

**STAFF REPORT**

**PROPOSED RULE 55.1, PAVED ROADS AND PUBLIC UNPAVED ROADS  
PROPOSED RULE 55.2, STREET SWEEPING EQUIPMENT**

**Ventura County Air Pollution Control District**

**669 County Square Drive  
Ventura, California 93003**

**September 15, 2009**



**CONTENTS**

| <b><u>Section</u></b>   | <b><u>Page</u></b> |
|---|--------------------|
| <b>Executive Summary</b> .....  | 3                  |
| <b>Background</b> .....   | 4                  |
| Health Impacts of Particulate Matter (PM) .....   | 4                  |
| Particulate Matter (PM) Air Quality in Ventura County .....   | 4                  |
| Existing Regulations for Controlling PM .....   | 6                  |
| Senate Bill 656 (Sher) .....  | 7                  |
| Fugitive Dust Rule Development Schedule .....   | 8                  |
| <b>Proposal for Rule 55.1</b> .....   | 9                  |
| Applicability .....   | 9                  |
| Proposed Rule Requirements .....  | 9                  |
| Removal of Visible Roadway Accumulations .....  | 9                  |
| Paved Road Construction .....   | 10                 |
| General Requirements for Public Unpaved Roads .....   | 10                 |
| Opacity Test Method .....   | 10                 |
| Compliance Schedule .....   | 10                 |
| <b>Proposal for Rule 55.2</b> .....   | 10                 |
| Applicability .....   | 10                 |
| Proposed Rule Requirements .....  | 11                 |
| Certified PM-10 Street Sweeping Equipment .....   | 11                 |
| Compliance Schedule .....   | 11                 |
| <b>Comparison of Proposed Rule Requirements with Other Air Pollution Control Requirements</b> ..... | 12                 |
| Comparison with Federal and APCD Regulations .....  | 12                 |
| Comparison with BACT and APCD Regulations .....   | 12                 |
| <b>Impact of the Proposed Rule</b> .....  | 12                 |
| PM Emission Inventory .....   | 12                 |
| PM Emission Reductions .....  | 13                 |
| Cost-Effectiveness .....  | 13                 |
| Socioeconomic Analysis .....  | 14                 |
| <b>Environmental Impacts of Methods of Compliance/CEQA</b> .....                                    | 15                 |
| <b>References</b> .....   | 16                 |

**LIST OF FIGURES**

|          |   |    |
|----------|---|----|
| Figure 1 | El Rio Monthly Average PM10 and PM2.5 Concentrations .....                | 6  |
| Figure 2 | Simi Valley Monthly Average PM10 and PM2.5 Concentrations .....           | 6  |
| Figure 3 | Thousand Oaks Average PM10 and PM2.5 Concentrations .....                 | 6  |
| Figure 4 | Piru Monthly Average PM10 and PM2.5 Concentrations .....                  | 6  |
| Figure 5 | PM10 Certified Street Sweeper .....                                       | 11 |
| Figure 6 | Example of Street Sweeper in Violation of Visible Emission Standard ..... | 11 |
| Figure 7 | 2001 Ventura County PM10 Emissions Inventory .....                        | 13 |

**LIST OF TABLES**

|         |  |    |
|---------|--|----|
| Table 1 | State and National Particulate Matter Ambient Air Quality Standards .....      | 4  |
| Table 2 | PM10 and PM2.5 Concentrations and Exceedances .....                            | 5  |
| Table 3 | Average Percent of Particles (by weight) that are Coarse Particles .....       | 6  |
| Table 4 | ARB List of Fugitive Dust Control Measures .....                               | 8  |
| Table 5 | Control Measures to be adopted by 12/31/2007 .....                             | 8  |
| Table 6 | Control Measures to be adopted by 12/31/2008 .....                             | 9  |
| Table 7 | Control Measures to be adopted by 12/31/2009 .....                             | 9  |
| Table 8 | Cost-Effectiveness Analysis of PM10 Compliance Option for Street Sweeper ..... | 14 |
| Table 9 | Environmental Impacts and Mitigations of Methods of Compliance .....           | 15 |

---

## EXECUTIVE SUMMARY

Particulate pollution has been linked to increases in asthma attacks, chronic bronchitis, hospitalizations for heart and lung illnesses, emergency room visits, lung cancer, and premature death of people with pre-existing cardiac and respiratory illnesses. Particulate matter pollution (collectively referred to as PM) consists of very small particles suspended in the air and includes particles smaller than 10 microns in size (PM10).

Ambient PM is comprised of both directly emitted PM such as fugitive dust and soot, as well as secondary PM formed in the atmosphere from reactions involving precursor pollutants including oxides of nitrogen, volatile organic compounds, and sulfur oxides (NO<sub>x</sub>, VOC, and SO<sub>x</sub>). Secondary PM and combustion soot tend to be fine particles less than 2.5 microns in size (PM<sub>2.5</sub>), while fugitive dust is larger in size.

PM control regulations have already been adopted by the Ventura County Air Pollution Control District (VCAPCD) to:

- Control secondary PM precursors (NO<sub>x</sub>, VOC, and SO<sub>x</sub>) from combustion and coating sources.
- Control directly emitted PM from incinerators and fuel burning equipment.
- Control PM emissions from asphalt plants, smelters, forges, material dryers, and others.
- Regulate agricultural burning.
- Control general visible emissions (opacity).
- Control PM from commercial charbroiling.
- Control PM from fugitive dust sources.

APCD also has incentive programs to reduce directly-emitted PM and PM precursors from heavy duty diesel engines. A transportation outreach program also reduces PM emissions from light duty vehicles.

Because Ventura County fails to meet state ambient health standards for PM, a 2003 state law (SB 656) requires the Ventura County Air Pollution Control District (APCD) to adopt additional new regulations to reduce particulate pollution.

On June 28, 2005, the Ventura County Air Pollution Control Board (Board) approved staff's plan to develop new PM control measures. Rule 55, an all encompassing fugitive dust regulation based on

South Coast AQMD Rule 403, was recently adopted by the Board on June 8, 2008. This rule will impact many man-made conditions capable of generating fugitive dust. Affected sources include bulk material handling facilities, construction/demolition sites, storage piles, private unpaved roads, off-field agricultural sources, and earth-moving operations on private construction sites.

