State of California

California Environmental Protection Agency
AIR RESOURCES BOARD

Staff Report

Proposed List of Measures to Reduce Particulate Matter – PM10 and PM2.5

(Implementation of Senate Bill 656, Sher 2003)

Release Date: October 18, 2004
Meeting Date: November 18-19, 2004

Approved by the Air Resources Board
November 18, 2004

Planning and Technical Support Division

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Air Resources Board Meeting
Begins November 18, 2004 at 9:00 a.m.
and may continue November 19, 2004 at 8:30 a.m.
Air Resources Board
Central Valley Auditorium
1001 I Street
Sacramento, California 95814

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I. INTRODUCTION

A. Background

Reducing particulate matter air pollution is one of the California Air Resources Board's (ARB or Board) highest public health priorities. Exposure to particulate pollution is linked to increased frequency and severity of asthma attacks, pneumonia and bronchitis, and even premature death in people with pre-existing cardiac or respiratory disease. Those most sensitive to particle pollution include infants and children, the elderly, and persons with heart and lung disease. Particulate matter pollution consists of very small liquid and solid particles suspended in the air and includes particles smaller than 10 microns in size (PM10), as well as the subset of fine particles smaller than 2.5 microns in size (PM2.5). Particles with a size between 2.5 and 10 microns are often referred to as coarse particles.

In 2003, the Legislature enacted Senate Bill 656 (SB 656, Sher), codified as Health and Safety Code (H&SC) section 39614, to reduce public exposure to PM10 and PM2.5. SB 656 requires ARB, in consultation with local air pollution control and air quality management districts (air districts), to develop and adopt, by January 1, 2005, a list of the most readily available, feasible, and cost-effective control measures that could be employed by ARB and the air districts to reduce PM10 and PM2.5 (collectively referred to as PM). The goal is to make progress toward attainment of State and national PM10 and PM2.5 standards.

The proposed control measures are to be based on rules, regulations, and programs existing in California as of January 1, 2004 to reduce emissions from new, modified, and existing stationary, area, and mobile sources. By July 31, 2005, the bill requires the ARB and air districts to adopt implementation schedules for appropriate ARB and air district measures. Finally, no later than January 1, 2009, the ARB must prepare a report describing actions taken to fulfill the requirements of the legislation as well as recommendations for further actions to assist in achieving the State PM standards. The bill requirements sunset on January 1, 2011, unless extended.

B. Scope of the PM Problem

1. PM Standards

The U.S. Environmental Protection Agency (U.S. EPA) and the 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. Attainment of California's standards is expected to result in the yearly prevention of an estimated 6,500 premature deaths, approximately

400,000 incidences of lower respiratory symptoms among children ages seven to fourteen, and over two million lost work days.

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

	California ($\mu g/m^3$)	**National** ($\mu g/m^3$)
PM10		
Annual	**20**	**50**
24-hour	**50**	**150**
PM2.5		
Annual	**12**	**15**
24-hour	-------	**65**

Virtually the entire State is nonattainment for the State PM10 standard, with most urban areas and several isolated sub-areas nonattainment for the State PM2.5 standard (Figure 1). With respect to the national standards, the San Joaquin Valley, the South Coast, and several desert areas are nonattainment for the federal PM10 standard. The U.S. EPA has issued preliminary PM2.5 national designation recommendations, with final designations to occur by December 31, 2004. Preliminary national PM2.5 nonattainment areas include the San Joaquin Valley, the South Coast, and San Diego. Further information on State and national designations can be found at:

http://www.arb.ca.gov/desig/desig03/desig03.htm

and

http://www.arb.ca.gov/desig/pm25desig/pm25desig.htm

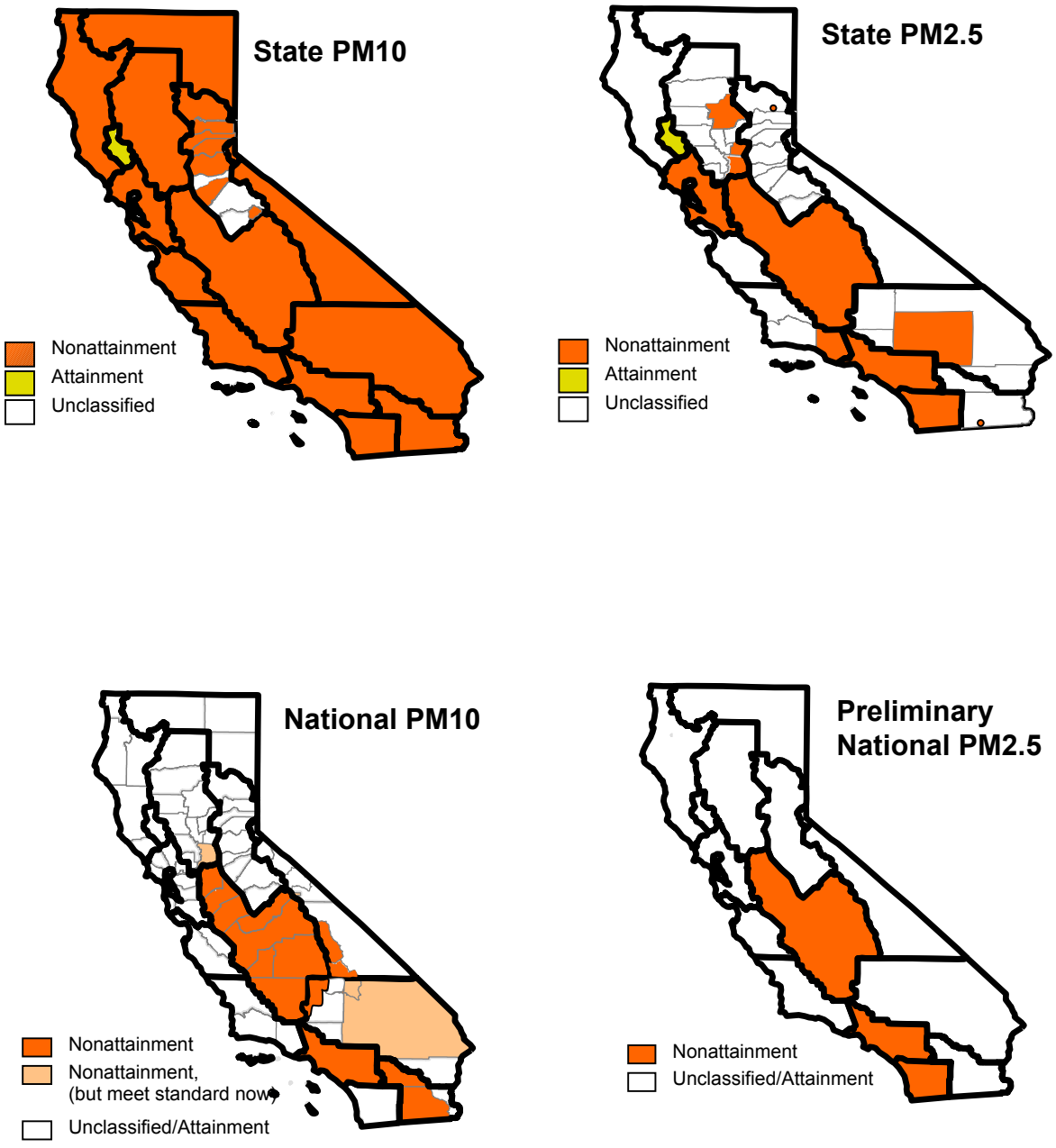
As discussed above, almost every area in California experiences PM concentrations above the level of the State standards. SB 656 therefore sets forth a framework for the implementation of measures to provide near-term reductions in PM throughout California, especially in those areas that have not been subject to federal planning requirements. This will ensure continuing focus on PM and progress towards attaining California's health protective standards.

In addition to the State PM standards, in 1998, the ARB identified PM emitted from diesel-fueled engines as a toxic air contaminant. Diesel PM contributes approximately 70 percent of the cancer risk associated with all currently identified toxic air contaminants in the State. Measures to reduce diesel PM are ARB's highest priority.

2. Nature of PM in California

Ambient PM is comprised of both directly emitted PM such as dust or 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

Figure 1. State and National Designations for Particulate Matter Standards



include nitrogen oxides (NOx), sulfur oxides (SOx), volatile organic compounds (VOC), and ammonia. NOx, SOx, and ammonia combine to form secondary ammonium nitrate and sulfate. VOC can form secondary organic aerosols, as well as participate in the production of secondary ammonium nitrate. NOx and VOC are also precursors of ambient ozone. 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 predominantly coarse particles.

The size, concentration, and chemical composition of PM vary by season and by region depending upon the mix of contributing sources and meteorology. A number of areas exhibit strong seasonal patterns. Other areas have a much more uniform distribution -- PM concentrations remain high throughout the year. In yet other areas, isolated PM exceedances can occur at any time of the year.

For example, in the San Joaquin Valley, the San Francisco Bay Area, and the Sacramento Valley, there is a strong seasonal variation in PM, with higher PM10 and PM2.5 concentrations in the fall and winter months. In the winter, PM10 and PM2.5 concentrations can remain elevated for extended periods. The PM2.5 size fraction drives the PM concentrations, and a major contributor to high levels of ambient PM2.5 in these regions in the winter is the secondary formation of ammonium nitrate from precursors emitted by stationary and mobile combustion sources. Increased activity for some emission sources (e.g. wood-combustion in stoves and fireplaces) and meteorological conditions are conducive to the build-up of PM.

In the South Coast region, PM concentrations remain high throughout the year. The more consistent activity patterns of emission sources, as well as less variability in weather patterns in the South Coast, leads to this more uniform concentration pattern. In other areas, high PM can be more episodic than seasonal. For example, in Owens Lake in the Great Basin Valleys Air Basin, episodic fugitive dust events lead to very high PM10 levels, with soil dust as the major contributor to ambient PM10.

The relative contribution of primary versus secondary PM will also vary by region and season. Throughout the State, on an annual basis, the fraction of PM2.5 comprised of secondary ammonium nitrate and sulfate can range between 10 and 60 percent of the PM2.5 mass (with ammonium nitrate contributing between 5 and 50 percent and ammonium sulfate contributing between 5 and 25 percent of the PM2.5 mass). The fraction contributed by secondary ammonium nitrate and ammonium sulfate can be even higher on a 24-hour basis. Only limited information is available on how much of the measured PM2.5

organic carbon component is secondary organic aerosols. In most areas, the majority of organic carbon is primary, and has been directly emitted from sources such as wood combustion, mobile sources, and commercial cooking. However, available studies suggest that in the South Coast on an annual average basis, secondary organic aerosols may constitute 6 to 16 percent of PM2.5, and in urban areas of the San Joaquin Valley during the winter, secondary organic aerosols may contribute up to an average of 8 percent of PM2.5.

Because the challenges vary from area to area as outlined above, each air district will need to consider a different mix of measures to address the unique nature of the PM problem in their region.

II. LIST DEVELOPMENT

A. Overview

Section 39614 (b) of the H&SC requires the ARB to develop and adopt a list of the most readily available, feasible, and cost-effective proposed control measures, based on rules, regulations, and programs existing in California as of January 1, 2004. To meet this requirement, ARB staff has developed a proposed list of readily available, feasible, and cost-effective air measures that could be adopted by air districts to make progress towards attainment of the State and federal standards. For information purposes, we also provide a summary of measures that ARB has adopted prior to January 1, 2004. We also provide a summary of measures that ARB is considering for development as part of our State Implementation Plan obligation for PM10 and ozone, as well as our Diesel Risk Reduction Program.

