

Regulation VIII RACM Analysis

for

**San Joaquin Valley Unified Pollution
Control District PM₁₀ Nonattainment
Plan**

prepared for:

San Joaquin Valley Unified Air Pollution
Control District

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I. Introduction

The San Joaquin Valley Unified Air Pollution Control District (District) is required by the U.S. Environmental Protection Agency (EPA) to demonstrate that measures adopted to control emissions of fugitive PM₁₀ satisfy the requirements of Reasonably Available Control Measure (RACM) technology. Sierra Research (Sierra) and Mel Zeldin (Zeldin) reviewed the EPA requirements in federal regulations and prepared the following analysis with respect to compliance with those requirements.

A. Requirements for RACM

Sections 172(c)(1) and 189(a)(1)(C) of the Clean Air Act together require that moderate area PM₁₀ nonattainment plans include Reasonably Available Control Measures (RACM) for existing sources of fugitive PM₁₀. The methodology for determining RACM is partially described in “General Preamble” regulations published by EPA.^{1*}

In summary, the General Preamble regulations list the available control measures applicable to fugitive PM₁₀ sources.² The list of candidate RACM applicable to sources regulated by the San Joaquin Valley Air Pollution Control District’s (District) Regulation VIII is presented in Table 1. Also included in the table are the corresponding Regulation VIII rules that incorporate the candidate RACM. Where candidate RACM do not need to be adopted by the District, for reasons that are explained below, the entry of “Not Applicable” is included in the Regulation VIII column.

Although the determination of Best Available Control Measure (BACM) technology requires a comparison of locally adopted regulations to those of other PM₁₀ nonattainment areas, such comparison is not required for determination of RACM technology. This conclusion was confirmed in discussions with EPA Region IX staff, who indicated, however, that support for exemption thresholds could be provided through comparisons to other RACM rules.³ To facilitate consideration of this support, we reviewed fugitive PM₁₀ rules in other jurisdictions that have been approved, or are proposed for approval,

*Superscripts denote references provided at the end of this document.

Table 1 Available Control Measures for Fugitive PM₁₀ RACM Consideration		
Source Category	Control Measure	Applicable Regulation VIII Rule
Paved Roads	1. Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.	Rule 8041. Carryout and Trackout
	4. Provide for traffic rerouting or rapid clean up of temporary (and not readily preventable) sources of dust on paved roads (water erosion runoff, mud/dirt carryout areas, material spills, skid control sand). Delineate who is responsible for cleanup.	
	8. Require improved material specification for and reduction of usage of skid control sand or salt (e.g., require use of coarse, nonfriable material during snow and ice season).	Not Applicable
	9. Require curbing and pave or stabilize (chemically or with vegetation) shoulders of paved roads.	Rule 8061. Paved and Unpaved Roads
	13. Provide for storm water drainage to prevent water erosion onto paved roads.	Not Applicable
Unpaved Roads	5. Require paving, chemically stabilizing, or otherwise stabilizing permanent unpaved haul roads, and parking or staging areas at commercial, municipal, or industrial facilities.	Rule 8061. Paved and Unpaved Roads
	6. Develop traffic reduction plans for unpaved roads. Use of speed bumps, low speed limits, etc., to encourage use of other (paved) roads.	
	10. Pave or chemically stabilize unpaved roads.	
	11. Pave, vegetate, or chemically stabilize unpaved parking areas.	Rule 8071. Unpaved Vehicle/ Equipment Traffic Areas
Storage Piles	12. Establish dust control measures for material storage piles.	Rule 8031. Bulk Materials
Construction/ Demolition	2. Require dust control plans for construction and land clearing projects.	Rule 8021. Construction, Demolition, Excavation, Extraction and Other Earthmoving Activities
	3. Require haul trucks to be covered.	

Table 1		
Available Control Measures for Fugitive PM₁₀ RACM Consideration		
Source Category	Control Measure	Applicable Regulation VIII Rule
Open Area Wind Erosion	7. Limit use of recreational vehicles on open land (e.g., confine operations to specific areas, require use permits, outright ban).	Rule 8051. Open Areas
	14. Require vegetation, chemical stabilization, or other abatement of wind erodible soil, including lands subjected to water mining, abandoned farms, and abandoned construction sites.	

by EPA as RACM. Only two serious PM₁₀ nonattainment areas have received such recognition: Maricopa County, Arizona, and Clark County, Nevada. The Maricopa County rules were approved as RACM by EPA in July 2002.⁴ The Clark County rules were proposed for approval as RACM by EPA in January 2003.⁵ Both sets of rules are also deemed to satisfy BACM requirements, but no indication has been provided by EPA as to which individual requirements constitute RACM versus BACM. As a result, the comparison of Regulation VIII thresholds to those of other jurisdictions is clouded by the fact that the latter thresholds represent more restrictive BACM requirements. However, in its serious area guidance,⁶ EPA stated that "...it is reasonable to conclude that Congress intended a greater level of stringency to apply in areas that are required to implement 'best available' controls than in those required only to implement controls that are 'reasonably available.'" By this reasoning, for comparative purposes, in order to satisfy RACM requirements, the measures being considered as RACM in the San Joaquin Valley should, in general, have a lesser level of stringency than those accepted by EPA to be BACM.

