ANALYSES OF BEST AVAILABLE CONTROL MEASURES AND MOST STRINGENT MEASURES FOR THE WEST PINAL COUNTY SERIOUS PM$_{10}$ NONATTAINMENT AREA FINAL REPORT

Maricopa Association of Governments

Prepared By:

Tom Carlson, Managing Consultant
Sean Keane, Consultant

TRINITY CONSULTANTS
7919 Folsom Blvd, Suite 320
Sacramento, CA 95826

(916) 444-6666

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Summary

Introduction

On May 31, 2012, the Environmental Protection Agency (EPA) designated the West Pinal County PM$_{10}$ Nonattainment Area as a Moderate Area, effective July 2, 2012. The Moderate Area attainment date was December 31, 2018. The Arizona Department of Environmental Quality prepared the 2015 West Pinal Moderate PM$_{10}$ Nonattainment Area SIP and submitted it to EPA on December 21, 2015.

On June 24, 2020, the Environmental Protection Agency published a final rule to determine that the West Pinal County Moderate PM$_{10}$ Nonattainment Area did not attain the PM$_{10}$ standard by the December 31, 2018 attainment date and is reclassified as a Serious Area, effective July 24, 2020. The Serious Area attainment date is December 31, 2022.

The Clean Air Act requires that a Serious Area Particulate Plan be submitted within eighteen months of the reclassification effective date, which is January 24, 2022. The plan is required to include Best Available Control Measures (BACM) that are designed to achieve the maximum degree of emissions reduction from a particulate source. The Best Available Control Measures are required to be implemented no later than four years after the reclassification effective date or by July 24, 2024.

The Clean Air Act also allows the Environmental Protection Agency to extend the attainment date of a Serious Area for up to five years if the following requirements are met:

- Attainment by December 31, 2022 is impracticable.
- Compliance with all requirements and commitments in the plan.
- Plan includes the Most Stringent Measures that are included in the plan of any State or are achieved in practice in any State and can feasibly be implemented in the area.
- Attainment no later than December 31, 2027 (a five-year extension of the attainment date).

To date, multiple exceedances of the PM$_{10}$ standard in 2020 at the Hidden Valley monitor make attaining the PM$_{10}$ standard by December 31, 2022 impracticable. A request for an extension of the attainment date will be required, triggering the need to evaluate Most Stringent Measures (MSM).

To address Best Available Control Measures and Most Stringent Measures requirements, the Maricopa Association of Governments (MAG) contracted an analysis of BACM and MSM for the West Pinal County Serious PM$_{10}$ Nonattainment Area. The analysis examined and compared existing PM$_{10}$ control measures for significant sources of PM$_{10}$ in the West Pinal County nonattainment area to control measures in other Serious PM$_{10}$ nonattainment areas and PM$_{10}$ maintenance areas that were formally Serious as identified by EPA’s “Green Book” (www.epa.gov/green-book). These areas would have been required to implement BACM for
significant sources to meet Clean Air Act requirements. The significant sources of PM$_{10}$ in the West Pinal County nonattainment area have been previously identified in an analysis performed by the Arizona Department of Environmental Quality (ADEQ) in the ADEQ 2015 West Pinal Moderate PM$_{10}$ Nonattainment Area SIP. To date, the EPA Green Book has identified the 10 following areas for comparison to the West Pinal County nonattainment area:

- Coachella Valley, California;
- East Kern County, California;
- Imperial Valley, California;
- Maricopa County, Arizona;
- Owens Lake, California;
- Clark County, Nevada;
- Los Angeles South Coast Air Basin, California;
- San Joaquin Valley Air Basin, California;
- Wallula, Washington;
- and Washoe County, Nevada.

The comparison analysis resulted in the identification of control measures for consideration as BACM and MSM for the West Pinal County nonattainment area. The analysis further evaluated the identified control measures for PM$_{10}$ emissions reductions and for technological and economic feasibility. Based upon the results of the BACM and MSM analysis, a list of identified BACM and MSM for the West Pinal County nonattainment area has been compiled in this report for consideration by the implementing entities. Each implementing entity determines which measures are available and feasible for implementation by that entity. Regarding BACM and MSM that apply specifically to agricultural sources, the Governor’s Agricultural Best Management Practices Committee would be requested to evaluate the implementation of potential measures to further reduce PM$_{10}$ emissions from agriculture. This committee was established by law in 1998 (Arizona Revised Statutes, Title 49-457) to develop an agricultural PM$_{10}$ general permit that would address the need for controls on agricultural operations.

A total of 70 separate control measures are included in the list. A summary of each measure has been prepared and includes the following information:

- A review of existing applicable PM$_{10}$ regulations;
- A review of fugitive dust regulations in other PM$_{10}$ nonattainment areas;
- Suggested implementing agency;
- Analysis unit;
- Key analysis assumptions;
- An estimate of the cost of implementation;
- An estimate of the PM$_{10}$ emission reduction potential; and
- An estimate of the cost effectiveness ($/ton of PM$_{10}$ reduced).

To support the preparation of this information, contacts were established with other Serious Area PM$_{10}$ nonattainment or maintenance areas, including Clark County, Nevada, San Joaquin Valley, Imperial Valley and the South Coast Air Quality Management District, California and Maricopa County to assess their experience with individual control measures. Reviews of relevant dust control literature were also performed to obtain data on measured emission reductions. Contacts were established with local agencies to determine the cost of labor, equipment, materials, etc., located in western Pinal County. Emission estimates of control measure benefits were computed in a manner that is consistent with methods used to
measure source specific emissions in the most recent emission inventories. Detailed spreadsheets were prepared to document the sources of information, assumptions and methods used to prepare estimates of emission benefits, costs and cost effectiveness for each control measure.

**Measure Evaluation Summary**

Table 1 provides a summary of the name, analysis unit (to provide context on differences in values presented), cost, emission reductions, and cost effectiveness estimates for each of the identified measures. The measures are organized by source category (e.g., construction, agriculture, unpaved roads, etc.). The BACM and MSM regulatory comparison analysis determined that several of the identified control measures in the other nonattainment and maintenance areas are not as stringent as those currently in effect in West Pinal County nonattainment area. Those measures were excluded from further analysis and are not included in Table 1. Several control measures were determined to have more stringent requirements than those currently in place in the West Pinal County nonattainment area but provided zero quantifiable benefits; they are still included in Table 1 with zero values given for cost, emission reductions and cost-effectiveness where applicable. Similarly, those regulations which were determined to not be applicable because of threshold differences or insufficient data to prepare an analysis are included but listed with values of N/A (Not Available). Emission reductions are expressed in tons with significant digits presented as appropriate. Costs, emission reductions, and cost effectiveness are provided as bounded ranges for certain measures where different control technologies are available and/or different benefit assumptions were made.

A detailed summary of the information prepared for each control measure follows Table 1 in the subsequent “Measure Evaluations” section. For measures with ranges shown in Table 1, the detailed summaries explain the technology/cost assumptions for each measure where ranges are presented. The measures in Table 1 may or may not be feasible and available to the implementing entities.
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<th>Measure Number</th>
<th>BACM and MSM Title</th>
<th>Analysis Unit</th>
<th>Cost ($)</th>
<th>Emission Reductions (ton PM$_{10}$)</th>
<th>Cost-Effectiveness ($/ton PM$_{10}$)</th>
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<td>Require Mitigation Plans for Open Areas/Vacant Lots Over 10,000 Acres in Size</td>
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<td>$0</td>
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<td>31</td>
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<td>Source Category</td>
<td>Measure Number</td>
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<tr>
<td>Dairies</td>
<td>32</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs</td>
<td>Dairy Farm</td>
<td>Costs and benefits evaluated individually for Measures 33-36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs for Arenas, Corrals and Pens</td>
<td>Nonattainment Area-Yr</td>
<td>$3,861</td>
<td>27.57 - 54.35</td>
<td>$71 - $140</td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs for Animal Waste (and Feed) Handling and Transporting</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Access Connections</td>
<td>Nonattainment Area-Yr</td>
<td>$607</td>
<td>1.18 - 2.32</td>
<td>$261 - $515</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Roads or Feed Lanes</td>
<td>Nonattainment Area-Yr</td>
<td>$1,492</td>
<td>2.48 - 4.89</td>
<td>$305 - $601</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Vehicle/Equipment Traffic Areas</td>
<td>1 Acre Area-Yr</td>
<td>$779</td>
<td>0.029</td>
<td>$26,707</td>
</tr>
<tr>
<td>Cattle CAFOs</td>
<td>38</td>
<td>Tighten Definition of Cattle Confined Animal Feeding Operations Subject to Fugitive Dust Rules</td>
<td>Cattle Feedlot</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs</td>
<td>Cattle Feedlot</td>
<td>Costs and benefits evaluated individually for Measures 40-43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Arenas, Corrals and Pens</td>
<td>Nonattainment Area-Yr</td>
<td>$54,420 - $217,680</td>
<td>65.04 - 128.21</td>
<td>$424 - $3,347</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Animal Waste (and Feed) Handling and Transporting</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Source Category</td>
<td>Measure Number</td>
<td>BACM and MSM Title</td>
<td>Analysis Unit</td>
<td>Cost ($)</td>
<td>Emission Reductions (ton PM$_{10}$)</td>
<td>Cost-Effectiveness ($/ton PM$_{10}$)</td>
</tr>
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<td>--------------------------------------</td>
</tr>
<tr>
<td>Cattle CAFOs</td>
<td>42</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Access Connections</td>
<td>Nonattainment Area-Yr</td>
<td>$91,268</td>
<td>44.07 - 86.89</td>
<td>$1,050 - $2,071</td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Roads or Feed Lanes</td>
<td>Nonattainment Area-Yr</td>
<td>$91,268</td>
<td>44.07 - 86.89</td>
<td>$1,050 - $2,071</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Vehicle/Equipment Traffic Areas</td>
<td>1 Acre Area-Yr</td>
<td>$779</td>
<td>0.029</td>
<td>$26,707</td>
</tr>
<tr>
<td>Agriculture</td>
<td>45</td>
<td>Increase the Number of BMPs to Control Fugitive Dust from Cropland Areas</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>8.60 - 17.19</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>Increase the Number of BMPs to Control Fugitive Dust on Noncropland Areas That Are Not Tied to High-Risk Days</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>Increase the Number of BMPs for the Control of Fugitive Dust from Commercial Farm Roads</td>
<td>Nonattainment Area-Yr</td>
<td>$353,408 - $1,277,048</td>
<td>375.96 - 896.98</td>
<td>$394 - $3,397</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>Stabilization Requirements for Off-Field Bulk Material Storage</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>Fugitive Dust Controls for Off-Field Bulk Material Handling and Transport</td>
<td>Truck-Operating Day</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>Increase the Minimum Number of Agricultural Earth Moving BMPs</td>
<td>Nonattainment Area-Yr</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>Require Implementation of BMPs to Control Windblown Dust from Crop Operations on All Days</td>
<td>Nonattainment Area-Yr</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>Unpaved Roads</td>
<td>52</td>
<td>Expand Unpaved Road Definitions to Include Alleys</td>
<td>Centerline Mile-Yr</td>
<td>$20,157</td>
<td>3.27</td>
<td>$6,161</td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>Increase Average Daily Traffic (ADT) Thresholds for Unpaved Road Controls</td>
<td>Nonattainment Area-Yr</td>
<td>$1,357,569</td>
<td>4,428.91</td>
<td>$307</td>
</tr>
<tr>
<td>Source Category</td>
<td>Measure Number</td>
<td>BACM and MSM Title</td>
<td>Analysis Unit</td>
<td>Cost ($)</td>
<td>Emission Reductions (ton PM$_{10}$)</td>
<td>Cost-Effectiveness ($/ton PM$_{10}$)</td>
</tr>
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</tr>
<tr>
<td>Unpaved Roads</td>
<td>54</td>
<td>Visible Emissions and Stabilization Requirements for Unpaved Roads</td>
<td>Nonattainment Area-Yr</td>
<td>$1,357,569</td>
<td>4,428.91</td>
<td>$307</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>Increase Stringency of Unpaved Road Paving and Dust Stabilization Controls</td>
<td>Centerline Mile-Yr</td>
<td>$6,784 - $94,877</td>
<td>6.55 - 20.15</td>
<td>$1,036 - $4,709</td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>Expand Existing Reporting/Recordkeeping Requirements for Unpaved Roads</td>
<td>15 Centerline Miles</td>
<td>$146,463</td>
<td>0.45</td>
<td>$327,745</td>
</tr>
<tr>
<td></td>
<td>57</td>
<td>Explicit Dust Mitigation Controls for Off-Road Event Competitions on Unpaved Roads</td>
<td>Acre-Yr</td>
<td>$625</td>
<td>0.17</td>
<td>$3,625</td>
</tr>
<tr>
<td>Unpaved Lots</td>
<td>58</td>
<td>Add 0% Opacity at Property Line Provision to Unpaved Lot Requirements</td>
<td>50-Acre Area</td>
<td>$117,057</td>
<td>20.08</td>
<td>$5,829</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>More Stringent Unpaved Lot Fugitive Dust Control Measures</td>
<td>Acre-Yr</td>
<td>$779</td>
<td>0.05 - 0.29</td>
<td>$2,671 - $15,481</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>Prohibit Unpaved Lot/Storage Areas on Hydrographic Lands</td>
<td>Lot Acre-Yr</td>
<td>$16,994</td>
<td>2.71</td>
<td>$6,280</td>
</tr>
<tr>
<td>Paved Roads</td>
<td>61</td>
<td>Strengthen Stabilization Requirements for Unpaved Shoulders</td>
<td>Road Mile-Day</td>
<td>$50 - $134</td>
<td>0.00004 - 0.0016</td>
<td>$30,882 - $1,244,015</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>Paving and/or Stabilization of Shoulders and Medians on New and Modified Paved Roads</td>
<td>Road Mile-Day</td>
<td>$50 - $134</td>
<td>0.00004 - 0.0016</td>
<td>$30,882 - $1,244,015</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>Immediate Cleanup of Trackout, Carry Out &amp; Spillage from Areas Accessible to the Public</td>
<td>Access Point-Yr</td>
<td>$2,274</td>
<td>0.020</td>
<td>$114,521</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>Use of Only PM$_{10}$-Certified Street Sweepers to Clean Up Trackout Deposits on Paved Roads from Any Source</td>
<td>Centerline Mile-Yr</td>
<td>$14</td>
<td>0.40 - 1.52</td>
<td>$9 - $35</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>Trackout Controls for Large Operations and Windy Conditions</td>
<td>Truck Operating Day</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>66</td>
<td>Use of PM$_{10}$-Certified Street Sweepers on Freeways</td>
<td>Centerline Mile-Yr</td>
<td>$14</td>
<td>0.04 - 0.27</td>
<td>$51 - $340</td>
</tr>
<tr>
<td></td>
<td>67</td>
<td>Use of PM$_{10}$-Certified Street Sweepers on Arterial Roads</td>
<td>Centerline Mile-Yr</td>
<td>$14</td>
<td>0.40 - 1.52</td>
<td>$9 - $35</td>
</tr>
<tr>
<td>Source Category</td>
<td>Measure Number</td>
<td>BACM and MSM Title</td>
<td>Analysis Unit</td>
<td>Cost ($)</td>
<td>Emission Reductions (ton PM$_{10}$)</td>
<td>Cost-Effectiveness ($/ton PM$_{10}$)</td>
</tr>
<tr>
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</tr>
<tr>
<td>Paved Roads</td>
<td>68</td>
<td>Require Use of Wetted Brushes and Blowers on Sweepers Used on Both Paved Roads and Parking Lots and Only Vacuum-Type Cleaning Equipment in Pavement Crack Sealing Applications</td>
<td>Road Mile-Yr</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>69</td>
<td>Strengthen Existing Paved Road and Shoulder Standards Through Inclusion of Provisions Addressing Non-Conforming Roads and Shoulder Requirements</td>
<td>Road Mile-Yr</td>
<td>$784 - $18,363</td>
<td>0.01 - 0.59</td>
<td>$1,318 - $1,244,015</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>Strengthen Reporting and Recordkeeping Requirements to Include Street-Sweeping Extent and Frequency as Well as Dust Control Plans That Affect Trackout Compliance</td>
<td>50 Acre Project</td>
<td>$56,927</td>
<td>0.81</td>
<td>$69,980</td>
</tr>
</tbody>
</table>

**Notes:**
1) Rows with values of zero reflect measures for which emission reductions were determined to be negligible.
2) N/A - Not Available. Costs and cost-effectiveness could not be credibly quantified due to lack of available data.
3) These measures may or may not be feasible and available to the implementing entities.
MEASURE EVALUATIONS

Measure 1
Construction Sites - Require Dust Suppression Control Before and After Creation of Disturbed Surfaces

The West Pinal County PM₁₀ nonattainment area currently has no rules governing dust control before or after activity has ceased on disturbed surfaces created on either roadways or construction sites.

A review of fugitive dust regulations in place in western PM₁₀ nonattainment communities has determined that many agencies (e.g., Maricopa County, San Joaquin Valley, etc.) have implemented controls to suppress dust caused by these activities. The review determined that Maricopa County Air Quality Department Rule 310.305 for Disturbed Surfaces is the most stringent regulation governing this activity. Main requirements include:

- pre-watering and phased work to minimize dust before disturbed surfaces are created.
- application of one or more appropriate controls (e.g., paving, watering, graveling, dust suppression, establishing vegetation cover, etc.) within 10 days of completing dust generating activities.
- restricting access through the establishment of fences, barriers, etc. to curtail trespass.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Construction Project

**Key Analysis Assumptions:** Existing or adopted measures requiring dust suppression (watering) are implemented before disturbed surfaces are created. Polymer dust suppressant is used to stabilize disturbed surface after activity ceases. The treated area is not traveled upon for 90 days and all PM₁₀ emissions are windblown. Operation areas and roadways occupy 30% of the project sites.

**Cost:** $9,381

**Emission Reduction:** 0.10 tons PM₁₀

**Cost Effectiveness:** $94,199/ton PM₁₀
Measure 2
Construction Sites - Enhance Test Methods to Stabilize Inactive Disturbed Surface Areas

West Pinal County nonattainment area Rule 4-3-170 defines a stabilized surface to be demonstrated through the application of a “drop ball test”, which is used to determine whether sufficient soil crusting has been established to resist wind driven fugitive dust formation.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment communities has determined that many agencies (e.g., Maricopa County, East Kern, Imperial Valley, San Joaquin Valley, etc.) have additional requirements beyond the drop ball test to ensure stabilization of inactive and post-operation disturbed areas at construction sites. The most stringent requirements found in that review are those established in Maricopa County Air Quality Department Rule 310.304.3. It establishes specific soil stabilization limitations for inactive and post-operation open areas and vacant lots on which vehicles are operated that include:

- soil crust; or
- threshold friction velocity (TFV) corrected for non-erodible elements of 100 cm/second or higher; or
- flat vegetative cover, not subject to movement by wind that is equal to at least 50%; or
- standing vegetative cover that is equal to or greater than 30%; or
- standing vegetative cover that is equal to or greater than 10% and where the threshold friction velocity is equal to or greater than 43 cm/second when corrected for non-erodible elements; or
- a percent cover that is equal to or greater than 10% for non-erodible elements; or
- an alternative test method approved in writing by the Control Officer and the Administrator.