In preparing the Staff Report, ARB staff worked with air districts through conference calls with the California Air Pollution Control Officers Association planning managers and rule development committees, as well as with individual air districts. ARB staff also sought public input through a workshop held on May 6, 2004 in Sacramento, providing the opportunity to present both oral and written comments on a draft version of the air district list and summary of ARB measures released on April 22, 2004, and through follow-up meetings with various stakeholders.

Appendices A and B include an informational summary of ARB measures. Appendix C includes the proposed SB 656 list of air district measures. The H&SC describes broad authority for emissions control, with ARB having the primary jurisdiction over mobile sources, and air districts having primary jurisdiction over stationary sources. However, there are areas where cross-over can occur, such as ARB authority to develop airborne toxic control measures which can address both mobile and stationary sources. Therefore, the air district list is primarily comprised of measures for stationary sources, area-wide sources, transportation-related programs, and incentive programs.

As mentioned previously, ambient PM is comprised of both directly emitted PM such as dust or soot, as well as PM formed in the atmosphere from the reactions of precursor gases such as secondary ammonium nitrate or secondary organic aerosols. These precursor gases include NOx, SOx, VOC, and ammonia. Therefore, to address the full scope of possible PM problems, measures to address both directly emitted PM as well as precursor gases are included in the summaries of ARB measures and in the list of measures for air districts. It is important to note that these summaries and list are a compendium of measures that reflect the scope of the diverse nature of the different types of PM problems across the State. Air districts however, select an appropriate subset of measures from the air district list based on the severity and nature of the PM problem, and a feasibility and cost-effectiveness assessment specific to their area and sources.

B. ARB Measures

As described above, for information purposes, we prepared two summaries of ARB rules, regulations, and programs that reduce PM. The first is a summary of measures adopted from 1998 through January 1, 2004 (Appendix A). 1998 was selected as the starting point to take advantage of a recently developed compendium of ARB measures adopted within the past five years. Many measures adopted prior to 1998 were updated during this five-year period. Therefore, using the period of 1998 onward reflects the most current version of adopted measures. Some of these measures have future implementation dates. The summary includes measures in the following categories: 1) diesel-fueled engines and vehicles, 2) smoke management, 3) non-diesel mobile sources, 4) non-diesel fuels, 5) consumer products, 6) vapor recovery, and 7) distributed generation guidelines for electrical generation technologies. Some of the diesel measures have been adopted as airborne toxic control measures (ATCMs) to directly reduce the diesel component of PM as part of the Diesel Risk Reduction Program. As part of the toxic air contaminant control program, the ARB has also adopted ATCMs for asbestos from various sources (e.g., quarrying, mining), outdoor residential waste burning, medical waste incinerators, and chrome plating. While these measures are not included on the summary because their primary purpose was to reduce air toxics, they may provide additional PM reductions. Further information on these airborne toxic control measures can be found at:

http://www.arb.ca.gov/toxics/atcm/atcm.htm

The second summary describes measures that ARB has proposed for development as part of our State Implementation Plan obligation for PM10 and ozone, as well as our Diesel Risk Reduction Program (Appendix B).

C. SB 656 List of Air District Measures

Appendix C contains the proposed SB 656 list of air district measures. The list was compiled from a number of sources. These sources included recent rule assessments conducted by the California Air Pollution Control Officers Association for stationary and non-stationary sources, a best available control measure analysis performed for the 2003 San Joaquin Valley Air Pollution Control District PM10 State Implementation Plan, and review of air district rulebooks. The list comprises measures in the following categories: 1) wood-burning fireplaces and heaters, 2) non-agricultural open burning, 3) fugitive dust, 4) stationary combustion sources, 5) composting and related operations, 6) storage, transfer, and dispensing operations, 7) leaks and releases, 8) product manufacturing, 9) coatings, 10) solvent cleaning and degreasing, 11) miscellaneous activities, 12) general rules to reduce directly emitted PM, and 13) programs to reduce PM emissions from mobile sources (transportation-related programs and incentive programs).

All rules that had been adopted prior to January 1, 2004 were initially considered as readily available, feasible, and cost-effective due to their adoption by at least one air district within the State. However, many measures previously adopted by air districts, as well as rule assessments prepared by the California Air Pollution Control Officers Association, were developed for ozone planning purposes. While ozone and PM have common precursors, further evaluation of measures was conducted for the purpose of selecting a group of measures most appropriate for reducing ambient PM. Measures not included on the list from a PM perspective however, may still warrant consideration under different mechanisms such as ozone transport mitigation and other ozone planning requirements.

The review was conducted within the context of the legislation's criteria specifying measures that were the most readily available, feasible, and cost-effective from the perspective of attaining the PM standards, as well as an assessment of the types of measures that best reflect the nature of different PM source contributions on a statewide basis. No single criterion was given precedence in the review. Instead, the combined impact of all criteria was considered in selecting measures for inclusion on the list. In some cases, selected rules may operate under alternative compliance mechanisms such as the South Coast's RECLAIM program. However, their feasibility and availability were evaluated independently of these programs and rules were not eliminated simply on the basis of their eligibility to operate under this type of program. Measures that would have limited applicability, or which were already addressed through other statewide regulations were not included in the list. Setting opacity limits for wood burning fireplaces and heaters and requirements to cover haul vehicles are examples of such measures.

ARB staff identified measures that generally represent the best levels of emission control that have been adopted within the context of the screening procedures identified above. This serves to provide a list with the potential for the greatest degree of health protection, as well as providing adequate measures for areas in the State with the most severe nonattainment problems. Assessment of the level of emission control included examination of rule requirements such as emission limits, performance requirements, and the scope of source activities addressed. However, in a number of cases, several different control options for a given source category are presented where a number of individual source types are included within a single rule (such as the combustion and solvent use categories), or where different approaches to control can be equally effective depending upon the nature of the PM problem. For example, measures to reduce residential green waste burning include approaches that limit burning based on availability of green waste pickup, lot size, or population. In addition, alternative rules are included in cases where a rule has future implementation dates that are dependent on expected demonstration of technology. While rules with future implementation limits may not be necessary in many areas of the State, they are offered for consideration in air districts with more severe PM problems that may require more stringent emission limits. Finally, in several cases, similar rules or programs may have been adopted by multiple air districts, but in general only one has been listed as a representative example. Many air districts, for example, have adopted measures to require the sale and installation of only U.S. EPA-certified Phase II woodstoves. The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other air district rules which may also represent similar, suitable levels of control.

Given the diversity of PM problems throughout the State, as well as the range in the relative severity of nonattainment, the list of air district measures compiled by the ARB is necessarily broad in the scope of possible measures and the range of cost-effectiveness. The cost-effectiveness of a particular measure will also vary from air district to air district. With some exceptions, H&SC section 39614 requires each air district to adopt an implementation schedule for the measures from the list of air district measures that are the most cost-effective measures for that air district. Since the law leaves the final decision to each air district as to which measures are the most cost-effective measures, ARB is not drawing a firm line as to which measures are the most cost-effective measures from a “first-cut” or statewide perspective. Instead, ARB is presenting a more comprehensive list of measures along with guidance and supporting information in order to provide cost-effectiveness information to the air districts. Listing of a measure on the ARB list does not imply that the measure is a “most cost-effective” measure for every air district. Each air district should review the list together with the supporting information as the air district makes its determination as to which are the most cost-effective measures for the air district. The list therefore provides a starting point, or menu of control strategy options to address the many different types of PM problems. Air districts will select appropriate measures from this list

based on a local assessment of air quality conditions, feasibility, and cost-effectiveness. This process is discussed in further detail in Section III.

III. AIR DISTRICT IMPLEMENTATION PROCESS

Once the Board adopts the initial list, air districts must adopt implementation schedules by July 31, 2005 at a noticed public meeting and after at least one public workshop. The implementation schedules identify the selected subset of measures, and the dates for final adoption, implementation, and sequencing of selected control measures. In developing the implementation schedule, H&SC section 39614 (d)(2) specifically requires each air district to prioritize measures that the air district is considering from the list based on the effect individual measures will have on public health, air quality, emission reductions, and cost-effectiveness. Consideration is also given to the impact of selected measures on other criteria pollutants, as well as to the benefits accruing from measures adopted as part of ongoing ARB statewide efforts.

Air district implementation begins with an assessment of the nature and severity of the PM problem in each area. This is followed by an evaluation of the cost-effectiveness of a subset of measures appropriate to the specific needs of the area. Finally, an air district will select and prioritize a list of measures designed to most cost-effectively make progress towards attaining the PM standards.

Each air district will tailor its implementation schedule to its individual PM problem. For example, although most air districts do not meet the State PM10 standards, some are closer to attainment than others. In addition, the size (coarse versus fine) and chemical composition of PM varies by region and season. In some areas, fugitive dust events may lead to high PM concentrations. In other areas, the major contributors may be the secondary formation of PM2.5 caused by the reaction of precursor gases. Therefore, in adopting an implementation schedule, each air district will first characterize the major components of PM in their area to determine the most appropriate level and type of control approach. To assist air districts in evaluating the nature of their PM problem, the ARB is preparing the resources described in Section IV Part A. Within this context, air districts then prioritize and select the most cost-effective subset of measures appropriate to their local situation to make progress towards attaining the PM standards. For example, rules addressing VOC sources may only need to be considered in areas where there are significant contributions from secondary organic aerosols, or where VOCs are a key precursor for reducing ammonium nitrate concentrations. Other areas where wood smoke causes significant impacts may in contrast focus on residential wood combustion control measures. As a starting point, ARB has prepared the suggested list of basic control measures for different types of PM problems described in Section IV Part B.

In selecting and prioritizing the most cost-effective measures for their implementation schedules, H&SC section 39614 (a), (d)(1), and (d)(2) provide that air districts should follow the standards and process described in H&SC section 40922 which sets forth California Clean Air Act (CCAA) measure ranking procedures for ozone. H&SC section 40922 states that air districts shall determine the cost-effectiveness of available and proposed control measures and then prepare a list that ranks the control measures from least cost-effective to most cost-effective. In adopting an implementation schedule, air districts will also consider technological feasibility, emission reduction potential, rate of reduction, public acceptance, and enforceability, in addition to cost-effectiveness. H&SC section 39614 (d)(2) specifically requires each air district to prioritize measures that the air district is considering under the SB 656 program from the list of air district measures based on the effect individual control measures will have on public health, air quality, and emissions reductions and on cost-effectiveness. H&SC section 39614 (d)(1) provides that after the air district goes through the prioritization, the air district must adopt a prioritized implementation schedule for the most cost-effective measures (unless a statutory exception applies). Therefore, it is the air district's discretion to select, based on the magnitude and nature of their PM problem, a subset of measures to most cost-effectively address their specific PM problem.