Proposed Rules 55.1 and 55.2 will implement those PM control measures adopted by the Board on June 28, 2005, that were not covered by the adoption of Rule 55. Proposed Rules 55.1 and 55.2, similar to South Coast AQMD Rule 1186, are being proposed to regulate paved road emissions (excluding track-out), public unpaved roads, and street sweeping. Private unpaved road PM emissions and track-out emissions are already regulated by Rule 55.

The estimated emission reductions are 1.2 tons per day of PM<sub>10</sub> from the adoption of Rules 55.1 and 55.2. This is based on the 2001 inventory of 26 tons per day of PM<sub>10</sub>, and assumes that fugitive dust from street sweeping, paved roads, and public unpaved roads comprises about 16 percent of the sample and the control effectiveness of the proposed rule is approximately 30 percent. Since many of the existing street sweepers are already certified as PM-10 compliant, and many cities already improve medians and road shoulders, the actual control effectiveness of the proposal has been estimated at 30 percent. According to Bob Burrows of Venco Power Sweeping, an Oxnard sweeping service, his entire fleet of routine street sweepers is already PM-10 certified.

The estimated cost-effectiveness for Rule 55.1 is based on an economic analysis performed by the San Joaquin Valley APCD on controlling PM-10 emissions from earthmoving equipment regulated by their Rule 8021, Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities. Their staff estimated the cost-effectiveness for controlling PM-10 emissions from earthmoving equipment at \$304 per ton of PM reduced.

The estimated cost-effectiveness for Rule 55.2 is based on a vendor quote for the PM-10 compliance option offered on the purchase of a new street sweeper. According to the Haaker Equipment Company, the local vendor for Elgin sweepers, the

PM-10 compliance option for a new sweeper is approximately \$1,500. This option is much less than the cost of a new street sweeper, which can cost anywhere from \$170,000 to \$200,000. The cost-effectiveness of the Rule 55.2 proposal is also estimated at less than \$1,000 per ton of PM reduced

for installation of this option on a new street sweeper. For comparison, new sources subject to Best Available Control Technology requirements are required to spend up to \$10,000 per ton of PM reduced for particulate controls.

## BACKGROUND

### Health Impacts of Particulate Matter

The effects of inhaling particulate matter has been widely studied in humans and animals and include, asthma, lung cancer, cardiovascular issues, and premature death. Those most sensitive to particle pollution include infants and children, the elderly, and persons with heart and lung disease. The size of the particle is a main determinant of where in the respiratory tract the particle will come to rest when inhaled. Larger particles are generally filtered in the nose and throat and do not cause problems, but particulates less than 10 microns (PM10) can settle in the bronchi and lungs and cause health problems. The 10 micron size does not represent a strict boundary between respirable and non-respirable particles, but has been agreed upon for monitoring of airborne particulate matter by most regulatory agencies.

Similarly, particles smaller than 2.5 microns (PM2.5), tend to penetrate into the gas-exchange regions of the lung, and very small particles (< 100 nanometers) may pass through the lungs to affect other organs. In particular, a study published in the *Journal of the American Medical Association* (Pope et. al, 2002), indicates that PM2.5 leads to high plaque deposits in arteries, causing vascular inflammation and atherosclerosis — a hardening of the arteries that reduces elasticity, which can lead to heart attacks and other cardiovascular problems. Researchers suggest that even short-term exposure at elevated concentrations could significantly contribute to heart disease.

There is also evidence that particles smaller than 100 nanometers can pass through cell membranes. For example, particles may migrate into the brain. It has been suggested that particulate matter can cause similar brain damage as that found in Alzheimer patients. This research was done by Dr. Lilian Calderon-Garciduenas of the National Institute of Pediatrics in Mexico City and a postdoctoral student in the environmental pathology program at the

University of North Carolina at Chapel Hill. Particles emitted from modern diesel engines (commonly referred to as Diesel Particulate Matter, or DPM) are typically in the size range of 100 nanometers (0.1 microns). In addition, these soot particles also carry carcinogenic components like benzopyrenes adsorbed on their surface.

The large number of deaths and other health problems associated with particulate pollution was first demonstrated in the early 1970s (Lave et. al, 1973) and has been reproduced many times since. PM pollution is estimated to cause 20,000-50,000 deaths per year in the United States (Mokdad et. al, 2004) and 200,000 deaths per year in Europe.

### Particulate Matter (PM) Air Quality in Ventura County

The U.S. Environmental Protection Agency (U.S. EPA) and the California Air Resource Board (ARB) have adopted ambient air quality standards for PM10 and PM2.5 (Table 1). California's standards are the most health-protective standards in the nation, and are designed to provide additional protection for the most sensitive groups of people, including infants and children, the elderly, and persons with heart or lung disease. Both the state PM10 and PM2.5 standards were exceeded in the county.

|              | <b>California</b><br>( $\mu\text{g}/\text{m}^3$ ) | <b>National (2006)</b><br>( $\mu\text{g}/\text{m}^3$ ) |
|--------------|---|--|
| <b>PM10</b>  |   |  |
| Annual       | <b>20</b>   | <b>revoked</b>   |
| 24-hour      | <b>50</b>   | <b>150</b>   |
| <b>PM2.5</b> |   |  |
| Annual       | <b>12</b>   | <b>15</b>  |
| 24-hour      | <b>35</b>   | <b>35</b>  |

**Table 1. State and National Particulate Matter Ambient Air Quality Standards. The standards are expressed in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).**

Ambient PM is comprised of both directly emitted PM such as fugitive dust and soot, known as primary PM, as well as PM formed in the atmosphere from the reactions of precursor gases - known as secondary PM. These precursor gases include nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>x</sub>), volatile organic compounds (VOC), and ammonia.

Sources of ambient PM include combustion sources such as trucks and passenger cars, off-road equipment, industrial processes, residential wood burning, and forest and agricultural burning; fugitive dust from paved and unpaved roads, construction, mining and agricultural activities; and ammonia from sources such as livestock operations, fertilizer application, and motor vehicles. In general,

combustion processes form fine particles, whereas emissions from dust sources tend to be coarse particles.

In Ventura County, PM concentrations are measured every sixth day at five locations (El Rio, Piru, Simi Valley, Ojai and Thousand Oaks) – for a total of about 300 air samples per year. Both PM<sub>10</sub> and PM<sub>2.5</sub> are measured at all five locations.