The General Preamble regulations also require that any additional control measures proposed and documented in public comments be included in the list of candidate RACM. From discussions with District staff who attended and recorded each of the public workshops and hearings on the adoption and amendment of Regulation VIII, no additional measures were proposed as RACM in public verbal or written comments presented during these workshops and hearings.⁷

B. Background Information for RACM Justification

The purpose of this background discussion is to present an appropriate setting for using EPA-approved RACM/BACM in Maricopa County and Clark County for comparative purposes to the measures contained in the District's Regulation VIII. This helps place in perspective the need for fugitive dust controls measures to make progress toward attainment of the PM₁₀ standards.

The following table summarizes information from recent PM₁₀ serious area SIPs in Clark County (Las Vegas), Nevada and Maricopa County (Phoenix), Arizona. Also included, for information purposes, are similar data from South Coast and Coachella Valley in California. In Table 2, both the 24-hour and annual PM₁₀ design values are shown, along with the percent contribution from fugitive dust. It can be seen that in both Clark County and Coachella Valley, fugitive dust accounts for more than 50% of the annual PM₁₀ averages, and over 90% of the 24-hour values. Thus in these areas, fugitive dust is the most important source for targeting control efforts. In Maricopa County, the influence from fugitive dust is also more significant than in the San Joaquin Valley, though not as strongly as in Clark County and the Coachella Valley. By comparison, in the South Coast, fugitive dust contributes only 39% and 4%, respectively, to the annual average and maximum 24-hour levels, indicating the importance of other factors (e.g., secondary aerosols, primarily as ammonium nitrate) to the episodic conditions, and also to the annual conditions. In the San Joaquin Valley, there is also a substantial influence from secondary ammonium nitrate. For episodic conditions, fugitive dust accounts for only 28% of the episodic conditions at Bakersfield, and only 35% at Corcoran, which is more rural and should be more likely to have geological influences. On an annual basis, the results are reasonably similar, with the contribution from fugitive dust lower than Clark County and Coachella Valley, and within the equivalent range of Maricopa County. In assessing the combination of both annual and episodic conditions among these areas, it is apparent that, from a control standpoint, the most aggressive fugitive dust measures for attainment purposes should be in Clark County, Coachella Valley, and Maricopa County.

With respect to using Maricopa County and Clark County as benchmarks for comparing regulations to the District's Regulation VIII, it is important to notice that in all three areas, the 24-hour standard is the more controlling of the two standards. That is, a greater percentage of control is needed to meet the 24-hour standard than to meet the annual standard. In both Maricopa County and Clark County, the design day values are considerably higher than in the San Joaquin Valley, and further, the episodic events in Maricopa and Clark Counties are much more dominated by fugitive dust than the episodes in the San Joaquin Valley, which are dominated to a much greater extent by secondary particulates. Therefore, it would be expected that RACM for fugitive dust in Maricopa County and Clark County would need to be more stringent than similar RACM measures in the San Joaquin Valley, because, clearly, greater levels of fugitive dust controls are needed in those counties for attainment purposes.

Table 2 Comparison of Ambient Conditions (Design Values)				
Jurisdiction	Total Mass (ug/m ³)		% Fugitive Dust	
	24-hr	Annual	24-hr	Annual
San Joaquin Valley ⁸				
Bakersfield	205	57	28	47
Corcoran	174	49	35	36
Clark County ⁹	281	53	92	68
Maricopa County ¹⁰	282	60	40-60 ¹¹	34-52 ¹¹
Coachella Valley ¹²	149	52	95 ¹³	59 ¹³
South Coast ¹⁴	210	69	4	38

C. Approach to Analyzing RACM

EPA's General Preamble allows measures to be excluded from the list of candidate RACM to be adopted if one of several criteria are met. These exclusion criteria are that (1) the measure applies to a PM₁₀ source that is de minimis, (2) the measure is technologically infeasible, or (3) the measure has unreasonable costs attached to implementation. If a measure is excluded from inclusion in the moderate area plan as a RACM, a reasoned justification must be provided to support rejection.¹⁵

EPA practice also provides additional criteria for disqualifying candidate measures from consideration. In 1998, EPA Region IX adopted a PM₁₀ Federal Implementation Plan (FIP) for the Maricopa area in Arizona. In developing the FIP, EPA determined which measures would constitute RACM for this area.¹⁶ In the analysis of candidate RACM, EPA argued that measures should not be considered for adoption if (1) the measures applied to sources that were not present in the nonattainment area, (2) the measures were identical or very similar to requirements previously adopted at either the local or federal level and implemented locally, or (3) the measures could not be enforced because of insufficient legal authority on the part of the implementing agency.

II. RACM Analysis

The analysis of candidate RACM was conducted in a two-step process. First, candidate measures were screened against the criteria used by EPA in the determination of RACM for the Maricopa area Federal Implementation Plan. Second, remaining measures were

evaluated under the criteria included in the General Preamble. This section summarizes the results of these screening and evaluation processes.

A. Measures That Do Not Satisfy EPA FIP Screening Criteria

Criteria 1. Applicability to the San Joaquin Valley

The list of candidate RACM was screened to determine applicability to San Joaquin Valley fugitive PM₁₀ sources. Under the General Preamble, measures that would not benefit air quality do not need to be considered for adoption. Of the list of 14 measures contained in EPA's fugitive PM₁₀ RACM guidance, one does not provide air quality benefits: *8. Require improved material specification for and reduction of usage of skid control sand or salt (e.g., require use of coarse, nonfriable material during snow and ice season)*. Because road sanding/salting occurs only above elevations of 2,000 feet (the only areas in the Valley that receive snow or extended freezing temperatures), and because most of these areas are within National Forest lands in which there are few residences or PM₁₀ air quality problems, improvement in sanding/salting applications will not produce air quality benefits in areas where the public are located or where PM₁₀ concentrations exceed national ambient air quality standards.