It is important to recognize that not all rules are equally cost-effective or appropriate in all areas of the State. Cost-effectiveness and feasibility will vary depending upon the number, size, and configuration of sources within a jurisdiction, and the contribution of that source to local PM concentrations. Cost-effectiveness is also dependent upon the existing degree of control for a given source type. Therefore, cost-effectiveness will vary depending upon the baseline or starting point in each air district. Each air district will estimate the local cost-effectiveness when prioritizing potential control measures.

As a starting point for air district analysis, the ARB has compiled the available cost-effectiveness information for each measure. This information was developed based on ARB and air district review of district Board hearing materials, staff reports published to support rule adoption, air district Clean Air Plans or Air Quality Management Plans required under the CCAA, and State Implementation Plans. Table 2 summarizes the air district measures in each major program or major emission source category organized by increasing cost-effectiveness range. The supporting data for this table are presented in Appendix D. Cost-effectiveness is grouped into six bins. The first bin includes savings to no-cost; the next five bins include cost-effectiveness ranges increasing by $5,000/ton of pollutant reduced, with the last bin representing cost-effectiveness values greater than $20,000/ton of pollutant reduced. For some control measures, the cost-effectiveness figures span a large range. Table 2 includes short comments on factors leading to large cost-effectiveness ranges. For example, boiler, steam generator, and process heater control measures apply to different types of units in significantly different sizes, with a mix of

previous control levels, accomplished by a variety of control methods or technology. Therefore, within a single rule, some types of units may be more cost-effective to control than others. Therefore, in selecting the most cost-effective measures under the SB 656 program, an air district should adopt and implement the rule for the types of units or source types for which the measure is a most cost-effective measure for that individual air district.

In adopting an implementation schedule, air districts will also consider other ongoing programs such as measures being adopted to meet federal air quality standards or the State ozone planning process. Additionally, the implementation schedule may not include any measures that are substantially similar to one already adopted by an air district, or scheduled for adoption within two years of adoption of the implementation schedule. While the measures selected to fulfill the requirements of SB 656 must be different from any measures already planned to meet other requirements, the legislation does not require that any planned measure be accelerated. Air districts may modify their implementation schedules if circumstances change with respect to attainment status, the nature of sources, or the effects of ongoing control programs.

Air districts are not required to adopt a measure to further regulate emissions from any source that operates under, or that requires an air district to modify, either a market-based incentive program, or an interchangeable emission reduction credit program. The legislation provides flexibility to air districts in assessing whether there are alternative readily available, feasible, and cost-effective measures that would achieve equivalent or better emission reductions that could be included on the air district's implementation schedule in lieu of a measure on the list in Appendix C. The measures included on the air district list represent guidance on the scope and level of emission control for each source category, accompanied by a reference to a specific air district rule or rules. These rules are referenced with specific rule language as adopted. However, air districts do not need to incorporate the exact language of the referenced rules, but rather should match the scope and emission limits within the context and structure of their local rulebooks and the nature of sources within their air district.

Although the list of air district measures provides a retrospective look at measures adopted prior to January 1, 2004, footnotes have been provided in cases where rules have been amended subsequent to this date. While not part of the list, ongoing rule development and rule amendments can be reviewed for additional approaches to reduce PM.

Table 2: Cost-Effectiveness of Proposed Air District Measures

Category	Measure	Cost-Effectiveness ($ in thousands /ton of pollutant reduced)						Comments
		<0	0 – 5	5 – 10	10-15	15 – 20	>20	
Miscellan.	▪ Solid waste landfills	X						
Wood Burning Fireplaces and Heaters	▪ Public awareness program ▪ Curtailment programs ▪ Require installation of U.S. EPA certified stoves ▪ Limit number of heaters in new and exiting properties ▪ Control wood moisture content ▪ Prohibit fuel types	X	X					
Coating Operations	▪ Glass ▪ Metal parts and products ▪ Paper, fabric, and film ▪ Plastic and rubber ▪ Spray booth facilities ▪ Wood flat stock ▪ Wood products	X	X					
Product Manufacture	▪ Food manufacturing and processing ▪ Polyester resin operations	X	X					
Fugitive Dust	▪ Apply water during construction, operations (earthmoving, demolition, grading) ▪ Apply water during bulk material handling ▪ Clean up carryout and trackout ▪ Street sweeping		X					
Combustion Sources	▪ Commercial charbroiling operations ▪ Lime kilns ▪ Cement kilns ▪ Petroleum Coke Calcining		X					
Miscellan.	▪ Woodworking operations		X					
Coating Operations	▪ Adhesives and sealants	X	X	X				
Combustion Sources	▪ Furnaces		X	X				
Fugitive Dust	▪ Apply chemical stabilizers or pave shoulders on paved roads ▪ Apply water or chemical stabilizers on unpaved roads, ▪ Pave unpaved roads		X	X				

Table 2: Cost-Effectiveness of Proposed Air District Measures

Category	Measure	Cost-Effectiveness ($ in thousands /ton of pollutant reduced)						Comments
		<0	0 – 5	5 – 10	10-15	15 – 20	>20	
Product Manufacture	▪ Fiberboard		X	X				
Fugitive Dust	▪ Apply water at disturbed open areas ▪ Storage, handling of coke, coal, and sulfur			X				
Coating Operations	▪ Architectural coatings ▪ Graphic arts			X				
Solvent Cleaning and Degreasing	▪ Use of solvents			X				
Composting	▪ Chipping and grinding			X				
Wood Burning Fireplaces and Heaters	▪ Replace non-certified appliances	X	X	X	X			▪ Considering long term energy savings leads to lower CE ▪ CE also depends on appliance type
Fugitive Dust	▪ Apply water, chemical stabilizer, gravel, or pave unpaved parking lots ▪ Apply water, chemical stabilizer, gravel, or pave unpaved roads adjacent to agricultural fields		X	X	X			
Leaks and Releases	• Equipment leaks (valves and flanges)		X	X	X			
Product Manufacture	▪ Polymeric products			X	X			
Non-Agricultural Open Burning	▪ Prohibit burning in highly populated areas		X	X	X	X		
Combustion Sources	▪ Turbines		X	X	X	X		Depends on unit size and control method
Combustion Sources	▪ Residential water heaters		X	X	X	X		Depends on emission limit
Storage, Transfer, & Dispensing Operations	▪ Organic liquid storage		X		X	X		Depends on equipment type to be controlled

Table 2: Cost-Effectiveness of Proposed Air District Measures

Category	Measure	Cost-Effectiveness ($ in thousands /ton of pollutant reduced)						Comments
		<0	0 – 5	5 – 10	10-15	15 – 20	>20	
Combustion Sources	▪ Boilers, steam generators, and process heaters	X	X	X	X	X	X	Depends on unit size, operating capacity factor, and emission limits compared to the current limit
Solvent Cleaning and Degreasing	▪ Degreasing operations	X	X	X	X	X	X	Depends on equipment and control type
Combustion Sources	▪ IC Engines		X	X	X	X	X	Depends on burn type (rich burn-lower CE; lean burn-higher CE), power output, and original level of emissions (higher emissions-lower CE)
Fugitive Dust	▪ Set controls at roads to avoid carryout and track-out			X	X	X	X	Depends on extent of road control (devices installed at access points, length of interior road being paved) and traffic amount on road
Miscellan.	▪ Soil decontamination			X	X	X	X	Depends on soil disposition method
Fugitive Dust	▪ Apply water to stored bulk materials						X	
Non-Agricultural Open Burning	▪ Mandatory curtailment ▪ Control smoke production ▪ Performance standards							NE or NA
Mobile Sources	▪ Incentive Programs							NA
Mobile Sources	▪ Transportation-related programs							NA

NE = Not estimated
NA = Not applicable (emission reductions cannot be estimated accurately)

IV. RESOURCES FOR AIR DISTRICTS

A. Characterization of Ambient PM by Air Basin

To assist air districts in evaluating the nature of their PM problem, the ARB has prepared an initial evaluation of PM in each of the State's 15 air basins. This assessment evaluates the role of PM2.5 versus PM10, the magnitude of the PM problem, seasonality, significant sources of directly emitted PM, and the contribution of secondary PM. The current version of this assessment document can be found at:

http://www.arb.ca.gov/pm/pm.htm.
This assessment will be updated by January 1, 2005 with the most recent data available from both routine monitoring sites and special purpose monitoring studies.

B. Basic Measures for Different Types of PM Problems

The list of air district measures is comprehensive in scope, and, as discussed in Section III, air districts will select an appropriate subset of measures from the list. As a starting point, the ARB staff has prepared a suggested list of basic measures that air districts may want to consider in developing and prioritizing measures for their implementation schedules. Table 3 includes measures for those PM sources that generally represent the largest emission contributions and are the most ubiquitous throughout the State. The table contains suggested measures grouped by different types of PM problems. For example, areas with a winter wood smoke problem may want to target the core measures listed in the first section of the table, whereas areas with fugitive dust problems may focus on the different measures in the dust section.

In each section, a general description of the types of basic proposed measures are included, along with a reference to the specific measure on the full list of air district measures contained in Appendix C. While some areas that are closer to attainment may be able to select from the shorter list contained in Table 3, other areas with more severe problems, or with contributions from more unique sources, may need to consider the broader group of measures in Appendix C.

C. Cost-Effectiveness Documentation Clearinghouse

As discussed previously, a specific cost-effectiveness estimate associated with a previously adopted rule by an air district does not necessarily apply to a similar rule being considered by another air district. Each air district will need to review the information provided in this report and determine the applicability for their situation, and calculate air district-specific cost-effectiveness values as appropriate. Therefore, as an additional resource for air districts, the ARB staff is also developing a clearinghouse of the staff reports and cost-effectiveness

Table 3: Proposed Set of Basic Air District Measures for Different Types of Particulate Matter Problems

PM Problem Type	Measures	Measure Number*
Smoke from Wood-Burning Fireplaces and Heaters	▪ Establish a public awareness program; ▪ Set a voluntary curtailment during periods with predicted high PM levels (or update to mandatory); ▪ Require all woodstoves and fireplace inserts installed be U.S. EPA certified or equivalent; ▪ Limit number of wood-burning fireplaces and heaters in new developments; ▪ Replace non-certified units upon property sale; ▪ Control wood moisture content; ▪ Prohibit burning of materials not intended for use in wood-burning appliance.	1 2 (3) 4 7 10a 11 12
Smoke from Non-Agricultural Burning	▪ Establish mandatory curtailment during periods with predicted high PM levels; ▪ Set performance standards for allowed burns.	17 20-22
Dust from ▪ Construction	▪ Establish requirements for earthmoving, demolition, and grading operations (e.g., applying water or chemical stabilizers/dust suppressants).	24-26
▪ Paved Roads	▪ Establish requirements for new and modified public and private roads (e.g., paved shoulders, curbing, chemical suppressants); ▪ Establish requirements for sweeping existing roads.	33 34 37
▪ Unpaved Roads	▪ Set control requirements for unpaved roads (e.g., watering, graveling, applying suppressants, vegetating, paving, setting speed limits).	39-43
▪ Windy Conditions	▪ Establish requirements to suppress windblown dust from construction/earthmoving operations, disturbed areas, and bulk material storage piles (e.g., ceasing active operations, watering, applying chemical stabilizers).	44
▪ Agricultural Operations	▪ Set requirements for agricultural sources (e.g., treating unpaved roads, watering, and other dust-reducing measures).	