Table 2 is a summary of PM<sub>10</sub> and PM<sub>2.5</sub> concentrations and exceedances of the California PM standards. Both California PM<sub>10</sub> standards (24-hour and annual average) are exceeded at all five Ventura County sites.

**Table 2 – PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations and Exceedances**

|               | <b>Number of exceedances of the state PM<sub>10</sub> standard 2001 through 2003. (measured)</b> | <b>Estimated* number of days exceeding the state PM<sub>10</sub> standard in 2003. (California Standard is 50 µg/m<sup>3</sup>)</b> | <b>Annual Average (2003) PM<sub>10</sub> concentration. (California Standard is 20 µg/m<sup>3</sup>)</b> | <b>PM<sub>10</sub> Maximum Measured Concentration. (Average of top 4 measurements in 2003)</b> | <b>Annual Average (2003) PM<sub>2.5</sub> concentration. (California Standard is 12 µg/m<sup>3</sup>)</b> | <b>PM<sub>2.5</sub> Maximum Measured Concentration. (Average of top 4 measurements in 2003)</b> |
|---------------|--|---|--|--|---|---|
| Simi Valley   | 12 days  | 31.1 days   | 30 µg/m <sup>3</sup>   | 93 µg/m <sup>3</sup>   | 14.2 µg/m <sup>3</sup>  | 54 µg/m <sup>3</sup>  |
| El Rio        | 10 days  | 28.6 days   | 29 µg/m <sup>3</sup>   | 94 µg/m <sup>3</sup>   | 11.8 µg/m <sup>3</sup>  | 44 µg/m <sup>3</sup>  |
| Thousand Oaks | 4 days   | 20.1 days   | 25.8 µg/m <sup>3</sup>   | 58 µg/m <sup>3</sup>   | 12 µg/m <sup>3</sup>  | 27 µg/m <sup>3</sup>  |
| Ojai          | 3 days   | 12.2 days   | 20.7 µg/m <sup>3</sup>   | 47 µg/m <sup>3</sup>   | NA  | NA  |
| Piru          | 3 days   | 12.6 days   | 27 µg/m <sup>3</sup>   | 60 µg/m <sup>3</sup>   | 11 µg/m <sup>3</sup>  | 24 µg/m <sup>3</sup>  |

\* Takes every sixth day sampling schedule into consideration

Source: <http://www.arb.ca.gov/adam/welcome.html>

Table 2 shows that the California 24-hour PM<sub>10</sub> standard is exceeded at all monitoring sites in the County - most often at the Simi Valley site – 31 days in 2003 (est.). All County monitoring sites exceed the state annual average PM<sub>10</sub> standard. The state annual average PM<sub>2.5</sub> standard is exceeded only at the Simi Valley site, but all sites are close to the exceedance threshold. The state and federal 24 hour PM<sub>2.5</sub> standard at 35 µg/m<sup>3</sup> has been exceeded at Ojai, Simi Valley and Thousand Oaks sites, but the number of exceedances are not sufficient to merit non-attainment status of the federal standard.

Coarse particles (between 2.5 and 10 microns) are almost always a significant portion of total PM<sub>10</sub>. In fact, the average of the coarse fractions for all

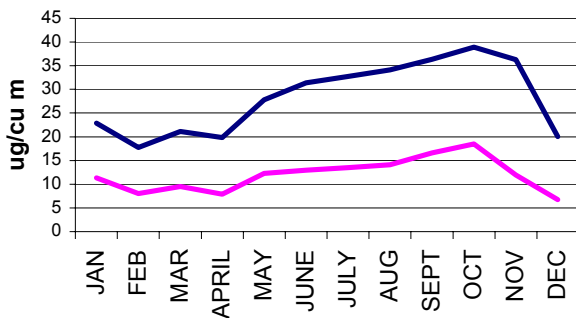
samples (not limited to samples collected on exceedance days) during 2001, 2002, and 2003 is over 50 percent. However, the local emission sources and local meteorology can significantly impact the coarse particle fractions, which can range from a low of 18 percent to as high as 88 percent.

|                                | Simi Valley | Thousand Oaks | El Rio | Piru |
|--------------------------------|-------------|---------------|--------|------|
| Coarse Particles (% by weight) | 52%         | 52%           | 57%    | 56%  |

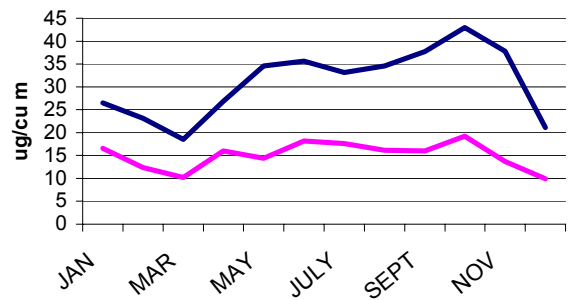
**Table 3 – Average Percent of Particles (by weight) that are Coarse Particles (2.5 µm to 10 µm)**

Note: Data derived from separate samples (PM2.5 and PM10) collected simultaneously using two separate techniques.

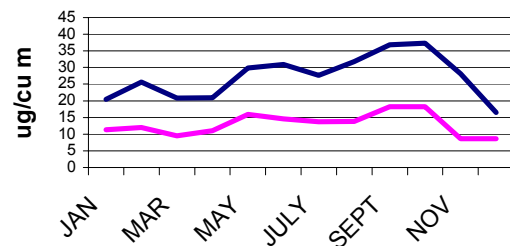
The following figures show monthly averages of PM10 and PM2.5 at four monitoring stations: El Rio (Coastal Inland), Simi Valley (Inland Valley), Thousand Oaks and Piru. A common pattern emerges for all four stations. Both the PM2.5 and PM10 values follow the ozone season, which lasts roughly from April through October. Since a significant part of both PM2.5 and PM10 are the result of secondary particle formation in the atmosphere, stable meteorological conditions with low inversions will increase PM concentrations. Direct particle emissions (primary) are also more concentrated when atmospheric dispersion is reduced. Also, PM10 concentrations are reduced during the rainy season, which typically runs from November through April and peak during the dry Santa Ana wind episodes.