Criteria 2. Existing RACM

Although EPA has proposed to conditionally approve Regulation VIII as fulfilling RACM per Clean Air Act ' 110(k)(4), such approval has been withheld pending receipt of an approvable RACM demonstration.¹⁷ As a result, no District regulations or non-regulatory programs have been deemed by EPA to satisfy RACM requirements.

Criteria 3. Legal Authority

Almost all of the candidate RACM can be implemented under the legal authority currently delegated to the District under California law. One exception to this delegation is the ability to adopt and enforce vehicle speed limits of less than 25 miles per hour on public unpaved roads. This authority is reserved to the State of California under ' 22365 of the California Vehicle Code and cannot be delegated to a local jurisdiction absent state legislation authorizing this express delegation.

Conclusions

The conclusions of these analyses are that one of the candidate RACM measures recommended by EPA fails the FIP screening process, but that the other 13 measures qualify for additional consideration. The single measure that fails the screening process is *8. Require improved material specification for and reduction of usage of skid control sand or salt (e.g., require use of coarse, nonfriable material during snow and ice season)*.

B. Measures That Do Not Pass EPA General Preamble Screening Criteria

The General Preamble RACM guidance specifies three tests for determining whether candidate measures should be excluded from consideration: (1) does the measure affect a source category that is not significant (de minimis) with respect to attainment of air quality standards, (2) is the measure technologically feasible, and (3) is the measure economically feasible. Below are discussions of applying these tests to the remaining candidate RACM measures.

1. De Minimis Source Category

De minimis sources are defined by EPA as those that do not produce PM₁₀ impacts at nonattainment monitoring stations that exceed either 5 $\Phi\text{g}/\text{m}^3$ (24-hour average) or 1 $\Phi\text{g}/\text{m}^3$ (annual average). Analysis to date indicates that of the sources regulated by Regulation VIII, including paved roads, unpaved roads, unpaved parking areas, construction activities, bulk material storage areas, or disturbed open areas, only bulk material storage areas qualify as de minimis sources. An analysis for the District by Mel Zeldin showed that the emissions limit for PM₁₀ corresponding to the de minimis criteria is 0.9 tons per day per source category.¹⁸ The baseline 1999 inventory shows emissions from bulk material storage areas to be less than 0.2 tons per day. Thus, this source category meets the criteria for a de minimis source category and measures to control emissions from this category are exempt from RACM/BACM requirements.

In addition, one source not regulated by Regulation VIII also qualifies as a de minimis source: the short-term deposition of soil onto paved roads, whether from water erosion runoff, material spills, skid control sand, or other sources. Water erosion runoff occurs almost exclusively in unpopulated areas in the mountainous regions along the western and eastern boundaries of the District, and then only during very infrequent periods of heavy precipitation. Thus, emissions from entrainment of erosion sediment on paved roads in these areas do not impact areas in which the general public reside. Material spills onto paved roads are relatively infrequent, due to California Vehicle Code requirements that truck beds have no holes and be covered or maintain a freeboard of at least six inches.¹⁹ The California Vehicle Code also makes the spilling of soil or aggregate onto a public road a violation of law.²⁰ Similarly, emissions from the use of skid control sand are de minimis as this sand is not used in the District because of the absence of snow and ice on District roads during the winter.

2. Technological Feasibility

Several of the 14 candidate fugitive PM₁₀ RACMs listed in the General Preamble result in adverse environmental, safety, and energy impacts, and one is technologically infeasible. The infeasible RACM is 6. *Develop traffic reduction plans for unpaved roads[.] [u]se of speed bumps, low speeds limits, etc., to encourage use of other (paved) roads.* This measure, and the technological limitations of others, is discussed below.

a. Infeasibility of shifting traffic from unpaved roads to paved roads

One of the candidate RACMs recommended for consideration in the General Preamble is the shifting of traffic from unpaved roads to paved roads through the use of speed bumps and low speed limits. Because the vast majority of the San Joaquin Valley is rural with respect to population density, the road network over much of the Valley is widely spaced. Where unpaved roads exist, residents living on such roads do not have the option of accessing their property from alternative paved roads. Because the unpaved roads are strictly local roads, these roads do not serve through traffic but instead are used almost exclusively to serve destinations along these roads. As a result, the use of disincentives to shift traffic from these unpaved roads to paved roads will be ineffective.

b. Erosion of sediment into surface waterways

The over-application of water to soil surfaces, and the transport of soil to impervious surfaces, results in the transport of fine soil particles (sediment) to open surface waterways. Currently, water quality control authorities impose requirements against soil erosion on all large construction sites in the San Joaquin Valley. While District Rule 8041 allows the use of interior paved roads as mitigation to carryout and trackout, the depositing of soil onto any impervious surface, either within or outside a construction site boundary, is generally prohibited by water quality control regulations.²¹ The implication from this finding is that given the competing goals of water pollution and air pollution control programs with respect to the use of water, construction site managers may minimize water use at the expense of fugitive PM₁₀ violations, and that a more aggressive District enforcement program may be required in order to secure simultaneous compliance with both air quality and water quality regulations at construction sites.

c. Contamination of surface water by chemical dust suppressant

The use of chemical dust suppressants is regulated by water quality control agencies on a case by case basis. To date, these agencies have not adopted a list of acceptable chemical dust suppressants for use anywhere in the District. Each dust suppressant use at a construction site, equipment storage area, or unpaved parking area subject to water quality control regulation must be individually reviewed and approved by the regional agency having jurisdiction. Acceptability of specific dust suppressants varies from county to county and is based on local soil, precipitation, drainage, and surface water quality conditions. Because of this uncertainty, the durabilities and cost-effectiveness of dust suppressants used at various sites will vary widely and cannot be forecast with accuracy.

