 12 source categories as de minimis.[19] The plan shows that even if emissions from these sources were totally eliminated, the area would still not attain either the annual or the 24-hour standards by the end of 2001, thus demonstrating that the 1 $\mu g/m^3$ annual and 5 $\mu g/m^3$ 24-hour de minimis threshold is appropriate. MAG plan, p. 9-12. See

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emissions from construction sites, other disturbed land, and agriculture–all significant sources–are included in the inventory then the identified significant source categories would account for an even greater percentage of the overall inventory.

[19] In both the significant source category list and the de minimis source category list, some of the identified source categories are very broad. For example, the motor vehicle emissions category includes everything from heavy duty diesel trucks to forklifts, lawn mowers, and the family car. From a control strategy perspective, these extremely broad categories have to be separated into their components since no one control will apply across the category.

also discussion under "other Comments" below. We, therefore, that 1 µg/m^3 and 5 µg/m^3 are the appropriate thresholds for determining significant sources in the Phoenix area for the annual and 24-hour standard, respectively, and that the source categories identified as having less than this impact are de minimis and are appropriately excluded from the BACM analysis.

Emissions from the proposed de minimis categories are a small percentage of the total inventory. The 12 source categories account for 6 percent of the total emissions in 1994 and just 5 percent of total pre-BACM emissions in 2001. In other words, in the Phoenix area plan, 95 percent of all emissions in 2001 are in source categories considered significant and thus evaluated for BACM. After application of BACM, the de minimis source categories still account for less than 7 percent of the total emissions in the 1994.[20] The minimal contribution of the proposed de minimis source categories to the inventory argue that, both individually and collectively, they have a trivial impact on elevated annual PM-10 levels in the Phoenix area.[21]

Other Information:

Re-analysis of the De Minimis Determination

In the de minimis analysis, certain emission categories (e.g., such as vacant land, unpaved parking) were assumed to be uncontrolled at the end of 2001. These categories will in fact be subject to BACM by that time. By not including these controls, the gap between nonattainment and attainment of the 24-hour standard in 2001 is much larger than it should be and thus, the de minimis determination is suspect.

To determine if the selected de minimis categories are truly de minimis under the correct control assumptions, we redid the analysis incorporating the appropriate level of control. For our

[20] Total de minimis source average annual emissions in 2001: 10.32 mtpd. Total average annual uncontrolled emissions in 2001 are 198.4 mtpd (MAG TSD, p. II-25). 10.32/198.4 = 0.052 or 5.2 percent Total average annual controlled emissions in 2001 are 151 mtpd (MAG plan, p. 9-11). 10.32/152 = 0.068 or 6.8 percent.

[21] Several of the significant source categories (e.g., unpaved parking lots) also contribute little to the overall inventory. However, the plan did not distinguish between source categories deemed significant for the annual standard and those deemed significant for the 24-hour standard, but rather considered a category significant if it was significant for either standard. Because of this, categories with small regional impacts are on the significance list because they contribute significantly to 24-hour exceedances.

re-analysis, we assumed that control effectiveness for each source category was the same as the one used for that category in the annual standard attainment demonstration. We concluded from the re-analysis that the selected de minimis threshold for the 24-hour standard is appropriate because attainment of the standard was still impracticable by 2001. We also determined that the identified de minimis categories are indeed de minimis and are appropriately excluded from the BACM analysis.

We summarize our re-analysis below. For more detailed information, please see the section, "Demonstrating the Impracticability of Attainment by December 31, 2001."

TABLE DEM-1
REVISED DE MINIMIS DEMONSTRATION
USING CONTROL FACTORS CONSISTENT WITH ANNUAL STANDARD DEMONSTRATION
WEST CHANDLER

SOURCE	CONTROL	1995 IMPACT ? G/M³	2001	
			CONTROL	IMPACT ? G/M³
Ag fields	BMP rule	190	39.1[1]	115.6
Ag aprons	BMP rule	24	20[1, 2]	19.2
Road construction	Rule 310	73.5	77[3]	16.9
Housing construction	Rule 310	0.1	77[3]	0
Vacant lands	Rule 310.01	29.3	88.7	3.3
Paved Roads	--	0.2	0	0.2
Unpaved Roads	Rule 310.01	4.1	75	1
Total local impact		321.2	Zero out nonwind background as a surrogate for 100 percent control of de minimis sources	156.2
Background - wind blown		58.2		34
Background - nonwind		21.8		0
Total		401.2		190.2

Footnotes:

1. Between 1995 and 2001, 20 percent of agricultural land were lost to development; assumes 23.9 percent control to control windblown dust from a cotton field using multi-year crop, the maximum control available from BMPs for this sources. See Ag Quantification TSD, p. B-7.
2. No controls for windblown dust for this category. Control reflects loss of agricultural lands only.
3. Control effectiveness for disturbed areas on construction sites only. There was no construction activity on the modeled exceedance day.

Source: 1995 impacts, ADEQ TSD, pp. 3-10 and 3-12. Control efficiencies, see Table MOD-9 of this TSD.

TABLE DEM-1A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND
WITH REVISED CONTROL FACTORS
WEST CHANDLER, 2001

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	56%	39%	5%
Wind contribution -- 9 hrs	32.6 µg/m^3	22.7 µg/m^3	2.9 µg/m^3
Overall control efficiency	31.3%[1]	54.9%	53.1%
PM10 Contribution with controls	22.4 µg/m^3	10.2 µg/m^3	1.4 µg/m^3
total windblown background = 34.0 µg/m^3			

Footnote: 1. 39.1 percent control from microscale component with a 80 percent rule effectiveness factor.

Source: Land use percentages and wind contributions - 9 hrs, ADEQ TSD, p. A-8. Overall control efficiencies, see Table MOD-9 of this TSD.

As can be seen from Table DEM-2 below, under our re-analysis, Gilbert would demonstrate attainment by December 31, 2001 without controls on the de minimis sources.

TABLE DEM-2
REVISED DE MINIMIS ATTAINMENT DEMONSTRATION
USING CONTROL FACTORS CONSISTENT WITH ANNUAL STANDARD DEMONSTRATION
GILBERT

SOURCE	CONTROL MEASURE	1995 IMPACT ? G/M^3	2001	
			CONTROL %	IMPACT ? G/M^3
Ag aprons	BMP rule	55	20[1, 2]	44
Unpaved parking lots	Rule 310	67.2	75	16.8
Vacant lands	Rule 310.01	13.5	88.7	1.5
Paved Roads	--	1.5	0	1.5
Unpaved Roads	Rule 310.01	3.5	75	0.9
Total local impact		140.7	Zero out nonwind background as a surrogate for 100 percent control of de minimis sources	64.7
Background - wind blown		68.2		39.7
Background - nonwind		21.8		0
Total		230.7		104.4

Footnotes:

1. Between 1995 and 2001, 20 percent of agricultural land were lost to development.
2. No controls for windblown dust for this category. Control reflects loss of agricultural lands only.

Source: 1995 impacts, ADEQ TSD, pp. 3-11 and 3-13. Control efficiencies, see Table MOD-9 of this TSD.

TABLE DEM-2A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND
WITH REVISED CONTROL FACTORS
GILBERT, 2001

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	55%	41%	4%
Wind contribution 9 hrs	37.5 $\mu g/m^3$	28.0 $\mu g/m^3$	2.7 $\mu g/m^3$
Overall control efficiency	31.3%	54.9%	53.1%
PM10 Contribution with controls	25.8 $\mu g/m^3$	12.6 $\mu g/m^3$	1.3 $\mu g/m^3$
total windblown background = 39.7 $\mu g/m^3$			

Source: Land use percentages and wind contributions - 7 hrs, ADEQ TSD, p. A-7. Overall control efficiencies, see Table MOD-9 of this TSD.

Potential Controls on De Minimis Categories

The de minimis source categories generally fall into one of two types: those that are already subject to control and those that are uncontrollable either by their nature or because the State is pre-empted from controlling them. Only a few of the categories are controllable but are not currently controlled. See Table DEM-3. As a result, there is little in additional emission reductions that could be realized by applying controls to the de minimis sources.

TABLE DEM-3
CONTROLS OPTIONS FOR DE MINIMIS SOURCE CATEGORIES

SOURCE CATEGORY	2001 PM-10 EMISSIONS (MTPD)	EXISTING CONTROLS OR CONTROL OPTION
ALREADY CONTROLLED		
Point sources	3.07	This category includes major sources which will be controlled by BACT. Other types of sources include concrete products, sand and gravel operations, and asphaltic concrete manufacturing which are subject to MCESD Rule 316 and cotton gins which are subject to MCESD Rule 319.
Fuel combustion (excluding residential wood combustion)	0.66	98% of emissions from this category are from the combustion of natural gas in residential, commercial, and industrial settings (water heaters, stoves, ovens, boilers). 1994 Regional PM-10 Inventory ,pp. 4-9 to 4-12.
Waste/open burning	0.08	Already subject to MCESD Rule 314.
Agricultural harvesting	0.0007	Already subject to control as part of the BMP rule.
Cattle feedlots	0.31	Already covered by MCESD Rule 310.01.
Charbroiling/frying meat	0.74	Source will be controlled in part by MCESD rule. See Revised Measure 23 in MCESD 1999 commitments. This emission inventory category also includes charbroiling/frying meat at home.
Marine vessel exhaust	0.03	These engines are covered by national emission standards which control VOC and NOX emissions. PM-10 emissions are not directly regulated.
Railroad locomotive exhaust	0.87	States are pre-empted from controlling engine emissions this source for emission reduction purposes. See section 209(e)(1)(B). We have issued national locomotive engine standards. See 40 CFR §92.7.
UNCONTROLLABLE SOURCES		
Structural/vehicle fires	0.26	Uncontrollable source
Wild fires	0.06	Uncontrollable source.

TABLE DEM-3
CONTROLS OPTIONS FOR DE MINIMIS SOURCE CATEGORIES

SOURCE CATEGORY	2001 PM-10 EMISSIONS (MTPD)	EXISTING CONTROLS OR CONTROL OPTION
POTENTIALLY CONTROLLABLE SOURCES		
Airport ground support equipment exhaust	0.79	Unregulated source. Some airlines are switching voluntarily to electric vehicles.
Windblown dust from fluvial channels	3.45	These are riverbed channels and are a natural source.

Source: MAG plan, Table 9-a.

We also checked the list of significant and de minimis source categories against the emission inventory to assure that all source categories in the inventory were evaluated for significance. We found that all were. See Table DEM-4.

TABLE DEM-4
EMISSION INVENTORY CATEGORIES AND THEIR CORRESPONDING SIGNIFICANCE CATEGORY

EMISSION INVENTORY	INCLUDES THESE SIGNIFICANT/*DE MINIMIS* SOURCE CATEGORY
Industrial processes External combustion Internal combustion Other stationary point sources	Precursor sources of secondary ammonium nitrate (i.e., ammonia sources) Haul roads *Point sources*
Fuel Combustion residential natural gas commercial/industrial natural gas industrial natural gas industrial fuel oil	*Fuel combustion (not including residential wood burning)*
Process fugitives	*Point sources* Haul roads

TABLE DEM-4
EMISSION INVENTORY CATEGORIES AND THEIR CORRESPONDING SIGNIFICANCE CATEGORY

EMISSION INVENTORY	INCLUDES THESE SIGNIFICANT/*DE MINIMIS* SOURCE CATEGORY
Waste/open burning	*Open burning*
Agricultural tilling	Agricultural tilling
Agricultural harvesting	*Agricultural harvesting*
Cattle feedlots	*Cattle feedlots*
Livestock	Precursor sources of secondary ammonium nitrate (i.e., ammonia sources)
Structural/vehicle fires	*Structural/vehicle fires*
Charbroiling/frying meat	*Charbroiling/frying meat*
Lawn and garden equipment exhaust Industrial/commercial equipment exhaust Agricultural equipment exhaust Recreational vehicle exhaust Marine vessel exhaust	On and off road motor vehicle exhaust
Airport ground support exhaust	*Airport ground support equipment exhaust*
Railroad locomotive exhaust	*Railroad locomotive exhaust*
Aircraft engine exhaust	No emissions estimated
Construction activity fugitive dust Entrained from construction track out	Construction
Paved road dust	Paved roads
Unpaved road dust	Unpaved roads

TABLE DEM-4
EMISSION INVENTORY CATEGORIES AND THEIR CORRESPONDING SIGNIFICANCE CATEGORY

EMISSION INVENTORY	INCLUDES THESE SIGNIFICANT/*DE MINIMIS* SOURCE CATEGORY
LDGV exhaust LDGT exhaust HDGV exhaust LDDV exhaust LDDT exhaust HDDT exhaust Motorcycle exhaust	On and off road motor vehicle exhaust
Wild fires	*Wild fires*
Construction windblown	Construction
Agricultural windblown	Agriculture
Fluvial channels	*Fluvial channels*
Disturbed vacant land (in windblown inventory only)	Vacant disturbed areas

This section prepared by Frances Wicher

BACM ANALYSIS – STEP 3, IDENTIFICATION OF POTENTIAL BACM MEASURES

Requirement:	CAA section 189(b)(1)(B): Provide for the implementation of BACM no later than June 10, 2000
Action:	Approve
Proposal Cite:	Annual: 65 FR 19972 24-Hour: 66 FR 50258
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory, regulatory and policy requirements?

CAA section 189(b)(1)(B) requires that the serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this is June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) area-wide source category. *Addendum* at 42011.

Step 3 in the analysis of BACM is to identify potential BACM for significant source categories including their technological feasibility, costs, and energy and environmental impacts. One source for identifying potential BACM is EPA's BACM guidance documents, but states are encouraged to consider other sources of information. A state should also consider any measures identified in public comments. *Addendum* at 42011.

How are these requirements addressed in the plan?

MAG hired Sierra Research to study the feasibility of PM-10 controls for the significant source categories in the Maricopa nonattainment area. Sierra Research used a five step process to develop a list of potential BACM. Sierra Research Study, pp. 3-12 to 3-17.

Step 1: develop a complete list of candidate control measures

A number of PM-10 planning documents were consulted including the MAG moderate area PM-10 and CO plans, EPA's PM-10 control measures technical information documents, and PM-10 plans from other serious PM-10 areas such as Las Vegas, San Joaquin Valley, and South Coast (Los Angeles). Sierra Research Study, p. 3-12.

From these documents an extensive list of potential control measures was developed. See Sierra Research Study, Appendix D.

Step 2: screen the list of potential control measures for applicability to significant source categories

The list of potential control measures was reviewed to eliminate measures for de minimis sources or sources that do not exist in the Maricopa area (e.g., de-icing material). Sierra Research Study, p. 3-13.

Step 3: screen list of potential control measures for critical source parameters that influence PM-10 emissions

A critical source parameter is a characteristic of the source that affects its emissions. For each significant source category, critical source parameters were identified. Sierra Research Study, pp. 3-13 to 3-14. See Table POT-1 for a list of critical source parameters for each significant source category.

TABLE POT-1
CRITICAL SOURCE PARAMETERS BY SIGNIFICANT SOURCE CATEGORY

SIGNIFICANT SOURCE CATEGORY	CRITICAL SOURCE PARAMETER
Paved road travel	total dust loading, silt content, VMT
Unpaved road travel	silt content, vehicle speed, vehicle weight, VMT
Industrial paved road travel	total dust loading, silt content, VMT
Construction site preparations	silt content, surface moisture content, VMT on construction site

TABLE POT-1
CRITICAL SOURCE PARAMETERS BY SIGNIFICANT SOURCE CATEGORY

SIGNIFICANT SOURCE CATEGORY	CRITICAL SOURCE PARAMETER
Agriculture tilling	number of tilling passes
Residential wood combustion	combustion device type, number of sources, rate of fuel consumption, frequency of use
On and off-road motor vehicle exhaust	engine design, engine maintenance practices, fuel specifications
PM-10 precursors	NOx and ammonia emissions
Wind entrainment of dust	roughness height, frequency of surface disturbance, area of disturbed surface

Source: Sierra Research study, pp. 3-13 to 3-14.

Step 4: screen list for sources regulated or potentially regulated by Maricopa County.

MAG's contractor did not evaluate stationary/industrial source measures that could be regulated by Maricopa County and therefore deleted from the list of measures any stationary/industrial source measures that would fall under Maricopa County's authority to adopt. Sierra Research Study, p. 3-15.

Step 5: group remaining control measures by significant source category

The measures remaining after completing step 4 were grouped together by significant source category and duplicate measures eliminated. Transportation control measures from section 108(f) of the CAA and TCMs identified in A.R.S. 49-402(c) were added. Sierra Research Study, p. 3-17 and Appendix E.

The plan considered control measures raised during each of the public comment periods on the plan. MAG plan, pp. 9-25 to 9-29.

Does the plan meet our policy requirements?

We find that the Phoenix serious area PM-10 plan identified and evaluated potential BACM for the Maricopa area consistent with our guidance. In preparing the list of candidate BACM, MAG reviewed our guidance documents on BACM, other EPA documents on PM-10 control, as well as PM-10 plans from other serious PM-10 areas in the West. It also evaluated controls proposed during public comment.

The plan appropriately screens the list to eliminate measures that

- did not apply to significant source categories in the area

  Measures eliminated under this criterion fell into one of four categories

  1. measure to reduce emissions resulting from sanding/salting for de-icing of roads

  2. measures to reduce emissions from prescribed burning which is not done within the nonattainment area

  3. measures applicable only to a source unique to another area, e.g., lakebed controls in Owens Valley, blowsand control in Coachella Valley

  4. measures that applied to de minimis sources, e.g., agricultural burning

- were technically infeasible for the area because they did not affect critical source parameters and therefore would not reduce PM-10 emissions. We did not see any instances where this criterion was used to eliminate a measure.

MAG also screened its list to eliminate measures that applied to stationary sources or industrial sources for which Maricopa County has direct authority to control.

Finally, the plan provides cost effectiveness estimates for each of the candidate BACM per EPA guidance.

We note that additional evaluation of control measures was done as part of the most stringent measure analysis. MAG plan, pp 10-25 & 10-26. Overall, the plan presents one of the most comprehensive lists of potential BACM ever produced.

PRESENTATION OF THE IMPLEMENTATION OF BACM AND INCLUSION OF MOST STRINGENT MEASURE ANALYSES

We have reformatted the list of significant source categories in the Phoenix PM-10 plan as shown in Table BACM-1. We have done this because our evaluations of the BACM and MSM analyses are easier to present and we believe more understandable when controls are grouped as we have done.

TABLE BACM-1
WHERE THE BACM AND MSM EVALUATIONS FOR EACH SIGNIFICANT SOURCE CATEGORY CAN BE FOUND

CONTROLS FOR THIS SIGNIFICANT SOURCE CATEGORY	ARE DISCUSSED IN THE FOLLOWING SECTION(S) ON THE IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR
Paved road travel	On-road motor vehicles (TCMs) Paved road dust
Unpaved road travel	Unpaved road travel Unpaved parking lots
Industrial paved road travel	Construction[22]
Construction site preparation	Construction Paved road dust Disturbed vacant land
Agricultural tilling	Agriculture
Residential wood combustion	Residential wood combustion

[22] We address industrial haul roads in the construction source category because both are covered by the same rule, MCESD's Rule 310.

TABLE BACM-1
WHERE THE BACM AND MSM EVALUATIONS FOR EACH SIGNIFICANT SOURCE CATEGORY CAN BE FOUND

CONTROLS FOR THIS SIGNIFICANT SOURCE CATEGORY	ARE DISCUSSED IN THE FOLLOWING SECTION(S) ON THE IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR
On-road and nonroad motor vehicle exhaust	On-road motor vehicles (technology controls) On-road motor vehicles (TCMs) nonroad engines
Secondary ammonium nitrate	Secondary ammonium nitrate

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR ON-ROAD MOTOR VEHICLE EXHAUST (TECHNOLOGY STANDARDS)

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible for the area
Action:	Approve
Proposal Cite:	Annual and 24-hour: 66 at 50528
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in

practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies on-road vehicle exhaust as a significant source of PM-10 in the Phoenix area. MAG plan, p. Table 9-1.

Description of the On-road Motor Vehicle Exhaust Source Category

This category includes tailpipe and tire wear emissions of primary PM-10 from on-road motor vehicles. On-road motor vehicles include both gasoline and diesel-powered passenger cars, light, medium, and heavy duty trucks, buses, and motorcycles.

PM-10 Emissions from On-road Motor Vehicle Exhaust in the Phoenix Area

The plan includes motor vehicle exhaust emissions from all types of on-road vehicles in the Phoenix area. See MAG plan, Appendix A, Exhibit 6 (1994 Regional PM-10 Emissions Inventory), Chapter 6, summarized in Table ORM-1. On-road motor vehicle exhaust accounts for 3.3 percent of the total directly-emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 1.2 percent of the 2006 pre-control PM-10 inventory. MAG TSD, Table II-3.Total on-road vehicle exhaust PM-10 drop by a third from 1995 to 2006 due primarily to fleet turnover to cleaner vehicles and new fuel standards. MAG TSD, Tables II-1 and II-3.The Microscale plan does not identify on-road motor vehicle exhaust as an explicit contributor to 24-hour exceedances. Microscale plan, p. 17-19.

TABLE ORM-1
1994 EMISSIONS FROM ON-ROAD MOTOR VEHICLE EXHAUST & TIRE WEAR IN THE PHOENIX PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	
	GASOLINE	DIESEL
Light duty vehicles (e.g., cars)	0.44	0.05
Light duty trucks	0.31	0.12
Heavy duty trucks	0.26	3.62
Motorcycles	0.01	0
Totals	1.02	3.8

Source: 1994 Regional PM-10 Inventory, Table 6-9

Existing Controls

1. National controls

We have adopted national emission standards for on-road motor vehicle exhaust. These standards apply to motor vehicles sold in Arizona. See Table OR-2. We have also recently adopted Tier II standards for motor vehicles including sports utility vehicles. 65 FR 6797 (February 10, 2000). We also have national controls on fuels sold throughout the county which affect emissions of motor vehicles in Arizona.

The 1990 standards for on-road diesel fuel limited sulfur levels to a maximum of 500 ppm and set a minimum centane index of 40 (max aromatics of 35%). 40 CFR 80.29. In January 2001, we established a new diesel fuel sulfur limit of 15 ppm as part of our overall program to control emissions from heavy duty diesel vehicles. The new limit will be fully in place by September, 2006. 66 FR 5002 (January 8, 2001).

In February 2000, we also established sulfur limits for gasoline. Starting in 2004, refiners and importers must meet a corporate average gasoline sulfur level of 120 ppm with a cap of 300 ppm. By 2006, the cap will be reduced to 80 ppm and most refineries must produce gasoline

averaging no more than 30 ppm sulfur. 65 FR 6697 (February 10, 2000). Because sulfur in gasoline reduces the effectiveness of catalytic converters, these lower sulfur limits will aid in meeting the new Tier 2 motor vehicle emissions standards. These sulfur limits will apply in the Phoenix area and will operate in addition to the State's cleaner burning gasoline program.[23]

TABLE ORM-2
SUMMARY OF ESTABLISHED EPA ON-ROAD MOTOR VEHICLE STANDARDS BY SOURCE CATEGORY IN MAG PLAN

EMISSION CATEGORY	EPA STANDARDS APPLICABLE TO CATEGORY (PM)	COMMENT
Light duty vehicles - gasoline	Tier 0 - none; Tier 1- 0.08 g/mile at 50K miles and 0.10 g/mile at 100K miles; Tier 2; 0.01-0.02 g/mile, full useful life	Tier 2 standards will be effective with model year 2004.
Light duty vehicles - diesel	Tier 0 - 0.20 g/mile at 50K miles; Tier 1- 0.08 g/mile at 50K miles and 0.10 g/mile at 100K miles; Tier 2; 0.01-0.02 g/mile, full useful life	Tier 2 standards will be effective with model year 2004.
Light duty trucks - gasoline	Tier 0 - none; Tier 1 - 0.08/0.10 g/mile; Tier 2; 0.01-0.02 g/mile, full useful life	Tier 2 standards will be effective with model year 2004.
Light duty trucks - diesel	Tier 0 LDT1 - 0.26 g/mile at 100K miles, Tier 0 LDT2 - 0.13 g/mile at 100K miles; Tier 1 - 0.08/0.10 g/mile; Tier 2; 0.01-0.02 g/mile, full useful life	Tier 2 standards will be effective with model year 2004.

[23] Arizona's CBG program is state program established by state law; as such, it operates along side but not in place of EPA's fuel regulations applicable to areas not in the federal reformulated gasoline program.

TABLE ORM-2 SUMMARY OF ESTABLISHED EPA ON-ROAD MOTOR VEHICLE STANDARDS BY SOURCE CATEGORY IN MAG PLAN		
EMISSION CATEGORY	**EPA STANDARDS APPLICABLE TO CATEGORY (PM)**	**COMMENT**
Medium and Heavy duty trucks - gasoline	Medium duty: interim, 0.06-0.08 g/mi; final, 0.01-0.02 g/mile, full useful life None Heavy: 0.01 g/bhp-hr	Interim standards will be effective with model year 2004, final with model year 2008. Standard will be effective with model year 2008.
Medium and Heavy duty trucks - diesel	1994+ - 0.10 g/bhp-hr; 2007+ - 0.01 g/bhp-hr	
Urban Buses	1994&1995 - 0.07 g/bhp-hr 1996+ - 0.05 g/bhp-hr	
Motorcycles	None	

2. State and local controls

Arizona has adopted a number of programs to reduce emissions from on-road motor vehicles. In most instances, these programs have focused on reducing carbon monoxide and volatile organic compounds (for ozone control) and not PM-10. Table OR-3 lists a number of the technology-based programs. Programs aimed at reducing vehicle usage or improving traffic flow are addressed later.

TABLE ORM-3 SUMMARY OF ARIZONA PROGRAMS AFFECTING ON-ROAD MOTOR VEHICLE EMISSIONS	
PROGRAM TYPE	**STATE PROGRAM**
Light Duty Vehicles and Trucks	
Inspection and maintenance	A comprehensive enhanced I/M program requiring 1981 and newer vehicles to undergo a I/M-240 like test including a pressure test, increased repair limits, and a road side testing program. MAG plan, pp. 4-4 to 4-6. See also 2001 I/M SIP submittal.[24]
Fuel standards	The Cleaner Burning gasoline program (CBG) requires either federal Phase II RFG or CA Phase II RFG during the summer at an RVP of 7.00 psi and CA Phase II RFG during winter at a RVP of 9 psi. MAG plan, pp. 7-16 to 7-17.
Alternatively-fueled vehicles	Personal and corporate tax credits for purchase or conversion of vehicles to alternative fuels. Mandated conversion of 75 percent of state, local, and federal fleets to alternative fuels. MAG plan, pp. 4-6 to 48.
Buses	
Conversion programs	Mandated conversion of 75 percent of school district buses. New transit buses must be alternative fuels. MAG plan, pp. 4-6 to 4-5.
Heavy Duty Diesel Trucks	
Inspection and maintenance	Snap Idle test. MAG plan, p. 4-4. Implemented in April 2000. 2001 I/M SIP submittal, p. 5.

[24] ADEQ, Final Arizona State Implementation Plan Revision, Basic and Enhanced Vehicle Emissions Inspection/Maintenance Program, June 2001.

Does the plan meet the statutory and policy requirements?

Suggested Measure List for BACM and MSM Analysis

We find that the Phoenix serious area plan evaluates a comprehensive set of potential technology-based controls for on-road motor vehicle exhaust emissions including potential most stringent measures from other States as well as provides information on their technological feasibility, costs, and energy and environmental impacts when appropriate.

The suggested technology-based measures for controlling emissions from on-road motor vehicle exhaust fall into one of five categories: new emission standards, inspection and maintenance programs, fuels, programs to encourage alternatively-fueled vehicle usage, and programs to accelerate fleet turnover. See Table OR-4. Tailpipe emissions are also controlled through the implementation of transportation control measures (TCMs) to reduce congestion and vehicle miles traveled and trips. We discuss TCMs in the next section.

New Controls in the Plan and Justifications for Rejecting Potential Controls

Even prior to the serious area PM-10 plan, Arizona had in place one of the nation's most comprehensive programs to address on-road motor vehicle emissions. With the additional measures in the plan (including a more stringent diesel I/M program and measures both encouraging and requiring diesel fleet turnover) the overall mobile source program is both strengthened and goes beyond the existing program. See Table OR-4. Both strengthening and expanding existing programs are criteria for demonstrating the implementation of BACM. See *Addendum* at 42013. Where the plan has rejected potential BACM, it provides a reasoned justification for the rejection.

The plan identified just a few measures from other areas as being more stringent than existing programs. These measures have either been adopted or we have concluded, based on information provided in the plan, that the measures need not be adopted to assure that the plan includes MSM. See Table OR-4.

Except for one measure, all the adopted BACM and MSM were implemented by June 10, 2000, the BACM implementation deadline for the Phoenix area. The requirement that pre-1988 HDDV registered in the nonattainment area to meet 1988 federal emission standards will not be fully implemented until January 1, 2004, in order to provide sufficient lead time for modification or replacement of the non-complying heavy duty diesel vehicles. However, normal fleet turn over and the State's voluntary vehicle repair program provide for early beginning implementation

of this measure.

We, therefore, find that the combination of on-road motor vehicle technology controls and TCMS (described in the next section) in the Phoenix serious area plan provides for the implementation of RACM and BACM and the inclusion of MSM for on-road motor vehicle exhaust as required by CAA sections 189(a)(1)(C), 189(b)(1)(B) and section 188(e). See Table OR-4.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
SUGGESTED BACM				
Emission standards for gasoline engines	adopt CA low-emissions vehicle program	No	Yes	EPA's new Tier II standards are very close to CA's standards. Federal tailpipe standards are implemented and enforced by EPA.
	catalyst retrofit/replacement program	Yes		SB 1427 (1998), section 39 allocated $275,000 to ADEQ to implement the Vehicle Repair Grant Program in A.R.S. 49-542 S and to implement the Catalytic Converter Replacement Program in A.R.S. 49-542 R. MAG plan, p. 7-11. These programs are aimed at high-emitting vehicles. See A.R.S. 49-542 R & S. Program became part of the County voluntary vehicle repair and retrofit program in 2000. See p. 18 of the 2001 I/M SIP submittal.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	vehicle repair and retrofit program	Yes	A.R.S. 49-474.03 D. (1998) required Maricopa County to develop programs for the repair or retrofit of vehicles that fail the emissions inspection test. The programs are voluntary and requirements for eligibility include: (1) vehicle must be functionally operational, (2) vehicle is titled in Arizona and registered in Area A or B for at least 24 months, (3) vehicle is at least 12 years older than the current model year passenger car or light-duty truck, (4) vehicles failed emissions testing before repair or retrofit. S.B. 1427, section 38 allocated $800,000 to fund the program, $640,000 was allocated to Maricopa County for the period, January 22, 1999 through June, 2000. An additional $1,920,000 was allocated for FY 2001. From January 1999 to October 2000, 2153 vehicles have been repaired or had catalyst retrofit kits installed. See MCESD, Voluntary Vehicle Repair and Retrofit Program, Final Report, 2000 found in Appendix G of the 2001 I/M SIP submittal.
Emission standards for diesel engines	require pre-1988 HDDV registered in the N/A to meet 1988 federal emission standards	Yes	A.R.S. 49-542 F.7. (1996) requires that after January 1, 2004, a diesel powered motor vehicle with gross wight of more than 26,000 lbs registered in Area A (Phoenix nonattainment) must meet emission standards contained in 40 CFR 86.088-11 (1988 federal emission standards) unless it was manufactured in or after the 1988 model year. MAG plan, p. 7-15. Early implementation of this measures is provided by the State's Voluntary Vehicle Repair and Retrofit Program. Requirement will be funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	heavy-duty diesel engine replacement or overhaul at recommended intervals	Yes	A.R.S. 49-474.03 (1998) required Maricopa County to establish and coordinate a Voluntary Vehicle Repair and Retrofit (VVRR) program in Area A by January 1, 1999. The program, which is coordinated with ADEQ and ADOT, is focused on older model year heavy-duty diesel vehicles. The legislation allows diesel-powered vehicles over 8,500 lbs that fail roadside vehicle tests to be eligible for up to $1000 in repair or retrofit costs. MAG plan, p. 7-15. VVRR program was funded with $800,000. SB 1427 (1998), section 38. $640,000 was allocated to Maricopa County for the period, January 22, 1999 through June, 2000. An additional $1,920,000 was allocated for FY 2001. 20% of these allocations can be used for diesel repairs. See MCESD, Voluntary Vehicle Repair and Retrofit Program, Final Report, 2000 found in Appendix G of the 2001 I/M SIP submittal and page 18 of that submittal.
	retrofit existing diesel vehicles	Yes	A.R.S. 9-500.04, 15-349, 41-803, 49-474.01, and 49-573 require public agencies operating fleets (cities, towns, Maricopa County, school districts, the state and federal government) to install oxidation catalyst on their heavy-duty diesel vehicles on a schedule set by A.R.S. 49-555 IF the entities receive a waiver to opt out of alternative fuel requirements. The replacement catalyst must reduce particulate emissions by 25% and be approved by EPA under the Urban Bus Engine Retrofit/Rebuilt Program. MAG plan, p. 7-25.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
Vehicle testing (Note: there is no means of calculating PM-10 emissions from the individual elements of I/M programs for gasoline-powered vehicles; therefore, reductions from these measures are unknown.)	phased-in emission test cutpoints	Yes		More stringent I/M 240 final standards for vehicle emission testing were mandated to be effective on January 1, 1997, but were not implemented due to problems with false failures. MAG plan, p. 6-7. HB 2237, section 19 (1997) appropriated $120,000 to ADEQ to develop and implement an alternative test protocol to reduce the false failure rates. New test procedures for transient loaded emissions standards (I/M 147) for 1981 and newer vehicles have been implemented. 2001 I/M SIP submittal, p. 5. Program is funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D.
	transient loaded mode test for 1967-1980 vehicles and 1981 and new HD gasoline trucks	No	Yes	Implementation of this program would increase emissions, MAG plan, p. 5-6.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	enhanced testing of constant four-wheeled vehicles	Yes	A.R.S. 49-541.01 (1999) which requires biennial transient loaded emissions testing program for constant four-wheel drive vehicles starting with model year 1981. MAG plan, p. 7-8. Implementation of this measure has been delayed because of funding constraints preventing the purchase of dual-axle dynamometers in several locations throughout the inspection station network. The program is authorized for implementation starting on January, 1 2002. Currently these vehicles are subject to a curb idle test because they cannot be tested on the single dynamometer used for transient loaded emissions test. A.R.S. 49-541.01. and AAC R18-2-1006. 2001 I/M SIP submittal, p. 5.
	geographic expansion of emissions testing program	Yes	A.R.S. 49-541.01 B. (1998) expanded the geographic coverage of the I/M program requirements to more parts of Maricopa County and parts of Pinal and Yavapai Counties. Program was implemented by December 31, 2000. See MAG plan, pp. 7-66 to 7-69. Program will be funded and enforced as part of the overall State I/M program. A.R.S. 49-541.01. and AAC R18-2-1001. 2001 I/M SIP submittal, p. 5.
	one-time waiver	Yes	A.R.S. 49-542 D. (1996) limited the issuance of waivers for failure to comply with emission testing requirements to 1-time only beginning January 1, 1997. MAG plan, p. 7-10. Program will be funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D and AAC R18-2-1008. 2001 I/M SIP submittal, p. 16.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	no-waiver or increased waiver repair options	Yes		A.R.S. 49-542 D. (1998) doubled to $200 the amount a person must spend to repair a failing 1967-1974 vehicle in area A to qualify for a waiver. MAG plan, p. 7-10. AAC R18-2-1010 E. Waiver repair amounts for other vehicles are up to $400 for gasoline-powered vehicles and $500 for HDDV. A.R.S. 49-542 L.1. and AAC R18-2-1010 E. Program is funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D.
	vehicle pollution charge	No	Yes	This measure was recommended only after completion of additional studies to determine appropriate and feasible implementation mechanisms and after resolution of the technical problems associated with the final cutpoints in the I/M 240 program. The measure, if implemented, would link vehicle registration fees to the results of the emission testing program so that higher fees would be charged to vehicle owners whose vehicles emit higher levels of pollutants. Purpose of the fees is to encourage the retirement of older, more polluting vehicles. Program would likely have substantial adverse and disproportionate impact on low income households and mobility because these household are most likely to operate older, higher polluting cars. The State has other programs that encourage repair or replacement of these vehicles that essentially have the same result without the adverse affects. See voluntary gasoline vehicle repair and retrofit program above. The feasibility of this program has never been demonstrated. It has not been implemented elsewhere in the U.S. See also p. 417

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	enhanced light duty vehicle emissions testing/ loaded-mode vehicle emissions testing	Yes	In 1995, Arizona implemented an enhanced vehicle emission testing program which includes a biannual transient loaded emissions test for gasoline powered vehicles model year 1981 and newer. A.R.S. 49-542 F.2.a. 1980 and earlier model year cars must pass a steady-state loaded-mode and curb idle test. A.R.S. 49-542 F.2.b. Program is funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D. In addition, ADOT is implementing additional methods to improve registration compliance to better enforce the I/M program. The new methods include (1) an expanded registration enforcement team, (2) a registration enforcement tracking program and a new resident tracking program. Additional methods to ensure better compliance were implemented in 1998 and 1999 including new requirements for vehicles in school and government parking lots. MAG plan, pp. 7-13 to 7-14.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED?	IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	remote sensing	No	Yes	A random on-road testing program, using remote sensing, was initially established in 1993 as a supplement to the Vehicle Emissions Inspection Program. In 2000, HB 2104 replaced this on-road testing program with a study designed, in part, to identify more accurate and cost-effective testing methods, given the large dollar per ton cost of the original program. 2001 I/M SIP submittal, p. 26. The remote sensing program tested for CO and VOC emissions. Projected PM-10 emission reductions from the program were not calculated, but were likely to be less than one-half ton per year (or 2.6 lbs per day), too small a reduction for remote sensing to be considered an available PM-10 control measure.[25] See also page 418. The State does continue to do road-side testing as part of its I/M program. 2001 I/M SIP submittal, p. 26.

[25] Estimated reductions calculated assuming the same ratio of CO reductions to PM-10 reductions for remote sensing as for expansion of area A. ADEQ estimated that the expansion of Area A would result in a 2,727 ton per year reduction in CO and a 0.99 ton per year reduction in PM-10 and that remote sensing would result in a 1, 336 ton per year reduction in CO. Using the 0.99/2727 ratio, estimated PM-10 reductions from remote sensing would be 0.48 tons per year or 2.6 lbs per day. See 6 AAR 382, 393 (January 21, 2000).

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	toll-free number to report gross emitting vehicles	No	Yes	The smoking-vehicle hotline was initiated in October 1996 and allows the public to use a local phone to report vehicles observed emitting excessive tailpipe smoke. In response to calls, ADEQ mails the vehicle owner a letter recommending an emissions test. The State rejected making this number toll-free since the program is aimed at callers within Area A. The increased costs associated with setting up the new line and reproducing and distributing additional outreach materials were not deemed cost-effective. ADEQ commitments. Smoking vehicles may now also be reported through the Internet. See MCESD's web site at www.maricopo.gov/mcvsvc and ADEQ's website at www.adeq.state.az.us/environ/air/vei
Vehicle inspection - HDDV	snap acceleration test for HDDV/enhanced HD diesel emissions testing	Yes		A.R.S. 49-592 F.7. (1996) requires that after March 1, 1997, HD diesel vehicles over 8,500 lbs to take the annual snap acceleration test conforms to SAE standard J1667. beginning on 3/1/97 if the vehicles are registered in Area A and are more than 33 months beyond the initial registration. MAG plan, p. 7-14. Program was implemented in April 2000 and is funded and enforced as part of the overall State I/M program. A.R.S. 49-542 D. In addition, S.B. 1427, Section 35 (1998) authorized a pilot random roadside emissions test for diesel vehicles registered in Area A or Area B with a gross vehicle weight rating over 8,500 lbs. The pilot was to determine if the program should become permanent. 2001 I/M SIP submittal, p. 26.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
Accelerated retirement	voluntary gasoline vehicle retirement program	Yes	A.R.S. 49-588 F.1. Allows major employers to meet their trip reduction targets through voluntary vehicle retirement program. Maricopa County revised its trip reduction ordinance to provide this option. MAG plan, p. 7-25. Resources and funding through existing program. MAG plan, p. 7-25.
	voluntary diesel vehicle retirement	Yes	A.R.S. 49-474.03 (1998) required Maricopa County to establish and coordinate a Voluntary Vehicle Repair and Retrofit program in Area A by January 1, 1999. The program, which is coordinated with ADEQ and ADOT, is focused on older model year heavy-duty diesel vehicles. The legislation allows diesel powered vehicles over 8,500 lbs that fail roadside vehicle tests to be eligible for up to $1000 in repair or retrofit costs. MAG plan, p. 7-15. Funded with $800,000 statewide. SB 1427 (1998), section 38. $640,000 was allocated to Maricopa County for the period, January 22, 1999 through June, 2000. An additional $1,920,000 was allocated for FY 2001. 20% of these allocations can be used for diesel repairs. See MCESD, Voluntary Vehicle Repair and Retrofit Program, Final Report, 2000 found in Appendix G of the 2001 I/M SIP submittal and page 18 of that submittal.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
Fuels - gasoline	opt into federal RFG program/adopt CARB phase 2 standards/ performance based standards for motor vehicle fuels/ tighter limits of sulfur content in gasoline	Yes		ADEQ adopted Cleaner Burning Gasoline (CBG) rules on September 12, 1997. The CBG gasoline Type 2 specifications include performance standards for NOx and requirements for the fuel parameters sulfur, olefins and aromatic HCs. EPA took final action approving the SIP revision submitted on September 15, 1997, establishing CBG fuel requirements for gasoline distributed in the Phoenix (Maricopa County) ozone nonattainment area on February 10, 1998, 63 FR 6653. Phase II of the program which requires tighter fuel programs was implemented in 1999.
	use of clean fuels on a statewide basis	No	Yes	A.R.S. 49-541.01 B. (1998) expanded the geographic coverage of the fuels program requirements to more parts of Maricopa County and parts of Pinal and Yavapai Counties. Program was implemented by December 31, 2000. See MAG plan, pp. 7-66 to 7-69. Provisions are enforced by AZ Department of Weights and Measures. A.R.S. 41-2065. Area A has been identified as the main area of influence contributing to pollutant emissions in the Maricopa Nonattainment Area. Vehicles operating in other portions of the State do not contribute significantly to emissions in the nonattainment area, thus reductions of emissions (from expansion of the CBG program) would have a relatively insignificant impact, thus it would not be cost effective to expand the CBG requirements and compliance efforts throughout the state. MAG plan, p. 6-4.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	reduced gasoline volatility	Yes		A.R.S. 41-2083 J (1993) limits the maximum summer vapor pressure (or Reid vapor pressure) of gasoline fuel sold in the Maricopa area to 7.0 psi beginning May 31, 1995 through September 30, 1995, and continues to apply from May 31 through September 30 of each year thereafter. We have approved this limit. See 62 FR 31734 (June 11, 1997). AAC R20-2-751. RVP is limited to 9 psi from November 1 to March 31 and in October and May; and 10 psi in April. A.A.C. R20-2-751. Provisions are enforced by AZ Department of Weights and Measures. A.R.S. 41-2065.
	mandatory oxygenated fuels program/ increased oxygen content of ethanol blend	Yes		A.R.S. 41-2124 B. (1998) requires all gasoline sold in Maricopa County and Area A in the period from Nov. 2, 2000 though March 31 2001 of each subsequent year to contain a minimum 3.5 percent by weight oxygenate content. Provision is enforced by AZ Department of Weights and Measures. A.R.S. 41-2065. A.A.C. R20-2-751
Fuels - diesel	CARB diesel or other clean diesel	No	Yes	See discussion on CARB diesel below.
	limit sulfur content of diesel oil to 500 ppm	Yes		A.R.S. 41-2083 J (1996) restricts the sale of diesel fuel in Area A to a maximum sulfur content of 500 ppm. Provision is enforced by AZ Department of Weights and Measures. A.R.S. 41-2065.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	truck stop electrification	No	Yes	Measure rejected because it would result in insignificant emissions reductions due to an insignificant number of facilities in the nonattainment area. MAG plan, p. 6-5.
Alternatively fueled vehicles	encourage the construction & operation of alternative fuel fueling stations/ incentives for the use of compressed natural gas/ alternative fuels for general vehicle use (tax incentives)	Yes		A.R.S. 43-1086, 43-1086.01, 43-1128.01, and 43-1174.01 provide both tax credits and deductions for the construction and operation of new fueling stations for alternatively-fueled vehicles and the purchase, leasing, or conversion of alternatively-fueled vehicles. Alternative fuels are defined as natural gas, propane, electricity, solar energy, hydrogen or mixes of natural gas or propane with gasoline or diesel. MAG plan, pp. 7-22 to 7-24.
	alternative fuels for fleets/conversion of buses to alternative fuels	Yes		A.R.S. 9-500.04, 15-349, 41-1516, 49-474.01, and 49-573 set requirements for fleets and buses operated by cities, towns, schools and state and federal agencies in Area A. At a minimum, the vehicles must (1) meet the EPA LEV standards (40 CFR 88.104-94 - 88.105-94), or (2) meet the provisions of EPA Memorandum 1-A or (3) qualify for a waiver under EPA Memorandum 1-A at fixed rates established by the applicable A.R.S. sections. MAG plan, pp. 7-19 to 7-22.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	reporting requirements for fleets using alternative fuels	Yes	A.R.S. 41-803 requires all state agencies to report annually on cost, operation, maintenance, and mileage to the AZ Department of Administration who must then report to the State Legislature and the Governor. MAG plan, p. 7-22.
	public education program for alternative fuels	Yes	A.R.S. 41-1516 (1998) allows monies from the State Clean Air Fund to be used to conduct public awareness programs for alternative fuels. MAG plan, p. 7-24.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
MOST STRINGENT MEASURES				
Clean fuels	CARB diesel	No	Yes	The Phoenix serious area plan claims measure is not reasonable on cost basis. (pg 9-46) All currently available evidence is that 24-hour exceedances are caused by local fugitive dust sources and controls on these sources alone will result in the earliest practicable date for attainment of the 24-hour PM-10 standard in the Phoenix area. Microscale plan, pp. 17-19. Annual standard exceedances are also dominated by fugitive dust sources with on-road and nonroad engines contributing little to annual PM-10 levels in the area. The small emission reduction associated with the introduction of CARB diesel would not advance the attainment date in the area, either by itself or in combination with other measures. Because implementation of CARB diesel would not result in an earlier attainment date and thus unnecessary for expeditious attainment, we find that the Phoenix serious area plan provides for the inclusion of MSM to our satisfaction absent the adoption and implementation of CARB diesel. See also, p. 419, 428. We note that the State has already adopted half of the CARB diesel standards, the 500 ppm sulfur limit. (S.B. 1002) We have also recently adopted a 30 ppm diesel sulfur standard which will apply to the Phoenix area.
Vehicle standards	HD diesel engine replacement	N/A		Arizona has implemented other programs to mandate or encourage the retrofitting/replacement of diesel engines. See program listed above under BACM - Emission Standards for Diesel Engines.

TABLE OR-4
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST (TECHNOLOGY-BASED)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
Vehicle retirement	scrappage program for HD diesel	No	Yes	Arizona has implemented other programs to mandate or encourage the retrofitting/replacement of diesel engines. See program listed above under BACM - Emission Standards for Diesel Engines.

This section prepared by Karina O'Connor and Frances Wicher

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR ON-ROAD MOTOR VEHICLE EXHAUST AND PAVED ROAD DUST (TCMS)

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area.
Action:	Approve
Proposal Cite:	Annual standard: 65 at 19973 24-Hour standard: 66 at 50259
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most

stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies on-road motor vehicle exhaust and paved road dust as significant sources of PM-10 in the Phoenix area. MAG plan, Table 9-1. Transportation control measures reduce PM-10 emissions from both these categories.

Description of the On-road Motor Vehicle Exhaust and Paved Road Dust Source Categories

The on-road motor vehicle exhaust category includes tailpipe and tire wear emissions of primary PM-10 from on-road motor vehicles. On-road motor vehicles include both gasoline and diesel-powered passenger cars, light, medium, and heavy duty trucks, buses, and motorcycles.

Paved road dust is fugitive dust that is deposited on a paved roadway and then is re-entrained into the air by the action of tires grinding on the roadway. Re-entrained road dust emission rates are not affected by vehicle speed but are affected by the silt loading on the road and amount of vehicle travel on a road. Emission rates are lower per mile traveled on higher traveled roads than they are on-roads that receive less traffic.

PM-10 Emissions from On-road Motor Vehicle Exhaust and Paved Road Dust in the Phoenix Area

The plan includes motor vehicle exhaust emissions from all types of on-road vehicles in the Phoenix area. See 1994 Regional PM-10 Emissions Inventory, Chapter 6, summarized in Table TCM-1. On-road motor vehicle exhaust accounts for 3.3 percent of the total directly-

emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 1.2 percent of the 2006 pre-control PM-10 inventory (MAG TSD, Table II-3). Total on-road vehicle exhaust PM-10 drop by a third from 1995 to 2006 due primarily to fleet turnover to cleaner vehicles and new fuel standards. MAG TSD, Tables II-1 and II-3. The Microscale plan does not identify on-road motor vehicle exhaust as an explicit contributor to 24-hour exceedances. Microscale plan, p. 17-19.

Paved road dust is one of the largest categories in the regional PM-10 inventory, accounting for 39.1 percent of the total directly-emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 20.4 percent of the 2006 pre-control total (including windblown) PM-10 inventory (MAG TSD, Table II-3). Total uncontrolled paved road dust emissions increase by almost 30 percent third from 1995 to 2006 due to the increase in vehicle miles traveled (VMT). MAG TSD, Tables II-1 and II-3. The Microscale plan shows that paved road dust is a very small contributor to 24-hour exceedances. Microscale plan, p. 17-19.

TABLE TCM-1
1994 EMISSIONS FROM ON-ROAD MOTOR VEHICLE EXHAUST, TIRE WEAR, AND PAVED ROAD DUST IN THE PHOENIX PM-10 NONATTAINMENT AREA

CATEGORY	METRIC TONS PER DAY	
	GASOLINE	DIESEL
Light duty vehicles (e.g., cars)	0.44	0.05
Light duty trucks	0.31	0.12
Heavy duty trucks	0.26	3.62
Motorcycles	0.01	0
Totals vehicle exhaust and tire wear	1.02	3.8
Paved road dust	56.4	

Source: 1994 Regional PM-10 Inventory, Tables 2-3 and 6-9

Existing Controls

Arizona has a long history of adopting and then enhancing programs to reduce emissions from on-road motor vehicles by reducing vehicle miles traveled, vehicle trips, and/or congestion.[26] In most instances, these programs were adopted and implemented as part of carbon monoxide and ozone control programs, but they do have carry over effects on PM-10. Table TCM-2 lists a number of the transportation control measures.

TABLE TCM-2
SUMMARY OF ARIZONA PROGRAMS AFFECTING ON-ROAD MOTOR VEHICLE EMISSIONS
TRANSPORTATION CONTROL MEASURES

PROGRAM TYPE	STATE PROGRAM
Congestion Management	
Traffic light synchronization	State law (ARS 28-642) requires all roadways with traffic flow greater than 15,000 vehicles per day to have traffic lights synchronized. MAG plan, p. 4-9.
Freeway incident management	55 miles of freeway will be covered with variable message signs, ramp meters, cameras, and loop detectors all working to maintain free flow on the freeway. MAG plan, pp. 2-13, 4-9, & 5-50.
VMT and VT Reduction	
Trip reduction program	County Trip Reduction Ordinance (P-7) requires all employers with greater than 50 employees to provide incentives to reach certain trip reduction goals. MAG plan, p. 4-9. Program approved 63 FR 24434 (May 4, 1998).
Public education	Clean Air Campaign has been on-going since 1987 and involves extensive public outreach on air pollution and ways individual can reduce their contributions. MAG plan, pp. 2-12

[26] These plans include the MAG moderate area ozone and carbon monoxide plans and the serious area CO plan.

TABLE TCM-2 SUMMARY OF ARIZONA PROGRAMS AFFECTING ON-ROAD MOTOR VEHICLE EMISSIONS TRANSPORTATION CONTROL MEASURES	
PROGRAM TYPE	**STATE PROGRAM**
Transit improvements	Many jurisdiction provide transit service including Phoenix, Tempe, and Mesa. Many others contract with the Regional Public Transportation Authority to provide services. See MAG plan, p. 4-11. Service improvements are on-going. See MAG, *Draft MAG Conformity Analysis*, June 2001, pp. 3-9 to 3-11.

Does the plan meet the statutory and policy requirements?

Suggested Measure List for BACM and MSM Analysis

We find that the Phoenix serious area plan evaluates a comprehensive set of potential TCMs for on-road motor vehicle exhaust emissions including those listed in section 108(f) of the CAA as required by our guidance (*Addendum* at 42011) and potential most stringent measures from other States. The plan also provides information on their technological feasibility and costs.

The suggested TCMs for controlling emissions from on-road motor vehicle exhaust fall into one of two categories: congestion management aimed at reducing delays and stop and go traffic (i.e., increasing speeds) and travel reduction programs aimed at reducing vehicle miles traveled or vehicle trips. Only travel reduction programs are effective at reducing paved road dust because only VMT affects emissions from paved roads. Vehicle speeds do not significantly affect emission rates of paved road dust. See Table TCM-3.

New Controls in the Plan and Justifications for Rejecting Potential Controls

Even prior to the serious area PM-10 plan, the Phoenix area already had in place a comprehensive set of TCMs. See Table TCM-2. With the additional measures in the plan (including additional traffic light synchronization, transit improvements, and bicycle and pedestrian facility improvements), the overall TCM program is strengthened and goes beyond the existing program. See Table TCM-3. Both strengthening and expanding existing programs are criteria for demonstrating the implementation of BACM. See *Addendum* at 42013. Where the

plan has rejected potential BACM, it provides a reasoned justification for the rejection.

The Phoenix plan identifies no measures from other areas more stringent than existing local programs.

All the adopted TCM BACM are were implemented by June 10, 2000, the BACM implementation deadline for the Phoenix area, or have on-going implementation schedules because they are part of a on-going capital improvement program. (e.g., signal synchronization).

We find that the combination of on-road motor vehicle technology controls (described in the previous section) and TCMs in the Phoenix serious area PM-10 plan provides for the implementation of RACM and BACM and inclusion of MSM for on-road motor vehicle exhaust as required by CAA sections 189(a)(1)(C), 189(b)(1)(B) and section 188(e). See Table TCM-3. We also find that the combination of TCMs and paved road dust measures (described in the paved road section later in this TSD) provides for the implementation of RACM and BACM and inclusion of MSM for paved road dust exhaust as exhaust as required by CAA sections 189(a)(1)(C), 189(b)(1)(B) and section 188(e).

In our review, we have primarily assessed the Phoenix plan's provisions for implementing RACM and BACM and including MSM through TCMs based on the measures' effectiveness in controlling directly-emitted PM-10 from vehicle exhaust and paved road dust. We have not assessed the plan based on the TCM's potential benefit in controlling PM-10 precursors such as NOx and SOx though TCMs because 1) from available ambient measurements, neither nitrates nor sulfates are important to overall PM-10 concentrations in the Phoenix area [27] and 2) Arizona already has already targeted mobile source NOx and SOx through an aggressive set of mobile source controls from motor vehicles including its vehicle emissions inspection program and Cleaner Burning Gasoline program which we believe cover the RACM, BACM and MSM requirements for tailpipe NOx and SOx. See previous section "Implementation of BACM and Inclusion of MSM for On-Road Motor Vehicles (Technology Controls)."

[27] Total secondary particulate from all sources contributed less than 4 $\mu g/m^3$ on average to daily PM-10 levels in 1995 with a maximum contribution of 9.2 $\mu g/m^3$. See MAG TSD, p. III-40. The annual standard is 50 $\mu g/m^3$, so total secondaries contribute less than 8 percent to annual levels. The 24-hour PM-10 standard is 150 $\mu g/m^3$, so total secondaries contribute less than 3 percent to average 24-hour PM-10 levels and 6 percent when secondaries are at their highest combined levels.

The Phoenix serious area plan rejects as technologically infeasible TCMs that reduce congestion by relocating trips spatially or temporally. These measures simply move emission from one place to another and from one time of the day to another and provide no benefit for attaining the 24-hour PM-10 standard because of the regional nature of the standard and its long averaging time. MAG plan, p. 9-16. We agree with this reasoning.

The plan also rejects as technologically infeasible any TCMs that reduce trips or reduce exhaust emissions of NOx because they "were determined to conflict with attainment of the ozone air quality standard as modeling has shown that NOx reductions will produce ozone increases." MAG plan, p. 9-17. While this reasoning is inconsistent with the attainment demonstration for the annual standard which includes 8 mtpd in NOx emission reductions from various State measures as well as over 12 mtpd in reductions from the national low emission vehicle program, it does not affect our conclusion that Phoenix serious area plan provides for implementation of RACM and BACM and includes MSM through technology-based programs because the plan still includes a number of TCMs in addition to ones already implemented in the area and because secondary particulate is not implicated in 24-hour standard violations and contribute little to the annual standard. Violations of both the 24-hour standard and the annual standard are due to fugitive dust emissions and not secondary particulate.

The Phoenix serious area plan shows that jurisdictions are implementing TCMs to varying degrees, which can be attributed to differences in local road conditions, local transportation options, and budgets. CAA requirements to implement BACM and include MSM are a collective obligation of the nonattainment area and not of individual jurisdictions within that nonattainment area.[28] Therefore, to judge whether the plan provides for implementation of BACM and for the inclusion of MSM, we have focused on the combined effect of local commitments on the region as whole rather than judging compliance jurisdiction by jurisdiction.

Moreover, because BACM and MSM are obligations of the nonattainment area, we do not judge one jurisdiction's efforts against another nor consider one jurisdiction's efforts to set a BACM or MSM standard that other jurisdictions must meet or provide a justification for not

[28] This is clear from the language of the applicable CAA sections. CAA section 189(b)(1)(b) requires that "a state in which all or part of a serious area is located shall submit an implementation plan for such area that includes...provisions to assure that [BACM]...shall be implemented...." CAA section 188(e) requires that "the State [requesting an extension of the attainment date] demonstrates...that the plan for that [serious] area includes the most stringent measures...." The requirements in both sections apply to the serious area and not to the individual jurisdictions within the serious area.

doing so. Just because one jurisdiction has adopted a measure does not compel the others under the BACM or MSM requirements to do the same.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
SUGGESTED BACM				
Congestion management/idling reduction	removal of on-street parking	Yes		This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-19 to 8-20.
	optimize freeway ramp meters	Yes		This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-7.
	HOV lane pricing	No	Yes	This measure is a mechanism for taking advantage of underused roadway capacity in the HOV lanes and would result in higher overall average speeds in the general traffic lanes. MAG plan, p. 5-48. The measure was not adopted nor a reasoned justification given for rejecting it. Because as a congestion relief measure it has minimal benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without including either this measure or a reasoned justification for rejecting it.. We also note that it could lead to more congested HOV lanes which may undermine carpooling.
	coordinate traffic signal systems	Yes		This measure has been widely adopted for CO and ozone control. Measure has minimal benefit for directly-emitted PM-10, an estimated 2.4 kg per day from 435 synchronized lights. MAG TSD, Appendix 4, committed measure 16. MAG plan, pp. 7-204 to 7-208.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	reduce traffic congestion at major intersections	Yes	This measure has been widely adopted where appropriate (many communities reported no congested intersections). MAG plan, pp. 7-208 to 7-213
	reversible lanes	Yes	This measure has already been extensively implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-28.
	freeway incident detection and response management	Yes	This measure is implemented. See MAG plan, p. 4-9.
	mitigation of freeway construction impacts	Yes	Mitigation here means reduce impact of construction on traffic and not fugitive dust control which is covered under MCESD Rule 310. This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-29.
	one way streets	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-30.
	on-street parking restrictions	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-19 to 8-20.
	bus pullouts in curbs for passenger loadings	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-31.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED?	IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	off-peak goods movement	No	Yes	This measure reduces congestion by reducing the number of trucks during peak travel times. Measure does not reduce the overall amount of truck traffic. No measures were adopted and no justification for rejecting the measure was provided. Because as a congestion relief measure it has minimal benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without including either this measure or a reasoned justification for rejecting it.
	truck restrictions during peak periods	No	Yes	This measure reduces congestion by reducing number of trucks during peak travel times. Measure does not reduce the overall amount of truck traffic. No measures were adopted and no justification for rejecting the measure was provided. Because as a congestion relief measure it has minimal benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without including either this measure or a reasoned justification for rejecting it.
	programs to control extended idling of vehicles	Yes		RPTA has an engine idling policy. See MAG plan, p. 7-66. No further measures to control extended idling were included in the plan. We find this a trivial flaw because PM-10 emissions from on-road motor vehicles are a very small percentage of total 1994 emissions in the area, 3.4 percent (4.1 mtpd out of a total inventory of 141 mtpd (MAG, table 1.1)) and will decrease by 30 percent by 2006. Emissions from

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				extended idling are a very small fraction of these emissions. Because this measure it has minimal benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without including either this measure or a reasoned justification for rejecting it.
	modification of work schedules	Yes		This measure has already been extensively implemented in previous plans and continues to be implemented through state law and Maricopa County trip reduction program. See MAG plan, Appendix B, Exhibit 2, pp. 8-46 to 8-48.
	traffic diversion	Yes		Measures requires ADOT to place signs outside on I-10 outside of the Phoenix area encourage vehicles not bound for Phoenix to bypass the area. Measure implemented as a CO contingency measure in 1996.
	develop intelligent transportation systems	Yes		This measure is being implemented through ADOT's freeway management system and pilot programs in the area. MAG plan, pp. 7-31 to 7-37.
	limit excessive car dealership vehicle starts	No	Yes	Total PM-10 emissions from automobiles are very small at 1.01 mtpd out of a total inventory of 141 mtpd (1994 figures, MAG, table 1.1). Idle emissions are a fraction of this; therefore, this measure would have minimal to no benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED?	IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				including either this measure or a reasoned justification for rejecting it.
	limit idling time to 3 minutes	No	Yes	RPTA has an engine idling policy. See MAG plan, p. 7-66. Total PM-10 emissions from on-road motor vehicles is a small percentage of total emissions in the area, 3.4 percent (4.1 mtpd out of a total inventory of 141 mtpd (1994 figures, MAG, table 1.1)). Idle emissions are a fraction of this; therefore, this measure would have minimal to no benefits for directly-emitted PM-10 and thus would not contribute to more expeditious attainment of either PM-10 standard, we find that the plan provides for RACM and BACM without including either this measure or a reasoned justification for rejecting it.
	modified business hours for private and public sector during high pollution season to reduce cold start emissions	No	Yes	This measure is a CO control measure without benefit for PM-10. MAG plan, Table 5-2, measure 90.
	enforcement of traffic, parking, and air pollution regulations	Yes		MCESD has increased enforcement efforts. State has increased enforcement of I/M testing requirement. MAG plan, p. 7-13. Local programs to enforce traffic and parking are not addressed but absent any information to the contrary, we assume

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				local jurisdictions enforce their regulations to a reasonable degree.
VMT and VT reduction	mass transit alternatives	No	Yes	Mass transit alternatives are being studied but funding remains uncertain.
	expansion of transit	Yes		MAG plan, pp. 7-185 to 7-192. Service improvements are on-going. See MAG, *Draft MAG Conformity Analysis*, June 2001, pp. 3-9 to 3-11.
	fuel tax increase	No	Yes	Measure rejected by Governor's Alternative Transportation Systems Task Force because of low ranking re: public acceptance, community impact on low income households and mobility; medium impact on air quality, and high cost of implementation; all acceptable justifications for rejecting a measures as BACM. MAG plan, p. 5-50. We know of no jurisdiction that has adopted a fuel tax increase as a means of reducing air pollution.
	special events control	Yes		MAG plan, pp. 7-37 to 7-41.
	transit service improvements in combination with park and ride lots and parking management	Yes		RPTA has program to promote and expand park & ride lots. MAG plan, p. 7-279. In addition, this measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-33.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	fringe and transportation corridor parking facilities serving HOV programs or transit services		
	park & ride programs		
	fixed lanes for buses and carpools on arterials	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-7.
	fixed lanes for buses and carpools on freeways	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-7.
	HOV ramps which by-pass freeway ramp meter signals	Yes	This measure has already been implemented in previous plans. MAG plan, p. 4-9.
	employer rideshare program incentives	Yes	The Maricopa County Trip Reduction Program Ordinance requires employers to provide incentives to employees to reduce single occupant vehicle trips. We approved the program into the SIP on May 4, 1998 (62 FR 24431).