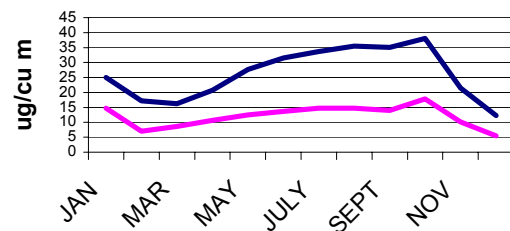
**Figure 1 – El Rio Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.**



**Figure 2 – Simi Valley Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.**



**Figure 3 – Thousand Oaks Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.**



**Figure 4 – Piru Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.**

**Existing Regulations for Controlling PM**

Ventura County APCD has already adopted rules to regulate both primary and secondary PM. Primary

PM from stationary sources is regulated by the following rules:

- Rule 26, New Source Review
- Rule 50, Opacity
- Rule 52, Particulate Concentration
- Rule 53, Particulate - Process Weight
- Rule 55, Fugitive Dust
- Rule 56, Open Burning
- Rule 57, Incinerators
- Rule 57.1, Particulate Matter from Fuel Burning Equipment
- Rule 62.7, Asbestos
- Rule 74.1, Abrasive Blasting
- Rule 74.25, Restaurant Cooking Operations

Secondary PM formed from atmospheric reactions of precursor gases (Oxides of Nitrogen, Oxides of Sulfur and Volatile Organic Compounds) are regulated by many district rules that have been adopted to reduce the ambient ozone levels. These include regulations for stationary combustion sources such as boilers, heaters, turbines, and engines, and source that emit organic solvents including coatings, adhesives, fiber glass manufacturing, and solvent cleaning. Large sources of volatile organic compounds regulated by district rules include gasoline marketing and oil and natural gas production and storage. Sulfur oxides are regulated by rules governing the sulfur content of fuels.

ARB also regulates PM emissions by regulating the mobile sources, mainly internal combustion engines. A recent program to control toxic particulates generated by diesel engines will reduce PM from both stationary and mobile diesel engines. Besides regulations, the district has incentive programs to replace older heavy duty diesel engines with engines burning cleaner fuels such as natural gas or having particulate control equipment, such as particulate traps or oxidation catalysts.

However, even with all these existing regulations, the county remains in violation of the state standard for PM. As a result of recent legislation (SB 656), the district is required to do more to help meet the ambient PM standard.

### Senate Bill 656

Senate Bill 656 (Health and Safety Code 39614), was adopted on October 9, 2003 by the legislature to reduce particulate matter emissions and reduce public exposure to particulate matter. The intent of the bill is to accelerate progress toward meeting the federal

and state PM ambient standards. The bill required ARB to consult with air districts, hold at least one public workshop, develop and adopt a list of the most readily available, feasible, and cost-effective control measures to reduce PM 10 and PM 2.5 emissions. These control measures were based upon rules and regulations in effect as of January 1, 2004 for specific emissions source categories and was published by ARB on October 19, 2004. Additional control measures were added on November 18, 2004.

Staff evaluated this ARB list of incentive programs, control measures and district rules, which were presented in Appendix C of the ARB staff report. As stated earlier, many of the control measures on ARB's list have already been adopted by VCAPCD, including the following:

- Rules to control secondary PM precursors (NO<sub>x</sub>, VOC, and SO<sub>x</sub>) from combustion and coating sources.
- Rules to control directly emitted PM from incinerators and fuel burning equipment.
- "Grain loading" rules for emissions from asphalt plants, smelters, forges, material dryers, and others.
- A rule to control agricultural burning.
- General visible emission limits (opacity).
- Incentive programs for diesel engine replacements.
- A transportation outreach program.
- A commercial grilling regulation.
- A wide-ranging fugitive dust rule.

VCAPCD does not currently have local regulations to implement the following control measures contained in the ARB list:

- 1) Control of combustion emissions from residential wood burning fireplaces and wood burning heaters
- 2) Control of fugitive dust (PM<sub>10</sub>) emissions from:
  - Public unpaved roads
  - Street Sweeping
  - Public paved roads (excluding track-out)

Only combustion emissions from residential wood burning fireplaces and fugitive dust emissions from street sweeping and public roads were included on the ARB list that have yet to be adopted by Ventura County. No increase in PM<sub>10</sub> concentrations is measured during the coldest part of the year that could be attributed to residential wood burning appliances. In fact, PM<sub>10</sub> concentrations are consistently at their lowest during the coldest part of

the year. Air districts in Northern California and ones with colder climates where residents use wood fueled stoves for heating are more likely to have a PM problem from smoke formation. Local regulatory restrictions, other than federal or state requirements for new stoves, are not being proposed to comply with PM10 air quality standards.

ARB staff report will be the focus of this district rulemaking effort to complete the commitment and schedule adopted by our Board. From the ARB list, staff has evaluated the existing district rules from the South Coast Air Quality Management District (SCAQMD Rule 1186) and San Joaquin Valley Air Pollution Control District (SJVAPCD Rule 8061) as possibly applicable to Ventura County (Table 4).

Therefore, not yet adopted fugitive dust control measures from Section C in that appendix of the

**Table 4 – ARB List of Readily Available, Feasible and Cost-Effective Fugitive Dust Control Measures**

| FUGITIVE PM SOURCE CATEGORIES              | APPLICABLE SJVAPCD RULE(S) | APPLICABLE SCAQMD RULE(S) |
|--|----------------------------|---------------------------|
| Paved Road Dust: New/Modified Public Roads | Rule 8061                  | Rule 1186                 |
| Paved Road: Street Sweeping                |                            | Rule 1186                 |
| Unpaved Public Roads                       | Rule 8061                  | Rule 1186                 |

SB 656 also requires the state board and each district to adopt an implementation schedule for the most cost-effective measures on that list after prioritizing the measures based on the effect individual control measures will have on public health, air quality, and emission reductions. The first step was to analyze data from existing air monitoring network, emission inventory, and other scientific studies to identify sources of particulate pollution and prioritize control measures for that pollution and its precursors. This data analysis is summarized in the prior section on PM air quality in Ventura County. The prioritization and implementation schedule for Ventura County was adopted by our Board on June 28, 2005.