3. Cost of Implementation

Guidance on RACM²² and BACM²³ published by EPA allows for candidate RACM and BACM to be rejected if economic impacts are unreasonable. Neither in this guidance nor in any other does EPA define “unreasonable” or recommend a detailed methodology for quantifying unreasonable economic impacts. In the absence of such guidance, we are using the current District cost-effectiveness criteria for determining BACT controls for

new or modified stationary sources as the benchmark for defining unreasonable economic impacts for more extensive RACM.²⁴ Under this criteria, the threshold for unreasonable cost-effectiveness is \$5,700 per ton of PM₁₀ reduced.

Conclusions

The conclusions of these analyses are that two of the candidate RACM measures fail the General Preamble screening process, but that the other 11 measures qualify for additional consideration. The measures that fail this screening process are 6. *Develop traffic reduction plans for unpaved roads. Use of speed bumps, low speed limits, etc., to encourage use of other (paved) roads;* and 12. *Establish dust control measures for material storage piles.* Among the other candidate measures, the technological limitations discussed above may limit application of control measures in some situations, but are not sufficient to disqualify any candidate RACM as being technologically infeasible.

C. Demonstration of RACM

In the following analysis, available control measures identified by EPA are compared with requirements of Regulation VIII as amended on November 15, 2001. The EPA control measures are numbered and organized by source category as presented in Table 1.

Paved Roads

[Note: For additional perspective on the comparability of San Joaquin Valley RACM to Maricopa County and Clark County RACM/BACM, each source category indicates the percentage contribution of the source category to its overall fugitive dust emissions inventory. Also shown are the emissions reductions estimated for the combination of control measures in existing Regulation VIII.]

For paved roads the contributions are as follows:

San Joaquin Valley:	17.7%;	Total control = 1.9 tons per day
Maricopa County:	20.2%	
Clark County:	13.9%	

1. *Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads:* Rule 8041 requires that carryout and trackout from unpaved areas onto paved public roads be prevented at construction sites required to implement Dust Control Plans and unpaved areas experiencing 150 or more one-way vehicle trips per day by (1) the installation and maintenance of trackout control devices, or (2) the maintenance of sufficient lengths of paved interior roads to allow mud and dirt to drop off of vehicles before exiting unpaved areas, including removal of mud and dirt deposits from interior paved roads with sufficient frequency to prevent carryout and trackout. Under Rule 8021, construction sites required to implement Dust Control Plans are those that include 40 acres or more of disturbed surface area, or that will include the movement of more than 2,500 cubic yards per day of bulk materials on at least three days. Within urban areas, trackout from other sites must be removed immediately when it extends more than 50 feet from the nearest site exit. Otherwise, trackout must be removed at the end of each day.

The corresponding RACM/BACM requirement adopted by Maricopa County is contained in Rule 310 as amended on June 16, 1999. Section 308.3 of this rule requires the installation of suitable trackout control devices at dust generating sites that are 5 acres or larger in size or that import or export 100 cubic yards or more of bulk materials. Trackout that extends for a distance of 50 feet or more is required to be removed from public paved roads immediately, and lesser quantities are required to be removed at the end of each work day. Clark County Rule 94, Section 6.8, requires the installation of specific trackout control devices at sites that are 0.25 acres or larger in size. The rule also requires the immediate cleanup of trackout that extends a distance of 50 feet or more on a public road from a construction site or cleanup at the end of each work day of any trackout on a public road from such site. These thresholds are not readily comparable, since Rule 8041 places limits based on vehicle activity (150 vehicle trips per day) and Maricopa County and Clark County thresholds are based on project size. Since projects smaller than 5 acres (Maricopa County BACM threshold) could have more than 150 vehicle trips per day for an active site, in some cases the Maricopa rule may be less restrictive than Rule 8041. Overall, the fact that BACM is to be more restrictive than RACM indicates that reasonableness is satisfied for the Rule 8041 threshold.

Further, the District requirements for control of trackout from unpaved areas onto paved roads are RACM because more stringent requirements are not cost effective. In a recent study of Best Available Control Measure (BACM) cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring trackout control for sites experiencing 10 or more one-way vehicle trips by 3 or more axle vehicles was determined to range from \$44,100 to \$387,000 per ton of PM₁₀ reduced, depending on which published soil deposition factor was used in the calculation of emissions.²⁵ This range of cost-effectiveness values is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, District Rule 8041 satisfies RACM requirements for this source category on the basis of cost-effectiveness considerations.