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	mandatory employee parking fees	No	Yes	In previous plans, considered an option under the Maricopa County Trip Reduction Program Ordinance. See MAG plan, Appendix B, Exhibit 2, p. 8-13. On comprehensive list of measures but not further addressed in MAG plan; no explanation for rejection given. We are not aware of any regional programs to require employee parking fees for air quality controls. This measure would likely have the same issues as increasing fuel tax: low public acceptance, community impact on low income households and mobility; with a medium impact on air quality and high cost (to individual and companies) of implementation.*
	preferential parking for carpools and vanpools	Yes		MAG plan, pp. 7-198 to 7-204. This measure has also been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-14.
	encouragement of vanpools for county and state employees	Yes		State and county agencies are subject to Maricopa County trip reduction ordinance under which employers as part of the trip reduction plans can include programs to encourage vanpooling. See Maricopa County Trip Reduction Ordinance, P-7. Also, RPTA also encourage the development of vanpool programs. See RPTA commitment, 97-TC-19.
	vanpools purchase incentives	Yes		State and county agencies are subject to Maricopa County trip reduction ordinance under which employers as part of the trip reduction plans can include programs to encourage vanpooling. See Maricopa County Trip Reduction Ordinance, P-7. Also,

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				RPTA also encourage the development of vanpool programs. See RPTA commitment, 97-TC-19.
	merchant transportation incentives	No	Yes	No explanation given. Given the other TCM programs in the Maricopa area, we believe that the failure to include this measure does not effect a finding that the Phoenix serious area plan provides for the implementation of BACM and inclusion of MSM for motor vehicle exhaust and road dust.
	trip reduction ordinances	Yes		Maricopa County Trip Reduction Ordinance approved May 4, 1998 (62 FR 24431)
	financial incentives, including zero bus fares	Yes		Maricopa County Trip Reduction Program Ordinance requires employers to provide incentives to employees to reduce single occupant vehicle trips. These incentives can include subsidized or free bus passes. See MAG plan, Appendix B, Exhibit 2, pp. 8-36 - 8-38.
	programs to limit portions of road surfaces or certain section of the metro area to the use of non-motorized vehicles or pedestrian use, both	Yes		This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, p. 8-38.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	as to time and place		
	encouragement of bicycle travel	Yes	MAG plan, pp. 7-218 to 7-226.
	development of bicycle travel facilities	Yes	This measure has already been extensively implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-39 to 8-45. MAG plan, pp. 7-226 to 7-232.
	modification of work schedule	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-19 to 8-20. MAG plan, p. 7-232 to 738.
	telecommuting	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-48 to 8-50. MAG plan, p. 7-279.
	teleconferencing	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-50 to 8-51. MAG plan, p. 7-279.
	alternative work schedules	Yes	This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-46 to 8-48. MAG plan, p. 7-232 to 7-238.
	land use/development alternatives	Yes	MAG plan, p. 7-238 to 7-245.

TABLE TCM-3
ANALYSIS OF BACM AND MSM FOR ON-ROAD VEHICLE EXHAUST
(TRANSPORTATION CONTROL MEASURES)

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	voluntary no drive day programs	Yes		This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-19 to 8-20.
	area wide public awareness programs	Yes		This measure has already been implemented in previous plans. See MAG plan, Appendix B, Exhibit 2, pp. 8-19 to 8-20.
	evaluation of the air quality impacts of new development and mitigation of adverse impacts	No	Yes	No explanation given. Given the comprehensiveness of the overall TCM program in the Maricopa area, we believe that the failure to include this measure does not effect a finding that the Phoenix serious area plan provides for the implementation of BACM and inclusion of MSM for motor vehicle exhaust and road dust.[#]
	encouragement of pedestrian travel	Yes		MAG plan, pp. 7-245 to 7-253.
MOST STRINGENT MEASURES (NOT ALREADY IDENTIFIED IN BACM ANALYSIS)				
None identified.				

Source of measures: MAG plan, Tables 5-2 and 10-7.
Footnotes:
* A mandatory parking fee program is a "parking surcharge regulation" under the CAA. We are specifically barred from requiring states to include such regulations in their SIPs as a condition for approval. CAA section 110(c)(1)(B). So even if we considered that the failure of the State to implement this measure

or to provide a reasoned justification for not implementing it as cause to disapprove the BACM demonstration, we could not do so because such a disapproval would be tantamount to requiring a parking surcharge regulation as a conditional for approval of the serious area plan. The general BACM requirement in section 189(b)(1)(B) and the MSM requirement in section 188(e) do not override the very explicit bar in section 110(c)(1)(B).

[#] A program to evaluate the air quality impacts of new developments and require mitigation of adverse impacts is an "indirect source review (ISR) program" under the CAA. We are specifically barred from requiring states to include ISR programs in their SIPs as a condition for approval. CAA section 110(a)(5)(a)(i). So even if we considered that the failure of the State to implement this measure or to provide a reasoned justification for not implementing it as cause to disapprove the BACM demonstration, we could not do so because such a disapproval would be tantamount to requiring an ISR program as a conditional for approval of the serious area plan. The general BACM requirement in section 189(b)(1)(B) and the MSM requirement in section 188(e) do not override the very explicit bar in section 110(a)(5)(a)(i).

This section prepared by Frances Wicher.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR NONROAD ENGINES

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area.
Action:	Approve
Proposal Cites:	Annual and 24-Hour: 66 Fr at 50260
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in

practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies nonroad engines as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of Nonroad Engine Source Category

The nonroad engine category covers a diverse collection of engines, equipment and vehicles fueled by gasoline, diesel, electric, natural gas, and other alternative fuels. Also referred to as "off-road" or "off-highway," the nonroad category includes outdoor power equipment, recreational equipment, farm equipment, construction equipment, lawn and garden equipment, and marine vessels. Though dealt with separately in the Clean Air Act, locomotives and aircraft are also considered categories of nonroad engines. (See 40 CFR Parts 89.103 for the definition of nonroad equipment and engines.)

As a legal matter, nonroad engines are distinct from highway (on-road) engines. Under the CAA, a nonroad engine is defined as an internal combustion engine that is not used in a motor vehicle and a motor vehicle is defined any self-propelled vehicle designed for transporting persons or property on a street or highway. See CAA sections 215(10) and (2). As practical matter, nonroad engines are generally distinguished from highway engines in one of four ways: (1) the engine is used in a piece of mobile equipment that propels itself in addition to performing an auxiliary function (such as a bulldozer grading a construction site); (2) the engine is used in a piece of equipment that is intended to be propelled as it performs its function (such as a lawnmower); (3) the engine is used in a piece of equipment that is stationary but portable, such as a generator or compressor; or (4) the engine is used in a piece of mobile equipment that propels itself, but is primarily used for off-road functions.

This category is also different from other mobile source categories because: (1) it applies to a wider range of engine sizes and power ratings; (2) the pieces of equipment in which the engines are used are extremely myriad; and (3) the same engine can be used in widely varying equipment applications (e.g., the same engine used in a backhoe can also be used in a drill rig or in an air compressor).

Emissions from Nonroad Engines in the Phoenix Area

The plan includes emissions from all sources of nonroad engines in the Phoenix area. See 1994 Regional Emissions inventory, Chapter 5 and NRM-1. Nonroad engines account for 6.1 percent of the total directly-emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 4.8 percent of the 2006 pre-control PM-10 inventory (MAG TSD, Table II-3) with particulate emissions from diesel engines dominating the nonroad inventory in both years. Total nonroad vehicle exhaust PM-10 increases by 25 percent from 1995 to 2006 in the face of tighter engine and fuel standards because of increases in usage. MAG TSD, Tables II-1 and II-3. The Microscale plan does not identify nonroad engines as a contributor to 24-hour exceedances. Microscale plan, p. 17-19.

TABLE NRM-1
1994 EMISSIONS FROM NONROAD ENGINES IN THE PHOENIX PM-10 NONATTAINMENT AREA

CATEGORY	EXAMPLES OF EQUIPMENT IN THE CATEGORY	METRIC TONS PER YEAR	
		GASOLINE	DIESEL
Recreational vehicles	off-road motorcycles golf carts	5.4	0
Construction equipment	earthmoving equipment cranes	11.1	2199.3
Industrial equipment	forklifts material handling equipment	2.9	113.5
Light industrial equipment (utility equipment)	generators <50 hp air compressors < 50 hp pumps < 50 hp	10	25.1

TABLE NRM-1
1994 EMISSIONS FROM NONROAD ENGINES IN THE PHOENIX PM-10 NONATTAINMENT AREA

CATEGORY	EXAMPLES OF EQUIPMENT IN THE CATEGORY	METRIC TONS PER YEAR	
		GASOLINE	DIESEL
Lawn and garden equipment	lawnmowers chainsaws leaf blowers	207.3	31.9
Agricultural equipment	tractors combines	0.3	94.6
Marine vessels	outboard engines inboard engines	5.1	0.2
Totals		242.1	2464.6

Source: MAG TSD, Appendix D1, Table D1-1

The plan considers both locomotives and airport ground support equipment categories as de minimis. MAG plan, Table 9-1.

Existing Controls

1. National controls

We have adopted national emission standards which apply to a broad range of nonroad engines sold in Arizona. Only those emission standards for diesel engines have PM-10 emission limits. engines.

Nonroad diesel engines. Tier 1 emission standards for nonroad diesel engines rated 37 kW and above were set in 1994 and start to apply beginning January 1, 1996. (Limits phase in based on engine size.) 59 FR 31361 (June 17, 1994). Tier 2 emission standards for these engines were issued on October 23, 1996 and become effective in the 2001 to 2006 time frame. 63 FR 56968. Tier 3 emissions standards which were also issued on October 23, 1996 and become effective between 2006 and 2008. 63 FR 56968. These standards approximate the degree of control anticipated from existing standards covering engines used in heavy-duty diesel highway vehicles, with appropriate consideration of differences in size and operational

characteristics of engines and in the organization of industries.

The final standards for engines rated under 37 kW are the first EPA emission standards for these engines. The Tier 1 standards began phasing in by power category in 1999, with Tier 2 standards scheduled for phase in by power category beginning in 2004. Tier 3 standards are not being set for these engines, or for engines rated over 560 kW. In power categories for which Tier 3 standards are finalized, we have chosen not to include more stringent PM standards. We have a number of reasons for deferring the establishment of a Tier 3 PM control program at this time. Primarily, we believe that Tier 3 PM standards will be more appropriately discussed in the context of the improved technical understanding that will exist by the time the Agency's feasibility review for nonroad engine standards is completed.

Marine engines. We have finalized regulations for recreational marine gasoline engines, including personal watercraft and outboard engines on October 4, 1996. 61 FR 52087. We issued initial standards for large diesel marine engine rule rated at or above 37 kW on December 29, 1999. 64 FR 73299. We published final standards for small marine diesel engines less than 37kw and even tighter diesel emission standards for engines rated above 37 kW on October 23, 1998. 63 FR 56967.

Small gasoline engines. We have also established a first phase of regulations for small spark-ignition (SI) engines rated at and below 25 hp, (60 FR 34581, July 3, 1995). On January 27, 1998 (63 FR 3949) we published a second phase proposing tighter emission standards for this category. However, because of dramatic advancements in small engine emission control technology we later published a supplemental notice on July 28, 1999 (64 FR 40939) reproposing a second phase of emission regulations to control emissions from new nonroad SI handheld engines at or below 25 hp. The engines covered by this proposal are used principally in lawn and garden equipment such as trimmers, leaf blowers and chainsaws. We finalized these rules on April 25, 2000 (65 FR 24268).

Large gasoline engines. We proposed emission standards for large gasoline engines greater than 25 hp (e.g., forklifts, portable generators, pumps, crop sprayers, and other general industrial equipment) on October 5, 2001 (66 FR 51098). For recreational engines (e.g., go-carts, all-terrain vehicles, and snowmobiles), we published an advanced notice of proposed rulemaking on December 7, 2000 (65 FR 76797). Large gasoline engines and recreational engines are not currently subject to federal emission standards.

Other. We have also set emission standards for locomotive engines (63 FR 18977 (April 16, 1998)) and for aircraft engines (62 FR 25356, (May 8, 1997)).

2. State and local controls

Only California has authority to set emission standards for new off-road engines. Under CAA section 209(e), state and local standards and other requirements relating to emissions from nonroad engines and vehicles have been preempted since November 15, 1990. Other states may then adopt regulations identical to California's regulations, provided they notify EPA and give the appropriate lead time (see section 209(e)(2)(B).

A.R.S. 49-542.04 gives ADEQ authority to adopt certain CARB off-road standards. On January 27, 1999, ADEQ sent a letter to us committing to complete rulemaking requiring the sale of off-road vehicles and engines meeting the CARB standards. A copy of this letter can be found in the ADEQ commitments. However, between the time Arizona committed to adopt these standards and today, EPA has promulgated new nonroad engine standards that approximate CARB's. ADEQ reviewed the effect of these new federal standards on nonroad emissions in the Phoenix area and compared it against the effect of adopting CARB's standards at this time. Its review showed that there would be only a marginal benefit to adopting CARB's standards at this time. ADEQ determined that this marginal benefit does not justify adopting those standards. Based on this determination, the State withdrew its commitment to adopt the CARB standards. See letter, Jacqueline E. Schafer, ADEQ to Laura Yoshii, EPA, "Justification for not implementing CARB Off-road engine standards for the Maricopa County PM-10 SIP," September 7, 2001. (ADEQ Off-road Letter). See also note below.

Arizona has both gasoline and diesel fuel quality standards. For gasoline, it has a summertime and wintertime Cleaner Burning Gasoline program. We approved the summertime program on February 10, 1998 (63 FR 6653). For diesel, the state sets a sulfur content for diesel fuels (to 500 ppm). See MAG plan, p. 7-17 and A.R.S. 41-2083 J. While aimed primarily at on-road vehicles, these programs also control emissions from nonroad engines.

Does the plan meet the statutory and policy requirements?

Suggested Measure List for BACM and MSM Analysis

The suggested measures for controlling emissions from nonroad engines fell into one of three categories: new emission standards, programs to accelerate fleet turnover, programs affecting usage, and fuels. See Table NRM-3.

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for nonroad engines including potential most stringent measures from other States as

well as provides information on their technological feasibility, costs, and energy and environmental impacts when appropriate.

New Controls in the Plan and Justifications for Rejecting Potential Controls

The Phoenix serious area plan includes a number of new measures for nonroad engines. See Table NRM-3. With the addition of these measures, the overall nonroad engine program is strengthened and goes beyond the existing program. Both strengthening and expanding existing programs are criteria for demonstrating the implementation of BACM. See *Addendum* at 42013. Where the plan has rejected potential BACM, it provides a reasoned justification for the rejection. We, therefore, find that the Phoenix serious area plan provides for implementation of RACM and BACM and the inclusion of MSM for nonroad engines as required by CAA sections 189(a)(1)(C), 189(b)(1)(B), and 188(e).

TABLE NRM-3
ANALYSIS OF BACM AND MSM FOR NONROAD ENGINES

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
SUGGESTED BACM				
California Off-Road Vehicle and Engine Emission Standards	New heavy-duty diesel vehicles rated at 175 - 750 hp	Yes		EPA has issued Tier 1 emission standards for nonroad diesel engines rated 37 kW and above in 1994. These standards applied beginning January 1, 1996. (Limits phase in based on engine size.) 59 FR 31361 (June 17, 1994). We issued Tier 2 emission standards for these engines on October 23, 1996 to become effective in the 2001 to 2006 time frame. 63 FR 56968. We also issued Tier 3 emissions standards on October 23, 1996 to become effective between 2006 and 2008. 63 FR 56968. These standards are identical to CARB's standards and automatically apply to Arizona.
	New small utility and lawn and garden equipment engines rated < 25 hp	No	Yes	A.R.S. 49-542.04 gives ADEQ authority to adopt CARB standards for small off-road engine category. ADEQ had committed to adopt these standards. However, based on the impact on resources, ADEQ has withdrawn this commitment, showing that any loss of emission reductions is minimal. See ADEQ Off-Road Letter and note below.
	Recreational vehicles rated < 25 hp; Specialty engines and go-carts; Off-road motorcycles and all-terrain vehicles; Golf cart engines (Maricopa County only)	No	Yes	A.R.S. 49-542.04 gives ADEQ authority to adopt CARB standards for these engines. ADEQ had committed to adopt these standards. However, based on the impact on resources, ADEQ has withdrawn this commitment, showing that any loss of emission reductions is minimal. See ADEQ Off-Road Letter and note below. Golf carts: telephone surveys in Maricopa County indicate that 99.5 percent of golf carts in the area are already electric. ADEQ Off-road letter, TSD, p. 2.

TABLE NRM-3
ANALYSIS OF BACM AND MSM FOR NONROAD ENGINES

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
	vehicles			
Accelerated retirement	Voluntary retirement program for gasoline powered lawn and garden equipment	Yes		A.R.S. 49-574.02 established a voluntary lawn mower emissions reduction fund. Maricopa County runs program (see Maricopa County commitment, Measure 2). Minimal reductions (less than 0.1% in 2001, MAG plan, p. 5-54), reduction not credited in attainment demonstration; measure used as a contingency measure. MAG plan, p. 8-17. Funded by legislature at $1 M in FY 97/98 and $500,000 per year in 98/99 and 99/00 to be split between Maricopa and Pima Counties. MAG plan, p. 7-42. Program ended in 2000. Program is voluntary, no enforcement program needed
Usage	Require government agencies to minimize user of gasoline-powered lawn and maintenance equipment	Yes		See commitments by local jurisdictions found in MAG plan. Commitment for Implementation, volumes 1- 4. Jurisdiction's legal authority for measure are contained in the general powers granted cities/towns/counties under State law, ARS 11-251 and 9-240. Jurisdictions will use existing funds. Program is not regulatory; therefore, no enforcement program is needed.
	Ban sale/use of gasoline-powered lawn and garden equipment	No	Yes	Banning the use of gasoline-powered lawn and garden equipment is unreasonable, because there are on practical replacement for some equipment or the replacement, electric lawn and garden equipment, cannot be used in many applications because of the lack of or distance to electrical power (e.g., large residential lots, ranches, parks, commercial landscaping). Lawn and garden equipment is already subject to comprehensive controls including federal emission standards, fuel standards (the State's Cleaner Burning Gasoline Program) and a State program that encouraged fleet turnover. We find that these measures collectively provide for implementation

TABLE NRM-3
ANALYSIS OF BACM AND MSM FOR NONROAD ENGINES

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				of BACM on this nonroad engine category.
	Encourage use of temporary electrical power lines rather than portable generators at construction sites	Yes		See commitments by local jurisdictions found in MAG plan, Commitment for Implementation, volumes 1-4. No emissions reduction estimated. Jurisdiction's legal authority for measure are contained in the general powers granted cities/towns/counties under State law, ARS 11-251 and §9-240. Jurisdictions will use existing funds. See commitments. Program is not regulatory; therefore, no enforcement program is needed.
	Defer emissions associated with governmental activities	Yes		See commitments by local jurisdictions found in MAG plan, Commitment for Implementation, volumes 1-4. No emissions reduction estimated. Jurisdiction's legal authority for measure are contained in the general powers granted cities/towns/counties under State law, ARS 11-251 and §9-240. Jurisdictions will use existing funds. See commitments. Program is not regulatory; therefore, no enforcement program is needed.
MOST STRINGENT MEASURES				
Clean diesel fuels	Adopt Fuel Similar to CARB Diesel Fuel	No	Yes	The Phoenix serious area plan claims measure is not reasonable on cost basis. (pg 9-46) All currently available evidence is that 24-hour exceedances are caused by local fugitive dust sources and controls on these sources alone will result in the earliest practicable date for attainment of the 24-hour PM-10 standard in the Phoenix area. Microscale plan, pp. 17-19. Annual standard exceedances are also dominated by fugitive dust sources with nonroad engines contributing little to annual PM-10 levels

TABLE NRM-3
ANALYSIS OF BACM AND MSM FOR NONROAD ENGINES

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
				in the area. The small emission reduction associated with the introduction of CARB diesel would not advance the attainment date in the area, either by itself or in combination with other measures. Because implementation of CARB diesel would not result in an earlier attainment date and thus unnecessary for expeditious attainment, we find that the Phoenix serious area plan provides for the inclusion of MSM to our satisfaction absent the adoption and implementation of CARB diesel. See also, p. 419, 428. We note that the State has already adopted half of the CARB diesel standards, the 500 ppm sulfur limit. (S.B. 1002)
Emission standards	New heavy-duty construction equipment	Yes		We have adopted tier 2 and 3 emission standards for engines greater than 37 hp engines. 63 FR 56968 (October 23, 1998). State pre-empted from regulating engines < 175 hp. CAA section 209(e)(1)(A).

Other Information

Withdrawal of Arizona's Commitment to Adopt California Emissions Standards for Some Classes of Nonroad Engines

Arizona legislation allows ADEQ to adopt California's emission standards for six categories of off-road vehicles and engines:

1. Heavy Duty diesel vehicle rated at $175 horsepower (hp);
2. Small utility and lawn and garden equipment and engines rated at less than 25 hp;
3. Recreational vehicles rated at less than 25 hp;
4. Specialty engines and go-carts rated at greater than 25 hp;
5. Off-road motorcycles and all-terrain vehicles; and
6. Golf cart engines (Maricopa County only).

The Phoenix serious area plan estimates that the directly-emitted PM-10 emission reductions for these standards would be 1.01 mtpd. MAG TSD, p. V-66. The bulk of these reductions would come from the controls on heavy duty diesel vehicles rated at greater or equal to 175 hp.

In October, 1996, we adopted emission standards for large diesel engines that are essentially identical to the CARB standards for these engines. See 63 FR 56968 and ADEQ Off-road Letter, Enclosure 3, Table 2. ADEQ calculated that these federal standards will reduce directly-emitted PM-10 by 0.85 mtpd in 2006 or 85 percent of the emission reductions attributed in total to all the CARB standards.

In order to adopt, implement, and enforce these balance of the CARB off-road standards, ADEQ would have to expend considerable resources, primarily because they would have to establish their own certification program for each of the engine/vehicle types they regulated. See ADEQ Off-road Letter. This level of expenditure is unwarranted given the very small reductions that would be achieved from the standards, 0.16 mtpd, and therefore, the measure is not applicable to the Phoenix area for that reason.

The plan as submitted in February 2000 considered the CARB off-road standards to be a contingency measure for the annual standard, showing that the emission reductions from them were not needed for expeditious attainment or RFP. MAG plan, p. 8-17. As will be discussed later in this TSD in the section on contingency measures, the plan continues to provide for the implementation of contingency measures consistent with the CAA and our policies without the

State's commitment to adopt the CARB standards.

Neither attainment of the 24-hour standard or attainment of the annual standard depends on emission reductions from nonroad engine standards, therefore, withdrawal of the ADEQ commitment does not adversely affect either the attainment or RFP demonstrations for these standards. See Microscale plan, pp. 17-19 and MAG plan, Figure 8-1.

This section prepared by Roxanne Johnson and Frances Wicher.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR PAVED ROAD DUST

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area.
Action:	Approve
Proposal Cites:	Annual: 65 FR at 19975 24-Hour: 66 FR at 50260
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in

practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies paved road dust as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of the Paved Road Dust Source Category

Paved road dust is fugitive dust that is deposited on a paved roadway and then is re-entrained into the air by the action of tires on the roadway. Dust is deposited on the roadway from being blown onto the road from disturbed areas; tracked onto the road from unpaved shoulders, unpaved roads, or other unpaved access points (such as those at construction sites); stirred up from unpaved shoulders by wind currents created from traffic movement; spilled onto the road by haul trucks; and carried onto the road by water runoff or erosion.

Emissions of paved road dust are proportional to vehicle miles traveled. Re-entrained road dust emission rates are not significantly affected by vehicle speed but are affected by the silt loading on the road and amount of vehicle travel on a road. Emission rates are lower per mile traveled on more trafficked roads then they are on-roads that receive less traffic.

Emissions from Paved Road Dust in the Phoenix Area

Paved road dust is one of the largest categories of PM-10 emissions in the inventory accounting for 56.4 metric tons per day or 39.1 percent of the total directly-emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 20.4 percent of the 2006 pre-control total (including windblown) PM-10 inventory (MAG TSD, Table II-3). Total uncontrolled paved road dust emissions increase by almost 30 percent from 1995 to 2006 due to the increased vehicle miles traveled (VMT) between 1995 and 2006. (MAG TSD, Tables II-1 and

II-3). The Microscale plan shows that paved road dust is a very small contributor to 24-hour exceedances. Microscale plan, p. 17-19.

Track out from construction sites is also paved road dust but is treated as a separate inventory category in the MAG plan. Table PRD-1.

TABLE PRD-1
EMISSIONS FROM CONSTRUCTION TRACK OUT
(AVERAGE ANNUAL DAY)

		TRACK-OUT
1995 modeling year	mtpd	24.8
	percent of inventory	13
2006 projected year – uncontrolled	mtpd	27.6
	percent of inventory	13.9
Growth between 1995 and 2006		11%

Does the plan meet the statutory and policy requirements?

Suggested Measure List for BACM and MSM Analysis

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for paved road dust including potential most stringent measures from other States and provides information on their technological feasibility, costs, and energy and environmental impacts when appropriate.

The suggested measures for controlling emissions from paved road dust fall into one of three categories: reductions in VMT and VT, preventing deposition of material onto roadway, and cleaning material off roadways. We have already discussed measures for reducing VMT, see section "Implementation of BACM and Inclusion of MSM for On-Road Motor Vehicle Exhaust and Paved Road Dust (TCMs)" in the TSD. Table PRD-2 describes the other two categories of control.

New Controls in the Plan and Justifications for Rejecting Potential Controls

Prior to the development of Phoenix serious area PM-10 plan, the cities and towns in the Phoenix area and Maricopa County have implemented a number measures addressing paved road dust. See MAG plan, Table 10-5. With the additional measures in the plan (described below), the overall control program to reduce paved road dust is both strengthened and expanded beyond the existing program. See Table PRD-2. Both strengthening and expanding existing programs are criteria for demonstrating the implementation of BACM. See *Addendum* at 42013. Where the plan has rejected potential BACM, it provides a reasoned justification for the rejection. See Table PRD-2.

The plan identifies a number of potentially most stringent measures for controlling paved road dust from other areas and has shown that they are either adopted or are not in fact more stringent than existing Phoenix area programs.

All BACM for paved roads were implemented by June 10, 2000, the BACM implementation deadline for the Phoenix area, or have on-going implementation schedules because they are part of a on-going capital improvement program. (e.g., curbing). See Table PRD-2. For the reasons discussed below, we to find that the plan provides for the implementation of the PM-10 efficient street sweeper measures as expeditiously as practicable, consistent with our MSM policy.

We, therefore, find that the Phoenix serious area plan provides for the implementation of RACM and BACM and for the inclusion of MSM for paved road dust as required by CAA sections 189(a)(1)(C), 189(b)(1)(B), and 188(e).

There are three “regulatory” approaches for controlling paved road dust in the MAG plan:

1. MCESD regulation: both MCESD Rule 310 and Rule 310.01 have provisions addressing deposition of dirt onto paved road surfaces and clean up of dirt on paved road surfaces.

2. City and County commitments: many of the cities and towns of Maricopa County as well as the County itself have committed to reduce sources of dust that can be tracked onto paved road surfaces such as paving or stabilizing unpaved access points and unpaved shoulders and to sweep roads.

3. Arizona legislation: A.R.S. 9-500.04(3) and 49-474.01(4) added in S.B. 1427 (1998) requires Maricopa County cities, towns, and the County starting January 1, 2000 to develop and implement plans to stabilize unpaved roads, alleys and stabilize unpaved shoulders on targeted arterials. These plans must address the performances goals, the criteria for targeting the roads, alley and shoulders, a schedule for implementation, funding options, and reporting requirements.

Notwithstanding the requirements of Rule 310 and Rule 310.01 that apply county-wide, we note that jurisdictions are implementing paved road measures to varying degrees, which can be attributed to differences in the type and extent of local sources and budgets. CAA requirements to implement BACM and include MSM are a collective obligation of the nonattainment area and not of individual jurisdictions within that nonattainment area. See footnote 48. Therefore, to judge whether the plan provides for implementation of BACM and for the inclusion of MSM, we have focused on the combined effect of local commitments on the region as whole rather than judging compliance jurisdiction by jurisdiction. Because BACM and MSM are nonattainment area-wide requirements, the actions of one jurisdiction within the nonattainment area cannot set a standard for BACM and/or MSM that must either be implemented by all other jurisdictions within the area or demonstrated to be infeasible.

TABLE PRD-2
ANALYSIS OF BACM AND MSM FOR PAVED-ROAD DUST

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
SUGGESTED BACM			
Preventing deposition of material onto roadways	Paving, vegetating, and chemically stabilizing unpaved access points onto paved roads	Yes	See Note 1 below. Programs are generally implemented using existing personnel and City/Town/County general funds and/or state and federal transportation funds and program. Legal authority for Cities/Towns/County to maintain/improve roads in found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements do not need a traditional enforcement program.
	Prevent trackout from construction/industrial sites	Yes	Rule 310, sections 308.2(c) and 308.3 address dirt trackout from construction/industrial sites: All work sites that are five acres or larger and all work sites where 100 cubic yards of bulk materials are hauled on-site or off-site each day must control and prevent trackout by installing a trackout control device. All work sites must also clean up spillage or trackout immediately when it extends a cumulative distance of 50 linear feet or more; where trackout extends less than 50 feet, it must be cleaned up at the end of the work day. See Note 2 below.
	Curbing, paving, or stabilizing shoulders on paved roads	Yes	See Note 3 below. Programs are generally implemented using existing personnel and City/Town/County general funds and/or state and federal transportation funds and program. Legal authority for Cities/Towns/County to maintain/improve roads in found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements do not need a traditional enforcement program.

TABLE PRD-2
ANALYSIS OF BACM AND MSM FOR PAVED-ROAD DUST

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
	Control of emissions due to material transport (truck covers, freeboard requirements)	Yes		Rule 310, sections 308.1 and 308.2 address material transport. When hauling material off-site onto paved public roadways, sources are required to: 1) load trucks such that the freeboard is not less than three inches; 2) prevent spillage; 3) cover trucks with a tarp or suitable enclosure; and 4) clean or cover the interior cargo compartment before leaving a site with an empty truck. See Note 4 below.
	Storm water drainage to prevent water erosion onto paved roads	Yes		Rule 310.01, section 306 requires property owners/operators to remediate erosion-caused deposits of bulk materials onto paved surfaces. Erosion-caused deposits are to be removed within 24 hours of their identification or prior to resumption of traffic on the pavement. See note 5 below.
	Improved material specification for and reduction of usage of skid control sand or salt	No	Yes	Materials not used in the Phoenix area. MAG plan, p. 5-2.
Clean up material from roads	Control of emission due to material transport (clean up of spills)	Yes		Rule 310, section 308.2 and 308.3 address rapid clean up of track out from construction/industrial sites. Rule 310.01, section 306 requires property owners/operators to remediate erosion-caused deposits of bulk materials onto paved surfaces. Erosion-caused deposits are to be removed within 24 hours of their identification or prior to resumption of traffic on the pavement. See Note 4 below.
	Frequent routine sweeping or cleaning of paved roads	Yes		Programs are generally implemented using existing personnel and City/Town/County general funds. Legal authority for Cities/Towns/County to maintain/improve roads in found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements do not need a traditional enforcement program. See Note 6 below.

TABLE PRD-2
ANALYSIS OF BACM AND MSM FOR PAVED-ROAD DUST

TYPE OF CONTROL	SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
	Intensive street cleaning requirements for industrial paved roads and streets providing access to industrial/construction sites	Yes		Rule 310, sections 308.2(c) and 308.3 address dirt trackout from construction/ industrial sites: when crossing a public roadway that is open to travel during construction, sources must install a suitable trackout control device (e.g., grizzly, wheel wash system, gravel pad, or paving). All work sites that are five acres or larger and all work sites where 100 cubic yards of bulk materials are hauled on-site or off-site each day must control and prevent trackout by installing a trackout control device. All work sites must also clean up spillage or trackout immediately when it extends a cumulative distance of 50 linear feet or more; where trackout extends less than 50 feet, it must be cleaned up at the end of the work day. See Note 2 below.
	Traffic rerouting or rapid clean up of temporary sources of dust on paved roads	Yes		Rule 310, section 308.2 and 308.3 address rapid clean up of track out from construction/industrial sites. Rule 310.01, section 306 requires property owners/operators to remediate erosion-caused deposits of bulk materials onto paved surfaces. Erosion-caused deposits are to be removed within 24 hours of their identification or prior to resumption of traffic on the pavement.
	Crack seal equipment	Yes		A.R.S. 9-500.04(4) and 49-474.01(3) requires Maricopa County city, towns, and the County to acquire or use vacuum systems or other dust removal technology to reduce particulate attributable to crack sealing operations as existing equipment is retired.
MOST STRINGENT MEASURES				
	Limit procurement of street sweepers to PM-10 efficient units	No	Yes	The plan provides for the procurement of PM-10 efficient units through the use of CMAQ funds but does not limit jurisdictional ability to procure non PM-10 efficient street sweepers. See Note 6 below.

* For information on resources for implementing Rules 310 and Rule 310.01, see TSD section "MCESD's Commitments to Improve Compliance and Enforcement of the Fugitive Dust Program." For information on legal authority for Rules 310 and Rule 310.01, see TSD section, "General SIP Requirements: Adequate Personnel, Funding, and Authority." For information on the enforcement program for Rule 310 and Rule 310.01, see TSD section, "Description of the Enforcement Methods and State Back-Up Authority."

Note 1 – Stabilizing Unpaved Access Points

In the MAG moderate area plan, local jurisdictions focused on requiring new connections to public paved streets to be paved. MAG plan, p. 9-74. In the serious area plan, the focus has shifted to addressing existing unpaved access points. Most public entities committed to stabilize unpaved access points when a connecting road is built, improved or reconstructed. See, for example, Glendale Commitment, "Reduce Particulate Emissions from Unpaved Shoulders and Unpaved Access Points on Paved Roads." Some cities, such as Gilbert and Mesa, have made explicit commitments for stabilizing existing access points without this prerequisite.[29] We also anticipate that city/town/County road paving and stabilization projects will result in controlling a number of existing unpaved access points. These projects combined with increased enforcement of track-out restrictions and additional PM-10 efficient street sweeping efforts should reduce paved road emissions attributable to unpaved access points.

The plan identifies stabilizing unpaved access points as one of the most expensive paved road dust controls per pound of emissions reduced. MAG plan, p. 9-19. This high cost effectiveness suggests that it is appropriate for jurisdictions to stabilize existing unpaved access points on a selective basis, in combination with other paved road measures, in order to maximize PM-10 emission reductions achievable with the available funding.

Note 2 - Most Stringent Measures for Trackout

The Phoenix serious area plan identifies as a potentially most stringent measure for trackout South Coast Rule 403. MAG plan, Table 10-7. Rule 403 requires construction site sources to prevent or remove trackout onto public paved roadways within one hour or 1) prevent and remove trackout that extends a cumulative distance of 50 feet or more onto any paved public road during active operations; 2) remove all visible roadway trackout onto paved public roads at the end of each work day when active operations cease; and 3) pave or chemically stabilize the point of intersection with public paved road surfaces and install a trackout control device (unless the paving/stabilization extends 100 feet and is 20 feet wide). Rule 403, Table 3.

[29] Gilbert commits to mill asphalting all unpaved road access points with paved roads. Gilbert commitment, measure II. Mesa commits $120,000 for stabilization of approximately 10 miles per year of all high priority unpaved shoulders and access points. Mesa commitment, measure 97-DC-8.

The plan concludes that the two rules are reasonably similar in several respects, and where differences exist, the relative impacts on control roughly balance against each other. MSM Study, p. C-4. We agree that the trackout requirements in Maricopa County's Rule 310 are very similar to those in South Coast Rule 403. Both rules emphasize prevention and removal of trackout by requiring that trackout control devices be installed and/or equivalent measures taken and that trackout be removed from any worksites at the end of the day or sooner if the trackout extends more than 50 feet. Thus, the "bottom line" control is the same in the two rules.

Maricopa County's Rule 310 does not require trackout control devices for work sites less than 5 acres that haul less than 100 cubic feet of material; however, the Rule's strict trackout removal requirements still apply to such sites. In developing its rule, MCESD determined that some flexibility is appropriate for small worksites regarding trackout control methods provided that they can comply with the rule's requirements without installing a trackout control device.[30] If a site in Maricopa County that is less than 5 acres or that hauls less than 100 cubic yards of material each day cannot control its trackout sufficiently to meet the requirements absent use of a trackout control device, then the site will be in violation of Rule 310 and will need to take additional actions to comply. We also note that Rule 310 requires installation of trackout control devices for *any* site where bulk material is hauled on-site across a public road that is open to public travel while construction is underway. Rule 310, section 308.2.

Note 3 – Unpaved Road Shoulders

In the MAG moderate area plan, local jurisdictions focused on preventing the creation of new unpaved road shoulders by requiring new and reconstructed roads to have curbs, gutters, and sidewalks. MAG plan, p. 9-77. In the serious area plan, the focus has shifted to addressing existing unpaved shoulders. Maricopa County has committed to treat 100 miles of shoulders along existing paved arterial and collector roadways with high volume truck traffic between 1999 and 2003, in addition to its annual capital improvement projects for paving or treating unpaved shoulders. Maricopa County 1999 commitment, revised measure 5.

A.R.S. 9-500.04(3) and 49-474.01(4), adopted by the State legislature in 1998, require the cities, towns and County of Maricopa to develop and implement plans to stabilize targeted unpaved roads and alleys and to stabilize unpaved shoulders on targeted arterials beginning January 1, 2000. The legislation also allows the use of petroleum-based or non petroleum -based products in the maintenance and repair of shoulders.

Although this legislation does not specify how many shoulder miles are to be controlled,

[30] This determination by MCESD is essentially a finding that the South Coast's less flexible requirement is not feasible for the Phoenix area. Under CAA section 188(e) states do not need to include potential MSM that are infeasible for their areas.

we believe that local jurisdictions' efforts to meet this new legislation will result in the control of unpaved shoulders where it is most needed. As with stabilizing unpaved access points, costs will be a factor in determining the extent to which unpaved shoulders are treated. The plan shows that stabilizing shoulders is relatively more expensive than most other control strategies for paved roads. MAG plan, p. 9-18. Thus, it is appropriate for cities and towns to apply this measure selectively to paved roads with disturbed shoulders and/or that experience heavy traffic volumes. We also note that shoulder improvements (e.g., adding curbs, gutter, and sidewalks) are a normal part of most roadway improvements (reconstructions) and widening, a routine activity of local jurisdictions. A list of such projects by jurisdictions scheduled for the next five years can be seen in the highway projects section of *MAG FY 2002-2006 MAG Transportation Improvement Program*, July 25, 2001. A copy of the TIP can be found at www.mag.maricopa.gov.

Note 4 - MSM for Material Transport

The Phoenix serious area plan identifies requirements for bulk material transport in Imperial County (California) Regulation VIII as a potential MSM. MAG plan, Table 10-7. Rule 310's requirements for bulk material transport/hauling are essentially the same as Imperial County's requirements.

Note 5 – MSM for Material Spillage, Erosion, or Accumulation

The Phoenix serious area plan identifies South Coast Rule 1186 as a potential MSM for material spillage, erosion, and accumulation onto roadways. MAG plan, Table 10-7.

South Coast Rule 1186 establishes requirements for public entities to clean visible accumulations off public streets. Specifically, the rule requires owners/operators of paved public roads with 500 or more average daily trips (ADT) to begin street cleaning visible roadway accumulations (caused by erosion or haul truck spillage) that cover a contiguous area in excess of 200 square feet within 72 hours of notification. The accumulation is to be completely removed as soon as feasible, and if it is not removed within 10 days of notification, the owner/operator must notify the District and provide an estimated removal completion date.

This measure can be compared to Maricopa County's Rule 310.01's provision for removal of erosion-caused deposits. Rule 310.01's requirement covers more sources in that it applies to any paved road (public or private), whereas Rule 1186 applies strictly to public roads. Also, Rule 310.01 applies to any erosion-caused deposit that violates the rule's opacity standard, regardless of whether the deposit covers more than 200 contiguous square feet or exists on a road with less than 500 ADT. Finally, Rule 310.01 sources are required to comply within 24 hours of the deposit's identification or prior to the resumption of traffic on pavement, which is more stringent than the time frame allowed in Rule 1186. Given that MCESD's rule generally have more strict requirements than South Coast, we believe that in total they are more stringent.

We cannot compare Rule 1186's and MCESD's provisions quantitatively. In order to quantify the emission reductions from each measure, we would need information on how many deposits, their cause, their size and opacity, the type of roads on which they occur and the ADT on those roads. This level of detailed information is just not available.

The plan also identifies requirements for spillage cleanup in Mojave Desert (San Bernadino, California) Air Quality Management District Rule 403 as a potential MSM. The rule requires construction/demolition site owners/operators to clean up project-related spills on publicly maintained paved surfaces within 24 hours for projects 0.5 acre or greater. Rule 310, sections 308.2(c) and 308.3 require all work sites greater than 0.1 acres to clean up spillage or trackout immediately when it extends a cumulative distance of 50 linear feet or more; where trackout extends less than 50 feet, it must be cleaned up at the end of the work day. Rule 310 is clearly more stringent than Mojave Desert's Rule 403.

Note 6 - BACM and MSM for Street Sweeping

The Phoenix serious area plan includes commitments by MAG, cities, towns and the County for the purchase and use of PM-10 efficient street sweepers. See MAG commitment, PM-10 Efficient Street Sweepers. This commitment involves the allocation of $3.8 million in Congestion Mitigation and Air Quality (CMAQ) funds for the FY 2000-2004 Transportation Improvement Program (TIP) to purchase PM-10 certified street sweepers for the local jurisdictions to use.[31] MAG has recommended an additional $1.9 million in CMAQ funds be allocated to purchase PM-10 certified street sweepers in the FY 2001-2005 TIP. See MAG commitment, PM-10 Efficient Street Sweepers.

The funds allocated by MAG for this program should be sufficient to replace approximately two-thirds of the 72 existing city/town/County street sweepers.[32] Each fiscal year in which CMAQ funds are allocated for street sweepers, MAG will solicit requests for funding from cities, towns and the County in the PM-10 nonattainment area. Funding requests must identify by facility type (i.e. freeway, arterial/collector, local) the number of centerline miles to be swept with the PM-10 certified units, expected frequency of sweeping and average daily traffic (if available). MAG will use this information to estimate the emissions reduction associated with each sweeper request and rank the requests in priority order of effectiveness for consideration in the allocation of CMAQ funds. See MAG commitment, PM-10 Efficient Street

[31] CMAQ funds are federal transportation funds awarded to certain nonattainment areas for congestion management and or air quality-transportation projects such as paving unpaved roads.

[32] Some street sweepers may be additions to, as opposed to replacements of, existing equipment.

Sweepers.

In evaluating this program, we consider not only the number of PM-10 efficient street sweepers to be purchased and distributed, but whether the program incorporates use factors that influence emissions reductions. The greatest emissions reduction benefit for this mitigative measure will be achieved if the sweepers are used on a frequent basis on-roads with high silt loadings or significant visible accumulations. Each public entity has a monetary incentive to compete for the PM-10 efficient street sweepers, as the program is funded by MAG with a low cost share requirement.[33] Also, the new street sweepers will either replace existing city-owned street sweeping equipment or contracted out services, or be added to existing street sweeper equipment/services. MAG's selection process includes PM-10 emissions reduction potential, based on the types of roads each jurisdiction is targeting for sweeping and how frequently they will be swept.[34] This data will assist MAG in distributing the street sweepers to local jurisdictions in a way that maximizes the regional air quality benefits of the program. In addition, when the cities/towns/County are awarded PM-10 efficient street sweepers, their submittals will that incorporate use factors that maximize emission reductions from this measure

Most cities/towns and the County have ongoing street sweeping programs with variable sweeping frequencies. With some exceptions, public entities implementing this measure have not explicitly committed to increase their existing sweeping frequencies.[35] However, sweeping frequency is appropriately evaluated in combination with other paved road measures, because the emission-reducing potential of increased sweeping frequency is closely associated with other factors. These factors include whether the sweepers currently in use are PM-10 efficient (such that the act of sweeping does not cause increased emissions) and whether the public entity has identified roads that tend to experience higher silt loadings where more frequent sweeping is likely to make an appreciable difference in PM-10 emissions. Sweeping frequency is among the criteria included in MAG's PM-10 efficient street sweeper solicitation and thus we believes this measure is largely incorporated into MAG's new program. See footnote 54.

We believe that implementation of the PM-10 efficient street sweeper program is as

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[33] The required cost share for local jurisdictions is 5.7 percent.

[34] See MAG, "Methodology for Evaluating Congestion Mitigation and Air Quality Improvement Projects," Draft Revised, June 21, 2001, pp. 18 - 22.

[35] Phoenix approved a program in 1996 to increase the frequency of residential street sweeping to match the uncontained trash pick-up schedule ($656,000 estimated budget). Phoenix commitment, measure 97-DC-5. Tolleson committed to increase the frequency of street sweeping on 15.3 miles of road, and include vacuuming in addition to sweeping. Tolleson commitment, measure 97-DC-5.

expeditious as practicable. Funding for purchasing this equipment is allocated on a fiscal year basis and it will take several years for sufficient funds to be available to purchase enough equipment to replace or add to the current street sweeping equipment.

The plan identifies as a potential MSM the PM-10 efficient street sweeping provisions in South Coast Rule 1186. MAG plan, Table 10-7. However, the plan's analysis pre-dates MAG's commitment for the purchase and distribution of PM-10 efficient street sweepers and is no longer current.

South Coast Rule 1186 requires any government or government agency which contracts to acquire street sweeping equipment or services for routine street sweeping on public roads that it owns and/or maintains, where the contract date or purchase or lease date is January 1, 2000 or later, to acquire or use only certified street sweeping equipment. The rule establishes street sweeper testing and certification procedures. Unlike Maricopa's strategy, Rule 1186 requires that PM-10 efficient street sweepers be used whenever street sweeping is contracted out as of January 2000, and it requires public agencies to replace their street sweeping equipment when it is retired with PM-10 efficient equipment.

MAG's PM-10 efficient street sweeper program is being funded over the next 4 to 5 fiscal years, which may result in a greater number of street sweepers distributed in a shorter time frame than could be expected using South Coast's natural attrition approach. While it is possible that some cities/towns in Maricopa may continue to contract out for street sweeping services where PM-10 efficient sweepers may not be used, most do not contract for street sweeping.[36] Furthermore, due to the fact that public entities will be competing for PM-10 efficient street sweepers funded by CMAQ dollars with only a low cost share requirement, we believe that the already limited reliance on contracted out services in Maricopa County will be reduced even more as new PM-10 efficient equipment becomes available and that contractors will switch to PM-10 efficient equipment to meet new demand. In addition, MAG's program ensures that the cities/town/County develop plans for how the street sweepers will be used to maximize their emissions reduction potential. We therefore believe that overall the Maricopa program is equivalent to South Coast Rule 1186. See also p. ?

This section prepared by Karen Irwin.

[36] El Mirage and Queen Creek appear to be the only cities/towns that fully rely on contracted out street sweeper services. Avondale, Goodyear, Mesa, Youngtown and Arizona Department of Transportation indicate that they own at least one street sweeper and contract out some additional services.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR UNPAVED PARKING LOTS

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area
Action:	Approve
Proposal Cites:	Annual: 65 FR at 19976 24-Hour: 66 FR at 50263
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies unpaved parking lots as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-9

Description of the Unpaved Parking Lot Source Category

This category includes emissions from re-entrained road dust from vehicle traffic on unpaved parking lots and windblown dust entrained from the disturbed surface of unpaved parking lots. MAG TSD, Appendix II, Exhibit 6, Attachment 3, "Documentation of Calculations of Emissions from Unpaved Parking Lots"

Emissions from Unpaved Parking Lots in the Phoenix Area

Emissions from unpaved parking lots are not in a separate category in the 1994 base year emissions inventory but are included in the disturbed vacant land category.

Emissions from unpaved parking lots were calculated for the 1995 base year modeling inventory. Based on information gathered as part of the microscale study, 24 percent of disturbed vacant land is actually unpaved parking lots. MAG TSD, p. V-17. Based on the same study, more than 99 percent of unpaved parking is comprised of lots greater than or equal to 5000 square feet. MAG TSD, p. V-17. Emission estimates for traffic on unpaved parking lots in 1995 are 5.3 mtpd. MAG TSD, Appendix II, Exhibit 6, Attachment 3, p. 2. Windblown emissions are estimated to be 0.8 mtpd.[37] The plan assumes no growth of unpaved parking lot emissions due to city ordinances requiring paving of any new parking lots. The Microscale plan shows that fugitive dust from unpaved parking lots can be a large contributor to 24-hour exceedances. Microscale plan, p. 17-19.

[37] Calculated at 24 percent of the windblown dust from disturbed vacant land: 1,186 mtpy x 0.24 /365. MAG TSD, Table II-3.

Does the plan meet the statutory and policy requirements?

Existing Controls

The Phoenix serious area plan includes two rules that address unpaved parking lots. MCESD Rule 310.01 (formerly Rule 310) establishes requirements to stabilize unpaved parking lots over 5000 square feet. Section 303. Rule 310 applies to unpaved parking lots over 5000 square feet located at permitted facilities (including construction sites).[38] Section 302.1. Rule 310 and Rule 310.01 requirements apply to both publicly- and privately-owned lots.

In 1998, we promulgated a federal fugitive dust rule as part of our federal implementation plan (FIP) for Phoenix. 63 FR 41326. This rule establishes RACM for nonpermitted unpaved parking lots, among other sources. See 40 CFR 52.128(d)(3). We subsequently made revisions to the Phoenix FIP rule and the final version was published on December 21, 1999. See 64 FR 71304. The FIP rule establishes requirements to stabilize unpaved parking lots over 5000 square feet.

Suggested Measure List for BACM and MSM Analysis

There are two principal ways to control emissions from unpaved parking lots: prohibit new unpaved parking lots or treat existing lots. The plan identified both: a prohibition on unpaved haul roads and parking or staging areas and surface treatment to reduce dust from unpaved driveways and parking lots. MAG plan, Table 5-2 (measures 136 & 137).

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for unpaved parking lots as well as provides information on their technological feasibility, costs, and energy and environmental impacts when appropriate. The plan only identified one potential most stringent measure from South Coast. This measure controls fugitive dust from parking areas on construction sites. MSM Study, p. C-9 and 10. It did not identify any potential MSM for non-construction site unpaved parking lots.

See Table UPL-1.

[38] Permitted sources include any facility permitted by MCESD and is not limited solely to those facilities with earthmoving permits. Rule 310, section 102.

New Controls in the Plan and Justifications for Rejecting Potential Controls

For the reasons discussed below, we believe that Phoenix serious area plan provides for the implementation of RACM and BACM and includes MSM for unpaved parking lots as required by CAA section 189(a)(1)(C), 189(b)(1)(B), and section 188(e). All the plan's measures for unpaved parking lots were implemented by June 10, 2000, the BACM implementation deadline for the Phoenix area. See Table UPL-1.

1. RACM and BACM

In determining whether the Phoenix serious area plan provides for the implementation of BACM for unpaved parking lots, we are first specifically considering whether the plan provides for the implementation of RACM for these sources.[39] In our FIP, we promulgated a RACM fugitive dust rule applicable to unpaved parking lots in the Phoenix PM-10 nonattainment area. 40 CFR 52.128(d)(3). This rule provides a starting point for determining whether the Phoenix serious area plan's measures for unpaved parking lots meet RACM. It is not necessary for the plan measures to be identical to the FIP rule in order to meet the CAA's RACM requirements, but only that they provide for the implementation of RACM. However, if the submitted measures for a particular source are identical to the FIP rule, we can determine without further analysis that the plan has provided for RACM for that source.

The FIP rule's RACM requirements for unpaved parking lots are as follows:

C Owners/operators of an unpaved parking lot larger than 5,000 square feet are required to pave, apply dust suppressants, or apply gravel, according to the applicable rule standards/ test methods. Applicable standards include a 20 percent opacity standard, and an 8 percent silt content standard and/or a 0.33 oz/square foot silt loading standard. Unpaved

[39] While a serious area PM-10 plan must provide for both the implementation of RACM (to the extent that it has not already satisfied the requirement in its moderate area plan) and BACM, in determining whether such a plan provides for BACM implementation, we do not normally conduct a separate evaluation to determine if the measures also meet the RACM requirements of the CAA as interpreted by EPA in its *General Preamble* at 13540. This is because in our serious area guidance (*Addendum* at 42010), we interpret the BACM requirement as generally subsuming the RACM requirement (i.e., if we determine that the measures are indeed the "best available," we have necessarily concluded that they are "reasonably available"). See *Addendum* at 42012-42014. Therefore, a separate analysis to determine if the measures also represent a RACM-level of control is not generally necessary. However, in this particular case, we have already established through our FIP rule the RACM-level of control for this source category. Thus our FIP rule provides us with a baseline against which we can review whether the plan provides not only for RACM but also goes beyond that for BACM .

parking lots that are used no more than 35 days a year, excluding days when ten or fewer vehicles enter, are only required to implement controls on days when over 100 vehicles enter and park.

MCESD requirements for unpaved parking lots are found in Rule 310.01, section 303. See Table UPL-1. Rule 310.01 contains the same requirements in terms of source coverage and applicable standards/test methods for unpaved parking lots as the FIP rule, with the only difference being that Rule 310.01 applies county-wide while the FIP rule applies strictly to sources located in the PM-10 nonattainment area. Rule 310.01 requirements are effective upon adoption and were adopted on February 2000, a schedule consistent with the FIP rule and is also as expeditious as practicable.

In addition to Rule 310.01 requirements, many cities/towns stated that they had treated their own parking lots or required treatment of private lots below MCESD's thresholds. See Table UPL-2. Table UPL-2 shows that jurisdictions are implementing unpaved parking lot measures to varying degrees, which can be attributed to differences in the type and extent of local sources and budgets. CAA requirements to implement BACM and include MSM are a collective obligation of the nonattainment area and not of individual jurisdictions within that nonattainment area. See footnote 48. Therefore, to judge whether the plan provides for implementation of BACM and for the inclusion of MSM, we have focused on the combined effect of local commitments on the region as whole rather than judging compliance jurisdiction by jurisdiction.

Moreover, because BACM and MSM are obligations of the nonattainment area, we do not judge one jurisdiction's efforts against another nor consider one jurisdiction's efforts to set a BACM or MSM standard that other jurisdictions must meet or provide a justification for not doing so. Just because one jurisdiction has adopted a measure does not compel the others under the BACM or MSM requirements to do the same.

In light of the fact that Rule 310.01 requirements are the same as the FIP rule requirements, we find that the Phoenix serious area plan meets RACM. Given the additional city/town commitments in the plan that collectively increase the stringency of control on unpaved parking lots, we find that the Phoenix serious area plan also meets BACM. Rule 310.01 required compliance prior to June 10, 2000 and the city and town commitments were all implemented prior to June 10, 2000, therefore, BACM for unpaved parking lots was implemented prior to the June 10, 2000 BACM implementation deadline for the Phoenix area.

2. Most Stringent Measure

South Coast Rule 403 requires sources to apply dust suppressants to stabilize at least 80 percent of unstabilized surface area at construction sites and comply with a 0 percent opacity property line limit. The Phoenix serious area plan deems the respective requirements roughly equivalent to Rule 310. MAG plan, p. 10-29. We believe that the addition of a silt

loading/content standard for unpaved parking lots for sources covered under Rule 310 increases the rule's stringency to be at least equivalent to that of South Coast Rule 403.

The plan did not identify potential MSM for unpaved parking lots that are not associated with construction sites (i.e., sources subject to Rule 310.01). As mentioned above, the federal fugitive dust rule establishes requirements to stabilize unpaved parking lots over 5000 square feet in Maricopa County. The Rule 310.01 requirements for unpaved parking lots are virtually identical to those of the federal fugitive dust rule. In addition, some city/town ordinances are more stringent than Rule 310.01 requirements.

TABLE UPL-1
ANALYSIS OF BACM AND MSM FOR UNPAVED PARKING LOTS

SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
BEST AVAILABLE CONTROL MEASURES		
Prohibit unpaved parking lots	Yes	Most cities identified ordinances that require paving of new parking lots. See Table UPL-2. Programs are generally implemented using existing personnel and City/Town/County general funds. Legal authority for Cities/Towns/County to require new parking lots be paved is in found in A.R.S. 9-240 and 11-251, respectively. Ordinances are enforced through building permits and code. See MAG Plan, pp, 7-111 to 7-127. A number of cities/towns did not identify an ordinance that requires paving of new parking lots. This does not necessarily mean that they do not have such ordinances.
Treat unpaved parking lots	Yes	MCESD Rule 310.01 requires owners/operators of an unpaved parking lot larger than 5,000 square feet to pave, apply dust suppressants, or apply gravel, according to the applicable rule standards/test methods. Section 303. Applicable standards include a 20 percent opacity standard, and an 8 percent silt content standard and/or a 0.33 oz/square foot silt loading standard. Section 303.2. Unpaved parking lots that are used no more than 35 days a year, excluding days when ten or fewer vehicles enter, are only required to implement controls on days when over 100 vehicles enter and park. Section 303. MCESD Rule 310 applies the same stabilization requirements to parking lots. Rule 310, section 302.1. Many cities/towns stated that they had treated their own parking lots or required treatment of private lots below MCESD's thresholds. See UPL-2.

* For information on resources for implementing Rules 310 and Rule 310.01, see TSD section "MCESD's Commitments to Improve Compliance and Enforcement of the Fugitive Dust Program." For information on legal authority for Rules 310 and Rule 310.01, see TSD section, "General SIP Requirements: Adequate Personnel,

Funding, and Authority." For information on the enforcement program for Rule 310 and Rule 310.01, see TSD section, "Description of the Enforcement Methods and State Back-Up Authority."

TABLE UPL-2
CITY COMMITMENTS FOR UNPAVED PARKING LOTS

CITY OR TOWN	NEW LOTS	EXISTING LOTS
Avondale Measure 98-DC-9	No information provided in plan.	Notified all owners of unpaved parking lots that they must pave their lots by September 10, 1999
Carefree Measure 98-DC-9	Zoning ordinance requires all new parking lots to be paved.	All unpaved parking lots are graveled.
Chandler Measure 98-DC-9	City ordinance requires all parking areas to have a paved or dust free surface regardless of size.	City ordinance requires all parking areas to have a paved or dust free surface regardless of size.
El Mirage Measure "Reduce Particulate Emissions from Unpaved Parking Lots"	Zoning ordinance requires all new parking lots to be paved with materials suitable to control dust.	All high use parking lots are paved.
Fountain Hills Measure 98-DC-9	Zoning ordinance requires all new parking lots to be paved.	City will pave or stabilize all town-owned parking lots.
Gilbert Measure 98-DC-9	City ordinance requires paving or dust proofing all unpaved parking lots containing 5 parking spaces or greater than 2000 sq ft.	City ordinance requires paving or dust proofing all unpaved parking lots containing 5 parking spaces or greater than 2000 sq ft.
Glendale Measure 98-DC-9	Zoning ordinance requires all new parking lots to be paved.	Not addressed.
Goodyear Measure 98-DC-9	No information provided in plan.	Notified all owners of unpaved parking lots that they must pave their lots by April, 1999.
Mesa Measure 97-DC-9	No information provided in plan. (Zoning code requires new parking lots to be paved.)	Public lots are paved. City ordinance requires improved dust proof parking surface at residences and commercial sites.