Pinal County Rule 4-7-226 (for Apache Junction, not West Pinal County) sets standards and test methods for assessing stabilization requirements including use of the drop ball test, maintaining a threshold friction velocity (TFV) for disturbed surface areas corrected for non-erodible elements of 100 cm/second or higher, vegetative cover, etc.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Construction Project

**Key Analysis Assumptions:** Project size equals the threshold for requiring a Dust Control Coordinator (i.e., 50 acres). The portion of the project that is disturbed is 100%. After considering alternate test methods and their costs, the most cost-effective method of compliance was determined to be achieved by having a laborer trained in EPA Method 9 devote 2 hours/day to site inspection and recordkeeping. Emission control is achieved through
the addition of one additional water truck operating 8 hr/day during the earthmoving phase of the project.

**Cost:** $122,397

**Emission Reduction:** 2.37 tons PM$_{10}$

**Cost Effectiveness:** $51,612/ton PM$_{10}$
Measure 3
Construction Sites - Enhance Test Methods to Include Additional Stabilization Requirements/Standards

West Pinal County nonattainment area Rule 4-3-170 defines a stabilized surface to be demonstrated through the application of a “drop ball test”, which is used to determine whether sufficient soil crusting has been established to resist wind driven fugitive dust formation.

A review of fugitive dust regulations in place in western PM10 nonattainment communities has determined that many agencies (e.g., Maricopa County, East Kern, Imperial Valley, San Joaquin Valley, etc.) have additional requirements beyond the drop ball test for active areas that include stabilization frequency and watering. The most stringent requirements found in that review are those established in Maricopa County Air Quality Department Rule 310.304. It establishes stabilization requirements for three categories of dust-generating operations, including:

- Unpaved Parking Lots - The owner and/or operator of any unpaved parking lot shall not allow visible fugitive dust emissions to exceed 20% opacity and shall not allow silt loading equal to or greater than 0.33 oz/ft2. However, if silt loading is equal to or greater than 0.33 oz/ft2, then the owner and/or operator shall not allow the silt content to exceed 8%.
- Unpaved Haul/Access Road – The owner and/or operator of any unpaved haul/access road (whether at a work site that is under construction or at a work site that is temporarily or permanently inactive) shall not allow visible fugitive dust emissions to exceed 20% opacity and shall not allow silt loading equal to or greater than 0.33 oz/ft2. However, if silt loading is equal to or greater than 0.33 oz/ft2, then the owner and/or operator shall not allow the silt content to exceed 6%.
- Disturbed Surfaces – noted above in Measure 2.

Pinal County Rule 4-7-226 (for Apache Junction, not West Pinal County) sets standards and test methods for assessing stabilization requirements including use of the drop ball test, maintaining a threshold friction velocity (TFV) for disturbed surface areas corrected for non-erodible elements of 100 cm/second or higher, vegetative cover, etc.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 50-Acre Construction Project

Key Analysis Assumptions: The most efficient approach to compliance with this measure was determined to be the approach employed in the Measure 2 analysis; therefore, the assumptions for both Measures are the same. Project size equals the threshold for requiring a Dust Control Coordinator (i.e., 50 acres). The portion of the project that is disturbed is 100%. Compliance is achieved by having a laborer trained in EPA Method 9 devote 2 hours/day to site
inspection and recordkeeping. The most cost-effective method of emission control was determined to be through the addition of one additional water truck operating 8 hr/day during the earthmoving phase of the project.

**Cost:** $122,397

**Emission Reduction:** 2.37 tons PM$_{10}$

**Cost Effectiveness:** $51,612/ton PM$_{10}$
Measure 4
Construction Sites - Strengthen Visible Dust/Opacity Standards

West Pinal County nonattainment area Rule 4-3-180 (Dust Generating Operations) requires that an owner and/or operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method; and
- Shall stabilize any disturbed surface area. The owner and/or operator shall conduct every other week inspections to ensure that the work site is stabilized. Ensuring the work site is stabilized shall include a site-wide inspection to ensure all applicable control measures as specified in the permit, are implemented on dust generating operations and disturbed surface areas are stabilized.

West Pinal County nonattainment area Rule 4-3-070. (Definitions) requires preemptive or concurrent technique, practice, or procedure used to minimize the generation, emission, entrainment, suspension, and/or airborne transport of fugitive dust. Control measures requirements include the following:

- Watering (operational control) - In active earth-moving areas water should be applied at sufficient intervals and quantity to prevent visible emissions from extending more than 100 feet from the site's boundaries, as noted on the plot plan.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment communities has determined that Maricopa County has the most stringent visible emission standards and contingency provisions for Dust Control Plans on high wind days. Rule 310.303 Visible Emission Requirements for Dust Generating Operations requires that an owner and/or operator shall not:

- cause or allow visible fugitive dust emissions to exceed 20% opacity.
- cause or allow visible emissions of particulate matter, including fugitive dust, beyond the property line within which the emissions are generated.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Construction Project

**Key Analysis Assumptions:** The most efficient approach to compliance with this measure was determined to be the approach employed in the Measure 2 & 3 analyses; therefore, the assumptions for these Measures are the same. Project size equals the threshold for requiring a Dust Control Coordinator (i.e., 50 acres). The portion of the project that is disturbed is 100%. Compliance is achieved by having a laborer trained in EPA Method 9 devote 2 hours/day to site inspection and recordkeeping. Emission control is achieved through the addition of one
additional water truck operating 8 hr/day during the earthmoving phase of the project. No more than one additional short-notice rental watering truck will be available on high wind days as all construction contractors will need them.

**Cost**: $122,397

**Emission Reduction**: 2.37 tons PM$_{10}$

**Cost Effectiveness**: $51,612/ton PM$_{10}$
Measure 5
Construction Sites - Tighten Bulk Material Transport Dust Control Requirements

West Pinal County nonattainment area Rule 4-3-170 specifies fugitive dust controls for bulk material transportation operation (loading, unloading, conveying, transporting, piling, etc.), they include:

- Watering (pre-wetting) - Application of water by means of trucks, hoses, and/or sprinklers prior to conducting any dust generating operation. This will increase the moisture content of the soils and increase stability of the soil.
- Reducing vehicular speeds - Restrict maximum vehicular speeds to 15 miles per hour on unpaved easements, right of way, unpaved haul/access roads and parking lots.
- Controlling Freeboard and spillage and covering haul vehicles - Load all trucks such that the freeboard is not less than three inches; and prevent spillage or loss of bulk material from holes or other openings in the conveyance; cover all haul trucks (empty or full) with an anchored tarp or other suitable anchored material.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment communities has determined several (e.g., Coachella Valley, South Coast, Imperial Valley and San Joaquin Valley) have more stringent freeboard limits (i.e., 6 inches). In addition, Coachella Valley regulations mandate regular inspection of belly-dump truck seals and the removal of trapped rocks. Watering is also required during loading and unloading to reduce fugitive dust.

While the freeboard requirement is more stringent, when considered within the context of tarping, no benefit accrues to the tighter requirement as the generation of dust is already controlled independent of freeboard. Another consideration, the application of tarping on construction site operation offers no benefit because the speed limit (which is set not to exceed 15 mph) does not likely exceed the threshold wind speed for soil particle entrainment. A review of belly truck seal design shows they are one inch in diameter and the gate will close even with material up to ¾ inch in diameter is jammed into the gap before there is material loss onto the roadway. The frequency of this occurrence has not been quantified but is thought to be limited. Therefore, while it is possible to quantify a cost for inspection, the estimate of an emission benefit would be a guess. The Coachella watering requirement is less specific than the existing West Pinal control requirement, therefore no benefit would accrue to the implementation of that requirement. Overall, the implementation of this measure would not provide a measurable reduction in emissions.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Individual Haul Truck
**Key Analysis Assumptions:** Changes in freeboard requirements provide no benefit under current tarping requirements. Belly dump truck leakage rates are currently insignificant due to strict enforcement by Arizona Highway Patrol.

**Cost:** $0

**Emission Reduction:** 0.00 tons PM$_{10}$

**Cost Effectiveness:** $0/ton PM$_{10}$
Measure 6
Construction Sites - Strengthen & Expand Trackout Dust Control Requirements

West Pinal County nonattainment area Rule 4-3-170.4 requires trackout control for work sites 5 acres or larger. For all work sites, when trackout extends a cumulative distance of 50 linear feet or more, be cleaned up as soon as practicable; but, in any case, by the end of the workday. Controls include: a gravel pad, grizzly, wheel wash system, or a paved area, located at the point of intersection of an unpaved area and a paved public roadway that controls or prevents vehicular trackout.

West Pinal County nonattainment area Rule 4-3-180 requires the installation of trackout controls prior to the start of dust generating operations on work sites or combination of work sites 5 acres or larger where an owner and/or operator obtains a dust generating permit.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment communities has determined that several communities (i.e., Maricopa County, Washoe County, East Kern and San Joaquin Valley) have more stringent trackout requirements. Maricopa County requires similar types of trackout controls (e.g., gravel pads, grizzlies, rumble gates, etc.) seen in these communities as well as West Pinal. The main requirement in their regulations that establishes them as the most stringent is the that work sites with a disturbed surface area of 2 acres and larger must install, maintain, and use trackout devices that remove particulate matter from tires and exterior surfaces of haul trucks and/or motor vehicles that traverse the site at all exits onto areas accessible to the public.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Public Access Point

Key Analysis Assumptions: Gravel beds are the least expensive trackout control device available to install and maintain. Maintenance of gravel beds requires 4 man-hours per month. A 2-acre construction site generates 20 trips/day (10-exiting trips) per day.

Cost: $1,817

Emission Reduction: 0.0026 tons PM$_{10}$

Cost Effectiveness: $696,054/ton PM$_{10}$
Measure 7
Construction Sites - Adopt Disturbed Soil, Staging, Unpaved Routes & Parking Area Dust Best Management Practices (BMPs)

The West Pinal County PM$_{10}$ nonattainment area currently has no rules or BMPs governing construction site disturbed soil or staging area dust control.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that many communities (Maricopa County, Coachella Valley, South Coast, Imperial Valley, etc.) have BMPs that address disturbed soil on construction sites and related management practices. The review determined that Clark County has the most stringent requirements governing dust control from Disturbed Soil (BMP 10), from Staging Areas (BMP 18) and Vehicular Operations (BMP 21). Main elements of the Disturbed Soil BMP include:

- For each non-linear project to be permitted for 5 acres or less; install perimeter wind barrier 3 feet or more in height made of material with a porosity of 50% or less.
- Limit vehicle traffic and disturbance of soils where possible. Palliative requirements are a function of the soil type (i.e., particulate emission potential (PEP)).
- Limit vehicle traffic and disturbance of soils with the use of fencing, barriers, barricades, and/or wind barriers.
- Stabilize and maintain stability of all disturbed soil throughout construction site.

Main elements of the Staging Areas BMP include:

- Limit vehicle speeds to 15 mph in the staging area and on all unpaved access routes.
- Apply and maintain dust suppressant on all vehicle traffic areas in the staging areas and unpaved access routes.
- Stabilize staging area soils during use.
- Pre-water and maintain surface soils in a stabilized condition where support equipment and vehicles will operate.
- Apply and maintain a dust palliative to surface soils where support equipment and vehicles will be operated.
- Stabilize staging area soils at project completion.

Main elements of the Unpaved Routes and Parking Areas BMP include:

- Stabilize staging area soils at project completion,
- Limit vehicle speeds to 15 mph on all unpaved routes, and
- Stabilize haul routes and off-road parking areas.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 5-Acre Construction Project
**Key Analysis Assumptions:** Baseline (uncontrolled) watering control efficiency is 50%. Unpaved roads and parking areas occupy 10% of the project site. New controls required by Clark County Rule 94.9 are the installation of a 3-ft wind barrier around the project perimeter and the application of dust suppressant on unpaved staging areas and parking areas. Installation of the wind barrier requires 2 laborers working 1 hour to install 200 feet.

**Cost:** $2,550

**Emission Reduction:** 0.89 tons PM$_{10}$

**Cost Effectiveness:** $2,867/ton PM$_{10}$
Measure 8  
Construction Sites - Strengthen Soil Watering Requirement & Adopt Dust Palliative BMP

West Pinal County nonattainment area Rule 4-3-170.4 requires watering (pre-wetting), watering (operational control) for disturbed surface areas and dust generating operations at sufficient intervals and quantity to increase the moisture content and increase the stability of the soil. It also requires the application of chemical stabilizers or dust suppressants to disturbed surface areas and dust generating operations. Rule 4-3-170 requires that opacity levels on the property shall not exceed 20% and that the owner and/or operator shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County and Maricopa County have more stringent watering and soil moisture content requirements. Clark County Rule 94.9 requires the implementation of all dust control measures necessary to maintain soil stability twenty-four (24) hours a day, seven (7) days a week until the permit is closed. More stringent watering requirements are mandated when wind conditions cause fugitive dust emissions to exceed 20% opacity. The measures to be implemented are specified in the Dust Palliative Selection and Use BMP (12) and Landscaping BMP (14). BMP 12 sets requirements for palliative use in traffic and non-traffic applications, application rates, record keeping, etc. BMP 14 establishes soil stabilization requirements for different soil categories with application rates and suppressant use increasing with particulate emission potential (PEP).

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 50-Acre Construction Project

Key Analysis Assumptions: Pre-excavation soil moisture content is 4% per the 1998 Maricopa Association of Governments BACM analysis. An average of 1-ft of soil is excavated from a 50-acre project (represents limited residential earthmoving in Pinal County due to the relatively flat terrain). Sprinkler set up time each day is 1.5 hours/day for 2 laborers. Excavation water is delivered by sprinkler systems. Scraper loading and unloading emissions vary by moisture content per AP-42 13.24 emission factor equation for material handling.

Cost: $10,255

Emission Reduction: 2.59 tons PM$_{10}$

Cost Effectiveness: $3,960/ton PM$_{10}$
Measure 9
Construction Sites - Adopt Demolition / Implosion Dust BMP

The West Pinal County nonattainment area has no fugitive dust rules that directly address demolition beyond the baseline opacity and stabilization standards in Rule 4-3-180 below. Main provisions require an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that several other areas have additional demolition requirements/practices. Clark County’s Implosion BMP (08) and Demolition-Mechanical/Manual BMP (09) were determined to be the most stringent. Main requirements of BMP 08 include:

- Confining blasting to times when wind direction is away from closest residential areas, occupied buildings, and major roadways.
- Stabilizing surface area where support equipment and vehicles will be operated.
- Stabilizing demolition debris immediately following blast and safety clearance.

Main requirements of BMP 09 include:

- Stabilizing surface soils where support equipment and vehicles will operate.
- Stabilizing demolition debris during handling.
- Stabilizing debris following demolition.
- Stabilizing surrounding area following demolition.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 20-Acre Construction Project

Key Analysis Assumptions: BMP 08 provides no emission reduction as it changes the timing of emissions based on wind direction. The open area surrounding the building to be imploded is 20 acres. The building to be imploded is 10 stories high (with a base that is 600 feet wide and 300 feet deep). The building unit weight is 270 lb per ft$^2$ of floor space. The demolition debris has a moisture content of 0.3% and a silt content of 1.0%. Bulldozer debris marshalling is 200 tons/hour. No controls can reduce emissions from the implosion and collapse of the building. Water spraying with a fire hose is used to control emissions from bulldozing and loading debris into haul trucks, which have loadout rates of 7 minutes per 25-ton truckload. The firehose used to water debris during marshalling and loading is throttled to deliver 50 gal/min of water. Dust suppressant control efficiency for haul truck travel is 75%.

Cost: $43,262
**Emission Reduction:** 4.78 tons PM$_{10}$

**Cost Effectiveness:** $9,047/ton PM$_{10}$
Measure 10
Construction Sites - Adopt Weed Abatement Dust Controls

West Pinal County nonattainment area Rule 4-3-070 establishes work practices that require watering before and during weed abatement by discing or blading to minimize the generation, emission, entrainment, suspension, and/or airborne transport of fugitive dust.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Maricopa County has the most stringent weed abatement fugitive dust controls. Maricopa County Rule 310 Section 305.8 requires that the owner and/or operator of a dust generating operation that involves weed abatement by discing or blading shall comply with the following control measures:

- Before weed abatement by discing or blading occurs, apply water;
- While weed abatement by discing or blading is occurring, apply water; and
- After weed abatement by discing or blading occurs, pave, apply gravel, apply water, apply a suitable dust suppressant other than water, or establish vegetative ground cover.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 5-Acre Weed Abatement Project

**Key Analysis Assumptions:** Pre-weed abatement control is watering; post abatement control is the application of dust suppressant. Average tilling depth is 6 inches. Pre-abatement watering increases moisture content from 4% to 12%. Water truck spray width is 50 ft. for soaking to 12% moisture content.

**Cost:** $2,064

**Emission Reduction:** 0.018 tons PM$_{10}$

**Cost Effectiveness:** $113,091/ton PM$_{10}$
Measure 11
Construction Sites - Adopt Sand Blasting & Abrasive Blasting Dust BMPs

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Blasting-Abrasive BMP (02) and Blasting – Soil Rock BMP (03) mandate the most stringent controls. Main requirements of BMP 02 include:

- Stabilize surface soils where support equipment and vehicles will operate.
- Limit visible emissions to no more than an average of 40% opacity for any period aggregating 3 minutes in any 60-minute period pursuant to Air Quality Regulations.
- Stabilize particulate matter in surrounding area following blasting. It is recommended that abrasive blasting should be conducted within an enclosed structure whenever possible to preclude the release of visible emissions to the atmosphere.

Main requirements of BMP 03 include:

- No blasting within 1,500 feet of a residential area, occupied building, or major roadway, when wind direction is toward these structures.
- Blasting shall be between the hours of 8:00 a.m. and 4:30 p.m., excluding Saturdays, Sundays, and holidays unless prior permission is obtained from the Control Officer.
- No blasting allowed when the National Weather Service forecasts wind gusts above 25 miles per hour (mph).
- Stabilize surface soils where drills, support equipment and vehicles will operate.
- Stabilize soil during blast preparation activities (the controls required vary by particulate emission potential (PEP)).
- Stabilize soil after blasting.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 1-Acre Abrasive Blasting Site

**Key Analysis Assumptions:** Abrasive blasting is performed with handheld equipment connected to semi-stationary compressors that are trailer mounted. Pre-operation watering is designed to facilitate ease of post-operation vacuuming of deposited particulate. Abrasive blasting items are removed by forklift and haul truck. One-way forklift loading trips are 75
feet, 150 feet roundtrip. 50 forklift loadout trips are required per 1-acre of blasting operation and 5-haul truck trips are required to remove debris from 1-acre of blasting. Pre-watering provides 50% control efficiency for post-operation site sweeping. Post-watering provides 70% control efficiency for forklift and haul truck travel.

**Cost:** $2,025

**Emission Reduction:** 0.00011 tons PM$_{10}$

**Cost Effectiveness:** $17,713,432/ton PM$_{10}$
Measure 12
Construction Sites - Adopt Backfilling Dust Control BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Backfilling BMP (01) mandate the most stringent controls; main requirements include:

- Stabilize backfill material when not actively handling.
- Stabilize backfill material during handling. The requirements for backfilling depend on the soil type.
- Stabilize soil at completion of backfilling activity.
- Stabilize material while using pipe padder equipment.

**Suggested Implementing Agency**: Pinal County Air Quality Control District

**Analysis Unit**: 500 Foot Trench Excavation

**Key Analysis Assumptions**: The trenching project is 500 feet long, 6 feet deep and 3 feet wide. Soil density is 90 lb/ft$^3$. The trenching rate with a backhoe is 100 yd$^3$/day and the backfilling rate is 300 yd$^3$/day. Emission control is implemented by the dedication and operation of a water truck at the backfilling site. Windrowed soil loses 10% water content per day. Windrowed soil pile increases linearly over 15 days of excavation and decreases linearly over 3 days of backfilling. Backhoe trenching emission factors are the same as for a wheeled scraper per ton of material removed.