Table 3: Proposed Set of Basic Air District Measures for Different Types of Particulate Matter Problems

PM Problem Type	Measures	Measure Number*
Direct PM from Combustion Sources	Set requirements for commercial charbroiling operations (e.g., emission control device)	53
Direct PM from Sources Not Covered under Any Other Specific Rule	▪ Set visible emission limits (e.g, opacity). ▪ Set PM emission limits from combustion sources.	89 90-91
Ammonium Nitrate (NOx measures)	Set NOx emission limits for: ▪ Boilers, steam generators, and process heaters ▪ Turbines; ▪ IC engines; ▪ Residential central furnaces; ▪ Residential water heaters.	 45 46 47 51b 52
Ammonium Nitrate and Secondary Organic Aerosols (VOC measures)	▪ Set requirements for architectural coatings (e.g., limiting VOC content in coatings); ▪ Set VOC emission limits from solvent use (e.g., limiting VOC content of products used, through operation requirements).	68 83-85

* Measure number from Appendix C – Proposed List of Air District Measures to Reduce Particulate Matter

evaluations prepared by the air districts in support of adopting the rules contained in the list of air district measures. This information will be made available via the web to facilitate air district evaluations of local cost-effectiveness and emission reduction potential considerations.

V. ISSUES

During the development of the list, several issues were raised by various stakeholders. The key issues and a summary of how they were addressed is provided below.

A number of comments were received on the need for presentation of cost-effectiveness information, both for understanding the selection of control measures included on the list, and to provide a resource for air districts in prioritizing control measures during the air district implementation process. In response, as described in Section IV above, the ARB worked with air districts to compile the cost-effectiveness information developed for each rule as adopted by the air district. This information is presented in Table 2 and Appendix D. The methodology used by air districts to calculate cost-effectiveness may differ, and cost-effectiveness values will also vary depending upon the baseline level of control. In addition, the base year for the economic calculation will vary depending upon when the rule was adopted. No normalization of the data was conducted. However, information relevant to understanding this variability is presented in Appendix D and in the accompanying staff reports that will be included in the clearinghouse. Not withstanding these caveats, the information presented in Table 2 and Appendix D provides useful information on the relative cost-effectiveness of different types of control programs and serves as a launching point for initial selection of measures and local cost-effectiveness evaluation.

Another comment was that ARB should specify a threshold for cost-effectiveness, above which measures would not be deemed cost-effective. Such measures would not be included for consideration either on the initial list of air district measures prepared by ARB, or in the implementation schedules to be prepared by the air districts. As discussed earlier, given the breadth of PM problems in the State, their complexity, and their severity, ARB believes that it is not appropriate or feasible to establish a cost-effectiveness threshold. Depending upon the rules already adopted in an air district and the nature and severity of the problem, what is considered cost-effective will vary among air districts. The list of air district measures presented in Appendix C, accompanied by the cost-effectiveness information presented in Table 2 and Appendix D, serves to establish a “master” list of the most readily available, feasible, and cost-effective measures for subsequent air district use in developing implementation schedules. Air districts, during the implementation schedule development process, will develop the most cost-effective solution to reducing PM in their

region, following the guidance specified in the legislation as described in Section III of this report.

Finally, several commenters suggested that transportation control measures be included on the list. These types of measures are not addressed here because transportation control measures are generally adopted and implemented by local transportation control agencies, rather than by air districts. However, air districts are not precluded from working with other agencies in assessing the benefits of additional non-air district programs and pursuing these types of programs as appropriate as part of an air district's overall efforts to attain the PM standards.

FOREWORD TO APPENDICES

Appendices A and B summarize ARB measures that reduce PM. Appendix C provides the SB 656 list of air district measures. The appendices include measures that reduce directly emitted particulate matter (PM) and measures that reduce gaseous precursors that react in the atmosphere to form secondary PM. Pollutants reduced by each of the listed measures are indicated in parenthesis. For measures that reduce directly emitted PM10, the listing of "PM10, PM2.5" indicates that while the measure reduces both PM2.5 and PM10, reductions occur primarily in the fine fraction. In contrast, a listing of "PM10" indicates the measure reduces primarily the coarse fraction. Precursors reduced by listed measures include nitrogen oxides (NOx), volatile organic compounds (VOC), and sulfur oxides (SOx). NOx and VOC are also precursors of ambient ozone. Different measure descriptions may also refer to VOC as reactive organic gases (ROG), hydrocarbons (HC), non-methane hydrocarbons (NMHC), or non-methane organic gases (NMOG).

In each of these appendices, the listed measures are grouped by major program or by major emission source category. Appendix A also indicates the date of the public ARB hearing when the measure was adopted. Appendix B includes the proposed date for Board consideration of measures proposed for development. Appendix C indicates the air district that adopted the listed measure, the rule identification number, and the date when the district adopted or most recently amended the rule. The source type column specifies if the listed measure applies to new, existing, or modified sources. The specific rule language for each listed rule can be found in ARB's air district rule logbook at:

http://www.arb.ca.gov/drdb/drdb.htm

Appendix D lists the cost-effectiveness of each air district control measure as reported by the air district at the time the rule was adopted or amended. Cost-effectiveness is expressed in dollars per ton of pollutant reduced. The measures are organized by major program or by emission source category. The list indicates the air district that adopted the listed measure, the rule identification number, and the date when the district adopted or most recently amended the rule. For some rules, the cost-effectiveness numbers represent overall rule cost-effectiveness (e.g., average cost-effectiveness), while for other rules, cost-effectiveness is presented as a range. The cost-effectiveness (C.E.) notes column includes information related to the cost-effectiveness numbers listed such as pollutant(s) considered in the cost-effectiveness estimates, explanations of reference document dates, and specific equipment and operation scenarios leading to cost-effectiveness ranges.

APPENDIX A

Adopted ARB Measures that Reduce Particulate Matter

Adopted ARB Measures that Reduce Particulate Matter (PM)

The following are measures adopted from 1998 through December 2003 under the ARB Diesel Risk Reduction Plan (DRRP), as part of Ozone and PM State Implementation Plans (SIP), and additional measures adopted to make progress towards the attainment of ambient ozone standards.

A. Diesel-Fueled Engines and Vehicles

	Strategy	Adoption Date*
	Emission Standards for New On-Road Heavy Duty Diesel (HDD) Engines (PM10, PM2.5, NOx, VOC)	
1.	***HDD Engines 2004 and Later Model Year*** Requires HDD engines, exclusive of urban bus engines, to certify to a 0.10 grams per brake horsepower-hour (g/bhp-h) PM standard and a 4.0 g/bhp-hr NOx standard. Urban bus engines produced for sale in California have been subject to more stringent emission standards sooner that other classes of HDD engines – 0.05 g/hp-hr PM and 4.0 g/bhp-hr NOx standards since 1996. *Reference:* *http://www.arb.ca.gov/regact/2004/2004.htm*	4/23/98
2.	***Supplemental Test Procedures for HDD Engine Certification*** Includes the Not-to-Exceed and the EURO III European Stationary Cycle Emission Tests in the required California certification process for 2005 and subsequent model year HDD engines and in 2007 for “ultra-small volume " and “urban buses”. The supplemental tests ensure that engine exhaust emissions are controlled over the range of operating conditions. *Reference:* *http://www.arb.ca.gov/regact/NTEtest/ntetest.htm*	12/7/00
3.	***HDD Engines 2007 and Later Model Year*** Aligns ARB with U.S. EPA’s emission standards – 0.01 g/bhp-hr PM, 0.20 g/bhp-hr NOx, and 0.14 g/bhp-hr NMHC – and phase-in schedule based on model year. The 2007 standards require aftertreatment-based technologies for all HDD engines and vehicles in conjunction with very low-sulfur diesel fuel. The standards also apply to natural gas-fueled engines and liquefied petroleum gas-fueled engines derived from the diesel-cycle engine. *Reference:* *http://www.arb.ca.gov/regact/HDDE2007/HDDE2007.htm*	Revised 10/25/01

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
4.	**Emission Standards for New Off-Road Diesel Engines** (PM10, PM2.5, NOx, VOC, CO) Requires new off-road compression ignition engines (CI) to meet several tiers of PM, NOx, HC, and CO emission standards, phased-in by sales date and engine power. U.S. EPA standards aligned with ARB's Tier 1 standards beginning with 1996 model year engines, and ARB harmonized with U.S. EPA Tier 2 and Tier 3 requirements beginning in 2000. Tier 3 standards are to be phased-in through 2008 and will only apply to 50-750 hp engines. ARB does not have authority to regulate new farm and construction equipment under 175 hp. Only U.S. EPA can set emission standards for these preempt engines. *Reference:* http://www.arb.ca.gov/regact/ciengine/ciengine.htm	1/27/00
5.	**California Diesel Fuel Regulations** (PM10, PM2.5, SOx) Includes the following: 1) sets the maximum permissible sulfur content in vehicular diesel fuel to 15 ppmw starting in mid-2006 (very low sulfur), 2) sets requirements for certification of alternative diesel fuel formulations, 3) sets sulfur specification for certification of diesel fuel for light- and medium-duty vehicles that is identical to U.S. EPA's, 4) sets new specifications for equivalency to the aromatic hydrocarbon limit for California diesel fuel, 5) establishes standards for diesel fuel lubricity, 6) requires the use of vehicular diesel fuel in all non-vehicular diesel engines except engines used to power locomotives and marine vessels, and 7) establishes a method for testing low sulfur diesel. *Reference:* http://www.arb.ca.gov/regactulsd2003/usld2003.htm Use of very low-sulfur diesel fuel reduces PM and SOx emissions and enables the use of aftertreatment technologies which can reduce NOx, PM, and ROG. For examples of measures requiring use of low-sulfur diesel fuel, refer to the following measures on this list: 3. HDD Engines 2007 and Later Model Year 7. Transit Bus Fleet Rule 9. On-Road Heavy Duty Solid Waste Collection Vehicles Air Toxic Control Measure (ATCM) Additional measures can be found on the list of ARB measures proposed for development: 13. Transport Refrigeration Units ATCM 16. Portable Engines ATCM 24. Stationary Compression Ignition Engines ATCM	7/24/03