TABLE UPL-2
CITY COMMITMENTS FOR UNPAVED PARKING LOTS

CITY OR TOWN	NEW LOTS	EXISTING LOTS
Paradise Valley Measure 98-DC-9	City ordinance requires all parking lots be paved. City will adopt an ordinance that would require any new unpaved parking, if approved, to be improved and maintained per MAG standards.	City ordinance requires all parking lots be paved.
Peoria Measure 98-DC-9	No information provided in plan.	Notified all owners of unpaved parking lots that they must pave their lots by April, 1999.
Phoenix Measure 97-DC-9b	City requires paving of commercial, industrial, and multi-family parking lots with 3 or more parking spaces and gravel or other dust-free parking for single family and duplex homes with 3 or more spaces.	City requires paving of commercial, industrial, and multi-family parking lots with 3 or more parking spaces and gravel or other dust-free parking for single family and duplex homes with 3 or more spaces.
Queen Creek Measure "Reduce Particulate Emissions from Unpaved Parking Lots"	No information provided in plan.	City does not have any public, commercial or residential parking lots.
Scottsdale "Dust proof Commercial and Residential Lots to Reduce Particulate Emissions from Unpaved Parking Lots"	City ordinance requires paving/dust proofing of all new parking lots.	City code requires that any applicant for renovation, expansion or improvement of an existing commercial or multi-family residential property shall pave or dust proof parking lots designed for the parking of 6 or more motor vehicles.
Surprise Measure "Reduce Particulate Emissions from Unpaved Parking Lots"	Zoning ordinance requires all new parking lots shall be paved with materials suitable to control dust.	All high-use city-owned parking lots are paved. There are no existing high use unpaved commercial parking lots.
Tempe Measure 98-DC-9	No information provided in plan.	Zoning ordinance requires all commercial/residential parking lots shall be dust proofed.
Tolleson Measure 98-DC-9	City ordinance requires paving of all new parking lots.	City ordinance prohibits parking on any lot or area which is not dust free.

TABLE UPL-2
CITY COMMITMENTS FOR UNPAVED PARKING LOTS

CITY OR TOWN	NEW LOTS	EXISTING LOTS
Youngtown Measure 98-DC-9	City ordinance requires paving of all new parking lots.	Town ordinance specifies the type of surface on which a motor vehicle must be parked.
Maricopa County Measure 97-DC-9	No information provided in plan.	Rules 310/310.01

Programs are generally implemented using existing personnel and City/Town/County general funds and/or state and federal transportation funds and program. Legal authority for Cities/Towns/County to maintain/improve roads in found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements are not regulatory programs and do not need a traditional enforcement program.

This section prepared by Karen Irwin

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR DISTURBED VACANT LAND

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area
Action:	Approve
Proposal Cite:	Annual standard: 65 at 19977 24-Hour standard: 66 at 50263
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify

potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies disturbed vacant land as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of the Disturbed Vacant Land Source Category

This category includes windblown fugitive dust emissions from disturbed surfaces of vacant lands. On vacant land, fugitive dust emissions are caused by virtually any activity which disturbs an otherwise naturally stable parcel of land, including earthmoving activities, material dumping, weed abatement, and vehicle traffic. 63 FR 15919, 15937 (April 1, 1998)

Emissions from Disturbed Vacant Lands in the Phoenix Area

Emissions from disturbed vacant lands were calculated for the 1995 base year modeling inventory. There were an estimated 33,000 acres of vacant lands in the Maricopa nonattainment area in 1995. MAG TSD, Appendix II, Exhibit 7 (High Wind Inventory). Total annual emissions estimated for this category are 1,391 mtpy. MAG TSD, Table II-2. However, based on information gathered as part of the microscale study, 24 percent of disturbed vacant land is actually unpaved parking lots, so only 1057 mtpy are due to disturbed vacant land. MAG TSD, p. V-17. Emissions from disturbed vacant lands are expected to decrease to 901 mtpy in 2006 due to development on vacant lands. MAG TSD, Table II-3 (76 percent of the emissions from disturbed vacant lands). The Microscale plan shows that fugitive dust from disturbed vacant lots can be a large contributor to 24-hour exceedances. Microscale plan, p. 17-19.

Does the plan meet the statutory and policy requirements?

Existing Controls

The Phoenix serious area plan includes two MCESD rules that address vacant lots. Rule 310 requirements apply to vacant lots located at permitted facilities (including construction sites)

and Rule 310.01 requirements apply to nonpermitted sources.[40] Rule 310 and Rule 310.01 requirements apply to both publicly and privately owned lots. Rule 310, section 302.3 and Rule 310.01, sections 301 and 302.

In 1998, we promulgated a federal fugitive dust rule as part of our federal implementation plan (FIP) for Phoenix. 63 FR 41326. This rule establishes RACM for nonpermitted vacant lots and open areas, among other sources. See 40 CFR 52.128(d)(3). We subsequently made revisions to the Phoenix FIP rule and the final version was published on December 21, 1999. See 64 FR 71304. The federal fugitive dust rule establishes requirements to prevent motor vehicle disturbance on vacant lots and for stabilization of disturbed vacant lots.

Suggested Measure List for BACM and MSM Analysis

The Phoenix serious area plan includes three suggested measures for controlling fugitive dust from vacant disturbed lands. The plan also identified controls on weed abatement operations as a potential most stringent measure. See Table DVL-1

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for vacant disturbed land including potential most stringent measures from other States as well as provides information on their technological feasibility, costs, and energy and environmental impacts when appropriate.

New Controls in the Plan and Justifications for Rejecting Potential Controls

For the reasons discussed below, we find that the Phoenix serious area plan provides for the implementation of RACM and BACM and for the inclusion of MSM for disturbed vacant lands as required by CAA section 189(a)(1)(C), 189(b)(1)(B), and 188(e). All the adopted measures for disturbed vacant lands were implemented by June 10, 2000, the BACM implementation deadline for the Phoenix area. See Table DVL-1.

1. RACM and BACM

In determining whether the Phoenix serious area plan provides for the implementation of BACM for disturbed vacant land, we are also considering whether the plan provides for the implementation of RACM for these sources. See Footnote 59. In our FIP, we promulgated a RACM fugitive dust rule applicable to disturbed vacant land in the Phoenix PM-10 nonattainment area. This rule provides a starting point for determining whether the Phoenix serious area plan's measures for disturbed vacant lands meet RACM. It is not necessary for the

[40] Permitted sources include any facility permitted by MCESD and is not limited solely to those facilities with earthmoving permits. Rule 310, section 102.

plan's measures to be identical to the FIP rule in order to meet the CAA's RACM requirement, but only that they provide for implementation of RACM. However, if the submitted measures for a particular source are identical to the FIP rule, we can determine without further analysis that the plan has provided for RACM for that source.

The FIP rule's requirements for vacant lots and open areas are as follows:

- Owners/operators of vacant lots and open areas greater than or equal to 0.10 acres that are driven over/used by motor vehicles and/or off-road motor vehicles are required to prevent trespassing by installing barriers or other effective measures. Alternatively, owners/operators may choose to uniformly apply and maintain surface gravel or chemical/organic stabilizers to all disturbed areas in compliance with one of the rule's applicable stabilization standards/ test methods. The rule allows a 60 day period for compliance following initial discovery of vehicle activity on the vacant lot/open area.

- Owners/operators of vacant lots and open areas with greater than or equal 0.5 acres of disturbed surface area that remain vacant or unused for more than 15 days are required to implement one or more control methods to stabilize the surface, according to the applicable standards/test methods. Control methods include establishing groundcover vegetation, applying dust suppressants (including water), restoring to a natural state, applying surface gravel, or implementing an alternative control methods. The rule allows a 60 day period for compliance following initial discovery of the disturbance on the vacant lot/open area.

- Anyone who conducts weed abatement and disturbs greater than or equal 0.5 acres on a vacant lot or open area is required to 1) apply a dust suppressant(s) to the total surface area subject to disturbance immediately prior to or during the weed abatement; 2) prevent or eliminate material track-out onto paved surfaces and access points adjoining paved surfaces; and 3) apply a dust suppressant(s), gravel, compaction or alternative control methods immediately following weed abatement to the entire disturbed surface area such that it is stabilized according to the one or more of the applicable standards/test methods.[41]

MCESD Rule 310.01 (formerly Rule 310) establishes requirements to prevent motor vehicle disturbance on vacant lots, and for stabilization of disturbed vacant lots. Sections 301 and 302. Rule 310 establishes requirements for disturbed vacant lots and open areas on permitted sources. Rule 310 also applies to and weed abatement operations that disturb greater than or equal 0.1 acre. Rule 310, section 308.8, establishes work practice requirements for weed

[41] The FIP rule exempts weed abatement conducted by mowing or cutting where the weed stubble is maintained at least three inches above the soil surface. §52.128(c)(6).

abatement by blading or discing, including weed abatement that occurs on vacant lots. See Table DVL-1. MCESD has included the weed abatement requirements into Rule 310 rather than Rule 310.01 because weed abatement operations are subject to permits and Rule 310 applies to permitted sources.

In comparing Rule 310.01 requirements for vacant lots and open areas to the relevant FIP rule requirements, the two rules are virtually the same in terms of source coverage and stringency.[42] We address below minor differences between the two rules:

- Rule 310.01 includes a statement that clarifies the rule applies to any open area or vacant lot that is not defined as agricultural land and is not used for agricultural purposes according to A.R.S. 42-12151 and 42-12152. These statutes respectively define agricultural land and property that is in active, as opposed to inactive, production. Thus, if for tax purposes, a vacant lot or open area reverts from classification as agricultural property under Arizona law to non-agricultural property, it is subject to Rule 310.01 requirements. This clarification improves upon the FIP rule for questions concerning rule applicability.

- Aside from the fact that Rule 310.01 applies to sources county-wide,[43] the definition of open areas and vacant lots in Rule 310.01 is more inclusive of sources than the Phoenix FIP rule. Unlike the FIP rule, Rule 310.01's (section 211) definition includes 1) partially developed residential, industrial, institutional, governmental, or commercial lots; and 2) any tract of land, in the nonattainment area, adjoining agricultural property. Furthermore, Rule 310.01 clarifies that vacant portions of residential or commercial lots that are immediately adjacent and owned and/or operated by the same individual or entity are to be considered one vacant open area or lot. These provisions increase the number of vacant lots subject to Rule 310.01 beyond that of the FIP rule.

- Appendix C, Table 1, which lists threshold friction velocity values for determination of vacant lot/open area stability, includes a value of 135 cm/s associated with Tyler Sieve No. 5. The Phoenix FIP rule lacks a specific value. This better enables test method results to be appropriately averaged when the largest volume of material for one or more soil samples is captured in Tyler Sieve No. 5.

- Rule 310.01 exempts vacant lots/open areas from requirements for preventing motor vehicle use that have less than 500 cumulative square feet of disturbed surface area. The

[42] The same standards and test methods apply.

[43] The FIP rule applies strictly to vacant lots in the PM-10 nonattainment area (located in the eastern third of the County)., §52.128(a)(1).

FIP rule does not contain this exemption. However, the threshold for exempted sources is low[44] and is intended to spare owners/operators from rule requirements when trespass by motor vehicles is minimal. We believe this minor exemption does not have a significant impact on the emission reductions potential of Rule 310.01 and therefore does not impact our determination that Rule 310.01 meets RACM. Further note that Rule 310.01 applies to more vacant lots than the FIP rule (as discussed above in the 2nd bullet), which helps offset any slight difference in coverage between the two rules.

C Rule 310.01 provides that, if vegetation is the chosen control method to stabilize open areas and vacant lots, the owner/operator has eight months to achieve stabilization, provided that vegetative ground cover is established within 60 days of initial discovery of the disturbance and that it is maintained and reapplied, if necessary, to achieve stabilization. The Phoenix FIP rule contains a 60-day compliance period, as opposed to an eight-month compliance period. Compared to the FIP rule, however, Rule 310.01 does not alter the time frame when an owner/operator is required to *begin* implementing a control(s). MCESD's eight-month allowance simply acknowledge that a longer time frame may be needed for vegetation growth to occur to an extent that complies with the rule's vegetation standard(s) for stabilization. This issue concerns the realities of using vegetation as a fugitive dust control in the Phoenix PM-10 nonattainment area, and we find MCESD's argument reasonable for allowing a longer time frame to complete this control requirement.

C Rule 310.01 provides that, if restoration to undisturbed native conditions is the chosen control method to stabilize open areas and vacant lots, the owner/operator has eight months to achieve stabilization, provided that restoration by the owner/operator begin within 60 days of initial discovery of the disturbance and is to be maintained and reapplied, if necessary, to achieve stabilization. The Phoenix FIP rule contains a 60-day compliance period. See previous comment.[45]

Rule 310.01 was initially adopted in June 1999 (revised February 2000) and became effective upon adoption. Its compliance date for vacant lots is only slightly later than the FIP's date of May 2, 1999. §52.128(d)(6).

Rule 310, section 308.8 requires that the following measures be implemented when

[44] For added perspective, a 0.1 acre lot is 4,356 square feet.

[45] Similar reasoning applies to restoring disturbed land to its undisturbed native conditions.

greater than or equal to 0.1 acres are disturbed through weed abatement by discing or blading:[46]

- apply water before weed abatement by discing or blading occurs;
- apply water while weed abatement by discing or blading is occurring;
- pave, apply gravel, apply water, apply a suitable dust suppressant, or establish vegetative ground cover, in compliance with at least one of the applicable standards/test methods, after weed abatement by discing or blading occurs.

The main difference between the FIP rule's weed abatement requirements and those of Rule 310 is that material trackout is not listed in Rule 310, section 308.8 as a specific weed abatement requirement. However, weed abatement operations must comply with the trackout requirements found in Rule 310, section 308.3. Section 308.3 requires that trackout be prevented by installing a trackout control device at work sites with a disturbed surface area of five acres or larger. For all work sites, trackout must be cleaned up immediately when it extends a cumulative distance of 50 linear feet or more, or at the end of the work day if it extends less than 50 feet.

Rule 310 requirements are effective upon adoption and the rule was initially adopted June 1999 (revised February 2000). Therefore, the time frame for controls is equivalent to the FIP rule implementation of May 2, 1999. §52.128(d)(6).

For reasons discussed above, we find that the requirements in Rule 310.01 and Rule 310 provide for the implementation of RACM as required by CAA section 189(a)(1)(C) on vacant lots currently subject to the FIP rule.

With respect to evaluating BACM for nonpermitted vacant lots, we consider the stringency of Rule 310.01 and the other commitments for controlling fugitive dust from vacant lots from cities/towns in the plan. As discussed above, Rule 310.01 applies to more sources than the Phoenix FIP rule (to provide a RACM comparison). The Phoenix serious area plan contains several commitments made by several cities and towns to address vacant disturbed lots. For example, seven (7) jurisdictions require or will require stabilization of disturbed vacant lots after 15 days of inactivity (as compared to Rule 310.01's 60-day compliance period); two (2) prohibit dumping of materials on vacant land; and two (2) will stabilize all city-owned vacant lots. Most notably, Phoenix has funded a program to identify and stabilize City-owned vacant lots and Peoria has targeted 17 commercial lots and large tracts of desert for access and dust control. Phoenix commitment, measure 98-DC-10 and Peoria commitment, measure 98-DC-10.

Local jurisdictions are implementing disturbed vacant lot measures to varying degrees, which can be attributed to differences in the type and extent of local sources and budgets. CAA

[46] Owners/operators must also submit a dust control plan and gain approval of it by MCESD, Rule 310, section 303.

requirements to implement BACM and include MSM are a collective obligation of the nonattainment area and not of individual jurisdictions within that nonattainment area. See footnote 48. Therefore, to judge whether the plan provides for implementation of BACM and for the inclusion of MSM, we have focused on the combined effect of local commitments on the region as whole rather than judging compliance jurisdiction by jurisdiction.

Moreover, because BACM and MSM are obligations of the nonattainment area, we do not judge one jurisdiction's efforts against another nor consider one jurisdiction's efforts to set a BACM or MSM standard that other jurisdictions must meet or provide a justification for not doing so. Just because one jurisdiction has adopted a measure does not compel the others under the BACM or MSM requirements to do the same.

With respect to evaluating BACM for vacant lots associated with permitted sources, Rule 310 requirements for vacant lots and open areas are more stringent than those in Rule 310.01, in that Rule 310 requires stabilization of all inactive disturbed surface areas on permitted facilities, regardless of their size. Rule 310, section 302.3. Rule 310 also contains requirements for weed abatement that closely resemble the Phoenix FIP rule's weed abatement requirements, except that, as discussed above, Rule 310's threshold for coverage is more stringent.[47] Vacant lots and open areas subject to Rule 310 are required to meet the same surface stabilization standards/test methods as required in the Phoenix FIP rule.

Based on our analysis of the Phoenix serious area plan, we find that Rule 310 and Rule 310.01 requirements for disturbed vacant lots and open areas, in addition to commitments from the cities and towns which, in some cases, will result in stabilization of disturbed vacant lots sooner than the 60-day compliance period allowed in Rule 310.01, provide for the implementation of BACM as required by CAA section 189(b)(1)(B). All measures were implemented by the June 10, 2000 BACM implementation deadline for the Phoenix area or within days thereafter.

2. Most Stringent Measures

For its MSM comparison, the Phoenix serious area plan identifies measures in Clark County (Las Vegas, Nevada) Rule 41 and South Coast Rule 403. MSM Study, pp. C-11 and C-16, 17.

Clark County Rule 41 limits off-road vehicle racing in the PM-10 nonattainment area to

[47] Rule 310 requires any earthmoving operation that disturbs 0.1 acre or more to have a dust control plan, including weed abatement by discing or blading (section 303), whereas the Phoenix FIP rule weed abatement requirements only apply to disturbances equal to or greater than 0.5 acres (§52.128(a)(2)).

permanent race courses and prohibits off-road vehicle racing unless adequate dust controls approved by the District are implemented. The plan concludes that because the Clark County rule fails to specify control methods, the two regulations cannot be adequately compared with respect to stringency.

In Maricopa County, we understand that permanent off-road race courses are required to obtain a general air quality permit and are therefore subject to Rule 310 requirements. While temporary off-road race courses are not necessarily subject to Rule 310, MCESD may plausibly require that dust suppressants be applied according to Rule 310.01 requirements for "vehicle use in open areas and vacant lots". Section 301. Thus, we agree with the MAG plan's assessment that the Clark County requirements are not more stringent.

South Coast Rule 403 prohibits visible fugitive dust emissions beyond the property line. The Phoenix serious area plan deems the Rule 403 requirements equivalent in stringency to Maricopa County requirements with respect to control of fugitive dust from vacant lots. We believe that, since Maricopa County Rule 310 and Rule 310.01 both establish a specific list of controls for vacant lots, as well as appropriate standards and test methods to be used to determine source compliance, the rules are sufficiently stringent for these sources. The Maricopa County vacant lot standards may, in fact, be more stringent than South Coast Rule 403 requirements because they directly pertain to ensuring surface stability instead of simply requiring no visible emissions at the property line.

The plan also identifies weed abatement operations in South Coast Rule 403(h)(I)(H) as potentially more stringent. See p. 3-15 in the MSM analysis. Rule 403 prohibits emissions of fugitive dust from any disturbed surface that remains visible beyond the property boundary of the emission sources. It exempts weed abatement operations from this requirement if the operation has been ordered by the agricultural commissioner or fire department provided that 1) mowing, cutting, or other similar process is used which maintains weed stubble at least three inches above the soil, or discing or similar operation is used if a determination is made by the agency issuing the weed abatement order that mowing or cutting of weeds is not practical. MCESD Rule 310, section 303 requires any earthmoving operation that disturbs 0.1 acre or more to have a dust control plan, including any weed abatement done by discing or blading and thus does not in any circumstances exempt weed abatement operations using discing or blading from dust control requirements like the South Coast rule allows. Section 303. Rule 310 also requires work practice standards for weed abatement. Section 308.8. In both regards, MCESD's rule is more stringent than South Coast's.

We, therefore, find that the Phoenix serious area plan correctly concluded that there are no most stringent measures in other State plans or used in practice elsewhere that are applicable to the Phoenix area.

Control measures for disturbed vacant lots are described in Table DVL-1. We find that

the Phoenix serious area plan includes MSM for disturbed vacant lands as required by CAA section 188(e) for areas requesting attainment date extensions..

TABLE DVL-1
ANALYSIS OF BACM AND MSM FOR DISTURBED VACANT LANDS

SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
BEST AVAILABLE CONTROL MEASURES			
Require dust mitigation plan submission and implementation by property owner for vacant parcels greater than 10 acres.	Partial	Yes	MCESD Rules 310 and 310.01 already require BACM-level controls on all inactive disturbed areas on permitted facilities (Rule 310, section 302.3) and open area and vacant lots with 0.5 acres or more of disturbed surface (Rule 310.1, section 302). Permitting is a compliance mechanism and not an emission reduction measure. Maricopa County has committed to an aggressive enforcement program and we do not believe that permitting of vacant parcels greater than 10 acres is warranted to provide for BACM.
Require vegetative and chemical stabilization and construction of windbreaks on public property adjacent to open land or lots	Yes		Disturbed vacant land in Maricopa County, regardless of ownership, is subject to the provisions of Rule 310 and Rule 310.01 for stabilization. In addition, section 37 of S.B. 1427 (1998) appropriated $200K to implement a dust abatement and management plan for state lands in the Maricopa nonattainment area. The money does not lapse at the end of the fiscal year. MAG plan, p. 7-156.
Limit off-road use of recreational vehicles on open land	Yes		MCESD Rule 310.01, section 301 requires either stabilization of land disturbed by vehicle use or prevention of motor vehicle trespassing, parking and other access. The rule applies to vacant lots and open areas $\geq$ 0.1 acres.
MOST STRINGENT MEASURES			
Controls on weed abatement	Yes		MCESD Rule 310 requires any earthmoving operation that disturbs 0.1 acre or more to have a dust control plan, including weed abatement by discing or blading. Section 303. Rule 310 also requires work practice standards for weed abatement. Section 308.8.
OTHER ADOPTED MEASURES			
Dust abatement and management plan for state lands	Yes		S.B. 1427 (1998) appropriates $200K to implement a dust abatement and management plan for state lands in the Maricopa nonattainment area. MAG plan, p. 7-156.

Source of measures: Table 5-2, measures 41, 138, and 141; Table 10.7, measure 25.5

* For information on resources for implementing Rules 310 and Rule 310.01, see TSD section "MCESD's Commitments to Improve Compliance and Enforcement of the Fugitive Dust Program." For information on legal authority for Rules 310 and Rule 310.01, see TSD section, "General SIP Requirements: Adequate Personnel, Funding, and Authority." For information on the enforcement program for Rule 310 and Rule 310.01, see TSD section, "Description of the Enforcement Methods and State Back-Up Authority."

This section prepared by Karen Irwin.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR UNPAVED ROADS

Requirement:	CAA section 189(b)(1)(B): Plan must provide for implementation of BACM on significant source categories of PM-10. CAA section 188(e): Criterion 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible for the area.
Action:	Approve
Proposal Cite:	Annual standard: 65 at 19978 24-Hour standard: 66 at 50264
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and

economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies unpaved roads as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of the Unpaved Roads Source Category

This category includes re-entrained dust from vehicle travel on unpaved roads. There are three classes of unpaved roads in the Maricopa nonattainment area: public roads, private roads that are publicly maintained (also referred to as minimally-maintained or courtesy grade), and private roads that are privately maintained.[48]

Emissions from Unpaved Roads in the Phoenix Area

Unpaved roads are the second largest source of PM-10 emissions in the inventory, accounting for 31.1 mtpd in 1994 or 21.6 percent of the total directly-emitted, non-windblown PM-10 inventory (1994 Regional Inventory, Table 2-3) and 13.1 percent of the 2006 pre-control total (including windblown) PM-10 inventory (MAG TSD, Table II-3). Total uncontrolled paved road dust emissions increase by 12 percent from 1995 to 2006 due to the increased vehicle miles traveled (VMT) between 1995 and 2006. (MAG TSD, Tables II-1 and II-3). The Microscale plan shows that fugitive dust from unpaved roads can be a contributor to 24-hour exceedances. Microscale plan, p. 17-19.

Existing Controls

From 1995 to 1999, Maricopa County and its local jurisdictions have paved more than 107 miles of unpaved road. MAG plan, p. 9-63.

The Phoenix serious area plan includes Rule 310.01 requirements for unpaved roads, and also County, city and town commitments addressing unpaved roads.

[48] Unpaved haul/access roads associated with permitted sites that are subject to Rule 310 are addressed in the section of this TSD titled “Implementation of BACM and inclusion of MSM for Construction Sites and Operations.”

In 1998, we promulgated a federal fugitive dust rule as part of our federal implementation plan (FIP) for Phoenix. 63 FR 41326. This rule establishes RACM for unpaved roads, among other sources. See 40 CFR 52.128(d)(3). We subsequently made revisions to the Phoenix FIP rule and the final version was published on December 21, 1999. See 64 FR 71304. The federal fugitive dust rule requires paving, applying chemical/organic stabilizers, or graveling any public or publicly maintained unpaved road in the nonattainment area with average daily vehicle traffic that meets or exceeds 250. See 40 CFR §52.128(d)(2).

Does the plan meet the statutory and policy requirements?

Suggested Measures List for BACM and MSM Analysis

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for unpaved roads including potential most stringent measures from other States as well as provides information on their technological feasibility, costs, and energy and environmental impacts where appropriate.

The plan includes three suggested measures for controlling fugitive dust from unpaved roads. Evaluation of unpaved road measures in other areas found none that are more stringent than the measures for unpaved roads in the MAG plan. MAG plan, Table 10-7. See Table UPR-1.

New Controls in the Plan and Justifications for Rejecting Potential Controls

In summary, MCESD Rule 310.01 requires stabilization of all unpaved public roads and alleys with 250 vehicle trips per day (VPD) or more by 2000 and 150 vehicle trips per day or more by 2004. Rule 310.01 and Rule 310 require stabilization of all unpaved utility roads with 150 VPD.[49] The County has committed to pave at least 60 miles of high VPD privately-owned roads and the City of Phoenix has recently paved all 80 miles of its publicly-owned roads. See Table UPR-1.

In Note 1, we provide a RACM/BACM evaluation of Rule 310.01 and County and city/town commitments to pave roads. In Note 2, we provide an MSM evaluation. We find that the combined effect of MCESD's Rules 310 and 310.01 requirements and the County and city/town commitments to pave roads not subject to Rule 310.01, provides for the

[49] Our approval of the County's strategy to target unpaved roads with 150 ADT or more should not be interpreted as a policy statement that controls on unpaved roads with less than 150 ADT are not important. Rather, we believe that this strategy is BACM for the Maricopa PM-10 nonattainment area at this time, given the large volume of unpaved roads and cost considerations involved in paving or otherwise stabilizing them.

implementation of RACM and BACM and inclusion of MSM for unpaved roads as required by CAA section 189(a)(1)(C), 189(b)(1)(B), and 188(e).

TABLE UPR-1
ANALYSIS OF BACM AND MSM FOR UNPAVED ROADS

SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
BEST AVAILABLE CONTROL MEASURES			
Surface treatment to reduce dust from unpaved roads and alleys	Yes		See discussion below under Note 1. Programs are generally implemented using existing personnel and City/Town/County general funds and/or state and federal transportation funds and program. Legal authority for Cities/Towns/County to maintain/improve roads found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements are not regulatory programs and do not need a traditional enforcement program.
Traffic reduction/speed control plans for unpaved roads	Some	Yes	Some jurisdictions committed to evaluate this measure. Two jurisdictions committed to posting 15 mph speed limit signs on private and public unpaved roads and access ways; one jurisdiction has posted 15 mph speed limits in all alleys. (See Table 10-9). Also, under Rule 310, owners/operators of unpaved haul roads and utility roads who comply with the rule by limiting vehicle trips to 20 per day, must also limit vehicle speeds to 15 mph. While speed limit controls are only being implemented to a limited extent, we believe the SIP measures to pave or otherwise stabilize unpaved roads in the Phoenix PM-10 nonattainment area establish the critical commitments for the implementation of BACM and the inclusion of MSM. Programs are generally implemented using existing personnel and City/Town/County general funds and/or state and federal transportation funds and program. Legal authority for Cities/Towns/County to maintain/improve roads in found in A.R.S. 9-240 and 11-251, respectively. City/Town/County commitments for capital improvements are not regulatory programs and do not need a traditional enforcement program.
Prohibition of unpaved haul roads	No	Yes	Rule 310 requires that unpaved haul roads meet both a 20 percent opacity standard and a silt content or silt loading standard. Rule 310, section 302.2.
MOST STRINGENT MEASURES			
None	N/A		The Phoenix serious area plan identified no unpaved road measures from other areas that are more stringent than the existing Maricopa measures. See discussion below under Note 2.

Source of measures: Table 5-2, measures 134 - 136

* For information on resources for implementing Rules 310 and Rule 310.01, see TSD section "MCESD's Commitments to Improve Compliance and Enforcement of the Fugitive Dust Program." For information on legal

authority for Rules 310 and Rule 310.01, see TSD section, "General SIP Requirements: Adequate Personnel, Funding, and Authority." For information on the enforcement program for Rule 310 and Rule 310.01, see TSD section, "Description of the Enforcement Methods and State Back-Up Authority."

Note 1. BACM for Unpaved Roads and Alleys

In determining whether the Phoenix serious area plan provides for the implementation of BACM for unpaved roads, we are also considering whether the plan provides for the implementation of RACM for these sources. See Footnote 59. In our FIP, we promulgated a RACM fugitive dust rule applicable to unpaved roads in the Phoenix PM-10 nonattainment area. See 40 CFR 52.128(d)(2). This rule provides a starting point for determining whether the Phoenix serious area plan measures for unpaved roads meet RACM. It is not necessary for the plan's measures to be identical to the FIP rule in order to meet the CAA's RACM requirement, but only that they provide for implementation of RACM. However, if the submitted measures for a particular source are identical to the FIP rule, we can determine without further analysis that the Phoenix plan has provided for RACM for that source.

The FIP rule's requirements for unpaved roads are as follows:

- Unpaved roads that are owned/operated by any federal, state, county, municipal or other governmental or quasi-governmental agency, that have average daily trip (ADT) volumes of 250 vehicles or more are required to be paved, treated with chemical/organic stabilizer, or graveled according to the applicable rule standards/test methods. §52.128(d)(2). Applicable standards include a 20 percent opacity standard, and a 6 percent silt content standard and/or a 0.33 oz/square foot silt loading standard. §52.128(b)(16). Compliance is required by June 10, 2000. §52.128(d)(5).

By the FIP rule's definition, "owner/operator" means any person who owns, leases, operates, controls, maintains or supervises a fugitive dust source subject to the rule's requirements. §52.128(b)(11). Therefore, the FIP rule requirements apply not only to publicly owned unpaved roads but also to privately owned unpaved roads that are publicly maintained. This is an important distinction because many unpaved roads in Maricopa County are classified as privately owned, publicly maintained. (See "Private Unpaved Roads" below for further discussion.)

Both the FIP rule and Rule 310.01 require unpaved roads located in the PM-10 nonattainment area with 250 vehicles per day (VPD) or more to be stabilized by June 10, 2000. Rule 310.01, section 304. Also, Rule 310.01's control options and standards/test methods for unpaved roads are the same as the FIP rule's. Compare Rule 310.01, section 304 to §52.128(d)(2). Additional provisions in Rule 310.01 that strengthen the rule beyond the FIP rule requirements include:

- A requirement that publicly owned unpaved roads with 150 VPD or more must be stabilized by June 10, 2004. Section 304.

- Control requirements for private unpaved utility easement, rights-of-way and access roads with greater than or equal to 150 VPD.[50] Rule 310, section 308.5. Compared to the Rule 310.01 requirements for publicly owned unpaved roads, the compliance period is immediate (effective on the date the rule was adopted, February 16, 2000) as opposed to June 10, 2000. Again, the applicable control methods and standards/test methods are the same for these unpaved roads as those covered under in the FIP rule. Rule 310, section 308.5(c).

Other differences between the FIP rule and Rule 310.01 include:

- Rule 310.01's terminology for unpaved road traffic levels is vehicles per day (VPD), as compared to the FIP rule's use of average daily trips (ADT).[51] Rule 310.01, section 304. In their efforts to assess unpaved road usage in order to comply with applicable rule requirements, Maricopa County public entities are relying on tube counts to assess VPD, which are the most accurate method for determining vehicle usage and are included in the FIP rule as a means of calculating ADT. Furthermore, EPA and/or MCESD can rely upon credible evidence to establish the approximate vehicle usage if there is concern that VPD is not being properly assessed by a regulated public entity.

- The Phoenix FIP rule applies to all privately owned roads that are publicly maintained with greater than or equal to 250 ADT, whereas Rule 310.01 applies strictly to publicly owned roads. Compare Rule 310.01, section 216 to §52.128(b)(11). (For discussion of Maricopa County private road commitments, see "Private Unpaved Roads" below.)

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[50] This requirement in section 307 of Rule 310.01 covers unpaved utility roads that are not otherwise subject to Rule 310.

[51] The FIP rule defines ADT as the average number of vehicles that cross a given surface during a specified 24-hour time period as determined by the Institute of Transportation Engineers Trip Generation Report (6th edition, 1997) or tube counts. According to MCDOT, calculating ADT is a more formalized process appropriate for paved roads, where a year's worth of data is collected for a given road classification in order to establish correction factors, prior to the use of tube counts over a 48-hour period. Such data is not available for unpaved roads so the County and cities are relying on 48-hour tube counts to establish daily vehicle traffic levels. We accept this as credible evidence of traffic use levels for the purposes of controlling fugitive dust from unpaved roads. Thus, the reference to ADT found in MCDOT's commitment to pave 60 miles of minimal maintenance unpaved roads with $\geq$ 150 ADT actually refers to 150 vehicle trips per day (VPD) as established by a 48-hour tube count.

1. Public unpaved roads and alleys

The principal control for public unpaved roads and alleys is Rule 310.01, section 304, which requires all publicly-owned unpaved roads and alleys with 250 vehicles per day or more to be stabilized by June 10, 2000 and those with 150 vehicles per day or more to be stabilized by June 10, 2004.

Several cities have commitments that go beyond the requirements of Rule 310.01 for publicly-owned unpaved roads. For example, the City of Phoenix committed to, and recently accomplished, paving all 80 miles of its publicly-owned unpaved roads regardless of the level of vehicle traffic. Phoenix Commitment, Measure 98-DC-7. Other cities, such as Tempe and Gilbert, have very few remaining miles of public unpaved roads/alleys. See Tempe Commitments, Measure 98-DC-7 and Gilbert Commitments, Measure 98-DC-7.

2. Private Unpaved Roads

Rule 310, section 308.6, requires that easements, rights-of-way, and access roads for utilities (electricity, natural gas, oil, water, and gas transmission) that receive 150 or more VPD must be paved, chemically stabilized, or graveled in compliance with the rule's standards. However, neither Rule 310 nor 310.01, apply to other privately-owned roads. See definition of unpaved roadroad way in Rule 310.01, section 216.

Private unpaved roads are scattered throughout Maricopa County, within both County and city jurisdictions. A number of these private roads are minimally maintained by the local jurisdiction. Under contract to us, Pacific Environmental Services (PES) conducted a survey of unpaved roads, unpaved parking lots and vacant lots in Maricopa County. See PES, "Survey for Fugitive Dust Emission Sources," April 15, 1999. The survey included available information on both public and private unpaved roads and determined that the great majority of identified unpaved road mileage consists of privately-owned roads that receive minimal maintenance by the Maricopa County Department of Transportation (MCDOT).[52]

MAG and MCDOT have committed to pave County minimal maintenance roads within the nonattainment area that currently exceed 150 ADT[53] and meet criteria to become public highways, using $22 million from CMAQ and MCDOT funds. MAG Commitments; Maricopa

[52] The inventory did not include County-jurisdiction private roads that are not maintained by MCDOT.

[53] The Maricopa County's commitment uses ADT in error instead of the correct VPD. See footnote 71 for further information.

County Commitment, 1999 Revised Measure 17. This program will pave an estimated 60 miles of unpaved roadways in fiscal years 2001-2003 which is approximately 20 percent of the privately-owned, publicly-maintained County-jurisdiction-roads and accounts for 40 percent of vehicle miles traveled on these roads. Maricopa County has also committed to continue to evaluate other roads for funding when traffic levels increase above 150 vehicle trips per day. Maricopa County Commitment, 1999 Revised Measure 17. We interpret this commitment to apply to any private roads within County jurisdiction, whether they currently receive minimal maintenance or not.

As the County evaluates roads for paving, it may make exceptions to its commitment to pave roads with vehicle trips that exceed 150 VPD and meet criteria to become public highways. The County's evaluation process takes into account whether estimated costs of paving are excessive (greater than $500,000 per mile).[54] An example provided in the Phoenix's plan's BACM analysis as to why costs may be excessive is when structural deficiencies exist on an unpaved road (e.g. drainage issues, road needs to be realigned, or utilities or private structures intrude into the right-of-way). Maricopa County commitments, fourth submittal titled "BACM/RACM justification for Unpaved Roads." When MCDOT identifies a road that meets its criteria (i.e. the road can be declared a public highway and costs are not excessive), it will recommend that the Board of Supervisors open and declare the road a public highway.

Because BACM determination properly takes costs into account, we believe that MCDOT's criteria for selecting private roads to pave are suitable in the context of a BACM strategy and will result in control of the great majority of high traffic unpaved roads.

In its commitment to pave unpaved roads, Maricopa County mentions that acquiring right-of-way, which is necessary for the County to have the legal authority to pave, and securing funding, can be a slow process that takes three to five years due to legal complexities. Given the realities of obtaining rights of way and funding, we believe that the time frame for paving unpaved roads in the County's commitment is consistent with the implementation of RACM/BACM by MCDOT.

Maricopa County also includes other information in its commitment regarding 1) the inability of private property owners to restrict use of their roads; 2) "regulatory takings" issues if road owners pay for improvements that benefit others; 3) a reference to Arizona law that prohibits the spending of public monies for road improvements that benefit owners; and 4) liability implications of road paving. However, we do not consider these arguments relevant to the commitment made by Maricopa County to address private unpaved roads nor the County's

[54] A private road begins to bear other than local traffic through extensions of other nearby public roads or the construction of an indirect source that attracts external drivers using the road as a short cut. See Maricopa County Commitments, 1999 Revised Measure 17.

ability to carry out its commitment.

Maricopa County provided an update to us of their efforts to identify and pave County minimal maintenance roads. Email, Kelly McMullen, MCDOT, to Karen Irwin, EPA, May 4, 2001. The County identified approximately 68 miles of minimal maintenance roads (courtesy grading only) that potentially could have over 150 VPD traffic. Of those roads, the County was unable to gather traffic count information for approximately 3 miles due to repeated counter vandalism or theft. The County included remaining roads with traffic counts over 130 VPD (allowing for short term growth, seasonal variation, etc.) in its program to pave, totaling approximately 65 miles, consisting of approximately 186 segments.

Each of these road segments were inspected by Maricopa County staff for preliminary evaluation of what environmental impacts might occur from paving, right-of-way needed, drainage issues, and roadway alignment/traffic engineering issues. Based on those inspections, the County divided the roadways into three groups based on geography and the amount of design, permitting and other work needed prior to paving. The first group is expected to have a bid awarded in June 2001, and be paved by Fall 2001. Design work for the second group will begin in June 2001, and is expected to go to bid for construction within the next twelve months. Design work for the third group will begin in Summer 2001, and is expected to be bid approximately 10-12 months following the second group, as the third group reflects the most difficult engineering and environmental issues. Based on project engineer estimates at this time, the County believes that six segments totaling approximately 3.0 miles may exceed the reasonable cost threshold of $500,000 per mile, or have issues with adjoining property owners that are not possible to resolve within the SIP time frames. The County will evaluate whether another method of dust suppression may be viable for those segments.

PES also surveyed several cities/towns regarding private unpaved roads in their jurisdictions. PES was unable to survey six jurisdictions (Avondale, Carefree, Cave Creek, El Mirage, Goodyear, and Surprise), however, these are all relatively small cities/towns and, because their populations are low and they are on the urban fringe, they are unlikely to have unpaved roads that exceed 150 VPD. Eight jurisdictions (Fountain Hills, Guadalupe, Paradise Valley, Buckeye, Queen Creek, Tempe, Tolleson, and Youngtown) declared having zero or minimal miles of private unpaved roads. Chandler indicated it has 5 miles of private unpaved roads which are publicly accessible, but believes all of these roads receive less than 250 average daily trips. Scottsdale indicated it has 65 miles of privately-owned, city-maintained unpaved roads, 20 miles of which had already been paved at the time the survey was conducted and 13 miles were planned for paving.[55] Other cities (Gilbert, Glendale, Mesa and Phoenix) surveyed indicated that a few miles of unpaved private roads were already treated or were scheduled to be

[55] Thus, approximately 50 percent of the 65 miles of private roads identified by the City of Scottsdale have been or are scheduled to be paved.

treated but were not able to provide further details on the mileage of or ADT on private unpaved roads in their jurisdictions.

We mailed a letter to MAG requesting additional information on private unpaved roads from the cities of Chandler, Scottsdale, Gilbert, Glendale, Mesa, Phoenix, Tempe, Peoria, Avondale, Carefree, Cave Creek, El Mirage, Goodyear, and Surprise. Letter Colleen McKaughan, EPA, to Lindy Bauer, MAG, March 21, 2001. All but three cities (Scottsdale, Gilbert, and El Mirage) responded to MAG's survey. Letter, Lindy Bauer, MAG to Colleen McKaughan, EPA, June 29, 2001.

Five of the cities (Avondale, Carefree, Chandler, Goodyear, and Tempe) affirmed they currently have no private unpaved roads with greater than 150 VPD. Three cities (Glendale, Mesa, and Surprise) indicate they do not believe there are private unpaved roads with greater than 150 VPD in their jurisdictions.[56] The remaining cities either have a small number of private road miles identified with greater than 150 VPD or make no statement regarding the number of private road miles with greater than 150 VPD in their jurisdictions.

With respect to potential increases in traffic on private unpaved roads in city jurisdictions, there are a couple of means (short of condemnation by the city) that would result in the paving or surface treatment of a private road. First, most municipalities, if not all, have laws requiring that developers of subdivisions pay for the paving of access roads to and from the new development. Where the development of a subdivision occurs along an existing private unpaved road and increased traffic levels are anticipated, developers are held responsible for paving the road. Second, private owners living along the road may choose to form an Improvement District to pay for road paving or surface treatment. Cities do not have authority to require private roads to be stabilized through Improvement Districts. Some cities appear to be proactive in encouraging Improvement Districts, e.g. Peoria, Mesa and Surprise. (We also note that in a 1998 SIP commitment from El Mirage, adequate information is provided to indicate that the City has approximately six unpaved private road miles and that it will propose an improvement district program for paving those miles.)

As described earlier in this section, information received from Scottsdale in their SIP commitment indicates they have controlled or are in the process of controlling half of the private unpaved road miles in their jurisdiction. This suggests that unpaved private road miles in Scottsdale are being addressed to the best of the City's ability. Only two (Phoenix and Gilbert) of the twenty cities in the nonattainment area have not provided information to allow us to make any determination of whether private unpaved road miles with greater than 150 ADT exist in

[56] Information from Glendale is supplemented by a phone conversation with Douglas Kukino on August 1, 2001 and information from Surprise is supplemented by a phone conversation with Brian Pirooz on August 6, 2001.

their jurisdictions, nor have they provided information on city efforts to address any such private unpaved roads.[57] We also recognize that existing laws limit municipal authority to address private roads, and while cities may be able to encourage improvement districts, they cannot require private road owners to donate right-of-way.

Although available information on private roads in some city jurisdictions is limited, our existing information suggests that the vast majority of privately-owned unpaved roads have low ADT.[58] Since private roads are largely not inventoried, it is possible that a few miles of private roads with ADT exceeding 150 will not be controlled unless road owners expressly form an improvement district and fund paving or surface treatment. We believe that future increases in traffic on private unpaved roads would primarily occur with development of large subdivisions, in which circumstance the roads will be paved under local laws. There is no evidence available to us to suggest that private unpaved roads in city jurisdictions would hinder Maricopa County's ability to achieve either the annual or 24-hour PM-10 standard. Notwithstanding, we encourage cities in the nonattainment area to take steps to inform private unpaved road owners of the health issues associated with PM-10 and encourage the formation of improvement districts for any private roads with significant traffic levels.

New Unpaved Roads. Because of growth in the Phoenix area, it is very likely that new unpaved roads may be created. Several existing requirements are in place to deal with this. The Phoenix serious area plan indicates that the Maricopa County roadway design standard requires that all new subdivision-roads and County-built roads be paved. Maricopa County commitment, 1999 Revised Measure 17.

Also, ten jurisdictions require roads serving new multi-family, commercial, and industrial development to be paved. Nine jurisdictions require roads serving new residential developments to be paved. MAG plan, Table 10-9. While, in the remaining jurisdictions it is possible that new unpaved roads will be built, the requirements of Rule 310.01 apply to any such public roads that receive traffic levels exceeding 150 ADT.

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[57] In its SIP commitment (Phoenix commitments, Measure 98-DC-8), Phoenix indicates that it will pave approximately 3.2 miles of private unpaved streets through an Improvement District program.

[58] Among the 100 plus segments of unpaved privately-owned and maintained roads that were identified in the PES survey, the contractor estimated using aerial photographs that only 6 of these have ADTs that exceed 150. Tube counts, which are more accurate than other methods to estimate ADT, were not conducted on these roads. Written responses from cities as well as conversations with various city personnel further establish the preponderance of evidence that the great majority of private road miles in city jurisdictions have low traffic.

For reasons discussed above, we find that the combined effect of Rule 310.01 requirements and County and city commitments in the Phoenix serious area plan to pave roads provide for the implementation of RACM for unpaved roads currently subject to the FIP rule. We believe the overall reduction in high ADT unpaved road miles that will be achieved under the plan is much larger than that which would be achieved through implementing the FIP rule, given the lower 150 ADT threshold
among other factors. For this reason, we also find that the combined effect of the Rule 310.01 requirements and County/city paving commitments provide for the implementation of BACM.

The plan shows that jurisdictions are implementing unpaved road measures to varying degrees, which can be attributed to differences in the type and extent of local sources and budgets. The Phoenix serious area plan shows that jurisdictions are implementing TCMs to varying degrees, which can be attributed to differences in local road conditions, local transportation options, and budgets. CAA requirements to implement BACM and include MSM are a collective obligation of the nonattainment area and not of individual jurisdictions within that nonattainment area. See footnote 48. Therefore, to judge whether the plan provides for implementation of BACM and for the inclusion of MSM, we have focused on the combined effect of local commitments on the region as whole rather than judging compliance jurisdiction by jurisdiction.

Moreover, because BACM and MSM are obligations of the nonattainment area, we do not judge one jurisdiction's efforts against another nor consider one jurisdiction's efforts to set a BACM or MSM standard that other jurisdictions must meet or provide a justification for not doing so. Just because one jurisdiction has adopted a measure does not compel the others under the BACM or MSM requirements to do the same.

Note 2 - Most Stringent Measures for Unpaved Roads

The Phoenix serious area plan did not identify any other State's measures that are more stringent than the ones already in the plan. Upon an independent review of existing unpaved road measures as discussed below, we concur with the plan's finding.

The commitments and rules in the Phoenix serious area plan for controlling unpaved roads can be compared to South Coast Rule 1186 requirements and Clark County's "PM-10 Offset Paving Program."

South Coast Rule 1186 requires owners/operators of unpaved public roads to address roads with greater than the average ADT by paving at least one mile, chemically stabilizing 2 miles, or placing speed limits or speed bumps on 3 miles of road each year over a 9-year span. We believe Maricopa County's commitments may exceed the emission benefits provided by South Coast Rule 1186 because they are not limited to public unpaved roads, provide for paving much more extensive road mileage in the near-term, and do not contain an option for

jurisdictions to fully rely upon speed controls which may be difficult to enforce and not as effective.[59]

Clark County's "PM-10 Offset Paving Program" relies upon collection of fees from permitted PM-10 sources to pave unpaved roads, as prioritized by ADT. The program's *goal* to pave all unpaved roads of 30 ATD or more. The program does not require the paving all unpaved roads of 30 ATD or more. This goal is neither included in a SIP as an enforceable measure nor has it been achieved in practice; therefore, the measure does not represent a "most stringent measure found in the implementation plan or achieved in practice" that must be considered by Arizona.

This section prepared by Karen Irwin.

[59] South Coast Rule 1186 requires owners/operators of unpaved public roads to address roads with greater than the average ADT by paving at least one mile, chemically stabilizing 2 miles, or placing speed limits or speed bumps on 3 miles of road each year over a 9-year span. All or part of 24 local jurisdictions are located in the Maricopa County portion of the Phoenix nonattainment area. Therefore, to be as stringent as the South Coast rule at its most stringent, Rule 310.01 and the local commitments would require that a total of 24 jurisdictions paving at least 1 mile per year per year for 9 years for a total of 166 miles of unpaved road be paved. Phoenix, Scottsdale, and Maricopa County alone have paved already or have committed to pave at least 174 miles of unpaved roads by no later than 2004. See MAG plan, pp. 7-87, 7-91, and 7-94. With the addition of commitments from other jurisdictions and the requirements in Rule 310.01, the Maricopa County unpaved road measures are clearly more stringent than South Coast's Rule 1186.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR CONSTRUCTION ACTIVITIES AND SITES

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area
Action:	Approve
Proposal Cite:	Annual standard: 65 at 19979 24-Hour standard: 66 at 50265
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies construction activities as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of the Construction Source Category

Sources of fugitive dust emissions at construction site sources include land clearing, earthmoving, excavating, construction, demolition, material handling, bulk material storage and/or transporting operations, material trackout or spillage onto paved roads (which we have addressed under the paved road category), and vehicle use and movement on site (e.g., the operation of any equipment on unpaved surfaces, unpaved roads and unpaved parking areas). Windblown emission from disturbed areas and inactive storage piles on construction sites are also a source of PM-10. Construction operations which are essentially various earthmoving operations represent the majority of emissions in this source category.

Emissions from Construction Activities in the Phoenix Area

Collectively, emissions from construction activities including operations and windblown emissions are the second largest contributor to PM-10 emissions in the Phoenix area. Both the base year and future year inventories treat each category of construction related emissions–operations and windblown–as separate emission categories. Table CST-1 shows the emissions from construction.

TABLE CST-1 EMISSIONS FROM CONSTRUCTION-RELATED SOURCES (AVERAGE ANNUAL DAY)			
		OPERATIONS	WINDBLOWN
1995 modeling year	mtpd	44.5	4.5
	percent of inventory	23.3	2.4
2006 projected year – uncontrolled	mtpd	49.5	5
	percent of inventory	24.5	2.5
Growth between 1995 and 2006		11%	9%

The Microscale plan shows that fugitive dust from disturbed areas on construction sites can be a large contributor to 24-hour exceedances. Microscale plan, p. 17-19.

Does the plan meet the statutory and policy requirements?

Existing Controls

MCESD Rule 310 establishes requirements for all categories of emissions from construction sites.

Suggested Measure List for BACM and MSM Analysis

The Phoenix serious area plan includes three suggested measures for controlling emissions from construction sites. The suggested measures are for the most part means of improving compliance with controls as opposed to new controls for these sources and are based on the understanding that the exist fugitive dust rule, Rule 310, combined with MCESD's commitments, already includes a comprehensive set of controls for construction sources. See Table CST-2.

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for construction sites based on our review of Rule 310 and additional SIP commitments.

New Controls in the Plan and Justifications for Rejecting Potential Controls

See Table CST-2. We find that the Phoenix serious area plan provides for the implementation of RACM and BACM and inclusion of MSM for construction activities and windblown dust from disturbed land on construction sites for both the annual and 24-hour PM-10 standard as required by CAA sections 189(a)(1)(C), 189(b)(1)(B) and 188(e), . See also Note 1 below. As noted before, we have evaluated the track-out requirements for construction sites in the section evaluating controls for paved road dust. We discuss MCESD's commitments to improve compliance and enforcement of Rule 310 in the later in this TSD.

TABLE CST-2
ANALYSIS OF IMPLEMENTATION OF BACM AND MSM FOR CONSTRUCTION SITES

SUGGESTED MEASURE	IMPLE-MENTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE*
BEST AVAILABLE CONTROL MEASURE		
Strengthen and better enforcement of fugitive dust control rules	Yes	Control requirements in MCESD Rule 310 are strengthened to meet the requirements to implement BACM and include MSM. See Note 1 below and discussion in Section 6 evaluating Rule 310. Maricopa County committed to extensive improvements to its compliance and enforcement program for implementing fugitive dust controls on construction sites. Maricopa County commitment, 2000 revised measures 6. We discuss these improvements more extensively in Note 1 below . Note: we do not consider improved enforcement a BACM but rather a method of implementing BACM. BACM is an emissions limitation or control requirement applied to a specific source.

TABLE CST-2 ANALYSIS OF IMPLEMENTATION OF BACM AND MSM FOR CONSTRUCTION SITES			
Mitigation bond requirements for construction and development projects to provide funding for agencies to control project emissions in event of contractor noncompliance	No	Yes	The MAG Air Quality Committee recommended including this measure as part of the strengthening and better enforcement of fugitive dust control rules. MAG plan, p. 6-4. As with improved enforcement, mitigation bonds are a means of ensuring the implementation (through enforcement) of BACM and not a BACM itself because they are used only to assure compliance with existing control requirements and not to impose new control requirements. It is an enforcement mechanism because noncomplying contractor suffers an economic penalty (i.e., the amount of money deposited to meet the bonding requirement, money that would come back to the contractor if the bond is never invoked) for failure to comply. We are finding that Rule 310 is BACM and MCESD's commitments to improve compliance with and enforcement of Rule 310 provide for the implementation of BACM. This measure was also considered as a potential MSM. As with BACM, MSM is an emission limitation or control requirement applied to a specific source and not a means of assuring compliance with an existing control measures.
Dust control plans for construction/land clearing with elements addressing trackout prevention, site and material maintenance construction staging, and high wind operating restrictions	Yes		MCESD Rule 310 requires all earthmoving operations over 0.1 acres to obtain dust control permits which address these requirements. Sections 303, 304.3, and 301.1.
MOST STRINGENT MEASURES			
See Note 2 below.			

* For information on resources for implementing Rules 310 and Rule 310.01, see TSD section "MCESD's Commitments to Improve Compliance and Enforcement of the Fugitive Dust Program." For information on legal authority for Rules 310 and Rule 310.01, see TSD section, "General SIP Requirements: Adequate Personnel, Funding, and Authority." For information on the enforcement program for Rule 310 and Rule 310.01, see TSD section, "Description of the Enforcement Methods and State Back-Up Authority."

Note 1. Rule 310

The applicable requirements for construction sites are found in Rule 310. The requirements apply to any source required to obtain a permit under Maricopa County rules, which includes earthmoving operations of 0.10 acre or more and sources subject to Title V permits,

Non-Title V permits, or General Permits. In addition to requirements for fugitive dust sources located at any permitted source, Rule 310, section 303 requires that a Dust Control Plan (DCP) be submitted for any earthmoving operations of 0.10 acre or more, and that the DCP be approved prior to commencing any dust generating operation. The rule's definition of a dust generating operation includes any activity capable of generating fugitive dust including land clearing, earthmoving, weed abatement by discing or blading, excavating, construction, demolition, material handling, storage and/or transporting operations, vehicle use and movement, the operation of any outdoor equipment or unpaved parking lots. Rule 310, section 208. For other permitted sources, Rule 310 requires that a DCP be submitted and approved prior to commencing any routine dust generating activity, defined as any dust generating operation which occurs more than 4 times per year or lasts 30 cumulative days or more per year.[60] Rule 310, section 224.

Specific Rule 310 requirements include:

- a 20 percent opacity requirement for any dust generating operation (section 301)
- wind event control requirements (section 301.1)
- implementation of control requirements before, after and while conducting any dust generating operation, including weekends, after work hours and holidays (section 306)
- required controls and standards for (sections 302 and 308):
  - unpaved parking lots
  - unpaved haul/access roads
  - disturbed open areas and vacant lots
  - bulk material hauling
  - bulk material spillage, carry-out, erosion and trackout
  - open storage piles
  - weed abatement by blading or discing
- a requirement in dust control plans for at least one primary and one contingency control for all fugitive dust sources; the contingency measure is to be immediately implemented if the primary controls proves ineffective. Section 303.2

In order to comply with the rule's 20 percent opacity standard and dust control plan requirements for implementing primary and/or contingency controls for earthmoving activities,[61]

[60] This is in addition to the requirement to submit a DCP for any earthmoving operations that disturbs 0.10 acre or more even if the operation is subject to Title V or other permitting requirements.

[61] Earthmoving operations include cutting and filling, grading, leveling, excavating, trenching, loading or unloading of bulk materials, demolishing, blasting, drilling, adding to or removing bulk materials from open storage piles, back filling, soil mulching, landfill operations, or weed abatement by discing or blading. Rule 310, section 210.

sources need to apply one or more controls, which in most cases includes applying water or another dust suppressant before and during operations. Inactive disturbed surfaces must be stabilized to meet at least one of the rule's stabilization standards (e.g. visible crusting, 10 percent rock cover, etc.). Section 302.3. Unpaved roads and unpaved parking lots must also be stabilized to meet both a 20 percent opacity standard and a silt content/loading standard.[62] Sections 302.2 and .3. Test methods associated with stabilization and opacity standards are contained in Appendix C, which was submitted with Rule 310. Section 501.

Revisions to Rule 310 made in 1999 and 2000 have increased the rule's overall stringency. These revisions include the addition of specific work practice standards, the addition of stabilization standards and test methods for unpaved surfaces, and modifications to the opacity test method, which including adding an alternative opacity test method for unpaved roads and unpaved parking lots and modifying the opacity test method for other sources. We believe that the new and/or revised standards/test methods provide for a greater degree of control than under the previous (SIP-approved) version of Rule 310.

For example, the SIP-approved Rule 310 required that disturbed surface areas be stabilized through the application of reasonably available permanent controls. However, the rule did not specify what this meant; the only quantitative standard that applied was a 20 percent opacity standard. Compliance with the 20 percent opacity standard was gauged using a test method that requires observation according to 15 second intervals. Since dust from inactive disturbed surfaces is windblown and wind gusts do not typically occur at regular intervals, we believe this test method may not appropriately gauge whether a source is sufficiently controlled. In order to increase the rule's effectiveness for disturbed surfaces, MCESD revised the rule to include a list of surface stabilization standards and test methods. Permitted sources subject to the rule can apply various techniques to meet the standards. This enables not only better understanding among both regulators and the regulated community of how to comply with the rule, but also establishes a more protective threshold than the previous applicable standard/test method. This Rule 310 strengthening typifies similar strengthenings for a variety of fugitive dust sources subject to the rule.

For a more detailed discussion of Rule 310's requirements and our evaluation of its requirements, see the evaluation of Rule 310 in section 6 of the annual standard TSD.

In addition to these Rule 310 revisions, MCESD made three enforceable commitments to further strengthen requirements for construction sites in 1999. See Maricopa County Commitments, Revised Measure 6 (December 19, 2001).

[62] Unpaved roads must meet a 6 percent silt content standard or, alternatively, a 0.33 oz/ft^2 silt loading standard, while unpaved parking lots must meet an 8 percent silt content standard or, alternatively, a 0.33 oz/ft^2 silt loading standard.

The commitments are to:

24. Research and develop a standard(s) and test method(s) for earth moving sources, designed to be enforceable and meet BACM requirements as to stringency and the number of sources that it applies to. Revise Rule 310/appendix C by no later than December 2002 to modify the existing opacity standard/test method or add an additional opacity standard(s)/test method(s), tailored to non-process fugitive dust sources that create intermittent plumes. This commitment will be met in its entirety only if the standard(s)/test method(s) is approved by EPA.

    The County is also proposing to support and coordinate with Clark County in the ongoing research to develop fugitive dust test methods through the appropriation of $25,000.

2. Part 1: Onsite Implementation of Dust Control Plan

    Raise awareness of onsite project supervisors to acquire and read approved site dust control plans thereby improving the implementation of the dust control plan at the construction site. This will be achieved through one-on-one contact at the time of inspection and through the development of a revised training curriculum and supporting materials for both a classroom setting and onsite aids for improved project management. Maricopa County inspectors will continue to go over dust control plans with construction site personnel during the initial site inspection and whenever issues arise during subsequent inspections. The ADOT project training module is scheduled for completion in winter of 2002 and implementation of the second level of dust control education will begin March--June 2003.

    Part 2: Dust Control Plan Improvements

    Research, develop and incorporate additional requirements for dust suppression practices/equipment into dust control plans and/or Rule 310 by March--December 2002. Based on the Arizona Department of Transportation (ADOT) project research, MCESD research or other alternative research, Maricopa County will develop a growing list of criteria for effective versus ineffective dust suppression practices that address various site circumstances.

3. Revise the sample daily record keeping logs for new and renewed Rule 310 permits to be consistent with rule revisions and to provide sufficient detail documenting the implementation of dust control measures required by Rule 310 and the dust control plan. Distribute sample log sheets with issued permits and conduct outreach to sources by December 2001.

    The first commitment addresses our concern that the existing opacity standard and test

method for earthmoving operations may not always be sufficient to control construction site dust to BACM levels. MCESD has already revised the opacity test method to deal partially with this concern (see Rule 310, Appendix C),[63] but we believe that additional standards/test methods are needed to fully assure that sources are effectively controlled.[64]

Field research is needed to identify an appropriate standard(s) and test method(s) to meet this commitment. Research on test methods for earthmoving sources has recently been conducted by Clark County. Clark County is planning to conduct a second phase of research. MCESD indicates in its commitment that it will contribute funding to these efforts.