**Cost**: $5,341

**Emission Reduction**: 0.016 tons PM$_{10}$

**Cost Effectiveness**: $329,344/ton PM$_{10}$
### Measure 13

**Construction Sites - Adopt Clearing & Grubbing Dust Control BMP**

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Clearing and Grubbing BMP (04) mandate the most stringent controls for stabilizing surface soils where support equipment and vehicles operate; main requirements include:

- Stabilize surface soils where support equipment and vehicles will operate.
- Stabilize soil during clearing and grubbing activities. The requirements for these activities depend on the soil type.
- Stabilize disturbed soil immediately after clearing and grubbing activities.

It is recommended that live perennial vegetation and desert pavement be maintained where possible.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Construction Project

**Key Analysis Assumptions:** The baseline surface moisture content is 0.3% and the soil moisture content is 4%. Emission control is implemented by use of one watering truck dedicated to the site and application of dust suppressant to traveled areas. The water truck is used 2 hours/day in clearing and grubbing activities. The traveled areas within the 50-acre site during clearing and grubbing activities covers 20% of the project site. Clearing and grubbing activities require 10 days of work and produce debris removal rates of 75 tons/day. Backhoe emission factors are the same as those for a wheeled scraper per ton of material moved.

**Cost:** $9,141

**Emission Reduction:** 0.032 tons PM$_{10}$

**Cost Effectiveness:** $284,975/ton PM$_{10}$
Measure 14
Construction Sites - Adopt Foundation/Slab Form Clearing/Cleaning Dust BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Foundation and Clearing and Grubbing BMP (05) require implementation of the most stringent controls of fugitive dust from clearing and cleaning of forms used for foundations and slabs. Main requirements include limiting visible emissions to no more than an average of 20% opacity for any period aggregating 3 minutes in any 60-minute period pursuant to Air Quality Regulations. Specific controls include use of single stage pours unless prohibited by engineering design or building code, to minimize clearing and the use of one of the following:

- Water spray to clear forms, foundations, and slabs.
- Sweeping and water spray to clear forms, foundations, and slabs.
- Industrial vacuum to clear forms, foundations, and slabs prior to the use of high-pressure air to blow soil and debris.
- Industrial vacuum to clear forms, foundations, and slabs.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Construction Project

**Key Analysis Assumptions:** Assume the concrete pad area is 3,000 ft$^2$ per residence. Residential density is 5 units per acre. Concrete forms are 12 inches wide. Concrete residue on a 16 ft. x 12-inch form is 0.1 lbs. The PM$_{10}$ fraction of released concrete residue is 1% of concrete mass. Water application provides a control efficiency of 99% for cleaning concrete forms.

**Cost:** $211

**Emission Reduction:** 0.0017 tons PM$_{10}$

**Cost Effectiveness:** $124,600/ton PM$_{10}$
Measure 15
Construction Sites - Adopt Crushing Operation Dust Control BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Crushing BMP (06) require implementation of the most stringent controls of fugitive dust from crushing of demolition debris, rock and soil. Main requirements include:

- Obtain the appropriate Operating Permit for powered crushers prior to engaging in crushing activity.
- Stabilize surface soils where support equipment and vehicles will operate.
- Stabilize material before crushing.
- Stabilize material during crushing.
- Stabilize material after crushing.

**Suggested Implementing Agency**: Pinal County Air Quality Control District

**Analysis Unit**: Misting Control System-Year

**Key Analysis Assumptions**: The cost of a water misting control system is $3,777; the setup time for the misting system requires 3 laborers working for 2 days; its useful life is 10 years. The capital recovery interest rate for asset amortization is 10%. Maintenance time for the control system is 5%. Concrete crushing systems operate 2,000 hours per year at a crushing rate of 1,000 tons per hour. Misting control systems are assumed to consume 7,500 gallons of water per day. The control efficiency of water misting systems is 80%.

**Cost**: $14,989

**Emission Reduction**: 1.40 tons PM$_{10}$

**Cost Effectiveness**: $10,706/ton PM$_{10}$
Measure 16
Construction Sites - Adopt Cut & Fill Activity Dust Control BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Cut and Fill BMP (07) requires implementation of the most stringent controls of fugitive dust from cut and/or fill soils for site grade preparation. Main requirements include:

- Stabilize surface soils where support equipment and vehicles will operate.
- Pre-water soils. Dig a hole to depth of the cut or equipment penetration to determine if soils are moist and apply controls depending on the soil type particulate emission potential (PEP).
- Stabilize soil during cut activities.
- Stabilize soil after cut and fill activities.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 50-Acre Construction Project

Key Analysis Assumptions: Emission control is achieved by pre-watering the soil to be excavated. The excavation depth over the entire site is 1-foot. Earthmoving requires 0.75 months. Irrigation pipe and sprinklers are used to pre-water the excavation area. Irrigation pipe and sprinklers installation requires 2 laborers 1.5 hours per day to set up the system. Dust suppressant is applied to the excavated surface to control travel and windblown dust emissions.

Cost: $43,733

Emission Reduction: 2.59 tons PM$_{10}$

Cost Effectiveness: $16,888/ton PM$_{10}$
Measure 17
Construction Sites - Adopt Screening Operation Dust Control BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Screening BMP (17) requires implementation of the most stringent controls of fugitive dust from screening of rock, soil or construction debris. Main requirements include:

- If using a powered screen, obtain the appropriate Operating Permit for powered screens prior to engaging in screening activity.
- Drop material through the screen slowly and minimize drop height.
- Stabilize surface soils where support equipment and vehicles will operate.
- Pre-treat material prior to screening.
- Stabilize material during screening.
- Stabilize material and surrounding area immediately after screening.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Misting Control System-Year

**Key Analysis Assumptions:** Screening operations are assumed to have the same activity rates as crushing operations and employ identical misting control systems with the same water consumption rate and control efficiency. The cost of a water misting control system is $3,777; the setup time for the misting system requires 3 laborers working for 2 days; its useful life is 10 years. The capital recovery interest rate for asset amortization is 10%. Maintenance time for the control system is 5%. Concrete crushing systems operate 2,000 hours per year at a rate of 1,000 tons per hour. Misting control systems are assumed to consume 7,500 gallons of water per day. The control efficiency of water misting systems is 80%.

**Cost:** $14,989

**Emission Reduction:** 0.83 tons PM$_{10}$

**Cost Effectiveness:** $17,986/ton PM$_{10}$
Measure 18
Construction Sites - Adopt Trenching Operation Dust Control BMP

The West Pinal County nonattainment area Rule 4-3-170.28 defines work site trenches as those that are equal to or larger than the following dimensions:

- less than four feet in depth, that exceed a length of 726 feet;
- are four feet or greater in depth, that exceed a length of 363 feet

West Pinal County nonattainment area work site rules have no activity-specific requirements beyond the baseline opacity and stabilization standards that in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Trenching BMP (22) requires implementation of the most stringent controls of fugitive dust from trenching with track or wheel mounted excavator, shovel, backhoe or trencher. Main requirements include:

- Stabilize surface soils where trenching equipment, support equipment and vehicles will operate.
- Presoak soils prior to trenching activities. Specific controls depend on the particulate emission potential (PEP) of the soil type.
- Stabilize soil during trenching activities. Again, specific controls depend on the PEP of the soil type.
- Stabilize soils at the completion of trenching activities.

It is recommended that mud and soil be washed from equipment at completion of each trench to prevent crusting and drying of soil on equipment.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 500 Foot Trench Excavation

**Key Analysis Assumptions:** The trenching project is 500 feet long, 6 feet deep and 3 feet wide. Soil density is 90 lb/ft$^3$. The trenching rate with a backhoe is 100 yd$^3$/day and the backfilling rate is 300 yd$^3$/day. Emission control is implemented by the dedication and operation of a water truck at the backfilling site. Windrowed soil looses 10% water content per day. Windrowed soil pile increases linearly over 15 days of excavation and decreases linearly over 3 days of backfilling. Backhoe trenching emission factors are the same as for a wheeled scraper per ton of material removed.
**Cost:** $5,341

**Emission Reduction:** 0.016 tons PM$_{10}$

**Cost Effectiveness:** $329,344/ton PM$_{10}$
Measure 19
Construction Sites - Adopt Paving/Subgrade Operation Dust Control BMP

The West Pinal County nonattainment area has no activity-specific requirements beyond the baseline opacity and stabilization standards in Rule 4-3-180, which require that an owner/operator:

- Shall not conduct or allow dust generating operations that result in opacity of the dust on the property to exceed twenty percent (20%) as measured using an opacity method.
- Shall conduct every other week inspections to ensure that the work site is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas has determined that Clark County’s Paving/Subgrade Preparation BMP (15) requires implementation of the most stringent controls of fugitive dust from subgrade preparation for paving streets, parking lots, etc.:

- Stabilize soils prior to activities.
- Stabilize soils following activities.
- Stabilize adjacent disturbed soils following paving activities.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 0.25 Mile Paving Project

**Key Analysis Assumptions:** Emission control is implemented by application of water to Type II aggregate during application and application of dust suppressant to adjacent areas after paving is completed. Paving width is 30 feet. Type II aggregate is 4 inches thick. Water application rate is sufficient to bring aggregate to 1% moisture content. Type II aggregate base course for 0.25 miles of paving is constructed in 2 workdays. The un-watered Type II aggregate has moisture content of 0.3%.

**Cost:** $2,068

**Emission Reduction:** 0.0082 tons PM$_{10}$

**Cost Effectiveness:** $252,957/ton PM$_{10}$
Measure 20
Construction Sites - Strengthen Dust Control Plan Requirements

West Pinal County nonattainment area Rule 4-3-170 defines work site as any property upon which dust generating operations occur during construction, and which covers an area of 0.1 acres or larger. Rule 4-3-180 specifies that prior to engaging in any dust generating operations on a work site, the owner and/or operator shall file a dust generating operation application form with the Control Officer, pay the appropriate fee in Appendix C, and receive a signed permit from the Control Officer. Main dust generating requirements include:

- A separate application form is required for each site location that is not a contiguous geographic area to the location on the original application form, unless an annual block application is approved.
- The owner and/or operator of work sites 5 acres or larger shall subscribe to the Pinal County Dust Control Forecast as part of the permit application process.
- Each dust generating operation application shall contain an explanation of how the applicant will demonstrate compliance with this rule by selection of at least one control measure for each dust generating operation.
- Annual Area Block applications are only available for dust generating operations associated with: a) Maintenance of existing underground or above-ground lines; b) Effecting end-user connections; c) Underground utility line extensions not exceeding 500’ in length; and d) Overhead utility line extensions; and e) Expansion or extension of paved roads, unpaved roads, road shoulders, and/or alleys and public right of ways at non-contiguous sites.

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that many communities have more stringent dust control planning requirements. The most stringent rules were found in Maricopa County’s – Rule 310.302 (Permit Requirements for Dust Generating Operations) and Rule 310.401 (Dust Control Permit Requirements). Main requirements for Rule 310.302 include:

- No person shall commence construction of, operate, or make a modification to any dust-generating operation when such dust-generating operations disturb a total surface area of 0.10 acre (4,356 square feet) or more without first obtaining a permit or permit revision from the Control Officer.

Main requirements for Rule 310.401 include:

- A requirement to include a project site drawing and, if the site is one acre or larger, soil designations; and
- The permittee is responsible for ensuring that all persons abide by conditions of the dust control permit, supply copies to all project contractors and subcontractors and accept responsibility for meeting the conditions of the Dust Control permit and for
ensuring that control measures are implemented throughout the project site and during the duration of the project.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 5-Acre Project

**Key Analysis Assumptions:** A 4,000-gallon water truck is used for a 5-acre project. Emission control is achieved by one additional watering truck operating on the site.

**Cost:** $73,310

**Emission Reduction:** 0.69 tons PM\(_{10}\)

**Cost Effectiveness:** $105,549/ton PM\(_{10}\)
Measure 21
Construction Sites - Strengthen Dust Control Recordkeeping Requirements

West Pinal County nonattainment area Rule 4-3-180. (DUST GENERATING OPERATIONS Standards, Application, Permit and Recordkeeping Requirements) contains no specific training requirements. Numerous recordkeeping requirements are specified, including:

- maintain a copy of the signed permit form and provide it upon request of the Control Officer or his designee.
- keep records of every other week inspection reports and site-wide inspection reports from the day leading up to and the day that is forecast to be high risk for dust emissions, including any necessary corrective actions.
- At all sites that are five acres or larger, the owner and/or operator shall erect a project information sign at the main entrance that is visible to the public or at each end of the road construction project site.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that many communities have more stringent dust control planning requirements. The most stringent dust control permit record keeping rules were found in Maricopa County’s Rule 310.401 Dust Control Permit Requirements and Rule 310.502 Record Keeping. Main Rule 310.401 requirements include:

- a project site drawing and, if the site is one acre or larger, soil designations; and
- The permittee is responsible for ensuring that all persons abide by conditions of the dust control permit, supply copies to all project contractors and subcontractors and accept responsibility for meeting the conditions of the Dust Control permit and for ensuring that control measures are implemented throughout the project site and during the duration of the project.

Rule 310.502 requirements include:

- Any person who conducts dust-generating operations that do not require a Dust Control Plan shall compile and retain records (including records on any street sweeping, water applications, and maintenance of trackout control devices, gravel pads, fences, wind barriers, and tarps) that provide evidence of control measure application, by indicating the type of treatment or control measure, extent of coverage, and date applied.
- Upon verbal or written request by the Control Officer, the log or the records and supporting documentation shall be provided as soon as possible but no later than 48 hours, excluding weekends.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 50-Acre Project
**Key Analysis Assumptions:** The emission control is limited to one additional water truck being used onsite. The cost of the measure is based on operator training and operation of one additional water truck onsite.

**Cost:** $117,145

**Emission Reduction:** 4.99 tons PM$_{10}$

**Cost Effectiveness:** $23,462/ton PM$_{10}$
Measure 22
Construction Sites - Strengthen Dust Control Coordinator Requirements

West Pinal County nonattainment area Rule 4-3-180. (DUST GENERATING OPERATIONS Standards, Application, Permit and Recordkeeping Requirements) contains no specific training requirements for dust coordinators. Numerous recordkeeping requirements are specified, including:

- Maintain a copy of the signed permit form and provide it upon request of the Control Officer or his designee.
- Keep records of every other week inspection reports and site-wide inspection reports from the day leading up to and the day that is forecast to be high risk for dust emissions, including any necessary corrective actions.
- At all sites that are five acres or larger, the owner and/or operator shall erect a project information sign at the main entrance that is visible to the public or at each end of the project site.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent dust control coordinator planning requirements. Rule 310.402.1 requires:

- The owner and/or operator of a dust-generating operation shall submit to the Control Officer a Dust Control Plan with any permit applications that involve dust generating operations with a disturbed surface area that equals or exceeds 0.10 acre (4,356 square feet):

Rule 301.402.3 specifies that the contents of dust control plans include:

- Contact information for parties responsible for plan submittal.
- A drawing of the entire project, including boundaries, acres to be disturbed, nearest public roads, north arrow, planned exit locations and unpaved parking lot(s).
- Appropriate control measures for each dust-generating operation
- Dust suppressants to be applied, including all product specifications or label instructions for approved use.
- Specific surface treatments to be used for trackout control.

In addition, requirements from Rules 310.402.3, .4, .5 and .6 apply as do the recordkeeping requirements addressed in Measure 21.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Project
**Key Analysis Assumptions:** Recordkeeping and reporting requirements that are the subject of this measure are those contained in Maricopa County Air Quality Department Rule 301 Sections 501 and 502. The baseline number of watering trucks for a 50-acre site is 5. Emission control is limited to one additional watering truck operating an additional 8 hours per day. The inspection, recordkeeping and reporting requirements require 4 hours/day for a Dust Control Coordinator. Inspections find 10% of the project site require additional watering each day.

**Cost:** $141,410

**Emission Reduction:** 3.18 tons PM$_{10}$

**Cost Effectiveness:** $44,466/ton PM$_{10}$
Measure 23
Construction Sites - Strengthen & Expand Dust Control Monitoring and Violation Requirements

West Pinal County nonattainment area Rule 4-3-180. (Registration Requirements) specify that the owner and/or operator shall keep records of every other week inspection reports and site-wide inspection reports from the day leading up to and the day that is forecast to be high risk for dust emissions, including any necessary corrective actions. Rule 4-3-190. (Violations) include numerous exemptions. Penalties can include:

- All dust generating operations are ceased until the opacity requirements of §4-3-180(A)(1) are no longer being exceeded;
- Generally any landowner, contractor, or subcontractor operating on the job site, who violates any Pinal County Air Quality Control District rule may be subject to an order of abatement, a civil action for injunctive relief or civil penalties, or may be found guilty of a Class I Misdemeanor.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County has the most stringent monitoring and violation requirements since it includes surety bond-based financial penalties/mechanisms for failure to comply with any/all conditions of dust control permit and incorporates separate compliance determinations for dust generation using additional methods beyond the Drop Ball test. Maricopa County also includes more stringent provisions than West Pinal due to requirements for a Dust Control Coordinator and dust control training. Main Clark County Rule 94.7 General and Administrative Standards requirements include:

- If an Owner and/or Operator has three (3) Notices of Violation that have been adjudicated by the Hearing Officer at the same project for which the Dust Control Permit was issued, the Control Officer or his/her representative may suspend or revoke the permit. Upon suspension or revocation of a permit, all activities that are authorized by that permit shall cease.
- If during any 180-day period an Owner and/or Operator has three (3) Notices of Violation that have been adjudicated by the Hearing Officer for the same Construction site, the Control Officer shall require the posting of a surety bond to ensure implementation of the mitigation measures set forth in the approved Dust Control Permit for the subject site.
- The Control Officer, or his/her designee can be further empowered to enter upon any said land where any loose soil or dust problem exists, and to take such remedial and corrective action as may be deemed appropriate to cope with and relieve, reduce, or remedy the loose soil, dust situation or condition, when the Owner and/or Operator fails to do so – any cost incurred in connection with the remediation shall be reimbursed by the landowner.

Suggested Implementing Agency: Pinal County Air Quality Control District
**Analysis Unit**: 5-Acre Construction Project

**Key Analysis Assumptions**: Emission control is limited to one water truck operating 8 hours per day. Dust control cost is $30,000 per acre or $150,000 per site. The cost of the surety bond is 10% of the covered cost.

**Cost**: $180,967

**Emission Reduction**: 0.48 tons PM$_{10}$

**Cost Effectiveness**: $379,366/ton PM$_{10}$
Measure 24
Construction Sites - Strengthen Project & Trenching Signage Requirements

West Pinal County nonattainment area Rule 4-3-180. (DUST GENERATING OPERATIONS Standards, Application, Permit and Recordkeeping Requirements) includes the following:

- At all sites that are five acres or larger, the owner and/or operator shall erect a project information sign at the main entrance that is visible to the public or at each end of the road construction project site.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County has the most stringent signage requirements. Main Clark County AQR Rule 94.7.7 Signage Requirements include:

- For each Dust Control Permit issued where the project site is less than or equal to ten (10) acres, or for Trenching projects between one hundred (100) feet and one (1) mile in length, or for demolition of a structure totaling one thousand (1,000) square feet or more, the permittee shall install a sign on the project site prior to commencing Construction activity that is visible to the public and measures, at minimum, four (4) feet wide by four (4) feet high, conforming to department policy on Dust Control Permit Design and Posting of Signage listed in Attachment 4 of the Construction Activities Dust Control Handbook.