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
6.	**Procedures to Verify Diesel Retrofit Strategies for Existing Engines** (PM10, PM2.5) Establishes procedures to verify emission control strategies by ARB that can be applied to various diesel-fueled engines and vehicle model years to significantly reduce diesel PM emissions. Strategies verified to "level 1" achieve at least 25% PM reduction (e.g., diesel oxidation catalysts or DOC); those verified to "level 2" achieve at least 50% PM reduction; and those verified to "level 3" achieve at least 85% PM reduction or reduce PM levels to no more than 0.01 g/bhp-hr (e.g., diesel particulate filter or DPF). In addition, verification procedures require, starting January 1, 2007, NO_2 emissions from an engine employing a diesel emission control strategy not to exceed 20% of the engine's baseline NOx emissions. Note: This measure was amended on February 26, 2004. *Reference:* http://www.arb.ca.gov/regact/diesel/rv/dieselrv.htm	5/16/02
7.	**Fleet Rule for Transit Agencies and Emission Standards for New Urban Bus Engines** (PM10, PM2.5, NOx) The Urban Bus Engine Exhaust Emission Standards rule requires new diesel urban engines to meet a 0.01 g/bhp-h PM standard in October 2002, a 0.5 g/bhp-h NOx standard in 2004, and a 0.2 g/bhp-hr NOx standard in 2007. Recently adopted amendments allow engine manufacturers to certify 2004 to 2006 model year diesel hybrid electric buses at 0.01 g/bhp-hr for PM and 1.8 g/bhp-hr for NOx for sale to select transit agencies. The Fleet Rule for Transit Agencies requires transit agencies to: 1) reduce emissions of NOx to a fleet average from all engines of 4.8 g/bhp-h NOx as of October 1, 2002, 2) phase-in fleet PM emission reductions from diesel engines beginning in 2004, 3) use very low sulfur diesel fuel as of July 1, 2002, and 4) for larger transit agencies, demonstrate and eventually purchase zero emission buses. Recently adopted amendments allow diesel path transit agencies to purchase hybrid electric buses certified to 0.01 g/bhp-hr for PM and 1.8 g/bhp-hr for NOx, provided they offset the difference between the 1.8 g/bhp-hr NOx standard and the diesel bus engine standard of 0.5 g/bhp-hr NOx. Note: Amendments to this measure were adopted at the June 24, 2004 Board meeting. *Reference:* http://www.arb.ca.gov/msprog/bus/bus/htm	1/27/00; amended 10/24/02

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Diesel PM Air Toxic Control Measures (ATCMs) (PM10, PM2.5)	
8.	***School Bus Idling and Idling at Schools*** Limits school bus idling and idling of public transit and charter type buses and heavy-duty vehicles while operating on or near school grounds. The ATCM is intended to reduce diesel PM and other pollutants from these vehicles' exhaust. Enforcement implemented since April 2004. *References:* http://www.arb.ca.gov/regact/sbidling/sbidling.htm and http://www.arb.ca.gov/toxics/idling/idling.htm	12/12/02
9.	***On-Road New and In-Use Heavy Duty Solid Waste Collection Vehicles*** Mandates the reduction of diesel PM emissions through the application of best available control technology (BACT) to 1960-2006 model year residential and commercial in-use solid waste collection vehicles. Four options are offered to fleet owners and operators to meet the requirement to use BACT: 1) use of a diesel engine or power system that is certified to the 0.01 g/bhp-hr PM standard, 2) use of an engine certified to 0.01 g/bhp-hr PM in combination with the highest applicable verified diesel emission control strategy, 3) use of an alternative fuel engine or a heavy-duty pilot ignition engine, or 4) application of a diesel emission control strategy or system verified by ARB that reduces diesel PM emissions by the greatest amount possible for that engine and application. The requirement to install BACT will be phased-in between 2005 and 2010 by engine model year group. *Reference:* http://www.arb.ca.gov/msprog/swcv/swcv.htm	9/25/03
10.	**Statewide Portable Equipment Registration Program** (PM10, PM2.5, NOx, VOC) This statewide registration program currently allows portable-engine owners to voluntarily register their new and existing certified engines with the ARB in lieu of obtaining operating permits from the air districts. Certified portable engines are engines that meet U.S. EPA/ARB off-road engine emission standards. On February 26, 2004, the Board approved an amendment that will allow any portable engine, certified or not, and operating in California before 2003, to register into the program until December 31, 2005. After this date, only certified portable engines can register in the program. In addition, the program will require, by January 1, 2010, non-certified engines that are registered into the program to be replaced with certified engines. Note: This measure was amended on February 26, 2004. *Reference:* http://www.arb.ca.gov/perprev/perprev.htm	Revised 12/10/98

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Inspection Programs (PM10, PM2.5) Ensure that in-use engines continue to have functional controls and proper maintenance.	
11.	***Periodic Smoke Inspection*** Requires fleets with two or more HDD trucks or buses to perform annual smoke inspections to ensure compliance with ARB approved smoke opacity limits and to repair failing vehicles. *Reference:* *http://www.arb.ca.gov/msprog/hdvip/hdvip.htm*	Implemented 7/1/98
12.	***Heavy Duty Roadside Inspection*** Inspectors conduct random roadside tests of diesel trucks to ensure that smoke emissions are within acceptable levels and that emission control devices have not been tampered with. The program was adopted in 1990 and ran from 1990-1993, when it was suspended. A revised program was adopted in December 1997. In 2001, ARB staff began conducting inspections in mixed-use communities (residential/commercial/industrial areas), as part of an environmental inspections program. In 2003, ARB increased the frequency of truck and bus highway inspections in conjunction with community-based inspections in the South Coast Air Basin. *Reference:* *http://www.arb.ca.gov/msprog/hdvip/hdvip.htm*	Implemented 6/1/98, augmented 2003
	Incentive Programs (PM10, PM2.5, NOx) An annual funding source is needed in order to rely on incentive programs.	Starting Date
13.	***Carl Moyer*** This grant program provides grants to pay for the extra cost of replacing in-use diesel equipment and engines by retrofitting with ARB-certified technology or by purchasing new cleaner diesel engines or engines powered by alternative fuels or electricity. The implementation of this program has resulted in cleaner heavy-duty trucks, buses, marine vessels, harbor craft, and agricultural equipment. ARB has the responsibility to establish program guidelines, oversee the program, and report program benefits. Air districts implement the program and work with public and private participants. *Reference:* *http://www.arb.ca.gov/msprog/moyer/moyer.htm* (continued on next page)	1999

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Incentive Programs (continuation)	
14.	***Lower Emission School Bus Program*** The new bus purchase component of the program, intended to replace high-polluting pre-1987 buses, provides grants to public school districts to assist with the purchase of new lower-emitting alternative-fuel school buses or new lower-emitting diesel school buses that use ultra-low sulfur diesel fuel. The in-use diesel bus retrofit component pays for the full purchase and installation of ARB-verified retrofit devices for use on eligible 1991 and later model year engines. A portion of the program funds are targeted in areas to directly benefit low-income communities and communities of color. *Reference:* http://www.arb.ca.gov/msprog/schoolbus/schoolbus.htm	2001
15.	***Alternative Diesel Fuel*** Under this program, ARB distributed $500,000 - allocated for fiscal years 2000/2001 through 2002/20003 by the passage of Assembly Bill 2061, (Lowenthal) in 2000 - to air districts (BAAQMD, SMAQMD, and SCAQMD) to offset the incremental operating costs of alternative diesel fuel, or emulsified diesels, used in on-road and off-road heavy-duty vehicles and equipment. Emulsified diesel can reduce NOx emissions over 10% and PM emissions over 60%. *Reference: none*	2000
B.	**Smoke Management Program**	
16.	**Statewide Guidelines for Prescribed Burning and Agricultural Burning** (PM10 and PM2.5, but as an added benefit also reduce NOx and VOC) Smoke Management Guidelines were originally adopted in 1971 and were revised in 2000 to address expected increases in prescribed burning while minimizing or preventing smoke impacts to protect public health. The Guidelines emphasize effective planning, coordination among burners, and use of most technically advanced air quality and meteorology burn management tools. An important element is the consideration of alternatives to open burning. Requires air districts to develop their smoke management programs for ARB review and approval. The Guidelines contain three basic components: 1) requirements for a burn authorization system, 2) requirements for smoke management plans by prescribed burners, and 3) requirements for burn, no burn, and marginal burn days. *Reference:* http://www.arb.ca.gov/regact/agburn/agburn.htm	Revised 3/23/00

*Date of public Board hearing when the measure was adopted.

C. Non-Diesel Mobile Source Measures

	Strategy	Adoption Date*
	Low Emission Vehicle (LEV) Program for New Light- and Medium-Duty Vehicles (NOx, VOC) The LEV regulations are the cornerstone of ARB efforts to reduce emissions from light and medium-duty vehicles. The original LEV I program was adopted in 1990, and LEV II in November 1998. Both LEV I and LEV II include four primary elements: 1) increasingly stringent exhaust emission standards for specific categories of low-emission vehicles, 2) an increasingly stringent annual fleet average standard for NMOG that requires each manufacturer to phase-in a progressively clean mix of vehicles from year to year, 3) banking and trading provisions, and 4) a requirement that a specified percentage of passenger cars and lighter light-duty trucks be zero emission vehicles (ZEV). The LEV I program established the ZEV program and set forth increasingly stringent vehicle tailpipe NMOG and NOx standards from 1994 through 2003, establishing four low emission vehicle categories: Transitional LEV (TLEV), LEV, Ultra LEV (ULEV), and Super Ultra LEV (SULEV). *Reference:* http://www.arb.ca.gov/msprog/levprog/levprog.htm	
17.	***LEV II Program*** LEV II regulations run from 2004 through 2010, setting more stringent emission requirements and phasing in these requirements during 2004-2007 model years. LEV II also requires sport utility vehicles (SUV) and pickup trucks that are now being used primarily as passenger cars (meaning all light-duty trucks and medium-duty vehicles having a gross vehicle weight, GVW of less than 8,500 pounds) to meet the same NMOG and NOx emission requirements as passenger cars. LEV II also reduces further evaporative NMOG emissions. *Reference:* http://www.arb.ca.gov/msprog/levprog/levprog.htm	11/5/98 Latest Amendment 12/12/02
18.	**Zero Emission Vehicle (ZEV) Program** (NOx, VOC) ***Vehicle Requirements*** Requires the large and intermediate volume auto manufacturers to produce ZEVs beginning with model year 2005. Starting with model year 2005, ZEVs are to comprise 10% of vehicles offered for sale in California. The ZEV program allows: 1) extremely clean conventional vehicles to meet a portion of the pure ZEV requirements (these are partial zero emission vehicles or PZEVs), 2) manufacturers to generate credit toward their ZEV requirement with vehicles that have advanced components (advanced technology partial zero emission vehicles or AT PZEVs), 3) additional credits for ZEVs placed in transportation	1990 Last Updated 12/19/03

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Zero Emission Vehicle (ZEV) Program (continuation) systems such as station car programs, and 4) additional credits for grid-connected hybrid electric vehicles. The program includes phased-in ZEV requirements for larger trucks and SUVs. Large volume auto manufacturers can fulfill their ZEV obligation by either: 1) using a formula allowing a vehicle mix of 2% pure ZEVs, 2% AT PZEVs and 6% PZEVs or 2) producing their market share of 250 fuel cell vehicles by 2008, plus producing 4% AT PZEVs and 6% PZEVs. The required number of fuel cell vehicles will increase to 2,500 from 2009-2011, 25,000 from 2012-2014, and 50,000 from 2015-2017. Automakers can substitute up to 50% of their fuel cell requirements with battery electric vehicles. The program also allows manufacturers to receive credit for fuel cell vehicles placed in other states that have adopted California's LEVII program. Intermediate volume auto manufacturers may meet the ZEV requirement entirely with PZEVs. Reference: http://www.arb.ca.gov/regact/zev2003/zev2003.htm	
19.	***Federal Tier 2 Exhaust Emission Standards for Heavy-Duty Gasoline Vehicles and Engines*** (NOx, VOC) The regulation reduces emissions of NMHC+NOx from the current 4.0 g/bhp-hr standard to 1.0 g/bhp-hr, beginning with the 2005 model year, harmonizing California's standards with those adopted by U.S. EPA in 2000. In 2001, U.S. EPA implemented more stringent standards for 2008 and later model years – 0.14 g/bhp-hr NMHC and 0.2 g/bhp-hr NOx. In 2002, ARB harmonized standards with the new federal standards. *Reference: http://www/arb/ca/gov/regact/levhdg02/levhdg02.htm*	12/10/98 Latest Amendment 12/12/02
20.	***Exhaust Emission Standards for On-Road Motorcycles*** (NOx, VOC) In 1998, ARB adopted a new set of emission standards for new 280 cc and larger motorcycles. HC and NOx are combined into a single standard to give manufacturers flexibility to lower emissions. Requires HC+NOx emissions to be reduced to 1.4 g/km for the 2004 year and 0.8 g/km for the 2008 model year. Reference: http://www.arb.ca.gov/regact/motorcyc/motorcyc.htm	12/10/98