**Fugitive Dust Rule Development Schedule**

On June 28, 2005, the Ventura County Air Pollution Control Board (Board) approved a plan proposed by staff to develop new PM control measures. This plan would establish new visible emission (opacity) limits for fugitive dust sources and would include new requirements to prevent vehicles from tracking out soils onto paved roadways where they are subsequently ground into small PM10 particles and entrained in the air by traffic. The following rule adoption schedule and description of proposed control measures was approved by the Board as Attachment 1 to the Board Letter.

**PROPOSED CONTROL MEASURE IMPLEMENTATION SCHEDULE**

**Table 5: Control Measures to be adopted by 12/31/2007**

|  |
|--|
| <b><u>Construction, demolition, or earthmoving operations</u></b>  |
| <ul style="list-style-type: none"> <li>• Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.</li> <li>• Operations contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.</li> <li>• Establish visible dust emission limits (opacity).</li> </ul> |
| <b><u>Bulk material handling and storage facilities</u></b>  |
| <ul style="list-style-type: none"> <li>• Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.</li> <li>• Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.</li> <li>• Establish visible dust emission limits (opacity).</li> </ul> |
| <b><u>Agricultural operations</u></b>  |
| <ul style="list-style-type: none"> <li>• Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.</li> </ul>  |



- |  |
|--|
| <ul style="list-style-type: none"> <li>Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.</li> </ul> |
|--|

**Table 6: Control Measures to be adopted by 12/31/2008**

|  |
|--|
| <b>Unpaved roads</b>   |
| <ul style="list-style-type: none"> <li>Establish visible dust emission limits (opacity).</li> </ul>  |
| <b>Unpaved parking lots and staging areas</b>  |
| <ul style="list-style-type: none"> <li>Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.</li> <li>Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.</li> <li>Establish visible dust emission limits (opacity).</li> </ul> |
| <b>Weed abatement activities</b>   |
| <ul style="list-style-type: none"> <li>Establish visible dust emission limits (opacity).</li> </ul>  |

**Table 7: Control Measures to be adopted by 12/31/2009**

|  |
|--|
| <b>New and modified public and private paved roads</b>   |
| <ul style="list-style-type: none"> <li>Develop control measures to minimize emissions from unpaved road shoulders.</li> </ul>  |
| <b>In-use paved roads</b>  |
| <ul style="list-style-type: none"> <li>Develop incentives for municipal street sweeping.</li> <li>Require responsible entities to conduct post-event cleanup of roadways.</li> </ul> |

Rule 55, Fugitive Dust, adopted on June 8, 2008, will implement both the control measures to be adopted by December 31, 2007 and those to be adopted by December 31, 2008, except for regulating the emissions from public unpaved roads. Proposed Rules 55.1 and 55.2 will implement the control measures to be adopted by December 31, 2009 (Table 7), and it will impact the following sources not covered by Rule 55: street sweeping, public roads both paved and unpaved.

The only significant difference between the proposal for Rule 55.2 and control measures in Table 7

concerns street sweeping. Rather than develop incentives for municipal street sweeping, the proposal requires that routine street sweepers be certified as PM-10 compliant under specification outlined in South Coast AQMD Rule 1186. Almost all street sweeper manufacturers offer a PM-10 compliance option for installation in a new sweeper. This equipment may include an upgraded water pump and enhanced water suppression equipment. Many street sweepers services already have certified PM-10 street sweepers, as exemplified by Venco Power Sweeping.

**Proposal for Rule 55.1, Paved Roads and Public Unpaved Roads**

**Applicability**

Proposed Rule 55.1 will apply to any government agency that owns or operates a public road that is open to the public. This proposed rule will also apply to any person operating construction or earthmoving equipment on a public unpaved road.

**Proposed Rule Requirements**

Removal of Visible Roadway Accumulations (Section B.1)

Any operator or owner of a public paved road shall begin removal of visible roadway accumulated

material within 72 hours of notification by the APCD. Complete removal of such material shall be performed as soon as feasible, but no later than 10 days after notification. If removal cannot be completed within 10 days, the owner may request an extension for up to 90 days after the original written notification to the District. The use of blowers for removal is expressly prohibited. There are three exemptions to this requirement (Subsection D.1). These include:

- Visible roadway accumulations that occur on roads with fewer than 1,000 average daily trips.
- Paved roads that are closed to vehicular activity.
- Events covered under the Governor-declared State of Emergency.

Paved Road Construction (Section B.2)

All new or widened paved roads will be required to meet specifications adopted in South Coast AQMD Rule 1186. New construction or widening of paved roads with projected average daily trips of 1,000 vehicles or more need to have curbs or paved outside shoulders of 4 foot width if average daily trips range from 1,000 to 3,000 or an 8 foot width if the average daily trips exceed 3,000. The other requirement in this section applies to paved roads with medians.

General Requirements for Public Unpaved Roads – Construction Activities (Section C)

Rather than require public agencies to pave miles of unpaved road in their jurisdiction, this proposed rule focuses only on the person operating construction or earthmoving equipment on an unpaved road and prohibits that person from exceeding visible emission standards. Dust emissions from construction or earthmoving equipment working on unpaved public roads are regulated by two visible dust standards: 1) 100 foot dust plume; and 2) Visible dust that causes 20 percent or greater opacity during each observation for any three minutes in any one hour.

Opacity is a measure of the degree of visibility impairment caused by a cloud of airborne particulate matter. For example, a thick cloud of dust (called a plume) has an opacity of 100 percent if it totally obscures the visibility of an object behind it. If a faint outline of the object can be observed through the plume, the opacity is less than 100 percent.

A trained observer tested and certified by the U.S. Environmental Protection Agency (U.S.EPA) in the practice of reading opacity, can assign an opacity level to any plume. If only a faint outline can be observed, the certified observer might assign an opacity reading of 80 percent to the plume. If most of the features of the object can be seen, the certified observer might assign an opacity reading of 15 percent or less to the plume.

### Opacity Test Method

---

## Proposal for Rule 55.2, Certified PM-10 Street Sweeping Equipment Applicability

Proposed Rule 55.2 will apply to any government agency, or government contractor that owns, operates, or contracts for routine street sweeping equipment operated in the county.