- For each Dust Control Permit issued where the project site is over ten (10) acres, or for Trenching projects aggregating one (1) mile or greater in length, the permittee shall install a sign on the project site prior to commencing Construction Activity and visible to the public and measures, at minimum, eight (8) feet wide by four (4) feet high, conforming to department policy on Dust Control Permit Design and Posting of Signage listed in Attachment 4 of the Construction Activities Dust Control Handbook.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 1-Acre Project

**Key Analysis Assumptions:** Signs are spaced 200 ft. apart and have a 15-year useful life. The increase in project control efficiency is estimated to be 2% due to increased notification of visible emissions and enforcement of emission limitations.

**Cost:** $143

**Emission Reduction:** 0.018 tons PM$_{10}$

**Cost Effectiveness:** $8,037/ton PM$_{10}$
Measure 25
Construction Sites - Adopt Dust Control Training Requirements for Project Coordinators and Foreman

The West Pinal County nonattainment area has no dust control coordinator training regulations.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County and Maricopa County include dust coordinator training requirements. Clark County Rule 94.7.5.5 establishes Dust Control Monitor qualifications which include Basic and Monitoring dust control classes and Visual Emissions Evaluation (VEE) certification. Clark County Rule 94.7.6 includes 3-year Dust Control Class renewal requirements and class attendance for workers/equipment operators as a corrective measure when violations occur. These additional Clark County elements may reflect MSM. Maricopa County Rule 310.309 (DUST CONTROL TRAINING CLASSES FOR DUST-GENERATING OPERATIONS) requirements include:

- At least once every three years, the persons specified in Section 309.1(b) or Section 309.1(c) of this rule shall successfully complete a Basic Dust Control Training Class conducted or approved by the Control Officer.
- The following persons present at a site that is subject to a permit issued by the Control Officer requiring control of PM$_{10}$ emissions from dust-generating operations shall complete a Basic Dust Control Training Class as specified in Section 309.1(a) of this rule: (1) Water truck drivers; (2) Water-pull drivers; (3) The site superintendent or other designated on-site representative of the permit holder, if present at a site that has more than one acre of disturbed surface area.
- A Dust Control Block Permit permittee/holder shall have, at a minimum, one individual trained in accordance with the Basic Dust Control Training Class as specified in Section 309.1(a) of this rule, if present at a site that has more than one acre of disturbed surface area.
- At least once every three years, the Dust Control Coordinator, who meets the requirements of Section 310 of this rule, shall successfully complete the Comprehensive Dust Control Training Class conducted or approved by the Control Officer.

Rule 310.310 (DUST CONTROL COORDINATOR FOR DUST-GENERATING OPERATIONS) requirements include:

- The permittee for any site of five acres or more of disturbed surface area subject to a permit issued by the Control Officer requiring control of PM$_{10}$ emissions from dust generating operations shall have on-site at least one Dust Control Coordinator trained in accordance with Section 309.2 of this rule at all times during primary dust generating operations related to the purposes for which the Dust Control permit was obtained.
• At least once every three years, the Dust Control Coordinator shall successfully complete a Comprehensive Dust Control Training Class conducted or approved by the Control Officer.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 12.3 Acre Construction Project

**Key Analysis Assumptions:** The disturbed portion of the development project is 5 acres (the minimum for requiring a Dust Control Coordinator under Maricopa County Air Quality Department Rule 310 Section 310.6). The developed portion of a project is based on each parcel hosting a 2,000 ft² dwelling, a 600 ft² garage, a 450 ft. driveway, 300 ft. patio, a 1,542 ft² public road/sidewalk right of way, with 5 units per gross acre. Emission control is limited to a 50% increase in water trucks operating 8 hours per day.

**Cost:** $165,842

**Emission Reduction:** 1.08 tons PM\(_{10}\)

**Cost Effectiveness:** $153,876/ton PM\(_{10}\)**
West Pinal County nonattainment area Rule 4-1-030 sets standards for open areas/vacant lots. Key requirements include:

- The owner and/or operator of open areas/vacant lots shall not cause, suffer, allow, or permit fugitive dust emissions which result in opacity of the dust to exceed twenty percent (20%) as measured using an opacity method. In addition, upon evidence of trespass, the owner and/or operator is required to install trespass signs and physical barriers such as curbs, fences, gates, posts, shrubs, trees, or other effective control measures to effectively prevent access to the open areas/vacant lots.
- Owners and/or operators of open areas/vacant lots 1.0 acre (43,560 square feet) or larger and have a cumulative of 0.5 acre (21,780 square feet) or more disturbed surface area are required to implement specified control measures in order to stabilize the surface.
- For open areas/vacant lots 1.0 acre (43,560 square feet) or larger and have a cumulative of 0.5 acre (21,780 square feet) or more disturbed surface area, within 30 calendar days following the initial discovery of the disturbed surface area on the open areas/vacant lots, the owner and/or operator shall sign up to receive the Pinal County dust control forecast and ensure the open areas/vacant lots are stabilized the day leading up to and the day that is forecast to be high risk for dust emissions.
- No person shall remove vegetation from any open areas/vacant lots by blading, diskng, plowing under or any other means without implementing one of the specified control measures to prevent or minimize fugitive dust.
- Specific criteria for determining compliance with the stabilization requirement include use of the drop ball test and categories of vegetation coverage.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the smallest acreage thresholds and with the exception of trackout control has the most stringent controls. Key requirements of Maricopa County Rule 310.01 Section 302.4 specify that the owner and/or operator of a non-traditional source of fugitive dust that involves vehicle use in open areas and vacant lots shall:

- not cause or allow visible emissions of particulate matter, including fugitive dust, beyond the property line within which the emissions are generated.
- stabilize the open areas and vacant lots on which vehicles are used to meet one of the specified stabilization limitations (e.g., soil crust, threshold friction velocity (TFV) corrected for non-erodible elements of 100 cm/second or higher; vegetative cover, etc.)

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 0.1-Acre Vacant Lot-Year
**Key Analysis Assumptions:** The analysis was derived from the 2007 Maricopa Association of Governments Measure 41 methodology (Vacant Lots Stabilized by County if Owners Do Not Respond); costs were updated to 2020 using historical price indexes. The Measure 3 analysis from this report was adjusted to represent a 0.1 acre parcel; emission control is achieved through barriers (to address no visible emissions beyond the property line). The high wind speed emissions were based on wind speed bin emission factors and 5-min bin counts developed for the 2017 Maricopa County Periodic Emission Inventory. The vehicle disturbed portion of an open area is assumed to be 20%. The range displayed represents barrier, and barrier plus monitoring controls.

**Cost:** $344 - $385

**Emission Reduction:** 0.018 tons PM$_{10}$

**Cost Effectiveness:** $18,725 - $20,918/ton PM$_{10}$
Measure 27
Cleared Areas - Strengthen Existing Vacant Lot Vehicle Use Requirements

West Pinal County nonattainment area Rule 4-1-030.2.B specifies that upon evidence of trespass in open areas/vacant lots, an owner and/or operator shall install and maintain one of the following:

- No trespassing signs; or
- Physical barriers such as curbs, fences, gates, posts, shrubs, trees, or other effective control measures to effectively prevent access to the open areas/vacant lots.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent vehicle use in open areas and vacant lot control measures. The primary requirements specified in Maricopa County Rule 310.01 Section 302.4 include:

- Prevent motor vehicle and/or off-road vehicle trespassing, parking, and/or access by installing barriers, curbs, fences, gates, posts, shrubs, trees, or other effective control measures;
- Prevent motor vehicle and/or off-road vehicle trespassing, parking, and/or access by posting ordinances, maps, etc.
- Uniformly apply and maintain surface gravel or chemical/organic stabilizers to all areas disturbed by motor vehicles and/or off-road vehicles.

Maricopa Rule 310.01 Section 302.5 specifies control measures for open land and includes:

- Establish vegetative ground cover on all disturbed surface areas.
- Apply a dust suppressant to all disturbed surface areas; or
- Uniformly apply and maintain surface gravel; or
- Apply and maintain an alternative control measure approved in writing by the Control Officer and the Administrator.

Additional requirements if open areas and vacant lots are 0.10 acre (4,356 square feet) or larger and have a cumulative of 500 square feet or more that are disturbed and if such disturbed area remains unoccupied, unused, vacant, or undeveloped for more than 15 days, then the owner and/or operator shall implement one of the defined control measures.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Vacant Lot-Year

**Key Analysis Assumptions:** The most efficient approach to compliance with this measure was determined to be the approach employed in the Measure 26 analysis; therefore, the assumptions for both Measures are the same. The analysis was derived from the 2007
Maricopa Association of Governments Measure 41 methodology (Vacant Lots Stabilized by County if Owners Do Not Respond); costs were updated to 2020 using historical price indexes. The Measure 3 analysis from this report was adjusted to account for having a laborer trained in EPA Method 9 inspect the site and keep records; emission control is achieved through barriers (to address no visible emissions beyond the property line). The high wind speed emissions were based on wind speed bin emission factors and 5-min bin counts developed for the 2017 Maricopa Periodic Emission Inventory. The vehicle disturbed portion of an open area is assumed to be 20%. The range displayed represents barrier, and barrier plus monitoring controls.

**Cost:** $344 - $364

**Emission Reduction:** 0.018 tons PM$_{10}$

**Cost Effectiveness:** $18,725 - $19,813/ton PM$_{10}$
Measure 28
Cleared Areas - Strengthen Existing Vacant Lot Fugitive Dust Controls

West Pinal County nonattainment area Rule 4-1-030.2.C requires owners and/or operators of open areas/vacant lots 1.0 acre (43,560 square feet) or larger and have a cumulative of 0.5 acre (21,780 square feet) or more disturbed surface area to implement at least one control measure described below on the disturbed surface area:

- Apply and maintain water or dust suppressants; or
- Establish vegetation; or
- Install and maintain pavement; or
- Apply and maintain gravel uniformly; or
- Apply and maintain chemical/organic stabilizers/suppressants; or
- Apply and maintain an alternative control measure approved in writing by the Control Officer and the EPA Administrator.

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that Maricopa County has the most stringent fugitive dust control measures for open areas and vacant lots. Rule 310.01 Section 302.5 requires:

- Establish vegetative ground cover on all disturbed surface areas. Such control measure(s) must be maintained and reapplied, if necessary. Stabilization shall be achieved, per this control measure, within eight months after the control measure has been implemented; or
- Apply a dust suppressant to all disturbed surface areas; or
- Restore all disturbed surface areas within 60 calendar days following the initial discovery by the Control Officer of the disturbance, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby undisturbed native conditions. Such control measure(s) must be maintained and reapplied, if necessary. Stabilization shall be achieved, per such control measure, within eight months after such control measure has been implemented; or
- Uniformly apply and maintain surface gravel; or
- Apply and maintain an alternative control measure approved in writing by the Control Officer and the Administrator.

Additional Requirements are specified for 0.10 acre (4,356 square feet) or larger areas that have a cumulative of 500 square feet or more that are disturbed and if such disturbed area remains unoccupied, unused, vacant, or undeveloped for more than 15 days.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 0.1-Acre Vacant Lot-Year
**Key Analysis Assumptions:** The most efficient approach to compliance with this measure was determined to be the approach employed in the Measures 26 & 27 analyses; therefore, the assumptions for these Measures are the same. The analysis was derived from the 2007 Maricopa Association of Governments Measure 41 methodology (Vacant Lots Stabilized by County if Owners Do Not Respond); costs were updated to 2020 using historical price indexes. The Measure 3 analysis from this report was adjusted to represent a 0.1 acre parcel; emission control is achieved through barriers (to address no visible emissions beyond the property line). The high wind speed emissions were based on wind speed bin emission factors and 5-min bin counts developed for the 2017 Maricopa County Periodic Emission Inventory. The vehicle disturbed portion of an open area is assumed to be 20%. The range displayed represents barrier, and barrier plus monitoring controls.

**Cost:** $344 - $364

**Emission Reduction:** 0.018 tons PM$_{10}$

**Cost Effectiveness:** $18,725 - $19,813/ton PM$_{10}$
Measure 29
Cleared Areas - Require Mitigation Plans for Open Areas/Vacant Lots Over 10,000 Acres in Size

The West Pinal county nonattainment area has no rules addressing the development and submission of mitigation plans for open areas and vacant lots.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County has the only requirements addressing the preparation and submission of dust mitigation plans for large (>10,000 acres) vacant lots. Rule 90.2.2 requires any owner and/or operator of open areas and vacant lots having a cumulative area of 10,000 acres or greater must submit a dust mitigation plan to the department for approval by March 31, 2003, in a format prescribed by the Control Officer.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 1-Acre Cleared Area-Year

**Key Analysis Assumptions:** A review of spatial land use data for Pinal County indicates there are currently no cleared areas that exceed the 10,000-acre applicability threshold. Therefore, no emission reductions (or costs) are expected from implementation of this measure.

**Cost:** $0

**Emission Reduction:** 0.00 tons PM$_{10}$

**Cost Effectiveness:** $0/ton PM$_{10}$
Measure 30
Cleared Areas - Strengthen Weed Abatement Trash Removal Requirements for Open Areas/Vacant Lots

West Pinal County nonattainment area Rule 4-1-030.2.E specifies that no person shall remove vegetation from any open areas/vacant lots by blading, disking, plowing under or any other means without implementing all of the following control measures to prevent or minimize fugitive dust, including:

- Apply a dust suppressant(s) to the total surface area subject to the disturbance immediately prior to or during the weed abatement.
- Prevent or eliminate material trackout onto paved surfaces and access points adjoining paved surfaces through one of the control measures in 4-1-030.5.A.i.
- Apply a dust suppressant(s), gravel, compaction or an alternative control measure immediately following weed abatement to the entire disturbed surface area such that the surface is stabilized.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County is potentially more stringent as it has more specific controls. However, it does not address trackout. Where machinery is used to clear weeds and/or remove trash, Rule 90.2.3 establishes the following control measures for open areas and vacant lots larger than 5,000 ft$^2$:

- Pre-wet surface soils before mechanized weed abatement and/or trash removal occurs; and,
- Maintain dust control measures while mechanized weed abatement and/or trash removal is occurring; and,
- Pave, apply gravel, apply water, or apply a suitable Dust Palliative, in compliance with the stabilization standards set forth in Subsection 90.2.1.2 of this regulation, after mechanized weed abatement and/or trash removal occurs.

The rule also notes that in order to conserve water to the greatest extent practicable, the use of reclaimed water is highly encouraged.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 5,000 ft$^2$ Cleared Area-Year

Key Analysis Assumptions: The analysis was derived from the 2007 Maricopa Association of Governments Measure 32 methodology. The paving and palliative option values were updated to account for changes in the historical Producer Price Index and reflect a 5,000 ft$^2$ cleared area.

Cost: $236 - $2,995
**Emission Reduction:** 0.02 – 0.06 tons PM$_{10}$

**Cost Effectiveness:** $11,479 - $51,549/ton PM$_{10}$
Measure 31  
Dairies - Tighten Definition of Dairies Subject to Fugitive Dust Rules

Arizona Administrative Code R18-2-611 defines commercial dairy operation to be a dairy operation with more than 150 dairy cattle within the boundary of the Maricopa PM nonattainment area and the Maricopa County portion of Area A, a PM nonattainment area designated after June 1, 2009 as stated in A.R.S. § 49-457(P)(1)(f), or the Pinal County PM Nonattainment Area.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Coachella Valley and South Coast have the most stringent dairy operation definition based on minimum number of animals (50 vs. 150 in West Pinal County nonattainment area). Although unlike West Pinal, they exempt dairies with bounded areas that is less than 10 acres.

South Coast AQMD Rule 403(c)(13) defines dairy farm as an operation on a property or set of properties that are contiguous or separated only by a public right-of-way, that raises cows or produces milk from cows for the purpose of making a profit or for a livelihood. Rule 1186.(c)(12) defines livestock operations 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. Both definitions do not apply to livestock operations whose contiguous bounded areas do not exceed ten acres.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Dairy Farm

**Key Analysis Assumptions:** A review of West Pinal Dairy information from ADEQ shows that all dairy farms have more than 150 animals. Therefore, the reductions and cost-effectiveness from this provision are zero.

**Cost:** $0

**Emission Reduction:** 0.00 tons PM$_{10}$

**Cost Effectiveness:** $0/ton PM$_{10}$
Measure 32
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs

Arizona Administrative Code R18-2-611.03(A) requires a commercial animal operator within the West Pinal County nonattainment area to implement at least one best management practice from each operational category to reduce PM emissions.

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that Maricopa County is the most stringent as it requires two BMPs to be implemented in each operational category.

AAC R18-2-611.01.A requires a commercial animal operator within a Serious PM Nonattainment Area shall implement at least two best management practices from each category to reduce PM emissions.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Dairy Farm

**Key Analysis Assumptions:** No specific dairy operations are specified for this measure. The costs and benefits of doubling BMP requirements are separately addressed for each of the mandated dairy operations in subsequent dairy control measure analyses for Measures 33-36.

**Cost:** N/A

**Emission Reduction:** N/A

**Cost Effectiveness:** N/A
Measure 33
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs for Arenas, Corrals and Pens

Arizona Administrative Code R18-2-611.03.D requires West Pinal County nonattainment area dairy operations to implement one of the following best management practices, as described in subsection (A), from each of the following categories for arenas, corrals and pens:

- Use free stall housing,
- Provide shade in corral,
- Provide cooling in corral,
- Cement cattle walkways to milk barn,
- Groom manure surface,
- Water misting systems,
- Use drag equipment to maintain pens,
- Pile manure between cleanings,
- Feed green chop,
- Keep calves in barns or hutch,
- Do not run cattle,
- Apply a fibrous layer, or
- Wind barrier.

A review of fugitive dust regulations in place in western PM10 nonattainment areas found that Maricopa County has the most stringent dairy operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of arena, corral and pen categories.

Suggested Implementing Agency: Governor’s Agricultural Best Management Practices Committee

Analysis Unit: Nonattainment Area-Year

Key Analysis Assumptions: 2017 dairy data for the West Pinal County nonattainment area provided by ADEQ were used to perform the analysis. Information on dairies and cows at each dairy were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting dairy BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). For surveyed dairies that implemented only 1 BMP, the effects of requiring a minimum of 2 BMPs were estimated by calculating changes on overall control efficiency for those farms assuming the second BMP was use of wind barriers. Two levels of rule effectiveness were used to provide a range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Costs for wind barriers were estimated assuming 3-foot barrier fencing with a useful life of 10 years.
**Cost**: $3,861

**Emission Reduction**: 27.57 - 54.35 tons PM$_{10}$

**Cost Effectiveness**: $71 - $140/ton PM$_{10}$
Measure 34
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs for Animal Waste (and Feed) Handling and Transporting

Arizona Administrative Code R18-2-611.03.D specifies that West Pinal County nonattainment area dairy operations implement one of the following best management practices for animal waste (and feed) handling and transporting:

- Feed higher moisture feed to dairy cattle,
- Store and maintain feed stock,
- Covers for silage,
- Store silage in bunkers,
- Cover manure hauling trucks, or
- Do not load manure trucks with dry manure when wind exceeds 15 mph.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent dairy operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of animal waste (and feed) handling and transporting categories

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** The 2017 dairy data for the West Pinal County nonattainment area provided by ADEQ were used. Information on dairies and cows at each dairy were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting dairy BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). For surveyed dairies that implemented only 1 BMP, the effects of requiring a minimum of 2 BMPs were evaluated by adding a BMP for farms only using 1. However, since composite control efficiency was conservatively estimated by ADEQ as the maximum across all BMPs and the individual BMP control efficiencies were all identical, simulating the additional BMP for applicable farms resulted in no calculated increase in composite efficiency and no emission reductions. Further analysis of the BMP interactions within this activity category will be needed to estimate an emission reduction and cost effectiveness.