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
21.	**On-Board Diagnostic (OBD) II** (NOx, VOC) OBD II requirements were amended in 2002 to improve their effectiveness. The program requires all 1996 and newer vehicles less than 14,000 lbs. (e.g., passenger cars, pickup trucks, sport utility vehicles) be equipped with OBD II systems, which are California's second generation of OBD requirements. OBD systems are self-diagnostic systems incorporated into the computers of new vehicles. The OBD II system monitors virtually every component that can affect the emission performance of the vehicle to ensure that the vehicle remains as clean as possible over its entire life, and assists repair technicians in diagnosing and fixing problems with the computerized engine controls. If a problem is detected, the OBD II system illuminates a warning lamp on the vehicle instrument panel to alert the driver. This warning lamp typically contains the phrase Check Engine or Service Engine Soon. The system will also store important information about the detected malfunction so that a repair technician can accurately find and fix the problem. Reference: http://www.arb.ca.gov/msprog/obdprog/obdregs.htm	Amended 4/25/02
22.	**Voluntary Accelerated Vehicle Retirement (VAVR) Programs** (NOx, VOC) (Also referred to as scrap, clunker, or old vehicle buy back programs) Reduces NOx and NMOG emissions through voluntary retirement of older, higher-emitting vehicles. Provides for privately-operated, market-based VAVR enterprises that purchase and retire eligible vehicles mobile source emission reduction credits. Reference: http://www.arb.ca.gov/regact/scrap/scrap.htm and http://www.arb.ca.gov/regact/vavr/vavr.htm	12/10/98 & 2/21/02
23.	**Off-Road Vehicle Emission Standards** (PM10, PM2.5, NOx, VOC, CO) ***Small Off-Road Engine (SORE) Regulations*** a) The SORE category consists of off-road spark-ignition engines less than or equal to 19 kilowatt (25 horsepower), including handheld engines and equipment such as weed trimmers, leaf blowers, and chainsaws and non-handheld small engines and equipment such as lawnmowers. ARB has adopted HC+NOx and CO emission standards for 1995 and later SORE, along with a 1.5 g/bhp-hr PM emission standard for 0-65 cc two-stroke engines starting with model year 2000. The standards differ by engine size. (continued on next page)	3/26/98

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Off-Road Vehicle Emission Standards (continuation)	
	b) The latest regulatory revision established evaporative emission standards for 2007 and later model year engines and equipment and new exhaust emission standards starting with 2005 through 2008 model years, depending on engine size. For engines less than or equal to 80 cc, the new exhaust standards align California's standards with the most stringent federal standards for similar engines. For engines above 80 cc, the new exhaust emission standards are based on the use of catalytic converters. The evaporative emission standards are designed to control HC emissions from the fuel lines and fuel tanks of equipment, as well as diurnal and running loss emissions. *Reference:* http://www.arb.ca.gov/regact/sore03/sore03.htm	9/25/03
24.	***Off-Road Large Spark-Ignition (LSI) Engine Regulations*** The off-road LSI category consists of engines above 25 horsepower, typically fueled by gasoline or liquefied petroleum gas (LPG). A small number are fueled by compressed natural gas (CNG), and some have dual fuel capability. LSI engines are most commonly found in forklifts, specialty vehicles, portable generators, pumps, compressors, farm equipment, and construction equipment. U.S. EPA has the sole authority to control new farm and construction equipment engines less than 175 horsepower. Exhaust standards of 3.0 g/bhp-hr HC+NOx and 37 g/bhp-hr CO for LSI engines with engine displacement of greater than 1.0 liter were phased in beginning with model year 2001 with more stringent durability based compliance starting in 2004. For LSI engines with engine displacement equal to or less than 1.0 liter, exhaust standards of 9.0 g/bhp-hr HC+NOx and 410 g/bhp-hr CO apply to 2002 and subsequent model years. *Reference:* http://www.arb.ca.gov/regact/lore/lore.htm	10/22/98
25.	***Off-Highway Recreational Vehicles and Engines*** In 1994, the ARB approved off-highway recreational vehicle regulations (including off-road motorcycles and all terrain vehicles or ATVs) that established HC and CO exhaust emission standards and test procedures. The regulations also provided specific coding requirements of the vehicle identification number to distinguish an emission-compliant vehicle. In 1998, the regulations were amended to link vehicle registration and usage to compliance with California's exhaust emission standards. Those in compliance are eligible for off-highway vehicle (OHV) green sticker registration that allows year-round operation in designated off-road areas. Those not in compliance are eligible for OHV red sticker registration that allows operation only during designated months when ozone levels are low. The regulations apply to engines greater	12/10/98

(continued on next page)

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Off-Road Vehicle Emission Standards (continuation) than 90 cc built in 1997 and later. The same standards also apply to engines of 90 cc or less built in 1999 and later. Engines built pre-1997 and pre-1999, respectively, are not subject to this regulation. *Reference:* http://www.arb.ca.gov/regact/recreact/recreat.htm	
26.	***Recreational Marine Engines*** a) Requires outboard and personal watercraft engine manufacturers to meet HC+NOx standards starting with model year 2001. The standards range from 47 grams per kilowatt hour (g/kW-hr) to 16 g/kW-hr, depending on the engine model year. The regulation also sets emission parts warranty requirements, consumer label requirements, and production line and in-use testing requirements.	12/10/98
	b) Requires inboard and sterndrive engine manufacturers to cap combined HC+NOx emissions at 16 g/kW-hr, and later to reduce combined HC+NOx emissions from new engines to 5 g/kW-hr for at least 480 hours of use. The cap is effective beginning in 2003. Beginning in 2007, manufacturers are required to comply with the 5 g/kW-hr requirement on 45% of product sales, but the number of complying engines ramps to 75% in 2008 and 100% in 2009 and later. Beginning in 2007, new engines complying with the 5 g/kW-hr HC+NOx standard will be required to possess an integrated on-board diagnostics system. Reference: ***http://www.arb.ca.gov/msprog/marine/marinectp/marinectp.htm***	7/26/01
27.	**Aftermarket Parts for Off-Road Engines** (NOx, VOC) Establishes procedures for exempting aftermarket add-on and modified parts from off-road vehicles, engines, and equipment from the anti-tampering prohibitions to ensure these parts do not reduce the effectiveness of any required emission control device and do not cause the modified vehicle, engine, or equipment to exceed applicable standards. This program has been implemented since September 29, 2000. Reference: http://www.arb.ca.gov/regact/afteroff/afteroff.htm	11/19/98

*Date of public Board hearing when the measure was adopted.

D. Non-Diesel Fuel Measures

	Strategy	Adoption Date*
28.	**California Reformulated Gasoline (CaRFG)** (PM10, PM2.5, NOx, VOC, SOx, CO, toxic air contaminants) In 1991, ARB adopted the California Phase II reformulated gasoline (CaRFG2) regulations which contained a comprehensive set of specifications for eight fuel properties designed to achieve the maximum reductions in ROG, NOx, SOx, PM, CO, and toxic air emissions starting in 1996. In 1999, ARB adopted the Phase III cleaner burning gasoline regulations to enable refiners to produce MTBE-free gasoline while preserving the air quality benefits of existing gasoline. The regulations prohibited the addition of MTBE to California gasoline after 2002 and reduced the sulfur and benzene content of gasoline. The MTBE phase out was extended until 12/31/2003. Note: Amendments to this measure are scheduled for consideration at the November 18, 2004 Board Hearing. Reference: http://www.arb.ca.gov/fuels/gasoline/cbgmtbe.htm and *http://www.arb.ca.gov/fuels/gasoline/meeting/2002/mtg2002.htm*	12/9/99 7/25/02 12/12/02
29.	**Gasoline Deposit Control Additive** (NOx, VOC) Requires that all commercial gasoline formulations be certified to contain effective levels of detergent additives to control deposits. Reference: *http://www.arb.ca.gov/regact/ccd/ccd.htm*	9/24/98
30.	**Liquefied Petroleum Gas (LPG) Specifications for In-Use Motor Vehicle Fuels** (NOx, VOC) Finalized the interim content limit for LPG of 10% per volume propene, increased the combination of butanes, butenes and heavier constituents to 5% per volume of LPG, and decreased the sulfur content to 80 ppmv. LPG component content limits were originally adopted in 1992 and were applied to fuel supplied since January 1, 1993. LPG combustion produces some PM and sulfur emissions, but yields less NMOG and NOx emissions than gasoline combustion. Reference: http://www.arb.ca.gov/regact/lpgspecs/lpgspecs.htm	12/10/98

*Date of public Board hearing when the measure was adopted.

E. Non-Diesel Stationary and Area Source Measures

	Strategy	Adoption Date*
	Consumer Products Regulations (VOC) Sets ROG emission limits affecting 83 categories of consumer products. A consumer product is defined as a chemically formulated product used by household and institutional consumers. Consumer products include, but are not limited to: detergents, cleaning compounds, polishes, floor finishes, cosmetics, personal care products such as antiperspirants and hairsprays, home, lawn and garden products, disinfectants, sanitizers, automotive specialty products, and aerosol paints. ARB has adopted five regulations affecting consumer products: 1) antiperspirants and deodorants in 1989, 2) first phase regulations for 16 other consumer products categories in 1990 (which have been amended several times, including Midterm Measures), 3) Alternative Control Plan (ACP) in 1994, 4) Aerosol Coatings in 1995, and 5) Hairspray Credit Program in 1997. The ACP, the Hairspray Credit Program, and the Innovative Products Exemption are market-based components of the consumer products program intended to provide manufacturers with compliance flexibility.	
31.	***Midterm Measures II*** Added product category definitions and VOC limits for two new categories, more stringent VOC limits for fifteen existing categories, and additional subcategories for some of the existing product categories with separate VOC limits for each subcategory. The new or modified VOC limits became effective from December 31, 2002, to December 31, 2004, depending on the product category. Includes reporting requirements for manufacturers. Reference: http://www.arb.ca.gov/regact/midterm2.midterm2.htm	10/28/99
32.	***Antiperspirants and Deodorants*** Amendments to this regulation require high volatility organic compounds be limited to 40% by weight, beginning January 1, 2001. A 10% content limit for medium volatility organic compounds has been in effect since February 27, 1991. Includes reporting requirements for manufacturers. Reference: http://www.arb.ca.gov/regact/conspro/00apdo/00apdo.htm	Amended 10/26/00

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
	Consumer Products Regulations (continuation)	
33.	***Aerosol Adhesives*** Sets 75% by weight as sole limit of VOC content for aerosol adhesives (in effect since January 1, 1995), and sets VOC limits for 3 new categories of aerosol adhesives (mist spray, web spray, and special purpose spray adhesives). Includes labeling requirements and requirements to facilitate compliance and enforcement of the new standards. Effective January 1, 2002, the proposed regulatory action also prohibits the use of methylene chloride, perchloroethylene, and trichloroethylene, which are toxic air contaminants, in aerosol adhesives manufactured for use in California. *Reference:* *http://www.arb.ca.gov/regact/conspro/aeroadh/aeroadh.htm*	5/25/00
34.	***Aerosol Coating Products*** Replaces the January 1, 2002, VOC limits for aerosol coatings with equivalent reactivity-based limits. The units of the limits are in grams of ozone per gram of product using the maximum incremental reactivity (MIR) scale. MIR-based limits became effective June 1, 2002, for the six general coating product categories, and January 1, 2003, for the 29 specialty coating categories. Because the chemical mechanism used to calculate the MIR values is evolving and improving, updates to the MIR scale were adopted in 2003. Manufacturers will be able to use the updated MIR values until June 1, 2007 to calculate VOC content in products. The aerosol coatings regulations, effective since 1995, contained VOC limits for the 35 aerosol coating on a percent-by-weight basis. *Reference:* *http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm*	6/22/00
35.	**Portable Fuel Container Spillage Control Regulation** (VOC) Requires containers sold after December 31, 2000 to meet four performance standards (automatic closure, automatic shut-off, one opening, and permeation). Reference: http://www.ar.ca.gov/regact/spillcon/spillcon.htm	9/23/99

*Date of public Board hearing when the measure was adopted.