4. *Provide for traffic rerouting or rapid clean up of temporary (and not readily preventable) sources of dust on paved roads (water erosion runoff, mud/dirt carryout areas, material spills, skid control sand). Delineate who is responsible for cleanup:* Several of the sources of temporary and non-preventable material deposition on public paved roads were concluded in an earlier discussion above to be de minimis. These sources included water erosion runoff, material spills, and skid control sand in the San Joaquin Valley. As a result, only mud/dirt carryout areas are evaluated here for economic feasibility of control.

Rule 8041 requires that carryout and trackout from unpaved areas onto paved public roads be prevented at construction sites required to implement Dust Control Plans and unpaved areas experiencing 150 or more one-way vehicle trips per day by (1) the installation and maintenance of trackout control devices, or (2) the maintenance of sufficient lengths of paved interior roads to allow mud and dirt to drop off of vehicles before exiting unpaved areas, including removal of mud and dirt deposits from interior

paved roads with sufficient frequency to prevent carryout and trackout. Under Rule 8021, construction sites required to implement Dust Control Plans are those that include 40 acres or more of disturbed surface area, or that will include the movement of more than 2,500 cubic yards per day of bulk materials on at least three days. Within urban areas, trackout from other sites must be removed immediately when it extends more than 50 feet from the nearest site exit. Otherwise, trackout must be removed at the end of each day.

The corresponding RACM requirement adopted by Maricopa County is contained in Rule 310 as amended on June 16, 1999. Section 308.3 of this rule requires the installation of suitable trackout control devices at dust generating sites that are 5 acres or larger in size or that import or export 100 cubic yards or more of bulk materials. Trackout that extends for a distance of 50 feet or more is required to be removed from public paved roads immediately, and lesser quantities are required to be removed at the end of each work day. Clark County Rule 94, Section 6.8, requires the installation of specific trackout control devices at sites that are 0.25 acres or larger in size. The rule also requires the immediate cleanup of trackout that extends a distance of 50 feet or more on a public road from a construction site or cleanup at the end of each work day of any trackout on a public road from such site. Thresholds are not readily comparable, since Rule 8041 places limits based on vehicle activity (150 vehicle trips per day) and Maricopa County and Clark County thresholds are based on project size. Since projects smaller than 5 acres (Maricopa County BACM threshold) could have more than 150 vehicle trips per day for an active site, in some cases the Maricopa rule may be less restrictive than Rule 8041. Overall, the fact that BACM is to be more restrictive than RACM indicates that reasonableness is satisfied for the Rule 8041 threshold.

In addition, District requirements for control of trackout from unpaved areas onto paved roads are RACM because more stringent requirements are not cost effective. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring trackout control for sites experiencing 10 or more one-way vehicle trips by 3 or more axle vehicles was determined to range from \$44,100 to \$387,000 per ton of PM₁₀ reduced depending on which published soil deposition factor was used in the calculation of emissions.¹⁶ This range of cost-effectiveness values is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources.

9. Require curbing and pave or stabilize (chemically or with vegetation) shoulders of paved roads: District Rule 8061 requires the installation of paved or stabilized shoulders, or curbing, on new paved roads projected to carry 500 or more vehicles per day. The Rule, however, does not impose requirements on the treatment of unpaved shoulders on existing paved roads. Maricopa County rules do not impose any requirements on the treatment of paved road shoulders. Clark County Rule 93 requires that all new paved roads be constructed with paved or stabilized shoulders, and that owners of existing paved roads either pave or stabilize shoulders within one year after discovery. Because Clark County has no threshold for its rule as BACM, a modest threshold of 500 vehicles per day is deemed to be an appropriate lesser condition for acceptable RACM. Further,

since Maricopa County has no specified actions for road shoulders, SJV Rule 8061 is more restrictive. Therefore, by comparison, RACM conditions are satisfied.

Furthermore, District requirements for shoulder treatment on new paved roads are RACM because more stringent requirements are not cost effective. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring paving or stabilization of shoulders on new or existing paved roads was determined to range from \$13,800 to \$554,000 per ton of PM₁₀ reduced depending on the traffic level on the road being controlled.¹⁶ This range of cost-effectiveness values is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, District Rule 8061 satisfies RACM requirements for this source category on the basis of cost-effectiveness considerations.

13. *Provide for storm water drainage to prevent water erosion onto paved roads:* Water erosion runoff occurs almost exclusively in unpopulated areas in the mountainous regions along the western and eastern boundaries of the District, and then only during very infrequent periods of heavy precipitation. Thus, emissions from entrainment of erosion sediment on paved roads in these areas do not impact areas in which the general public reside. As a result, this source category is deemed to be de minimis.

Unpaved Roads

San Joaquin Valley:	7.9% (excludes on-field ag which is not part of Regulation VIII)
	Total control = 6.3 tons per day
Maricopa County:	12.9%
Clark County:	4.7%

5. *Require paving, chemically stabilizing, or otherwise stabilizing permanent unpaved haul roads, and parking or staging areas at commercial, municipal, or industrial facilities:* District Rule 8061 requires that any unpaved road experiencing more than 75 vehicle trips per day be controlled to limit visible dust emissions to 20% opacity. The rule also requires that any road experiencing more than 100 vehicle trips per day satisfy surface stabilization requirements. Rule 8071 similarly imposes the same requirements on all unpaved parking or staging areas of 1.0 acres or more in size.