**Cost:** N/A

**Emission Reduction:** N/A

**Cost Effectiveness:** N/A
Measure 35
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Access Connections

Arizona Administrative Code R18-2-611.03.D specifies that West Pinal County nonattainment area dairy operations implement one of the following best management practices for unpaved access connections:

- Install signage to limit vehicle speed to 15 mph,
- Install speed control devices,
- Restrict access to through traffic,
- Install and maintain a track-out control device,
- Apply and maintain pavement in high traffic areas,
- Apply and maintain aggregate cover,
- Apply and maintain synthetic particulate suppressant, or
- Apply and maintain water as a dust suppressant.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent dairy operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of unpaved access connections.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** The 2017 dairy data for the West Pinal County nonattainment area provided by ADEQ were used in attempting to perform the analysis. Information on dairies and cows at each dairy were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting dairy BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). For surveyed dairies that implemented only 1 BMP, the effects of requiring a minimum of 2 BMPs were estimated by calculating changes on overall control efficiency for those farms assuming the second BMP was use of synthetic dust suppressant. Two levels of rule effectiveness were used to provide a range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Costs for annual application of polymer emulsion dust suppressant application were estimated and scaled to the estimated fractional unpaved access connection area per farm.

**Cost:** $607

**Emission Reduction:** 1.18 – 2.32 tons PM$_{10}$
**Cost Effectiveness:** $261 - $515/ton PM$_{10}$
Measure 36
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Roads or Feed Lanes

Arizona Administrative Code R18-2-611.03.D.4 specifies that West Pinal County nonattainment area dairy operations implement one of the following best management practices for unpaved roads or feed lanes:

- Install engine speed governors on feed truck to 15 mph,
- Install signage to limit vehicle speed to 15 mph,
- Install speed control devices,
- Restrict access to through traffic,
- Apply and maintain pavement in high traffic areas,
- Apply and maintain aggregate cover,
- Apply and maintain synthetic particulate suppressant,
- Apply and maintain water as a dust suppressant,
- Use appropriate vehicles such as electric carts or small utility vehicles instead of trucks, or
- Apply and maintain pavement or cement feed lanes.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent dairy operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of unpaved roads or feed lanes.

**Suggested Implementing Agency**: Governor’s Agricultural Best Management Practices Committee

**Analysis Unit**: Nonattainment Area-Year

**Key Analysis Assumptions**: The 2017 dairy data for the West Pinal County nonattainment area provided by ADEQ were used in attempting to perform the analysis. Information on dairies and cows at each dairy were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting dairy BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). For surveyed dairies that implemented only 1 BMP, the effects of requiring a minimum of 2 BMPs were estimated by calculating changes on overall control efficiency for those farms assuming the second BMP was use of a synthetic dust suppressant. Two levels of rule effectiveness were used to provide a range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Costs for annual application of polymer emulsion dust suppressant application were estimated and scaled to the estimated fractional unpaved road or feed lane area per farm.
**Cost:** $1,492

**Emission Reduction:** 2.48 – 4.89 tons PM$_{10}$

**Cost Effectiveness:** $305 - $601/ton PM$_{10}$
Measure 37  
Dairies - Increase the Number of Dairy Operation Fugitive Dust BMPs for Unpaved Vehicle/Equipment Traffic Areas

Neither the Arizona Administrative Code (AAC) nor the West Pinal County nonattainment area have fugitive dust rules addressing unpaved vehicle/equipment traffic areas within dairy operations.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that San Joaquin Valley is the most stringent as this source activity category is not explicitly addressed in AAC R18-2-611. Rule 4550 requires the implementation of one of the following BMPs for unpaved vehicle/traffic areas within a dairy operation:

- Dust suppressants;
- Gravel;
- Access restriction;
- Speed reduction;
- Pavement Appropriate equipment and vehicles.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** 1.0 Acre Area-Year

**Key Analysis Assumptions:** The BMP would require annual polymer dust suppressant for consistency/leverage with other vehicle-traveled unpaved areas within the facility. Key assumptions were: 1) 0.1 acres traffic area; 2) 10 trips/day; and 3) 5 mph average speed.

**Cost:** $779

**Emission Reduction:** 0.029 tons PM$_{10}$

**Cost Effectiveness:** $26,707/ton PM$_{10}$
Measure 38  
Cattle CAFOs - Tighten Definition of Cattle Confined Animal Feeding Operations Subject to Fugitive Dust Rules

Arizona Administrative Code R18-2-611 defines commercial beef cattle feedlot to be a beef cattle feedlot with more than 500 beef cattle within the boundary of the Maricopa PM nonattainment area and the Maricopa County portion of Area A, a PM nonattainment area designated after June 1, 2009 as stated in A.R.S. § 49-457(P)(1)(f), or the Pinal County PM Nonattainment Area.

A review of fugitive dust regulations in place in western PM₁₀ nonattainment areas found that Coachella Valley and South Coast are the most stringent based on minimum number of animals (50 vs. 500 in the West Pinal County nonattainment area).

South Coast AQMD Rule 403 (10) confined animal facility as an agricultural source for the raising of 3,360 or more fowl or 50 or more animals, including but not limited to, any structure, building, installation, farm, corral, coop, feed storage area, milking parlor, or system for the collection, storage, or distribution of solid and liquid manure; if domesticated animals, including horses, sheep, goats, swine, beef cattle, rabbits, chickens, turkeys, or ducks are corralled, penned, or otherwise caused to remain in restricted areas for commercial agricultural purposes and feeding is by means other than grazing.

Rule 403 (34) specifies that the unpaved road definition does not apply to confined animal facilities with a combined disturbed surface area within one continuous property line that is one acre or less. Rule 1186 (12) addresses emissions from paved and unpaved roads and livestock operations. It exempts livestock operations with a contiguous bounded area of less than 10 acres.

Suggested Implementing Agency: Governor’s Agricultural Best Management Practices Committee

Analysis Unit: Cattle Feedlot

Key Analysis Assumptions: A spreadsheet on cattle Confined Animal Facility Operations (CAFOs) from ADEQ shows no facilities with the number of cattle between the 500 and 50 animal threshold -- all cattle CAFOs have more than 500 animals. Therefore, the reductions and cost-effectiveness from this provision are zero.

Cost: $0

Emission Reduction: 0.00 tons PM₁₀

Cost Effectiveness: $0/ton PM₁₀
Measure 39
Cattle CAFOs - Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs

Arizona Administrative Code (AAC) R18-2-611.03(A) requires a commercial animal operator within the West Pinal County nonattainment area to implement at least one best management practice from each operational category to reduce PM emissions.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County is the most stringent as it requires two BMPs to be implemented in each operational category. AAC R18-2-611.01.A requires a commercial animal operator within a Serious PM Nonattainment Area shall implement at least two best management practices from each category to reduce PM emissions.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Cattle Feedlot

**Key Analysis Assumptions:** No specific operations are specified for this measure. The costs and benefits of doubling BMP requirements are separately addressed for each of the mandated cattle CAFO operations in subsequent cattle control measure analyses for Measures 40-43.

**Cost:** N/A

**Emission Reduction:** N/A

**Cost Effectiveness:** N/A
Arizona Administrative Code R18-2-611.03.D requires West Pinal County nonattainment area cattle operations to implement one of the following best management practices, as described in subsection (A), from each of the following categories for arenas, corrals and pens:

- Use free stall housing,
- Provide shade in corral,
- Provide cooling in corral,
- Cement cattle walkways to milk barn,
- Groom manure surface,
- Water misting systems,
- Use drag equipment to maintain pens,
- Pile manure between cleanings,
- Feed green chop,
- Keep calves in barns or hutches,
- Do not run cattle,
- Apply a fibrous layer, or
- Wind barrier.

A review of fugitive dust regulations in place in western PM₁₀ nonattainment areas found that Maricopa County has the most stringent cattle operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. Arizona Administrative Code R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of arena, corral and pen categories.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** 2017 cattle CAFO data for the West Pinal County nonattainment area provided by ADEQ were used to perform the analysis. Information on feedlots and cattle at each feedlot were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). For surveyed facilities that implemented only 1 BMP, the effects of requiring a minimum of 2 BMPs were estimated by calculating changes on overall control efficiency for those facilities assuming the second BMP was application of pen watering. Two levels of rule effectiveness were used to provide a
range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Annual costs for pen watering were based on per head ranges from "Water Requirements for Dust Control on Feedlots" available at: [https://lpelc.org/water-requirements-for-dust-control-on-feedlots/](https://lpelc.org/water-requirements-for-dust-control-on-feedlots/).

**Cost:** $54,420 - $217,680

**Emission Reduction:** 65.04 – 128.21 tons PM$_{10}$

**Cost Effectiveness:** $424 - $3,347/ton PM$_{10}$
Measure 41  
Cattle CAFOs - Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Animal Waste (and Feed) Handling and Transporting

Arizona Administrative Code (AAC) R18-2-611.03.E specifies that West Pinal County nonattainment area commercial beef cattle feedlot shall implement one of the best management practices as specified in subsection (A) for the following categories of animal waste (and feed) handling and transporting:

- Feed higher moisture feed to beef cattle;
- Add molasses or tallow to feed,
- Store and maintain feed stock,
- Bulk materials,
- Use drag equipment to maintain pens,
- Cover manure hauling trucks, or
- Do not load manure when wind exceeds 15 mph

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that Maricopa County has the most stringent commercial cattle operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.C specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of animal waste (and feed) handling and transporting categories.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** 2017 cattle feedlot data for the West Pinal County nonattainment area provided by ADEQ were used in attempting to perform the analysis. Information on feedlots and cattle at each feedlot were combined with baseline emission factors (per head-day) and estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting a minimum of 1 BMP control levels). The effects of requiring a minimum of 2 BMPs could not be quantified based on available data since composite control efficiency was conservatively estimated by ADEQ as the maximum across all BMPs and the individual BMP control efficiencies were all identical. Thus, simulating an additional BMP for applicable feedlots resulted in no calculated increase in composite efficiency and no emission reductions.

**Cost:** N/A
**Emission Reduction**: N/A

**Cost Effectiveness**: N/A
Measure 42  
Cattle CAFOs - Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Access Connections

Arizona Administrative Code (AAC) R18-2-611.03.E specifies that a West Pinal County nonattainment area commercial beef cattle feedlot shall implement the following best management practices, as described in subsection (A), from each of the following categories for unpaved access connections:

- Install and maintain a track-out control device,
- Apply and maintain pavement in high traffic areas,
- Apply and maintain aggregate cover,
- Apply and maintain synthetic particulate suppressant, or
- Apply and maintain water as a dust suppressant

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County is likely the most stringent. It has a similar BMP list to West Pinal and requires 2 BMPs. However, Coachella Valley and South Coast (SCAQMD Rule 1186) likely have more effective and durable control measures. Maricopa County has the most stringent confined animal feed operation – cattle operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.C specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of unpaved access connections.

**Suggested Implementing Agency**: Governor’s Agricultural Best Management Practices Committee

**Analysis Unit**: Nonattainment Area-Year

**Key Analysis Assumptions**: 2017 cattle CAFO data for the West Pinal County nonattainment area provided by ADEQ were used to perform the analysis. Information on feedlots and cattle at each feedlot were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). Based on ADEQ data, the existing BMP was a vehicle speed reduction (from 25 to 15 mph). The second BMP assumed use of synthetic dust suppressant, which has the highest individual BMP control efficiency based on data from ADEQ. Two levels of rule effectiveness were used to provide a range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Costs for annual application of polymer emulsion dust suppressant were estimated and scaled to the estimated fractional unpaved road or feed lane area per feedlot and applied to all feedlots in the nonattainment area. Note - unpaved Access Connections are not separately resolved from Unpaved Roads/Feed Lanes in data.
provided by ADEQ. Therefore, the analyses for these two source types within cattle CAFOs (Measures 42 and 43) were modeled as a single group.

**Cost:** $91,268

**Emission Reduction:** 44.07 – 86.89 tons PM$_{10}$

**Cost Effectiveness:** $1,050 - $2,071/ton PM$_{10}$
Measure 43
Cattle CAFOs - Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Roads or Feed Lanes

Arizona Administrative Code (AAC) R18-2-611.03.D.4 specifies that West Pinal County nonattainment area commercial cattle feedlot operations implement one of the following best management practices for unpaved roads or feed lanes:

- Install engine speed governors on feed truck to 15 mph,
- Install signage to limit vehicle speed to 15 mph,
- Install speed control devices,
- Restrict access to through traffic,
- Apply and maintain pavement in high traffic areas,
- Apply and maintain aggregate cover,
- Apply and maintain synthetic particulate suppressant,
- Apply and maintain water as a dust suppressant,
- Use appropriate vehicles such as electric carts or small utility vehicles instead of trucks, or
- Apply and maintain pavement or cement feed lanes.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent commercial cattle feedlot operation BMP requirement. It has a list that is similar to West Pinal but requires the implementation of 2 BMPs. AAC R18-2-611.01.B specifies the implementation of 2 best management practices, as described in subsection (A) for the same list of unpaved roads or feed lanes.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** 2017 cattle CAFO data for the West Pinal County nonattainment area provided by ADEQ were used to perform the analysis. Information on feedlots and cattle at each feedlot were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting BMP control levels for activity-based and windblown dust consistent with the Moderate SIP). Based on ADEQ data, the existing BMP was a vehicle speed reduction (from 25 to 15 mph). The second BMP assumed use of synthetic dust suppressant, which has the highest individual BMP control efficiency based on data from ADEQ. Two levels of rule effectiveness were used to provide a range of potential benefits and cost effectiveness (original ADEQ assumption and 50% of that value to address EPA concerns about optimistic assumptions). Costs for annual application of polymer emulsion dust suppressant were estimated and scaled to the estimated fractional unpaved road or feed
lane area per feedlot. Unpaved Access Connections are not separately resolved from Unpaved Roads/Feed Lanes in data provided by ADEQ. Therefore, the analyses for these two source types within cattle CAFOs (Measures 42 and 43) were modeled as a single group.

**Cost:** $91,268

**Emission Reduction:** 44.07 – 86.89 tons PM$_{10}$

**Cost Effectiveness:** $1,050 - $2,071/ton PM$_{10}$
Measure 44
Cattle CAFOs - Increase the Number of Cattle Confined Animal Feeding Operations Fugitive Dust BMPs for Unpaved Vehicle/Equipment Traffic Areas

Neither the Arizona Administrative Code nor the West Pinal County nonattainment area have fugitive dust rules addressing unpaved vehicle/equipment traffic areas within cattle CAFOs.

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that Coachella Valley and South Coast are likely the most stringent. However, these areas exempt CAFOs with disturbed surface area less than 1 acre. San Joaquin Valley has more, but less specific measures. This source activity category does not appear to be explicitly addressed in Arizona Administrative Code R18-2-611.

South Coast Rule 403. Requires equipment parking areas to:

- Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; or
- Apply material with low silt content (i.e., asphalt, concrete, recycled road base, or gravel to a depth of four inches).

**Suggested Implementing Agency**: Governor’s Agricultural Best Management Practices Committee

**Analysis Unit**: 1 Acre Area-Year

**Key Analysis Assumptions**: The BMP requires annual application of a polymer dust suppressant for consistency/leverage with other vehicle-traveled unpaved areas within the facility. Key assumptions: 1) 1 acre traffic area; 2) 10 trips/day; and 3) 5 mph average speed.

**Cost**: $779

**Emission Reduction**: 0.029 tons PM\textsubscript{10}

**Cost Effectiveness**: $26,707/ton PM\textsubscript{10}
**Measure 45**  
*Agriculture - Increase the Number of BMPs to Control Fugitive Dust from Cropland Areas*

Arizona Administrative Code R18-2-610.03.B requires a West Pinal County nonattainment area commercial farmer to implement at least two of the following best management practices, one from subsection (i) through (vii), and one from subsection (viii) through (xi), to reduce PM emissions from cropland:

1. Wind barrier,
2. Cover crop,
3. Cross-wind ridges,
4. Chips/mulches,
5. Sequential cropping
6. Residue management,
7. Surface roughening,
8. Multi-year crop,
9. Permanent cover, or
10. Stabilization of soil prior to plant emergence.

On the day before and during the day that is forecast to be high risk for dust generation by the Pinal County Dust Control Forecast, a commercial farmer is required to ensure implementation of at least one of the following:

1. Wind barrier,
2. Cover crop,
3. Cross-wind ridges,
4. Chips/mulches,
5. Surface roughening,
6. Multi-year crop,
7. Permanent cover,
8. Stabilization of soil prior to plant emergence, or
9. Residue management.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Coachella Valley and South Coast have potentially more stringent requirements. Coachella/South Coast conservation management practices (CMPs) are slightly less extensive, but at least 3 must be implemented vs. only 1 in West Pinal for inactive/noncropland areas (2 in West Pinal on high-risk days).

SCAQMD Rule 403 specifies that exempted operations include: orchards, vine crops, nurseries, range land, and irrigated pastures. Producers that want a Rule 403 exemption must implement at least three of the following nine listed conservation practices:
1. Local Jurisdiction Ordinance - Compliance with a local jurisdiction's ordinance intended to reduce windblown dust emissions.

2. Cover Crop - Establish a cover crop that establishes a minimum of 60 percent ground cover on fields that will remain fallow until the next crop planting. Vegetative growth to be managed, if necessary, by mowing, grazing, approved chemicals or other means that maintain the necessary cover. (Native or volunteer vegetation that meets the minimum ground cover requirements also represents an acceptable cover crop).

3. Crop Residue Management - Maintain crop residues from previous crops that establishes a minimum of 60 percent ground cover on fields that will remain fallow until the next crop planting. Implements such as undercutters or sweeps that sever roots and lift weeds without burying or destroying much of the residue are most efficient for maintaining surface cover.

4. Surface Roughening - Conduct surface roughening by bedding, rough disking, or tillage that leaves the surface covered with stable clods. Disc fallow fields in the early spring to get the winter weeds before they mature seed and before it dries out so clods will be produced. List or bed up in May to get early summer weeds before they seed and before it is too dry to bed.

5. Minimum Tillage - Utilize conservation tillage practices to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops in narrow slots or tilled strips.

6. Cross Wind Stripcropping - Establish crops in strips established across the prevailing wind erosion direction and arranged so that strips susceptible to wind erosion are alternated with strips having a protective cover that is resistant to wind erosion.

7. Field Windbreaks - Plant or maintain a single or multiple row of trees or shrubs adjacent to windward edge of the field as close to perpendicular as practical with the direction of erosive winds. Avoid conflicts with any above or below ground utilities.

8. Ridge Roughness - Establish ridges by normal tillage and planting equipment as close to perpendicular as practical with the direction of erosive winds (not appropriate for unstable soils such as sands or loamy sands). After establishment, ridges shall be maintained through those periods when wind erosion is expected to occur, or until growing crops provide enough cover to protect the soil from wind erosion.