	Strategy	Adoption Date*
36.	**Enhanced Vapor Recovery (EVR)** (VOC) Requires more stringent standards and new equipment specifications for both Phase I and Phase II vapor recovery systems. The new standards reduce spillage and gasoline evaporation from gasoline nozzles, make vapor recovery systems compatible with the on-board refueling vapor recovery systems on motor vehicles, and require computerized monitoring equipment for vapor recovery systems to self-diagnose and alert operators when repairs are needed. These requirements are being phased-in over several years (7/15/01 to 10/1/08). One of the EVR standards (post-refueling drops) was amended in 2002. Phase I vapor recovery is applied to gasoline transfer operations involving cargo tank trucks. Phase II vapor recovery controls emissions resulting from gasoline transfer from the gasoline dispensing facility to vehicles. Reference: http://www.arb.ca.gov/regact/evrtech/evrtech.htm	3/23/00 12/12/02
37.	**Distributed Generation (DG) Guidelines and Regulations** (PM10, PM2.5, NOx, VOC, CO) Sets two levels of PM, NOx, VOC, CO emissions standards and certification requirements for electrical generation technologies (DG technologies) that are exempted from air district permit requirements, and provides guidance to the air districts on the permitting of electrical generation technologies that are subject to their regulatory jurisdiction. The first set of standards became effective January 1, 2003, and reflects the best performance achieved in practice by existing DG technologies that are exempt from air district permitting requirements. The second set of standards becomes effective January 1, 2007 and is equivalent to the level determined by the ARB to be Best Available Control Technology (BACT) for permitted central station power plants in California. The regulation also includes labeling requirements, testing procedures, record keeping requirements, recertification requirements, and payment of fees for technologies subject to the certification program. Reference: http://www.arb.ca.gov/regact/dg01/dg01.htm	11/15/01

*Date of public Board hearing when the measure was adopted.

APPENDIX B

ARB Measures Proposed for Development that Reduce Particulate Matter

ARB Measures Proposed for Development that Reduce Particulate Matter

The following are measures under development by the ARB as part of the 2003 State and Federal Strategy and the 2000 Diesel Risk Reduction Plan (DRRP). Some of these measures have already been adopted. For the measures that have not yet been adopted, the descriptions represent our current concept, however this may change as each rule is developed.

A. On-Road Motor Vehicle Measures

	Strategy	Proposed Date for Board Consideration
1.	**Replace or Upgrade Emission Control Systems on Existing Passenger Vehicles – Pilot Program** (NOx, VOC) ARB is currently performing a test program to evaluate the potential benefits of mandatory replacement of catalysts, oxygen sensors and evaporative emission carbon canisters on older passenger cars. The decision on whether to proceed with a mandatory program is expected to occur in 2004, with regulations to follow in 2005, if the pilot program shows the potential for significant benefits (NOx and ROG emission reductions) at reasonable cost and funding can be identified.	2005
2.	**Capture and Control Vapors from Gasoline Cargo Tankers** (VOC) Gasoline cargo tanks are equipped with a vapor recovery system that returns and collects gasoline vapor during the loading at terminals or bulk plants and unloading at service stations respectively. Cargo tanks utilize hoses and fittings during the process of delivering gasoline and collecting gasoline vapor. The proposed measure would require: 1) control technologies to reduce ROG emissions from gasoline evaporated from the transfer hoses and connections on the tanks after the delivery is completed (the control technology necessary to implement this measure is currently available), 2) a monthly inspection and maintenance program to check the vapor connections and hoses on the fuel cargo tankers, 3) cargo tanks to be purged using an approved method prior to any maintenance or repair being performed, and 4) development of performance specifications and standards for individual components of gasoline cargo tanks and methodology for testing and certifying these components.	2006

	Strategy	Proposed Date for Board Consideration
	Pursue Approaches to Clean Up the Existing and New Truck /Bus Fleet (PM10, PM2.5, NOx, VOC)	
3.	***On-Road Public Heavy Duty Vehicle Fleets*** Publicly owned or operated fleets include dump trucks, street sweepers, shuttles, and other non-transit buses. The regulation would require the reduction of diesel PM emissions through the application of best available control technology (BACT) to 1960-2006 model year vehicles. Four options would be offered to meet the requirement to use BACT: 1) use of a diesel engine or power system that is certified to the 0.01 g/bhp-hr PM standard, 2) use of a diesel engine certified to 0.1 g/bhp-hr PM along with application of the highest applicable diesel emission control system, 3) use of an alternative fuel engine, or a heavy-duty pilot ignition engine, and 4) application of a diesel emission control strategy or system verified by ARB that reduces diesel PM emissions by the greatest amount possible for that engine and application. This is both a NOx control and a diesel risk reduction measure.	2005
4.	***Transit Bus Fleets*** Future revisions to the existing Transit Bus Fleet Rule would require transit agencies to reduce emissions from non-urban buses they own or operate. This is both a NOx control and a diesel risk reduction measure.	2005
5.	***On-Road Private Heavy Duty Vehicle Fleets*** Examples of on-road private fleets include goods movement carriers, long haul trucks, charter buses, and tourism buses. Owners would be offered four options: 1) use an engine certified to 0.01 g/bhp-hr PM, 2) use an engine certified to 0.1 g/bhp-hr PM plus a highest applicable verified diesel emission control strategy, 3) use an alternative fuel engine, or 4) apply a verified diesel emission control strategy and install a hardware-based retrofit system. This is both a NOx control and a diesel risk reduction measure.	2006

	Strategy	Proposed Date for Board Consideration
	Pursue Approaches to Clean Up the Existing and New Truck /Bus Fleet (continuation)	
6.	***Heavy Duty Diesel Engine Software Upgrade*** (Also known as chip reflash or engine recalibration) Software upgrade installations reduce NOx emissions from trucks, school buses, and motor homes. Under California's voluntary program, engine manufacturers have agreed to provide, at no charge, low NOx software for heavy-duty diesel vehicles with certain 1993 through 1998 model year engines. These vehicle owners are encouraged to install the low NOx software to reduce "off-cycle" emissions. "Off-cycle" NOx emissions are greater than the emissions allowed in the engine certification process. The voluntary program goals for software installation are: 1) 35% of California registered heavy-duty diesel vehicles by November 2004, 2) 60% by June 2005, 3) 80% by February 2006, and 4) 100% by 2008. If the Board determines that the voluntary program has not met the first goal by November 2004 or the progress does not appear sustainable, low NOx software installations will be required by a regulation. The regulation requires software upgrades to be installed between April 30, 2005, and December 31, 2006, depending on the model year of the engine. In general, the engine software upgrade reduces NOx emissions by eliminating advanced computer controls – "defeat devices" – that produce excess off-cycle NOx emissions during steady-state vehicle operation, such as on-highway driving. Engine manufacturers were required to develop and provide the software under federal Consent Decree/California Settlement Agreements. Note: This measure was adopted at the March 25, 2004 Board hearing.	2004
7.	***Engine Manufacturer Diagnostics*** Specifies interim requirements for on-road heavy-duty diesel and gasoline engines to be equipped with diagnostic systems to detect malfunctions of the fuel system, exhaust gas recirculation system, and particulate matter trap. This is both a NOx control and a diesel risk reduction measure. Note: This measure was adopted at the May 20, 2004 Board hearing.	2004

	Strategy	Proposed Date for Board Consideration
	Pursue Approaches to Clean Up the Existing and New Truck /Bus Fleet (continuation)	
8.	***On-Board Diagnostics (OBD)*** Requires comprehensive OBD systems on on-road heavy-duty diesel vehicles to detect malfunctions of virtually every component that can cause emission increases before the emissions exceed a specified level. OBD requirements would also apply to new heavy-duty gasoline engines. This is both a NOx control and a diesel risk reduction measure.	2005
9.	**California Motor Vehicle Service Information Rule** The applicability of the existing rule was extended to heavy-duty vehicles, since ARB is currently in the midst of developing requirements for heavy-duty vehicles to be equipped with OBD systems. Requires vehicle manufacturers to make available al l emission-related information about their vehicles, including service manuals, technical service bulletins, OBD II descriptions, and diagnostic tools for 1996 and later model years. The majority of this information must be made available for download from the Internet. Note: The applicability of this rule was extended at the January 22, 2004 Board hearing.	2004
10.	***Manufacturer-Required In-Use Vehicle Testing*** Would require heavy-duty engine manufacturers to in-use test a specific number of engines per engine family the manufacturer procured at various mileage intervals. If vehicles do not meet applicable emission standards (including PM and NOx), an engine recall may be required. The program would also include mechanisms to streamline the engine certification process to ease manufacturer's engine testing burden. A fully implemented and enforceable manufacturer-run in-use compliance program will meet both ARB and U.S. EPA requirements. (continued on next page)	2005