Maricopa County Rule 310.01 requires that any unpaved road experiencing more than 150 vehicle trips per day in June 2004 be controlled to limit visible dust emissions to 20% opacity and satisfy surface stabilization requirements. The rule also requires that any unpaved parking lots experiencing more than 10 vehicle trips per day for more than 35 days per year meet the same requirements. Clark County Rule 91 requires that any unpaved road experiencing more than 150 vehicle trips per day meet surface stabilization requirements by June 2003. Rule 92 requires that any nonindustrial unpaved parking lot satisfy surface stabilization requirements.

Because the District requirements are more restrictive for unpaved roads than the RACM/BACM rules of Maricopa and Clark Counties, District Rule 8061 satisfies RACM requirements for unpaved roads on the basis of comparison with approved RACM rules in other jurisdictions. Because Maricopa and Clark County rules are more restrictive for unpaved parking lots, and because the nature of the comparative thresholds is difficult to assess as to whether the District 1.0 acre exemption is an appropriate less stringent limit to justify as “reasonable,” no determination for RACM can be made based on comparative conditions.

However, in a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of chemically stabilizing unpaved parking areas, at traffic levels below those regulated by Rule 8071, was found to be not cost-effective under current District BACT guidelines. Requiring the chemical stabilization of unpaved parking areas carrying 100 vehicle trips per day was determined to have a cost-effectiveness value of \$22,800 per ton of PM₁₀ reduced.¹⁶ The conclusion of this analysis is that the chemical stabilization of unpaved parking areas with traffic levels lower than 100 vehicle trips per day is not cost-effective. However, a subsequent calculation using heavy-duty, instead of light-duty, vehicles indicated that the chemical stabilization of unpaved parking areas may be cost-effective (i.e., at \$5,700 per ton of PM₁₀ reduced) at traffic levels down to 85 vehicle trips per day for heavy-duty vehicles only. As a result, cost-effectiveness considerations demonstrate that Rule 8071 is RACM for unpaved parking areas except in very limited circumstances.

6. *Develop traffic reduction plans for unpaved roads. Use of speed bumps, low speed limits, etc., to encourage use of other (paved) roads:* As concluded in the discussion of this measure above, the use of disincentives to shift traffic from unpaved to paved roads is not technologically feasible in the San Joaquin Valley.

10. *Pave or chemically stabilize unpaved roads:* District Rule 8061 requires that any unpaved road experiencing more than 75 vehicle trips per day be controlled to limit visible dust emissions to 20% opacity. The rule also requires that any road experiencing more than 100 vehicle trips per day satisfy surface stabilization requirements.

Maricopa County Rule 310.01 requires that any unpaved road experiencing more than 150 vehicle trips per day in June 2004 be controlled to limit visible dust emissions to 20% opacity and satisfy surface stabilization requirements. Clark County Rule 91 requires that any unpaved road experiencing more than 150 vehicle trips per day meet surface stabilization requirements by June 2003. For this source category, District requirements are more restrictive for unpaved roads than the RACM/BACM rules of Maricopa and Clark Counties. As a result, comparisons of regulatory thresholds demonstrate that District Rule 8061 satisfies RACM requirements for unpaved road control.

11. *Pave, vegetate, or chemically stabilize unpaved parking areas:* District Rule 8071 requires that any unpaved parking or staging area of 1.0 acres or more in size that

experiences more than 75 vehicle trips per day be controlled to limit visible dust emissions to 20% opacity. The rule also requires that any area experiencing more than 100 vehicle trips per day satisfy surface stabilization requirements.

Maricopa County Rule 310.01 requires owners of unpaved parking lots larger than 5,000 square feet to either pave, apply dust suppressants, or apply gravel to the parking surface. Event parking lots used fewer than 35 days per year are required to be stabilized with either dust suppressants or gravel on any day on which 100 vehicles enter and/or park on the lot. Clark County Rule 92 requires that any nonindustrial unpaved parking lot satisfy surface stabilization requirements. Because of the reasons cited above, the less restrictive threshold levels are considered “reasonable” when compared to the need for much more stringent thresholds for BACM in Maricopa County and Clark County, as shown by the substantially greater importance of windblown dust in these areas compared to the San Joaquin Valley.

The imposition of more restrictive requirements would not be economically feasible. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring stabilization of unpaved parking areas experiencing 25 to 50 vehicles trips per day was determined to range from \$9,420 to \$91,400 per ton of PM₁₀ reduced depending on the traffic level on the parking area being controlled.¹⁶ This range of cost-effectiveness values is substantially higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, cost-effectiveness considerations demonstrate that District Rule 8071 constitutes RACM for this source category.

Storage Piles

12. *Establish dust control measures for material storage piles:* District Rule 8031 requires that bulk material storage piles containing 100 cubic yards or more have stabilized surfaces, be tarped, or be protected by wind barriers capable of limiting visible dust emissions to 20% opacity. Since this has been determined to be a de minimis source category, it is not subject to a RACM determination. Accordingly, any measures which seek to control emissions from this category exceed requirements for such actions.