The proposed test method is modified form of EPA Method 9, and is identical to the current opacity test method used in Rule 55. The proposed method requires that observers be certified by ARB or EPA, and APCD inspectors are trained and tested on a regular basis. The testing involves the generation of different plumes with known opacity as measured by an in-stack transmissometer. The modifications to EPA Test Method 9 are:

1. **Observation Distance from Source:** The proposed method allows observers to stand as close as 16.5 feet from the source, while the EPA Method limits the observation distance to 20 feet. This provides a little more flexibility for the inspector to make observations.
2. **Observers are instructed to read the smoke plume starting at a height of 5 feet above the emission source.** This allows the observer to screen for the fallout of fugitive dust that is not emitted into the atmosphere.
3. **Compliance Determination:** Similar to VCAPCD Rule 55, if the observer records twelve readings of 20 percent or greater within an hours time, then the source is in violation of the rule limit. Observations are taken once every 15 seconds, and the twelve readings do not have to be consecutive. Thus, once twelve 20 percent or greater readings are taken in an hour (3 total minutes), then the observer may stop and issue the violation.

### Compliance Schedule

The requirements of this proposed rule will become effective one year after the adoption date. Once effective, the regulated community will have a six month honeymoon period, where Notices to Comply rather than Notices of Violations will be issued by APCD staff.

## Proposed Rule Requirements

### Certified PM-10 Street Sweeping Equipment (Section B)

The intent of this requirement is to insure routine street sweepers are certified to meet PM-10 standards established by South Coast AQMD Rule 1186. There is also a requirement that applies to new contracts or renewal of contracts for street sweeping services. South Coast AQMD's requirement for PM certification of street sweepers has been in effect since 1999. Almost all sweeper manufacturers offer the installation of a PM-10 compliance option on newly manufactured sweepers. The PM-10 features are part of a design, which incorporates a recirculation and particulate capture mechanism, as shown in the following Figure 5.



**Figure 5: PM-10 certified street sweeper with enclosed air recirculation and cyclone particulate trap.**

Retrofit of existing sweepers will be allowed by this rule as long as it can be demonstrated that the retrofitted sweeper meets the performance specifications outlined in South Coast AQMD Rule 1186, Appendix A.

Another requirement is that all routine street sweepers, including existing equipment, shall be properly maintained and operated. An example of a poorly maintained sweeper, shown in Figure 6, is in violation of this proposed standard.



**Figure 6. Example of street sweeper in violation of proposed operational standard.**

Similar to the South Coast AQMD Rule 1186, the proposed rule contains an exemption from certified requirements for sweepers used strictly for construction purposes (Section C). These sweepers used in construction are more heavy-duty than typical municipal street sweepers, and are used for larger particle removal. Another proposed exemption is for the smaller parking lot sweepers, which have not been certified to PM-10 standards, and sweepers used on private roads.

Recordkeeping requirements for persons subject to the street sweeping provisions are contained in Section D, and require records showing compliance with manufacturer's maintenance and operational recommendations. Reporting requirements are summarized in Section E, and provides the APCD with a status report of the compliance of the sweeper fleet in terms of PM-10 certification.

## Compliance Schedule

The requirements of this proposed rule will become effective one year after the adoption date. Once effective, the regulated community will have a six month honeymoon period, where Notices to Comply rather than Notices of Violations will be issued by APCD staff.

---

## COMPARISON OF PROPOSED RULES REQUIREMENTS WITH OTHER AIR POLLUTION CONTROL REQUIREMENTS

Health and Safety Code 40727.2 requires Districts to compare the requirements of a proposed rule with other air pollution control requirements. These other air pollution control requirements include federal New Source Performance Standards (NSPS), federal National Emissions Standards for Hazardous Air Pollutants (NESHAPS), Best Available Control Technology (BACT) and any other District rule applying to the same equipment.

### Comparison with Federal and APCD Regulations

There are no national federal regulations regarding area source fugitive dust emissions, which includes construction sites and unpaved roads. The Environmental Protection Agency (EPA) does regulate toxic fugitive dust at stationary sources through its National Emission Standards for Hazardous Pollutants (NESHAPS). Examples include ferroalloy production, primary copper smelting and secondary lead smelting.

However, EPA has adopted fugitive dust rules within a particular State Implementation Plan for those areas that are non-attainment with respect to the PM-10 standard. Examples of nonattainment areas having fugitive dust rules include the South Coast AQMD, the San Joaquin Valley APCD, Maricopa County (Arizona) and Mammoth Lakes Planning Area. Because these areas are federal nonattainment areas, the U.S.EPA requires them to implement similar regulations including Best Available Control Measures (BACM) and compliance tests for fugitive dust.

### Comparison with BACT and APCD Regulations

For the purpose of the BACT comparative analysis required by the Health and Safety Code Section 40727.2(a), BACT for street sweepers may be found in South Coast AQMD Rule 1186.1, which requires that new street sweepers be alternative-fueled, such as propane or LNG. BACT for the control of fugitive dust from public unpaved roads is provided in South Coast AQMD Rule 1186, Section (d)(5), Unpaved Roads. The South Coast requires the paving, treating, or the installation of signage or speed control devices on unpaved with greater than average vehicle trips.

Since Ventura County meets the federal PM-10 standards, the district is not required to duplicate these regulations and test methods. The regulations developed for Ventura County to meet the state standards may take a different approach that is equally effective. For the case of controlling emissions from street sweepers (proposed Rule 55.2), Ventura County is relying on adopted regulations from the state Air Resources Board to regulate both the PM and NOx emissions from the diesel exhaust of street sweepers. Regarding duplicating the SCAQMD or San Joaquin Valley APCD requirements to pave, treat, or install signage or speed control devices on unpaved roads, staff believes these requirements merit further study. A preliminary analysis of this control measure and discussions with the South Coast and San Joaquin staffs raised some questions about the implementation of these requirements in those air districts.