The second commitment addresses our concern that the DCP lack specific criteria for dust suppressant application. For example, a source engaged in grading or cut-and-fill earthmoving for a multi-acre project may choose to comply with Rule 310 by applying water. However, neither the rule nor DCP establish minimum criteria for the number of water trucks/water application systems and water truck capacity for any given size construction site or a ratio of earthmoving equipment to water trucks. Also, for effective dust control, certain soil types may require substantial pre-wetting, thorough mixing of water into the soil for uniform penetration, and/or dust surfactant or tackifyer combined with water; neither Rule 310 nor DCP currently require such measures for any sites.

Establishing criteria for dust control is complicated by variations in soils, meteorological conditions, equipment size/use, project phase, and level of activity. All these factors can impact the amount of water (or other controls) needed to control fugitive dust on a particular site on a particular day, making it difficult to establish criteria that can be applied to all sites at all times.

The need for specific criteria lessens if a firm standard(s) is established to gauge source compliance (i.e., emphasis is placed on whether the standard is met, not on how it is met). Thus, if in meeting the first commitment, MCESD incorporates additional standards/tests into Rule 310 that increase the certainty of adequate control, this may lessen the necessity for detailed requirements on dust suppressant application and/or equipment. Even so, we anticipate that some new requirements will be necessary to ensure adequate control, particularly for sites where soils tend to have low water permeability and during the driest seasons. In meeting this commitment, MCESD should evaluate the following in addition to other possible requirements:

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[63] The opacity test method in Appendix C to determine compliance with the rule's 20 percent opacity standard for earthmoving operations has been better tailored towards the intermittent and mobile nature of these sources.

[64] For example, it is unclear whether the test method can be effectively used when dust plumes are generated by heavy vehicles in "turn-around" areas that may be only infrequently watered (if at all) and during bulk material collection/dumping.

C pre-wetting a minimum number of days prior to earthmoving operations and/or using a surfactant, tackifyer, or chemical/organic dust suppressant in combination with water for better permeability;

C adequate mixing of water into the soil across the entire disturbed area, including vehicle turn-around areas;

C a ratio of water truck equipment to earthmoving equipment and/or project size.

MCESD indicates that it will review the DCP form again based on the results of an ADOT project, which is expected to generate information on dust palliatives and mitigation measures, an environmental management system (EMS) project for construction, and any applicable projects from other PM-10 nonattainment areas.

MCESD's commitment also includes a program to work with on-site supervisors to assure that they obtain and review the DCP for their sites. In implementing Rule 310 during the last year, it found that site supervisors do not have or do not know what is in their DCP and thus may not be implementing appropriate dust control methods.

The third commitment addresses our concern that while Rule 310 currently contains an acceptable record keeping requirement, a more specific record keeping requirement would help improve compliance. Currently neither the rule nor DCP specify what information should be included in a daily log. MCESD has committed to revising and distributing to permitted sources daily record keeping log sheets to provide sufficient detail documenting the implementation of dust control measures. We believe that the log sheet should require the following type of information, in addition to other information on control measures implemented, to be completed by site owners/operators each work day:

- initial start and final stop time of wet suppression equipment for each work day;
- the frequency (e.g. record the date and time) when water tanks are refilled;
- if bulk material other than soil is stored or handled, a description of the type and cumulative volume of material;
- daily verification that the water truck(s) is/are operational or a statement to indicate the nature of the breakdown and steps taken to repair it/them;
- whether wind gusts or average wind speeds exceed 25 miles per hour and the source of this meteorological data.

MCESD indicates that the County drafted a record keeping form for public comment and held a stakeholder meeting in February 2001. See Letter, Al Brown, MCESD to Jack Broadbent, EPA, September 13, 2001. The stakeholders expressed concerns with the form and elected to try to develop their own draft form, which explains the delay in meeting the original deadline for this commitment. MCESD indicates it will continue to try to develop a sample record keeping form

that contains an appropriate level of detail, contains information on more than one day, and is in a format practical for use on a construction site. The Department will also review the sample record keeping form when the construction EMS project is complete.

We find that Rule 310 as adopted on February 16, 2000 and combined with the revised commitments adopted by MCESD on December 18, 2001 to make certain additional changes to the Rule, provide for the implementation of RACM and BACM on construction sites for the 24-hour and annual PM-10 standards. The rule is comprehensive in scope in that each dust source is subject to a set of requirements under Rule 310 (e.g. storage piles, dirt trackout, haul truck loads, disturbed areas, earthmoving operations).

Most Stringent Measures

With respect to the CAA's "most stringent measures" requirement, the Phoenix serious area plan identifies construction site fugitive dust measures either in or under consideration for inclusion in other SIPs. These measures are labeled under the categories:

- dust control plans for construction/land clearing
- dust control measures for material storage piles
- bulk material rapid stabilization
- traffic re-routing or rapid clean up of dust deposits on paved roads
- prohibition of work site unpaved haul roads/parking/staging areas
- traffic reduction/speed control plans for unpaved roads
- weed abatement operations
- require dust control plans for all grading permit activities
- implement high-wind condition BACM

See MSM Study, Table 1-2 and Table 3-1.

Most of the potential MSM are provisions in South Coast's fugitive dust Rule 403. The plan indicates that each of the South Coast and MCESD's rules are more stringent than the other in certain respects. MAG plan, p.10-35. The plan acknowledges that Rule 403 contains more stringent control measure requirements than imposed by Rule 310.[65] For example, Rule 403 requires that water be applied to soil not more than 15 minutes prior to moving the soil and requires open storage piles to be watered twice per hour or covered. However, the plan indicates that Rule 310's 20 percent opacity limit is generally more restrictive than Rule 403's property line

[65] This analysis, which is found in the MAG plan on p.10-35, was done before the 1999 and 2000 revisions to Rule 310 and Rule 310.01 which strengthened the rule.

standard.[66] MAG plan, p. 10-35. The Phoenix plan concludes that, on balance, Rule 310's construction site requirements are equally as stringent as Rule 403's requirements. MAG plan, p. 10-35. We agree with this conclusion. We note that MCESD has committed to research, develop and incorporate more specific requirements for dust suppression practices/equipment for construction activities into dust control plans and/or Rule 310. This work provides further assure that Rule 310 is as stringent if not more stringent than Rule 403.

The Phoenix serious area plan does not discuss any construction site measures from other areas as potentially more stringent measures. Based on our work with the Las Vegas area, we have identified requirements in Clark County Health District permits that are potentially more stringent than Maricopa County's measures.[67] These measures include requiring:

- stand tanks on projects that are 10 acres or more in size,
- an additional, separate water truck when using a trencher or when screening,
- a separate water truck or pull during landscaping,
- maintaining all stockpiles in a moist condition,
- stockpiles not to exceed 8 feet in height or be within 100 yards of any occupied existing structures
- all unpaved ingress/egress and interior roads to be watered, graveled, or treated with chemical dust suppressant regardless of vehicle usage,
- surfaces to be pre-soaked at least one day prior to rough grading or grubbing,
- specific aggregate and apron dimensions for gravel pads on projects 5 acres or larger,
- entrances/exits to be properly graded to prevent runoff from leaving the construction site
- additional conditions for earthmoving operations > 120 acres.[68]
- dust to be controlled 24 hours a day, 7 days a week

We find that Maricopa County's Rule 310 provisions are sufficiently consistent with Clark County's requirements to control dust 24 hours a day, 7 days a week and to install gravel pads at all site entrances/exits on projects 5 acres or larger. We also believe that Rule 310's provision that controls only need to be applied to unpaved haul roads with over 20 vehicle trips

[66] The plan indicates that a 20 percent opacity fugitive dust plume typically disperses to zero visibility within 50 feet downwind of a source. See MAG plan, p. 10-35.

[67] These requirements are not in Clark County's fugitive dust rule, but rather are required practices in dust control permits.

[68] For example, a maximum 3:1 ratio of earthmoving equipment to water truck/pull equipment is required.

per day is consistent with BACM and meets MSM.[69]

The remaining Clark County MSM discussed above are addressed by Maricopa County's second enforceable commitment to research, develop and incorporate additional requirements for dust suppression practices/equipment into Rule 310 and/or DCP. In order to fulfill its commitment, MCESD will need to adopt similar measures. Due to the variety of site conditions, Clark County could be selectively enforcing or selectively enforces these MSM because they are not or may not be appropriate in all circumstances. Therefore, we do not expect Maricopa County to adopt the MSM from Clark County permits at this time, until they can be further evaluated for sites in the Phoenix PM-10 nonattainment area and specified for inclusion in Rule 310 and/or DCP.

We have also identified a requirement in Imperial County Regulation VIII that is potentially more stringent than Maricopa County's measures. Imperial County Regulation VIII establishes the following requirement for bulk material handling/transfer:

- spray with water 15 minutes prior to handling and/or at points of transfer,
- chemical/physical stabilization, or
- protect from wind erosion by sheltering or enclosing the operation and transfer line.

While Maricopa County Rule 310 requires owners/operators to comply with a 20 percent opacity standard for any dust generating operation and dust control plans must include a control measure for every fugitive dust source (including bulk material handling/transfer), it does not contain specific requirements that are equivalent to the Imperial County requirements for this activity. However, watering 15 minutes prior to handling may be overly prescriptive and not necessary in all cases to meet the rule's performance standards. In researching information to meet its second enforceable commitment, should MCESD determine that watering within a specific time frame prior to handling bulk materials is necessary for some sites, this will presumably be incorporated into Dust Control Plans as warranted.

Overall, we find that Rule 310 combined with MCESD's commitments provide for the inclusion of MSM for construction sites. See Footnote ?.

This section prepared by Karen Irwin.

[69] South Coast Rule 403 contains this same low-use exemption.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR AGRICULTURAL SOURCES

Requirement:	CAA section 189(b)(1)(B): BACM must be applied to significant sources of PM-10. CAA section 188(e): Criterion 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State.
Action:	Approve
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010-42014 MSM: Section 3 of this TSD
***Primary Plan Cites*:**	MAG plan, pp. 7-153, 8-17, 10-36 through 10-37, 10-47 BMP plan
SIP Submittals:	ACC R18-2-610, *Definitions for R18-2-611* and ACC R18-2-611, *Agricultural PM-10 General Permit; Maricopa PM-10 Nonattainment Area* (collectively, BMP general permit)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies agricultural sources (including agricultural fields and aprons) as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-1.

Description of Agriculture Source Category

The agriculture source category covers all dust generating activities and sources on farms and ranches in the Maricopa nonattainment area. These activities and sources include land planning, tilling, harvesting, fallow fields, prepared fields, field aprons, and unpaved roads.

In 1996, there were approximately 600 growers farming approximately 300,000 acres of land in Maricopa County. An estimated 63 percent of the agricultural activity in Maricopa County occurred within the nonattainment area. Upland cotton (112,000 acres), alfalfa (54,000 acres), and durum wheat (45,000 acres) comprised over two-thirds of the crop acreage in Maricopa County during 1996. Cash receipts for crops grown in 1996 totaled over $440 million, ranking Maricopa County second in the state. See Arizona Statistics Service, August, 1997, p. 2. The area is characterized by very low rainfall (7 inches per year) and desert conditions.

Maricopa County is rapidly urbanizing with agricultural land being converted into other uses at an average rate of approximately 8,700 acres per year. BMP TSD, p. 1. As this urbanization continues to result in the withdrawal of land from agricultural production, the amount of PM-10 emissions associated with agricultural lands will decrease. The 1996 Farm Bill has also affected farming practices in the Maricopa County nonattainment area. See 16 U.S.C. 3801 et seq. After 1994, land which had been set-aside under a prior U.S. Department of Agriculture (USDA) program was placed in production, primarily alfalfa. See "Proposed Method to Account for Effects of the 1995 Farm Bill," Cathy Arthur, MAG, December, 1997. The switch from unplanted set-aside to planted alfalfa resulted in a relatively small decrease in PM-10 emissions because lands that were previously susceptible to disturbance and wind erosion would now be in a continuous cover crop, typically for a three-year period. Despite the conversion of agricultural lands to other uses and the small increase in agricultural land being put back into production, agricultural sources are expected to continue to contribute to PM-10

emissions for the foreseeable future, especially in relation to the 24-hour PM-10 standard.

Emissions from Agricultural Sources in the Phoenix Area

PM-10 emissions from agricultural windblown dust and agricultural dust account for 14.9 percent and 3.3 percent respectively of the 1995 Regional PM-10 Emissions Inventory. MAG TSD, Table II-1. In 2006, agricultural sources, without additional controls, are expected to contribute a total of 7.3 percent (6 percent windblown and 1.3 percent other) to the total uncontrolled inventory. MAG TSD, Table II-3.

For purposes of the 24-hour standard, PM-10 from agricultural fields and aprons accounts for 62 percent and 7 percent respectively of the microscale impact at the monitor on the 1995 design day for the West Chandler site, and PM-10 from agricultural aprons accounts for 45 percent of the microscale impact at the monitor on 1995 design day inventory for the Gilbert site. Microscale plan, pp. 19-20.

For purposes of both standards, the percentage of agricultural land going out of production by 2006 was determined to be approximately 37 percent. BMP TSD, p. 1.

Existing Controls

The State has adopted a best management practices general permit rule for agricultural sources at AAC R-18-2-610 and 6111 and submitted to the rule to us as a SIP revision. We approved the rule into the SIP on October 11, 2001 as meeting the RACM requirements of 189(a)(1)(C). 66 FR 51869.

Development of Agricultural BMP General Permit Rule

In November, 1997, EPA Region 9 staff traveled to Phoenix to begin a series of meetings with agricultural stakeholders regarding the need to address agricultural sources of PM-10 in the Agency's pending moderate area PM-10 federal implementation plan (FIP). These meetings led to a recommendation from the agricultural stakeholders for us to propose in the FIP that agricultural sources be addressed through a stakeholder-based effort to develop BMPs. We concurred with this recommendation, and in our FIP we included an enforceable commitment to develop BMPs sufficient to meet the Act's RACM requirement for agricultural sources. See 63 FR 41326, 41350.

On May 29, 1998, Arizona Governor Hull signed into law Senate Bill 1427 (SB 1427) which revised title 49 of the Arizona Revised Statutes (A.R.S.) by adding section 49-457. This

legislation established an Agricultural Best Management Practices committee[70] for the purpose of adopting by June 10, 2000, an agricultural general permit[71] specifying BMPs for regulated agricultural activities[72] to reduce PM-10 emissions in the Maricopa PM-10 nonattainment area. The Committee also was required to adopt and implement an education program by June 10, 2000, and affected agricultural sources are required to implement at least one BMP by December 31, 2001. A.R.S. 49-457.A-H, M.

On September 4, 1998, the State of Arizona submitted A.R.S. 49-457 to us as a revision to the Arizona SIP. On June 29, 1999, we approved the SIP revision under section 110(k)(3) of the CAA as meeting the requirements of sections 110(a) and RACM requirements in 189(a)(1)(C) and withdrew the FIP RACM commitment for such sources. A copy of A.R.S. 49-457 can be found in the docket for this rulemaking.

As directed by ARS 49-457, the Agricultural BMP Committee adopted the agricultural general permit and associated definitions, effective May 12, 2000, at Arizona Administrative Code (AAC) R18-2-610, "Definitions for R18-2-611," and 611, "Agricultural PM-10 General Permit; Maricopa PM10 Nonattainment Area" (collectively, general permit rule). On July 11, 2000, the State submitted AAC R18-2-610 and 611 as a revision to the Arizona SIP.

In addition to fulfilling the commitment in ARS 49-457, the July 2000 submittal was intended to partially satisfy the CAA's serious area PM-10 planning requirements. The State, however, indicated that documentation for the remaining requirements (a demonstration that the rule provided for the implementation of BACM and inclusion of MSM, documentation on its emission reductions and a demonstration that these emission reductions were sufficient for expeditious attainment of the 24-hour standard) would be submitted later. See letter, Richard

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[70] The Committee is composed of five local farmers, the Director of ADEQ, the Director of the Arizona Department of Agriculture, the State Conservationist for the United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) state office, the Dean of the University of Arizona's College of Agriculture, and a soil scientist from the University of Arizona.

[71] Subsection N.1 of ARS 49-457 defines "agricultural general permit" to mean: best management practices that: (a) reduce PM-10 particulate emissions from tillage practices and from harvesting on a commercial farm[;] (b) reduce PM-10 particulate emissions from those areas of a commercial farm that are not normally in crop production [;] (c) reduce PM-10 particulate emissions from those areas of a commercial farm that are normally in crop production including prior to plant emergence and when the land is not in crop production.

[72] "Regulated agricultural activities" are defined as "commercial farming practices that may produce PM-10 particulate emissions within the Maricopa PM-10 particulate nonattainment area." A.R.S. 49-457.N.4.

W. Tobin II, ADEQ, to Felicia Marcus, Regional Administrator, EPA, Region 9, July 11, 2000, Maricopa County PM10 State Implementation Plan Revision: Agricultural Best Management Practices.

On April 26, 2001, the State submitted this additional documentation as part of a draft revision to the 1999 serious area plan and requested parallel processing under 40 CFR part 51, appendix V, section 2.3.1., a procedure to expedite review of a state plan. See letter, Jacqueline E. Schafer, Director, ADEQ to Felicia Marcus, Regional Administrator, EPA, Region 9, April 26, 2001, Submittal of the Proposed State Implementation Plan revision for the Agricultural Best Management Practices program in the Maricopa County PM-10 Nonattainment Area. The State formally submitted the final revision to us on June 13, 2001. See See letter, Jacqueline E. Schafer, Director, ADEQ to Felicia Marcus, Regional Administrator, EPA, Region 9, June 13, 2001, Submittal of the State Implementation Plan revision for the Agricultural Best Management Practices program in the Maricopa County PM-10 Nonattainment Area. This submittal includes among other things, a description of the public education initiative for the general permit, quantification of the emission reductions from the general permit rule, and a demonstration that the CAA section 110 general requirements have been met for the rule. As stated above, we approved the general permit rule as meeting the requirements of 189(a)(1)(C) for RACM. 66 FR 51870.

Summary of general permit rule and public education initiative

The BMP general permit rule requires a commercial farmer[73] to implement by December 31, 2001 at least one BMP for three categories of emission sources: tillage and harvest, non-cropland, and cropland.[74] Table AG-1 lists the thirty-four BMPs approved by the BMP Committee as feasible, effective, and common sense practices that will reduce PM-10 emissions

[73] R18-2-610 defines commercial farmer as "an individual, entity, or joint operation in general control of 10 or more continuous acres of land used for agricultural purposes within the boundary of the Maricopa County PM10 nonattainment area."

[74] R18-2-610 defines tillage and harvest as "any mechanical practice that physically disturbs cropland or crops on a commercial farm." R18-2-610 defines non-cropland as "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." R18-2-610 defines cropland as "land on a commercial farm that: is within the time frame of final harvest to plant emergence; has been tilled in a prior year and is suitable for crop production, but is currently fallow; is a turn-row."

while minimizing negative economic impacts on local agriculture.[75]

For enforcement purposes, a commercial farmer is required to maintain a record demonstrating compliance with the general permit. A commercial farmer not in compliance with the general permit is subject to a series of compliance actions described in ARS 49-457.I-K.

TABLE AG-1
LIST OF BMPS IN THE AGRICULTURAL GENERAL PERMIT

CATEGORY	BEST MANAGEMENT PRACTICES
Tillage and Harvest Activities	Chemical Irrigation Combining Tractor Operations Equipment Modification Limited Activity During High-wind Event Multi-year Crop Planting Based on Soil Moisture Reduced Harvest Activity Reduced Tillage System Tillage Based on Soil Moisture, or Timing of Tillage Operation.
Non-Cropland	Access Restriction Aggregate Cover Artificial Wind Barrier Critical Area Planting Manure Application Reduced Vehicle Speed Synthetic Particulate Suppressant Track-out Control System Tree, Shrub, or Windbreak Planting, or Watering.

[75] R18-2-610 defines a BMP as "a technique verified by scientific research, that on a case-by-case basis is practical, economically feasible and effective in reducing PM-10 particulate emissions from a regulated agricultural activity."

TABLE AG-1 LIST OF BMPS IN THE AGRICULTURAL GENERAL PERMIT	
CATEGORY	**BEST MANAGEMENT PRACTICES**
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, or Tree, Shrub, or Windbreak Planting.

The BMP Committee developed and in June 2000 began implementing an Agricultural BMP General Permit Education Program to inform and educate the public and growers about the forthcoming general permit. As of July 2000 nine public presentations had been given in addition to the twenty-two public meetings held by the BMP Committee. These meetings included informational public workshops for growers held on February 20, 2001 and March 1, 2001. BMP TSD, pp. 31-33. The workshops focused on the purpose of the rule, the individual BMPs, record keeping requirements, and compliance options. ADEQ plans to hold an annual workshop to educate growers, inspectors, and interested stakeholders. Finally, in addition to the guide referenced above, the BMP Committee developed a brochure to inform the public and growers about PM-10 and the BMPs. See Governor's Agricultural BMP Committee, "How Agriculture is Improving Maricopa County's Air Quality," March, 2001.

The State's BACM Analysis

1. Initial identification of potential BACM for agricultural sources

The MAG plan, submitted in 2000, included discussions of PM-10 control strategies identified (pp. 5-66 to 5-72) and measures recommended in February, 1997 by the Maricopa County Farm Bureau (pp. 6-12 to 6-13). These recommended measures pre-date the BMP Committee's efforts and were included among the measures evaluated during the BMP process. A history of these potential measures is provided below. See also BMP TSD, pp. 9-14.

Identification of potential measures began when MAG hired Sierra Research to develop a list of control measures for consideration. See, Sierra Research, "Particulate Control Measure Feasibility Study," January 24, 1997. The 1997 Sierra Research study identified the following five potential PM-10 control requirements for agricultural sources:

- Soil conservation requirements of the U.S. Food Security Act.
- Restrictions on tilling or soil mulching during high wind events.
- Fallow treatment (cover crop or grass revegetation of irrigated fields, maintenance of crop residues on non-irrigated fields, mowing for weed control).
- Require comprehensive dust control plans for farms larger than 640 acres (including surface treatment, vegetative cover, and windbreaks).
- Reduce emissions of ammonia and nitrates from agricultural operations.

1997 Sierra Research Study, Table 1-2.

As a next step in selecting BACM, MAG evaluated various control measures to develop a more comprehensive list of potential BACM. MAG utilized the Sierra Research study, the Governor's Air Quality Task Force,[76] previous MAG plans, air quality plans from other nonattainment areas, and other sources to identify the following draft comprehensive list of potential control requirements for agricultural:

- Cover crops - planting alternative crops during fallow period.
- Vegetation establishment - conversion of crops to grassland or trees on land not suitable for continuous cropping.
- Windbreaks - planting trees or grass perpendicular to the prevailing wind.
- Restrictions on tilling or mulching during high wind events.
- Reduce emissions of ammonia and nitrates from agricultural operations.
- Provide for burial of whole stalks during lowdown (if research documents no increase in spread of plant disease or pests from this practice).
- Require comprehensive dust control plans for farms larger than 640 acres - including windbreaks, maintenance of crop residues on non-irrigated fields, mowing for weed control.
- Soil conservation requirements of the U.S. Food Security Act.

MAG plan, p. 5-5 and Table 5-2.

To select the final list of BACM control requirements, MAG worked with stakeholders to review the potential agricultural measures. As a result of input from the Maricopa County Farm

[76] See [Arizona] Governor's Air Quality Task Force, *Report of the [Arizona] Governor's Air Quality Task Force*, December 2, 1998.

Bureau, the list was revised to include the following potential requirements:

- Incentives and credits for use of improved agricultural practices.
- Tilling restrictions on high wind days and tillage irrigation where feasible.
- Reduce emissions of ammonia and nitrates from agricultural operations.
- Cooperative development of management practices to reduce emissions from agricultural activities.
- Deep furrowing of fallow fields.
- Provide burial of whole stalks during lowdown.

MAG plan, pp. 6-13 to 6-14.

For the Microscale plan, ADEQ determined assistance was needed to evaluate additional reduction strategies to address the short-term impacts of agricultural sources. In order to identify potential agricultural control requirements to address the 24-hour standard at the West Chandler and Gilbert sites, ADEQ contracted ENSR to identify potential controls. The effort consisted of identifying agricultural control requirements, including a survey of nonattainment areas in the west, and an exhaustive study of the effectiveness of the controls. The ENSR report identified the potential agricultural control requirements listed below. See ENSR, "Evaluation of Fugitive Dust Control in the Maricopa County PM-10 Nonattainment Area," March 1997, found in Appendix B to the Microscale plan.

For windblown dust from agricultural fields:

- Tree windbreaks
- Conservation tillage practices, such as leaving vegetative cover between crops
- Sprinkler irrigation to maintain crust on surface

For windblown dust from agricultural aprons:

- Wind fence
- Tree windbreaks
- Mulch or vegetative cover
- Chemical stabilizers.

ENSR Report, p. 4-8.

ENSR also noted that agencies are generally restricted by state law from requiring agricultural operations to obtain air quality permits but that the South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Unified Air Pollution Control District did have or were planning to implement agricultural related control programs. ENSR Report, p.3-2.

2. Identification of BACM by the BMP Committee

In September 1998, the Agricultural BMP Committee was established for the purpose of developing an agricultural general permit specifying the implementation of BMPs. BMP TSD, p. 4. The BMP Committee established an Ad-hoc Technical Group to develop a comprehensive list of potential BMPs for regulated sources in the Maricopa nonattainment area. Participants on the Ad-hoc Group included the USDA NRCS, USDA Agricultural Research Service, University of Arizona College of Agriculture, ADEQ, University of Arizona College of Agriculture and Cooperative Extension, Western Growers Association, Arizona Cotton Growers Association, Arizona Farm Bureau Federation, and EPA. BMP TSD, p. 15.

The Ad-hoc Technical Group reviewed available dust control regulations, literature, and technical documents, and developed a list of conservation practices potentially suitable to agricultural sources in the Maricopa County nonattainment area. The information sources evaluated are listed below in Table AG-2.[77]

[77] Potential BACM control requirements previously identified for consideration (i.e., in the 1997 Sierra Research study, 1997 ENSR Report, and Revised MAG 1999 Plan) were included within the comprehensive list of BMP's evaluated by the Committee.

TABLE AG-2
PRIMARY INFORMATION SOURCES USED TO DEVELOP A LIST OF CONSERVATION PRACTICES WITH POTENTIAL APPLICABILITY IN MARICOPA COUNTY

NRCS Field Office Technical Guide.

South Coast Air Quality Management District
Rule 403 (fugitive dust) Agricultural Handbook.

San Joaquin Valley Unified Air Pollution Control District
1997 PM-10 Attainment Demonstration Plan.

University of Arizona Cooperative Extension
Mojave Valley research project

University of Washington Columbia Plateau research project.

ENSR Report: Evaluation of Fugitive Dust Control in the
Maricopa County PM-10 Nonattainment Area. March 1997.

From a review of these information sources, 65 potential practices were selected for further consideration. BMP TSD, p. 16. These 65 practices represented a broad spectrum of potential BMPs, many of which related to conservation practices used in the western United States that had never been evaluated in the context of reducing PM-10. This list represented potential practices to be considered in determining which could actually be implemented in the Phoenix area.

The Agricultural BMP Committee thoroughly reviewed the potential practices presented by the Ad-hoc Technical Group and evaluated them using the available information on technological feasibility, costs, and energy and environmental impacts. After an analysis of the limited information available and numerous public discussions, the Committee decided to include 34 of the 65 BMPs in the general permit rule and divided these 34 BMPs into the three categories of farm activities specified in A.R.S. 49-457.N: 10 BMPs were applicable to the Tillage and Harvest category; 10 BMPs were applicable to the Non-Cropland category; and 14 BMPs were applicable to the Cropland category. See BMP TSD, 17. In selecting these BMPs, the Committee deemed them to be feasible, effective and common sense practices for PM-10 emissions in the Phoenix area which minimized potential negative impacts on local agriculture.

Of the 31 potential BMPs eliminated, the majority were dropped because they either duplicated another BMP or did not reduce PM-10. Other reasons for elimination included the impracticability of a BMP for the Maricopa County Area, lack of cost effectiveness, or infeasibility of implementation. See June 13, 2001 BMP submittal, Enclosure 3, Attachment 8. Examples of how potential BMPs were eliminated for these reasons are provided below:

(1) *No identifiable relation to PM-10 emission reductions.* For example, the original list of potential BMPs developed by the Ad-hoc Technical Committee included a potential BMP for tree/shrub pruning. Although the tree/shrub pruning might qualify as a BMP for some agricultural activities, it would not reduce PM-10; therefore, tree/shrub pruning was dropped.

(2) *Duplication.* Many similar BMPs were combined into a single BMP. For example, the original list of potential BMPs included numerous practices that relate to creating a barrier to reduce the impact of wind on disturbed soils, e.g., tree/shrub establishment, windbreak/shelterbelt establishment, windbreak/shelterbelt renovation, hedgerow plating, herbaceous wind barriers. These practices were combined into a single BMP: tree, shrub, or windbreak planting.

(3) *Impracticability to Maricopa County farming or implementation infeasibility.* Some of the potential BMPs were determined to be impractical or infeasible. For example, the original list included Wildlife Upland Habitat Management. This conservation practice is intended to create, maintain, or enhance habitat suitable to sustaining desired kinds of upland wildlife.[78] Although evaluated as a potential BMP, it was determined to be impracticable for Maricopa County given that the agricultural sources in question are not located in an area suitable for upland wildlife.

At the time the BMP Committee was developing the general permit rule, there was very limited information available concerning technological feasibility, costs, and energy and environmental impacts. Although the Committee determined that all the selected BMPs were technologically-feasible control requirements, it found that calculating the other impacts on a commercial farmer was difficult. Because of the variety, complexity, and uniqueness of farming operations in Maricopa County, the Committee concluded that farmers need a variety of BMPs in each of the three categories of agricultural activities to choose from in order to tailor an effective PM-10 controls to their individual circumstances.

Further, the BMP Committee acknowledged that there is a limited amount of scientific information available concerning the emission reduction and cost effectiveness of some BMPs, especially in relation to Maricopa County. The BMP Committee balanced this limited scientific

[78] USDA NRCS, Arizona; Conservation Practice Summary; Air Quality (cropland - irrigated), FOTG Section IV, November, 1998.

cost effectiveness information with the common sense recognition that the BMPs would reduce wind erosion and the entrainment of agricultural soils, thereby reducing PM-10. As a result, and given the myriad factors that affect farming operations, the BMP Committee concluded that requiring more than one BMP for each of the three agricultural categories could not be considered technologically justified and could cause an unnecessary economic burden to farmers. Instead, the BMP Committee and ADEQ committed to monitor the effectiveness of the BMPs and adjust the program, if needed, in the future. BMP TSD, p. 18.

The State's Most Stringent Measure Analysis

The South Coast Air Basin (SCAB) in California is the only other PM-10 nonattainment area in the nation that is currently requiring agricultural sources to reduce PM-10 emissions. The SCAB includes the agricultural areas of western Riverside County and the Coachella Valley for which the SCAQMD has adopted Rules 403.1 and 403 to reduce PM-10 emissions from agricultural sources. These rules, respectively, require cessation of tilling on high winds days and soil erosion plans and represent the potential MSM for agricultural sources identified by the State. MSM study, pp. 4-21 to 4-24 and pp. 4-30 to 4-32.

1. South Coast's Rule 403.1 (Wind Entrainment of Fugitive Dust)

South Coast's 403.1, "Wind Entrainment of Fugitive Dust," applies only in the Coachella Valley (Palm Springs) portion of the SCAB and requires that, when wind speeds exceed 25 miles per hour (mph), agricultural tilling and soil mulching activities should cease. While the measure applies throughout the year, the high wind days tend to occur during the period between April and June. The Coachella Valley typically experiences high winds on 47 days of the year. MSM study, pp. 4-23. In contrast, MAG estimated that there were a total of 37 hours, representing 11 days, with wind speeds greater than 15 mph in 1995 in Maricopa County. MAG TSD, Appendix II, Exhibit 7, p. 2.

Emissions from tilling are a very small contributor to total agricultural emissions on the 1995 design day (which was a high-wind day), representing just 1.6 percent of all agricultural emissions. Ag Quantification TSD, p. 3-11. According to an analysis by Sierra Research, postponing tilling on high wind days would reduce emissions by 72 percent on high-wind days. MSM study, p. 4-23. However, because only 15 percent of the tilling in the Phoenix area occurs during the area's high wind season (March through September) and because less than 4 percent of the days during this period experience winds greater than 15 mph, the air quality benefits of the measure would be small (i.e, 0.08 metric tons per average annual day in 1995) for the annual standard. MSM study, p. 4-23.

The BMP general permit rule does include "limited activity during high wind event" as one of ten BMPs that a grower can choose for the Tillage and Harvest category. Based on the limited amount of information available regarding the control efficiencies for the ten BMPs in

the Tillage and Harvest category, the control efficiency for "limited activity during high-wind event" is on average as effective or less effective than the other BMPs in this category. Ag Quantification TSD, pp. 2-8 to 2-10. See also, page 448.

2. South Coast's Rule 403 (Fugitive Dust)

South Coast's Rule 403, "Fugitive Dust," requires the implementation of conservation practices to reduce PM-10 from agricultural sources. Under Rule 403(h), agricultural operations exceeding 10 acres within the SCAB are exempt from the rule's requirements for fugitive dust if the farmer implements the conservation practices in the most recent Rule 403 Agricultural Handbook. See "Rule 403 Agricultural Handbook: Measures to Reduce Dust from Agricultural Operations in the South Coast Air Basin," South Coast AQMD, December 1998 (the Handbook). Because the requirements of Rule 403 are more stringent than the practices in the Handbook, it is assumed that farmers will always choose to comply with the latter's provisions. Thus the Handbook, rather than Rule 403 itself, is appropriately evaluated as a potential most stringent measure.

For a variety of reasons, it is difficult to directly compare the requirements in the general permit with the practices in the Handbook. First, the South Coast did not attempt to estimate the reductions and cost from each conservation practice included in its June 1999 "Guide to Agricultural PM10 Dust Control Practices" so we are unable to evaluate their effect on agricultural emissions.[79] Second, the types of crops grown in Maricopa County and the South Coast area differ significantly. For example, cotton is a dominant crop in Maricopa County but is not grown in the SCAB and thus its requirements are not directly transferable to the Phoenix area. Third, the Handbook allows a grower to substitute a local ordinance for the three conservation practices required for "inactive" agricultural land; however, the minimum requirements for the local ordinance are not specified. Handbook, section II, p.4. Finally, the general permit rule and the Handbook also differ in terms of exemption and waivers. The general permit rule does not exempt any crop types or provide a waiver option, but the Handbook exempts orchards, vine crops, nurseries, range land, and irrigated pastures from requiring a practice for the active and inactive categories and allows farmers to request a waiver if the farmer cannot apply the required practices or a verifiable alternative.

Although the general permit rule divides agricultural activities into three categories and the Handbook divides them into six and the terminology used is different, the categories of activities covered are essentially coterminous. Cf. Handbook, section I and ACC R18-2-610.7., 12, .22, .33. However, depending on the type of farming operation, the general permit rule

[79] In June 1999, South Coast published its "Guide To Agricultural PM10 Dust Control Practices." The guide contained the same practices described in the Handbook, but also included photographs and additional information to educate growers about practices to reduce PM10.

would require
implementation of at least one BMP for each of the Tillage and Harvest, Cropland, and Non-Cropland categories and the Handbook requires one practice in 5 categories and 3 in the final category.

In assessing South Coast's requirements for the purpose of developing the BMP general permit rule to meet the CAA's BACM requirements, the BMP Committee and ADEQ determined that because of the lack of adequate technical information concerning BMP costs and effectiveness, requiring at least one BMP for the three agricultural categories adequately addressed agricultural sources for the agricultural sources of PM-10 in the Maricopa County nonattainment area. ADEQ concluded that:

> The agricultural general permit cannot mirror South Coast Rule 403 for a variety of reasons. One main reason is that agriculture in Maricopa area is primarily flood irrigated. The South Coast has dryland, irrigated, and sprinkler irrigated agriculture. The actual amount of irrigation water and frequency of irrigation can effect wind erosion estimates and the effectiveness of different control measures under different conditions. Therefore, the BMPs for Maricopa County were based on practical applications during those times when the fields were not flooded. Also, because the application of more than one BMP at a time for a selected category would only provide incremental PM-10 reductions, sometimes at an uneconomical cost, flexibility was provided in the rule to allow the expert (the farmer) to decide what BMP should be applied when and where.

See BMP TSD, p. 27.

As we discussed in the proposal for the 24-hour standard (see 66 FR 50252, 50268) and as we concluded in our original FIP measure for the agricultural sector (63 FR 41332), the BMP Committee found that agricultural PM-10 strategies must be based on *local* factors because of the variety, complexity, and uniqueness of farming operations and because agricultural sources vary by factors such as regional climate, soil type, growing season, crop type, water availability, and relation to urban centers.

While the Committee surveyed measures adopted in other geographic areas, these measures were of limited utility in determining what measures are available for the Maricopa County area. Given the limited scientific information available and the myriad factors that affect farming operations, the BMP Committee concluded that requiring more than one BMP could not be considered technologically justified and could cause an unnecessary economic burden to farmers.

Adding to concerns about the economic feasibility of requiring more BMPs per farming activity is the general uncertainty regarding the cost of the BMPs and continued viability of

agriculture in Maricopa County. Between 1987 and 1997, the number of farms operating in Maricopa County declined by approximately 30 percent and the amount of land farmed declined by approximately 50 percent. This trend is expected to continue. Finally, in order to justify additional requirements for farming operations in the area beyond those in the general permit rule, the BMP Committee determined that a significant influx of money and additional research would be needed.

Based on all of these factors, the BMP Committee concluded that the Handbook's practices were neither technologically nor economically feasible for agricultural sources in Maricopa County and therefore are not feasible for the Phoenix area. BMP TSD, p. 18.

Does the Plan meet the statutory and policy requirements?

For the reasons discussed below, we find that the State's BMP general permit rule meets the CAA's section 189(b)(1)(B) and in section 188(e) requirements to provide for the implementation of BACM by June 10, 2000 and for the inclusion of MSM.[80]

BACM

The general permit rule, as finally adopted by the BMP Committee in May 2000 as BACM and MSM, requires that commercial farmers implement at least one BMP for the tillage and harvest, cropland, and non-cropland categories by December 31, 2001.

We define a BACM-level of control to be, among other things, the maximum degree of emission reduction achievable from a source or source category which is determined on a case-by-case basis, considering energy, economic and environmental impacts. *Addendum* at 42010. Based on the BMP Committee's findings regarding technological feasibility and economic effects of requiring more than one BMP per category, we believe that the BMP rule provides the maximum degree of emission reductions achievable from the agriculture source category in the Phoenix area and, therefore, meets the BACM requirement in section 189(b)(1)(B).

[80] As noted previously, we have already approved the BMP general permit rule as meeting the RACM requirement in CAA section 189(a)(1)(C). In the proposal for that action, we stated our belief "that the general permit rule represents a comprehensive, sensible approach that meets, and in fact far exceeds, the RACM requirements of CAA section 189(a)(1)(C) and EPA guidance interpreting those requirements." 66 FR 34598, 34602. Moreover, we explained that the State also intended the general permit rule and its enabling legislation to meet the CAA's serious area requirements. 66 FR 34598, 34599. Thus today's finding that the general permit rule meets the BACM and MSM requirements of the Act is consistent with our prior action.

The general permit rule allows a farmer to choose from a list of BMP options in each activity category. We believe that this approach represents an acceptable form for the implementation of BACM. A requirement that an individual source select one control method from a list but allowing the source to select which is most appropriate for its situation, is a common and accepted practice for the control of fugitive dust. For example, the general permit rule follows the same general control format as Rules 310 and 310.01. This format allows the regulated entity (e.g., construction site operator, vacant lot owner, unpaved parking lot owner, etc.) to choose from a list of options for controlling its source.[81] For example, an unpaved parking lot owner may pave, gravel, or apply a chemical stabilizer. See Rule 310.01, section 303.1.[82] This control format has developed over time because of the need to impose effective but reasonable and feasible controls on a large number of similar but distinct sources.

Allowing sources the discretion to choose from a range of specified options is particularly important for the agricultural sector because of the variable nature of farming. As a technical matter, neither we nor the State is in a position to dictate what precise control method is appropriate for a given farm activity at a given time in a given locale. The decision as to which control method from an array of methods is appropriate is best left to the individual farmer. Moreover, the economic circumstances of farmers vary considerably. As a result, it is imperative that flexibility be built into any PM-10 control measure for the agricultural source category.

We believe that the work of the BMP Committee resulted in the timely adoption of the general permit and educational programs that requires BACM implementation on a schedule that will allow time for the agricultural community to understand and select appropriate BMPs and to transition to new practices, some of which may involve the purchase of new equipment. As

[81] This control format is also used in South Coast's fugitive dust rules, including Rules 403, 403.1, and 1186. We approved these rules on December 9, 1998 (63 FR 67784).

[82] See also South Coast Rule 403 (providing for alternative compliance mechanisms for the control of fugitive dust from earthmoving, disturbed surface areas, unpaved roads etc.); and South Coast Rule 1186 (requiring owners/operators of certain unpaved roads the option to pave, chemically stabilize, or install signage, speed bumps or maintain roadways to inhibit speeds greater than 15 mph). We proposed to approve these South Coast rules as meeting the RACM and/or BACM requirements of the CAA on August 11, 1998 (63 FR 42786) and took final action approving them on December 9, 1998 (63 FR 67784). See also the approval of MCESD Rule 310 as meeting the RACM/BACM requirements (62 FR 41856, August 4, 1997) and the proposal to approve updated Rule 310 and MCESD Rule 310.01 as meeting the same requirements (65 FR 19964, April 13, 2000).

noted before, the BMP Committee started its education and outreach program in June 2000.[83] Based on these factors, we believe that the BMP implementation schedule is as expeditious as practicable and meets the BACM implementation deadline for the Phoenix area of June 10, 2000.

The development of the general permit rule was a multi-year endeavor involving an array of experts in agricultural practices. These experts considered key local factors, such as regional climate, soil type, growing season, crop type, water availability, and relation to urban centers, in the development of the general permit rule. Based on the available scientific and cost information, we believe that the general permit rule represents a comprehensive, sensible approach that meets the requirement to provide for the implementation of BACM for both the 24-hour and annual standard as required by CAA section 189(a)(1)(C) and our guidance interpreting those requirements. See also, p. 450.

Most Stringent Measures

The Phoenix serious area plan identified just two potentially more stringent measures: South Coast's agricultural control program in Rule 403 and the Handbook and the cessation of tilling on high wind day in South Coast's Rule 403.1.

As discussed above, the BMP Committee concluded that the South Coast agricultural control measure as reflected in the Handbook was neither technologically nor economically feasible for agricultural sources in Maricopa County and therefore are not feasible for the Phoenix area. BMP TSD, p. 18. We agree with the analysis of the BMP Committee. The development of the general permit rule was a multi-year endeavor involving an array of agricultural experts familiar with Maricopa County agriculture who considered all available data before reaching its conclusion.

Arizona has provided a reasonable justification for not requiring cessation of tilling during high wind events. In the Microscale plan, the State shows that it was windblown dust from an already tilled agricultural field and not the active tilling of that field that contributed to the 24-hour exceedance at West Chandler. See Microscale plan, pp. 16. In the serious area plan, the State demonstrates that the BMP general permit rule as adopted in combination with other adopted measures provides for expeditious attainment of the 24-hour PM-10 standard in the Phoenix area and is not necessary for expeditious attainment of the annual standard in the area. Finally, the State through its BMP committee has determined that the requirement for one BMP per category is the most effective economically and technologically feasible control measure for

[83] This is consistent with EPA guidance. For measures that cannot be implemented in their entirety prior to the BACM implementation deadline, the *Addendum* at 42014 suggests that the BACM might be defined to change over time from a more limited set of measures at the initial implementation date to progressively tighter or more ambitious program at later dates.

agricultural sources in the Phoenix area. Given all of this, the State has reasonably declined to mandate the cessation of tilling during high winds when faced with an absence of data that it would be make the BMP rule more effective.

Because all the identified potential MSM have either not been demonstrated to be more stringent than existing Maricopa County controls or found to be infeasible for the area, we find that the Phoenix serious area plan provides for the inclusion of MSM as required by CAA section 188(e) to our satisfaction.

Quantification of the Emission Reductions from the BMP General Permit Rule

ADEQ contracted URS to assist in determining the expected reductions from the general permit rule. URS report is found in Enclosure 3, Attachment 5 of the June 13, 2001 SIP submittal.

The process URS used to develop an emission reduction estimate for the general permit rule is:

1. Determine applicability of each BMP to the major crops in Maricopa County;
2. Rank the BMPs based upon their likelihood of use for each major crop;
3. Determine control efficiencies for individual BMPs; and
4. Estimate emission reductions from application of BMPs.

Factors influencing which the applicability of any given BMP to a given crop include technical feasibility and crop switching . Ag Quantification TSD, p. 2-5. BMP applicability is shown in Table 2-1 in the Ag Quantification TSD.

USR asked members of the agricultural community to rank each BMP within each activity category on a scale from 1 to 10 from most-likely to least-likely to be implemented. Factors influencing the likelihood of implementation are economic feasibility, the ability to achieve the greatest amount of PM-10 reductions, and farm ownership. Ag Quantification TSD, p. 2-5. Rankings are shown in Table 2-2 in the Ag Quantification TSD.

USR reviewed a wide range of documents to determine control efficiencies for the BMPs. Ag Quantification TSD, Appendix A. The estimated emission reductions from individual BMPs vary widely. See Ag Quantification TSD, Table 2-2. For example, USR identified nine studies that included an estimate of the control efficiency when applying a reduced tillage system. The reductions ranged from 25-100 percent. For BMP with ranges of control efficiencies, a maximum, minimum, and mid-point control efficiency were established. Finally, the net maximum, minimum, and mid-point control efficiencies were calculated for each BMP by combining the researched control efficiency, a 80 percent compliance rate, and the relevancy factor (that is, the percent of farmers that will use the given BMP that was established in step 2).

See Ag Quantification TSD, Table 2-3.

Finally, for each agricultural activity, the net maximum, minimum, and mid-point control efficiencies were applied to design-day (April 9, 1995) emission estimates, adjusted for a 37 percent loss in agricultural lands between 1995 to 2006. The result is the estimated maximum, minimum, and mid-point emission reductions from the general permit rule for 2006. See Ag Quantification TSD, Table 4-2. The mid-point emission reductions were used for the 24-hour standard attainment demonstration. Ag Quantification TSD, p. 4-5.

The agriculture source category is widely diverse, with many types of emission sources. Also diverse are the control requirements that can be applied to these emission sources. Given this context, the approach taken in the Phoenix serious area plan to calculate the emission reductions from the agricultural general permit rule (especially, the proportioning of emission reduction from each BMP based on the likelihood of its use) is appropriate and consistent with how emission reductions are estimated from other fugitive dust rules where there are multiply compliance options. See also, p. 453.

This section prepared by John Ungvarsky, Jan Taradash, and Frances Wicher.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR RESIDENTIAL WOOD COMBUSTION

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area
Action:	Approval
Proposal Cite:	Annual standard: 65 at 19982 24-Hour standard: 66 at 50271
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010-42014 MSM: Section 3 of this TSD *Technical Information Document for Residential Wood Combustion Best Available Control Measures*, EPA-450/2-92-002 (September 1992)
Primary Plan Cites:	Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies residential wood combustion as a significant source of PM-10 in the Phoenix area. MAG Plan, Table 9-1.

Description of Residential Wood Combustion Source Category

The residential wood combustion (RWC) category includes emissions from the burning of solid fuel in residential fireplaces and woodstoves as well as barbecues and firepits. 1994 Regional PM-10 Inventory, p. 4-1.

Emissions from Residential Wood Combustion in the Phoenix Area

Residential woodburning contributes 0.87 metric tons per average annual day or 0.6 percent of the total directly-emitted, non-windblown 1994 PM-10 inventory (1994 Regional Inventory, Table 2-3) and 0.7 percent of the 2006 pre-control total (including windblown) PM-10 inventory (MAG TSD, Table II-3). Residential woodburning contributes more to the overall inventory during the winter months. Total uncontrolled woodburning emissions increase by more than 40 percent from 1995 to 2006. MAG TSD, Tables II-1 and II-3.

Existing controls

1. National controls

Nationally, we have established PM-10 emission limits for new woodstoves and fireplace inserts. All woodstoves manufactured on or after July 1, 1990, or sold on or after July 1, 1992 must meet Phase II emission limits. (See Standards of Performance for New Residential Wood Heaters, 40 CFR part 60, subpart AAA.)

2. Local controls

MCESD Rule 318 "Approval of Residential Woodburning Devices" (revised April 21, 1999) and Residential Woodburning Restriction Ordinance (revised November 17, 1999) implement a mandatory woodburning curtailment program. The curtailment program restricts the types of woodburning devices that can be used during periods of high PM-10 concentrations. We approved Rule 318 and an earlier version of the ordinance (revised April 21, 1999) into the SIP as RACM. See 64 FR 60678 (November 8, 1999). Rule 318 establishes standards for the approval of residential woodburning devices that can be used during restricted-burn periods. The SIP-approved ordinance provides that restricted-burn periods are declared by the Control Officer when the Control Officer determines that air pollution levels could exceed the CO standard and/or the PM standard (150 $\mu g/m^3$). MCESD revised the ordinance on November 17, 1999 to allow the Control Officer to declare restricted-burn periods when the particulate matter pollution levels could exceed the "particulate matter no-burn standard"of 120 $\mu g/m^3$.

Does the plan meet the statutory and policy requirements?

Suggested Measure List for BACM and MSM Analysis

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for residential wood combustion including potential most stringent measures from other States as well as provides information on their technological feasibility, costs, and energy impacts when appropriate.

The suggested measures in the Phoenix serious area plan for controlling emissions from residential wood combustion are listed in Table RWC-1.

New Controls in the Plan and Justifications for Rejecting Potential Controls.

As demonstrated in Table RWC-1, the overall residential woodburning restriction program is strengthened and goes beyond the existing program, which we have previously found to provide for the implementation of RACM . See 64 FR 60678 (November 8, 1999). Both strengthening and expanding existing programs are criteria for demonstrating the implementation of BACM. See *Addendum* at 42013. Where the Phoenix serious area plan has rejected potential BACM, it provides a reasoned justification for the rejection. Therefore, we find that the Phoenix serious area plan provides for the implementation of RACM and BACM as required by CAA sections 189(a)(1)(C) and 189(b)(1)(B).

The Phoenix serious area plan identified a number of potential MSM for residential wood combustion. See RWC-1. The plan does not provide for the adoption of any of these measures but provides reasoned and acceptable justifications for their rejection. Therefore, we find that the Phoenix serious area plan provides for the inclusion of MSM as required by CAA section 188(e) for areas requesting an extension of the attainment date.

1. Approval of Residential Woodburning Restriction Ordinance

On November 17, 1999, Maricopa County revised its woodburning ordinance to lower the criteria for declaring a restricted-burn period. As revised, the Control Officer will declare a restricted-burn period when particulate matter pollution levels could exceed 120 $\mu g/m^3$. ("particulate matter no-burn standard"). Arizona submitted the revised ordinance as a SIP revision on January 28, 2000. We found it complete on March 31, 2000. This submitted ordinance is more stringent than the version of the ordinance that we approved into the SIP on November 8, 1999. See 64 FR 60678. We are approving it as part of this action.

The BACM guidance for RWC suggests that a curtailment program be implemented in two stages where the woodburning restrictions are less severe in the first stage, which is called at lower PM levels. In the first stage, the program could allow exemptions for EPA-certified stoves or equivalent, sole source of heat, and low-income households. In the second stage, exemptions should be limited to low-income households. Maricopa's current program is a single stage program that allows the use of EPA-certified stoves or equivalent during curtailment periods and provides for sole source of heat and inadequate alternate source of heat exemptions.

TABLE RWC-1
ANALYSIS OF BACM AND MSM FOR RESIDENTIAL WOOD COMBUSTION

SUGGESTED MEASURE	ADOPTED? IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
SUGGESTED BACM		
Public awareness and education	Yes	MCESD established a Public Information Program and developed a booklet and brochure to inform the public about pollution from residential wood combustion. The County is also coordinating with the Regional Public Transportation Authority's High Pollution Advisory program. The County allocates $30,000 to the woodburning program including the public information program. RPTA uses its existing funding. See MAG Plan, pp. 7-64 to 7-66. Maricopa County Commitment, measure 8 and RPTA commitment, measure 97-TC-15.
Mandatory curtailment during predicted periods of high PM-10 concentrations	Yes (partial)	MCESD has adopted Rule 318 (Approval of Residential Woodburning Devices) and the Residential Woodburning Restriction Ordinance which implement a mandatory curtailment program that restricts the types of woodburning devices that can be used during periods of high PM-10 concentrations. The curtailment program is a single stage program that prohibits the operation of unapproved woodburning devices when the Control Officer determines that PM levels could exceed the "particulate matter no-burn standard" of 120 $\mu g/m^3$. The Control Officer may grant

TABLE RWC-1
ANALYSIS OF BACM AND MSM FOR RESIDENTIAL WOOD COMBUSTION

SUGGESTED MEASURE	ADOPTED? IF NO, OK?		DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
			exemptions for sole source of heat (permanent, temporary, or emergency) and for inadequate alternate source of heat. Approved woodburning devices (EPA-certified, Phase II wood stoves or equivalent, pellet stoves, and gas burning devices) may be operated during restricted-burn periods.
All new stove installations EPA-certified, Phase II stoves or equivalent	Yes		A.R.S. 9-500.16 and A.R.S. 11-875 (1998) require cities and the County to adopt by December 31, 1998, an ordinance that prohibits the installation or construction of a fireplace or wood stove unless it is a fireplace with a permanently installed gas or electric log insert, a fireplace or wood stove that meets EPA's Phase II wood stove requirements, or a fireplace with a wood stove insert that meets EPA's Phase II stove requirements. Most jurisdiction have adopted or have committed to or indicated that State law requires them to adopt the required ordinance. Funding is provided through annual budget process and enforced through the building permits and code. See MAG Plan, pp, 7-55 to 7-64.
Measures to improve woodburning performance: firewood moisture limit, weatherization of homes, opacity limit	Yes (partial)		Maricopa County's Residential Woodburning Restriction Ordinance prohibits the burning of inappropriate fuel, including wood with a moisture content of greater than 30 percent. Reasons for rejecting weatherization measure are not given. However, MCESD has indicated that residential wood combustion in Maricopa County is for ornamental and not heating purposes (Justification for Non-implementation for MAG 1998 Plan). For this reason, a weatherization program would probably not result in decreased wood combustion. During restricted-burn periods, the ordinance prohibits visible emissions to the atmosphere after 20 consecutive minutes immediately following an ignition of or a refueling of an exempt or approved woodburning device.
Inducement to retrofit existing fireplaces and uncertified wood stoves	Yes		A.R.S. 43-1027 allows for a tax deduction of up to $500 for the conversion of an existing woodburning fireplace to a clean burning wood stove or gas-fired fireplace.
Requirement to retrofit existing fireplaces and uncertified wood stoves	No	Yes	This program has a high cost for a very limited potential emission reduction (estimated to be less than 0.49 mtpd). The requirements for new fireplace and wood stove installations and the mandatory curtailment program limit the potential air quality benefits from this measure. Measure would also be difficult to enforce given the number of residences that would need to be inspected for compliance (~300K). Maricopa County commitments, justification for non-implementation for

TABLE RWC-1
ANALYSIS OF BACM AND MSM FOR RESIDENTIAL WOOD COMBUSTION

SUGGESTED MEASURE	ADOPTED?	IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
			MAG 1998 Plan.
Restriction on the number and density of new wood stoves and/or fireplace installations	No	Yes	Reasons for rejecting this measure are not given. A.R.S. 9-500.16 and A.R.S. 11-875 (1998) require cities and the County to restrict only the type of new woodburning devices. The potential air quality benefit from restricting the number of new woodburning devices would be akin to the benefit from a ban on solid fuel burning devices in new construction (discussed below) and would be very limited. Because the potential reductions are very small and the implementation of this measure would not advance attainment, we believe that the failure to include this measure or provide a justification for rejecting it does not affect our finding that the plan provides for BACM and MSM without it.
Device offset and/or upgrade offset program (tradeable permits for wood stoves)	No	Yes	Reasons for rejecting this measure are not given. The measure requires emissions from new clean stove installations to be offset by the upgrade (retrofit) or elimination of uncertified wood stoves. Because Maricopa's mandatory curtailment program generally prohibits the use of uncertified wood stoves during curtailment periods, this measure would have little air quality benefit. The cost of implementing such an offset program could be very high. Because the potential reductions are very small and the implementation of this measure would not advance attainment, we believe that the failure to include this measure or provide a justification for rejecting it does not affect our finding that the Phoenix serious area plan provides for BACM and MSM.
MOST STRINGENT MEASURES			
Cease use of all woodburning devices (except low-income households with no other source of heat) upon declaration of curtailment period	No	Yes	Maricopa's mandatory curtailment program is a single stage program that allows the use of certain woodburning devices (EPA-certified, Phase II wood stoves or equivalent and pellet stoves) during declared curtailment periods. The Control Officer may also grant sole source of heat (permanent, temporary, or emergency) and inadequate alternate source of heat exemptions for other woodburning devices. The emission reduction potential of a complete ban on residential wood combustion (except for sole source wood heaters) is limited. Maricopa County estimated that this measure (which included curtailment of commercial cooking equipment and barbecues) would reduce PM-10 emissions by 0.081 mtpd. Maricopa County commitments, justification for non-implementation for MAG 1998 Plan.
Limit emission rate of new wood stoves and fireplace inserts	No	Yes	A.R.S. 9-500.16 and A.R.S. 11-875 (1998) require cities and the County to adopt by December 31, 1998, an ordinance that prohibits the installation or construction of a fireplace or wood stove unless it is clean

TABLE RWC-1
ANALYSIS OF BACM AND MSM FOR RESIDENTIAL WOOD COMBUSTION

SUGGESTED MEASURE	ADOPTED?	IF NO, OK?	DESCRIPTION OF MEASURE (INCLUDING LEGAL AUTHORITY, RESOURCES, AND ENFORCEMENT PROGRAM) OR REASONED JUSTIFICATION FOR REJECTING MEASURE
to 60 percent of EPA Phase II standards			burning. Because of this requirement and the mandatory curtailment program, limiting the emission rates of new stoves would have very limited emission reduction potential. In addition, Maricopa County estimates the cost for this measure to be high. Maricopa County commitments, justification for non-implementation for MAG 1998 Plan.
Prohibit the installation of solid fuel burning devices in any new or modified structure	No	Yes	A.R.S. 9-500.16 and A.R.S. 11-875 (1998) require cities and the County to adopt by December 31, 1998, an ordinance that prohibits the installation or construction of a fireplace or wood stove unless it is clean burning. Because of this requirement and the mandatory curtailment program, a complete ban on solid fuel burning devices in new construction would have very limited emission reduction potential. Maricopa County commitments, justification for non-implementation for MAG 1998 Plan.
Limit moisture content of firewood to 20 percent	No	Yes	Implementation of this measure is unnecessary because the dry climate of the Maricopa area reduces the moisture content of firewood to less than 20 percent. In addition, the Residential Woodburning Restriction Ordinance limits the moisture content of wood to 30 percent. Maricopa County commitments, justification for non-implementation for MAG 1998 Plan.

Source of measures: MAG Plan, Table 5-2, measures 49-58, and 144, Table 6-1, measures 97-FP-1 to 97-FP-4, Table 10-7, measures 26 a-i.

This section prepared by Frances Wicher and Patricia Bowman.

IMPLEMENTATION OF BACM AND INCLUSION OF MSM FOR SOURCES OF SECONDARY AMMONIUM NITRATE

Requirement:	CAA section 189(b)(1)(B): Plan must provide for the implementation of BACM on significant sources of PM-10 CAA section 188(e): Criteria 4 for granting an extension request: Plan must include the most stringent measures that are included in the implementation plan of any State or achieved in practice in any State that are feasible in the area
Action:	Approve
Proposal Cite:	Annual standard: 65 at 19982 24-Hour standard: 66 at 50271
Primary Guidance Documents:	BACM: *Addendum*, pp. 42010- 42014 MSM: Section 3 of this TSD
Primary Plan Cites:	MAG plan, Chapters 5, 6, 7, 9 (BACM) and 10 (MSM)

What are the statutory and policy requirements?

CAA section 189(b)(1)(B) requires that a serious area PM-10 plan provide for the implementation of BACM within four years of reclassification to serious. For Phoenix, this deadline June 10, 2000. BACM must be applied to each significant (*i.e.*, non-de minimis) source or area-wide source category. *Addendum* at 42011.

Under our BACM policy, the plan must identify potential BACM for each significant source categories including their technological feasibility, costs, and energy and environmental impacts, and provide for the implementation of the BACM or provide a reasoned justification for rejecting any potential BACM. *Addendum* at 42013.

Arizona has applied for an extension of the serious area attainment date. One of the requirements that must be met before we can grant an extension request is the State "demonstrates to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely be implemented in the area." CAA section 188(e).

Under our policy on most stringent measures (MSM), the plan must first identify potential most stringent measures in other implementation plans or used in practice in other States for the significant source category and for each measure determine their technological and economic feasibility for the area, compare the potential most stringent measure for each significant source category against the existing BACM or other measures, if any, for that source category already adopted in the area, and provide for the adoption of those measures that are found to be more stringent and for their implementation as expeditiously as practicable. For any measure not adopted, the State should provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

How are these requirements addressed in the plan?