Construction/Demolition

San Joaquin Valley: 4.5% ; Total control = 1.5 tons per day
Maricopa County: 23.4%
Clark County: 6.1%, but 16.2% for episodic inventory

2. *Require dust control plans for construction and land clearing projects:* District Rule 8021 requires dust control plans for commercial, industrial, and institutional construction projects that disturb 40 acres or more of soil surface or that involve the movement of more than 2,500 cubic yards of bulk materials on at least three days. Maricopa County Rule 200 requires dust control plans for earthmoving and construction projects that

disturb an area of 0.1 acres or more. Clark County Rule 94 requires dust control plans for all soil disturbing or construction projects of 0.25 acres or greater in size, trenching activities 100 feet or greater in length, or for structural demolition involving 1,000 square feet or more. Rule 94 also requires site-specific dust mitigation plans for all soil disturbing or construction projects of 10 acres or greater in size, trenching activities one mile or greater in length, or for structural demolition involving implosive or explosive techniques. Because dust control plans are mainly a tool to gain better compliance and enforcement of dust control measures at construction sites (i.e., not a direct control measure), and because the contribution to the fugitive dust inventory is low (e.g., 4.5%) in the San Joaquin Valley, especially as compared to both Maricopa County, and Clark County, it is reasonable to expect a considerably less stringent threshold for dust plan requirements in the San Joaquin Valley. Thus the existing Rule 8021 requirements for dust control plans are considered “reasonable” for the purposes of RACM.

Although District requirements are less restrictive than those of approved Maricopa and Clark County RACM/BACM rules, the imposition of more restrictive requirements would not be economically feasible. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring dust control plans for residential projects of 10 acres in size ranged from \$17,200 to \$31,500 per ton of PM₁₀ reduced depending on the estimated emissions benefits.¹⁶ This cost-effectiveness value is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, cost-effectiveness considerations demonstrate that District Rule 8021 satisfies RACM requirements for this source category.

3. *Require Haul Trucks To Be Covered:* District Rule 8031 requires that trucks hauling bulk materials on public paved roads be tarped or that a freeboard of at least 6 inches be maintained together with sufficient watering of the material to limit visible dust emissions to 20% opacity. On a work site, Rule 8031 requires that visible dust emissions be limited to 20% by limiting truck speeds or by applying water to the top of the load. When haul trucks cross a public paved road, Rule 8031 requires that they maintain a freeboard of 6 inches or more sufficient to limit visible dust emissions to 20% opacity.

Maricopa County Rule 310 requires trucks hauling bulk materials on public paved roads to be tarped and to maintain a freeboard of at least 3 inches. When haul trucks cross a public paved road, Rule 310 requires that they maintain a freeboard of 3 inches or more. Clark County Rule 94 requires that any project disturbing 0.25 acres or more of soil surface, or excavating 100 feet or more of trench, be conducted under an approved Dust Control Permit. The Dust Control Permit must require the implementation of dust control measures selected by the applicant from the Section 94 Handbook and approved by the Control Officer. For the hauling of bulk materials, the Section 94 Handbook lists the use of tarps and the maintenance of 3 to 6 inches of freeboard as control measures for the hauling of all soil types. Because District Rule 8031 is only slightly less restrictive than the Maricopa County and Clark County rules, approved by EPA as BACM, this meets the less stringent “reasonableness” criterion for acceptable RACM.

Open Area Wind Erosion

San Joaquin Valley: 3.7% (excluding on-field ag emissions, not part of Regulation VIII)
Total control = 0.4 tons per day
Maricopa County: 17.2%
Clark County: 75.3%

7. *Limit use of recreational vehicles on open land (e.g., confine operations to specific areas, require use permits, outright ban):* District Rule 8051 requires the implementation of one or more dust control measures sufficient to produce stabilized surfaces and to limit visible dust emissions to 20% opacity on open areas having 3 acres or more of surface area disturbed by vehicle use. In addition, the rule requires the posting of “No Trespassing” signs or the construction of physical barriers where trespass by vehicles is evident.

Maricopa County Rule 310.01 requires that open areas and vacant lots of 0.1 acres or more that are disturbed by vehicle use shall either be stabilized or be closed to vehicle access within 60 days following initial discovery. If vehicle access is prevented, then the surface of the open area shall subsequently be stabilized if the open area contains 0.5 acres or more of disturbed surface. Clark County Rule 90 requires that open areas and vacant lots of 5,000 square feet or more that are disturbed by vehicle use shall be stabilized and, at the option of the owner, closed to vehicle access within 30 days of discovery.

The use of recreational vehicles on open areas is a more significant source of PM₁₀ emissions in Maricopa and Clark Counties than in the San Joaquin Valley. Much more of the undeveloped land in the San Joaquin Valley is used for agricultural purposes and is thus closed to vehicle trespass. District Rule 8051 is roughly equivalent to the Maricopa and Clark County rules in that it requires surface stabilization and limits visible dust emission opacity, where RACM/BACM rules in the latter jurisdictions require only surface stabilization. Because of the reasons cited above, the less restrictive threshold levels are considered “reasonable” when compared to the need for much more stringent thresholds for BACM in Maricopa County and Clark County, as shown by the substantially greater importance of windblown dust in these areas compared to the San Joaquin Valley.

In addition, the imposition of more restrictive requirements within the District would not be economically feasible. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring stabilized surfaces on disturbed open areas of 0.5 acres in size was found to be \$67,800 per ton of PM₁₀ reduced.¹⁶ This cost-effectiveness value is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, cost-effectiveness considerations demonstrate that District Rule 8051 satisfies RACM requirements for this source category.

14. *Require vegetation, chemical stabilization, or other abatement of wind erodible soil, including lands subjected to water mining, abandoned farms, and abandoned construction sites:* District Rule 8051 requires the implementation of one or more dust control measures sufficient to produce stabilized surfaces and to limit visible dust emissions to 20% opacity on open areas having 3 acres or more of surface area disturbed by vehicle use. The rule further requires that dust control measures be implemented no later than 7 days after use, development, or occupation of the property ceases.