---

## Impact of the Proposed Rules

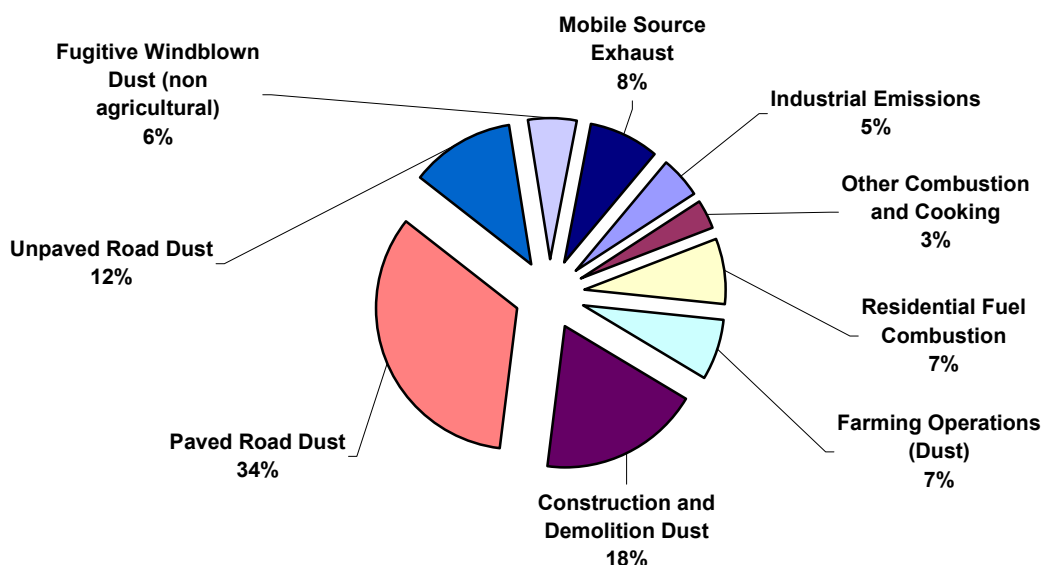
### PM Emission Inventory

Figure 7 was plotted using emissions inventory information for Ventura County supplied by ARB. It shows the relative contributions for various categories of directly emitted PM10. The chart depicts only directly emitted particles. Fine secondary particles that account for a significant

portion of the total PM10 mass are not included in the chart because they are formed in the atmosphere and not directly emitted. Fugitive dust emissions, including windblown dust, vehicle-entrained road dust, construction and demolition dust and farming dust account for about 77 percent of this directly emitted PM10 inventory. Coarse particles are, by far, the major contributor to PM10 during Santa Ana

winds in the dry season. Both PM10 and PM2.5 concentrations rise during the dry season and drop sharply after the first rain in autumn. The PM10

emission inventory in 2001 was approximately 26 tons per day for direct (primary) emissions.



**Figure 7 – 2001 Ventura County PM10 Emissions Inventory – Direct Emissions = 26 Tons per Day**

### PM Emission Reductions

The estimated emission reductions are 1.2 tons per day of PM10 from the adoption of Rules 55.1 and 55.2. This is based on the 2001 inventory of 26 tons per day of PM10, and assumes that fugitive dust from street sweeping, paved roads, and public unpaved roads comprises about 16 percent of the sample and the control effectiveness of the proposed rule is about 30 percent. Since many of the existing street sweepers are already in compliance with the proposed PM-10 certification requirements, the actual control effectiveness of the proposal has been estimated at 30 percent. Since the South Coast AQMD Rule 1186 has been in effect since 1999, many of the existing street sweepers in the county may already be PM-10 compliant.

#### Cost-Effectiveness – Rule 55.1

The cost-effectiveness of Rule 55.1 was based on a cost analysis performed by the San Joaquin Valley APCD in the development of their Rule 8021. According to San Joaquin staff, the cost-effectiveness for controlling PM emissions from earthmoving equipment was approximately \$300 per ton of PM reduced. Since Rule 55.1 contains similar requirements, staff is estimating cost-effectiveness

for this rule at less than \$1,000 per ton of PM reduced.

#### Cost-Effectiveness – Rule 55.2

The cost-effectiveness of Rule 55.2 was based on the installation of a PM-10 compliance option on the purchase of a new street sweeper. According to the Southern California dealer for Elgin Sweepers, the PM-10 compliance option ranges from \$1200 to \$1500 above the new purchase price of a sweeper, which ranges from \$170,000 to \$200,000. The calculations are summarized in Table 8. The estimated emission reductions from all street sweepers in the county was estimated at 16% of the 1.2 tons/day total emission reduction or about 0.2 tons/day. Assuming a total inventory of 200 street sweepers in the county gives an emission reduction per sweeper to 730 pounds of PM per year. The estimated cost-effectiveness for a single street sweeper is about \$1,000 per ton of PM reduced, which compares favorably with the \$10,000 per ton BACT threshold used to evaluate new sources.

**Table 8  
Cost-Effectiveness Analysis of PM-10 Compliance Option for Street Sweeper**

| Capital Costs   |                | Annualized Costs<br>Assume n = 10yrs at 5% |              |
|---|----------------|--|--------------|
| PM-10 Compliance Option   | \$1,500        | Capital Cost                               | \$195        |
|   |                | Operation/Maintenance                      | \$150        |
| <b>Total</b>  | <b>\$1,500</b> | <b>Total</b>                               | <b>\$345</b> |
| Estimated Annual Emissions Reduced = 730 lbs/yr   |                |  |              |
| Cost Effectiveness = Annualized Cost Increment/ Annual Emissions Reduced Increment<br>\$0.47 per pound or approximately \$1,000 per ton of PM Reduced |                |  |              |

### Socioeconomic Analysis

Health and Safety Code Section 40728.5 requires the District Board consider the socioeconomic impacts of any new rule. The Board must evaluate the following socioeconomic information on proposed new Rules 55.1 and 55.2.

- (1) *The type of industries or businesses, including small business, affected by the rule or regulation.*

Government agencies and their contractors engaged in road building may be impacted by the requirements of new Rule 55.1. New Rule 55.2 will impact government agencies and their contractors that are involved in street sweeping.

- (2) *The impact of the rule amendments on employment and the economy of the region.*

Adoption of new Rules 55.1 and 55.2 are not expected to have a negative impact on either employment or the economy of Ventura County. The additional cost of upgrading new sweepers to more efficiently capture PM-10 is a very small percentage of the total cost of the vehicle (less than one percent).

- (3) *The range of probable costs, including costs to industry or business, and including small business, of the rule or regulation.*

Probable cost-effectiveness is estimated at \$1,000 per ton of Particulate Matter reduced.