9. Wind Barriers - Plant or maintain perennial or annual plants interspersed throughout a crop field as close to perpendicular as practical with the direction of erosive winds. To be effective, the selected plant(s) must create a stand at least three feet tall. Selection of plants for wind barriers should favor species or varieties tolerant to herbicides used on adjacent crops.

Suggested Implementing Agency: Governor’s Agricultural Best Management Practices Committee

Analysis Unit: Nonattainment Area-Year

Key Analysis Assumptions: Since "Cropland" is a phase that is defined as the period from after final harvest until subsequent planting (excluding tilling) it is assumed that no activity-
based emissions occur and windblown dust emissions only occur on high wind days during this phase. 2017 meteorological data for 7 stations in the Nonattainment Area were averaged to calculate the annual fraction and distribution of high wind (>12 mph) days. Cropland BMP Aggregation data were provided by ADEQ which contained survey based existing BMPs implemented during the cropland phase, along with assumptions regarding the cropland period (% of year) by crop type for six applicable crops: alfalfa, cotton, forage/hay, vegetables, corn and grain. Windblown dust emission factors using MAG's methodology were developed based on the distribution of high wind days for 100% stable cropland to represent uncontrolled emissions. Composite control effectiveness across each of the six crops were then calculated for the baseline (2 general BMPs + 1 High-Risk BMP) based on existing survey data from ADEQ. Control effectiveness reflecting 3 BMPs (irrespective of day type) were then simulated with the ADEQ survey data and composited by crop to calculate a crop acreage-weighted composite control effectiveness. Two variants of control effectiveness were examined: ADEQs existing rule effectiveness of 80%, and a low-range estimate based on a 40% rule effectiveness. No BMP cost data are available, so only emission reductions were estimated.

**Cost:** N/A

**Emission Reduction:** 8.60 - 17.19 tons PM$_{10}$

**Cost Effectiveness:** N/A
Measure 46
Agriculture - BMPs to Control Fugitive Dust on Noncropland Areas That Are Not Tied to High-Risk Days

As defined under Arizona Administrative Code (AAC) R18-2-610 (Definition 33), “Noncropland” means any commercial farm land that:

a. Is no longer used for agricultural production;
b. Is no longer suitable for production of crops;
c. Is subject to a restrictive easement or contract that prohibits use for the production of crops; or
d. Includes a ditch, ditch bank, equipment yard, storage yard, or well head.

Thus, under this statute noncropland areas include both inactive fields and unpaved equipment/storage yards and traffic areas.

AAC R18-2-610.03.B (Agricultural General Permit for Crop Operations in Pinal County PM Nonattainment Area) specifies that a commercial farmer shall implement at least one of the following Noncropland best management practices:

- Access restriction
- Aggregate cover,
- Wind barrier,
- Critical area planting,
- Organic material cover,
- Reduce vehicle speed,
- Synthetic particulate suppressant, or
- Watering.

Unless choosing watering on a high-risk day (subsection vi, below), on the day before and during a day forecast to be high risk for dust generation by the Pinal County Dust Control Forecast, on a noncropland area that experiences more than 20 vehicle daily trips (VDT) from 2 or more axle vehicles, commercial farmer shall ensure implementation of at least one of the following best management practices:

- Aggregate cover,
- Wind barrier,
- Critical area planting,
- Organic material cover,
- Synthetic particulate suppressant, or
- Watering on a high-risk day.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Imperial Valley appears to be nominally more stringent since its VDT thresholds are tied to all
days, not just high-risk days as it relates to the unpaved traffic areas portion of the Arizona Administrative Code definition of Noncropland. Imperial Valley Rule 806 specifies that the owner or operator of an agricultural operation site shall implement at least one of the following conservation management practices (CMPs) for each unpaved traffic area (CMP Category D.1.d) to reduce PM$_{10}$ emissions at all times:

- Chips/Mulches, Organic Materials, Polymers, Road Oil and Sand,
- Gravel
- Paving
- Restricted Access
- Speed Limit
- Track-Out Control
- Water Application
- Field windbreak

On each day that high traffic accounts for 50 or more VDT, or 20 or more VDT with 3 or more axles, on an unpaved traffic area larger than one (1) acre, the owner/operator of an Agricultural Operation Site shall comply with the requirements of a stabilized unpaved road and limit visible dust emissions (VDE) to 20% opacity by implementing or maintaining one or more of the following CMPs:

- Pave.
- Apply chemical stabilization as directed by product manufacturer to control dust on Unpaved Roads.
- Apply and maintain gravel, re-crushed/recycled asphalt or other material of low silt (<5%) content to a depth of three or more inches.
- Water application.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** Spreadsheets provided by ADEQ were examined to ascertain if sufficient data were available to estimate emission reductions associated with BMPs applicable to unpaved traffic areas under typical (all day) conditions. Although the Cropland BMP Aggregation spreadsheet contained noncropland existing BMP data and total noncropland acreage for each surveyed farm, the subset of unpaved traffic area acreage was not available. In addition, the VDT data from the Pinal nonattainment area (NAA) Agricultural Roads 2017 Emission Inventory spreadsheet does not contain information on equipment/storage yard traffic areas. Therefore, emission reductions could not be reasonably estimated. Cost data required to quantify the cost effectiveness of this measure were also not available. Thus, no further analysis of the measure was performed.
**Cost**: N/A

**Emission Reduction**: N/A

**Cost Effectiveness**: N/A
Measure 47
Agriculture - Increase the Number of BMPs for the Control of Fugitive Dust from Commercial Farm Roads

Arizona Administrative Code (AAC) R18-2-610.03.B specifies that a West Pinal County nonattainment area commercial farmer shall implement at least one of the following best management practices:

- Access restriction
- Aggregate cover,
- Wind barrier,
- Critical area planting,
- Organic material cover,
- Reduce vehicle speed,
- Synthetic particulate suppressant, or
- Watering.

Unless choosing watering on a high-risk day, on the day before and during a day forecast to be high risk for dust generation by the Pinal County Dust Control Forecast, on a noncropland area that experiences more than 20 vehicle daily trips (VDT) from 2 or more axle vehicles, a commercial farmer shall ensure implementation of at least one of the following best management practices:

- Aggregate cover,
- Wind barrier,
- Critical area planting,
- Organic material cover,
- Synthetic particulate suppressant, or
- Watering on a high-risk day.

A review of fugitive dust regulations for noncropland and commercial farm roads in place in western PM_{10} nonattainment areas found that Maricopa County, Coachella Valley and South Coast appear to be most stringent. Maricopa County requires two controls to be implemented. And Coachella Valley and South Coast include a separate track-out control category that applies to unpaved farm roads that effectively require 2 conservation management practices, one of which addresses track-out. AAC R18-2-610.01.C specifies that a commercial farmer in Maricopa County shall implement from the following best management practices, as described in subsection (A), to reduce PM emissions from noncropland and commercial farm roads:

- Access restriction,
- Aggregate cover,
- Wind barrier,
- Critical area planting,
- Organic material cover,
- Reduce vehicle speed,
- Synthetic particulate suppressant,
- Track-out control system, or
- Watering.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** 2017 Agricultural farm road mileage, vehicle activity and vehicle travel-based emission data provided by ADEQ for the nonattainment area were used to perform the analysis. Survey data for application of existing BMPs on commercial farm roads were combined with estimates of BMP control efficiency, rule effectiveness and rule penetration to simulate baseline emissions (reflecting BMP control levels for activity-based and windblown dust consistent with 1 BMP each required on typical and high-risk days). For surveyed facilities, the effects of requiring a minimum of 2 BMP on any day were estimated by calculating changes on overall control efficiency for those facilities assuming the second BMP was 1) watering or 2) synthetic suppressant to provide a range of reductions and costs. These ranges were further bounded by considering two rule effectiveness levels: 1) ADEQ’s original 80% level and 2) a conservative/low level of 40%. For Watering as the second BMP, key cost assumptions included: 1) watering on a total of 70 days per year (45 high-risk days plus 25 high activity days); and 2) a maximum duration to complete daily watering of 12 hours. For Synthetic Suppressant as the second BMP, costs were based on annual application of a polymer emulsion suppressant and included costs for water (to prepare the 11:1 dilution) and daily truck rental and operator costs based on the affected acreage. The values presented represent the bounds of the range of effectiveness assumptions for dust suppressant and watering.

**Cost:** $353,408 - $1,277,408

**Emission Reduction:** 375.96 – 896.98 tons PM\textsubscript{10}

**Cost Effectiveness:** $394 - $3,397/ton PM\textsubscript{10}
Measure 48
Agriculture - Stabilization Requirements for Off-Field Bulk Material Storage

Neither the Arizona Administrative Code nor the West Pinal County nonattainment area have fugitive dust rules addressing off-field bulk material storage.

A review of fugitive dust regulations in place in western PM\textsubscript{10} nonattainment areas found that San Joaquin Valley appears to be the most stringent. Unlike other areas, it specifically regulates off-field bulk material storage. Bulk material control requirements for other areas are not specific to, or generally exempt agricultural operations. Imperial Valley simply includes bulk material control as one of many conservation management practice options for agricultural operations. San Joaquin Valley Rules 8011 defines an off-field agricultural source as any agricultural source that meets the definition of: outdoor handling, storage and transport of bulk material; unpaved road; or unpaved vehicle/equipment traffic area.

Rule 8081 exempts outdoor storage as any bulk material at a single site where no material is actively being added or removed and where the total material stored is less than 100 cubic yards. Key requirements for bulk material storage include:

- No person shall undertake any outdoor handling, storage, and transport of bulk materials unless the appropriate requirements in Table 8081-1 of this rule are sufficiently implemented to limit visible dust emissions (VDE) to 20% opacity or to comply with the conditions for a stabilized surface as defined in Rule 8011.

Table 8081-1 of Rule 8081 specifies the following menu of BMPs when storing bulk materials that must comply with the conditions for a stabilized surface, including:

- Cover bulk materials stored outdoors with tarps, plastic, or other suitable material and anchor in such a manner that prevents the cover from being removed by wind action; or
- Construct and maintain fences or wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. If utilizing fences or wind barriers, apply water or suitable chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity or;
- Utilize a 3-sided structure with a height at least equal to the height of the storage pile and with less than 50% porosity.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year
**Key Analysis Assumptions:** The cost and activity data required to quantify the cost effectiveness of this measure are not available. Therefore, no further analysis of this measure was prepared.

**Cost:** N/A

**Emission Reduction:** N/A

**Cost Effectiveness:** N/A
Measure 49
Agriculture - Fugitive Dust Controls for Off-Field Bulk Material Handling and Transport

Neither the Arizona Administrative Code nor the West Pinal County nonattainment area have fugitive dust rules addressing bulk material handling and transport for off-field agricultural sources.

A review of fugitive dust regulations for bulk material handling and transport in place in western PM$_{10}$ nonattainment areas found that San Joaquin Valley appears to be the most stringent. Unlike other areas, it specifically regulates off-field bulk material handling and transport. Bulk material control requirements for other areas are not specific to, or generally exempt agricultural operations. Imperial Valley simply includes bulk material control as one of many conservation management practice options for agricultural operations.

San Joaquin Valley Rule 8011 defines off-field agricultural sources as any agricultural source that meets the definition of: outdoor handling, storage and transport of bulk material; paved road; unpaved road; or unpaved vehicle/equipment traffic area. Rule 8081 exempts the transport of a bulk material in an outdoor area for a distance of twelve feet or less with the use of a chute or conveyor device. Key bulk material handling requirements include:

- No person shall undertake any outdoor handling, storage, and transport of bulk materials unless the appropriate requirements in Table 8081-1 of this rule are sufficiently implemented to limit visible dust emissions (VDE) to 20% opacity or to comply with the conditions for a stabilized surface as defined in Rule 8011.
- When handling bulk materials, apply water or suitable chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity or;
- Construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. If utilizing fences or wind barriers, control measure A1 shall also be implemented.

On-site transporting controls include:

- Limit vehicular speed while traveling on the work site sufficient to limit VDE to 20% opacity; or
- Load all haul trucks such that the freeboard is not less than six (6) inches when material is transported across any paved public access road; or
- Apply water to the top of the load sufficient to limit VDE to 20% opacity; or
- Cover haul trucks with a tarp or other suitable cover.

Off-site transporting controls include:

- Clean the interior of the cargo compartment or cover the cargo compartment before the empty truck leaves the site; and
• Prevent spillage or loss of bulk material from holes or other openings in the cargo compartment’s floor, sides, and/or tailgate; and
• Load all haul trucks such that the freeboard is not less than six (6) inches when material is transported on any paved public access road and apply water to the top of the load sufficient to limit VDE to 20% opacity; or cover haul trucks with a tarp or other suitable closure.

Outdoor transport of bulk materials with a chute or conveyor include:

• Fully enclose the chute or conveyor; or
• Operate water spray equipment that sufficiently wets materials to limit VDE to 20% opacity; or
• Wash separated or screened materials to remove conveyed materials having an aerodynamic diameter of 10 microns or less sufficient to limit VDE to 20% opacity.

**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Truck-Operating Day

**Key Analysis Assumptions:** Existing statewide tarping requirements already in place result in negligible emission benefits from implementation of these provisions.

**Cost:** $0

**Emission Reduction:** 0.00 tons PM$_{10}$

**Cost Effectiveness:** $0/ton PM$_{10}$
Measure 50
Agriculture - Increase the Minimum Number of Agricultural Earth Moving BMPs

Arizona Administrative Code (AAC) R18-2-610 defines significant agricultural earth moving activities as either leveling activities conducted on a commercial farm that disturb the soil more than 4 inches below the surface, or the creation, maintenance and relocation of: ditches, canals, ponds, irrigation lines, tailwater recovery systems (agricultural sumps) and other water conveyances, not to include activities performed on cropland for tillage, ground operations or harvest. AAC R18-2-610.03.B specifies that a West Pinal County nonattainment area commercial farmer shall implement at least one of the following best management practices, when conducting significant agricultural earth moving activities:

- Apply water prior to conducting Significant Agricultural Earth Moving Activities and/or time Significant Agricultural Earth Moving Activities to coincide with precipitation. Soil must have a minimum soil moisture content of 50% of field capacity. Compliance shall be determined by National Resources Conservation Service (NRCS) Estimating Soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions);
- Apply water during Significant Agricultural Earth Moving Activities. Soil must have a minimum soil moisture content of 30% of field capacity. Compliance shall be determined by NRCS Estimating Soil Moisture by Feel and Appearance Method, amended through April 1998 (and no future editions);
- Limit activities on a day identified by the Maricopa or Pinal County Dust Control Forecast to be high risk for dust generation; or
- Conduct Significant Agricultural Earth Moving Activities in a manner to reduce a minimum of one ground operation across a commercial farm by using equipment that is the most efficient means of moving the soil.

A review of fugitive dust regulations for agricultural earth moving in place in western PM$_{10}$ nonattainment areas found that Maricopa County is the most stringent. West Pinal only requires use of at least one BMP whereas Maricopa requires at least 2 of those listed in the previous bulk material handling and transport control measure.

Suggested Implementing Agency: Governor’s Agricultural Best Management Practices Committee

Analysis Unit: Nonattainment Area-Year

Key Analysis Assumptions: The cost and activity data required to quantify the cost effectiveness of this measure are not available. Therefore, no further analysis of this measure was prepared.

Cost: N/A
**Emission Reduction**: N/A

**Cost Effectiveness**: N/A
Measure 51
Agriculture - Require Implementation of BMPs to Control Windblown Dust from Crop Operations on All Days

Neither the Arizona Administrative Code nor the West Pinal County non attainment area have fugitive dust rules addressing control of windblown dust from crop operation on all days.

A review of fugitive dust regulations for the control of windblown dust from crop operations in western PM\textsubscript{10} non attainment areas found that East Kern and Imperial Valley are most stringent. They both have rules requiring everyday controls specific to windblown dust, while West Pinal focuses on high-risk days. Thus, although the BMPs are similar across all three areas East Kern and Imperial Valley are more stringent for this reason. East Kern Rule 402.2 specifies that when preparing a field for planting, owner/operator shall minimize the time that newly tilled soil is smooth and dry by leaving the field surface with large clods for as long as possible and bedding and planting the field as soon as possible once it no longer has large clods. At least one of the following windblown dust conservation management practices (CMPs) shall be implemented on all agricultural operation sites in addition to CMPs employed pursuant to Section VI.A:

- Alternate Tilling,
- Application Efficiencies,
- Bailing/Large Bales,
- Bulk Materials Control,
- Chemigation/Fertigation,
- Conservation Irrigation,
- Fallow Land,
- Grinding/Chipping/Shredding,
- Integrated Pest Management,
- Irrigation Power Units,
- Mulching,
- Night Farming,
- No Burning,
- Non-Tillage/Chemical Tillage,
- Organic Practices,
- Permanent Crops,
- Reduced Pruning,
- Soil Amendments,
- Soil Incorporation,
- Sulfur: Reduction or Elimination of Dusting,
- Surface Roughening,
- Transgenic Crops, or
- Wind Barrier.
**Suggested Implementing Agency:** Governor’s Agricultural Best Management Practices Committee

**Analysis Unit:** Nonattainment Area-Year

**Key Analysis Assumptions:** Existing West Pinal farmer survey data in the “Cropland BMP Aggregation” spreadsheet provided by ADEQ were examined for use in quantifying incremental emission reductions from a general crop operations/all day BMP requirement. Reviewing the data for 22 surveyed farms, 15 indicated they currently fallow a portion of their land, which is one of the East Kern BMPs (and requires no minimum percentage per East Kern Rule 402). Responses for the other 7 surveyed farms indicated they were applying a mixture of Permanent/Multi-Year crops, Transgenic Crops, Organic Practices and Mulching BMPs, each of which is included in the East Kern Rule 402 BMP list. Therefore, although no explicit general/all day windblown dust measure exists in West Pinal, the farmer survey data analyzed indicate that existing practices meet the “at least one” BMP requirements of East Kern Rule 402. Based on these available survey data, it is estimated that no additional emission reductions would result from implementation of such a rule.

**Cost:** $0

**Emission Reduction:** 0

**Cost Effectiveness:** $0
Measure 52
Unpaved Roads - Expand Unpaved Road Definitions to Include Alleys

West Pinal County nonattainment area Rule 4-1-020 defines unpaved roads as any roads, equipment paths, or travel ways that are not paved. Unpaved roads are owned only by federal, state, county, municipal, or other governmental or quasi-governmental agencies. For the purposes of this Rule, an unpaved road is not an agricultural road, horse trail, hiking path, bicycle path, or other similar path used exclusively for purposes other than travel by motor vehicles.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County (and several other jurisdictions) explicitly include alleys in the definition and are nominally the most stringent. Rule 310.01.2 defines an unpaved roadway as that which is not paved and that is owned by federal, state, county, municipal, or other governmental or quasi-governmental agencies. For the purposes of this rule, an unpaved roadway (including alleys) is not a horse trail, hiking path, bicycle path, or other similar path used exclusively for purposes other than travel by motor vehicles. An unpaved roadway (including alleys) includes designated or opened trail systems and service roads regardless of surface composition.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Centerline Mile-Year

Key Analysis Assumptions: The analysis used the 2007 Maricopa Association of Governments Measure 33 (Pave or Stabilize Existing Dirt Roads & Alleys) methodology and updated costs based on the historical Construction Price Index. High Traffic and Low Traffic data from that analysis were used to evaluate incremental benefits of adding alleys (modeled here as Low Traffic roads) with annual Ligno-10 stabilization of 1 centerline mile.