The Phoenix serious area plan identifies secondary ammonium nitrate as a significant source of PM-10 in the Phoenix area. MAG plan, Table 9-9

Description of secondary ammonium nitrate source category

Secondary ammonium nitrate is formed by a chemical reaction in the atmosphere between oxides of nitrogen (NOx) and ammonia (NH_3). Ninety percent of NOx comes from motor vehicle exhaust (both on and off road) and the major source (99.9 percent) of NH_3 is from animal wastes. 1994 Regional PM-10 Inventory.

Does the plan meet the statutory and policy requirements?

Existing Controls

Arizona has adopted numerous controls to reduce NOx emissions including its CBG program and vehicle emissions inspection program. See earlier sections on on-road motor vehicles and nonroad engines.

Nationally, we have also adopted numerous controls on mobile source NOx emissions. Again, see earlier sections on on-road motor vehicles and nonroad engines.

Suggested Measure List for BACM and MSM Analysis

Two potential BACM were identified for ammonia and nitrate control: reduce emissions of ammonia and nitrates from agricultural operations and require animal waster management plans for farms/ranches with more than 50 animals. The first measure involves tilling in of manure used as fertilizer within 48 hours of application. MAG plan, Table 6-1, measure 97-AG-3. The second measure would focus on reducing ammonia emissions during winter months. MAG plan, Appendix B, Exhibit 5, p. 5-70. For MSM, no measures were found that required

animal waste management plans for farms or ranches and no other measures were identified.[84] See MAG plan, Table 10-7. A large number of measures that could reduce NOx emissions were identified and have been evaluated earlier in this TSD. See sections on on-road motor vehicles and nonroad engines.

We find that the Phoenix serious area plan evaluates a comprehensive set of potential controls for ammonium nitrate.

New Controls in the Plan and Justifications for Rejecting Potential Controls

Other than the measures already discussed for on-road vehicles and nonroad engines, the Phoenix serious area plan does not include any measures directly targeting ammonium nitrate.

Data from earlier studies indicate that ammonia emissions would need to be reduced by 80 percent to have an appreciable impact on ambient concentrations of ammonium nitrate. MAG plan, Appendix B, Exhibit 5, p. C-1. Almost all ammonia emissions in the inventory are from cattle feedlots and dairies and not from the application of manure to agricultural fields. As result, controls on manure application are very unlikely to have any impact on PM-10 levels the Phoenix area and therefore are not technologically feasible.[85] The estimated reduction in ammonia from implementing waste management plans is 30 percent, far short of the 80 percent needed to show impact on PM-10 levels (MAG plan, Appendix B, Exhibit 5, p. 5-72), so we also believe that this measure is currently not technologically feasible.

Other than the on-road vehicle and nonroad engine categories, we do not believe that there are any other sources of NOx that should be called significant in terms of contributing to ammonium nitrate levels. The plan does include an extensive number of measures for these on-road and nonroad engines sources. No measures for controlling ammonia were found to be technologically feasible. We, therefore, find that the Phoenix serious area plan provides for the implementation of RACM and BACM and for inclusion of the MSM for secondary ammonium nitrates as required by CAA section 189(a)(1)(C), 189(b)(1)(B), and 188(e).

This section prepared by Frances Wicher.

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[84] We are not aware of any measures that address air emissions of ammonia from livestock waste. Both the South Coast and San Joaquin Valley serious PM-10 nonattainment areas are still studying emission rates and control techniques for this source and have adopted no controls.

[85] We consider a measure technologically feasible for an area only if it has the potential to reduce emissions in a way that reduces ambient concentrations in the area.

MCESD'S COMMITMENTS TO IMPROVE COMPLIANCE AND ENFORCEMENT OF THE FUGITIVE DUST PROGRAM

MCESD has committed to an extensive overhaul of the compliance and enforcement program for its fugitive dust sources. The commitments are found in Maricopa County commitments, 1999 Revised Measure 6, adopted December 15, 1999. A narrative description of the commitments and other program changes are found in MAG TSD, Appendix IV, Exhibit 3. MCESD has also committed to continuing to improve Rule 310 and Rule 310.01. These commitments are described in the TSD section "Implementation of BACM and Inclusion of MSM for Construction Activities and Sites." MCESD has recently provided us with an update on the status of these commitments which have discussed below.

These improvements cover rule and test method revisions (discussed previously in the section "Implementation of BACM and Inclusion of MSM for Construction Sites and Activities"), increased public outreach and education, increased funding and staffing, increased inspection frequency, revised enforcement policies, and commitments to program evaluations and improvements. They address many of the program areas that are key to improving compliance and we believe form a solid program for increasing the effectiveness of the County's fugitive dust program.

Staffing

Commitment: By the end of January 2000, the inspection staff will increase to eight inspectors, 1 supervisor, 1 aide and 2 enforcement officers. By April, 2000, the County Attorney's office will hire an attorney to expedite civil litigation and to assist with prosecuting Class One Misdemeanor cases. A coordinator will be added to the Small Business Environmental Assistance Program to assist smaller builders and construction companies and to help develop and implement education programs. In total, resources devoted to the fugitive dust program will be 15 positions, a 25 percent increase over previous levels. These resources are in addition to the Departments enforcement staff. This level of staffing is in contrast to the less than 1 staff position devoted to the program in 1996.

After reaching the committed staffing level, MCESD will review the program in March 2000 to evaluate its effectiveness and the potential need to add more staff.

Status as of September 1, 2001: By the end of January 2000, inspection unit staffing increased to eight inspectors, 1 supervisor, 1 coordinator (to oversee permit issuance and track NOVs), 2 aides and 2 enforcement officer. By May 2000, the County Attorney's office hired an attorney, paralegal, and support staff to expedite civil litigation and to assist with prosecuting Class One Misdemeanor cases. In 2000, the Department found that existing staff in the Small Business Environmental Assistance Program were able to handle the workload for assisting

smaller builders and construction companies and for helping to develop and implement education programs. MCESD will re-evaluated the need for an additional coordinator in the small business assistance program when the second generation outreach and education materials is completed. In total, resources devoted to the fugitive dust program were 17 positions, a 42 percent increase over previous levels. These resources were in addition to the Departments enforcement staff.

MCESD will continue to review the program in March of each year to evaluate its effectiveness and the potential need to add more staff.

Organization

Commitment: A new enforcement section has been created under the direct control supervision of the MCESD Director/Air Pollution Control Officer (APCO). This position streamlines enforcement by reducing the supervisor and senior management review and approval of enforcement and allows enforcement officers to submit directly to the APCO's desk all enforcement actions requiring APCO approval.

Inspectors will be located in two new regional offices to provide quicker response times to dust-related complaints and allow more time in the field.

Status as of September 1, 2001: The new enforcement section was created under the direct supervision the MCESD Director/APCO.

Inspectors are now located in four regional offices to provide quicker response times to dust-related complaints and allow more time in the field.

Funding

Commitment: Revenue for the fugitive dust program is estimated at $1.12 million from annual earth moving permit fees, a $772,000 increase over the previous level before permit fee increases were adopted in 1998.

Status as of September 1, 2001: Anticipated revenue for the fugitive dust program is approximately $1.7 million for FY 2000-2001, generated from annual earth moving permit fees. This is a $1.35 million increase over the previous level before permit fee increases were adopted in 1998.

Inspection Program

Commitment: MCESD will develop by April, 2000 inspection priorities for vacant lots and unpaved parking lots considering lot size and number of sources with larger lots being inspected first and smaller lots in succeeding years. A number of cities have municipal programs

to address these sources; therefore, the Department will initially direct its inspections to cities lacking such programs. It will also track city plans to stabilize target unpaved roads, alleys and unpaved shoulders.

MCESD has also increased inspection rates and improved procedures for permitted sources:

• Pro-actively inspect sites larger than 10 acres, 3 to 6 times per year and inspect smaller sites once within 30 days of project start date.

• Schedule weekend inspections randomly once per month.

• Provide a shortened complaint response time with a goal of 8 hours for high priority complaints and maintaining the current goal of 24 hours for others

• Revise standard operating procedures and checklists for fugitive dust inspections to be consistent with the revised rules.

• Revise inspection standard operating procedures to have inspectors check for records and inspect fugitive dust sources at permitted stationary sources.

Status as of September 1, 2001: MCESD developed by April, 2000 inspection priorities for vacant lots and unpaved parking lots considering lot size and number of sources with larger lots being inspected first and smaller lots in succeeding years. A number of cities have municipal programs to address these sources; therefore, the Department is initially direct its inspections to cities lacking such programs. EPA and MCESD attempted unsuccessfully to convert an Assessor's Office database of vacant lots into a user-friendly format and as a result, MCESD inspectors are assigned geographical districts and are compiling notes on the vacant lots and unpaved parking lots in each district during their routine surveillance activities. Under current MCESD policy, the inspectors are first directed to handle all complaints and then to begin to address the larger sites on the individual district lists. In 2000, the inspectors made 499 inspections on vacant lots, unpaved parking lots, and unpaved roads.

Enforcement Program:

Commitment: By April 2000, MCESD will revise it fugitive dust enforcement policy to

- include guidelines for initiating various enforcement actions
- include guidelines for reinspecting
- define timely and appropriate action by laying out guidelines for which type of violation is appropriate for specific enforcement actions and for the time frames for escalating enforcement actions when appropriate

- identify priority violations
- include guidelines for when to seek penalties reflecting the economic benefit of noncompliance, if feasible
- include guidelines for seeking and determining higher penalties for repeat violators
- guidelines for inspectors to handle predetermined citation categories form observation to justice court

Enforcement action options include issuing an Order of Abatement, filing a Misdemeanor Complaint in Justice court, or asking the County Attorney to seek a civil penalty in Superior Court.

Inspectors will handle certain predetermined citation category violations and will be responsible for case development from observance of a violation to filing the actual citation in the justice court. Having the inspectors handle routine case will enable the enforcement officers to work on resolving cases involving more serious and complicated violations.

Status as of September 1, 2001: MCESD issued a revised air quality enforcement policy on April 28, 2000 consistent with its commitment. See Air Quality Violation Reporting and Enforcement Policy and Procedure, MCESD, April 28, 2000. See also, p. 414.

Public Outreach/Education

Commitment: Public outreach and education consists of staff training, educating the regulated parties and developing good working relationships with other involved parties such as the cities and justice court judges and making the program more understandable. Increased education of both inspectors and the regulated industry increases compliance.

Among the public outreach and education efforts will be

- Inspector training on case development.
- Inspector training on revised test methods.
- City staff training on prepare inspection reports and notices of violation.
- On-going training at the local community college.
- Making information available on MCESD website.
- Distribution of information through city building departments and other sources.

Status as of September 1, 2001: In 2000, MCESD completed a revised dust control guideline with its partners ADOT and ASU. This year ADOT secured a research grant directed towards developing educational tools and outreach programs. This protect will enhance the current guidelines, add information on the life cycle costs of controls and controls' impact on the construction process, and develop additional outreach tools. In addition, MCESD is currently

working with two contractors to develop a model environmental management system for construction. These two efforts will add to the technical knowledge on dust control and offer additional tools for companies to increase compliance with regulations.

On-going public outreach and education efforts include:

- Inspector training on case development.
- Inspector training on revised test methods.
- Training at the local community college.
- Making information available on MCESD website.
- Distribution of information through city building departments and other sources.

Program Evaluation and Tracking

Commitment: MCESD will track the number of inspections, number and type of enforcement actions, amount of penalties assessed, and amount of penalties collected. It will conduct mid-year review of the program in September, 2000 and again in March 2001 to evaluate progress and future needs.

Status as of September 1, 2001: It will conduct mid-year review of the program in September, 2001 and again in March 2002 to evaluate progress and future needs. MCESD conducted 6625 inspections in 2000. In the first year of operation under the new enforcement process, it issued 189 violations, processed 145 settlement cases and netted $425,000 in fines (May 1, 2000 to April 30, 2001). See also, p. 414.

EXTENSION REQUEST – APPLICATION

Requirement: CAA section 188(e) allows states to apply for an extension of up to five years of the serious area attainment date.

Action: Approve

Proposal Cites: Annual standard: 65 at 19984
24-Hour standard: 66 at 50273

Primary Guidance Documents: See Section 4 of this TSD

Primary Plan Cites: Chapter 10.

What are the statutory and policy requirements?

CAA section 188(e) allows states to apply for an extension of the serious area attainment date of up to 5 years. We interpret this requirement to mean that the State must apply in writing for an extension and that the extension request must accompany the SIP submittal containing the demonstration that the area will attain by most expeditious alternative date practicable. The public must be provided reasonable notice and a public hearing on the request before it is submitted.

How are these requirements addressed in the plan?

MAG, as the lead air quality planning agency for the Phoenix metropolitan area, formally requested an extension of the PM-10 nonattainment deadline to December 31, 2006 based on documentation in the Chapter 10 of MAG plan and Appendix C, Exhibit 5 of the MAG plan. See MAG plan, p. 10-2.

This extension request and the documentation supporting it are integral parts of the MAG plan and were subject to public hearing along with the rest of the plan.

Does the plan meet the statutory and policy requirements?

Arizona, through its designated lead air quality planning agency, requested in writing an extension of the attainment date and submitted the request and its supporting documentation only after they were subject to public notice and comment as required by 40 CFR 51.102 and our

completeness criteria in 40 CFR part 51, Appendix V.

EXTENSION REQUEST – DEMONSTRATE THE IMPRACTICABILITY OF ATTAINMENT BY DECEMBER 31, 2001

Requirement: CAA section 188(e) allows states to apply for an extension of up to five years of the serious area attainment date but only if they have demonstrated that it is impracticable to attain by December 31, 2001. CAA section 189(b)(1)(A) requires serious area plans to either demonstrate attainment by December 31, 2001 or demonstrate attainment is impracticable by that date.

Action: Approve

Proposal Cites: Annual standard: 65 at 19984
24-Hour standard: 66 at 50273

Primary Guidance Documents: See Section 4 of this TSD

Primary Plan Cites: Chapter 10.
MAG TSD, Appendix A, Exhibit 7, Regional PM-10 Modeling

What are the statutory and policy requirements?

CAA section 189(b)(1)(A) requires serious area plans to either demonstrate attainment by December 31, 2001 or demonstrate attainment is impracticable by that date.

In order to demonstrate impracticability, the plan must show that the implementation of BACM (as determined by our guidance) on significant sources categories will not bring the area into attainment by December 31, 2001. BACM is the minimum level of control required for serious areas; therefore, we believe that it is reasonable to interpret the Act to require that a state provide for at least the implementation of BACM on significant source categories before it can claim impracticability of attainment by 2001. This interpretation parallels our interpretation of the impracticability option for moderate PM-10 nonattainment areas in section 189(a)(1)(B). In moderate areas, RACM was required before a moderate area Plan could show impracticability of attainment by 1994, the moderate area attainment date. *General Preamble* at 13544.

The statutory provision for demonstrating impracticability requires that the demonstration be based on air quality modeling. See section 189(b)(1)(A). We have established minimum requirements for air quality modeling. See discussion on air quality modeling later in this TSD.

How are these requirements addressed in the plan?

We have earlier in this TSD described the implementation of BACM in the Phoenix serious area PM-10 plan.

Annual Standard

To demonstrate the impracticability of attaining the annual standard by 2001, the Phoenix serious area plan derived a change in PM-10 concentration per change in emissions using the modeled concentration for the year 2006 and observed concentration for the year 1995 at Greenwood monitor and the overall change in emissions between the two years (MAG plan, p. 8-10 and MAG TSD, p. VI-2):

? $\mu g/m^3$ / ? metric tons
= ('06 predicted concentration - '95 observed concentration)/('06 emissions - '95 emissions)

Using this equation the plan estimates that there is a 0.2 $\mu g/m^3$ decrease in the PM-10 annual ambient concentration per metric ton reduction in the inventory. This ratio was then multiplied by the 39 mtpd reduction in regional PM-10 emissions expected between 1995 and 2001 from the implementation of BACM, essentially scaling them to give an expected improvement in air quality of 7.80 $\mu g/m^3$. MAG plan, p. 8-11 (equation 2.1). Subtracting this figure from the observed concentration in 1995 at the Greenwood monitor of 60.01 $\mu g/m^3$ results in an estimated 2001 annual concentration of 52.21 $\mu g/m^3$. Because the projected 2001 annual concentration is still above the 50 $\mu g/m^3$ annual NAAQS, the Phoenix serious area plan concluded that it was impracticable to attain by 2001. MAG plan, p. 8-11.

24-Hour Standard

ADEQ developed the impracticability demonstration for the 24-hour standard. To make this demonstrate, ADEQ evaluated the impact of controls on sources at both the West Chandler and Gilbert sites in 2001. See Tables Imp-1 and Imp-2. The evaluation showed that attainment at both sites is impracticable by 2001.

TABLE IMP-1 IMPRACTICABILITY DEMONSTRATION WEST CHANDLER			
SOURCE	1995 IMPACT ? G/M^3	2001	
		CONTROL %	IMPACT ? G/M^3
Ag fields	190	0	190
Ag aprons	24	0	24.2
Road construction	73.5	90	7.4
Housing construction	0.1	90	0
Vacant lands	29.3	0	29.3
Paved Roads	0.2	0	0.2
Unpaved Roads	4.1	0	4.1
Total local impact	321.2		255
Background	80		59.6
Total	401.2		314.6

Source: ADEQ TSD, pp. 3-10

TABLE IMP-2 IMPRACTICABILITY DEMONSTRATION GILBERT			
SOURCE	1995 IMPACT ? G/M^3	2001	
		CONTROL %	IMPACT ? G/M^3
Ag aprons	55	0	55
Vacant lands	13.5	0	13.5
Unpaved parking Lots	67.2	0	67.2

TABLE IMP-2 IMPRACTICABILITY DEMONSTRATION GILBERT			
SOURCE	1995 IMPACT ? G/M^3	2001	
		CONTROL %	IMPACT ? G/M^3
Paved roads	1.5	0	1.5
Unpaved roads	3.5	0	3.5
Total local impact	140.7		140.7
Background	90		64.8
Total	230.7		205.5

Source: ADEQ TSD, pp. 3-11

Does the plan meet the statutory and policy requirements?

Based on our analysis of control measures in the Phoenix serious area plan as described in the preceding sections, we find that the Phoenix serious area plan provides for implementation of BACM on all significant source categories for both annual and 24-hour standard. Based on the modeling analysis in the plan, we also find that the Phoenix serious area plan demonstrates that attainment by 2001 is impracticable for both standards with the implementation of BACM.

Annual Standard

Ideally, to assess whether the annual PM-10 standard will be achieved in 2001, a serious area plan should first calculate emissions for that year incorporating reductions from measures that will be implemented and then run the air quality model developed for the base year and compare predicted concentrations to the NAAQS.

While this modeling approach is conceptionally simplest, it would involve substantial resources because of the effort needed to model an annual standard. See discussion later in this TSD describing modeling of the 1995 base year and 2006 attainment year. Thus an alternative method, such as the one used in the plan, which reduces the burden but retains a good degree of accuracy, is acceptable.

The procedure used by the plan assumes a certain linearity in the effect of emission reductions and does not distinguish between primary and secondary PM-10. Emission reductions

can be unevenly distributed over time and geography, and wind and other meteorological factors could make the reductions' ambient effects be felt unevenly. Thus the effect of the emissions reductions might not be accurately portrayed with a simple ratio.

However, in this Phoenix situation, a good argument can be made that ambient concentrations change close to linearly with emission changes. First, the factors contributing to unevenness of control measure effects are implicitly taken into account by basing the ratio on the results from the full modeling exercise done for 2006. This modeling used the Urban Airshed Model (UAM-LC), which incorporates temporal and spatial distribution of emissions and meteorology. Second, emissions in the Phoenix area are predominantly fugitive dust and arise from sources that are fairly well-distributed, cover substantial land area, and to which controls are applied equally. In this situation, concentrations are likely to scale well with emissions.

For these reasons, applying a model scaling ratio to emissions in the Phoenix area is reasonable. Given the substantial burden of modeling the 61 episode days necessary to evaluate the annual standard and the fairly large uncertainty in fugitive dust emissions, we believe that, in this case, the chosen approach saves resources with little loss of accuracy.

In addition, the scaling method used is essentially a "modified rollback" approach which we have accepted previously for PM-10 SIPs and is acceptable under our guidance on a case-by-case basis.[86] MAG discussed this approach with us during the development of the plan and we concurred with it.

We note that, even after full 2006 implementation of all controls, the annual standard is just barely attained at 49.7 $\mu g/m^3$ which adds to the credibility of the 2001 impracticability demonstration. MAG plan, p. 8-12

24-Hour Standard

In its impracticability demonstration, ADEQ assumed controls only on the “permitted” sources, that is, only on those sources that receive permits from MCESD. ADEQ assumed that all the “nonpermitted” sources—unpaved roads, vacant lots, and unpaved parking lots—are uncontrolled in 2001. This latter assumption does not reflect the efforts by MCESD to assure the implementation of BACM on these sources and is inconsistent with the assumptions made for these sources in the annual standard impracticability demonstration. In fact, in most instances, the assumptions made on overall control effectiveness are inconsistent between the annual standard impracticability and attainment demonstrations and those demonstrations for the 24-hour standard.

[86] Guideline on Air Quality Models, 40 CFR 51 Appendix W, §7.2.2.

To determine if using consistent assumptions between the annual standard and 24-hour standard demonstrations would show that attainment of the 24-hour standard is in fact practicable by 2001, we recalculated the 2001 impacts at each monitor using the control assumptions from the annual standard demonstrations and additional control information from the BMP TSD.[87] Tables Imp-3 and Imp-4 show the results of these recalculations. In these recalculations, we assume that the sources at the microscale site are in full compliance with the applicable rule.

Our recalculations show that attainment of the 24-hour standard at the West Chandler site remains impracticable by 2001. The site needs substantial reductions, in excess of 50 percent, in agricultural emissions before the 24-hour standard can be attained. This level of emission reduction from agricultural sources is not expected until 2006.

However, our recalculations show that attainment of the 24-hour standard at the Gilbert site is practicable by 2001. The site's primary source, an unpaved parking lot, is subject to full control under Rule 310.01 by 2001 and controls on this source together with controls on vacant lands, also required by Rule 310.01, result in the site showing attainment by 2001.

In order to show attainment, a plan must show attainment at each location within the nonattainment area. Because the West Chandler site is still unable to show attainment of the 24-hour standard by 2001, the Phoenix nonattainment area as a whole is unable to show attainment by that date and the Phoenix plan's conclusion that attainment of the 24-hour standard in the Phoenix area is impracticable remains correct.

This section prepared by Scott Bohning and Frances Wicher.

[87] The agricultural field at the West Chandler site was a cotton field. We, therefore, used control factors for BMP's applicable to cotton fields.

TABLE IMP-3
REVISED IMPRACTICABILITY DEMONSTRATION
USING CONTROL FACTORS CONSISTENT
WITH ANNUAL STANDARD DEMONSTRATION
WEST CHANDLER

SOURCE	CONTROL	1995 IMPACT ? G/M^3	2001	
			CONTROL	IMPACT ? G/M^3
Ag fields	BMP rule	190	39.1[1]	115.6
Ag aprons	BMP rule	24	20[2]	19.2
Road construction	Rule 310	73.5	77[3]	16.9
Housing construction	Rule 310	0.1	77[3]	0
Vacant lands	Rule 310.01	29.3	88.7	3.3
Paved Roads	--	0.2	0	0.2
Unpaved Roads	Rule 310.01	4.1	75	1
Total local impact		321.2		156.2
Background - wind blown		58.2		34.04
Background - nonwind		21.8		21.8
Total		401.2		212

Table Footnotes:

1. Between 1995 and 2001, 20 percent of agricultural land were lost to development; control assumes 23.9 percent control to control windblown dust from a cotton field using multi-year crop, the maximum control available from BMPs for this sources.[88] BMP Quantification TSD, p. B-7.
2. No controls for windblown dust for this category. Control reflects loss of agricultural lands only.
3. Control effectiveness for disturbed areas on construction sites only. There was no construction activity

[88] The 20 percent figure is derived from taking the 6/11 of the 37 percent decline in agricultural lands between 1995 and 2001 used in the BMP TSD. 2001 is 6 years past 1995 and 2006 is 11 years past 1995. Agricultural lands are assumed to decline at a steady yearly rate between 1995 and 2006. BMP TSD, Attachment 4. Therefore, a linear interpolation is appropriate. The annual standard demonstration assumes a 26 percent decline in agricultural lands between 1995 and 2001 and a 41 percent decline between 1995 and 2006. See MAG TSD, Appendix 7, Exhibit 8, Table 3.

on the modeled exceedance day.
4. See Table Imp-3a.

Source: 1995 impacts: ADEQ TSD, pp. 3-10 Control efficiencies, see Table MOD-9 of this TSD.

TABLE IMP-3A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND WITH REVISED CONTROL FACTORS
WEST CHANDLER, 2001

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	56%	39%	5%
Wind contribution 9 hrs	32.6 µg/m^3	22.7 µg/m^3	2.9 µg/m^3
Overall control efficiency	31.3%[1]	54.9%	53.1%
PM10 Contribution with controls	22.4 µg/m^3	10.2 µg/m^3	1.4 µg/m^3
total windblown background = 34.0 µg/m^3			

Footnote 1. 39.1 percent control from microscale component with a 80 percent rule effectiveness factor.
Source: Land use percentages and wind contributions - 9 hrs, ADEQ TSD, p. A-8. Overall control efficiencies, see Table MOD-9 of this TSD.

TABLE IMP-4
REVISED IMPRACTICABILITY DEMONSTRATION USING CONTROL FACTORS CONSISTENT WITH THE ANNUAL STANDARD DEMONSTRATION
GILBERT

SOURCE	CONTROL MEASURE	1995 IMPACT ? G/M^3	2001	
			CONTROL %	IMPACT ? G/M^3
Ag aprons	BMP rule	55	20[1]	44
Unpaved parking lots	Rule 310	67.2	75	16.8
Vacant lands	Rule 310.01	13.5	88.7	1.5
Paved Roads	--	1.5	0	1.5
Unpaved Roads	Rule 310.01	3.5	75	0.9

TABLE IMP-4
REVISED IMPRACTICABILITY DEMONSTRATION
USING CONTROL FACTORS CONSISTENT
WITH THE ANNUAL STANDARD DEMONSTRATION
GILBERT

SOURCE	CONTROL MEASURE	1995 IMPACT ? G/M³	2001	
			CONTROL %	IMPACT ? G/M³
Total local impact		140.7		64.7
Background - wind blown		68.2		39.72
Background - nonwind		21.8		21.8
Total		230.7		108.3

Footnotes: 1. Between 1995 and 2001, 20 percent of agricultural land were lost to development.
2. See Table Imp-4a.
Source: 1995 impacts, ADEQ TSD, p. 3-11. Control efficiencies, see Table MOD-9 of this TSD.

TABLE IMP-4A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND
GILBERT, 2001

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	55%	41%	4%
Wind contribution 9 hrs	37.5 µg/m³	28.0 µg/m³	2.7 µg/m³
Overall control efficiency	31.3%[1]	54.9%	53.1%
PM10 Contribution with controls	25.8 µg/m³	12.6 µg/m³	1.3 µg/m³
total windblown background = 39.7 µg/m³			

Footnote 1. 39.1 percent control from microscale component with a 80 percent rule effectiveness factor.
Source: Land use percentages and wind contributions - 7 hrs, ADEQ TSD, p. A-7. Overall control efficiencies, see Table MOD-9 of this TSD.

This section prepared by Scott Bohning and Frances Wicher.

EXTENSION REQUEST – COMPLIED WITH ALL REQUIREMENTS AND COMMITMENTS IN ITS IMPLEMENTATION PLAN

Requirement: CAA section 188(e) allows states to apply for an extension of up to five years of the serious area attainment date but requires in part that they have complied with all requirements and commitments in its implementation Plan.

Action: Approve

Proposal Cites: Annual standard: 65 at 19984
24-Hour standard: 66 at 50274

Primary Guidance Documents: See section 4 of this TSD

Primary Plan Cites: Chapter 10
Appendix B, Exhibit 4: MAG Air Quality Plan, 1996 Annual Progress Report.

What are the statutory and policy requirements?

CAA section 188(e) allows the EPA to extend the attainment date for a serious PM-10 area beyond December 31, 2001, if a number of conditions are met. One of these conditions is that the State "has complied with all requirements and commitments pertaining to the area in the implementation Plan[.]"

We interpret this criterion to mean that the State has implemented the control measures in prior SIP revisions it has submitted to address the CAA requirements in sections 172 and 189 for PM-10 nonattainment areas. It does not include measures being approved in this action.

How are these requirements addressed in the plan?

The two principal SIP revisions that Arizona has submitted to address PM-10 are:

- MAG 1991 Particulate Plan for PM-10 for Maricopa County Area," MAG, November 1991 and the 1993 and 1994 revisions to this plan.

• ADEQ, "Plan for Attainment of the 24-hour PM-10 Standard, Maricopa County PM-10 Nonattainment Area," May 1997.

These 1991 MAG plan and its 1993 and 1994 revisions include a broad range of measures to address PM-10 including control for constructions sites, paved road, unpaved roads, unpaved parking areas, vacant lots, and woodburning. The 1991 plan also included reasonably available control technology for stationary sources and a wide range of transportation control measures. The measures in this plan are described in the MAG plan at pp. 10-10 to 10-25. The principal controls, however, in this plan were Rule 310 and the County woodburning ordinances, although the plan did contain a large number of commitments from the local jurisdictions to various measures. Most of the measures represented "business as usual" actions by the jurisdictions to do infrastructure (e.g., road) improvements, to implement existing building codes or take actions already underway for the carbon monoxide plan.

The 1997 Microscale plan focused on fugitive dust sources such as construction sites, vacant lots, unpaved roads, unpaved parking lots, and agriculture. The principal controls in this plan were improvements to the implementation of Rule 310 and coordination with the cities to improve fugitive dust control. Implementation of these measures are discussed in Maricopa County commitment Improvement Measures 1 and 2.

Does the plan meet the statutory and policy requirements?

We find that the State has complied with the requirements and commitments in its implementation plan. We note that only Rule 310[89] and a few local jurisdiction measures were relied on for explicit numerical emissions credits in the 1991 MAG plan and based on information available to us, these measures have been implemented. See Revised Chapter 9 of the 1991 MAG plan.

Other Information

1997 Microscale Plan Disapproval

Our finding that the requirements and commitments in the 1991 MAG plan and its revisions have been implemented may seem to conflict with our finding on the Microscale plan that Arizona had not provided for the implementation of BACM on non-permitted sources subject to Rule 310 (e.g., disturbed vacant land). However, it does not.

In the 1991 MAG plan, MCESD committed to implement Rule 310 for non-permitted

[89] We refer here to the old Rule 310 adopted in 1994 and not the newly revised Rule 310 adopted in February, 2000.

sources through a complaint-based compliance system. It did in fact implemented the rule consistent with this commitment. Subsequently, the technical analysis performed for the Microscale plan showed that a complaint-based compliance program for non-permitted sources was not adequate for attainment and a proactive compliance program was needed. Because the microscale plan did not provide for proactive compliance program for non-permitted sources, we found that the plan did not provide for implementation of BACM for these sources. In short, we found that the commitment in the 1991 plan was inadequate and not that MCESD had failed to fulfill its commitment.

The Remote Sensing Program in the Arizona Vehicle Emissions Inspection Program

At the time the MAG plan was submitted in June 1999, Arizona's vehicle emissions inspection program (VEIP) included a remote sensing program. The remote sensing program consisted roadside monitors that could detect concentrations of carbon monoxide and volatile organic compounds in the tailpipe emissions of cars driving by them. The owners of a vehicle whose tailpipe emissions exceeded certain levels were sent a notice and required to obtain a vehicle emission inspection within a certain period of time. MAG plan, p. 7-179.

The pre-2000 RSD program was not included in any previous PM-10 plan submittal for the Phoenix area. Consequently, the legislative changes made to the program in 2000 do not affect our finding that the State has complied with the requirements and commitments in its implementation plan.

This section prepared by Frances Wicher.

EXTENSION REQUEST – DEMONSTRATE THE INCLUSION OF THE MOST STRINGENT MEASURES

Requirement:	CAA section 188(e) allows states to apply for an extension of up to five years of the serious area attainment date but requires in part that they have included in the plan the most stringent measures found in other SIPs or used in practice.
Action:	Approve
Proposal Cites:	Annual standard: 65 at 19984 24-Hour standard: 66 at 50282
Primary Guidance Documents:	Section 4 of this TSD
Primary Plan Cites:	Chapter 10 "Most Stringent PM-10 Control Measure Analysis," Sierra Research, May 13, 1998 found in Appendix C, Exhibit 4. "MSM Study"

What are the statutory and policy requirements?

The fourth extension criterion requires the State to "demonstrate to the satisfaction of the Administrator that the plan for the area includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can feasiblely be implemented in the area." CAA section 188(e). We discuss our MSM policy in detail in section 4 of this TSD.

We define a "most stringent measure" as the maximum degree of emission reduction that has been required or achieved from a source or source category in other SIPs or in practice in other states and can be feasiblely implemented in the area. A state need not adopt any MSM that are not feasible on economic or technological grounds, applies to a de minimis source category, or will not contribute to expeditious attainment.

How are these requirements addressed in the plan?

Steps 1 & 2: Develop a detailed emission inventory of PM-10 sources and source categories/

model to evaluate the impact on PM-10 concentrations over the standards of the various source categories to determine which are significant for the purposes of adopting MSM.

The Phoenix plan excluded no source categories of directly-emitted PM-10 from its MSM analysis but instead simply started its evaluation of MSM by identifying candidate measures for any source category of PM-10 present in the Phoenix area.[90] MAG plan, p 10-25.

Step 3: Identify the potentially most stringent measures in other implementation plans or used in practice in other states for each significant source category and for each measure determine their technological and economic feasibility for the area as necessary,

To identify candidate MSM, MAG's contractor Sierra Research interviewed people knowledgeable about PM-10 controls, reviewed the documents used to develop the candidate list of BACM and obtained copies of current air quality control measures from most other States including both SIP and non-SIP measures. MSM Study, p. 1-2.

Evaluation of the feasibility of potential MSM for the Phoenix area was done only for those measures that passed Step 4 below. MSM Study, p. 3-5.

Step 4: Compare the potentially most stringent measures for each significant source category against the measures, if any, already adopted for that source category.

After a comprehensive list of candidate MSM was developed, each measure was screened against the corresponding Maricopa measure to identify those with:

- numerical emission limits more restrictive than those in existing Maricopa measures
- a more extensive list of affected sources than that of the Maricopa measure (e.g., lower applicability threshold)
- fewer exemptions than the Maricopa measure
- one or more substantive regulatory provisions not found in the Maricopa measures

The next round of screening compared similar non-Maricopa rules against each other to determine which measure was the most stringent among all candidate measures from other areas.

The final round of screening then ranked for each source category the surviving measures by emission reduction effectiveness estimate for the Maricopa area.[91] MSM study, p. 3-5.

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[90] Controls on NOx sources, a PM-10 precursor, were excluded. MSM study, p. 3-3.

[91] For consistency, the source categories used in the MSM analysis are the same ones used in the BACM analysis including both the categories found significant and those found

Step 5: Provide for the adoption of any MSM that is more stringent than existing measures and provide for implementation as expeditiously as practicable or, in lieu of adoption, provide a reasoned justification for rejecting the potential MSM, i.e., why such measures cannot be feasiblely implemented in the area.

The remaining MSM were grouped by source category and were either included in the plan or a justification for rejecting the measure was provided. MSM study, Table 3-1 and MAG plan, p. 10-46.

Does the plan meet the statutory and policy requirements?

We find that the Phoenix serious area PM-10 plan demonstrates to our satisfaction that it includes the most stringent measures that are included in the implementation plan of any State, or are achieved in practice in any State, and can be feasiblely implemented in the Phoenix area as required in CAA section 188(e) for areas being granted an extension of the attainment date.

We have discussed identification and adoption of MSM and the rejection of any MSM for each category deemed significant for BACM in the sections on "Implementation of BACM and Inclusion of MSM" earlier in this TSD. We discuss the adoption or reasoned justifications for the three potential MSM identified for categories considered de minimis in the BACM analysis below.

As we noted in the section "BACM Analysis, Step 2 Identification of Significant Source Categories," the proposed de minimis source categories generally fall into one of two types: those that are already subject to control and those that are uncontrollable either by their nature or because the State is pre-empted from controlling them. See Table DEM-1 in the section "BACM Analysis–Step 2, Model to Identify Significant Sources." Only a few of the categories are controllable but are not currently controlled and all but one of these are the categories for which MSM have been included in the plan.[92] We emphasize that these three measures are in addition to the MSM adopted for the source categories considered significant for the BACM analysis.

Cattle Feedlots

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insignificant in the BACM analysis.

[92] The exception is airport ground support equipment (GSE). Because this source category contributes only 0.8 mtpd (out of an inventory of 130 mtpd) and the equipment is used in just a few locations in the nonattainment area, we do not believe that controls on GSE would contribute to expeditious attainment in the Phoenix area and therefore, the lack of controls on them does not affect our finding that the MAG plan includes MSM to our satisfaction.

Cattle feedlots (including livestock areas, dairies, horse farms, horse stables and other similar sources) are estimated to contribute 0.4 mtpd in 1994 inventory or 0.3 percent of the non-windblown emissions inventory. 1994 Regional PM-10 inventory, Table 2-3. The plan identifies this source category as de minimis with respect to the PM-10 standards. In the Microscale plan, they are not an explicitly identified source category that contributes to 24-hour PM-10 exceedances.

MCESD Rule 310.01 requires that owners/operators of commercial feedlots and/or livestock areas to apply dust suppressants, apply gravel, or install shrubs and/or trees within 50 to 100 feet of animal pens. Commercial feedlots and livestock areas are defined as any operation directly related to feeding animals, displaying animals, racing animals, exercising animals, and/or for any other such activity, for the primary purpose of making a livelihood. The rule requires that controls be implemented in compliance with a 20 percent opacity standard.

For its MSM comparison, the plan identifies South Coast Rule 1186 requirements for livestock operations. MSM analysis, pg. C-18, 19. Rule 1186 defines livestock operation as any operation directly related to the raising of more than 50 animals for the primary purpose of making a profit or for a livelihood. The rule requires any owner/operator of a livestock operation to cease all hay grinding activities between 2 and 5 p.m. if visible emissions extend more than 50 feet from a hay grinding source. The rule also requires that any owner/operator of a livestock operation to treat all unpaved access connections and unpaved feed lane access areas with either pavement, gravel (maintained to a depth of four inches) or asphaltic road base.

The MSM study argues that the South Coast rule imposes similar requirements on cattle feedlots as Rule 310.01. However, we do not agree with this conclusion because it is based on the premise that Rule 310.01 applies to unpaved roads located at livestock operations which is inaccurate. Also, the MSM comparison does not specifically state why Rule 310.01 requirements are equivalent to Rule 1186's requirement that livestock operations cease all hay grinding activities between 2 and 5 p.m. if visible emissions extend more than 50 feet from a hay grinding source.

Therefore, we have independently reviewed South Coast Rule 1186 requirements and Rule 310.01 requirements for cattle feedlots, collecting available information on sources to which the rules apply.

South Coast does not have any cattle livestock farms, so its requirements apply primarily to dairies. There are 250 dairies subject to Rule 1186, with the number of cows totaling approximately 300,000 head.[93] Rule 1186 does not address fugitive dust emissions from cow

[93] Similar to Maricopa County, this source category is also de minimis in the South Coast with respect to the PM-10 standards.

activity on the land, but instead controls dust from unpaved roads and hay grinding. Rule 310.01 does address fugitive dust emissions from cow activity on the land, but does not control fugitive dust emissions from roads and hay grinding. The unpaved roads associated with these farms are typically low traffic (e.g. 10-20 ADT). Phone conversation, Karen Irwin, EPA, with Julia Lester, South Coast AQMD, March 21, 2000.

In 1997, there were approximately 115 dairies in Maricopa County, with approximately 107,000 head. 1997 USDA Census of Agriculture - County Data, Table 14 "Cattle and Calves." Since then, the number of dairy farms has decreased to 80 and many of these are located outside of the PM-10 nonattainment area.[94] Similar to South Coast's dairy farms, MCESD indicates that vehicle trips on dairy farm unpaved roads in Maricopa County are low use. See footnote 114. However, unlike South Coast Rule 1186, Rule 310.01 requirements are focused on controlling fugitive dust emissions from disturbed open areas as opposed to unpaved roads or hay grinding activities at dairies. In Maricopa County, dairy cows are typically fed alfalfa hay. Hay grinding activities occur primarily at feedmills, which are permitted sources and thus already subject to other requirements. See footnote 114.

Because the strategy chosen by MCESD differs significantly from that of South Coast, we find that the two regulations cannot be adequately compared to each other with respect to stringency for dairy farm controls. By default, we do not deem either regulation more stringent than the other, given that they both control distinct aspects of dairy farm operations.

South Coast Rule 1186 may also be construed to apply to horse farms. In Maricopa County, there are several horse farms but they do not typically contain large numbers of horses. See footnote 114. This premise is supported by County-wide statistics on horse farms. In 1997, there were 671 horse farms in Maricopa County, with a total of 7,089 horses. 1997 USDA Census of Agriculture - County Data, Table 18 "Horses and Ponies." The average number of horses per farm, based on these statistics, is approximately 10.5. This suggests that most horse farms in Maricopa County are well below the 50 animal threshold to which South Coast Rule 1186 applies. Also, since we only have County-wide statistics, it is likely that there are many fewer horse farms actually located within the Phoenix PM-10 nonattainment area. For these reasons, we believe it is unnecessary for MCESD to adopt the same requirements as South Coast for these sources to meet MSM.

We have also identified Imperial County Rule 420 requirements for livestock feed yards as an another potential MSM. The PM-10 emissions inventory relied upon at the time the rule was adopted by the Imperial County Air Pollution Control District (APCD) indicated that

[94] Information regarding cattle feedlots in Maricopa County was relayed in three separate phone conversation between Jo Crumbaker, MCESD, and Karen Irwin, EPA, on February 25, March 23, and March 28, 2000.

livestock yards contributed the greatest percentage of PM-10 among all source categories (approximately 38 percent). The rule requires that livestock feed yards develop and submit to the Imperial County APCD a dust control plan. The dust control plan must contain procedures for assuring manure at all times is maintained at a moisture factor between 20 percent and 40 percent in the top three inches in occupied pens. The dust control plan is also to contain an outline of manure management practices.

MCESD has indicated that there is only one feedlot located in the Maricopa County PM-10 nonattainment area.[95] This source category contributes a trivial amount to the PM-10 emissions in the area. Therefore, we believe it is unnecessary for MCESD to adopt the same requirements as Imperial County for these sources to meet MSM.

Incinerators (part of the fuel combustion source category)

The Phoenix plan identifies Clark County's Rule 26 as having a more stringent opacity limit than MCESD's Rule 313. Clark County limits opacity from existing incinerators to 5 percent while Maricopa's limit is 20 percent. MAG plan, Table 10-7.

Incinerators are a very small source in the Phoenix nonattainment area. In 1994 there were 32 incinerators that together emitted 2.56 metric tons per *year* (7.1 kg per day).[96] 1994 Regional PM-10 Inventory, p. 4-17. Since 1994, the medical waste incinerators in this category have shut down and today there are even fewer emissions. See email, Jo Crumbaker, MCESD to Frances Wicher, March 22, 2000.

Because incinerators are so small a source and controls on them would not advance the attainment date, we find that the MAG plan can provide for the inclusion of MSM to our satisfaction without including Clark County's opacity limit for incinerators.

Charbroiling

Emissions from charbroiling and frying meat are estimated to 0.6 mtpd or 227 mtpy. 1994 Regional PM-10 Inventory, p. 4-25. This is 0.4 percent of the daily directly-emitted PM-10 inventory in 1994 and 0.4 percent of the annual inventory in 1994.

MCESD has committed to develop a new rule requiring existing and new chain-driven

[95] Op. Cit., Jo Crumbaker, March 30, 2000. Information from Bes Aja of the Arizona Cattlemans Association.

[96] These amounts are 0.005 percent of the total daily inventory and 0.005 percent of the annual inventory.

and underfired charbroilers, typically found in restaurants specializing in grilled meat products, to be equipped with emission control equipment. South Coast is developing a new rule to deal with underfired charbroilers and MCESD will wait until South Coast completes its rulemaking to adopt this measure. MCESD initially projected adoption of its rule in Spring, 2001. Maricopa County commitments, Revised Measure 23. However, South Coast has delayed adoption of its rule until late 2001, also delaying MCESD's adoption.

We find that implementation of this rule is expeditious. Waiting on South Coast to complete its rulemaking, which will establish control requirements for underfired charbroilers, is appropriate given that the South Coast rule when adopted will set MSM for controls on charbroilers. We note that because the South Coast rule has not been adopted nor has its standards been achieved in practice, the proposed South Coast rule does not represent MSM under 188(e).

This section prepared by Karen Irwin and Frances Wicher.

EXTENSION REQUEST – DEMONSTRATE ATTAINMENT BY THE MOST EXPEDITIOUS ALTERNATIVE DATE PRACTICABLE AFTER DECEMBER 31, 2001

Requirement:	CAA section 188(e) allows states to apply for an extension. At the time of application the state must submit a SIP revision that demonstrates attainment by the most expeditious alternative date practicable. CAA section 189(b)(1)(A)(ii) requires serious area plans that demonstrate the impracticability of attainment by December 31, 2001 to demonstrate attainment by the most expeditious alternative date practicable.
Action:	Approve
Proposal Cites:	Annual standard: 65 at 19985 24-Hour standard: 66 at 50275
Primary Guidance Documents:	EPA modeling guidance documents (cited below)
Primary Plan Cites:	MAG plan, Chapters 7, 8 and 10 Microscale plan MAG TSD ADEQ TSD BMP TSD

What are the statutory and policy requirements for attainment demonstrations?

CAA section 189(b)(1)(A)(ii) requires serious area plans that demonstrate the impracticability of attainment by December 31, 2001 to demonstrate attainment by the most expeditious alternative date practicable. This demonstration must be based on air quality modeling. CAA section 188(e) allows the EPA to extend the attainment date for a serious PM-10 area beyond December 31, 2001, if the state applies for it and certain other conditions are met. However, section 188(e) requires that at the time of application, the state submit a SIP revision that demonstrates attainment by the most expeditious alternative date practicable.

There are two parts to reviewing a modeled attainment demonstration: 1) evaluating the technical adequacy of the modeling itself, and 2) evaluating the control measures that are relied on to demonstrate attainment. We will treat each part separately.

How are these requirements addressed in the plan?

See discussion below.

Does the plan meet the statutory and policy requirements?

For the reasons discussed below, we find that the Phoenix serious area PM-10 plan demonstrates attainment by the earliest date practicable after December 31, 2001 as required by section 189(b)(1)(A)(ii) of the CAA

We also find that the attainment demonstration relies on control measures that either are already approved or are being approved with action and meet our SIP enforceability criteria; that the emissions estimates assigned these measures in the attainment demonstration are reasonable; and the measures are being implemented on a schedule that is as expeditious as practicable and will result in attainment by the earliest practicable date. See discussion below.

Air Quality Modeling

Air Quality Modeling

1. Introduction - How the plan submittals fit together
2. Modeling requirements
3. Overall modeling approach -- conceptual evaluation
4. Microscale analysis (ISC)
5. Supplemental microscale analysis for Gilbert and West Chandler
6. Regional analysis (UAM-LC)
7. Agricultural measures; land use issue
8. Conclusion

1. Introduction - How the submittals fit together

The modeling treatment of the 24-hour and annual standards is somewhat intertwined in Phoenix serious area PM-10 plan. Over a four year period, Arizona has made three submittals that contain elements of the attainment demonstrations for the two PM-10 standards: the 1997 Microscale plan, the revised 1999 MAG plan, and the 2001 BMP TSD. A more complete description of these submittals can be found in section 1 of this TSD. This introductory section describes how these fit together to create the overall attainment demonstration for each standard.

The attainment demonstration for the 24-hour standard is divided into two parts, a microscale analysis and a regional analysis. Portions of a microscale or localized analysis are in all three submittals: an initial description of approach and attainment demonstration for two

monitoring sites in the microscale plan, an assessment of reductions need for attainment at two agriculture-affected sites in the MAG plan, and finally the analysis of the agricultural measures in the BMP TSD. The regional analysis is contained in the MAG plan covers both the 24-hour and annual PM-10 standards.

The first of the three submittals, the 1997 Microscale plan, contains a microscale, or localized, inventory and ISCST modeling analysis of 24-hour standard exceedances at four monitoring sites in the Phoenix area: Maryvale, Salt River, West Chandler and Gilbert. It shows attainment of the standard at the Maryvale and Salt River sites but does not demonstrate attainment for the Gilbert and West Chandler sites, both of which had substantial emissions from agricultural sources.

The second submittal, the 2000 revised MAG plan contains a regional modeling analysis of both the 24-hour and annual exceedances using the UAM-LC model and also uses the ISCST model to determine that a 58 percent reduction in agricultural emissions is needed to attain the 24-hour standard at the Gilbert and West Chandler sites. However, at the time of its submittal, Arizona had not yet completed adoption of its BMP rule and also had not yet quantified the expected reductions from rule and was unable demonstrate attainment at these sites.

Because the Microscale plan and MAG plan do not by themselves demonstrate attainment of the 24-hour PM-10 standard, the State made a third, supplemental submittal in 2001, the BMP TSD which documents the expected emission reductions from the BMP rule. While it does not contain new modeling, it does show that the BMP rule's emission reductions, together with a reasonable estimate of land use change, provide more than the 58 percent needed for attainment at the Gilbert and West Chandler sites.

In summary, the three submittals that make up the attainment demonstration for the 24-hour and annual standards in the Phoenix area are:

1. 1997 Microscale plan
   - localized analysis of 24-hour PM-10 using ISCST model
   - shows 24-hour attainment for Maryvale and Salt River microscale sites
   - shows available measures insufficient for Gilbert and West Chandler

2. 2000 Revised MAG plan
   - regional analysis of 24-hour and annual PM-10 using UAM-LC model
   - shows 24-hour and annual attainment for whole area
   - estimates reductions needed for Gilbert and West Chandler sites using ISCST (this is addressed in the "ADEQ TSD", Appendix C, Exhibit 3 in the MAG plan)

3. 2001 BMP TSD

- shows the BMP rule emission reductions suffice for attainment at Gilbert and West Chandler

None of these submittals provides an explanation of how they work together as a complete attainment demonstration for both PM-10 standards. Rearranging the above descriptions according to how they address the two standards, one finds that the annual PM-10 standard is addressed the only in the second submittal, the MAG plan, which contains a regional analysis, covering all locations at once using the UAM-LC model. The 24-hour Standard is addressed the in all three submittals. As with the annual standard, the plan addresses the 24-hour PM-10 standard using a regional analysis in the MAG plan. The plan also addresses the 24-hour standard in each of the three submittals via a localized or microscale analysis using the ISCST model. Analyses for the Maryvale and Salt River microscale sites is completely contained in the first. The analysis for the Gilbert and West Chandler sites is spread among the three, respectively showing that 1) available measures are insufficient for attainment, 2) 58 percent control on agricultural sources would be sufficient, 3) the agricultural BMPs, together with a reasonable estimate of land use change, provide more than the 58 percent needed for attainment.

TABLE MOD-1
ATTAINMENT DEMONSTRATIONS IN THE MAG PLAN

PM-10 STANDARD	MICROSCALE PLAN	MAG PLAN	BMP TSD
Annual	—	evaluated, attainment demonstrated	—
24-hour regional	—	evaluated & attainment demonstrated	—
24-hour Maryvale	evaluated, attainment demonstrated	—	—
24-hour Salt River	evaluated, attainment demonstrated	—	—
24-hour Gilbert	evaluated & attainment not demonstrated	evaluated & reductions needed for attainment calculated	showed reductions from measures (including BMP rule) sufficient for attainment
24-hour West Chandler	evaluated & attainment not demonstrated	evaluated & reductions needed for attainment calculated	showed reductions from measures (including BMP rule) sufficient for attainment

2. Modeling requirements and guidance

General. The basic attainment demonstration requirement is that the states show that enforceable control measures will be sufficient to reduce ambient 24-hour average PM-10 concentrations to under 150 $\mu g/m^3$ by the end of 2001 and annual PM-10 concentrations to under 50 $\mu g/m^3$, or if attainment is impracticable by that date, as expeditiously as practicable but no later than the end of 2006 (CAA section 189(b)(1)(A)). We have issued several guidance documents and memoranda that prescribe PM-10 modeling procedures. However, this available guidance is not comprehensive and is sometimes aimed only at moderate, rather than serious, PM-10 plans. Interpretation and judgement is therefore need in applying the guidance; also, the guidance explicitly recognizes that case-by-case evaluations of SIP modeling may be needed at times.

The attainment demonstration must be based on some form of air quality modeling. CAA section 189(a)(1)(B). The *PM-10 SIP Development Guideline* (EPA-450/2-86-001, June 1987, "*PSDG*") specified that, in order of preference, the modeling used in the demonstration can be 1) a combination of receptor and dispersion models, 2) dispersion models alone, or 3) two receptor models alone if dispersion modeling is inappropriate. For completeness (40 CFR 51 Appendix V, 2.2(e)), the SIP should include input and output data, including meteorological data, justification for the models used, for any off-site data used, and assumptions and settings used in the models.

Appropriate model use, such as the modeling of projections with allowable emissions rather than actual and the preparation of meteorological inputs, is described in the *Guideline On Air Quality Models (Revised)*, 1986 ("*GAQM*"), and in the user guides for particular models. *GAQM* 7.2.2 calls for the use of ISC2 ("Industrial Source Complex" model, ISCST2 or ISCLT2) for source-specific analyses of complicated sources of PM-10, and urges that receptor models be used in conjunction with dispersion models. *GAQM* 7.2.2 also states that a case-by-case approach is needed, for example if area sources are predominant (which is the case in the Maricopa area). The *Protocol for Applying and Validating the CMB Model* (EPA-45/4-87-020, May 1987) should generally be followed when the Chemical Mass Balance (CMB) model is used. Performance of models used should be evaluated in the SIP. If both receptor and dispersion modeling techniques are used, as preferred, the results should be reconciled using the *Protocol for Reconciling Differences Among Receptor and Dispersion Models* (EPA-450/4-87-008, March 1987).

Generally receptor models, such as the Chemical Mass Balance Model (CMB), cannot distinguish between the many source categories that create fugitive dust, like roadway dust, vacant lots, construction activities, etc. Thus for fugitive dust-dominated areas, the default recommendations for model selection, receptor and dispersion modeling combined, are not adequate. Previous work, as well as work done for the current plan (e.g., inventory summary in MAG plan modeling TSD, Table II-1, page II-9), has shown that the predominant portion of PM-

10 in the Phoenix area is fugitive dust. Because of this, we did not recommend that MAG pursue receptor modeling.

When an EPA-approved model such as ISCST or UAM is used in permitting of point sources, normally no model validation is required; it is assumed that the testing procedures by which the model became approved suffice. However, for a SIP it is desirable to evaluate the model results to ensure that the area's exceedances are being reasonably replicated. This is especially true when the emissions input to the model are uncertain, such as when fugitive dust is a major component. A formal study in accordance with EPA guidance on model acceptability is not necessary, but there should be some evaluation of the model's performance, with consideration given to the interaction of meteorological inputs and the emissions from contributing pollution sources.

Area-wide (regional) modeling. For reasons discussed in the next section, Arizona used regional modeling in developing the annual standard demonstration but used both regional scale and local scale analyses in developing the 24-hour PM-10 attainment demonstration. Somewhat different guidance applies to these two approaches. There is little guidance for regional or area-wide PM-10 modeling — as opposed to receptor and source-specific modeling — for PM-10. *GAQM* 7.2 states that RAM or CDM 2.0 should be used for urban-wide analyses. These two models are now outdated; the current dispersion model is ISCST3 (ISCST2 at the time the plan was prepared); it has all the capabilities of RAM and CDM. For carbon monoxide, for which RAM was formerly the recommended model, we now recommend the use of UAM ("Urban Airshed Model"). Since primary PM-10 is also an inert pollutant, and we also originally recommended RAM, a parallel with carbon monoxide makes it plausible to use UAM for PM-10.

There is no recommended model for analyzing secondary particulates (which form chemically in the air from precursors like ammonia and oxides of sulfur and nitrogen); a case-by-case approach (including possibly rollback) may be used (*GAQM* 7.2).

We do have extensive guidance on area-wide modeling of ozone and carbon monoxide. We have therefore used the existing guidance for these pollutants modeling in evaluating the plan's area-wide modeling (*Guideline for Regulatory Application of the Urban Airshed Model*, EPA-450/4-91-013, July 1991; *Guideline for Regulatory Application of the Urban Airshed Model for Areawide Carbon Monoxide*, EPA-450/4-92-011a and b, July 1992). It should be kept in mind that, strictly speaking, the ozone and CO modeling guidance is not binding on PM-10 SIP modeling. Thus, we have flexibility in using the criticisms and concerns raised below in determining acceptability of the submittal's modeling, e.g. in emission and other input preparation and in model performance.

Localized (microscale) modeling. Our guidance on attainment demonstrations generally assumes that the entire nonattainment area will be modeled using a dispersion model. However,

emissions inventory development and modeling for areas with substantial fugitive dust problems, such as the Maricopa area, has proved difficult, because fugitive dust emissions' marked uncertainty and their temporal and spatial variability. Accurately estimating emissions for input to dispersion modeling of fugitive dust over a large area is much more difficult than for point sources of gaseous pollutants, which were the archetypes for development of much of the modeling guidance.

Partly because of this emissions inventory uncertainty, initial EPA PM-10 guidance (*Receptor Model Technical Series, Volume I, Overview of Receptor Model Application to Particulate Source Apportionment*, EPA-450-4-81-016a, July 1981 p. 27; *PM-10 SIP Development Guideline*, section 6.4.2) put forward alternatives such as Chemical Mass Balance and the microinventory method, which focus on analysis of concentrations at specific monitoring sites. Even for these alternatives, the sites analyzed were to be shown to be "controlling", i.e., the resulting emission reduction targets were to be shown sufficient for attainment throughout the nonattainment area. The guidance does not describe how to make this showing, but some justification should be provided on how the sites chosen are "worst case" in the sense of resulting in the most stringent control requirement, or at least representative of exceedances.

The idea of intensively inventorying and modeling a small area is a reasonable one for assessing pollutants like PM-10, which is emitted near ground level and has relatively sharp spatial gradients as dust settles out with distance from the source, and hence has more localized effects than the other criteria pollutants, which are typically buoyant and gaseous. A focus on nearby source types and their activity levels is especially appropriate for fugitive PM-10 emissions, with their dependence on local soil characteristics and micrometeorology.

3. Conceptual evaluation of SIP submittal's overall modeling approach -- microscale and regional

Microscale analysis. The default assumption for an attainment demonstration is one that covers every point within the nonattainment area; the plan submittal's microscale approach focuses its analysis on small areas within the overall nonattainment area. This section of the TSD provides justification for the conceptual basis of the microscale approach. Note that the submittal does contain a regional analysis as well; these two independent analyses make for a stronger modeling demonstration.

The division between "microscale" and "regional" analyses reflects the result of a series of discussions between us, ADEQ, MCESD, and MAG regarding how the serious area plan's attainment demonstration could best address the area's PM-10 standard exceedances. The microscale approach is more fully described in *Microscale Monitoring and Modeling Protocol for the Maricopa PM-10 Nonattainment Area* by Harding Lawson Associates, 8/31/94 ("protocol"), and some of the following discussion also appears in our comment letters (10/17/94,

10/31/94) on the microscale protocol.

PM-10 from fugitive dust tends to be a localized pollutant because of its rapid deposition. As a result, ambient concentrations of PM-10 due to a fugitive dust source fall off with distance from the source much more rapidly than the ambient concentrations due to gaseous pollutants like CO, which have a longer atmospheric life-span. This is especially true for ground-level sources such as the fugitive dust that is the main PM-10 emission source in the Maricopa area. This observation has been borne out in earlier ADEQ work as well as in the Microscale plan itself. An intensive emissions inventory and modeling analysis of the area in the immediate vicinity of monitors exceeding the standard — a "microscale" analysis — a is thus a reasonable approach for an attainment demonstration. (Note: The term "microscale" is used in EPA monitoring regulations — a 40 CFR part 58, Appendix E, and elsewhere — a to mean a scale of several to one hundred meters. In the Maricopa microscale plan, its meaning is in opposition to "regional".)

The submittal's approach is an extension of the microinventory method recommended in early EPA guidance (cited above), under which intensive inventory work was done for areas near monitors exceeding the standard, to be used in a rollback attainment demonstration (concentration assumed directly proportional to emissions). The Phoenix plan’s microscale approach goes further in that it uses dispersion modeling in conjunction with the inventory. It thus gives a better indication of the relative impact of sources at the monitor, instead of just assuming that emissions from sources contribute to monitored concentrations independent of distance and meteorological conditions. It also allows an assessment of their effects at locations other than the monitor.

Under the microscale approach, the areas around the exceeding monitors are deemed to be representative of locations throughout the nonattainment area. Attainment is demonstrated at locations representing the mixes of emission sources that occur in the area. (This is somewhat analogous to ambient monitoring: a monitoring network that reliably assesses the attainment status of an area is composed of monitors at representative locations.) Although a given emitting activity, such as new housing construction, will eventually decline in a given location, it will reappear elsewhere as the metropolitan area grows. A location that is currently experiencing a lot of construction can thus be used to represent locations where construction will occur in the future. Strengthening the argument for the adequacy of the microscale approach is the fact that all locations exceeding the 24-hour PM-10 standard were subjected to such an analysis: a demonstration of attainment at these locations will show that the mixes of sources that in practice cause exceedances will be controlled sufficiently to meet the standard.

The approach is not a monitor-only attainment demonstration since these sites contain a mix of sources that represent other locations in the area, and the controls are applied over the entire nonattainment area. Further, the controls persist in time, thus applying to emitting

activities that would otherwise cause PM-10 exceedances at different places in the future. These considerations make the approach consistent with, and somewhat superior to, the idea of basing an attainment demonstration on "controlling" sites, per the *PM-10 SIP Development Guideline* (section 6.4.2).