- (4) *The availability and cost-effectiveness of alternatives to the rule or regulation being proposed or amended.*

The District could have proposed the Best Available Control Technology requirements from SCAQMD Rule 1186.1, which requires alternative-fueled street sweepers. Instead, the District is relying on state regulations to reduce the NOx and PM emissions from the exhaust of diesel engines used in street sweeping.

- (5) *The emission reduction potential of the rule or regulation.*

The anticipated emission reduction potential of the proposed rules is about 1.2 tons per day of direct PM-10 emissions.

- (6) *The necessity of adopting, amending, or repealing the rule or regulation in order to attain state and federal ambient air standards pursuant to Chapter 10 (commencing with Section 40910).*

Ventura County is currently a non-attainment area for the state ambient standard for PM-10. Health and Safety Code Section 39614 requires that every air pollution control district that violates California ambient air quality standards for particulate matter adopt cost-effective control measure to control these emissions and to make progress toward attaining these standards.

---

**ENVIRONMENTAL IMPACTS OF METHODS OF COMPLIANCE/CEQA**

California Public Resources Code Section 21159 requires the District to perform an environmental analysis of the reasonably foreseeable methods of compliance. The analysis must include the following information on proposed new Rules 55.1 and 55.2:

- (1) *An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.*
- (2) *An analysis of the reasonably foreseeable mitigation measures.*
- (3) *An analysis of the reasonably foreseeable alternative means of compliance with the rule or regulation.*

Table 4 lists some reasonably foreseeable compliance methods, the environmental impacts of those methods, and measures that could be used to mitigate the environmental impacts.

**Table 9  
Environmental Impacts and Mitigations of Methods of Compliance**

| Compliance Methods (including all reasonably foreseeable alternative means of compliance)                | Reasonably Foreseeable Environmental Impacts   | Reasonably Foreseeable Mitigation Measures  |
|--|--|---|
| Using additional water to increase street sweeper PM collection efficiency.                              | Storm Water Impacts: Excess treatment or runoff may impact downstream waterways.                                   | The Los Angeles Regional Water Quality Control Board has adopted storm water regulations to mitigate contaminated effluent. |
| As an option to paving road shoulders or vegetation requirements, chemical dust suppressant may be used. | Water Impacts: Improper or excessive use of chemical dust suppressants containing sodium may impact water quality. | Proposed Rule 55.1 prohibits the use of chemical dust suppressants that may violate water quality standards.                |

This analysis demonstrates the adoption of new Rules 55.1 and 55.2 will not have a significant effect on the environment due to unusual circumstances. The amendments overall reduce emissions by an estimate of 1.2 tons per day of PM, and are thus categorically exempt from CEQA under Sections 15307 and 15308 of the state CEQA Guidelines.

---

**DISCLAIMER**

This report contains references to company and product names and services to illustrate product availability. Mention of these names is not to be considered an endorsement by the Ventura County Air Pollution Control District.

---

**REFERENCES**

1. Bernalillo County Air Quality Division, Albuquerque Environmental Health Department, Fugitive Dust Control Permit Application, March 1, 2005.
2. California Air Resources Board, "Ventura County PM-10 Emission Inventory," 2002.
3. California Air Resources Board, "PM-10 and PM-2.5 Concentrations and Exceedances," Air Quality Data Statistics, South Central Coast Air Basin, [www.arb.ca.gov/adam/welcome.html](http://www.arb.ca.gov/adam/welcome.html).
4. California Air Resources Board, "SB656 Staff Report - Air District Measures, Appendix C, 2004.
5. Clark County Air Quality Regulations, last amended July 1, 2004.
6. Darlington, T.L., Kahlbaum, D.F., Heuss, J.M. and Wolff, G.T., "Analysis of the PM-10 Trends in the United States from 1988 through 1995. Journal of the Air & Waste Management Association, October 1997. 1070-1078
7. Environmental Protection Agency, "Method 9: Visual Determination of the Opacity of Emissions from Stationary Sources," October 25, 1990.
8. Environmental Protection Agency, "PM Standards Revisions - 2006," promulgated Sept 2006.
9. Environmental Protection Agency, "Review of the National Ambient Air Quality Standards for Particulate Matter. Policy Assessment of Scientific and Technical Information - Extended Review Draft. 1996.
10. Health and Clean Air Newsletter, "An Inconvenient Reality," Winter-Spring 2006
11. Lave, Lester B. & Eugene P. Seskin "An Analysis of the Association Between U.S. Mortality and Air Pollution," Journal of the American Statistical Association 1973.
12. Mathai, C.V. and D.H. Stonefield, (editors) PM-10 Implementation of Standards. Air Pollution Control Association/EPA International Specialty Conference, San Francisco, February 1988.
13. Mokdad, Ali H., et. al "Actual Causes of Death in the United States, 2000". Journal of the American Medical Association, 2004.
14. Pope, C Arden, et. al . "Cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution." Journal of the American Medical Association. 2002.
15. Senate Bill 656, Chapter 738, Health and Safety Code Section 39614, approved by Governor on Oct 8, 2003, authored by Sen. Sher, Air Quality- Particulate Matter.
16. South Coast AQMD, List of Certified Street Sweepers under SCAQMD Rule 1186 (as of July 9, 2004). [www.aqmd.gov](http://www.aqmd.gov)
17. South Coast AQMD, Rule 1186, PM-10 Emissions from Paved and Unpaved Roads and Livestock Operations, adopted on Feb 14, 1997, and last amended on April 2, 2004.
18. South Coast AQMD, Rule 1186, Appendix A: SCAQMD Test Protocol - Rule 1186 Certified Street Sweeper Compliance Testing.
19. South Coast AQMD Rule 1186.1, Less Polluting Street Sweepers adopted on Aug 18, 2000, and last amended on May 5, 2006.
20. United States Dept of Agriculture, Dust Palliative Selection and Application Guide, Forest Service, Technology & Development Program, Nov 1999.
21. Ventura County Air Pollution Control Board, SB656 PM Reduction Plan, "Proposed Implementation Schedule for Fugitive Dust Control Measures," adopted on June 28, 2005.
22. Ventura County APCD, PM-2.5 Monitoring Network Plan, Monitoring and Technical Services Division, June 1998.
23. Watson, Richard, "Dust Control in the South Coast Air Basin: Working Together for Healthful Air," SCAQMD Fugitive Dust Course.