Cost: $20,157

Emission Reduction: 3.27 tons PM$_{10}$

Cost Effectiveness: $6,161/ton PM$_{10}$
Measure 53
Unpaved Roads - Increase Average Daily Traffic (ADT) Thresholds for Unpaved Road Controls

West Pinal County nonattainment area Rule 4-1-030.4 establishes the following standards for unpaved roads. The owner and/or operator of unpaved roads with average daily trips (ADT) greater than 150 (based on traffic counts collected over a 48-hour period, which may consist of two non-consecutive 24-hour periods, where counts are required to be collected continuously during each 24-hour period) shall be subject to the requirements described in Rule 4-1-030.4.A.i and shall comply with one of the control measures described in Rule 4-1-030.4.A.ii.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that San Joaquin Valley is the most stringent based on lowest ADT threshold (26 trips/day). The East Kern volume threshold is nominally lower, but not expressed as ADT so it was determined to be less stringent than San Joaquin Valley. Exemptions to San Joaquin Valley Rule 8061.4 include:

- Any unpaved road segment with less than 26 annual average daily trips (AADT). This exemption shall not apply to Section 5.2.3 of this rule. Section 4.1.2 requires an owner/operator of any unpaved road segment with 26 or more AADT to provide estimated or actual vehicle trip data to the Air Pollution Control Officer (APCO).
- Maintenance and resurfacing activity on existing paved roads.
- Agricultural sources subject to, or specifically exempt from Rule 8081.
- Emergency activities performed to ensure public health and safety as specified in Rule 8011, section and equipment used to remove debris beyond the capabilities of PM$_{10}$-efficient street sweepers.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Nonattainment Area-Year

Key Analysis Assumptions: Due to the interrelationship between provisions under this measure (Measure 53) and Measure 54 and their shared evaluation methods, their costs and emission reductions were analyzed together and reported in separate summaries for each (which explain their separate provisions). The analysis approach utilized West Pinal traffic, speed, and moisture parameter data for 5 classes of unpaved public roads provided by ADEQ. Baseline emissions and costs assumed treatment of class E roads with ADT levels above 150. The control scenario evaluated benefits for 3 classes of roads B through D. Emissions and costs under each scenario were calculated by applying the dust suppressant to classes of roads based on their ADT levels. The increment between the 2 scenarios was used to quantify the cost and benefits of tightening the ADT threshold.

Cost: $1,357,569
**Emission Reduction**: 4,428.91 tons PM$_{10}$

**Cost Effectiveness**: $307/ton PM_{10}$
Measure 54
Unpaved Roads - Visible Emissions and Stabilization Requirements for Unpaved Roads

West Pinal County nonattainment area Rule 4-1-030.4 specifies the following control measures for stabilizing unpaved roads:

• Pave; or
• Apply and maintain dust suppressants other than water; or
• Uniformly apply and maintain surface gravel.

A review of fugitive dust regulations in place in western PM₁₀ nonattainment areas found that San Joaquin Valley, Coachella Valley and South Coast all have more explicit control requirements than West Pinal that could provide increases in effective stringency beyond “parent” visible emission, opacity and stabilization requirements. San Joaquin Valley also requires unpaved road owners/operators to implement a Fugitive Dust PM₁₀ Management Plan per Rule 8011.

San Joaquin Valley Rule 8061.5.2. specifies that any unpaved road segment with 26 or more average annual daily trips (AADT), the owner/operator shall limit visible dust emissions (VDE) to 20% opacity and comply with the requirements of a stabilized unpaved road by application and/or reapplication/maintenance of at least one of the following control measures, or shall implement an Air Pollution Control Officer (APCO) - approved Fugitive PM₁₀ Management Plan as specified in Rule 8011 including:

• Watering;
• Uniform layer of washed gravel;
• Chemical/organic dust stabilizers/suppressants in accordance with the manufacturer’s specifications;
• Roadmix;
• Paving;
• Any other method that can be demonstrated to the satisfaction of the APCO that effectively limits VDE to 20% opacity and meets the conditions of a stabilized unpaved road.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Nonattainment Area-Year

Key Analysis Assumptions: Due to the interrelationship between provisions under this measure (Measure 54) and Measure 53 and their shared evaluation methods, their costs and emission reductions were analyzed together and reported in separate summaries for each (which explain their separate provisions). The analysis approach utilized West Pinal traffic, speed, and moisture parameter data for 5 classes of unpaved public roads provided by ADEQ.
Baseline emissions and costs assumed treatment of class E roads with ADT levels above 150, the control scenario evaluated benefits for 3 classes of roads B through D. Emissions and costs under each scenario were calculated by applying the dust suppressant to classes of roads based on their ADT levels. The increment between the 2 scenarios was used to quantify the cost and benefits of tightening the ADT threshold.

**Cost**: $1,357,569

**Emission Reduction**: 4,428.91 tons PM$_{10}$

**Cost Effectiveness**: $307/ton PM$_{10}$
Measure 55
Unpaved Roads - Increase Stringency of Unpaved Road Paving and Dust Stabilization Controls

West Pinal County nonattainment area Rule 4-1-030.4 specifies the control measures to be annually implemented on 15 miles per year of unpaved roads having average daily trips (ADT) of 150 or more. When the control measure is application and maintenance of dust suppressants other than water, the application and maintenance of the dust suppressants shall only be counted towards the 15-mile threshold when:

- Done on unpaved roads previously untreated, and
- Application and maintenance of dust suppressants on unpaved roads previously treated continues annually until the unpaved road is paved.

For year 2019 and beyond, control measures applied on unpaved roads with less than 150 ADT can be used for compliance through use of a equivalency conversion that is a function of the ADT range.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County requires more controls to be implemented per year. However, San Joaquin Valley has speed limit requirements as well as requirements for new unpaved roads. And it requires 20% of unpaved road segments to be paved per year up to a max of 5 miles. Although West Pinal has a 15 mile per year threshold, it is not specific to paving only. Unpaved road requirements from San Joaquin Valley Rule 8061.5 include:

- Within an urban area, the construction of any new unpaved road is prohibited unless the road meets the definition of a temporary unpaved road as specified in section 3.60 of Rule 8011.
- By January 1, 2010, public unpaved roads are required to pave an average of 20% annually of all unpaved roads identified in Section 5.2.3.1.1 up to a maximum of 5 cumulative miles within any one urban area, with priority given to roads with the highest AADT levels. In meeting this requirement, each jurisdiction must show incremental progress.
- Each owner/operator shall establish a maximum speed limit of 25 mph on each unpaved road with 26 AADT or more and shall post speed limit signs, one in each direction, per mile of road segment in urban areas, and per two miles of road segment in rural areas.

Maricopa Rule 310.01 Section302.7 requires implementation of control measures when vehicle counts of 150 vehicle trips or more per day are allowed on an unpaved roadway (including an alley) in the PM$_{10}$ nonattainment area. Control measures are considered implemented under the following conditions:
• When the unpaved roadway (including an alley) meets the requirements described in Section 302.7(a) of this rule.
• When one of the control measures described in Section 302.7(b) of this rule is implemented on 5 miles of unpaved roadways (including alleys) having vehicle traffic of 150 vehicle trips or more per day within one calendar year beginning in calendar year of 2008.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Centerline Mile-Year

**Key Analysis Assumptions:** This analysis adapted the paving portion of 2007 Maricopa Association of Governments Measure 32 (Pave or Stabilize Existing Unpaved Parking Lots) methodology. Parking lot acreage values were converted to lineal unpaved road-based distance values for paving analysis; costs were updated with differences in the Producer Price Index (PPI). The 2007 Maricopa Association of Governments Measure 34 (Limit Speeds to 15 mph on Dirt Roads) methodology was updated with PPI increments; the controlled speed was adjusted to 25 mph. The range displayed represents paving and speed limit controls.

**Cost:** $6,784 - $94,877

**Emission Reduction:** 6.55 – 20.15 tons PM$_{10}$

**Cost Effectiveness:** $1,036 - $4,709/ton PM$_{10}$
Measure 56  
Unpaved Roads - Expand Existing Reporting/Recordkeeping Requirements for Unpaved Roads

West Pinal County nonattainment area Rule 4-1-045 specifies the following reporting requirements for any existing public paved and unpaved roads:

- By January 30 of each year provide the district with a list of all unpaved roads under its jurisdiction, including data on length of, and average daily trips (ADT) (if available) on, each unpaved road segment.
- By January 30 of each year, submit to the district a list of unpaved roads which were paved during the previous year including the total number of unpaved roads miles, ADTs (if available) and their respective segments.
- Copies of the records required by §4-1-040 (Recordkeeping) and §4-1-045 (reporting) of this rule shall be retained for at least two years.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that San Joaquin Valley has the most stringent reporting requirements as they extend to reporting on new or improved roads. Rule 8061.6.2. establishes the following key recordkeeping and reporting requirements:

- The total miles of paved and unpaved roads under the jurisdiction of the owner or agency and the miles of roads constructed or modified during the reporting period subject to the requirements of this regulation.
- For newly constructed or modified roads, a summary of actions taken during the reporting period to prevent or mitigate PM$_{10}$ emissions, with miles specified for each type of control measure used to reduce PM$_{10}$ emissions.
- For all roads under the agency’s jurisdiction, a summary of actions taken to reduce PM$_{10}$ emissions from roads during the reporting period. The total miles of roads for which these procedures were enforced and the estimated traffic volume on the affected roads shall be provided.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 15 Centerline Miles

**Key Analysis Assumptions:** The analysis was derived from Measure 23 methodology from this report with the following steps: (a) acreage from the project was translated into equivalent unpaved road centerline mileage and (b) the reductions from Measure 23 were scaled based on an estimate of annual fraction of new/improved roads covered by the expanded reporting requirements. The reporting requirements were assumed to trigger control of 5% of the unpaved roads that are new or improved each year.

**Cost:** $146,463
**Emission Reduction**: 0.45 tons PM$_{10}$

**Cost Effectiveness**: $327,745/ton PM$_{10}$
Measure 57
Unpaved Roads - Explicit Dust Mitigation Controls for Off-Road Event Competitions on Unpaved Roads

The West Pinal County nonattainment area has no rules addressing off-road events competition on unpaved roads.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Imperial Valley is the most stringent since it is the only area that has control requirements for this specific activity category. Imperial County Rule 800.C. defines off-road event and/or competition as any organized, sanctioned, or structured use, event or activity on public land in which two hundred and fifty (250) or more contestants compete and either or both of the following elements apply: (i) Participants register, enter, or complete an application for the event; (ii) A predetermined course or area is designated.

Imperial County Rule 800.F.5 requires the owner/operator on each day of an off-road event and/or competition that average 50 vehicle daily trips per day on unpaved roads and parking areas to limit visible dust emissions to 20% opacity and comply with the requirements of a stabilized unpaved road by application and/or re-application/maintenance of at least one of the following control measures:

- Watering;
- Uniform layer of washed gravel;
- Paving;
- Restrict access;
- Restrict speed limit at or below 15 mph;
- Chemical/organic dust suppressants;
- Roadmix;
- Any other method(s) that can be demonstrated that effectively limits visible dust emission (VDE) to 20% opacity and meets the conditions of a stabilized unpaved road.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Acre-Year

**Key Analysis Assumptions:** The analysis used the "Typical" scenario from the 2003 San Joaquin Valley Measure 3f values (which is for 50 VDT) and updated the results with 2020 cost adjustments and the unpaved emissions using local data and the 2011 AP-42 unpaved emission factor equation.

**Cost:** $625

**Emission Reduction:** 0.17 tons PM$_{10}$
Cost Effectiveness: $3,625/ton PM$_{10}$
West Pinal County nonattainment area Rule 4-1-030 requires the owner and/or operator of an unpaved lot greater than 5,000 square feet to comply with at least one of the following:

- shall not cause or allow visible fugitive dust emissions to exceed 20% opacity as measured using an opacity method, as determined by the applicable test method in §4-9-340 or an equivalent test method approved in writing by the Control Officer and the EPA Administrator,
- shall not allow silt loading equal to or greater than 0.33 oz/ft² as determined by the applicable test method,
- shall not allow the silt content to exceed 8% if silt loading is equal to or greater than 0.33 oz/ft².

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County appears to be most stringent because it does not allow either 20% opacity exceedance within the lot boundary and 0% opacity at the property line. Maricopa County and San Joaquin Valley APCD regulations are also more stringent than West Pinal for this category of control.

Clark County Rule 92.4.1 states “control measures shall be considered effectively implemented when stabilization observations for fugitive dust emissions from unpaved parking lots or storage areas do not exceed 20 percent opacity and do not equal or exceed 0.33 oz/ft² silt loading, or do not exceed 8 percent silt content, as determined by Section 92.6 (“Test Methods”), except in areas on which gravel has been applied under the provisions of Section 92.3.1.2(c).”

Rule 92.4.2 specifies that where Best Available Control Measures provided for in this regulation have not been applied, no owner and/or operator of an unpaved parking lot or storage area shall permit a dust plume from that unpaved parking lot or storage area to cross a property line.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** 50-Acre Area

**Key Analysis Assumptions:** This analysis used the methodology employed in the analysis of Measure 3 in this report; adjustments were made to represent the inspection requirements of this measure and emission control benefits. Project size equals the threshold for requiring a Dust Control Coordinator (i.e., 50 acres). The portion of the project that is disturbed is 100%. Compliance is achieved by having a laborer trained in EPA Method 9 devote 2 hours/day to site inspection and recordkeeping.
**Cost:** $117,057

**Emission Reduction:** 20.08 tons PM$_{10}$

**Cost Effectiveness:** $5,829/ton PM$_{10}$
Measure 59
Unpaved Lots - More Stringent Unpaved Lot Fugitive Dust Control Measures

West Pinal County nonattainment area Rule 4-1-030 lists the following unpaved parking lot fugitive dust control measures:

- Pave; or
- Apply dust suppressant in sufficient quantity and frequency to maintain a stabilized surface; or
- Apply and maintain surface gravel uniformly such that the surface is stabilized; or
- Apply and maintain an alternative control measure approved in writing by the Control Officer and the EPA Administrator.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County and San Joaquin Valley have the most stringent control measures for unpaved parking lots.

Maricopa County Air Quality Department Rule 310.01 Section 302.6 specifies the following unpaved lot control measures for parking, maneuvering, ingress, and egress areas at developments other than residential buildings with four or fewer units that are utilized for more than 35 days during the calendar year:

- Install and maintain pavement; or
- Apply dust suppressant other than water and install, maintain, and use a suitable trackout control device that controls and prevents trackout and/or removes particulate matter from tires and the exterior surfaces of motor vehicles that traverse the site; or
- Uniformly apply and maintain surface gravel.

For parking, maneuvering, ingress, and egress areas at developments other than residential buildings with four or fewer units that are utilized for 35 days or less during the calendar year:

- Install and maintain one of the control measures listed in Section 302.6(b)(1) of this rule; or
- Apply water and install, maintain, and use a suitable trackout control device that controls and prevents trackout and/or removes particulate matter from tires and the exterior surfaces of motor vehicles that traverse the site.

For parking, maneuvering, ingress, and egress areas 3,000 square feet or more in size at residential buildings with four or fewer units install and maintain a paving or stabilization method authorized by the city, town, or county by code, ordinance, or permit.

San Joaquin Valley Rule 8071.5 limits unpaved parking lot visible dust emissions (VDE) to 20% opacity; it also specifies a range of control measures to ensure compliance with this requirement.
**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Acre-Year

**Key Analysis Assumptions:** The analysis used the 2003 San Joaquin Valley Measure 3h (Require paving, gravel, or dust suppressants on unpaved parking areas receiving more than 100 trips per day or more than 10 trips per day by vehicles with more than 2 axles) methodology, which requires annual application of polymer emulsion dust suppressant, with price-index adjusted costs and updated unpaved roads emission factor based on local data and equation. The range represents differences between 2 and 3 axle vehicle activity rates. Both values likely overstate the reductions and cost effectiveness because some stabilization is already in place per West Pinal County nonattainment area Rule 4-1-030.3.

**Cost:** $779

**Emission Reduction:** 0.05 – 0.29 tons PM$_{10}$

**Cost Effectiveness:** $2,671 - $15,481/ton PM$_{10}$
Measure 60
Unpaved Lots - Prohibit Unpaved Lot/Storage Areas on Hydrographic Lands

The West Pinal County nonattainment area has no rule addressing unpaved parking lots/storage areas on hydrographic lands.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County is most stringent since it is the only jurisdiction with a requirement that is specific to hydrographic areas. Clark County 92.3.1.1 specifies that no unpaved parking lots or storage areas may be constructed in hydrographic areas subject to a PM$_{10}$ maintenance plan defined under 42 U.S. Code § 7505a except as provided in the following:

- Exemptions. The requirements of this Section shall not be applicable to parking lots for rural public facilities, such as trailheads, campgrounds, and similar facilities where paved parking lots would conflict with the rural nature of these facilities, provided such unpaved parking lot is stabilized in accordance with Sections 92. 3.1.2(b) through (d) prior to being used. For the purposes of this Section, a rural public facility shall not include any facility located within the BLM Disposal Boundary.

- Material Storage and Handling Areas. If an area is used for storing and handling of landscaping, aggregate, and other similar bulk materials, the owner and/or operator shall implement one or more of the control measures described in Section 92.3.1.2, subject to the approval of the Control Officer, provided, however, that all access, parking, and loading areas used by on-road vehicles shall be paved.

- Tracked, Non-Rubber Tired Vehicle, or Heavy Equipment Storage Areas. If an area is used primarily for storage of nonrubber tired vehicles or equipment that the control officer has determined to be of such weight as to damage or destroy pavement (e.g., heavy equipment), the owner and/or operator shall implement one or more of the control measures described in Section 92.3.1.2, subject to the approval of the Control Officer, provided, however, that all access, parking, and loading areas primarily used by rubber-tired vehicles shall be paved.

- Equestrian Staging Areas: Areas designed and used exclusively for the loading, unloading, and saddling of horses for equestrian activities shall be exempt from the paving requirements of this section if control measures applied to the designated areas meet the performance standards of Section 92.4. Posted vehicle speed limits for vehicles using such designated areas shall not exceed 10 miles per hour.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Lot Acre-Year

Key Analysis Assumptions: The analysis used the paving portion of 2007 Maricopa Association of Governments Measure 32 (Pave or Stabilize Existing Unpaved Parking Lots) to assess the emission and cost impacts of no new unpaved lots on hydrographic lands. The costs were updated to account for changes in the historical Producer Price Index.
**Cost:** $16,994

**Emission Reduction:** 2.71 tons PM$_{10}$

**Cost Effectiveness:** $6,280/ton PM$_{10}$
West Pinal County nonattainment area Rule 4-1-030.5.B requires the owner and/or operator of any existing paved public roadways to take the following actions prior to, during and after work on unpaved road shoulders:

- Apply a dust suppressant(s) to the total surface area subject to the disturbance in sufficient quantity and frequency to maintain a stabilized surface.
- Prevent trackout by using one of the control measures listed in §4-1-030.5.A.i.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County and San Joaquin Valley have more stringent unpaved shoulder stabilization requirements. San Joaquin Valley includes shoulder paving in addition to stabilization requirements. Coachella Valley and the South Coast also include watering provision for vegetation clearing.