A final argument supporting the microscale approach is that for fugitive dust sources, validation of a model used at this local scale seems more likely than on a large scale, for which of necessity the inventory inputs must be more generic, and represent more numerous sources. This also applies to the temporal scale: model replication of a 24-hour event requires more tailored emission inputs than would modeling for the annual PM-10 standard. Finally, given limited resources, it makes sense to thoroughly examine what are known to be the main pollution problems, based on past observation and analysis.

Regional analysis. Although there is solid reasoning underpinning the microscale approach, there was concern that for a large urban area the sheer number of sources, especially fugitive dust area sources, could make for a pervasive "regional" component of PM-10 in addition to the more localized or "microscale" component. Additionally, a portion of PM-10 is fine particles, which can stay suspended longer and so can be transported greater distances than coarse particulate.

Fine particulate includes secondary particulate, which form chemically in the air from precursors like ammonia and oxides of sulfur and nitrogen. Secondary particulate is formed by chemical reactions in a mixture of emissions from various sources, spread over hours and a spatial scale of 10's of km. Like ozone, it is a regional pollutant, and so needs to be modeled on a larger scale. Though only a small fraction (4 percent) of the total PM in the Maricopa area, secondary particulate is present. While this "regional component" could partly be addressed by adding a background concentration to microscale modeling, the determination of a "background" is ambiguous since it includes the effect of sources similar to those in the microscale domain. For these reasons, we required that the Phoenix plan include regional modeling for the 24-hour standard.

Annual PM-10 standard. The 24-hour PM-10 standard is addressed by both microscale and regional analyses. However the annual PM-10 standard is addressed only via a regional analysis; there is no localized analysis of the annual standard. While this could have been done, it was not, for several reasons. The main reason is that the microscale study during 1995 was focused on the 24-hour standard, which the area exceeded to a greater degree than it did the annual standard, and for which a timely response to the court order was possible. Also, it was felt that the hypothesized "regional component" that could be handled in a regional analysis was more likely to show up on an annual basis, since by assumption it involves a larger temporal and spatial scale than the microscale component. We view the microscale analysis as something additional and valuable that was performed for the 24-hour standard, rather than as an analysis necessarily required for both standards.

4. Microscale Analysis (ISC)

This section discusses modeling in the 1997 Microscale plan, and is very similar to the corresponding portion of our TSD for the rulemaking on that plan.

Model selection and domain definition. The choice of the ISCST2 model (Microscale plan TSD, p. 4-12) for analyzing sub-areas is in accordance with EPA guidance (*GAQM* 7.2.2). FDM, the Fugitive Dust Model, might also have been considered, given its ability to model the effect of an area source within the boundaries of the source itself. The area source algorithm in ISC2 does not have this capability. Still, given FDM's other limitations, ISC2 is a reasonable choice, and is an EPA-approved model, as discussed above. (If the work could have been done later, ISC3 would have been appropriate, since it uses FDM's improved area source algorithm.)

The domain definition description does not fully explain how changes in emission density or local meteorological measurements were used in determining the boundaries. The microscale plan implies or states (Microscale plan TSD, p. 4-2, 4-23 ff, 4-37 ff, 5-2) that SCREEN2 and ISCST2 were used to see how near a source had to be to have a noticeable impact at the monitor, and also to see which areas needed higher resolution because of their greater influence at the monitor. (See also discussion of background concentration, below.) It is implied that this analysis was used to reduce the sizes of the modeling domains to just the contributing source areas. This seems like a reasonable approach, but a more complete explanation and would have been helpful.

An emission grid cell size of 400 meters was chosen for the West Chandler sub-area, with the domain initially a square 6 miles on a side, then reduced to a single square mile (Microscale plan TSD, p. 5-1). The cell size for Gilbert (202 m) is smaller (Microscale plan TSD. p. 4-3), but even this seems coarse for a modeling receptor grid for a “microscale approach.” The domain for Gilbert ended up being a single city block, a rectangle about 1/4th of a mile on a side.

Meteorological and emissions inputs. As described in the microscale protocol, the microscale study took place throughout the 1995 year. In addition to the standard AP-42 emission methodologies, and some other prior special studies for particular source categories cites in the submittal, the microscale study included field surveys, aerial photography, examination of activity logs, and interviews with source operators. This resulted in a substantially better emissions inventory data than is usually available, overcoming this difficulty of previous efforts. In addition, the use of portable PM-10 samplers and on-site meteorological measurements further enriched the database, though this information is not summarized in the submittal. Together, these provided a strong basis for the microscale modeling.

No local wind data or windroses are provided for either the West Chandler or Gilbert sites, though the Microscale plan notes that meteorological monitoring was done for each

modeled sub-area, and summaries of the exceedances' meteorological conditions are provided (Microscale plan TSD, p. 3-1 ff). At one point the plan states that upper air data from Tucson was used; at another it states that "pseudo" data was used; at yet another it mentions data from the Bullhead City SIP. In any case, what the data to use is somewhat of a judgement call, as nearby upper air data is typically not available, so this is not a major issue, though again a fuller description would have been useful.

Site selection. The rationale for the choice of sites is explained in the protocol, and in the submittal (Microscale plan TSD, p. 2-2). Based on past emissions inventory and modeling work, the agencies identified several fugitive dust source categories as being especially important for PM-10 exceedances, mainly urban lots, highway and other construction activities, agricultural activities, and some known industrial sources. Sites were chosen in areas of high emissions density: South Phoenix for its mix of urban sources; Salt River for its proximity to industrial sources; West Chandler for its nearby highway construction; and East Chandler for its mix of urban and agricultural sources. Later, the Gilbert and Maryvale sites were added because of the exceedances observed during the field study. These are characterized by nearby agricultural land and by park landscaping (i.e., a large area of disturbed, unstabilized ground), respectively. These sites represent a good cross-section of the emission sources known in the Maricopa area, and given the monitored exceedances can be considered representative of exceedance conditions. It cannot be known with certainty whether they are “worst case” in the absolute sense, given the necessarily finite number of monitors, but are certainly a good choice from among those available, and address the standard exceedances that were observed.

East Chandler was later dropped, because there was insufficient source activity information to develop a useable modeling inventory. This is regrettable, but the West Chandler exceedances turned out to have the similar causes, stemming from windblown dust during high winds from a mix of urban and agricultural sources. In addition, the Gilbert site had similar source characteristics, a mix of urban and agricultural sources. Thus, the dropping of East Chandler is not a problem for the attainment demonstration. It was reasonable not to attempt to model it without the detailed emission information necessary to the microscale approach.

Episode selection. Episodes were selected from among exceedances observed during the 1995 field study; this is appropriate given the basis of the microscale approach is modeling of days for which an intensive database is available. The submittal (Microscale plan TSD, p. 4-16) stated that a single episode day was to be chosen, but since in the microscale approach each event and site is modeled independently, this was not strictly necessary. In any case, because of data shortcomings for the other days, the selected episode, April 9, 1995, was definitely the best choice for the West Chandler and Gilbert sites.

Background concentration. Modeling accounts for the natural and anthropogenic sources that are not explicitly handled in the modeling analysis; the background is added to the model predictions. In EPA guidance (*GAQM* 9.2), background is to be determined from a regional

background monitor, or from monitor(s) that affect the receptor during meteorological conditions of concern (e.g., upwind). Ideally, a background monitor is not itself influenced by nearby sources. An additional component of background is that due to nearby sources, which in multi-source areas should be explicitly modeled; *GAQM* suggests trial and error analyses to help determine which nearby sources should be included in the modeling.

The latter component is dealt with though the definition of a modeling domain (Microscale plan TSD p. 4-24 ff), in which SCREEN and ISC were used to delimit the region contributing substantially to the microscale monitor locations. The Microscale plan appears to be in accordance with GAQM recommendations in this area.

The plan (Microscale plan TSD, p. 4-15 ff) lists the steps used in developing background concentrations for sites other than Salt River, but is not clear, and does not state how the final cell backgrounds and isopleths were used in the modeling. Wind speeds and directions for particular hours are stated to have been used in determining which grid cells influenced the monitors, but it is not clear how. Assigning a background concentration to a cell based on its land use being similar to the land use of a monitor, which seems also to be stated, would not be making use of that wind influence information. Still, even if this is what was done, it would not be a bad procedure, given that the predominant influence at a point will typically be the land use nearest that point. (An alternative would have been to express each monitor's concentration as the sum of the cells influencing it for each hour's wind speed and direction, and from these to tease out the individual cell-monitor contributions, perhaps by regression.)

The use of neighborhood scale monitors for determining background is appropriate — microscale sites with known nearby sources could not be used as background. Still, this choice underlines a limitation of the microscale approach: these monitors have PM-10 concentrations above natural background, yet are assumed not to be influenced by nearby sources — i.e., a microscale approach cannot explain concentrations at these monitors. The term “microscale” is used in a different sense in the submittal than in the our regulations on monitoring (e.g. 40 CFR 58). In these regulations, “microscale” means from several to 100 meters, “neighborhood scale” means from 500 to 4000 meters, i.e. roughly one third to 2½ miles — the latter are approximately the scale of the submittal's "microscale" modeling domains. It seems puzzling that this size is what a “background” monitor represents, but also the size of the area that must be explicitly modeled. Alleviating this difficulty would require that the background sites themselves be modeled — but that would lead to regional scale modeling, which would be outside the microscale approach. Overall, within this approach, the chosen method is perhaps the best that could be used.

In any case, the method used apparently worked well, considering the decent agreement between model and observation. In addition, as mentioned above, the constant background represents a conservative attainment approach, and in any case represent a regional scale issue addressed in the regional analysis.

Model validation. Tables 5-1 and 7-2 of the Microscale plan's TSD (p. 5-4 and p. 7-17) compare model predictions to the observations. Though a full model evaluation need not be done, ideally there should have been an evaluation of model performance at more that just at one point, which in the submittal was the monitor or nearby. Isopleths of model predicted concentration would aid in this, as would quantitative comparisons to any monitoring data available from portable samplers used during the study.

Model predictions' agreement with observation is not great, but also not terrible (from Table 5-1, p. 5-4 and Table 7-2, p. 7-17):

TABLE MOD-2
PM-10 MICROSCALE MODELING PREDICTION
WEST CHANDLER AND GILBERT
Fg/m³

SITE	SITE OBSERVATION	ISCST2 VALUE	BACKGROUND	PREDICTION
West Chandler	463	235	80	315
Gilbert	182	123	90	213

Source: Microscale plan TSD, Table 5-1, p. 5-4 and Table 7-2, p. 7-17

It is notable that the background is a high percentage of the total. This indicates a limitation of the microscale approach, the key assumption of which is that exceedances are caused by nearby sources. If that were completely true, one would expect the backgrounds to be lower. Nevertheless, overall this is good performance. Gaussian dispersion models do well to predict concentrations at a particular time and place within a factor of two, while remaining reliable for predicting the maximum over a set of times and places, such as for standard compliance demonstrations.

Attainment demonstration. The Microscale plan's attainment demonstration approach within each sub-area or modeling domain was proportional rollback, based on dispersion modeling. Every attainment demonstration for an inert pollutant is implicitly proportional rollback, so this is acceptable (though the term is often associated with the Chemical Mass Balance model, CMB). The basic rollback assumption is that a given percentage reduction in emissions yields the same percentage reduction in concentration at the receptor — concentrations are "*rolled back*" by emissions changes. The assumption is applied to each source individually, and the individual source changes are added in *proportion* to the sources' contribution to the observed concentration. This can be stated in terms of a formula: let each source i have emissions E_i and contribute X_i to the concentration at the monitor; controls change emissions by ? E_i, leading to in

concentration changes $?X_i$. With this notation, the basic rollback assumption is $?X_i/X_i = ?E_i/E_i$, and the total effect $?X$ of source emission reductions $?E_i$ is:

$$?X \;=\; \sum_i X_i\left(\frac{?X_i}{X_i}\right) \;=\; \sum_i X_i\left(\frac{?E_i}{E_i}\right) \;=\; \sum_i ?E_i\left(\frac{X_i}{E_i}\right)$$

Each source's emissions are rolled back by a percentage, $?E_i/E_i$, the monitor effect of which is proportional to its contribution X_i. For an attainment demonstration, the reductions $?E_i$ must be set so that the sum of their effects is enough to bring the total concentration (including background) down to the Standard. In CMB, the (X_i/E_i) "dispersion factor" is determined though chemical analysis of monitor samples; in ISC and other dispersion models it is determined by dispersion algorithms. For CMB, the "dispersion factor" is assumed independent of distance, but for a dispersion model it varies, allowing a lessening of effect with distance from the source.

The model should be used to evaluate the effectiveness of controls throughout the entire modeling domain — "proportional rollback" at every receptor point. A control strategy sufficient for attainment at the monitor or at the maximum modeled receptor might not be enough at other receptor points, where source contributions would be in different proportions because of the varying distances between the receptors and the sources. There is no information in the submittal about the model receptors chosen (i.e., at what points in space the model is used to predict concentrations). At places the Microscale plan seems to imply that the receptor and inventory grid cell sizes used were the same; they need not have been, and a smaller inventory grid cell size could have reduced the impact of limitations in the ISC2 area source algorithm. On the other hand it could be argued that grid spacing was appropriate given the coarse resolution of available land use information, and in any case this is not a crucial issue, given that the dominant sources are area sources with emissions distributed over the area, rather than point sources. At other places the submittal seems to imply that only the monitor location was used as a model receptor.

Overall, this receptor issue might be important for the Gilbert and West Chandler sub-areas, with their mix of agricultural and construction sources. An array of points within each modeling domain should have been evaluated for standard attainment. Evaluating only at the monitor is weaker than using a full set of receptors throughout the domain, yet still is consistent with the idea of showing attainment via "controlling" sites, per the *PM-10 SIP Development Guideline* (section 6.4.2).

The tables in the initial summary show that the current and planned RACM and BACM are sufficient for attainment at sites of the maximum concentration within each sub-area. While not stated in this portion of the Microscale plan, the controls listed in Tables 4-2 through 4-5 involved enforcement of existing Rule 310 (except for the agricultural source controls), which could be implemented by December 31, 2001. As the sub-areas are representative of the sources

and conditions that lead to exceedances, for the Maryvale and Salt River sites this constitutes an adequate attainment demonstration for the 24-hour PM-10 standard within the context of the microscale approach, with BACM implemented. We approved these attainment demonstrations in our action on the Microscale plan. 62 FR 41856, 41862. However, it did not constitute an adequate demonstration at the West Chandler and Gilbert sites because their contributing sources were not subject to Rule 310, consequently, we disapproved these attainment demonstrations. 62 FR 41856, 41862. (Exceedances due to regional scale processes were be addressed in the MAG plan submittal).

5. Supplemental microscale analysis for Gilbert and West Chandler sites

This section discusses the supplemental microscale modeling included in the 1999 MAG plan, and performed for the Gilbert and West Chandler sites, for which the 1997 Microscale plan did not demonstrate attainment. A description of this modeling appears in the ADEQ TSD found in Appendix C, Exhibit 3 of the MAG plan.

The approach used for this modeling was essentially the same as that already discussed in the previous section of this TSD, with three differences. First, it uses a new calculation of background concentrations to add to the model predictions (see below). Second, it evaluated concentrations at multiple locations, rather than just at the monitor, resulting in a more robust attainment demonstration (ADEQ TSD, page 3-8). Finally, it evaluated various sets of agricultural control measures with hypothetical control efficiencies, in order to determine the emission reductions needed for attainment. It was shown that even with full implementation of MCESD's Rule 310, attainment could not be demonstrated by 2001 (ADEQ TSD, tables 3-1 and 3-2). However, emissions reductions are sufficient for attainment in 2006 at the West Chandler site with the application of a 70 percent BACM control efficiency for vacant lots, and 58 percent control efficiency for agricultural aprons and fields. For the Gilbert site, only 20 percent emission reductions were shown to be needed from agricultural sources. The 58 percent reduction is the target set in 1999 for the agricultural best management practices, which were submitted in 2001 (see section below).

6. Regional Analysis (UAM-LC)

This section discusses area-wide modeling in the MAG plan. As noted previously, the regional analysis is used in the attainment demonstration for the annual standard and the regional component of the attainment demonstration for the 24-hour standard.

Attainment is demonstrated when sufficient emission reductions are in place so that modeled concentrations in every grid square are below the standard.

The Phoenix serious area PM-10 plan shows that with additional controls (including BACM), peak annual PM-10 concentration in 2006 is 49.68 $\mu g/m^3$, which is below the NAAQS

at 50 µg/m^3, thus demonstrating attainment could be achieved. MAG modeling TSD, Table III-11, p. VI-11 and Table VI-3, p. VI-12. The plan also shows that with additional controls (including BACM), peak 24-hour PM-10 concentration in 2006 is 112.6 µg/m^3, which is below the standard at 150 µg/m^3, thus demonstrating attainment. MAG TSD, Table VI-3, p. VI-12.

Choice of model. As discussed above (section on "conceptual evaluation"), generally receptor models are of little use in an area dominated by fugitive dust; this leaves dispersion models, of which there are several types. Both *PSDG* and *GAQM* recommend the ISC model ("Industrial Source Complex" model) for source-specific analyses, and RAM or CDM for urban-wide analyses. These latter two models are now outdated. The current dispersion model is ISCST3; it has all the capabilities of RAM and CDM, and could be considered the EPA-recommended model for both source-specific and urban-wide analyses of PM-10.

RAM, CDM, and ISCST3 are all steady-state Gaussian plume models. "Gaussian" means that the concentration through a cross-section of a pollutant plume from a source has a bell-shaped Gaussian or normal distribution; "steady state" means the plume is assumed to extend in a straight line downwind of the source for a given hour; there is no carry-over of conditions or pollutants from hour to hour. None of these models can simulate secondary particulate formation, so when using them secondary particulates have to be handled in some other way (for which there is no EPA guidance). The steady-state Gaussian plume type of model can be adequate for many circumstances, especially for short-range pollutant transport from well-characterized sources in steady, non-stagnant winds. However, when secondary particulates are of concern, or when there is specific interest in regional effects like transport of PM-10 through or within the area, a Gaussian model's simplistic portrayal of meteorology and plume transport is unlikely to be adequate and another type of model should be used.

For urban area ozone and CO SIPs, we recommend the use of the Urban Airshed Model (UAM) or a model of comparable ability and performance. UAM is an "Eulerian" dispersion model using a grid to represent an area, with multiple vertical layers. Wind and other meteorological variables can vary in each grid cell. Pollutants move between the three-dimensional set of cells, undergoing diffusion, transport, and chemical reactions as they do so. UAM thus provides a far more sophisticated portrayal of the atmosphere than ISC, with more complex interactions between meteorology and emissions. The disadvantage of UAM is that it is correspondingly more difficult to prepare inputs for and to troubleshoot, and as a result requires greater time and expense to run.

We recommend UAM (run in an inert chemistry mode) for carbon monoxide modeling, and with the Carbon Bond IV chemical mechanism for ozone modeling, but there is no EPA-recommended model for secondary particulates. The UAM-LC model has been used in the South Coast (Los Angeles) Air Basin where there is elevated ambient concentrations of secondary particulates. The "LC" designates a Linear Chemistry scheme, a simplified version of the complex chemistry of secondary particulate formation. Because of its relative simplicity, the

LC scheme makes it possible to perform simulations more quickly and economically, an important advantage for simulating PM-10 concentrations where a large number of modeling runs are performed, as was done for the Maricopa SIP.

In summary, given the need to model regional scale phenomena, the shortcomings of steady-state Gaussian models, the desirability of modeling secondary particulates, and the status of UAM in EPA guidance and previous SIP modeling exercises, UAM-LC seems a logical choice for modeling PM-10 levels in the Phoenix area. Appendix I of the MAG plan's modeling TSD, including the modeling protocol and its attached concept paper, follows essentially these same arguments. Since UAM-LC performed reasonably well for the Phoenix Area, we find the MAG plan's choice of UAM-LC to be approvable.

Episode selection. For a short-term standard, such as the 1-hour ozone standard or the 24-hour PM-10 standard, the selection of which air pollution episodes to model is a crucial one and must adequately account for the meteorological and emissions conditions when concentrations tend to be high, as well as data availability for those episode days. The decision in the MAG protocol to model every sixth day, as well as all the exceedance days during the microscale study, nicely addresses this issue and the need to analyze day or episode types. Also, it uses days for which there are PM-10 monitoring data (a key consideration), and results in enough days that it is likely a good selection of day types has been modeled. In total, 65 days were modeled altogether.

In an area with high secondary particulate concentrations the selection of individual days might pose a problem, as the secondary chemistry can require multi-day episodes to develop high concentrations (as do some episodes in the South Coast Air Basin and the San Joaquin Valley); but since secondaries are not the main problem in Maricopa County, this is less of a worry for acceptability of model predictions for total particulates (though it might compromise the model's performance for secondary particulates).

Whether multi-day buildup of PM-10 concentrations due to fugitive dust occurs in Maricopa County is not discussed in the MAG TSD. However, since each day is modeled with an initial “spin up” day preceding it, as is customary in UAM modeling, short multi-day episodes would likely be adequately handled. Longer episodes would not perform well, and this would become apparent later. Since no such problems were mentioned in the submittal, this was presumably not an issue. The possibility of multi-day episodes might have been good to examine, especially if secondary particulates were more of a concern.

One final problem with modeling so many days is that less time can then be spent making sure each one is performing reasonably, which is an issue for this submittal, as discussed below. But on balance, the choice to model a large number of days for which monitoring data is available is a reasonable one.

Domain and grid resolution. As the modeling domain, MAG chose the Maricopa County

portion of the Maricopa PM- 10 nonattainment area. This choice of domain is good for this modeling exercise because its boundaries are in areas with low emissions, it includes the metropolitan area's emissions, and modeling will not tend to be driven by relatively uncertain conditions at the boundary.

Horizontal grid resolution was 2 km, on the low end (higher resolution) of our recommended values (*Guideline for Regulatory Application of the Urban Airshed Model*, section 3.3, hereafter "*GRAUAM*").

The vertical grid matched the typical UAM application with two layers below the mixing height (height below which the atmosphere is fairly well-mixed) and three layers above. The minimum lower layer thickness was 40 m, whereas *GRAUAM* 3.4 recommends 50 m. This initially confines emissions to a thinner layer, leading to higher concentrations, other things being equal. Previous applications of UAM for CO modeling in the Phoenix area and elsewhere have used an even smaller minimum thickness which seemed to be needed for adequate model performance. This difference in minimum lower layer thickness is not of large concern.

The minimum upper layer thickness used was 500 m, whereas *GRAUAM* 3.4 recommends 100 m. This larger layer thickness is consistent with the relatively large mixing heights during the summer in the southwestern United States and also with a large value for the overall height (REGIONTOP) for the 3-D modeling grid.

The MAG TSD contains no documentation explaining the reasoning behind the choices for grid resolution; however, the choices appear reasonable as they are within the range of values typically seen in applications of the UAM model.

Wind, temperature, and mixing height fields. The EPA-recommended wind model for input to UAM is DWM, the Diagnostic Wind Model. The MAG plan used CALMET, which is comparable in functionality to DWM. Both wind models adjust wind flows according to terrain and interpolate between meteorological monitoring site observations of wind speed and direction. CALMET also handles temperature, and can help in determining mixing heights.

Data from several local meteorological networks were used. A considerable amount of preprocessing of the data was required to ready them for CALMET because they were in different formats. Appendix III of the MAG TSD gives example hourly plots of wind speed and direction in two vertical layers for one of the days modeled. They look reasonable, but other than a discussion in the quality assurance section (MAG TSD, pp. III-18 and III-20) of anomalous winds in layer two in the initial runs, there is no discussion of the wind field, which would have enhanced confidence in the model.

Upper air soundings are used to determine the appropriate mixing height. Because complete upper air sounding data is lacking for the Phoenix area, it is necessary to use some

creativity in determining a mixing height field to use with UAM. The MAG TSD (p. III-11) describes a semi-automated procedure for filling in gaps in the nearby Luke Air Force Base soundings with Tucson soundings and Sky Harbor Airport surface data. Given the available data and the large number of days being modeled, this approach is reasonable. Again, other than the description on how they were derived and changes made during the diagnostic stages (MAG TSD, p. III-19), there is little discussion of the mixing heights used in the model and their reasonableness.

UAM-LC was modified to enable a more reasonable handling of the Phoenix area's typically spotty precipitation, which in the original UAM model is handled in too much of an "on/off" fashion. The modification enabled a more realistic treatment of wet scavenging of pollutants, especially precursors to secondary particulates, which were thus prevented from being effectively zeroed out by the model. This approach was a good way to adapt the available modeling tools to the particulars of the Phoenix area.

More discussion of the meteorological fields would have been desirable. In addition to the MAG TSD's abbreviated description of the procedures followed in developing the fields, an account of the fields' physical reasonableness and how they help determine PM-10 concentrations would have been helpful in evaluating the application of the model. While MAG appears to have used reasonable procedures in developing the fields, it is difficult to determine the reasonableness of the results, although we note that the large number of days modeled partly justifies the lack of detail.

Initial and boundary conditions. Initial conditions are the starting concentration values for all the pollutants modeled. Boundary conditions are concentrations that apply throughout the simulation at the edges of the modeling domain and can represent the quality of air that is being transported into the area.

For the initial and boundary conditions for primary particulates, MAG used sampling data from around the modeling domain, with adjustment to ensure that secondary particulates were not double-counted, and incorporating upwind monitoring data for days dominated by high winds.

Initial and boundary conditions for secondary particulate precursors were set at background values taken from EPA guidance and previous applications of UAM-LC in the South Coast Air Basin. These values are appropriate for a relatively isolated urban area like Phoenix where high concentrations are not expected at the edges of the fairly large area encompassed in the modeling domain.

Thus the selection of boundary conditions was a relatively straightforward process and appears acceptable.

Model emissions. Chapter II of the MAG TSD gives a good overview of the process of spatially and temporally allocating emissions to every grid square for every hour modeled. The emission model used, EPS2.0, is EPA's standard emissions preprocessor for use with UAM. It provides a tool for allocating emissions in space and time for input into the model and allows the use of different surrogate variables for allocating different emission categories. Ideally, emissions should reflect activity levels for each hour, as well as the hourly wind and temperature for those source categories whose emissions depend on these variables. In practice, often only profiles of typical daily activity are available which are sometimes broken down by season, month, weekday vs. weekend, or day of the week.

Appendix II, Exhibit 1 of the MAG TSD documents the results of some sensitivity testing on this issue, reporting modeling results showing that the PM-10 modeling results varied very little between seasons; as a result, only two inventories -- for weekday and weekend -- were retained, instead of the eight used in earlier (pre-submittal) modeling work. This is partly because day-specific temperatures make essentially no difference in primary particulate emissions. Because secondary particulates are relatively low in the Phoenix area, a day-specific precursor emissions inventory (that is, NOx, SOx, and ammonia) is correspondingly less important. (Note that the chemistry of secondary particulates is still day-specific in the submittal, as the temperatures used in UAM-LC itself to drive the chemistry were derived from CALMET and actual temperature observations.) Thus, EPA agrees that using just the two inventories (weekday and weekend) was reasonable.

Quality assurance, diagnostic testing, sensitivity testing. The purposes of quality assurance, diagnostic testing, and sensitivity testing overlap somewhat. They have in common providing assurance that the model base case is performing in a reasonable way and confidence that the model will be reliable when used to assess the future effect of control measures. See *GRAUAM*, chapter 4.

Quality assurance focuses on uncovering mistakes in the inputs before the model is run, typically by range checks and graphical plots.

Diagnostic testing involves running the model, possibly with some alternative inputs, to check the model's ability to replicate a given pollution episode. This testing may uncover additional input errors, such as those caused by inputs that are reasonable in themselves but are not consistent with each other. An important goal is to improve model performance, while keeping the inputs scientifically reasonable. (See also discussion below on “counter-balancing errors”.)

Sensitivity testing involves typically large changes in model inputs to assess the model's response (that is, sensitivity) to them, to ensure that the response is physically reasonable. It can uncover errors as well as indicate the inputs to which the model is especially sensitive. The latter can be used as a guide to focusing additional input development efforts and possibly control

measure development.

The minimal set of sensitivity tests listed in *GRAUAM* are: 1) zero emissions, 2) zero boundary conditions, 3) varying mixing height and wind speeds. The first test is typically more useful as quality assurance than as a sensitivity analysis, though in combination with zeroing out the boundary it can help assess the extent that air quality is driven by transport of pollutants from elsewhere.

The MAG TSD contains no documentation that either the zero emissions or zero boundary conditions test were performed. Some diagnostic testing for mixing height and wind speed was performed, so this *GRUAM* recommendation was at least partially addressed. Overall the modeling in the MAG plan did not seem to perform the standard set of sensitivity tests typically done in ozone SIP submittals. Though *GRUAM* was developed for ozone and is not binding on PM-10 submittals, this lack of sensitivity testing is somewhat troubling considering that the regional PM-10 modeling is of comparable complexity to that done for ozone.

The MAG TSD discusses quality assurance of the UAM-LC inputs only briefly (p. III-18), describing range checks of inputs and outputs for the CALMET meteorological program including automated range checking for winds, temperatures, and mixing heights, and visual checks of these plotted against time. During this check, a problem with one vertical layer of winds was found and corrected by changing some CALMET inputs, including the method used to calculate the mean wind for the modeling domain. The MAG TSD in Appendix III, Exhibit 1 provides example plots of the wind fields for the highest PM-10 day (November 29, 1995); however, it is not clear from the document whether such plots were prepared for other modeled days or to what extent those plots were used in quality assurance.

Graphical plots were also made of emission density and of the surrogate factors used to allocate emissions across the modeling domain, providing a useful quality assurance tool. Altogether, while it is clear that useful quality assurance was performed, its extent is not well documented in the submittal.

Diagnostic and sensitivity testing are treated together in the MAG TSD (pp. III-18 through III-21). The MAG TSD provides example plots of modeled PM-10 concentrations for November 29, 1995 (Appendix III, Exhibit 2). The MAG TSD states that model performance was diagnosed using such plots and other statistical methods though the latter are not described. Overall, the MAG TSD provides a useful narrative describing the sensitivity modeling runs and a sequence of changes made to model inputs as a result of examining model results.

In addition to the alternative wind field correcting anomalously high winds (see above), the MAG plan describes tests on: omission of wet scavenging, a shorter model "spin up" period, smaller nitric acid deposition rate, an alternative (Holzworth) mixing height scheme, UAM's layer configuration, and temperature sounding data from a lower height.

The model was found to be insensitive to wet scavenging changes. It was also found to be insensitive to length of spin up period. Days with relatively constant meteorology were chosen for this test, to maximize the effect of the initial conditions; since there was very little difference between the use of one or two spin up days, it was decided to just use one (MAG TSD p. III-21). This was a very reasonable procedure and decision, which saved considerable computer run time.

The MAG TSD describes the nitric acid deposition factors in the UAM-LC model as being too small, though it does not state the reasoning for this conclusion. Increasing the factors by a large amount, thus decreasing the rate at which nitric acid is removed from the atmosphere by deposition, had the effect in the model of only slightly increasing PM-10. The MAG TSD makes a good point that this small increase is reasonable if there is only a limited amount of available ammonia; then there would not be enough ammonia to combine with the increased nitrate to form new secondary PM-10 in the form of ammonium nitrate. However, the MAG TSD does not cite evidence of this ammonia-limited atmosphere. In fact, an earlier study concluded that ammonia in Phoenix is abundant, at least for the period it covered.

However, the insensitivity of the model to this nitric acid deposition factor means that the particular value used is not crucial, so the specific question of nitric acid deposition is resolved. However, if ammonia is indeed abundant, the lack of sensitivity may indicate serious problems in how the model is handling secondary particulate chemistry. This issue is not addressed in the MAG TSD because of the assumption that ammonia was limited.

Given the lack of local upper air sounding data, it was appropriate to examine the sensitivity of the model to alternative ways of supplying input to CALMET for determination of mixing height, which is an important UAM-LC model input. Which height from the Tucson data should be used as input for the first vertical layer in CALMET is a judgement call, as are many of the other CALMET inputs. Using a slightly lower (and thus higher pressure) level was a reasonable diagnostic/sensitivity simulation to try, and is described in the MAG TSD (pp. III-20 - III-21). The small resulting difference in modeled concentrations lends confidence that this particular parameter's precise value is not critical.

The methodology for determining mixing height was also examined, at least for the nine days with the highest PM-10 concentrations. This review is important because a lower mixing height makes for less volume for pollutants to disperse in, and thus resulting in higher concentrations. The MAG TSD (p. III-19) states that mixing heights from CALMET tended to be much lower than those derived from the Holzworth method (a standard method used in many model applications). Together with UAM-LC over-predictions of PM-10, this suggested that the CALMET mixing heights were too low and they were scaled up, though the exact procedure used to do this is not documented.

Since two lines of evidence indicated mixing heights were too low, and there were not local upper air soundings to verify against, it was reasonable to adjust mixing heights upward.

But we note that the model was *under*-predicting for July, and the decision not to adjust July mixing heights seems to have been based solely on the effect on PM-10 concentrations, not on meteorological reasoning. UAM-LC could have been over-predicting for the other months for reasons other than mixing height; selectively "correcting" the over-predictions risks obscuring other potential problems. Given the overall sensitivity of pollutant concentrations to mixing heights, it would have been desirable to perform more extensive meteorological diagnostic testing, as well as other analyses aimed at uncovering possible additional reasons for the over-prediction and possible interactions between different parameters.

In a similar vein, the decision (documented on p. III-20) to use two model layers below the mixing height and three above (instead of the reverse) seemed to be driven by the consideration that this arrangement helped lower the modeled PM-10 over-predictions to improve model performance, though this is not totally clear from the MAG TSD. The documentation mentions weak diffusive transfer due to a slightly stable atmosphere; however, according to one plausible reading of the language in the MAG TSD, it would seem that this stability ought to suppress vertical transfer and thus keep pollutants more concentrated, rather than decreasing concentrations as it was stated to. Thus the reasoning of the MAG TSD is unclear on this point. Either arrangement of layers is acceptable, but the choice should ideally be based more on meteorological reasoning and how that meteorology is portrayed in the model, and less on the goal of improving model performance statistics.

We would also like to have seen additional diagnostic testing involving secondary particulates to ensure that the chemistry is working as it should, e.g., scaling the emissions inventory of one or another precursor. Complexities of the chemistry and of the types of errors that can occur make this especially important for areas with large secondary concentrations. Again, the dominance of primary particulates in Phoenix area makes this less of a concern for conclusions about total PM-10, though the lack of this diagnostic testing raises questions about the model's reliability for predicting the secondary component.

Taken together, these particular diagnostic/sensitivity tests show that substantial analysis of what was going on inside the model was performed during the preparation of the plan submittal. Such analysis is important because improving an over prediction is not in itself a sufficient reason for changing an input parameter. It is important to "get the right answer for the right reason." Using model performance as a guide to changing inputs is necessary, but doing so without understanding how the model is working runs the danger of obscuring other problems in the model inputs or the model itself. Counterbalancing errors may yield adequate base case model performance, yet cause the model to do poorly when emissions are extrapolated into the future. There is no evidence that counterbalancing errors occurred in this MAG plan's modeling, but neither is this potential problem explored fully, and the documentation leaves the impression that improved performance may have been accepted too readily as justification for model input changes.

In defense of the plan's modeling, the dominance of chemically inert primary particulates in the ambient air makes it less likely that hidden counterbalancing errors would make themselves felt in the attainment demonstration. Interaction of the meteorological and other parameters can have profound effects when atmospheric chemistry is involved as it is for ozone and secondary particulate formation. However, secondary particulate contribute only 2-10 $\mu g/m^3$ or around 4 percent of the PM-10 concentrations in the Phoenix Area. In addition, the large number of days modeled necessitated a streamlined, and somewhat mechanical approach to the diagnostic analysis. Finally, the diagnostic/sensitivity tests that were performed provide a reasonable substitute for many of the standard sensitivity tests recommended in the *GRAUAM* ozone guidance, for purposes of model performance for primary particulate.

One additional element that we would have liked to have seen in the MAG TSD is a "conceptual model" of PM-10 exceedances in the Phoenix area. A conceptual model would have identified the primary factors that lead to elevated PM-10 concentrations. Of course, especially high emissions on days with high PM-10 concentrations is an important part of such a model and may be the only important factor contributing. But, for example, a conceptual model might also describe local wind patterns, the location of sources, and their interaction with other meteorological parameters as a typical day unfolds.

In the modeling for the Phoenix plan, the highest predicted PM-10 concentration is in the north-northeast corner of the domain center (at cell 33,36). No explanation is given as to why the highest modeled levels are there. It is puzzling that the concentration is so high there and so much higher than its immediately surrounding grid cells, because there are no nearby cells with especially high emissions density that would readily explain it. Nor is there an explanation in the attainment demonstration why the modeled control measures are effective at reducing this peak (lack of "conceptual model").

While not strictly speaking a requirement for plan submittals, a conceptual model helps to guide diagnostic testing and possibly gives a sense of which control measures would be most effective. It would also help the public better understanding the modeling and its results and provide everyone assurance that the PM-10 problem is well enough understood to be adequately handled in an air quality model.

Despite all of the criticisms discussed above, we finds the modeling approach in the plan acceptable because at worst the result is a form of "modified rollback" which we has accepted in the past for PM-10 SIPs and is supported by our guidance on a case-by-case basis (*GAQM* 7.2.2).

Straight rollback would assume that a given percent reduction in emissions yields the same percentage reduction in concentration. In modified rollback there is also direct scaling, but the concentration may not have the same percent reduction as the emissions do (see also section D.6 above on straight proportional rollback). In the MAG modeling, when emissions decline by 32 percent (from 191 to 130 metric tons per day), the modeled ambient concentration at the

highest monitor declines by 59 percent percent (from 326.3 to 112.6 μg/m^3). (MAG TSD, p. VI-2 , III-42, and VI-12.) The rollback is "modified" in that data and reasoning — in this case the UAM-LC model — are used to make a more intelligent assessment of the effect of emission reductions. Despite the problems cited above, the modified rollback approach used is a more sophisticated approach than straight rollback, taking into account the timing and location of emissions, and transport and dispersion of these through meteorology, over a larger number of days than has been modeled in any previous PM-10 plan.

In summary, the modeling approach is acceptable because even if all the above criticisms are valid, it is still an improvement over rollback, which in itself would be acceptable.

Performance goals and evaluation. A summary of model performance is provided in the MAG TSD, but there is no detailed look provided for any given episode day. This level of detail would be difficult to do for every day modeled, but examination of a selection of additional days would improve our confidence in the ability of the model to predict PM-10.

The performance goals set out in the MAG modeling protocol are based on similar statistical goals for ozone in *GRAUAM*, and on the performance of UAM-LC in the South Coast Air Basin. Specifically, the goal was to have the model predict within 50 percent the matched peak, the bias, and the gross error. (MAG TSD, p. III-25.) There is no EPA guidance on performance goals for regional PM-10 modeling. As a rule of thumb, for individual point source modeling the peak should be accurate within 30 percent; *GAQM* Section 10.1.2 gives a figure of 10-40 percent. Because we are concerned here with not one point source but with a whole region (for which there is little modeling experience) and because of the relative uncertainty in fugitive dust emissions, the 50 percent goals for the three statistics seem reasonable. The model met the performance goals with matched peak under-predicted by 14 percent, bias of 10.8 percent, and gross error of 15.8 percent. (MAG plan, p. III-25, and Table III-8, p. III-37.)

These overall performance numbers are reassuring, though they cannot tell the whole story for something as complex as UAM-LC modeling of an urban area. We also have to be concerned about differences in performance across the modeling domain, and the model's ability to replicate PM-10 concentrations as they evolve throughout a day. We want to have confidence that the model is showing good performance for the "right reasons" as we have discussed above in the section on diagnostic testing. Other than the concentration plots of November 29, 1995 (MAG TSD Appendix III, Exhibit 2), the MAG TSD contains no documentation of how PM-10 concentrations evolve throughout a day; there is no information on how well UAM-LC matches the diurnal PM-10 pattern at particular monitors.

The MAG TSD does contain tables and plots of the observed and predicted peaks for the high PM-10 monitors, Greenwood, Mesa, and North Phoenix (Tables III-6 and III-7, Figure III-5); in addition there is a plot of observations against predictions (Figure III-6). It is clear from this information that observations and predictions are correlated: days monitored to have high

PM-10 concentration peaks tend to have high modeled peaks as well. But it is also clear that there is a lot of scatter, many high days are missed, and the fit is not especially close.

The performance of the model for secondary particulate is also far short of ideal. As with the total PM-10, there is some correlation with observations, but mainly secondary concentrations are substantially over-predicted, about 25 percent on average (MAG TSD, Table II-9). The MAG TSD does not discuss the evolution of secondary component throughout a day, or assess the specific chemistry of Phoenix area pollution episodes. It does point out that modeled concentrations are more in line with the values seen in the more intensive DRI study conducted in 1991, so they are not so unrealistic in themselves. (MAG TSD, p. III-38.) The mismatch between the plan's observed and predicted concentrations, however, imply that the model is not performing well for secondary particulate. Since no diagnostic testing on secondary particulate was documented in the MAG TSD, reasons for this poor performance are not explained. Overall, we have little confidence in the model's secondary particulate predictions; however, secondary particulate are a small part of the overall PM-10 problem. In addition, since the attainment demonstration does not rely on reducing secondary particulate, the over-prediction of secondaries tends to make attainment demonstration conservative.

Despite the performance problems and the lack of documentation on some issues, when one considers the unavoidable uncertainties in a modeling exercise, especially in modeling fugitive dust emissions, the model performance appears acceptable. Additional factors strengthening EPA's conclusions that the submittal uses an acceptable modeling approach and that model performance is acceptable are that there is no EPA guidance prescribing procedures for applying the approach used, and even with the criticisms described here the approach amounts to a form of modified rollback (see above discussion on diagnostic testing).

Demonstrations of attainment in 2006.

Simulations of projected 2006 emissions with no additional controls predicted a maximum annual concentration of 86.7 $\mu g/m^3$ in 2006, demonstrating that the Phoenix area would continue to exceed the annual PM-10 standard without the implementation of additional controls.[97] MAG plan, p. 8-6.

When the control measures included in the plan are simulated with UAM-LC for 2006,

[97] The predicted air quality situation is not as dire as this maximum value implies. This maximum level occurred in only one grid cell (33,36) in the north-northeast of the modeling domain. Of the 24 other grid cells showing concentrations over the standard, one had a concentration over 60 $\mu g/m^3$ and the rest were in the 50's (Table III-12, page III-44). Projected concentrations in the other 1886 grid cells in the modeling domain were all below the standard.

all grid squares in the modeling domain are below the annual PM-10 standard of 50 µg/m^3 thus demonstrating attainment of the annual standard. MAG TSD, Table VI-3. The maximum predicted annual concentration in 2006 is 49.7 µg/m3, which is barely below the standard leaving little room for error. As the MAG TSD points out in several places (pp. III-45 and VI-15), there is substantial uncertainty in the model results. A larger margin of safety would have been desirable but is not required by our guidance or the Clean Air Act.

Simulations of projected 2006 emissions with no additional controls predicted a maximum 24-hour concentration of 363.2 µg/m^3 in 2006, demonstrating that the Phoenix area would continue to exceed the 24-hour PM-10 standard without the implementation of additional controls (MAG modeling TSD, p. III-43).

When the control measures included in the MAG plan are simulated with UAM-LC for 2006, all grid squares in the modeling domain are below the 24-hour PM-10 standard of 150 µg/m^3 thus demonstrating attainment of the 24-hour standard (MAG modeling TSD, Table VI-3, p. VI-12). The maximum predicted 24-hour concentration in 2006 is 112.6 µg/m^3, which provides a comfortable margin of attainment.

Agricultural measures and land use issue. In the Microscale plan, it was shown that the Gilbert and West Chandler site needed a 58 percent emission reduction (ADEQ TSD, page 3-9; see above). The agricultural general permit, together with a reasonable estimate of land use change, provide more than the 58 percent needed for attainment at West Chandler. For the Gilbert site, the BMPs by themselves, even without any land use change, provided more than the 20 percent needed for attainment.

An issue not explicitly dealt with in the submittals is how land use change is handled in the microscale approach. The submittals do not deal with this issue completely consistently. The following discussion describes the issue and how we are resolving it in recommending approval for the plan.

Under the microscale approach, the areas around the exceeding monitors are deemed to be representative of locations throughout the nonattainment area; demonstrating attainment at these sites, and applying the controls over the whole nonattainment area, demonstrates attainment for the whole nonattainment area. One aspect of this approach which is not adequately explored in either the Microscale Protocol or any of the submittal documents, is how exactly future projections should be handled. As time passes, land uses will change, and some source types will displace others. For example, in an area dominated by construction activity, eventually most of the construction will be completed, and thus will no longer contribute to emissions in the area. A land use and socioeconomic model, in conjunction with a dispersion model, could legitimately show that exceedances no longer occur in the area. However, just waiting a few years for this to occur is not acceptable as an attainment demonstration; in a growing metropolitan like that of Phoenix the construction will still be occurring, only in a different areas of the region such as the

urban edge. In recognition of this, the Microscale plan assumed a fixed source mix for each microscale area; a given area represented not just the specific study area, but also future ones that would be similar to the one studied. It did not need to project changes in the mix of land uses and sources, because it assumed that the mix would continue to occur, somewhere in the nonattainment area.

For the Microscale plan, ISCST modeling of the mix of land uses and source types during the 1995 study period was used to determine the emission reductions needed for attainment at the Maryvale and Salt River sites. Sufficient controls were adopted to show attainment for those locations with the 1995 mix. However, in the BMP TSD's attainment demonstration at West Chandler, land use was allowed to change. The modeling showed that a 58 percent emission reduction was needed from agricultural sources; the BMP TSD submittal shows that emissions will reduce by 60.3 percent (BMP TSD, p. 4-4). That includes an average BMP control efficiency of 36.6 percent, but also includes reductions from the conversion of 37 percent of the agricultural land to residential and commercial, based on a land use model for the overall nonattainment area. The combination of BMP controls and land use changes just suffices to meet the 58 percent reduction needed, assuming that those new land uses have very low emissions. (BMP TSD p. 28, and BMP Quantification TSD, p. 4-5).

At the actual West Chandler site itself, there was essentially complete conversion of agricultural land to residential and commercial during the 1995 - 2000 period. Emissions figures from the BMP TSD (draft BMP TSD, Enclosure 3, Attachment 4) show that these new land uses have only trivial emissions or are otherwise captured in increased regional activity (e.g., increase vehicle miles traveled). Given the cost of land, it is reasonable to assume that the new housing developments will leave no vacant land, which might not have such low emissions. But as stated above, it would not be acceptable for an attainment demonstration simply to assume 100 percent conversion. The assumption in the microscale approach is that the West Chandler area is representative of similar areas elsewhere. Even if such total conversion could be projected for any given area, there would be an intervening period of high agricultural emissions first, just as there was at West Chandler; there would always be an urban edge with characteristics like those of the 1995 West Chandler area, leading to PM-10 exceedances. A control strategy of simply waiting for agriculture to disappear would not address these exceedances by 2006.

On the other hand, the opposite extreme of assuming no conversion of land at all does not seem reasonable either. The reality is that the metropolitan area is growing and agricultural land is rapidly being converted; this should not be ignored. Such changes have been observed over the past decades, and are projected to continue by the area's socioeconomic models.

Using an estimate from the area's land use model of the conversion to occur by 2006 is a reasonable approach to use instead. It is a compromise between the extremes of the no-conversion and the total-conversion assumptions, and one that is driven by the area's socioeconomic projections that are used for many purposes, and represent the best available

guess and what the overall area will experience.

Also, use an area average figure is consistent with the area wide application of control measures required under the submittal's approach. Reliably predicting the conversion for a particular small area (several square miles in the microscale approach) would be problematic in any case, since it would depend on knowing individuals' purchase decisions and development plans. Aggregate conversion figures, driven by larger economic forces and representing the average of many actions, ought to be more reliable.

In addition, assuming some land use change is more in line with the traditional use of microinventories in EPA's PM-10 attainment demonstration guidance, and also is in line with how attainment demonstrations are performed in general. Typically the projections for land use, employment, industrial production, population, vehicle traffic, etc. are part of the baseline conditions assumed in projecting air quality; in an attainment demonstration they are independent of, but used in conjunction with, estimates of control measure effectiveness. In other words, reductions that occur naturally because of socioeconomic changes are allowed to "count" toward reductions needed for attainment. Conversely, growth, such as often occurs with vehicle traffic, would count the other way, and must be compensated for by additional emission reductions. With a very few exceptions, changes in such underlying socioeconomic variables are deemed outside the scope of Clean Air Act, and outside the jurisdiction of EPA and of air quality control management agencies. Thus, it is reasonable to include the effect of land use changes in some way.

In summary, the approach assumed in 2001 BMP TSD is not completely consistent with how the microscale approach was implemented in the 1997 Microscale plan. Nevertheless, we find that it constitute a reasonable balance between different possible implementations of a microscale approach, and one that is consistent with EPA guidance.

Conclusion. The modeling performed for the Phoenix serious area PM-10 plan is as sophisticated as any that has been performed for a PM-10 SIP, combining two independent demonstrations, a microscale analysis and a regional analysis. The microscale approach is consistent with early EPA guidance on PM-10 attainment demonstrations, and appropriately focuses analysis on localized sources. The land use change assumed in association with the agricultural measures is a reasonable balance between an idealized approach and the real world, so that the BMP TSD completes the microscale approach started in the 1997 microscale plan. For the regional modeling, while we have noted several problems associated with its performance for secondary particulate, and several other shortcomings of the modeling and its documentation, the dominance of primary particulate from fugitive dust obviates these concerns. At worst the regional analysis modeling is akin to modified rollback, an approach that is acceptable under EPA modeling guidance for PM-10. (*GAQM* 7.2 and *PSDG* chapter 4). We therefore approve the modeling for the annual and 24-hour standards because it provides a credible demonstration that the credited control measures will provide for attainment of the

24-hour standard by 2006.

Attainment Demonstration Control Measures

We look at four factors to assure that the reductions credited in the attainment demonstration are appropriate and that attainment is demonstrated as expeditiously as practicable.

1. Each measure is approved or proposed for approval into the SIP.

The minimum pre-requisite for crediting a measure into an attainment demonstration is that it is in the SIP or will be made part of the SIP concurrently with the action on the attainment demonstration.

2. Each measure meets basic SIP-enforceability standards.

This factor is really a subset of the previous one since a measure must meet basic enforceability standards before we can approve it into the SIP. The SIP-enforceability standards we are evaluating here are usually described as standards for "practical" enforceability.[98] Practical enforceability of a measure is really a question of assuring that the measure is explicit in its compliance requirements. In general, practical enforceability is demonstrated for a measure when the measure has:

- a clear statement of applicability, that is, to whom, to what, and when does the measure apply,

- a clear and measurable performance standard, that is, the limit or requirement that must be met and/or what action must be taken is clear and must be capable of being measured, monitored, or otherwise explicitly tracked,

- a specified compliance schedule, that is, the time frames in which the requirements in the measure are to be met are clearly specified,

- a method for measuring/monitoring/tracking the standard.

[98] There are actually two distinct standards for "enforceable" that must be met for SIP measures: practical enforceability and legal authority. Legal authority is the assurance that the implementing agency has the legal authority under State and federal law to adopt, implement, and enforce the measure. See CAA section 110(a)(2)(E). We address this legal authority requirement elsewhere in this TSD.

See the *General Preamble* at 13567 and memorandum, J. Craig Potter, "Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency," September 23, 1987 (Potter memo) for a further discussion of these enforceability criteria.[99]

3. The emission reductions credited to each measure are reasonable and consistent with the implementation resources and schedule.

The emission reductions assigned to each measure in the attainment demonstration must be reasonable for the type of control, the source category, and the resources available for implementing and enforcing the measure. The rate at which emission reductions are claimed in an attainment demonstration and reasonable further progress demonstration must reflect the implementation schedule for the measure.

4. The measures must collectively be implemented on the most expeditious schedule practicable.

Section 189(b)(1)(A)(ii) requires if attainment is impracticable by December 31, 2001, that the plan must show attainment by the earliest alternative date practicable. In a plan that includes the feasible BACM and MSM, the principal means of demonstrating expeditious attainment is by implementing the BACM and MSM on an expedited schedule.

The Phoenix serious area plan divides the adopted control measures into three categories:

1. adopted measures that are quantified for numerical credit in the attainment demonstration

2. adopted measures that are not quantified for numerical credit but are included in the plan to assure the implementation of BACM and MSM

3. adopted measures that are contingency measures.[100]

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[99] Most of our guidance regarding SIP enforceability was developed assuming the SIP measure is a rule or regulation. Many of the control measures in the Phoenix plan are in the form of a commitment by local jurisdiction to take a specific one-time action, like pave a road or synchronize a traffic light. For these types of commitments the SIP enforceability guidance in the Potter memo is overly prescriptive, e.g., a formal test method is not required to determine if a road has been paved. We, therefore, will not apply the specific requirements of the Potter memo to these commitments but instead reference it as a general guide to what makes a SIP measure enforceable.

[100] Some BACM and MSM also serve as contingency measures.

The Phoenix serious area plan relies on reductions in directly-emitted PM-10 from 12 measures to demonstrate attainment of the annual standard. MAG plan, Table 8-2. These measures are listed and described in Table MOD-1 below.

TABLE MOD-1
CONTROL MEASURES RELIED ON IN THE ATTAINMENT DEMONSTRATION FOR THE ANNUAL STANDARD

MEASURE	EMISSION REDUCTION (MTPD)	SIP APPROVED ?	MEET SIP ENFORCEABILITY CRITERIA? (SEE TABLE MOD-2)	EMISSION REDUCTION ESTIMATES REASONABLE ?	EXPEDITIOUS IMPLEMENTATION? (SEE TABLE MOD-4)
Strengthening and Better Enforcement of Fugitive Dust Rules (Rule 310)	60.6	Approved with this action	Yes	Yes, See Table MOD-3 and Note 1 below.	Yes
Unpaved roads and alleys (city commitments and Rule 310.01)	12.2	Approved with this action	Yes	Yes. See Table MOD-3 and Note 1 below.	Yes
Unpaved parking lots (Rule 310.01)	3.7	Approved with this action	Yes	Yes. See Table MOD-3 and Note 1 below.	Yes
Vacant disturbed lots (Rule 310.01)	1.8	Approved with this action	Yes	Yes. See Table MOD-3 and Note 1 below.	Yes
PM-10 efficient street sweepers (MAG)	1.1	Approved with this action	Yes	Yes	Yes
Curbing, paving, or stabilizing shoulders on paved roads (city commitments)	1	Approved with this action	Yes	Yes	Yes
Curbing paving or stabilizing unpaved access points (city commitments)	0.4	Approved with this action	Yes	Yes	Yes

PM-10 episode thresholds (Maricopa County ordinance)	0.07	Approved with this action	Yes	Yes	Already implemented
Restaurant charbroiler controls (Maricopa County commitment)	0.07	Approved with this action	Yes	Yes	Yes
Cleaner Burning Gasoline (ADEQ)	0.03	Approved, 63 fr 6653 2/10/98	Yes	Yes	Already implemented
Pre-1988 Heavy-Duty Diesel Vehicle Standards (legislation)	0.02	Approved with this action	Yes	Yes	Yes
Coordinate traffic signals (city commitments)	<0.01	Approved with this action	Yes	Yes	Yes

Attainment of the 24-hour standard in the Phoenix plan relies explicitly on reductions from MCESD's Rule 310 and 310.01 and the BMP rule. ADEQ TSD, p. 3-9. These measures are listed and described in Table MOD-2 below.

TABLE MOD-2
CONTROL MEASURES RELIED ON IN THE ATTAINMENT DEMONSTRATION FOR THE 24-HOUR STANDARD

MEASURE	PERCENT EMISSION REDUCTION 2006	SIP APPROVED?	MEET SIP ENFORCEABILITY CRITERIA?	EMISSION REDUCTION ESTIMATES REASONABLE?	EXPEDITIOUS IMPLEMENTATION?
Rule 310 -- construction	90	Approved with this action	Yes.	Yes. See Table MOD-3 and Note 1 below.	Yes
Rule 310.01 Unpaved parking lots	50	Approved with this action	Yes	Yes. See Table MOD-3 and Note 1 below.	Yes

TABLE MOD-2
CONTROL MEASURES RELIED ON IN THE ATTAINMENT DEMONSTRATION FOR THE 24-HOUR STANDARD

MEASURE	PERCENT EMISSION REDUCTION 2006	SIP APPROVED?	MEET SIP ENFORCEABILITY CRITERIA?	EMISSION REDUCTION ESTIMATES REASONABLE ?	EXPEDITIOUS IMPLEMENTATION?
Rule 310.01 Vacant disturbed lots	70	Approved with this action	Yes	Yes. See Table MOD-3 and Note 1 below.	Yes
BMP rule Agricultural fields and aprons	60.3	Approved October 11, 2001	Yes, see June 29, 2001 proposal at 66 FR 34598	Yes.	Yes, see June 29, 2001 proposal at 66 FR 34598

SIP Enforceability

Table MOD-3 is a summary of how each credited measure meets our SIP enforceability criteria.

TABLE MOD-3
SIP ENFORCEABILITY CRITERIA

MEASURE	APPLICABILITY	COMPLIANCE TIME FRAMES	PERFORMANCE STANDARD	MONITORING METHOD
Rule 310	See TSD section on approval of MCESD Rule 310			
Unpaved roads and alleys (Rule 310.01and city commitments)	See TSD section on approval of MCESD Rule 310.01			
	Yes	Yes	Yes	RFP report
Unpaved parking lots (Rule 310.01)	See TSD section on approval of MCESD Rule 310.01			
Vacant disturbed lots (Rule 310.01)	See TSD section on approval of MCESD Rule 310.01			
PM-10 efficient street sweepers (MAG and city commitments)	Yes	Yes	Yes	RFP report

TABLE MOD-3
SIP ENFORCEABILITY CRITERIA

MEASURE	APPLICABILITY	COMPLIANCE TIME FRAMES	PERFORMANCE STANDARD	MONITORING METHOD
Curbing, paving, or stabilizing shoulders on paved roads (city commitments)	Yes	Yes	Yes	RFP report
Curbing paving or stabilizing unpaved access points (city commitments)	Yes	Yes	Yes	RFP report
PM-10 episode thresholds	See the SIP approval of Maricopa County Residential Woodburning Restrict Ordinance, 64 FR 60678 (November 8, 1999).			
Commitment to adopt restaurant charbroiler controls (Maricopa County commitment)	Yes.	Yes (MCESD's schedule for adoption)	Yes. (Adopt SIP-approvable rule with limits/ applicability like South Coast)	Yes.
Cleaner Burning Gasoline (ADEQ)	See SIP approval of the CBG program, 63 FR 6653 (February 10, 1998)			
Pre-1988 Heavy-Duty Diesel Vehicle Standards (legislation)	Yes. (program is part of the state's I/M program)	Yes	Yes	Through I/M program reports
Coordinate traffic signals (city commitments)	Yes.	Yes	Yes	RFP reports
BMP general permit rule	See June 29, 2001 proposed approval of the BMP rule at 66 FR 34598.			

Emission Reduction Estimates

Annual Standard

Table MOD-4 gives a summary of assumptions used in the Phoenix area plan to calculate emission reductions for measures credited in the annual standard attainment demonstration.

TABLE MOD-4 EMISSION ESTIMATES FOR MEASURES CREDITED IN ANNUAL STANDARD DEMONSTRATION	
MEASURE	**EMISSION CALCULATION FOR 2006 (CITES FOR ALL**
Rule 310	See Note 1 below.
Unpaved roads and alleys (city commitments and Rule 310.01)	See Note 1 below. For city commitments: Reductions in mileage of unpaved roads were assumed in the following jurisdictions: Phoenix (83.2 miles paved), Carefree (3 miles, graveled), El Mirage (all), Scottsdale (34 miles) , Queen Creek (1.15 miles, paved), Fountain Hills (0.15 miles paved), Maricopa County (106.61 miles paved), Chandler (8.3 miles, paved), Cave Creek (all, half paved, half stabilized), Surprise (5.5 miles stabilized, 7.5 miles paved), Goodyear (all, 1/3 paved, 1/3 graveled, 1/3 stabilized). MAG TSD, Appendix IV, Committed Measure 3. Commitments are consistent with these assumptions and emission reductions are reasonable. See discussion in Note 1 on control effectiveness for paving/stabilizing/ graveling unpaved roads
Unpaved parking lots (city commitments and Rule 310.01	For Rule 310.01, see Note 1 below.
Vacant disturbed lots (city commitments and Rule 310.01)	For Rule 310.01, see Note 1 below.
PM-10 efficient street sweepers (MAG and city commitments)	Calculated assuming half of all street sweepers will be PM-10 efficient by 2006. PM-10 efficient sweepers are estimated to remove 80% of surface soil from streets compared to 30% by broom sweepers. MSM Study, 4-29. MAG plan estimates the average life of a street sweeper is 8 years. Assuming linear fleet turnover with 1/8th of the current street sweeping fleet turning over each year and 4 years of funding commitments to purchase PM-10 efficient street sweepers, then half of the fleet turned over is reasonable. MAG TSD, Appendix IV, Committed Measure 7.
Curbing, paving, or stabilizing shoulders on paved roads (city commitments)	Uncontrolled shoulder results in 8.42 lb PM-10 per mile per day. Estimated 1000 miles of unpaved/unstabilized shoulders in 1995. Uncontrolled emissions in 2006 by assuming miles of unpaved/unstabilized shoulders would grow at the same rate as population. Controlled emission calculated assuming no growth in jurisdictions with commitments to control shoulders. Because 84% of the population is in jurisdictions with commitments, overall growth is 0.84 of the 33.6% population growth between 1995 and 2006 or 5.4%. Therefore, net reduction is (.336-0.054) x 1000 miles x 8.42 lb/mile-day = 1.08 mtpd. MAG TSD, Appendix IV, Committed Measure 8. Assumptions are reasonable, consistent with the commitments and probably conservative because a number of jurisdictions committed to stabilize current unpaved shoulders.