Maricopa County Rule 310.01 requires that open areas and vacant lots of 0.5 acres or more that are disturbed and remain unused for more than 15 days shall be stabilized within 60 days following initial discovery. Clark County Rule 90 requires that open areas and vacant lots of 5,000 square feet or more that are disturbed shall be stabilized within 30 days of discovery. In addition to the low emissions in this category, analysis by Sierra Research shows that there is no correlation between wind and PM₁₀ levels.²⁶ In fact, episodic conditions are associated with stagnant conditions. By comparison, windblown events in Maricopa County and Clark County are much more dominated by wind events. Thus, it is reasonable to expect higher exemption conditions in areas, such as the San Joaquin Valley, where wind is not a major factor for high PM₁₀ levels. Accordingly, the limits in District Rule 8051 are considered “reasonable” for RACM purposes.

Furthermore, the imposition of more restrictive requirements in the District would not be economically feasible. In a recent study of BACM cost-effectiveness conducted for the District by Sierra Research, the cost-effectiveness of requiring stabilized surfaces on disturbed open areas of 0.5 acres in size was found to be \$67,800 per ton of PM₁₀ reduced.¹⁶ This cost-effectiveness value is significantly higher than that deemed acceptable by the District for the control of PM₁₀ emissions from stationary sources. As a result, cost-effectiveness considerations demonstrate that District Rule 8051 satisfies RACM requirements for this source category.

III. Conclusions

Table 3 summarizes our findings with respect to how each of the General Preamble candidate measures applicable to fugitive PM₁₀ sources can be addressed in a demonstration of Regulation VIII as RACM.

Table 3
Recommended Disposition of Candidate RACM

Candidate Measure	Rationale for Exemption	Rationale for Demonstration as RACM
1. Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.		1. Justified as reasonably less stringent than approved BACM 2. Lower thresholds are not cost-effective
2. Require dust control plans for construction and land clearing projects.		Justified as reasonably less stringent than approved BACM Lower thresholds are not cost-effective
3. Require haul trucks to be covered.		Rule 8031 is reasonably equivalent to approved RACM/BACM rules
4. Provide for traffic rerouting or rapid clean up of temporary (and not readily preventable) sources of dust on paved roads (water erosion runoff, mud/dirt carryout areas, material spills, skid control sand). Delineate who is responsible for cleanup.	Water erosion runoff, material spills, and skid control sand are de minimis sources	1. Justified as reasonably less stringent than approved BACM. 2. Lower thresholds are not cost-effective for carryout control
5. Require paving, chemically stabilizing, or otherwise stabilizing permanent unpaved haul roads, and parking or staging areas at commercial, municipal, or industrial facilities.		1. Rule 8061 is more restrictive than approved RACM rules for unpaved haul roads; 2. Lower thresholds are not cost-effective for unpaved parking areas
6. Develop traffic reduction plans for unpaved roads. Use of speed bumps, low speed limits, etc., to encourage use of other (paved) roads.	Not technologically feasible	
7. Limit use of recreational vehicles on open land (e.g., confine operations to specific areas, require use permits, outright ban).		1. Justified as reasonably less stringent than

Table 3
Recommended Disposition of Candidate RACM

Candidate Measure	Rationale for Exemption	Rationale for Demonstration as RACM
		approved BACM 2.Lower thresholds are not cost-effective
8. Require improved material specification for and reduction of usage of skid control sand or salt (e.g., require use of coarse, nonfriable material during snow and ice season).	Not applicable to District sources	
9. Require curbing and pave or stabilize (chemically or with vegetation) shoulders of paved roads.		1.Justified as reasonably less stringent than approved BACM 2.Lower thresholds are not cost-effective
10. Pave or chemically stabilize unpaved roads.		Rule 8061 is more restrictive than approved RACM rules
11. Pave, vegetate, or chemically stabilize unpaved parking areas.		Lower thresholds are not cost-effective
12. Establish dust control measures for material storage piles.	De minimis source category	
13. Provide for storm water drainage to prevent water erosion onto paved roads.	De minimis source	
14. Require vegetation, chemical stabilization, or other abatement of wind erodible soil, including lands subjected to water mining, abandoned farms, and abandoned construction sites.		1.Justified as reasonably less stringent than approved BACM 2.Lower thresholds are not cost-effective

IV. References

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5. Approval and Promulgation of Implementation Plans; Nevada - Las Vegas Valley PM-10 Nonattainment Area, Serious Area Plan for Attainment of the Annual and 24-Hour Standards; Federal Register, Vol. 68, No. 14, Wednesday, January 22, 2003
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17. Technical Support Document for EPA's Notice of Proposed Rulemaking for the California State Implementation Plan, San Joaquin Valley Air Pollution Control District, U.S. EPA Region IX, March 14, 2002
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23. State Implementation Plans for Serious PM-10 Nonattainment Areas, and Attainment Date Waivers for PM-10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, U.S. Environmental Protection Agency, Federal Register, Volume 59, Number 157, Tuesday, August 16, 1994
24. Best Available Control Technology (BACT) Policy, San Joaquin Unified APCD, November 9, 1999
25. BACM Technical and Economic Feasibility Analysis (Draft), prepared by Sierra Research for the San Joaquin Valley UAPCD, January 2003
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