Clark County’s Rule 93.2.1.5 Stabilization Standards requires the unpaved shoulders and medians of paved roads to have control measures effectively implemented when Fugitive Dust Emissions do not exceed 20% opacity and silt loading does not equal or exceed 0.33 oz/ft$^2$:

- Failure to comply with either the 20% Opacity limit or silt loading limit indicates that the shoulder is not stable. Where gravel is utilized to prevent trackout from unpaved shoulders and medians of Paved roads, surface gravel shall be uniformly applied and maintained to a depth of two (2) inches to comply with the 20% opacity standards.
- The term gravel shall include “aggregate” and shall mean unconsolidated material greater than 0.25 (1/4) inch but less than three (3) inches and contain no more than six (6) percent silt, by dry weight, that will pass through a No. 200 sieve.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Road Mile-Day of Shoulder or Median Curbed and Paved

**Key Analysis Assumptions:** The analysis is based 1998 Maricopa Association of Governments MSM Measure 21b (Curbing, paving, or stabilizing shoulders) and 2003 San Joaquin Valley Measure 1a (Require 4 ft paved shoulders for all new or modified paved roads) for ranges of requirements. The paved road equation was updated to Nov 2011 AP-42 version and costs were updated to reflect changes in the historical Producer Price Index. The results for the San Joaquin Valley analysis values are shown below as they bound the range of cost effectiveness.

**Cost:** $50 - $134
**Emission Reduction**: 0.00004 - 0.0016 tons PM$_{10}$

**Cost Effectiveness**: $30,882 - $1,244,015/ton PM$_{10}$
Measure 62
Paved Roads - Paving and/or Stabilization of Shoulders and Medians on New and Modified Paved Roads

West Pinal County nonattainment area Rule 4-1-030.5.B requires the owner and/or operator of any existing paved public roadways to take the following actions prior to, during and after work on unpaved road shoulders:

- Apply a dust suppressant(s) to the total surface area subject to the disturbance in sufficient quantity and frequency to maintain a stabilized surface.
- Prevent trackout by using one of the control measures listed in §4-1-030.5.A.i.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County, Coachella Valley, Imperial Valley, the South Coast and San Joaquin Valley all have shoulder paving, curbing and/or other stabilization requirements, generally using a 20% opacity standard for stabilization performance. It is difficult to determine which community has the most stringent measure because of differences in the annual average daily traffic (AADT) threshold and roadway width requirements. Nevertheless, Clark County’s Rule 93.2.1 Paved Road Development Standards for owners and/or operators having jurisdiction over, or ownership of, public or private paved roads is the most restrictive and includes the following key requirements for road shoulder width and drivable median stabilization:

- New construction, modification, or approvals of paved roads shall be constructed with a paved travel section, and four (4) feet of paved or stabilized shoulder on each side of the paved travel section and must be paved or stabilized with a dust palliative or gravel to prevent trackout.
- New construction, modification, or approvals of paved roads on which vehicular traffic is greater than or equal to 3,000 vehicles per day after March 1, 2003 shall be constructed with a paved travel section, and eight (8) feet of stabilized shoulder adjacent to the paved travel section where right-of-way is available for the stabilized shoulder.
- Where curbing is constructed adjacent to and contiguous with the travel lane or paved shoulder of a road, the shoulder width design standards specified in Subsection 93.2.1.1 shall not be applicable.
- Where paved roads are constructed, or modified with shoulders and/or medians, the shoulders and/or medians shall be constructed with curbing, or paving or dust palliatives, gravel or rock to prevent trackout.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Road Mile-Day of Shoulder or Median Curbed and Paved

Key Analysis Assumptions: The most efficient approach to compliance with this measure was determined to be the approach employed in the Measure 61 analysis; therefore, the assumptions for both Measures are the same. The analysis is based on 1998 Maricopa
Association of Governments MSM Measure 21b (Curbing, paving, or stabilizing shoulders) and 2003 San Joaquin Valley Measure 1a (Require 4 ft paved shoulders for all new or modified paved roads) to bound the range of requirements. The paved road equation was updated to Nov 2011 AP-42 version and costs were updated to reflect changes in the historical Producer Price Index. The results for the San Joaquin Valley analysis values are shown below as they bound the range of cost effectiveness.

**Cost**: $50 - $134

**Emission Reduction**: 0.00004 - 0.0016 tons PM$_{10}$

**Cost Effectiveness**: $30,882 - $1,244,015/ton PM$_{10}$
Measure 63
Paved Roads - Immediate Cleanup of Trackout, Carry Out & Spillage from Areas Accessible to the Public

West Pinal County nonattainment area Rule 4-1-030.5.A requires clean-up of trackout upon discovery of mud/dirt that extends 50 feet or more from nearest unpaved surface exit onto paved public roadway:

- Within 24 hours of discovery, remove the mud/dirt from paved public roadway.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Maricopa County has the most stringent control requirements based on trackout length and clean-up frequency criteria. Washoe County includes a provision for immediate removal when dust is visible for more than 5 minutes/hour. The criterion for clean up of trackout specified in Maricopa’s Rule 310.01 and 306.2 are clean up, trackout, carry-out, spillage, and/or erosion from areas accessible to the public including curbs, gutters, and sidewalks, on the following time-schedule:

- Immediately, when trackout, carry-out, or spillage extends a cumulative distance of 25 linear feet or more; and
- At the end of the workday, for all other trackout, carry-out, spillage, and/or erosion.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Access Point-Year

**Key Analysis Assumptions:** The 2007 Maricopa Association of Governments Measure 6 (Strengthen Stringency & Enforcement of Trackout Provisions) costs were updated for the Producer Price Index increment. The control benefit was calculated from the change in sweeping frequency, which was increased from 5 to 7 times per day to account for the increase in trackout discovery associated with increasing the observation distance from 25 to 50 feet.

**Cost:** $2,274

**Emission Reduction:** 0.02 tons PM$_{10}$

**Cost Effectiveness:** $114,521/ton PM$_{10}$
Measure 64
Paved Roads - Use of Only PM$_{10}$-Certified Street Sweepers to Clean Up Trackout Deposits on Paved Roads from Any Source

West Pinal County nonattainment area Rule 4-1-030.A requires the owner and/or operator of the property from which the trackout or erosion-caused deposition came from upon discovery of mud/dirt that extends 50 feet or more from the nearest unpaved surface exit onto the paved public roadway to within 24-hours of discovery remove the mud/dirt from the paved public roadway with one of the following control measures:

- Manually sweeping and picking up; or
- Operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit opacity to 20% or less; or
- Operating a PM$_{10}$ efficient street sweeper; or
- Flushing with water

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that the most stringent requirements for cleanup of any trackout source using PM$_{10}$-efficient certified sweepers with explicit certification, performance, and technology requirements are included in Coachella Valley and the South Coast and are specified in the South Coast Rule 1186. Key requirements from that rule include:

- Any government or government agency which contracts to acquire street sweeping equipment or street sweeping services for routine street sweeping on public roads that it owns and/or maintains, shall acquire or use only certified street sweeping equipment.
- Any government or government agency subject to the requirements of paragraph (d)(2) and/or its contractors shall operate and maintain the certified street sweeping equipment in accordance with the manufacturer’s specifications.

South Coast AQMD Rule 1186(f) establishes street sweeper performance characteristics and specifies detailed dust collection and suppression system description requirements for submission to the Executive Officer.

**Suggested Implementing Agency**: Pinal County Air Quality Control District

**Analysis Unit**: Centerline Mile-Year

**Key Analysis Assumptions**: The analysis used 2007 Maricopa Association of Governments Measure 29 methodology (PM10 Certified Street Sweepers) with current certified sweeper purchase cost data and West Pinal-specific silt loading data from the Moderate SIP by road type. The average daily traffic (ADT) levels for arterials and local roads in West Pinal were used to bound the range of cost effectiveness.

**Cost**: $14
**Emission Reduction:** 0.40 – 1.52 tons $PM_{10}$

**Cost Effectiveness:** $9 - $35/ton $PM_{10}$
Measure 65
Paved Roads - Trackout Controls for Large Operations and Windy Conditions

The West Pinal County nonattainment area has no rules addressing large operation trackout or windy conditions.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that several communities have rules that require controls for trackout emissions from large operation sources on windy days (gusts over 25 mph). Coachella Valley and South Coast are the most stringent in that they are the only jurisdictions that require additional trackout contingency controls for large operations that apply on windy days. East Kern requires a Dust Control Plan for large operations (using different thresholds than Coachella Valley and South Coast) that trigger removal of trackout within one-half hour of the trackout generation, but this requirement (Rule 402.V.F.5) exists for all sources regardless of size and is thus less stringent.

South Coast AQMD Rule 403 addresses large operations, defined as $\geq50$ acre disturbed area or daily earthmoving of $\geq5,000$ cubic yards more than 3 times/yr when wind gusts exceed 25 mph. Paved road track-out controls meeting these criteria include:

- Cover all haul vehicles; or
- Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Truck Operating Day

**Key Analysis Assumptions:** As noted for Measure 5 from this report, changes in freeboard requirements provide no benefit under current tarping requirements.

**Cost:** $0

**Emission Reduction:** 0.00 tons PM$_{10}$

**Cost Effectiveness:** $0/ton PM$_{10}$
Measure 66
Paved Roads - Use of PM$_{10}$-Certified Street Sweepers on Freeways

The West Pinal County nonattainment area has no rules requiring the use of PM$_{10}$ certified street sweepers on all public roads.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Coachella Valley and South Coast have the most stringent control measures, requiring use of PM$_{10}$-certified street sweepers for removal of visible roadway material within 72 hours of notification and routine sweeping operations on all paved public roads. Other jurisdictions requiring certified sweepers phase in or require their use only in urban areas. SCAQMD Rule 1186 mandates the use of PM$_{10}$-certified street sweepers on all public paved roads for both routine street sweeping and clean-up of visible roadway material (the latter within 72 hours of notification). It establishes sweeper certification procedures and requirements for PM$_{10}$-efficient sweepers in Sections (e) and (f). Additional requirements for paved roads include:

- Any owner or operator of a paved public road on which there is visible roadway accumulations shall begin removal of such material through street cleaning within 72 hours of any notification of the accumulation and shall completely remove such material as soon as feasible.
- Any government or government agency which contracts to acquire street sweeping equipment or street sweeping services for routine street sweeping on public roads that it owns and/or maintains, shall acquire or use only certified street sweeping equipment.
- Any government or government agency subject to the requirements of paragraph (d)(2) and/or its contractors shall operate and maintain the certified street sweeping equipment in accordance with the manufacturer’s specifications.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Centerline Mile-Year

**Key Analysis Assumptions:** The most efficient approach to evaluate compliance with this measure was determined to be the approach employed in the Measure 64 analysis. The analysis used the 2007 Maricopa Association of Governments MSM Measure 29 (PM$_{10}$ Certified Street Sweepers) methods updated with current certified sweeper purchase cost data and West Pinal-specific silt loading data from Moderate SIP by road type, configured this evaluation for freeways based on low and high estimates of local traffic volumes.

**Cost:** $14

**Emission Reduction:** 0.04 – 0.27 tons PM$_{10}$

**Cost Effectiveness:** $51 - $340/ton PM$_{10}$
Measure 67
Paved Roads - Use of PM$_{10}$-Certified Street Sweepers on Arterial Roads

The West Pinal County nonattainment area has no rules requiring the use of PM$_{10}$ certified street sweepers on all public roads.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Coachella Valley and South Coast have the most stringent control measures, requiring use of PM$_{10}$-certified street sweepers for removal of visible roadway material within 72 hours of notification and routine sweeping operations on all paved public roads. Other jurisdictions requiring certified sweepers phase in or require their use only in urban areas. SCAQMD Rule 1186 mandates the use of PM$_{10}$-certified street sweepers on all public paved roads for both routine street sweeping and clean-up of visible roadway material (the latter within 72 hours of notification). It establishes sweeper certification procedures and requirements for PM$_{10}$-efficient sweepers in Sections (e) and (f). Additional requirements for paved roads include:

- Any owner or operator of a paved public road on which there is visible roadway accumulations shall begin removal of such material through street cleaning within 72 hours of any notification of the accumulation and shall completely remove such material as soon as feasible.
- Any government or government agency which contracts to acquire street sweeping equipment or street sweeping services for routine street sweeping on public roads that it owns and/or maintains, shall acquire or use only certified street sweeping equipment.
- Any government or government agency subject to the requirements of paragraph (d)(2) and/or its contractors shall operate and maintain the certified street sweeping equipment in accordance with the manufacturer’s specifications.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Centerline Mile-Year

Key Analysis Assumptions: The most efficient approach to evaluate compliance with this measure was determined to be the approach employed in the Measure 64 & 66 analyses; the assumptions for this Measure are the same as those employed for Measure 64. The analysis used the 2007 Maricopa Association of Governments MSM Measure 29 (PM10 Certified Street Sweepers) methods updated with current certified sweeper purchase cost data and West Pinal-specific silt loading data from Moderate SIP by road type, configured this evaluation for arterial roads based on low and high estimates of local traffic volumes.

Cost: $14

Emission Reduction: 0.40 – 1.52 tons PM$_{10}$

Cost Effectiveness: $9 - $35/ton PM$_{10}$
Measure 68
Paved Roads - Require Use of Wetted Brushes and Blowers on Sweepers Used on Both Paved Roads and Parking Lots and Only Vacuum-Type Cleaning Equipment in Pavement Crack Sealing Applications

The West Pinal County nonattainment area has no rules requiring the use of sweepers and blowers on paved surfaces and vacuum-type cleaning equipment on pavement crack sealing.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that several communities require use of wetted brushes and blowers on sweepers used on both paved roads and paved parking lots and only vacuum-type cleaning equipment on pavement crack sealing applications. Clark County is arguably the most stringent in that it includes provisions for paved parking lots and crack seal equipment. Although San Joaquin Valley includes a post-event cleanup requirement from wind/water soil erosion and runoff, it is essentially equivalent to the 72-hour provision in SCAQMD Rule 1186, identified above in Measures 64, 66 and 67 as the most stringent for certified sweepers.

The primary Clark County Rule 93.2 requirements include:

- The use of dry rotary brushes and blower devices for the removal of dirt, rock, or other debris from a paved road or parking lot is prohibited without the use of sufficient wetting to limit the visible emissions to not greater than 20% opacity.
- The use of dry rotary brushes or blower devices without the use of water is expressly prohibited.
- Owner and/or operators which utilize crack seal cleaning equipment shall acquire, or contract to acquire, only vacuum type crack cleaning seal equipment.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: Road Mile-Year

Key Analysis Assumptions: Existing fugitive dust opacity limits in West Pinal County were determined to pre-empt the equipment requirements of this measure; therefore, it has no benefit.

Cost: $0

Emission Reduction: 0.00 tons PM$_{10}$

Cost Effectiveness: $0/ton PM$_{10}$
Measure 69
Paved Roads - Strengthen Existing Paved Road and Shoulder Standards Through Inclusion of Provisions Addressing Non-Conforming Roads and Shoulder Requirements

The West Pinal County nonattainment area has no rules addressing non-conforming paved roads and shoulders.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found that Clark County has the most explicit requirements for fixing and stabilizing non-conforming roads. Paved roads must be in conformance with the road shoulder width and drivable median stabilization requirements established in Rule 93.2.1.1 through 93.2.1.5. Key requirements include:

- New construction, modification, or approvals of paved roads shall be constructed with a paved travel section, and four (4) feet of paved or stabilized shoulder on each side of the paved travel section. The four (4) feet of shoulder shall be paved or stabilized with a dust palliative or gravel to prevent the trackout of mud and dirt to the paved section.
- New construction, modification, or approvals of paved roads on which vehicular traffic is greater than or equal to 3,000 vehicles per day shall be constructed with a paved travel section, and eight (8) feet of stabilized shoulder adjacent to the paved travel section where right-of-way is available for the stabilized shoulder.
- Where curbing is constructed adjacent to and contiguous with the travel lane or paved shoulder of a road, the shoulder width design standards specified in Subsection 93.2.1.1 shall not be applicable.
- Where paved roads are constructed, or modified with shoulders and/or medians, the shoulders and/or medians shall be constructed as set forth in applicable stabilization standards.

Rule 93.2.1.6 requires owners and/or operators having paved roads which do not conform with those subsections to reconstruct the existing nonconforming paved road within 365 calendar days following the initial discovery that the road fails the specified criteria. In addition, the Control Officer may require short-term stabilization of any paved road subject to the requirements set forth in the rule. Other stabilization methods of equal or greater effectiveness may be implemented with the written approval of the Control Officer, providing emissions do not exceed 20% Opacity, unless the US EPA Region 9 objects to such approval.

**Suggested Implementing Agency:** Pinal County Air Quality Control District

**Analysis Unit:** Road Mile-Year

**Key Analysis Assumptions:** The analysis used the 2003 San Joaquin Valley Measure 1a (Require 4 ft paved shoulders for all new or modified paved roads) and 1b (Require
construction of 4 ft paved or stabilized shoulders on 50% of highest ADVT) methodologies with both Typical and Worst-Case scenarios and updated costs based on historical Producer Price Index changes).

**Cost:** $784 - $18,363

**Emission Reduction:** 0.015 – 0.59 tons PM$_{10}$

**Cost Effectiveness:** $1,318 - $1,244,015/ton PM$_{10}$
Measure 70
Paved Roads - Strengthen Reporting and Recordkeeping Requirements to Include Street-Sweeping Extent and Frequency as Well as Dust Control Plans That Affect Trackout Compliance

West Pinal County nonattainment area Rule 4-1-040 addresses recordkeeping. Any person subject to the requirements of this rule shall compile and retain records that provide evidence of control measure application (i.e. receipts and/or purchase records). Such person shall describe in the records, the type of treatment or control measure, extent of coverage, and date applied.

Related requirements are specified in West Pinal County nonattainment area Rule 4-1-045 which specifies reporting actions for agencies with responsibilities for any existing paved public roadway and unpaved roads. West Pinal County nonattainment area Rule 4-1-050 requires records to be retained for at least 2 years.

A review of fugitive dust regulations in place in western PM$_{10}$ nonattainment areas found Maricopa County has the most stringent recordkeeping requirements. Its recordkeeping requirements from Rule 310 augment those for West Pinal by adding provisions for street sweeping extent and frequency as well as Dust Control Plans that affect trackout compliance. Other areas such as Washoe County also include "additive" sweeping reporting requirements, but no additional trackout/dust control plan recording requirements. Key Maricopa Rule 310 Section 502 recordkeeping requirements include:

- Dust Control Plan self-inspection records shall include daily inspections for crusted or damp soil, trackout conditions and clean-up measures, daily water usage for dust control measures, and dust suppressant application.
- Any person who conducts dust-generating operations that do not require a Dust Control Plan shall compile and retain records (including records on any street sweeping, water applications, and maintenance of trackout control devices, gravel pads, fences, wind barriers, and tarps) that provide evidence of control measure application, by indicating the type of treatment or control measure, extent of coverage, and date applied.
- Any person who conducts dust-generating operations that require a Dust Control Plan shall retain copies of approved Dust Control Plans, control measures implementation records, and all supporting documentation for at least six months following the termination of the dust-generating operation and for at least two years from the date such records were initiated. If a person has obtained a Title V Permit and is subject to the requirements of this rule, then such person shall retain records required by this rule for at least five years from the date records are established.

Suggested Implementing Agency: Pinal County Air Quality Control District

Analysis Unit: 50-Acre Project
**Key Analysis Assumptions:** This analysis used the results of Measure 22 calculations from this report adjusted to represent the streetsweeper recordkeeping requirements of this measure.

**Cost:** $56,927

**Emission Reduction:** 0.81 tons PM$_{10}$

**Cost Effectiveness:** $69,980/ton PM$_{10}$