TABLE MOD-4
EMISSION ESTIMATES FOR MEASURES CREDITED IN ANNUAL STANDARD DEMONSTRATION

MEASURE	EMISSION CALCULATION FOR 2006 (CITES FOR ALL
Curbing paving or stabilizing unpaved access points (city commitments)	Uncontrolled access point results in 0.09 lb PM-10 per access point per day. Estimated 40,000 unpaved access points 1995. Uncontrolled emissions in 2006 by assuming number of unpaved access points would grow at the same rate as population. Controlled emission calculated assuming no growth in jurisdictions with commitments to control shoulders. Because 82.2% of the population is in jurisdictions with commitments, overall growth is 0.822 of the 33.6% population growth between 1995 and 2006 or 6.0%. Therefore, net reduction is (.336-0.06) x 40,000 miles x 0.09 lb/point-day = 0.4 mtpd. MAG TSD, Appendix IV, Committed Measure 8. Assumptions are reasonable, consistent with the commitments, and probably conservative because a number of jurisdictions committed to stabilize current unpaved access points.
PM-10 episode thresholds (Maricopa County Woodburning Ordinance)	Calculated assuming an additional 10 no burn days a year based on revised threshold being set to result in 10 additional days. MAG TSD, p. V-32. Assumptions are reasonable and consistent with ordinance revision.
Restaurant charbroiler controls (Maricopa County commitment)	Assumes measure will apply only to chain-driven charbroilers that represent approximate 11% of charbroiling emissions. Controls will be 83% effective at 80% compliance rate. MAG TSD, p. V-34. Assumptions are reasonable and are probably conservative because Maricopa County's commitment applies to a broader range of charbroiling operations than just chain-driven. See Maricopa County commitment, measure 23.
Cleaner Burning Gasoline (ADEQ)	Reductions taken from both on and nonroad engines using standard EPA models and approaches. MAG TSD, p. V-36.
Pre-1988 Heavy-Duty Diesel Vehicle Standards (legislation)	Assumed a 92% compliance rate and that all converted vehicles were 1988 vehicles. Overall approximately 50% of the all pre-1988 HDDV were subject to the program and complied. (50% is derived from assuming 92 compliance, 80% of fleet commercially-owned and 69% were >26,000 lbs, the threshold size). MAG TSD, Appendix IV, Committed Measure 15. Emission reductions calculated using EPA models. Assumptions and calculation approach are reasonable.
Coordinate traffic signals (city commitments)	Assumed 435 intersections would be synchronized between 1995 and 2006 saving 62.9 hrs of idle time delay per weekday. Used EPA models and approach to calculate emission factors. MAG TSD, Appendix IV, Committed Measure 16. Assumptions and calculation approach are reasonable.

Note 1 -- Emission reduction estimates from Rule 310 and Rule 310.01

The 2006 emission reductions used to in the annual standard attainment demonstration from the various source categories subject to Rule 310 and Rule 310.01 are given in Table MOD-4a.

TABLE MOD-4A
TOTAL EMISSION REDUCTION FROM FUGITIVE DUST SOURCES

SOURCE (SUB)CATEGORY	CONTROL MEASURE	2006 EMISSION REDUCTIONS MTPD	2006 EMISSION REDUCTION AS PERCENTAGE OF SOURCE CATEGORY (SOURCE CATEGORY)
Active construction activities	Rule 310	36.7	66 (construction dust)
Track out from construction sites	Rule 310	20.4	66 (construction track out)
Disturbed area on construction sites	Rule 310	3.5	62.5 (nonroad mobile-windblown)
Unpaved parking lots - vehicle traffic	Rule 310.01 & city commitments	3.17	40 (Other area sources)
Unpaved parking lots - windblown dust	Rule 310.01 & city commitments	0.56	3 (Area - windblown)
Vacant disturbed lots	Rule 310.01 & city and state commitment	1.79	10 (Area windblown)

Source: MAG TSD, Appendix IV, Exhibit 1, Measure 1, 3, 4, and 5.

The overall control effectiveness used in the annual standard modeling for 1995, 2001, and 2006 for the various source categories subject to the fugitive dust rules are given in Table MOD-4b. CF is the control reduction factor which is the percent of source's uncontrolled emissions that are removed by the application of controls assuming 100 percent compliance. The Phoenix plan assumes that controls are less effective in 2001 and reach maximum effectiveness in 2006. MAG TSD, Appendix IV, Exhibit 1, documentation for Measures 1, 3, 4, and 5. RE is the rule effectiveness factor. We discuss rule effectiveness factor in more detail below. The plan assumes an linear increase in RE from 66 percent in 1997 to 80 percent in 2006. MAG TSD,

Appendix IV, Exhibit 1, documentation for Measures 1, 3, 4, and 5. The overall control effectiveness is the percent of emissions left in the category after controls and RE are factored in and is product of the control effectiveness factor times the rule effectiveness factor.

TABLE MOD-4B
CONTROL AND RULE EFFECTIVENESS ASSUMPTIONS FOR FUGITIVE DUST SOURCES

SOURCE (SUB)CATEGORY	CONTROL MEASURE	1995	2001			2006		
		OVERALL CONTROL EFFECT	CF	RE	OVERALL CONTROL EFFECT	CE	RE	OVERALL CONTROL EFFECT
Active construction activities	Rule 310	18	75	71.3	53.4	90	80	72
Track out from construction sites	Rule 310	18	75	71.3	53.4	90	80	72
Disturbed area on construction sites	Rule 310	20	--	--	--	87.5*	80	70
Unpaved parking lots - vehicle traffic	Rule 310.01 & city commitments	0	75.0*	71.3	53.4	75.0*	80	60
Unpaved parking lots - windblown dust	Rule 310.01 & city commitments	0	--	71.3	--	88.7*	80	71
Vacant disturbed lots	Rule 310.01 & city and state commitment	0	--	71.3	--	88.7*	80	71

*Control effectiveness calculated assuming multiple control methods
Source: MAG TSD, Appendix IV, Exhibit 1, documentation for Measures 1, 3, 4, and 5.

Rule Effectiveness

Rule effectiveness (RE) accounts for emission reductions lost because of noncompliance, control equipment downtime, failure to apply adequate controls, or failure to use control equipment properly. One hundred percent rule effectiveness is the ability of a regulatory program to achieve all the emission reductions that could be achieved by full compliance with

the applicable regulations at all sources at all times.

We have established policies on applying rule effectiveness factors for both base year and projected year inventories of volatile organic compounds (VOC), a precursor to ozone. See *General Preamble* at 13503 and "Rule Effectiveness Guidance: Integration of Inventory, Compliance, and Assessment Applications." US EPA, OAQPS, EPA-452/R-94-001, January 1994, (RE Guidance). In general, we encourage states to derive local category-specific RE factors. If there are no such local RE factors, we require the use of an 80 percent effectiveness default value. *General Preamble* at 13503.

The items that influence compliance with a rule and thus the appropriate RE factor are the clarity of the rule, its compliance requirements and the complexity of the controls required by the rule; the source's actions; and the implementing agency's actions. See RE Guidance, pp. Table 1-1 and Appendix C.

We have not established any explicit guidance for applying RE to particulate matter sources. We know, however, that PM sources, like VOC sources, are not in full compliance with applicable rules at all times; therefore, some RE factor needs to be applied. For this rulemaking, we have applied the existing Agency RE guidance for VOC sources to emission reduction estimates for Rule 310 and Rule 310.01.

As noted before, a state is allowed and required to use an 80 percent RE factor absent evidence to the contrary. *General Preamble* at 13503. In this case, the evidence shows that compliance was below this level as of early 1998. MAG, with concurrence of MCESD, assumed a 18 to 20 percent overall control effectiveness for the unrevised Rule 310 in the 1995 base year modeling, based on an assumption of a 30 percent compliance rate. MAG TSD, Appendix II, Exhibit 6, "Documentation on Assumption of Rule 310 Control Efficiency and Compliance Rate." Inspections by MCESD in early 1998 indicated that the compliance rate with the rule was 66 percent. The Phoenix plan assumes a 80 percent RE for source categories in the annual standard demonstration in 2006. MAG TSD, p. V-9.

Over the last few years, MCESD has made substantial changes to its fugitive dust control program aimed directly at improving compliance. MCESD has also committed to a number of additional changes. These changes included by year:[101]

1993/1994 Substantive revisions to Rule 310 to address PM-10

[101] See Microscale plan, pp. 32-33 and Maricopa County Commitment, 1999 Revised Measure 6 and 2001 Revised Measure 6.

1997	Improvements to Rule 310 Implementation in the Microscale Plan • increased staffing • random weekend enforcement • clearer dust control permits forms with more specific requirements for stabilization and watering • new education material • improved inspection procedures • increased coordination with cities
1998	• earthmoving permit fee increases (total annual increase estimated to be $772,000 over previous revenue level) • increased inspection staffing by four • begun providing ongoing training to regulated community
1999	• increased staff on dust control program by 1 inspector, 1 aide, and 1 enforcement officer to a total of 8 inspectors, 1 supervisor, 1 aide and 2 enforcement officers • substantially revised Rule 310 by breaking it into two rules, one for permitted sources (Rule 310) and one for non-permitted sources, (Rule 310.01), improving clarity of the rule requirements
2000	• revised Rules 310/310.01 to update test methods • revised enforcement policy • improve response time to high-priority complaints • revise dust control program documents to reflect changes to rule • provide training for cities on case development • assigned county attorney to dust control cases • conduct mid-year review of program
2001 & beyond	• increase inspections rates • further revised Rules 310/310.01 to improve compliance methods • increase number of enforcement actions and amount of penalties collected • conduct reviews of program and revise program as needed • continue to provide ongoing training to regulated community

We believe that an 80 percent rule effectiveness in 2006 is appropriate given MCESD's efforts over the past few years and its commitments in the Phoenix serious area plan to improve compliance with Rules 310 and 310.01. These improvements cover rule and test method revisions, increased public outreach and education, increased funding and staffing, increased inspection frequency, revised enforcement policies, and commitments to program evaluations and improvements. They address many of the program areas that are key to improving

compliance.

In Table MOD-4c, we have compared the MCESD's fugitive dust program in 1996 prior to Microscale plan to the program that will be in place by 2006 based on the MCESD's commitments in the MAG plan and actions to date for each of the three categories of items that most strongly influence compliance rates. This comparison clearly shows the scope of improvements to the MCESD's fugitive dust program and supports our finding that an 80 percent RE in 2006 for Rule 310 and Rule 310.01 is appropriate.[102]

[102] The cities and towns in Maricopa County are also increasing their efforts to address fugitive dust sources, such as unpaved parking lots and disturbed vacant lots. See sections "Implementation of BACM and Inclusion of MSM for Unpaved Parking Lots" and same for vacant disturbed lands. These efforts also support an overall 80 percent rule effectiveness.

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
Nature of the Rule and Controls		
How clear is the rule on what control requirements apply to source? *The clearer the rule, the better the compliance.*	• Single rule covered most fugitive dust generating activities. Rule 310, section 102 (revised 9/20/94) • Rule required RACM without defining clearly what RACM was for each type of source. Rule 310, sections 221, 305-314 (revised 9/20/94) • Rule was not clear that source had to apply RACM *and* meet visibility requirement.	• Clarity increased by splitting rule into two rules, Rule 310 for permitted sources (e.g., construction sites) and Rule 310.01 for nonpermitted sources (e.g., unpaved roads, vacant lots) • Control measures for each type of fugitive dust generating activity provided in more detail. See e.g., Rule 310, section 308 (revised 2/16/00). • Standards for compliance clearly laid out. See, e.g., Rule 310, section 302.1. • On-going research, development, and incorporation of additional requirements for dust suppression practices/equipment into rule 310 and/or dust control permits. (Maricopa Commitments, 1999 Revised Measure 6) • Continue to revise rule as needed to improve compliance, revised test methods, etc. (Maricopa Commitments, 1999 Revised Measure 6)
How easy is it for a source to determine if it is in compliance with the rule? *The easier it is to determine compliance, the better the compliance.*	• Rule did not identify control measures by fugitive dust generating activity. Rule 310, sections 221, 305-314 (revised 9/20/94) • Control measures listed by activity only in dust control permit. • Rule was not clear that source had to apply RACM *and* meet visibility requirement.	• Rule lists control measures by fugitive dust generating activity. See, e.g, Rule 310, section 308, Tables 1 & 2, Rule 310.01, section 300. • Control measures listed by activity in rule and dust control permit. Rule 310, table 1. • Standards for compliance clearly laid out. See, e.g., Rule 310, section 302.1.

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
Are the test methods adequate to determine compliance? *Adequate test methods are necessary to assure the emission reductions are being achieved.*	• Stationary opacity test only, not effective for many dust generating activities or at certain times. Rule 310, section 501 (revised 9/20/94).	• Opacity test revised to be more usable in more situations and several other test methods added. Rule 310, section 500 • Continued research on test methods for construction sites and commitment to revise rule to incorporate new or improved test methods. (Maricopa Commitments, 1999 Revised Measure 6)

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
Are the record keeping requirements clear and simple? *The simpler and clearer the record keeping requirements are the more likely the source is to keep them and the easier it is to determine compliance over time.*	• Record keeping requirement is very general. Rule 310, section 503 (revised 9/20/94) • Sample daily record keeping log developed and distributed.	• Record keeping requirements are more detailed and tied to requirements in dust control permit or to type of activity. See Rule 310, section 504 and Rule 310.01, section 502. • Revise sample daily record keeping logs to be consistent with revised rules and to provide sufficient detail to document implementation of dust control measures. (Maricopa Commitments, 2001 Revised Measure 6) • Conduct outreach to sources on record keeping requirements. (Maricopa Commitments, 2001 Revised Measure 6)

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
How complex are the controls? *The more complex the control requirements, the more difficult compliance is.*	• Rule required RACM without defining clearly what RACM was for each type of source. Rule 310, sections 221, 305-314 (revised 9/20/94) • Standards for determining if control was sufficient not clearly spelled out. e.g., Rule 310, sections 305 (revised 9/20/94): "implement RACM to effectively prevent or minimize fugitive dust"	• Specific control requirements (e.g., water to depth of the cut, form visible crust) identified as a result of microscale study. Microscale plan, p. 32. • Control measures for each type of fugitive dust generating activity provided in more detail. See, e.g, Rule 310, section 308, Tables 1 & 2, Rule 310.01, section 300. • Continued research on effective controls for construction sites. (Maricopa Commitments, 2001 Revised Measure 6) • Standards for compliance clearly laid out. See, e.g., Rule 310, section 302.1.
Performance of Source in Complying with Regulation		
How much training is required for sources on rule requirements and how to comply? *The better trained a source is the better the compliance.*	• Information and outreach material available but distribution uneven. (ENSR, Summary of 12/19/96 public meeting, p. 2 and Summary of 1/7/97 public meeting, p. 3) • Presentations to and meetings with cities, regulated industry and others, but not reaching all who needed it.	• Distribution of information through city building departments and other sources (Microscale plan, City Resolutions in Appendices) • Earthmoving permit applications forms and dust program information available on MCESD website. (Maricopa Commitments, 1999 Revised Measure 6) • Dust control training course at paradise Valley Community College. • Mail outs to vacant lot owners on requirements (EPA) • Public advertisements (EPA)

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
How well do sources maintain records adequate to determine compliance?	• Inspectors typically did not check to see if records were kept. (Microscale plan, p. 12)	• Record keeping requirements are more detailed and tied to requirements in dust control permit or to type of activity. See Rule 310, section 504 and Rule 310.01, section 502. • Inspection standard operating procedures revised to require check of records. Microscale plan, p. 33. • Revise sample daily record keeping lots and distribute with permits and conduct outreach on requirement. (Maricopa Commitments, 1999/2001 Revised Measure 6)
How well do sources improve compliance over time?	• No electronic format for recording results of routine inspections, so hard to judge. (Microscale plan, p. 12)	• MCESD will track the number of inspections, number and type of enforcement actions, amount of penalties assessed, and amount of penalties collected. (Maricopa Commitments, 1999 Revised Measure 6)
Performance of Implementing Agency in Enforcing Regulation		
How much attention and resources does the agency direct at the source category?	• 0.75 FTE working full time on dust control with backup support from other inspectors to respond to complaints (Microscale plan, p. 12) • Revenue from dust control permits is approximately $300,000 (Microscale plan, appendix E, MCESD letter, p. 2)	• 8 inspectors, 1 coordinator, 1 supervisor, 1 aide, 2 enforcement office, and 1 county attorney working on dust control plus 19 others as backup. (Maricopa Commitments, 1999 Revised Measure 6) • Revenue for fugitive dust program estimated at $1.12 million. (Maricopa Commitments, 1999 Revised Measure 6) • County fugitive dust control program coordinated with city programs. Microscale plan, pp. 33 and 35.

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
How frequently are sources inspected? *The more frequent the inspections the faster any noncompliance is identified and corrected.*	• Earthmoving coordinator inspected projects >10 acres and smaller sources based on factors such as compliance history of source (Microscale plan, p. 12) • Other inspectors inspected sites only when complaints were received or time allowed and the only sites from 5 to 10 acres. (Microscale plan, p. 12) • No formal weekend inspections (Microscale plan, p. 13) • Vacant lots, unpaved parking, unpaved roads and other nonpermitted sources inspected only on a complaint basis. (Microscale plan, p. 10)	• Develop a pro-active inspection program for permitted sources (e.g., sites > 10 acres, 3 to 6 times per year and once within 30 days of project start date). (Maricopa Commitments, 1999 Revised Measure 6) • Schedule weekend inspections randomly once per month. (Maricopa Commitments, 1999 Revised Measure 6) • Develop a pro-active inspection program for unpaved parking lots and vacant lots (Maricopa Commitments, 1999 Revised Measure 6) • Track city plans (mandated by legislation) to stabilize target unpaved roads, alleys and unpaved shoulders. (Maricopa Commitments, 1999 Revised Measure 6) • 8-hour response time for high priority complaints and 24-hour for others (Maricopa Commitments, 1999 Revised Measure 6)
How comprehensive is each inspection of a source? *Since more than one point or operation at a source may contribute emissions, the more thorough the inspection, the better the assurance of compliance.*	• Inspectors did not routinely check for records (Microscale plan, p. 12) • Inspectors did not routinely inspect fugitive dust sources at stationary sources (Microscale plan, p. 10)	• Revise inspection standard operating procedures to have inspectors check for records and inspect fugitive dust sources at permitted stationary sources. (Maricopa Commitments, 1999 Revised Measure 6)

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
How often and how much are the inspectors trained?	• New inspectors received 2 months training and then additional field training (Microscale plan, p. 13) • Inspection guidelines were prepared. (ENSR, p. 2-6) • Inspectors certified to conduct EPA method 9 (visible emissions) every six months (ENSR, p. 2-7)	• Inspector training on case development. (Maricopa Commitments, 1999 Revised Measure 6) • Inspector training on revised test methods. (Maricopa Commitments, 1999 Revised Measure 6) • City staff training on preparing inspection reports and notices of violation. (Maricopa Commitments, 1999 Revised Measure 6)
How often is training course and material provided for sources?	• Information and outreach material available but distribution uneven. (ENSR, Summary of 12/19/96 public meeting, p. 2 and Summary of 1/7/97 public meeting, p. 3) • Presentations to and meetings with cities, regulated industry and others, but not reaching all who needed it.	• Information provided when source applies for permit. • On-going training at community college. (Maricopa Commitments, 1999 Revised Measure 6) • Information available on MCESD website. (Maricopa Commitments, 1999 Revised Measure 6)
How often is program reevaluated	• In 1995, a number of recommendations were developed to improve implementation including formal training program, hiring a dedicated dust program coordinator, and development of informational material. (ENSR, Summary of 12/19/96 public meeting, p. 2)	• Conduct mid-year review in 9/00 to evaluate progress and future needs. (Maricopa Commitments, 1999 Revised Measure 6) • Draft fugitive dust operating plan to track progress and identify future needs. (Maricopa Commitments, 1999 Revised Measure 6). • Perform rule effectiveness study in 2003-2004 to evaluate program effectiveness. (Maricopa Commitments, 1999 Revised Measure 6)
How high are the fines?	• Notices of violation (NOV) did not carry a monetary penalty. (Microscale plan, p. 12)	• Revise enforcement policy to include guidelines on when to seek penalties reflecting economic benefit of non-compliance and seeking and determining higher penalties for repeat violators. (Maricopa Commitments, 1999 Revised Measure 6)

TABLE MOD-4C
MCESD'S ACTUAL AND COMMITTED IMPROVEMENTS TO THE COMPLIANCE PROGRAM FOR FUGITIVE DUST RULES

CRITERION	PRE-MICROSCALE PLAN (PRIOR TO EARLY 1997)	PROGRAM IMPROVEMENTS AND COMMITMENTS (FROM MICROSCALE PLAN TO CURRENT)
What type of administrative enforcement authorities are available and used?	• Notices of violation (NOV) were issued for all but very minor violations. (Microscale plan, p. 12) • Orders of abatement or court orders were not issued unless a source did not correct NOV or had an excessive number of NOVs.	• Revised enforcement policy that includes guidelines for initiating various enforcement actions, guidelines for reinspecting, defines timely and appropriate action by laying out guidelines for which type of violation is appropriate for specific enforcement actions and for the time frames for escalating enforcement actions, identifies priority violations, provides guidelines for when to seek penalties reflecting the economic benefit of noncompliance, guidelines for seeking and determining higher penalties for repeat violators, and guidelines for inspectors to handle predetermined citation categories form observation to justice court. (Maricopa Commitments, 1999 Revised Measure 6)
Are enforcement actions publicized?	• Unknown	• Yes. • Track number of inspections, number and type of enforcement actions, amount of penalties assessed, amount of penalties collected, and the number of education opportunities provided. (Maricopa Commitments, 1999 Revised Measure 6)
How soon are follow-up inspections conducted?	• Unknown	• Revise enforcement policy to include guidelines for reinspection. (Maricopa Commitments, 1999 Revised Measure 6)

Table MOD-5 lists the 2001 and 2006 control factors used by in the microscale analysis at the West Chandler and Gilbert sites.

TABLE MOD-5
EMISSION REDUCTION FROM FUGITIVE DUST SOURCES AT WEST CHANDLER AND GILBERT MICROSCALE SITES

SOURCE (SUB)CATEGORY	CONTROL MEASURE	2001 CONTROL FACTOR PERCENT	2006 CONTROL FACTOR PERCENT
Construction activities - windblown	Rule 310	90	90
Unpaved parking lots	Rule 310.01	0	50
Vacant disturbed lots	Rule 310.01	0	70
Paved roads	various	0	0
Unpaved roads	Rule 310.01	0	0
Agricultural fields	BMP rule	0	60.3
Agricultural aprons	BMP rule	0	60.3

Source: BMP TSD, p. 31.

In performing its microscale analysis, ADEQ first determined that each significant, non-agricultural source at the microscale sites (e.g., the unpaved parking lot at the Gilbert site) was large enough to be subject to Rules 310 or 310.01. For each of these sources, it then applied the control factor used in the Microscale plan for that source. Except for the agricultural sources, ADEQ did not use rule effectiveness factors for either the sources in the microscale component or the sources in the windblown background component in the attainment demonstrations. ADEQ TSD, pp. 3-8, 3-9, and A-7.

Rule effectiveness (RE) accounts for emission reductions lost because of noncompliance, control equipment downtime, failure to apply adequate controls, or failure to use control equipment properly. One hundred percent rule effectiveness is the ability of a regulatory program to achieve all the emission reductions that could be achieved by full compliance with the applicable regulations at all sources at all times. Because RE factors are intended to reflect the variations in compliance among large numbers of sources, they are applied to *source categories* rather than to individual sources.

We agree that it is appropriate not to apply an RE factor to the individual sources at each

microscale site;[103] however, we believe that an RE factor should be applied to the windblown background source categories because each category represents multiple sources. However, as we discuss later, we find that the plan still demonstrates attainment of the 24-hour standard when appropriate RE factors are applied to the windblown background component.

In its modeling for 2001, ADEQ assumed controls only on the "permitted" sources, that is, only on those sources that receive permits from MCESD. ADEQ assumed that all the "nonpermitted" sources--unpaved roads, vacant lots, and unpaved parking lots--are uncontrolled in 2001. See ADEQ TSD, p. 3-8. This latter assumption does not reflect the efforts by MCESD to assure the implementation of BACM on these sources by 2001. However, incorporating appropriate control factors into the modeling for 2001 only decreases the projected air quality levels at each site in 2001 and does not affect the plan's conclusions that each site will attain by no later than 2006.

Overall, we find that the emission reduction estimates for each source category are consistent with research on the applicable control methods and are appropriately applied in the attainment demonstrations. For more information on the quantification of emission reductions from the agricultural BMP general permit rule, see the section "Implementation of BACM and Inclusion of MSM for Agricultural Sources" in this TSD.

Expeditious Implementation

Overall, we believe that the Phoenix serious area plan plan provides for expeditious implementation. See Table MOD-6.

TABLE MOD-6
EXPEDITIOUS IMPLEMENTATION

MEASURE	DISCUSSION

[103] At each microscale site, there is only a single source in each category, that is there is a single vacant lot, a single construction site, a single agricultural field with its apron, a single unpaved parking lot.

Rule 310	Rule adopted, compliance required now. Maricopa County's commitments to increase source education and enforcement are all scheduled for completion this year. Maricopa County commitments, 1999 Revised Measure 6. We find that implementation of the control program is expeditious. The MAG plan assumes that emission reductions from improving the fugitive dust control program ramp up over time due to improvements in compliance rates and control effectiveness. Both these are related to source education and the effect of increased enforcement modifying source behavior. Education and changes in behavior take time to effect; therefore, we believe that the emission reductions are being achieved expeditiously.
Unpaved roads and alleys (city commitments and Rule 310.01)	For public roads, 250 ATD roads by 6/10/00, 150 ATD roads by 6/10/04 (Rule 310.01, section 304). City commitments -- most city commitments have already been complied with their commitments. Maricopa County will complete its commitment by 9/03. Given costs of paving roads (e.g., Maricopa County will pave roads at a cost of up to $500K per mile) and planning/engineering requirements we believe that this schedule is expeditious. See Maricopa County Commitments, RACM/BACM justification for unpaved roads.
Unpaved parking lots (city commitments and Rule 310.01	Rule adopted, compliance required now.
Vacant disturbed lots (city commitments and Rule 310.01)	Rule adopted, compliance required now.
PM-10 efficient street sweepers (MAG and city commitments)	Funding for purchasing this equipment is allocated on a fiscal year basis and it will take several years for sufficient funds to be available to purchase enough equipment to replace or add to the current street sweeping equipment.
Curbing, paving, or stabilizing shoulders on paved roads (city commitments)	Most city commitments have already been fulfilled or represent on-going standard operations by the city, e.g., curbing when roads are improved, allowing vegetation to grow. See, e.g.,
Curbing paving or stabilizing unpaved access points (city commitments)	Most city commitments have already been fulfilled or represent on-going standard operations by the city, e.g., paving when roads are improved.
PM-10 episode thresholds (Maricopa County Residential Woodburning Restriction Ordinance)	Thresholds effective now.
Restaurant charbroiler controls (Maricopa County commitment, revised Measure 23)	This measure is a most stringent measure and not a BACM measure and therefore is not required to be implemented by 6/10/00. Adoption of rule tied to South Coast adoption of rule, South Coast Rule 1138.1 adoption is projected for 10/00. Projected MCESD adoption is Spring 2001 with compliance within 2 year. We find this to be expeditious.
Cleaner Burning Gasoline (ADEQ)	Already implemented.

Pre-1988 Heavy-Duty Diesel Vehicle Standards (A.R.S. 49-542 F.7)	Measure already adopted. Compliance required by January 1, 2004. This measure has very small emission reductions, 0.02 mtpd (40 kg) or 0.02% of the total PM-10 emission reduction in the MAG plan. MAG plan, Table 8-2. Because the emission reductions are small, an earlier implementation date would not advance the attainment date or change the RFP curve and therefore the measure is expeditiously implemented.
Coordinate traffic signals (city commitments)	Most city commitments have already been fulfilled or represent on-going coordination/study with surrounding jurisdictions.
Agricultural fields and aprons	Rule adopted, compliance required by December 31, 2001. AAC R18-2-611. See discussion in the section "Implementation of BACM and Inclusion of MSM for Agricultural Sources" and June 29, 2001 proposal for an explanation on why we consider this expeditious.

Conclusion. Based on the analysis above and the additional analysis below, we find the Phoenix serious area plan's conclusions that attainment of the 24-hour standard is demonstrated by 2006 and that this date is the most expeditious date practicable are correct

As noted before, the assumptions made on overall control effectiveness are not consistent between the annual standard attainment demonstration and this demonstration for the 24-hour standard. Also, in its attainment demonstration, ADEQ did not incorporate a rule effectiveness factor in calculating the contribution from windblown background.

We recalculated the 2006 impacts at each monitor to determine if using consistent assumptions between the annual standard and 24-hour standard demonstrations and incorporating a RE factor into the windblown background would affect the plan's demonstration of attainment by December 31, 2006. Tables Imp-3 and Imp-4 show the results of these recalculations.

TABLE MOD-7
REVISED ATTAINMENT DEMONSTRATION
USING CONTROL FACTORS CONSISTENT WITH ANNUAL STANDARD DEMONSTRATION
WEST CHANDLER

SOURCE	CONTROL	1995 IMPACT ? G/M^3	2006	
			CONTROL	IMPACT ? G/M^3
Ag fields	BMP rule	190	60.3	75.4
Ag aprons	BMP rule	24	60.3	9.5
Road construction	Rule 310	73.5	87.5	9.2

TABLE MOD-7
REVISED ATTAINMENT DEMONSTRATION
USING CONTROL FACTORS CONSISTENT WITH ANNUAL STANDARD DEMONSTRATION
WEST CHANDLER

SOURCE	CONTROL	1995 IMPACT ? G/M^3	2006	
			CONTROL	IMPACT ? G/M^3
Housing construction	Rule 310	0.1	87.5	0
Vacant lands	Rule 310.01	29.3	88.7	3.3
Paved Roads	--	0.2	0	0.2
Unpaved Roads	Rule 310.01	4.1	0[1]	4.1
Total local impact		321.2		101.7
Background - wind blown		58.2		20.5
Background - nonwind		21.8		21.8
Total		401.2		144.0

Footnote: 1. Controls on unpaved roads are considered contingency measure and therefore not credited in the attainment demonstration.
Source: 1995 impacts, ADEQ TSD, pp. 3-10 and 3-12. Control efficiencies, see Table MOD-9.

Source: Land use percentages and wind contributions - 9 hrs, ADEQ TSD, p. A-8. Overall control efficiencies, see Table MOD-9.

TABLE MOD-9A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND
WITH REVISED CONTROL FACTORS
WEST CHANDLER, 2006

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	56%	39%	5%

TABLE MOD-9A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND WITH REVISED CONTROL FACTORS WEST CHANDLER, 2006

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Wind contribution 9 hrs	32.6 μg/m^3	22.7 μg/m^3	2.9 μg/m^3
Overall control efficiency	60.3%	70%	71%
PM10 Contribution with controls	12.9 μg/m^3	6.8 μg/m^3	0.8 μg/m^3
total windblown background = 20.5 μg/m^3			

Source: Land use percentages and wind contributions - 9 hrs, ADEQ TSD, p. A-7. Overall control efficiencies, see Table MOD-9.

TABLE MOD-8
REVISED ATTAINMENT DEMONSTRATION USING CONTROL FACTORS CONSISTENT WITH ANNUAL STANDARD DEMONSTRATION GILBERT

SOURCE	CONTROL MEASURE	1995 IMPACT ? G/M^3	2006	
			CONTROL %	IMPACT ? G/M^3
Ag aprons	BMP rule	55	60.8	21.8
Unpaved parking lots	Rule 310	67.2	87.9	8.1
Vacant lands	Rule 310.01	13.5	88.7	1.5
Paved Roads	--	1.5	0	0.2
Unpaved Roads	Rule 310.01	3.5	0[1]	3.5
Total local impact		139.4		32
Background - wind blown		68.2		24.1

TABLE MOD-8
REVISED ATTAINMENT DEMONSTRATION
USING CONTROL FACTORS CONSISTENT
WITH ANNUAL STANDARD DEMONSTRATION
GILBERT

SOURCE	CONTROL MEASURE	1995 IMPACT ? G/M³	2006	
			CONTROL %	IMPACT ? G/M³
Background - nonwind		21.8		21.8
Total		229.7		77.9

Footnote: 1. Controls on unpaved roads are considered contingency measure and therefore not credited in the attainment demonstration.
Source: 1995 impacts, ADEQ TSD, pp. 3-11 and 3-13. Control efficiencies, see Table MOD-9.

Source: Land use percentages and wind contributions - 7 hrs, ADEQ TSD, p. A-7. Overall control efficiencies, see Table MOD-9.

TABLE MOD-8A
CONTRIBUTIONS TO WINDBLOWN BACKGROUND
WITH REVISED CONTROL FACTORS
GILBERT 2006

	AGRICULTURE	CONSTRUCTION	VACANT LOTS
Land use percentage	55%	41%	4%
Wind contribution 9 hrs	37.5 µg/m³	28.0 µg/m³	2.7 µg/m³
Overall control efficiency	60.3%	70%	71%
PM10 Contribution with controls	14.9 µg/m³	8.4 µg/m³	0.8 µg/m³
total windblown background = 24.1 µg/m³			

Source: Land use percentages and wind contributions - 7 hrs, ADEQ TSD, p. A-8. Overall control efficiencies, see Table MOD-9 of this TSD.

TABLE MOD-9
CONTROL AND RULE EFFECTIVENESS ASSUMPTIONS FOR FUGITIVE DUST SOURCES FROM ANNUAL STANDARD DEMONSTRATION
(EXCEPT FOR AGRICULTURAL SOURCES)

SOURCE (SUB)CATEGORY	CONTROL MEASURE	2001			2006		
		CF	RE	OVERALL CONTROL EFFECT	CF	RE	OVERALL CONTROL EFFECT
Disturbed area on construction sites	Rule 310	[77]	[71.3]	[54.9]	[87.5]	80	70
Unpaved roads (microscale only)	Rule 310.01	75.0	71.3	29.9	75.0	80	60
Unpaved parking lots - windblown dust	Rule 310.01	[88.7]	71.3	[35.4][2]	88.7	80	71
Vacant disturbed lots	Rule 310.01	[88.7]	71.3	[53.1][3]	88.7	80	71
Agricultural aprons and fields	BMP rule	[34][4]	[80][5]	[31.2]	--	--	60.3

Values in brackets have been calculated by EPA from information available in the MAG plan.
Table Footnotes:

1. Control effectiveness calculated assuming multiple control methods
2. Also incorporates a rule penetration factor of 56 percent.
3. Only 84 percent of vacant lots are assumed to be subject to control in 2001.
4. Factor includes 20 percent decline in agricultural land between 1995 and 2001 and minimum level BMP implementation. The 20 percent is calculated as 6/11of the 37 percent loss between 1995 and 2006. 6 being the number of years between 1995 and 2001 and 11 being the number between 1995 and 2006. 37 percent figure is from BMP TSD, p. 9. BMP control factor is calculate from information in the BMP Quantification TSD, table 4-2 and assumes minimum control levels from the BMP.

Source: MAG TSD, Appendix IV, Exhibit 1, documentation for Measures 1, 3, 4, and 5. Ag information: BMP Quantification TSD, Table 4-2.

As can be seen from Table MOD-9, 24-hour PM-10 levels at the West Chandler site will be below the standard by 2006.[104] Using figures from Tables IMP-3 and DEM-7, it is also clear that earliest attainment will occur at the West Chandler site is 2006. From 2001 to 2006, the

[104] The closeness of the attainment demonstration here is in part due to the conservative assumption that nonwind background concentrations remain constant from 1995 to 2006 despite the controls being placed on the sources that make up this component of the background.

Phoenix plan assumes that the control measures steadily become more effective as sources become more experienced at implementing them and compliance programs ramp up. Given this steady improvement in control levels, ambient concentrations should steadily decrease from 2001 to 2006, with roughly the same reduction in concentration each year. This annual decrease in ambient concentrations is 13.6 $\mu g/m^3$ (the difference between the 2001 total concentration of 212 $\mu g/m^3$ and the 2006 concentration of 144.0 $\mu g/m^3$ divided by 5 years). Adding this value to the 2006 level of 144.0 $\mu g/m^3$, we get an estimated 2005 ambient levels of 157.6 $\mu g/m^3$, still well above the standard of 150 $\mu g/m^3$.

However, our previous recalculations show that attainment of the 24-hour standard at the Gilbert site is practicable by 2001. See Table IMP-4. The site's primary source--an unpaved parking lot--is subject to full control under Rule 310.01 by 2001 and controls on this source together with controls on vacant lands, also required by Rule 310.01, result in the site showing attainment by 2001.

In order to show attainment, a plan must show attainment at each location within the nonattainment area; thus an area's attainment date is the date the last location within the nonattainment area attains. Because the West Chandler site does not attain the 24-hour standard until December 31, 2006, this date becomes the 24-hour PM-10 standard attainment date for the entire Phoenix nonattainment area.

Our recalculation shows that the MAG plan's conclusions that the Phoenix area will attain the 24-hour PM-10 standard by 2006 is correct.

This section prepared by Scott Bohning and Frances Wicher

EXTENSION REQUEST – OTHER FACTORS THAT EPA MAY CONSIDER IN GRANTING AN EXTENSION REQUEST

Requirement: CAA section 188(e) allows states to apply for an extension. We may grant the extension if certain criteria are met. We may also consider a number of other factors in determining whether to grant an extension and the length of that extension.

Action: Grant extension

Proposal Cites: Annual: 65 FR at 19987
24-hour standard: 66 FR at 50277

Primary Guidance Documents: None

Primary Plan Cites: Chapter 10

What are the statutory requirements?

Section 188(e) states that in determining whether to grant an extension and the appropriate length of the attainment date extension we may consider:

1. the nature and extent of the nonattainment problem,

2. the types and numbers of sources or other emitting activities in the area (including the influence of uncontrollable natural sources and international transport),

3. the population exposed to concentrations in excess of the standard,

4. the presence and concentration of potentially toxic substances in the mix of particulate emissions in the area, and

5. the technological and economic feasibility of various control measures.

The Act does not require us to consider any or all of these factors in deciding the length of the extension request.

How are these requirements addressed in the plan?

The Phoenix serious area plan provides information addressing each of the factors in Chapter 10 (pp. 10-47 to 10-48).

Does the plan meet the statutory requirements?

We discuss how the Phoenix plan addresses each of the five factors that we may take into account when determining whether to grant an extension and how long that extension should be in Table FAC-1.

We have already determined that the plan provides for both BACM and MSM and for attainment of the annual and 24-hour PM-10 standards by the earliest practicable date of December 31, 2006. Nothing in the additional information presented on the five factors suggest that granting an 5-year extension of the attainment date for either standard in the Phoenix area is inappropriate.

TABLE FAC-1
OTHER FACTORS EPA MAY CONSIDER IN GRANTING AN EXTENSION AND THE LENGTH OF THE EXTENSION

OTHER FACTORS	DISCUSSION
Nature and extent of nonattainment	Over the past 5 years, violations of the annual standard have occurred routinely at three sites (MAG plan, Table 10-11): 1. Greenwood, a urban site heavily impacted by transportation sources, at levels ranging from 55 - 61 $\mu g/m^3$. 2. Chandler, an urban fringe site heavily impacted by fugitive dust sources such as construction and agricultural, at levels ranging from 50 - 62 $\mu g/m^3$. 3 Salt River, a site heavily impacted by industrial sources, at levels ranging from 65 - 105 $\mu g/m^3$. Areas similar to the one of the first two sites can be found throughout the Maricopa nonattainment area, so we would expect that there are elevated PM-10 levels throughout the Phoenix nonattainment area; therefore controls need to be uniformly implemented throughout nonattainment area, a task that generally requires longer-term efforts to achieve than implementing controls in few localized areas. Elevated 24-hour levels of PM-10 occur mainly in areas with large fugitive dust sources or a concentration of fugitive dust sources. Areas such as this can be found throughout the Phoenix nonattainment area, so we would expect that there are elevated 24-hour PM-10 levels throughout the Phoenix area. As a result, in order to attain the 24-hour standard, controls need to be uniformly implemented throughout the area, a task that generally requires longer to achieve than implementing controls in few localized areas.
Types and numbers of sources or other emitting activities	Primary contributors to elevated PM-10 levels are fugitive dust sources including paved road dust, unpaved roads, construction activities, disturbed vacant lands, unpaved parking lots, and agricultural sources. MAG plan, p. 10-51. These sources are ubiquitous in the nonattainment area and collectively number in the thousands. (For example, MCESD issued 2500 construction permits in 1999; we mailed 50,000 letters to owners of vacant lots in the nonattainment area. there are nearly 12,000 miles of roadway in the nonattainment area. MAG plan, p. 2-3.

TABLE FAC-1
OTHER FACTORS EPA MAY CONSIDER IN GRANTING AN EXTENSION AND THE LENGTH OF THE EXTENSION

OTHER FACTORS	DISCUSSION
Population exposure to concentrations above the standard	The plan estimates population exposure to elevated levels of PM-10 (both annual and 24-hr) to be from 78,000 to be 163,000 (1995 figure), p. 10-13. This population exposure is calculated using estimates of disturbed land versus population in subareas of the nonattainment area. According to this calculation, 84% of Maricopa's population lives in areas where 10 or less percent of the land is open. MAG plan, Table 10-13. The plan does provide for implementation of BACM on disturbed land (including construction) with much of the emission reductions being achieved early, all these factors will reduce population exposure as quickly as practicable.
Presence and concentration of potentially toxic substances in the particulate	Primary source of airborne cancer risk in the Maricopa area is internal combustion engine exhaust from both on and off-road engines. This risk is from all pollutants emitted from these sources (gaseous and particulate). MAG plan, p. 10-61 based on an ADEQ study. The Phoenix plan concludes that the cancer risk in the Phoenix area is comparable to those in California cities, p. 10-61. The plan and other Arizona programs (e.g., cleaner burning gasoline, national emission standards for off-road engines) target emissions from on and off road engines. Almost all of the PM-10 emission reductions in the out years of the plan (2003 and later) are and need to be from fugitive dust sources and not from on and off road engines; therefore extending the attainment date does not affect the degree of public exposure to the major source of toxic risk. In other words, shortening the extension would not reduce the public's exposure to the major source of toxic risk, on and off road engines.

TABLE FAC-1
OTHER FACTORS EPA MAY CONSIDER IN GRANTING AN EXTENSION AND THE LENGTH OF THE EXTENSION

OTHER FACTORS	DISCUSSION
Technological and economic feasibility of controls	Fugitive dust sources dominate the emission inventory in the Maricopa nonattainment area. Controls for these sources are well known (paving, wetting surfaces, etc.) and have been adopted; however, the number of sources and nature of sources make education and outreach necessary to assure full compliance with those controls. In addition, costs for paving roads, purchasing street sweepers, and other capital improvements necessary to reduce PM-10 emissions are high and necessary funds are only available over a number of years. These factor generally support a longer time frame for attainment.

This section prepared by Frances Wicher

SUMMARY OF FINDINGS ON ARIZONA'S EXTENSION REQUEST

Based our review of the Phoenix serious area plan and our determination that it meets the five requirements necessary for granting an extension of the attainment date under CAA section 188(e), we are granting a five-year extension of the serious area attainment date for the Phoenix PM-10 serious area nonattainment area from December 31, 2001 to December 31, 2006 for both the annual and 24-hour PM-10 standards.

TABLE EXT -1
SUMMARY OF OUR FINDING ON ATTAINMENT DATE EXTENSION CRITERIA

EXTENSION CRITERIA	CONCLUSION
Applied for the extension request?	The extension request was subject to public comment during hearings on the overall Plan.
Demonstrated the impracticability of attaining the annual standard by December 31, 2001?	Despite the application of BACM, annual and 24-hour PM-10 levels will remain above the standard after 12/31/01 making attainment impracticable.
Comply with all requirements and commitments pertaining to the area in the implementation plan?	Agencies have complied with their commitments in the previously submitted PM-10 plans.
Demonstrated to our satisfaction that the plan includes the most stringent measures?	We find that the Phoenix serious area PM-10 plan includes to our satisfaction the most stringent measures applicable to the area.
Submitted a demonstration that the attainment will occur by the most expeditious alternative date practicable?	The Phoenix serious area PM-10 plan shows that attainment by December 31, 2006 is the most expeditious date practicable for both the 24-hour and annual standards given the level of emission reductions needed and the sources from which those reductions must come.

REASONABLE FURTHER PROGRESS AND QUANTITATIVE MILESTONES

Requirement: CAA section 172(c)(2): annual incremental reductions in emissions as may be required by EPA for ensuring attainment of the PM-10 standard by the applicable date.
CAA section 189(c)(1): quantitative milestones to be achieved every 3 years until the area is redesignated to attainment.

Final Action: Approve

Proposal Cites: Annual: 65 FR at 19988
24-hour: 66 FR at 50278

Primary Guidance Documents: *General Preamble*, p. 13539
Addendum, pp. 42015-42016

Primary Plan Cites: MAG plan, p. 8-20 to 8-22
BMP TSD, pp. 29-31

What are the statutory and policy requirements?

CAA section 172(c)(2) requires nonattainment area plans to provide for reasonable further progress (RFP). Section 171(1) of the Act defines RFP as "such annual incremental reductions in emissions of the relevant air pollutant as ... may reasonable be required by the Administrator for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date."

Historically, RFP has been met by showing annual incremental emission reductions sufficient generally to maintain at least linear progress toward attainment by the applicable deadline. Requiring linear progress in PM-10 plans is more appropriate in situations where:

- PM-10 is emitted by a large number of diverse sources,
- the relationship between any individual source or source category and overall air quality is not well known,
- secondary particulate significantly contributes to overall PM-10 levels, and
- the emission reductions needed for attainment are inventory-wide.

Addendum at 42015.

In general, serious area PM-10 plans should include detailed schedules for compliance with emission regulations in the areas and accurately indicate the corresponding annual emission reductions to be realized from each milestone in the schedule. We have considerable discretion in reviewing the PM-10 plan to determine whether the annual incremental emission reductions to be achieved are reasonable in light of the statutory objective of timely attainment. We believe that it is appropriate to require early implementation of the most cost-effective control measures while phasing in the more expensive control measures. *Addendum* at 42016.

CAA section 189(c) also requires PM-10 plans demonstrating attainment to contain quantitative milestones which are to be achieved every 3 years until the area is redesignated attainment and which demonstrate RFP. These quantitative milestones should consist of elements that allow progress to be quantified or measured. *Addendum* at 42016.

The Act does not specify which year is to be the starting point for the 3-year milestone. In the *General Preamble*, we determined that for the initial moderate areas, PM-10 plans demonstrating attainment should address at least two milestones and that the starting point for the first 3-year period should be the original moderate area PM-10 plan submittal due date of November 15, 1991, making the first milestone date 3 years later, i.e., the moderate area attainment date of December 31, 1994[105] and the second one, December 31, 1997, 3 years after the first. *General Preamble* at 13539, *Addendum* at 42016. For moderate areas that are reclassified as serious, the third milestone achievement date is November 15, 2000. *Addendum* at 42016.

How are these requirements addressed in the plan?

Annual Standard

The Phoenix serious area plan provides a demonstration that PM-10 emission will drop from 191 mtpd in 1995 to 130 mtpd in 2006 with two-thirds of the reduction occurring before 2001. MAG plan, Figure 8-4. See Figure RFP-1. Total regional emission decrease annually at a rate of approximately 6.5 mtpd per year from 1995 through 2001 and 4.4 mtpd per year from 2002 to 2006.

The MAG plan also provides milestones for 2001, 2003, and 2006. The plan's assumption regarding control implementation for each milestone is given in Table RFP-1.

[105] The exact milestone date would be November 15, 1994; however, given the relatively small amount of time between this date and the attainment date of December 31, 1994, we believed it appropriate and efficient to make the milestone coincide with the attainment date. *General Preamble* at 13539.

Figure RFP- 1

RFP Demonstration

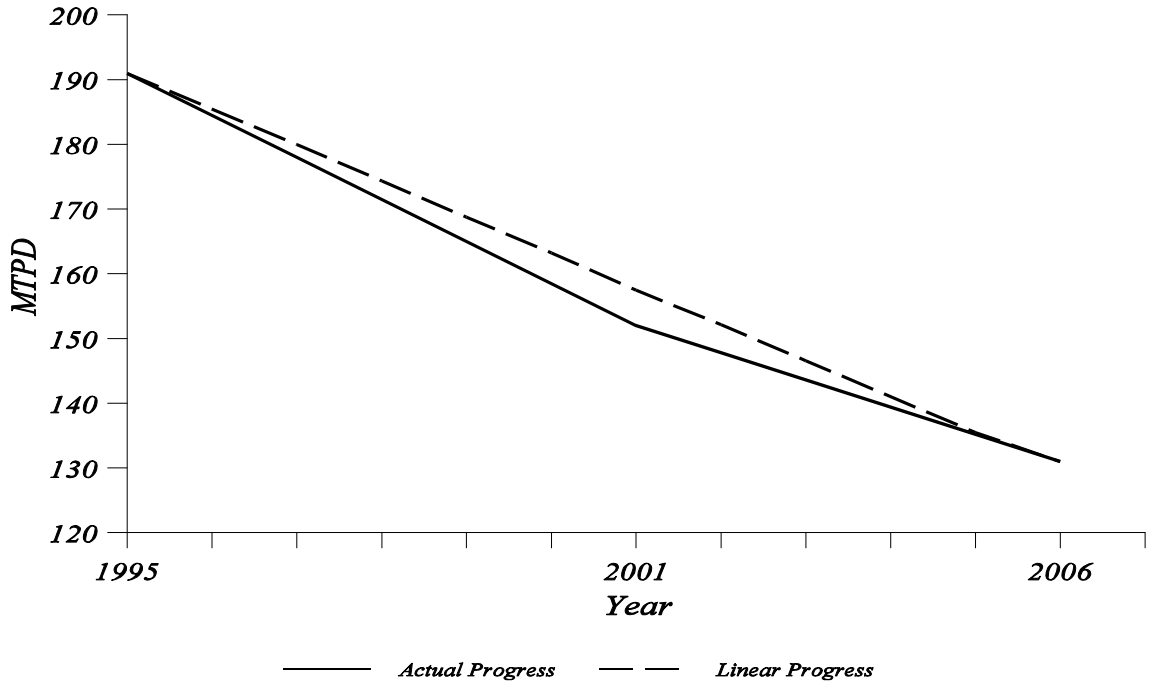


TABLE RFP-1 MILESTONE DEMONSTRATIONS	
MILESTONE YEAR	**ASSUMPTION REGARDING CONTROL MEASURE IMPLEMENTATION**
2001	**Full implementation** • coordinating traffic signals • cleaner burning gasoline • restaurant charbroiler controls • PM-10 episode threshold • curbing, paving, or stabilizing shoulders on paved roads • curbing, paving, or stabilizing shoulders on unpaved access points **Partial implementation** • improved compliance with fugitive dust rules (71.25% CR, 75% CE) • paving unpaved roads (74% completed) • controls on unpaved parking lots (56% RP, 71.25% CR, 75%-86% CE) • controls on disturbed vacant lands (84% RP, 71.25% CR, 70% CE)
2003	**Full implementation** • coordinating traffic signals • cleaner burning gasoline • restaurant charbroiler controls • PM-10 episode threshold • curbing, paving, or stabilizing shoulders on paved roads • curbing, paving, or stabilizing shoulders on unpaved access points **Partial implementation** • improved compliance with fugitive dust rules (74.75% CR, 81% CE) • paving unpaved roads (86% completed) • controls on unpaved parking lots (100% RP, 74.75% CR, 75% - 87% CE) • controls on disturbed vacant lands (100% RP, 74.75% CR, 78% CE) • purchase and use of PM-10 efficient street sweepers (1/8 of fleet converted)

TABLE RFP-1 MILESTONE DEMONSTRATIONS	
MILESTONE YEAR	**ASSUMPTION REGARDING CONTROL MEASURE IMPLEMENTATION**
2006	**Full implementation** • coordinating traffic signals • cleaner burning gasoline • restaurant charbroiler controls • PM-10 episode threshold • curbing, paving, or stabilizing shoulders on paved roads • curbing, paving, or stabilizing shoulders on unpaved access points • improved compliance with fugitive dust rules • paving unpaved roads • controls on unpaved parking lots • controls on disturbed vacant lands • improved compliance with fugitive dust rules (80% CR, 90% CE) • paving unpaved roads (100% complete) • controls unpaved parking lots (100% RP, 80% CR, 75%-89% CE) • controls on disturbed vacant lands (100% RP, 80% CR, 89% CE) **Partial implementation** • commercial heavy duty vehicles meeting 1988 standards • purchase and use of PM-10 efficient street sweepers (50% fleet converted)

Source: MAG TSD, Appendix V, Exhibit 3.
RP: rule penetration, CR: compliance rate, CE: control efficiency

24-Hour Standard

In order to demonstrate RFP for the 24-hour standard, the Phoenix serious area plan first regionalizes the inventories at the two microscale sites by multiplying emissions from each source by a factor of 360, which is the ratio of the size of the nonattainment area (2,880 square miles) to the size of the microscale sites (8 square miles). It then calculates the emission reductions from the application of the adopted measure to these sources. Next, it annualizes these emission reductions by multiplying the sources--which are all windblown sources--by 11, the number of windy days in 1995. Finally, the annualized figure is divided by 365 days to get an average annual day emission reductions. The annual RFP rate is the 2006 average annual day emission reduction divided by 5, the number of years between 2001 and 2006. See BMP TSD, pp. 29 - 31.

The BMP TSD presents the RFP calculation in a table on p. 31. There is an error in this table. In the Microscale plan, the inventories are in kg/day. One kilogram equals 2.2 lbs; however, in converting from kgs to lbs for the RFP table, the microscale inventory was divided by 2.2 instead of multiplied by 2.2. ADEQ corrected this error in a letter to us. See letter, Jacqueline Schafer, ADEQ to Laura Yoshii, "Addendum to June 13, 2001, Submittal of State Implementation Plan revision for the Agricultural Best Management Practices program in the Maricopa County PM_{10} Nonattainment Area," September 7, 2001. (ADEQ RFP Letter) We show the corrected RFP demonstration in Table RFP-2 and Figure RFP-2A.

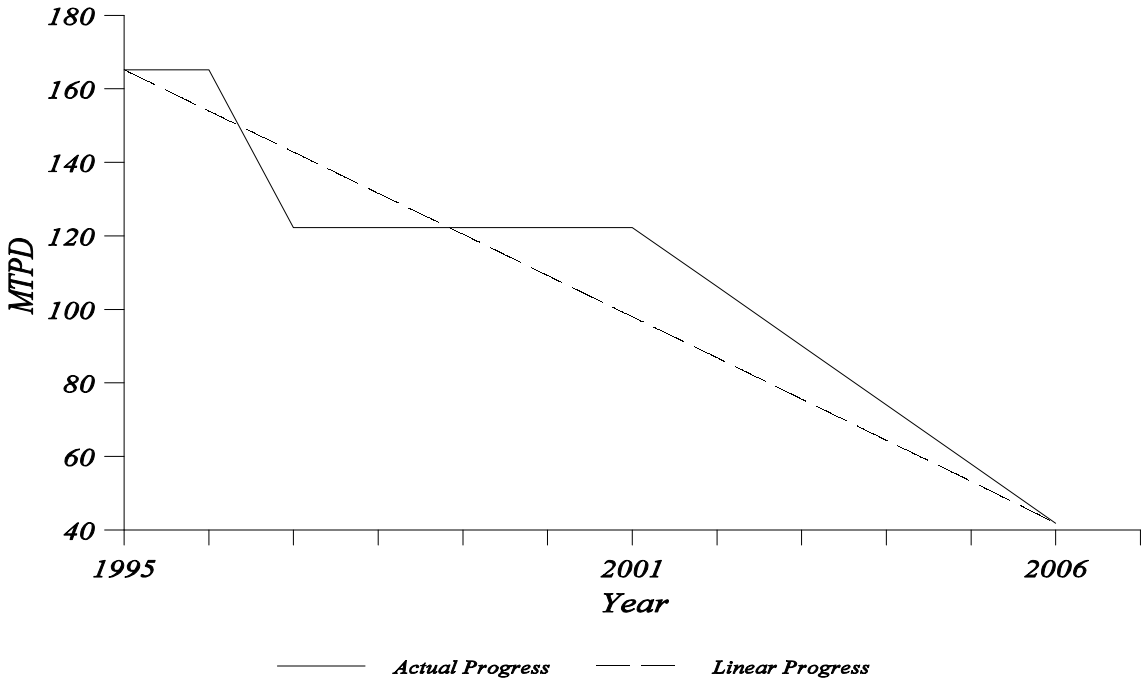
TABLE RFP-2
REVISED RFP DEMONSTRATIONS FOR THE 24-HOUR STANDARD
1995 TO 2006

SOURCE	24-HR MICROSCALE EMISSIONS INVENTORY 1995 (LB/DAY)	REGIONAL FACTOR	24-HOUR REGIONAL EMISSIONS (MTPD)	PERCENT EMISSION REDUCTION 2006	ESTIMATED DAILY EMISSION REDUCTION MTPD	ANNUAL FACTOR (DAYS PER YEAR)	ESTIMATED ANNUAL EMISSION REDUCTIONS 2006 (MTPY)	DAYS PER YEAR	ESTIMATED DAILY EMISSION REDUCTION 2006 (MTPD)
[Road] Construction	9,673	360	1,583	90	1,425	11	15,671	365	42.9
Vacant lands	13,781	360	2,255	70	1,579	11	17,364	365	47.6
Unpaved parking lots	418	360	68	50	34	11	376	365	1.0
Agriculture	--	--	1,575	60.3	950	11	10,447	365	28.6
Total			5,481						120.5
Total Reduction 1995-2006									120.1
Annual RFP Rate = Total reduction 1995-2006/11 years (mtpd per year)									10.9

Source: ADEQ RFP Letter, Enclosure 1.

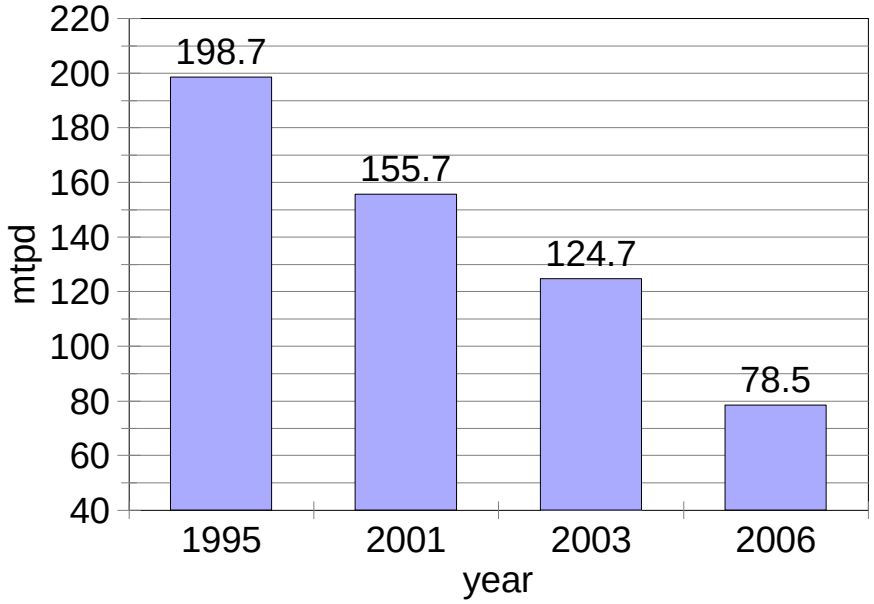
Figure RFP- 2A

RFP Demonstration for the 24-Hour Standard



ADEQ also provide milestones in its September 7, 2001 RFP letter. It estimated quantitative milestones for 2001, 2003, and 2006 for the 24-hour standard using the design day (April 9, 1995) emissions and control efficiencies (90 percent for road construction; 70 percent for vacant land, and 50 percent for unpaved parking lots) used in the 24-hour plan attainment demonstration. It also used the agricultural inventory and associated reductions detailed in the Ag Quantification TSD. The projected daily milestones for 2001, 2003, and 2006 are 156, 125, and 79 metric tons per day, respectively. ADEQ RFP Letter, Enclosure 2. The milestones are shown in Figure RFP-2. The 120 metric ton per day reduction in emissions from 1995 to 2006 satisfies the RFP requirement.

Figure RFP-2
Milestones for the 24-hour Standard



Does the plan meet our policy requirements?

We find that the Phoenix serious area plan provides for RFP and meets the milestone requirements of the Act for both the annual and 24-hour PM-10 standards.

Reasonable Further Progress

Annual Standard

The plan provides for annual progress that results in emissions levels in each year that are at or below the level needed to maintain linear progress toward attainment. See Figure RFP -1 above. Two-thirds of the emission reduction progress is before 2001 and thus the plan provides for greatest emission reductions in the early years. The assumptions regarding control measure implementation and effectiveness that underlie the RFP demonstration are reasonable.

The plan does not provide emission reduction information for each year between the base modeling year of 1995 and the attainment year of 2006. We do not believe that this level of detail is necessary or meaningful given the overwhelming evidence that progress is being made year to year. See Figure RFP-1. Therefore, we find that the Phoenix serious area plan provides

for "such annual incremental reductions in emissions of the relevant air pollutant as ... may reasonably be required by the Administrator for the purpose of ensuring attainment of the [annual PM-10] national ambient air quality standard by the applicable date" as required by section 172(c)(2) of the Act.

24-Hour Standard

The plan provides for annual progress toward attaining the 24-hour standard. See Figure RFP-2A above. This demonstration shows that most of the projected reductions occur after 2001; however, this is an artifact of the assumption that there are no controls on agricultural sources, vacant lots and unpaved parking before December 31, 2001. This assumption does not reflect the efforts by MCESD to assure the implementation of BACM on these sources and the requirement for BMPs in the general permit to be implemented by then.

As noted above, a demonstration of linear progress is most suitable under certain conditions such as 1) PM-10 is emitted by a large number of diverse sources, 2) the relationship between any individual source or source category and overall air quality is not well known, 3) secondary particulate significantly contributes to overall PM-10 levels, and/or 4) the emission reductions needed for attainment are inventory-wide. None of these conditions is met in the attaining the 24-hour standard in the Phoenix area because attainment is depended on controls on just a few types of fugitive dust sources: construction, unpaved roads, unpaved parking, vacant lots, and agricultural sources. Therefore, strict linear progress is not necessary to show reasonable further progress towards attainment in the Phoenix area.

The plan does not provide emission reduction information for each year between the base modeling year of 1995 and the attainment year of 2006. We do not believe that this level of detail is necessary or meaningful given the evidence that progress is being over time and the implementation of controls are not being delayed. See Figure RFP-2A. Therefore, we find that the Phoenix serious area plan provides for "such annual incremental reductions in emissions of the relevant air pollutant as ... may reasonably be required by the Administrator for the purpose of ensuring attainment of the [24-hour PM-10] national ambient air quality standard by the applicable date" as required by section 172(c)(2) of the Act.

Quantitative Milestones

Our guidance provides for a quantitative milestone for the year 2000. *Addendum* at 42016. Based on the statutory requirement for milestones every three years, the years 2003 and 2006 are the next two milestones for areas with an attainment date extension under section 188(e). The Phoenix serious area plan provides milestones for 2003 and 2006 but substitutes 2001 for 2000. We believe this minor deviation from our guidance is appropriate and acceptable for the following reasons.

First, we set the milestone schedule in our serious PM-10 area guidance assuming the area involved was one of the initial moderate areas and its moderate area plan demonstrates attainment by December 31, 1994.[106] *General Preamble* at 13539 and *Addendum* at 42016. Although the Phoenix area was one of the initial moderate nonattainment areas, its moderate area plan did not demonstrate attainment.[107] As a result, our guidance on the appropriate milestone years is not strictly applicable to the Phoenix serious area plan.

Second, we note that our guidance in the *General Preamble* and *Addendum* is just that, guidance. We never intended that it be applied invariably every situation without regard to the actual facts of the nonattainment area and problem under consideration. We make this plain at the beginning of *General Preamble*:

> This General Preamble principally describes EPA's preliminary views on how EPA should interpret various provisions of title I .... Although the General Preamble includes various statements that States must take certain actions, these statements are made pursuant to EPA's preliminary interpretations and thus do not bind the States and the public as a matter of law.

and

> While this preamble should reflect the majority of the SIP requirements under title I, unique circumstances or as yet unrecognized issues are likely to cause case-by-case exception to arise.

General Preamble at 13498 and 13499. See also *Addendum* at 41999.

Thus, we cannot apply guidance absent due consideration of whether it reflects the best interpretation of the statutory requirement in a given situation.

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[106] This is made clear by understanding two facts. First, only the initial moderate areas, those designated nonattainment by operation of law on November 15, 1990, had moderate area plans due by November 15, 1991 and moderate attainment dates of December 31, 1994. See CAA section 189(a)(2)(A). Second, section 189(c) only requires quantitative milestones in plans demonstrating attainment.

[107] The moderate area plan submitted by the State in 1991 and revised in 1993 and 1994 demonstrated the impracticability of attainment by December 31, 1994. While we have subsequently disapproved this impracticability demonstration because the plan did not include RACM, we confirmed that attainment was impracticable in our 1998 FIP. See 63 FR 41326, 41340.

Finally, we believe that the statutory purpose for including milestones in PM-10 plans is best served in the Phoenix area by having the milestone year be 2001 rather than 2000. Under the Act, states are to submit a demonstration 90 days after a milestone date that the state has implemented all measures in its approved plan and has met the milestone. See CAA section 189(c)(2). If a state fails to submit a report or we determine that the area has not met a milestone, then the state must submit a plan revision that assures that the next milestone will be met. See CAA section 189(c)(3).

It is clear from the statutory requirements, that the milestone requirement functions as a mid-course evaluation of the PM-10 plan and an opportunity to make corrections to the plan to assure that there is no delay in attainment due to failures to implement or achieve needed reductions. As such, the milestones should be keyed, to the extent possible, to major implementation deadlines in a manner that allows for a realistic and comprehensive look at the effectiveness of the implemented measures.

The BACM implementation deadline for Phoenix is June 10, 2000. A December 31, 2000 milestone allows for the evaluation of only a half-year of implementation, which is little time to see if implementation is going to achieve the expected emission reductions. Setting the milestone one year later on December 31, 2001 as the Phoenix plan does, provides for a full year of implementation and allows for a more real assessment of the effectiveness of BACM yet still leaves ample time to make any corrections needed to assure timely attainment. Therefore, we believe that strict adherence to the 2000 milestone date in our guidance would be less beneficial to attainment in the Phoenix area than setting the date at 2001.

The next milestone in the plan after the 2001 one is in 2003. MAG plan, Figure 8-4 and ADEQ RFP Letter, Enclosure 2.. This second milestone is only 2 years after the first, instead of 3 years arguably required by the Act. However, we believe that the 3-year milestone increment in CAA section 189(c) is the maximum allowable time between milestones and nothing in the section prohibits states from setting milestones dates that are closer together.

The milestones for both standards are based on reasonable assumptions that are consistent with the implementation schedules for the measures in the plan and with the RFP demonstrations.

For these reasons, we find that the Phoenix serious area plan meets the quantitative milestone requirement in CAA section 189(c)(1) for both the annual and 24-hour PM-10 standards.

RFP Demonstration for the 24-Hour Standard Based on Annual Standard Assumptions

As noted previously, ADEQ assumed controls only on the “permitted” sources, that is,

only on those sources that receive permits from MCESD, in its modeling of the microscale sites in 2001. ADEQ assumed that all the "nonpermitted" sources--unpaved roads, vacant lots, and unpaved parking lots--are uncontrolled in 2001. ADEQ TSD, pp. 3-10 and 3-1 . This latter assumption does not reflect the efforts by MCESD to assure the implementation of BACM on these sources and is inconsistent with the assumptions made for these sources in the annual standard impracticability demonstration. In fact, in most instances, the assumptions made on overall control effectiveness are not consistent between the 24-hour standard impracticability and attainment demonstrations and those demonstrations for the annual standard.

ADEQ also assumed that there would be no control on agricultural sources in 2001. This is inconsistent with the implementation schedule for the BMP rule which requires compliance by December 31, 2001 and the 20 percent loss of agricultural land between 1995 and 2001.

To determine if the plan would still show RFP with the use of consistent assumptions between the annual standard and 24-hour standard demonstrations, we recalculated the RFP demonstration using the control assumptions from the annual standard demonstrations and additional control information from the BMP TSD. Because we are dealing with region-wide controls, we assumed a 80 percent rule effectiveness factor for each controlled source. Table RFP-3 and Figure RFP-3 show the results of these recalculations.

TABLE RFP-3
RFP FOR THE 24-HOUR STANDARD
USING ANNUAL STANDARD ASSUMPTIONS

	CONSTRUC-TION	UNPAVED PARKING	VACANT LANDS	AGRICUL-TURE	UNPAVED ROADS[2]	PAVED ROADS	TOTAL
1995 Microscale Emissions (kg/day)	4,394	190	6,264	--	51	42	--
Regional Factor	360	360	360	--	360	360	
1995 Regionalize Microscale Emissions (mtpd)	1,582	68	2,255	1,575	18	15	5,514
Annual factor days per year	11	11	11	11	365	365	
1995 Regionalized Microscale Emissions (mtpy)	17,400	752	24,805	17,325	6,701	5,519	72,503

TABLE RFP-3
RFP FOR THE 24-HOUR STANDARD
USING ANNUAL STANDARD ASSUMPTIONS

	CONSTRUC-TION	UNPAVED PARKING	VACANT LANDS	AGRICUL-TURE	UNPAVED ROADS[2]	PAVED ROADS	TOTAL
1995 Regionalized Microscale Emissions (mtpd)	47.7	2.1	68.0	47.5	18.4	15.1	198.6
2001 Control Level Percent	54.9	35.4	53.1	20.0/31.2	0.0	0.0	
2001 Regionalized Microscale Emissions (mtpd)	21.5	1.3	31.9	38.0/32.7	18.4	15.1	126.2/ 120.8
2006 Control Level Percent	70.0	71.0	71.0	60.3	0.0	0.0	
2006 Regionalized Microscale Emissions (mtpd)	14.3	0.6	19.7	18.8	18.4	15.1	86.9

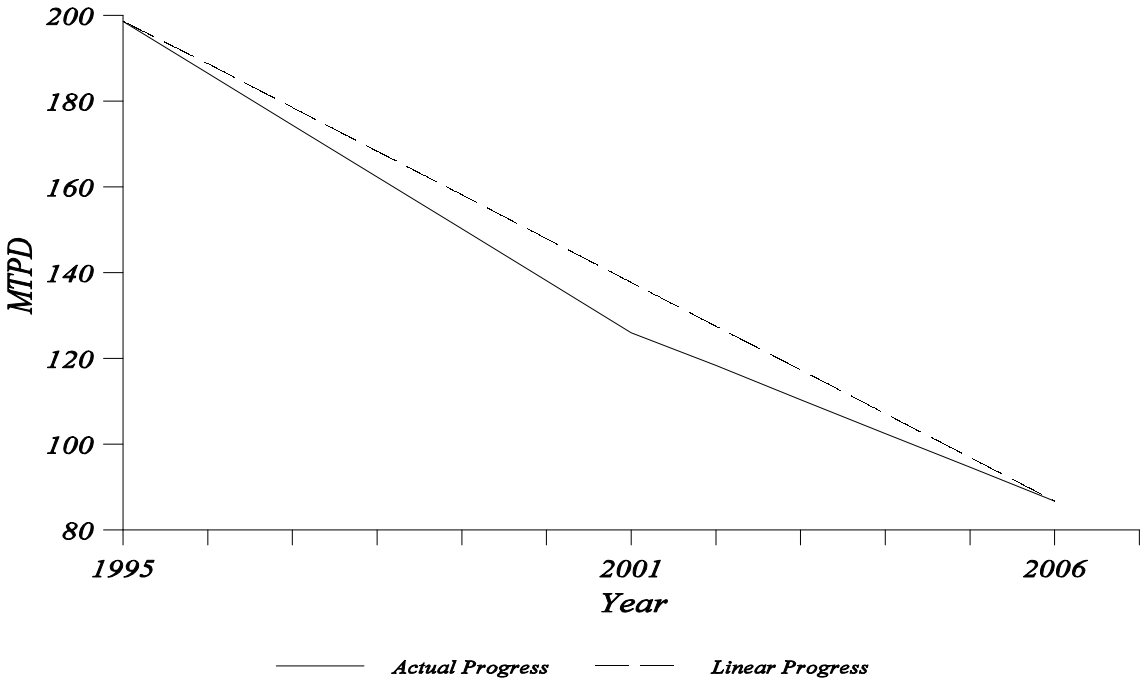
Source: BMP TSD, p. 31, Table MOD-9.
Footnote:
1. Calculated as (1-2001/03/06 control level/100) x 1995 regionalized microscale inventory in mtpd
2. No control is assumed on unpaved roads because controls on this source are used as contingency measures for the 24-hour standard and thus cannot be credited into an RFP demonstration.

1995 to 2006 RFP Rate: 10.2 mtpd per year
1995 to 2001 RFP Rate: 12.1 mtpd per year (20% ag control)/13.0 mtpd per year (31.2% ag control)
2001 to 2006 RFP Rate: 7.9 mtpd per year (20% ag control)/6.8 mtpd per year (31.2% ag control)

This recalculation shows that the plan does provide for RFP and that the plan's conclusions regarding RFP for the 24-hour standard are correct.

Figure RFP-3

RFP Demonstration for the 24-Hour Standard-Recalculated



This section prepared by Frances Wicher.

CONTINGENCY MEASURES

Requirement: Section 172(c)(9) of the Clean Air Act requires that implementation plan provide for contingency measures to be undertaken if the area fails to make RFP or attain.

Final Action: Approve

Proposal Cites: Annual & 24-hour: 66 FR at 50280

Primary Guidance Documents: *Addendum*, pp. 42014-42015
Memorandum, G.T. Helms, Chief, Ozone/Carbon Monoxide Programs Branch, OAQPS to Air Branch Chiefs, Regions I-X, "Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas," August 13, 1993

Primary Plan Cites: MAG plan, pp. 8-16 to 8-18.
BMP TSD, pp. 29 - 31 and ADEQ RFP Letter, Enclosure 1.

What are the statutory, regulatory, and policy requirements?

Section 172(c)(9) of the Clean Air Act requires that implementation plans provide for the implementation of specific measures to be undertaken if the area fails to make RFP or attain by its attainment deadline. These contingency measures are to take effect without further action by the State or the Administrator. The Act does not specify how many contingency measures are necessary nor does it specify the level of emission reductions they must produce.

We interpret the "take effect without further action by the State or the Administrator" to mean that no further rulemaking actions by the State or EPA would be needed to implement the contingency measures. *Addendum* at 42015.

The purpose of contingency measures is to ensure that additional emission reductions beyond those relied on in the attainment and RFP demonstrations are available if there is a failure to make RFP or attain by the applicable attainment date. These additional emission reductions will assure continued progress towards attainment while the SIP is being revised to fully correct the failure. To ensure this continued progress, we recommend that contingency measures provide emission reductions equivalent to one year's average increment of RFP. *Addendum* at 42016.

Certain core control measure requirements such as RACM, BACM, and MSM may result

in a state adopting and expeditiously implementing more measures than are strictly necessary for expeditious attainment and/or RFP. Because of this and because these core requirements effectively require the implementation of all non-trivial measures that are technologically and economically feasible for the area, states are left with few, if any, substantive unimplemented control measures. In fact, under the Act's PM-10 planning provisions, if there were a measure or set of measures that were technologically and economically feasible and could collectively generate substantial emission reductions, e.g., one year's worth of RFP, then a state would be hard pressed to justify withholding their implementation.[108]

If we read the CAA to demand that the only acceptable contingency measure are those that are adopted but not implemented, then states face a difficult choice: adopt the controls for immediate implementation and clearly meet the core control measure requirements but fail the contingency measure requirement or adopt the control measures but hold implementation in reserve to meet the contingency measure requirement but potentially fail the core control measure requirements.

However, states do not need to face this difficult choice if we read the CAA to allow adopted and implemented measures to serve as contingency measures, provided that those measures' emission reductions are not needed to demonstrate expeditious attainment and/or RFP. There is nothing in the language of section 172(c)(9) that prohibits this interpretation; that is, there is no language which says that the contingency measures cannot already be implemented This approach to the contingency measure requirement also has the benefit of allowing states to build uncredited cushions into their attainment and RFP demonstrations--which makes actual failures to make progress or attain less likely--while still obtaining the air quality and public health benefits from the implemented measures.

We have allowed this approach--which is effectively the early implementation of contingency measures--in ozone and carbon monoxide plans. See *memorandum*, G. T. Helms, Chief, Ozone/Carbon Monoxide Programs Brand, OAQPS to Air Branch Chiefs, Regions I-X, "Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas," August 13, 1993 ("Helms memo"). In this memorandum, we note that several states wished to implement their contingency measures early even though they were not needed for their attainment or RFP demonstrations and that "[i]t seems illogical to penalize nonattainment areas that are taking extra steps to ensure attainment of the NAAQS by having them adopt additional [replacement] contingency measures now." This rationale applies with equal force to PM-10 plans.

[108] We do not believe that States are obligated by section 172(c)(9) to adopt infeasible or unreasonable measures or measures that individually and collectively have trivial benefit.

How are these requirements addressed in the plan?

Annual Standard

The revised MAG plan as submitted in February 2000 identifies 5 measures as contingency measures. Table Cont-1 list the measures and their emission reductions as they are listed in the revised MAG plan. The average annual increment in RFP for the annual standard is 5.5 mtpd/year for the full 11 year period, 1995 to 2006 and 4.4 mtpd/year for the 5 year period, 2001 to 2006. See the section "Reasonable Further Progress and Quantitative Milestones" in this TSD.

TABLE CONT-1
ANNUAL STANDARD CONTINGENCY MEASURES AND ESTIMATED EMISSION REDUCTIONS
2000 MAG PLAN

MEASURE	2006 EMISSION REDUCTIONS MTPD
Agricultural best management practices	4.2
Off-road vehicle standards	1.0
Cleaning burn fireplace ordinance	0.1
Additional dust control - City of Tempe	0.1
Additional dust control - City of Phoenix	0.1
Total reductions	5.5

Source: MAG plan, p. 8-19.

After the MAG plan was submitted, Arizona changed its contingency measure package for the annual standard. First, Arizona has withdrawn its commitment to adopt California's off-road vehicle standards in favor of the federal program because the federal nonroad program produces essentially the same emission reductions. See ADEQ's September 7, 2001 letter on California's Off-Road Standards. Second, the State has recalculated the emission reductions for the agricultural best management practices based on the BMP general permit rule as adopted. The revised contingency measures and their emission reductions are given in Table Cont-2.

TABLE CONT-2 ANNUAL STANDARD CONTINGENCY MEASURES AND ESTIMATED EMISSION REDUCTIONS REVISED	
MEASURE	**2006 EMISSION REDUCTIONS MTPD**
Agricultural best management practices (see note 1 below)	5.7
Off-road engine standards (EPA)	0.9
Cleaning burn fireplace ordinance	0.1
Additional dust control - City of Tempe	0.1
Additional dust control - City of Phoenix	0.1
Total reductions	6.9

Source: MAG plan, p. 8-19.

Note 1 -- Changes in emission reduction estimates for the agricultural BMP rule

The estimate of emission reductions from BMP in the 2000 MAG plan was calculated prior to the adoption of the BMP rule and uses different assumption about the effectiveness of agricultural controls then were used to calculate the emissions reductions from the adopted BMP rule. The 2000 MAG plan assumed a 36 percent overall control effectiveness on windblown emissions from agricultural fields and aprons and a 0.3 percent control effectiveness on in tilling emissions from prohibiting tilling on high-wind days in 2006. The plan did not assume any reductions from other agricultural sources. MAG TSD, pp. V-63 to 64.

Estimated reductions from the BMP rule in 2006 are estimated as

2006 average annual day agriculture tilling/harvesting emissions are 3.8 mtpd (MAG TSD, Table II-3)

2006 annual agricultural tilling/harvesting emissions are: 3.8 mtpd x 365 day/year = 1,387 mtpy

2006 annual windblown agricultural fields emissions are: 4,284 mtpy (MAG TSD, Table II-3)

2006 total annual agricultural emissions windblown + tilling/harvesting: 4,284 + 1,387 = 5,671 mtpy
2006 total average annual day emissions windblown + tilling/harvesting: 5,671 mtpy/365 = 15.5 mtpd

Percent reduction from agricultural BMP rule in 2006 = 36.6 percent[109]
Emission reductions from agricultural BMP rule in 2006 - 0.366 x 15.5 mtpd = 5.7 mtpd.

24-Hour Standard

The identified contingency measure for the 24-hour standard is controls for unpaved roads and alleys. BMP TSD, p. 30. This measure comprises not only the unpaved road provisions in MCESD Rule 310.01 but also the commitments by local jurisdictions to control unpaved roads. See MAG plan, pp. 7-75 to 7-94. This measure is estimated to reduce emissions by 12.19 mtpd in 2006. MAG plan, p. 8-9.

The average annual increment in RFP for the 24-hour standard is 10.9 mtpd/year. See page 336 of this TSD.

Does the plan meet the statutory, regulatory and policy requirements?

Annual Standard Contingency Measures

We find that the Phoenix serious area PM-10 plan provides for the implementation of contingency measures for the annual standard as required by CAA section 172(c)(9).

All the measures that have been identified in the plan as contingency measures have been adopted and are being implemented but are not credited in the attainment, RFP or milestone demonstrations for the annual standard and are not necessary to demonstrate expeditious attainment of that standard. Under our applicable policies, states are allowed to use implemented but uncredited measures as contingency measures. See Helms memo.

Under our contingency measure policy, contingency measures should in total have emission reductions equal to or more than the annual RFP increment. For the Phoenix area, the annual standard RFP increment is 5.5 mtpd. *Addendum* at 42016. Collectively, the specified contingency measures generate 6.9 mtpd.

[109] 2006 emissions figures already account for the loss of agricultural lands between 1995 and 2006.

24-Hour Standard Contingency Measures

We find that the Phoenix serious area PM-10 plan provides for the implementation of contingency measures for the 24-hour standard as required by CAA section 172(c)(9).

The unpaved road measure that is identified in the plan as the contingency measure for the 24-hour standard has been adopted and is being implemented but is not credited in the attainment, RFP or milestone demonstrations for the 24-hour standard and is not necessary to demonstrate expeditious attainment of that standard. Under our applicable policies, states are allowed to use implemented but uncredited measures as contingency measures. See Helms memo.

Under our contingency measure policy, contingency measures should in total have emission reductions equal to or more than the annual RFP increment. *Addendum* at 42016. For the Phoenix area, the 24-hour standard RFP increment is 10.9 mtpd. The specified contingency measures generates 12.2 mtpd.

This section prepared by Frances Wicher.

GENERAL SIP REQUIREMENTS: ADEQUATE PERSONNEL, FUNDING, AND AUTHORITY

Requirement:	Section 110(a)(2)(E)(i) of the Clean Air Act requires that implementation plan provide necessary assurances that the State (or the general purpose local government) will have adequate personnel, funding and authority under State law.
Action:	Approve
Proposal Cites:	Annual and 24-hour: 65 FR at 19988 and 66 FR at 50280
Primary Guidance Documents:	40 CFR part 51, subpart L (§ 51.230-232) (authority) 40 CFR § 51.280 (resources).
Primary Plan Cites:	MAG plan, Chapter 11 "Commitments for Implementation," Volumes 1-4. BMP TSD, pp. 33-35.

What are the statutory, regulatory, and policy requirements?

Section 110(a)(2)(E)(i) of the Clean Air Act requires that implementation plan provide necessary assurances that the State (or the general purpose local government) will have adequate personnel, funding and authority under State law to carry out the submitted plan. Under this section, a state needs to provide assurances of adequate personnel, funding and authority only for those control measures that it has included in its submitted implementation plan. It does not need to provide such assurances for control measures that are not included in its submitted implementation plan, whether or not an argument could be made that such measures are necessary to meet another CAA provision. This is clear from the language of the section: "[e]ach implementation plan *submitted by a State*...shall...provide (i) necessary assurances that the State...will have adequate personnel, funding, and authority under State...law to carry out *such* implementation plan." (emphasis added). Therefore, where a jurisdiction has not committed to implement a measure, it is not required by CAA section 110(a)(2)(E) to provide assurances of adequate resources.

Requirements for legal authority are further defined in 40 CFR part 51, subpart L (§ 51.230-232) and for resources in 40 CFR § 51.280.

States and responsible local agencies must demonstrate that they have the legal authority to adopt and enforce provisions of the SIP and to obtain information necessary to determine

compliance. SIPs must also describe the resources that are available or will be available to the State and local agencies to carry out the plan, both at the time of submittal and during the 5-year period following submittal.

How are these requirements addressed in the plan?

Resources: Each agency committing to implement controls described the resources available to implement the controls. See MAG plan, Chapter 11, "Commitments for Implementation" We have discussed resources for each measure as we have evaluated it in this TSD. The available resources seem adequate for now and over the next 5 years.

Legal authority:

- The Maricopa Association of Governments (Adoption of the plan): A.R.S. 49-406 H.

- The County of Maricopa, as both a general purpose governmental agency and an air pollution control agency:

    - General purpose government (improve and maintain roads, adopt and enforce building codes, etc.): A.R.S. 11-251 and 11-251.05.

    - Environmental Services Department (adopt and enforce air pollution control regulation). A.R.S. 49-479 provides that the board of supervisors "shall adopt such rules as it determines are necessary and feasible to control release into the atmosphere of air contaminants..." A.R.S. 49-476.01 provides the County control officer the authority to require sources to monitor, sample, or otherwise quantify their emissions and the board of supervisors the authority to adopt rules for source monitoring, sampling, etc.

- The Cities and Towns of Maricopa County (improve and maintain roads, adopt and enforce building codes): A.R.S. 9-240, 9-243, 9-462

- The Arizona Department of Environmental Quality. A.R.S. 49-404 and 49-406, authority to adopt SIP, A.R.S. 49-422(B) & (C) authority to require sources to monitor, sample, or otherwise quantify their emissions and to adopt rules for source monitoring, sampling, etc. Authority to adopt specific program (e.g., inspection and maintenance) are described with the measure.

Does the plan meet the statutory, regulatory and policy requirements?

We find that the implementing agencies for the Phoenix serious area plan have adequate

resources for implementing their respective commitments that are included in the submitted plan. We also find that the plan also adequately describes the resources that are available or will be available to the State and local agencies to carry out the plan, both now and over the next 5 years. See discussion of the individual commitments and control measures earlier in this TSD.

All agencies and jurisdictions appear to have adequate authority under Arizona state law to implement their respected commitments and, where applicable, to obtain information necessary to determine compliance. We, therefore, find that these agencies/jurisdictions have demonstrated that they have adequate legal authority to implement the plan.

This section prepared by Frances Wicher.

DESCRIPTION OF THE ENFORCEMENT METHODS AND STATE BACK-UP AUTHORITY

Requirement:	Section 110(a)(2)(C) requires SIPs to include a program to provide for the enforcement of SIP measures. Section 110(a)(2)(E)(iii) requires SIPs to include necessary assurances that where a State has relied on a local or regional government, agency or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of the such plan provision.
Action:	Approve
Proposal Cites:	Annual and 24-hour: 65 FR at 19989 and 66 FR at 50280
Primary Guidance Documents:	40 CFR §51.111(a) enforcement authority
Primary Plan Cites:	MAG plan, Chapter 11 "Commitments for Implementation," Volumes 1-4. BMP SIP, p. 34

What are the statutory, regulatory, and policy requirements?

Section 110(a)(2)(C) requires SIPs to include a program to provide for the enforcement of SIP measures. The implementing regulation for this section is found at 40 CFR §51.111(a) and requires control strategies to include a description of the enforcement methods including 1) procedures for monitoring compliance with each of the selected control measures, 2) procedures for handling violations, and 3) the designation of the agency responsible for enforcement.

Section 110(a)(2)(E)(iii) requires SIPs to include necessary assurances that where a State has relied on a local or regional government, agency or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of the such plan provision.

How are these requirements addressed in the plan?

The principal control measures in the plan are MCESD's Rules 310 and 310.01. Procedures for monitoring compliance (i.e., the inspection strategy) with these rules are described in Maricopa County's commitments.

MCESD developed by April, 2000 inspection priorities for vacant lots and unpaved parking lots considering lot size and number of sources with larger lots being inspected first and smaller lots in succeeding years. A number of cities have municipal programs to address these sources; therefore, the Department is initially direct its inspections to cities lacking such programs. MCESD inspectors are assigned geographical districts and are compiling notes on the vacant lots and unpaved parking lots in each district during their routine surveillance activities. Under current MCESD policy, the inspectors are first directed to handle all complaints and then to begin to address the larger sites on the individual district lists. In 2000, the inspectors made 499 inspections on vacant lots, unpaved parking lots, and unpaved roads.

MCESD issued a revised air quality enforcement policy on April 28, 2000. See Air Quality Violation Reporting and Enforcement Policy and Procedure, MCESD, April 28, 2000. A copy of the policy can be found in the docket for this action. The policy is one of the commitments made by the Maricopa Board of Supervisors on December 15, 1999, to address EPA's concerns regarding enforcement of the County fugitive dust rules. See Maricopa County commitments, 1999 Revised Measure 6.

The purpose of the policy is to provide a consistent process for documenting air quality violations, notifying alleged violators, and initiating enforcement actions to ensure that violations are addressed in a timely and appropriate manner. See Enforcement Policy, p. 1.

The enforcement policy requires that when a potential violation is discovered, the inspector shall provide details on a compliance inspection report, earth moving site report and a written notice of the violation shall be provided to the owner or operator in a compliance status letter, inspection form, notice of violation, notice to appear and complaint ("citation"). Certain types of violations (e.g., violation of opacity limitations, stabilization requirements, work practices for hauling and trackout etc.) will be referred to the County Attorney's office. A follow up investigation shall be conducted if the violation has not already been corrected at the time of the written notice. Enforcement Policy, p. 2.

Enforcement options are Orders of Abatement, Notice to Appear and Complaint, or referral to the County Attorney's office. The County Attorney's office has the options of settlement agreement with consent decree, filing a criminal complaint under A.R.S. 49-512 and 49-514 or filing a civil complaint in Superior Court. Appropriate penalties will be sought for civil and criminal complaints, and the Department encourages Environmental Community Action Projects as part of settlements to supplement penalties. Enforcement Policy, p. 4-7 and Addendum A.

ADEQ will enforce the BMP rule. It will develop a compliance determination inspection initiative in 2002 by working with various organizations (e.g., University of Arizona, MCESD), ADEQ intends to select a section of the nonattainment area and perform compliance

determination inspections. Additional initiatives may be developed depending the results of this initial one.

Starting in January, 2002 ADEQ will respond to agriculture-related complaints within five working days. ADEQ will also work with other agencies to develop a program for referral of complaints. BMP SIP, p. 34.

THE BMP statute (ARS § 49-457 (I), (J), and (K)) and the BMP rule (AAC R18-2-611 (K) and (L)) give ADEQ authority to address agricultural-related complaints and details the compliance steps that ADEQ must follow in dealing with such compliance. BMP SIP, p. 34.

Under the BMP rule, if ADEQ determines that a commercial farmer is not in compliance with the BMP general permit and this is the first complaint against the farmer, then ADEQ will issue a compliance order requiring the farmer to submit a plan to the local Natural Resources Conservation District (NRCD) that specifies the BMPs that will be used in the future. The farmer will have a least six months to submit this plan. ARS § 49-457 (I). ADEQ will develop a memorandum of understanding with the NRCD to obtain copies of these plans. BMP SIP, p. 34.

If ADEQ determines that a commercial farmer is not in compliance with the BMP general permit and there have been previous complaints against the farmer, then ADEQ will issue a compliance order requiring the farmer to submit a plan to the ADEQ that specifies the BMPs that will be used in the future. The farmer will have a least six months to submit this plan. § 49-457 (J). BMP SIP, p. 34.

If the farmer fails to comply with the submitted plan, ADEQ may revoke the general permit and require the farmer to obtain an individual permit. § 49-457 (K).

The CAA section 110(a)(2)(E)(iii) requirement that plans include necessary assurances that where a State has relied on a local or regional government, agency or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of the such plan provision are addressed by A.R.S. 49-406. J. This A.R.S. section provides that if any person fails to implement an emission limitation or control measure, the relevant State official is required to issue a written finding to that effect, which may also necessitate the holding of a conference regarding the failure with the offending person. If a determination is made that the failure has not been corrected, the attorney general, at the responsible official's request, must file an action, seeking either "a preliminary injunction, a permanent injunction, or any other relief provided by law." A.R.S. 49-407 provides that citizens may sue the director to perform his or her duty. MAG plan, p. 7-285.

Does the plan meet the statutory, regulatory and policy requirements?

We find that the Phoenix plan adequately provides for the enforcement of the principal measures relied on for attainment measures and that the plan includes an adequate descriptions of enforcement methods as required by our regulations.

We have previously found that Arizona law includes the necessary assurances that where a State has relied on a local or regional government, agency or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of the such plan provision. 60 FR 18010, 18019 (April 10, 1995).

This section prepared by Colleen McKaughan and Frances Wicher.

Section 6 – Review of Maricopa County Rules

EVALUATION OF MCESD RULE 310 - FUGITIVE DUST SOURCES

Rule: MCESD Rule 310 -- Fugitive Dust Sources (adopted February 16, 2000)

Appendix C to Maricopa County rules contains the test methods to be used for Rule 310 compliance determinations; there is no existing SIP-approved version of Appendix C to Maricopa County rules.[110]

Submitted: March 2, 2000 (adopted February 16, 2000). Supersedes submittal of August 4, 1999, adopted June 16,

Complete: March 31, 2000

Applicable SIP Rule: MCESD Rule 310 (adopted September 9, 1994), approved 62 FR 41856 (August 4, 1997).[111]

Rule Summary: Rule 310 establishes requirements for fugitive dust sources on facilities that have or are required to have air quality permits from MCESD. These facilities include construction sites, stationary sources, and any other facility or operation that is required to have a permit under MCESD rules. The rule requires earthmoving activities that disturb 0.10 acre or more to apply for and get approval of a Dust Control Plan (DCP) and requires other permitted sources to obtain a DCP prior to commencing any routine dust generating activity.

Final Action: Approve.

Proposal Cite: 65 FR at 19989

Rule Evaluation:

[110] Appendix C contains test methods that apply to multiple Maricopa County rules, including Rule 310 and 310.01.

[111] We initially approved the September 9, 1994 version of Rule 310 in April 1995 as part of our broader rulemaking to approve the MAG moderate area plan. Our approval was vacated by the Ninth Circuit Court of Appeals in *Ober v. EPA* for reasons unrelated to the merits of Rule 310. We reapproved the rule as part of our action on the Microscale plan in August, 1998.

We have evaluated the revised Rule 310 for compliance with CAA requirements for SIP revisions in section 110 and Part D and our policy as outlined in "Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations: Clarification to Appendix D of November 24, 1987 Federal Register", May 25, 1988 (the "Blue Book"). The Blue Book is directed at VOC rules but policies outlined it have general relevance to all rule submittals.

We have also evaluated the rule for compliance with the CAA requirements for the implementation of BACM in section 189(b)(1)(C) and inclusion of the most stringent measures in section 188(e). See sections "Implementation of BACM and Inclusion of MSM for Construction Sites and Activities" and "Implementation of BACM and Inclusion of MSM for Paved Roads" found earlier in this TSD.

MCESD revised Rule 310 considerably from the current SIP-approved version. The greatest change has been to split the old rule into two new rules: the revised Rule 310 that addresses permitted facilities and a new Rule 310.01 that addresses nonpermitted sources. We evaluate Rule 310.01 in the next section. MCESD also revised Rule 310 to strengthen it compared to the current SIP-approved version. These rule strengthenings include:

- improved enforceability of control measures and dust control permits (DCP),
- improvements to existing test methods,
- new performance standards and test methods,
- clearer definitions,
- more specific work practice requirements

In 1998 through 2000, MCESD held multiple workshops on Rule 310 to gather public input on the rule's provisions. We also reviewed the revised rule during its development and sent several comment letters noting rule deficiencies and proposing changes to correct these deficiencies. Copies of our comment letters can be found in the docket for this proposal. We believe these deficiencies have been corrected in the latest version of the rule or in MCESD's commitments by MCESD to make future revisions to the rule.[112]

Rule Strengthenings

- To improve clarity, the requirements in the 1994 version of Rule 310 have been separated into two rules: Rule 310 for permitted sources and Rule 310.01 for

[112] These MCESD commitments to revise the rule concern BACM implementation as opposed to rule enforceability. See section "Implementation of BACM and Inclusion of MSM for Construction Sites and Activities" of this TSD. The rule is fully enforceable without these commitments.

nonpermitted sources.[113]

• A table has been added to the rule listing control measures by source type and provides references to the sections of the rule where the applicable standards for each source type are found. See Rule 310, Table 1.

a. Dust Control Plans

The revised rule clarifies that:

C failure to comply with the provisions of an approved DCP is a violation of the rule.

C an owner/operator is subject to all rule requirements at all times regardless of whether an approved DCP is in place.

C compliance with a DCP does not relieve the source from complying with all other applicable standards in the rule.

C control measures are required to be applied to all actual and potential fugitive dust sources, before, after and while conducting any dust generating operation, including during weekends, after work hours, and on holidays.

C sources subject to Title V permits, Non-Title V permits, or General Permits under Regulation II (Permits and Fees) are required to first submit and obtain approval of a DCP before commencing any routine dust generating operation.[114]

b. Work Practices

The revised Rule 310 contains a new section labeled “work practices” which includes:

C specific requirements/standards for bulk material handling and hauling, dirt spillage and

[113] Nonpermitted sources include unpaved roads/alleys, unpaved parking lots, and vacant lots that are not associated with permitted construction sites/earthmoving operations or located on the property of permitted facilities, erosion-caused deposits onto paved surfaces, and cattle feedlots and livestock areas.

[114] Rule 310 defines “routine” as any dust generating operation which occurs more than 4 times per year or lasts 30 cumulative days or more per year. This is in addition to the requirement to submit a DCP for any earthmoving operations that disturbs 0.10 acre or more even if the operation is subject to Title V or other permitting requirements.

trackout, and unpaved haul/access roads which are more descriptive than in the current SIP-approved rule.

C new work practice standards for open storage piles.

C new work practice standards for weed abatement.[115]

C a requirement to operate a water application system (e.g. water truck) while conducting earthmoving operations that disturb one or more acres, if water is the chosen control measure.

c. Standards and Test Methods

The revised Rule 310 requires that control measures must be implemented to an extent necessary to meet the applicable standard(s).

C Appendix C has been submitted with Rule 310, which contains test methods for fugitive dust sources subject to Rule 310.

C The revised rule requires that unpaved haul/access roads and unpaved parking lots comply with both: a 20 percent opacity standard and a silt content or a silt loading standard.

C A new opacity test method has been added to Appendix C to determine compliance with the rule's 20 percent opacity standard for unpaved haul/access roads and unpaved parking lots which is better tailored to these sources.[116]

C A test method for determining compliance with the new silt content/loading standards has

[115] Currently the only weed abatement standards in the applicable implementation plan for the Phoenix area are contained in the federal fugitive dust rule promulgated in 1998. See 40 CFR 52.128(d)(3)(i). Rule 310 requires control measures for weed abatement activities that disturb 0.10 acre or more compared to the federal rule that requires control for weed abatement operations that disturb 0.50 acre or more.

[116] The revised opacity test method provides that only two readings per plume are taken, one immediately when the plume is generated and the other at 5 seconds following plume generation rather than readings every 15 seconds regardless of whether a plume is still visible where the readings are being observed.

been added to Appendix C.[117]

- The opacity test method in Appendix C to determine compliance with the rule's 20 percent opacity standard for earthmoving operations (e.g. equipment used for grading or moving dirt, material dumping, etc.) has been better tailored towards the intermittent nature of these sources.[118]

- The revised rule requires inactive disturbed surfaces to be stabilized according to new standards/test methods included in the rule and Appendix C. Inactive disturbed surfaces are open areas, vacant lots, or other disturbed surfaces where no activity is occurring. Owners/operators must maintain a visible crust or meet at least one other applicable stabilization standard.

d. High Wind Provisions

- The SIP-approved version of Rule 310 exempts sources when average wind speed exceeds 25 miles per hour, provided all reasonably available control measures contained in an approved Dust Control Plan remain in effect. The revised Rule 310 provides that exceedances of the opacity limit that occur due to a wind event (when the 60-minute average wind speed exceeds 25 miles per hour) shall constitute a violation. However, an affirmative defense in an enforcement action is provided if the owner/operator applied and maintained the proper control measures,[119] the opacity exceedance could not have been prevented by better application of control measures, records were kept as required by the rule, and the wind event on the day in question was documented by records.

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[117] This rule revision is consistent with the standards that apply to unpaved roads and unpaved parking lots that are not associated with permitted sources, found in our federal fugitive dust rule for unpaved parking lots, unpaved roads and vacant lots as revised on December 21, 1999. 64 FR 71304. We believe the inclusion of these standards provides more assurance of fugitive dust control than sole reliance on an opacity standard.

[118] The observer may follow a fugitive dust plume generated by mobile earthmoving equipment, as long as the sun remains oriented in the 140 degree sector to the back. If the equipment travels outside the field of observation, resulting in the inability to maintain the orientation of the sun within the 140 degree sector, or if the equipment ceases operating, the observer is to consider the 15-second interval readings interrupted. The observer is to mark an "X" (rather than include "zeros" when the 15-second interval opacity readings are averaged).

[119] Owners/operators need to implement all required control measures and apply at least one "wind event control measure" in a new table included in the rule (Table 2).

Other Rule Changes

C The SIP-approved version of Rule 310 requires that records be retained for at least three (3) years. The revised Rule 310 requires that records be retained for at least one (1) year from the date the records are initiated.[120] The revised rule further requires that records be retained for at least six months following the termination of a dust generating operation; therefore, records associated with multi-year dust generating operations must be retained throughout the project's duration and for six months following its termination.

Our policy for VOC rules is that records be maintained on site for at least 2 years, and available for expeditious inspection and review for an additional 3 years.[121] We are approving the Rule 310 record keeping retention provision because it appears to be consistent with the temporary, as opposed to permanent, nature of most operations subject to Rule 310 and we believe one year is sufficiently long enough for rule enforcement purposes.

C The revised Rule 310 clarifies that landscape maintenance to establish initial landscapes or to redesign existing landscapes (not including grading, trenching, or any other mechanized surface disturbing activity) and playing on a ballfield are not considered dust generating operations and are exempt from the rule requirements. However, we believe that these activities are unlikely to release a significant enough amount of dust to warrant a DCP or other controls under Rule 310. Should landscape maintenance disturb the surface of a vacant lot or open area, the source is not exempt from Rule 310.01 requirements for stabilized surfaces.

Compliance with CAA Section 110(l)

CAA section 110(l) prohibits us from approving a revision to the applicable implementation plan if that revision would interfere with any applicable requirement concerning attainment and reasonable further progress (RFP) or any other applicable requirement of the Act. We interpret section 110(l) to mean that we cannot approve a plan revision if that revision would mean that the State's applicable implementation plans no longer provide for attainment or RFP as these are required by the CAA for those plans or if the revision would mean that the plans no longer meet another requirement of the Act that applies to the plans. For a further discussion of this interpretation, see 61 FR 51599, 51608 (October 3, 1996).

[120] Title V sources must maintain records for five years. Rule 310, section 503.

[121] See letter, Daniel A. Meer, Chief, Rulemaking Section, Air and Toxics Division, Region 9 to Pat Leyden, South Coast Air Quality Management District, "Rule Development Recordkeeping Policy," June 27, 1996.

We are revising the Arizona SIP to incorporate the updated Rule 310 in partial replacement of the older Rule 310 we approved in 1997.[122] In addition to the effect on attainment and RFP, the "other applicable requirement of the Act" that we must be concerned with for this final action is the Act's requirements for implementation of RACM and BACM and the inclusion of the MSM. We are concerned only with the PM-10 plan here because this rule only controls PM-10.

We are approving the expeditious attainment and RFP demonstrations in the Phoenix serious area plan. These demonstrations are in large part dependent on approval of the revised Rule 310. Therefore, our approving the rule will not adversely affect the plan's provisions for expeditious attainment and RFP, the implementation of RACM and BACM and the inclusion of MSM as these are required by the Act.

This section prepared by Karen Irwin.

[122] Rule 310.01, which we are also approving, replaces the balance of the older SIP-approved version of Rule 310.

EVALUATION OF MCESD RULE 310.01 - FUGITIVE DUST FROM OPEN AREAS, VACANT LOTS, UNPAVED PARKING LOTS, AND UNPAVED ROADWAYS

Rule: MCESD Rule 310.01 -- Fugitive Dust from Open Areas, Vacant Lots, Unpaved Parking Lots, and Unpaved Roadways (adopted February 16, 2000)

Appendix C (revised February 16, 2000). Appendix C contains the test methods to be used for Rule 310.01 compliance determinations.

Submitted: March 2, 2000, adopted February 16, 2000. Supersedes rule submittal of August 4, 1999, adopted June 16, 1999.

Complete: March 31, 2000

Applicable SIP Rule: MCESD Rule 310 (adopted September 9, 1994), approved 62 FR 41856 (August 4, 1997).[123]

Rule Summary: Rule 310.01 establishes requirements for fugitive dust emitted from nonpermitted sources, including unpaved public roads, unpaved parking lots, open areas and vacant lots, erosion-caused deposits of bulk materials onto paved surfaces, and commercial feedlots and/or commercial livestock areas.

Final Action: Approve.

Proposal Cite: 65 FR at 19989

Rule Evaluation:

We have evaluated the revised Rule 310.01 for compliance with CAA requirements for SIP revisions in section 110 and Part D and U.S. EPA rulemaking policy as outlined in the document entitled "Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations: Clarification to Appendix D of November 24, 1987 Federal Register", May 25, 1988 (the "Blue Book"). The policies outlined in document have general relevance to all rule submittals. We present this evaluation below.

We have also evaluated the rule for compliance with the CAA requirements for the

[123] MCESD removed the provisions for unpaved roads, etc. from the current SIP-approved Rule 310 and placed them into the new Rule 310.01.

implementation of BACM in section 189(b)(1)(C) and inclusion of the most stringent measures in section 188(e). See sections "Implementation of BACM and Inclusion of MSM for Unpaved Roads," "Implementation of BACM and Inclusion of MSM for Disturbed Vacant Lots", "Implementation of BACM and Inclusion of MSM for Unpaved Parking Lots", and "Implementation of BACM and Inclusion of MSM for Paved Roads" found earlier in this TSD.

The federal fugitive dust rule also establishes requirements for unpaved roads, unpaved parking lots, and open areas and vacant lots in the Phoenix PM-10 nonattainment area.[124] See 40 CFR 52.128. We intend to propose withdrawing the federal rule in part because Rule 310.10 establishes requirements for these sources that are equivalent to the requirements in the federal rule.

Summary of rule requirements

Disturbed Vacant Lots and Open Areas

- Owners/operators of vacant lots and open areas greater than or equal to 0.10 acres that have a cumulative of 500 square feet or more that are driven over/used by motor vehicles and/or off-road motor vehicles are required to prevent trespass by installing barriers or other effective measures. Alternatively, owners/operators may choose to uniformly apply and maintain surface gravel or chemical/organic stabilizers to all disturbed areas in compliance with one of the rule's applicable stabilization standards/test methods. The rule allows a 60 day period for compliance following initial discovery of vehicle activity on the vacant lot/open area. Section 301.

- Owners/operators of vacant lots and open areas with greater than or equal to 0.5 acres of disturbed surface area that remain vacant or unused for more than 15 days are required to implement one or more control measures to stabilize the surface, according to the applicable standards/test methods. The rule allows a 60 day period for compliance following initial discovery of the disturbance on the vacant lot/open area. Section 302.

Unpaved Parking Lots

- Owners/operators of an unpaved parking lot larger than 5,000 square feet are required to pave, apply dust suppressants, or apply gravel, according to the applicable rule standards/test methods. Applicable standards include a 20 percent opacity standard, and an 8 percent silt content standard and/or a 0.33 oz/square foot silt loading standard. Unpaved parking lots that are used no more than 35 days a year, excluding days when ten

[124] The FIP fugitive dust rule in its final form can be found at 64 FR 71304, December 21, 1999.

or fewer vehicles enter, are only required to implement control measures on days when over 100 vehicles enter and park. Section 303.

Unpaved Roads

C Owners/operators of unpaved public roads, including alleys, that are traveled by 150 vehicles per day (VPD) or more and are located in the PM-10 nonattainment area, are required to pave, apply dust suppressants, or apply gravel according to the applicable rule standards/test methods. Applicable standards include a 20 percent opacity standard, and a 6 percent silt content standard and/or a 0.33 oz/square foot silt loading standard. Unpaved roads with 250 VPD or more were required to be stabilized by June 10, 2000 while those with 150 VPD or more are required to be stabilized by June 10, 2004. Section 304.

Commercial Feedlots and/or Commercial Livestock Areas

C Owners/operators of commercial feedlots/livestock areas are required to apply dust suppressants, apply gravel, or install shrubs/trees within 50 feet to 100 feet of animal pens, in compliance with a 20 percent opacity standard. Section 305.

Erosion-caused Deposits of Bulk Materials onto Paved Surfaces

C Owners/operators of property from which deposits have eroded onto an adjacent paved roadway or parking lot are required to remove the deposits within 24 hours and dispose of them without causing another source of fugitive dust. Control measures are to be implemented to an extent that meets a 20 percent opacity standard.[125] Section 306.

Record keeping

C Rule 310.01 requires that records be compiled that provide evidence of control measure application (i.e. receipts and/or purchase records). The records should describe the type of treatment or control measure, extent of coverage, and date applied.[126] Records are to be retained for at least one year. Sections 502 and 503.

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[125] The opacity test method to be used for compliance determinations for erosion caused deposits is the same as that for unpaved roads and unpaved parking lots.

[126] Rule 310.01 indicates these details should be provided but does not require them. However, in light of the requirement that sources provide evidence of control measure application, we believe the recordkeeping provision is sufficient for enforcement purposes.

For the purposes of evaluating Rule 310.01 for SIP approvability under 110(l) and Part D of the CAA and EPA rulemaking policy, we are comparing Rule 310.01 to the SIP-approved requirements found in Rule 310. The requirements for sources now covered under Rule 310.01 have been strengthened compared to the relevant SIP-approved requirements in Rule 310, primarily through better specification of control measures and the addition of new standards/test methods.

Rule Strengthenings

- The revised rule requires that unpaved roads and unpaved parking lots comply with both: 1) a 20 percent opacity standard; and 2) a silt content or a silt loading standard.

- A new opacity test method has been added to Appendix C to determine compliance with the rule's 20 percent opacity standard for unpaved haul/access roads and unpaved parking lots which is better tailored to these sources. (See footnote 7 of this section.)

- A test method for determining compliance with the new silt content/loading standards has been added to Appendix C. (See footnote 8 of this section.)

- Owners/operators of disturbed vacant lots and open areas must maintain a visible crust or meet at least one other applicable stabilization standard, according to new test methods included in the rule and Appendix C.

- Specific control measures for commercial feedlots and/or commercial livestock areas have been added, including: application of dust suppressants or gravel, or installation of shrubs and/or trees within 50 to 100 feet of animal pens. The rule requires that these measures be implemented sufficiently to comply with a 20 percent opacity standard. Rule 310.01, section 305. The SIP-approved Rule 310 required that these sources apply unspecified RACM.[127]

[127] Although the requirements for cattle feedlots are strengthened compared to the SIP approved Rule 310, we are uncertain whether a 20 percent opacity standard, according to the applicable test method in Appendix C, is an effective benchmark for controlling dust from these sources. This is because the opacity test method referenced in section 305 requires that readings be taken every 15 seconds. We believe this test method is more suitable for mechanical disturbances, as opposed to dust plumes generated by animal movements and/or wind erosion. However, we are not aware of a practical alternative standard and test method for open areas where animal use occurs on a daily, routine basis with the exception of a moisture standard found in Imperial County Rule 420 that pertains to livestock feed yards only. This is discussed in the MSM section of this TSD pertaining to cattle feedlots. Thus, the strengthening of requirements for cattle feedlots lies primarily in the addition of specific control measures, at least one of which

Other Rule Changes

- The revised rule specifies that unpaved roads with vehicular traffic of 250 or more must be stabilized by June 10, 2000 and unpaved roads with vehicular traffic of 150 or more must be stabilized by June 10, 2004.

- The revised rule specifies that requirements to prevent vehicle trespassing (section 301) apply to vacant lots and open areas that are 0.10 acre or larger and have a cumulative of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles.

- The revised rule specifies that requirements to stabilize disturbed vacant lots and open areas (section 302) apply to lots/areas with 0.5 acre or more of disturbed surface.

- The SIP-approved version of Rule 310 requires that records be retained for at least three (3) years. Rule 310.01 requires that records be retained for at least one (1) year.

  Our policy for VOC rules is that records be maintained on site for at least 2 years, and available for expeditious inspection and review for an additional 3 years.[128] We are not aware of a policy specific to fugitive dust sources. We are approving the Rule 310 record keeping retention provision because it appears to be consistent with the temporary, as opposed to permanent, nature of most operations subject to Rule 310 and we believe one year is sufficiently long enough for rule enforcement purposes.

- Compared to the SIP-approved Rule 310 provision for erosion-caused deposits of bulk materials onto paved surfaces, Rule 310.01 requirements are revised in two ways:

  1. the SIP-approved Rule 310 contains a requirement that, upon notice by the MCESD, the responsible party must submit a Control Plan within five working days designed to prevent and/or minimize the recurrence of erosion-caused deposits onto paved surfaces. This requirement is not included in Rule 310.01.

  2. the SIP-approved Rule 310 provides that any and all deposits be removed. Rule 310.01 requires that deposits be removed such that a 20 percent opacity standard is met (thereby allowing the existence of some deposits). The Phoenix plan's "most stringent measures" analysis states that paved road fugitive dust emissions typically range from 0

needs to be applied.

[128] See footnote 141.

to 10 percent opacity and that, as a result, an opacity limit of 20 percent could be maintained on almost all paved roads with no controls. MSM Study, p. C-6.

However, we are approving the Rule 310.01 provision into the SIP because:

• the plan's statement on the opacity of paved road dust emissions is made with respect to frequent routine sweeping or cleaning of paved roads and not to rapid cleanup of dust deposits on paved roads. Erosion-caused deposits of substantial density could cause a portion(s) of a paved road to emit more significant amounts of PM-10 than is typical of paved roads with average silt loadings;

• the requirements in Rule 310.01 for erosion-caused deposition are, in some ways, more stringent than the comparable MSM in the South Coast Air Basin.[129]

• when viewed in the context of the plan's overall control program for paved road dust, we believe the rule relaxations will not allow significant PM-10 emission increases. City/town street sweeping agencies are most likely to be implementing the rule requirement for erosion control. In all probability, these agencies will remove any erosion-caused deposits to the extent feasible with their equipment rather than just to the extent needed to meet the 20 percent opacity standard.

Suggested Rule Improvements

C Section 301.1 specifies that owners/operators of vacant lots/open areas experiencing vehicle disturbance (e.g. trespass) that exceeds the rule's thresholds may comply in one of two ways. The owner/operator may either prevent vehicle disturbances by installing barriers or other effective measures, or apply surface gravel or chemical/organic stabilizer, in compliance with one of the stabilization limitations described in Section 301.2. In addition to standards/test methods for visible crust, threshold friction velocity, and rock cover, Section 301.2 contains three standards/test methods associated with vegetative cover.

Because applying vegetation is not among the choices provided in Section 301.1 to control fugitive dust caused by vehicle trespassing, the reference to these standards/test methods for vegetative cover in Section 301.2 is unnecessary and confusing and should be deleted. The reference, however, does not alter the control measure options in Section 301.1, so this is not an approvability issue.

[129] See the section of this TSD titled "Implementation of BACM and Inclusion of MSM for Paved Roads".

- We recommend that section 306 requirements for erosion-caused deposits be revised to include a silt loading standard. AP-42, Chapter 13.2.1 "Paved Roads" shows that silt loading is the relevant PM-10 emissions parameter for paved road sources. Inclusion of a silt loading standard would strengthen the rule by providing a more accurate means for owners/operators and MCESD to determine when deposits have been sufficiently removed.

  Alternatively, we recommend that the currently applicable 20 percent opacity standard be changed to a 5 percent opacity standard.

- We recommend that section 305 requirements for commercial feedlots and/or commercial livestock areas be revised to include a standard and/or test method that is better tailored to these sources than the currently applicable opacity standard/test method.

- The requirements in sections 304 and 307 for unpaved roads establish a "vehicle per day" threshold of coverage. Vehicles per day refers to the number of vehicle *trips* per day that an unpaved road receives and not simply to the number of vehicles traveling the road each day. Therefore, these sections should be revised to include the term "trips" in each reference to "vehicles per day". This will clarify that if a single vehicle travels on a road multiple times in one day, each vehicle pass constitutes a separate trip that counts towards the rule's vehicle per day thresholds.

Compliance with CAA Section 110(l)

CAA section 110(l) prohibits us from approving a revision to the applicable implementation plan if that revision would interfere with any applicable requirement concerning attainment and reasonable further progress (RFP) or any other applicable requirement of the Act. We interpret section 110(l) to mean that we cannot approve a plan revision if that revision would mean that the State's plans would no longer provide for attainment or RFP as these are required by the CAA for those plans or if the revision would mean that the plans would no longer meet another requirement of the Act that applies to the plans. For a further discussion of this interpretation, see 61 FR 51599, 51608 (October 3, 1996).

We are finalizing revising the Arizona SIP to incorporate 310.01 in partial replacement of the older Rule 310 we approved in 1997.[130] In addition to the effect on attainment and RFP, the "other applicable requirement of the Act" that we must be concerned with for this final action is the Act's requirements for implementation of RACM and BACM and the inclusion of the MSM. We are concerned only with the PM-10 plan here because this rule only controls PM-10.

[130]Rule 310, which we are also approving, replaces the balance of the older SIP-approved version of Rule 310.

We are approving the expeditious attainment and RFP demonstrations in the Phoenix serious area plan. These demonstrations have been made assuming the unpaved road travel and vacant lot size thresholds in Rule 310.01. We are also finding that the plan provides for the implementation of RACM and BACM and for the inclusion of MSM for unpaved roads and vacant lots. These findings are also made assuming the thresholds in Rule 310.01. Therefore, our approving the rule will not adversely affect the plan's provisions for expeditious attainment and RFP, the implementation of RACM and BACM and the inclusion of MSM as these are required by the Act.

This section prepared by Karen Irwin.

EVALUATION OF MARICOPA COUNTY'S RESIDENTIAL WOODBURNING RESTRICTIONS ORDINANCE

Rule: Maricopa County Residential Woodburning Restrictions Ordinance (adopted November 17, 1999)

Submitted: January 28, 2000

Complete: March 31, 2000

Applicable SIP Rule: Residential Woodburning Restriction Ordinance (adopted April 21, 1999) Approved 64 FR 60678 (November 8, 1999).

Rule Summary: Combined with MCESD Rule 318 "Approval of Residential Woodburning Devices" (adopted April 21, 1999; approved November 8, 1999), the Residential Woodburning Restriction Ordinance implements a mandatory woodburning curtailment program. The curtailment program restricts the types of woodburning devices that can be used during periods of high PM-10 concentrations. The ordinance allows the Control Officer to declare restricted-burn periods when the particulate matter pollution levels could exceed the "particulate matter no-burn standard"of 120 $\mu g/m^3$.

Final Action: Approve.

Proposal Cite: 65 FR at 19990

Rule Evaluation: The SIP-approved ordinance provides that restricted-burn periods are declared by the Control Officer when s/he determines that air pollution levels could exceed the CO standard and/or the PM standard (150 $\mu g/m^3$). The revised ordinance allows the Control Officer to declare restricted-burn periods when the particulate matter pollution levels could exceed the "particulate matter no-burn standard"of 120 $\mu g/m^3$. The lower of the particulate matter no burn standard to 120 $\mu g/m^3$ is the only change made to the ordinance as it is currently approved in the SIP.

This submitted ordinance is more stringent than the version of the ordinance that we approved into the SIP. Because approving this revision will strengthen the SIP and when combined with the Phoenix plan's other provision for residential woodburning will provide for the implementation of BACM and the inclusion of the MSM, we are approving it into the SIP. See section "Implementation of BACM and Inclusion of MSM for Residential Woodburning." We have already determined that the Arizona SIP provides for the implementation of RACM for residential woodburning. 64 FR 60678 (November 8, 1999)

The BACM guidance for RWC suggests that a curtailment program be implemented in two stages where the woodburning restrictions are less severe in the first stage, which is called at lower PM levels. In the first stage, the program could allow exemptions for EPA-certified stoves or equivalent, sole source of heat, and low-income households. In the second stage, exemptions should be limited to low-income households. Maricopa's current program is a single stage program that allows the use of EPA-certified stoves or equivalent during curtailment periods and provides for sole source of heat and inadequate alternate source of heat exemptions.

Compliance with CAA Section 110(l)

CAA section 110(l) prohibits us from approving a revision to the applicable implementation plan if that revision would interfere with any applicable requirement concerning attainment and reasonable further progress (RFP) or any other applicable requirement of the Act. We interpret section 110(l) to mean that we cannot approve a plan revision if that revision would mean that the State's plans would no longer provide for attainment or RFP as these are required by the CAA for those plans or if the revision would mean that the plans would no longer meet another requirement of the Act that applies to them. For a further discussion of this interpretation, see 61 FR 51599, 51608 (October 3, 1996).

We are revising the Arizona SIP to incorporate the revised Maricopa County Residential Woodburning Ordinance in replacement of the ordinance we approved in November, 1999. In addition to the effect on attainment and RFP, the "other applicable requirement of the Act" that we must be concerned with for this action is the Act's requirements for the implementation of RACM and BACM and the inclusion of MSM. Because this ordinance also reduces carbon monoxide, a pollutant for which the Phoenix area is also nonattainment, we must also be concerned regarding its impact on area's ability to make progress toward and attain the CO standard as well as provide for the implementation of RACM for CO.

We are approving the expeditious attainment and RFP demonstrations in the Phoenix serious area PM-10 plan. This approval is made based in part on approving the revised ordinance. We are also finding that the plan provides for the implementation of BACM and for the inclusion of MSM for residential woodburning. These findings are also made based on approval of the revised ordinance. Therefore, we find that our approval of the revised ordinance will not interfere with the plan's compliance with the Clean Air Act's requirements for expeditious attainment and RFP, the implementation of BACM and the inclusion of MSM as they pertain to residential woodburning.

For CO, this revision strengthens the existing SIP-approved woodburning ordinance but does not change its CO provisions; therefore, its approval will not interfere CO SIP's provisions for attainment, RFP, or RACM.

We have previously found that the Arizona SIP provided for the implementation of RACM for residential woodburning. 64 FR 60678 (November 8, 1999). The State has now strengthened its residential woodburning program in part with the revised ordinance; therefore, we find that approval of the revised ordinance will not interfere with the Arizona SIP's compliance with the requirement for the implementation of RACM as it applies to residential woodburning.