	Strategy	Proposed Date for Board Consideration
	Pursue Approaches to Clean Up the Existing and New Truck /Bus Fleet (continuation)	
11.	***Reduced Idling of New Heavy-Duty Diesel Trucks*** May require engine manufacturers to install electronic idle controls that automatically turn the engine off after 5 minutes of continuous idle operation. These requirements would be applicable to post-2007 model year on-road heavy-duty diesel engines and vehicles. The system must be tamper resistant and non-adjustable. This rule may allow the use of alternative idle reduction devices/strategies in order to provide heating and air conditioning for cab comfort, engine oil heating for easy engine start-up in cold ambient conditions, and electric power to charge batteries and for on-board accessories. These devices include on-board auxiliary devices such as fuel-fired heaters and auxiliary power units (APU), battery packs with inverter/charger systems, and truck stop electrification equipment. The measure may also include an optional idling emission standard for the main engine. A vehicle certified to the optional idling emission standards would be able to continue to operate the main engine at idle for more than the specified idle time limit. In addition, the measure may include an optional lower emission standard for diesel-fueled APUs that are used as alternatives to idling the main engine. This is both a NOx and PM control measure.	2005
12.	***Reduced Idling of In-Use Heavy-Duty Diesel Trucks*** Would limit idling off all vehicles with 10,000 pounds gross weight to 5 minutes per location (school bus idling is regulated under a previously adopted diesel PM air toxic control measure). Idling limits would become effective December 31, 2008 for vehicles equipped with sleeping berths at times when berthing is used for resting or sleeping. Idling is limited to 5 min for all buses in transit without passengers and to 10 minutes before passenger boarding. When passengers are on board a bus, for passenger comfort, idling limits would not apply. This is both a NOx control and a diesel risk reduction measure. Note: This measure was adopted a the July 22, 2004 Board hearing. (continued on next page)	2004

	Strategy	Proposed Date for Board Consideration
	Pursue Approaches to Clean Up the Existing and New Truck /Bus Fleet (continuation)	
13.	***Transport Refrigeration Units (TRU) Air Toxic Control Measure*** Requires in-use TRU engines that operate in California to meet specific performance standards that vary by horsepower range. The performance standard requirements are based on proposed Tier 4 emission standards for non-road engines and will be phased in from 2008 through 2020. The requirements can be met by retrofitting TRU engines with certified retrofit technology or replacing the engines, replacing entire units, or by using approved alternative technologies such as electrification or cryogenic refrigeration systems. The ARB is scheduled to conduct technology reviews in 2007 and 2009 to ensure that technologies are ready to meet the performance standard compliance schedule. Note: This measure was adopted at the February 26, 2004 Board hearing.	2004
B.	**Off-Road Engine and Vehicle Measures**	
14.	**Lower Emission Standards for New Off-Road Engines** (PM10, PM2.5, NOx, SOx) U.S. EPA has proposed a 4th Tier of diesel exhaust standards, which will require the use of aftertreatment technology and 15 ppm sulfur diesel fuel for most off-road engines in the 2011-2015 time frame. ARB intends to adopt similar standards for California's off-road diesel engines after the U.S. EPA rule has been finalized.	2004
15.	**Pursue Approaches to Clean Up the Existing Heavy-Duty Off-Road Equipment** (PM10, PM2.5, NOx, ROG, SOx) Strategies that operators select would have ARB-verified emission reductions or involve use of ARB-certified engines and must meet the emission reduction targets specified by the rules. Strategies that operators could potentially use to reduce PM emissions include installation of hardware-based retrofits (e.g., diesel particulate filters), replacement of older, dirtier engines with new certified ones (engine re-power), retirement of old vehicles/equipment or replace with new lower-emissions models. Depending on the strategy chosen, use of low-sulfur diesel may be an integral strategy component.	2005-2006

	Strategy	Proposed Date for Board Consideration
16.	**Portable Engines Air Toxic Control Measure** (PM10, PM2.5, NOx) Requires all portable engines 50 hp and larger to be certified to Tier 1, 2, or 3 U.S. EPA/ARB off-road engine standards by 2010, and meet more stringent fleet-average emissions limits in 2013 and 2017. In 2020, all engines must meet Tier 4 standards or use diesel retrofits that achieve 85% diesel PM emission reductions. The ATCM also aims to achieve NOx reductions through expedited engine replacement. **Note:** This measure was adopted at the February 26, 2004 Board hearing.	2004
17.	**Implement Registration and Inspection Program for Existing Off-Road Equipment** (PM10, PM2.5, NOx) As ARB develops off-road control measures to reduce in-use emissions (including PM and NOx), registration and inspection programs will be incorporated as a component of each regulation. The most cost-effective registration and inspection programs would be tailored to the type of equipment, application, and type of control proposed. These programs are a means of ensuring that the chosen control strategies remain effective over the lifetime of the engine or equipment.	2006-2009
18.	**Set Lower Emission Standards for New Off-Road Non-Preempt Gas Engines** (NOx, VOC) Adopts exhaust emission standards for new non-preempted engines, in alignment with the federal Tier 2 standards beginning with the 2007 model year. In 2002, U.S. EPA adopted these emission standards based on catalyst durability testing co-sponsored by U.S. EPA, ARB, and the South Coast Air Quality Management District.	2005
19.	**Clean Up Existing Off-Road Gas Equipment Fleet** (NOx, VOC) Reduces emissions from both existing and new large spark-ignition (LSI) engine fleets through a multi-faceted approach including: 1) retrofit of existing engines to achieve an 80% reduction in exhaust emissions or meet emission levels equivalent to 3.0 g/bhp-hr HC+NOx (the retrofit technology would include a three-way catalyst and, on some engines, closed loop fuel control systems) and 2) new emission standards to increase use of near-zero and zero-emission forklifts (e.g., electric forklifts).	2005

	Strategy	Proposed Date for Board Consideration
20.	**Pursue Approaches to Clean Up the Existing Harbor Craft** (PM10, PM2.5, NOx, VOC) Emission reduction options for in-use harbor craft engines (commercial marine vessels) would include: 1) use of add-on control equipment (e.g., diesel particulate filters, diesel oxidation catalyst, selective catalytic reduction, or a combination of systems), 2) repowering of existing vessels or early introduction of new vessels, and 3) use of cleaner fuels such as California on-road low sulfur diesel, emulsified diesel fuels, biodiesel, compressed natural gas, or liquefied natural gas. Due to the diversity within the harbor craft category, specific emission reduction proposals may vary with the type of vessels, industry, or other factors.	2005
21.	**Pursue Approaches to Reduce Land-Based Port** (PM10, PM2.5, NOx, VOC) Strategies to reduce PM, NOx, and ROG emissions may include: 1) early introduction of cleaner new vehicles and equipment, 2) expanded use of alternative fuels, 3) repowering with cleaner new engines, 4) add-on control equipment, 5) electrification of diesel equipment, 6) public education programs, and 7) operational changes such as idling limits.	2005
C.	**Fuels**	
22.	**Diesel Fuel for Intrastate Locomotives and Harbor Craft** (PM10, PM2.5, NOx, SOx) Requires the use of California low sulfur motor vehicle diesel fuel in locomotives operating exclusively within the State, and with commercial and recreational marine vessels. ARB is working to develop an implementation schedule, with consideration being given to SIP commitments in the SCAQMD, as well as to diesel fuel supply impacts.	2004
23.	**Set Additives for Diesel Fuel to Control Engine Deposits** (PM10, PM2.5, NOx, VOC, CO) Requires the use of deposit control additives in diesel fuel. The fuel would be certified upon passing engine tests that demonstrate that the fuel keeps injectors, cylinders, valves, and other engine parts free of combustion deposits.	2006-2009

D. Stationary and Area Sources		
	Strategy	**Proposed Date for Board Consideration**
24.	**Stationary Compression Ignition Engines Air Toxic Control Measure** (PM10, PM2.5, NOx, VOC) Stationary diesel engines remain in one location at a facility for more than 12 months. Sets emission standard requirements, operating hour limitations, fuel requirements, and record-keeping/reporting requirements for new (installed after 1/1/05) and existing (installed before 1/1/05) stationary diesel-fueled compression ignition engines. - The new and existing prime (non-emergency) engines (e.g., remote power generation, cranes, sand and gravel processing, and fluid pumping) must meet a stringent PM standard of 0.01 g/bhp-hr beginning in 2005. - New emergency standby engines (e.g., those that provide power during power outages, emergency pumping of water during floods or fire suppression, or power airport runway lights under low visibility) must meet a PM standard of 0.15 g/bhp beginning in 2005. Existing emergency standby engines must limit maintenance and testing hours depending on the baseline emission level of the engine beginning in 2005. - New stationary diesel engines used in agricultural operations must limit PM emissions to 0.15 g/bhp-hr beginning in 2005. - To control criteria pollutants, all of these engines must meet the Off-Road Compression Ignition Engine Standards applicable to engines of the same size and model year. - Sets requirements for demand response programs, remotely located engines, and emergency standby engines located near schools. Note: This measure was adopted at the February 26, 2004 Board hearing	2004
25.	**Stationary Diesel Agricultural Engine Air Toxic Control Measure (ATCM)** (PM10, PM2.5, NOx) ARB is working with the air districts and the agricultural community to develop an ATCM that will reduce diesel PM emissions from existing stationary compression ignition engines used in agricultural operations.	2005

	Strategy	Proposed Date for Board Consideration
26.	**Set New Consumer Products Limits in 2004, 2006, and 2008** (VOC) Targets previously unregulated categories or regulated categories that ARB staff has not evaluated for further emissions reductions during the last five years. Additional reductions may be achieved through both mass-based and reactivity-based limits. Products under evaluation include various unregulated solvent categories that may contain up to 100% ROG and many of the smaller regulated or currently unregulated categories of consumer products. To adopt new limits for consumer products in 2006 and 2008, ARB staff will need to update inventories detailing product ingredients and product sales by conducting surveys in 2004 and 2006. Note: New 2004 limits were adopted at the June 24, 2004 Board hearing.	2004-2008
27.	**Increase Recovery of Fuel Vapors from Aboveground Storage Tanks** (VOC) Applies as many of the current enhanced vapor recovery (EVR) standards as feasible to gasoline aboveground storage tanks (ASTs), including an increase in overall system efficiency from 90 to 95% vapor recovery. Current EVR regulations, including Phase I regulating gasoline transfer from cargo tank to dispensing facility storage tank, and Phase II regulating transfer from the dispensing facility to the motor vehicle apply to underground storage tanks, but do not apply to ASTs. The regulation would address the increasing number of AST dispensing systems used at private and public facilities and some retail sites.	2004-2005
28.	**Reduce Fuel Permeation Through Gasoline Dispenser Hoses** (VOC) Would review current permeation requirements for gasoline dispenser hoses and, if feasible, establish lower permeation requirements. Gasoline dispensing hoses used at marinas have stricter standards for hose permeability due to water quality concerns. The goal of this measure is to determine the applicability of the permeability standard for marine gasoline hoses to dispenser hoses at service stations.	2005

References: http://www.arb.ca.gov/planning/sip/stfed03/stfed03.htm
http://www.arb.ca.gov/diesel/dieselrrp.htm
http://www.arb.ca.gov/diesel/documents/rrpapp.htm

APPENDIX C

SB 656 List of Air District Measures that Reduce Particulate Matter

SB 656 List of Air District Measures that Reduce Particulate Matter

A. Wood-Burning Fireplaces and Wood-Burning Heaters

(wood-burning heaters include woodstoves and fireplace inserts)

Measures reduce directly emitted PM10 and PM2.5, and as an added benefit reduce NOx, VOC, CO, and air toxic emissions.

	Strategy	Source Type	District, Rule, and Adoption Date*
1.	**Public Awareness Program** Informs the public about the indoor wood combustion control program. The program covers three areas: program effectiveness and tracking; key program elements; and communication strategy. The goal is to inform the public about potential health hazards of wood smoke and to encourage better wood burning practices or use of heating devices (e.g. some programs recommend use of manufactured firelogs instead of wood in fireplaces).	Existing	SJVAPCD Rule 4901 7/17/03
	Curtailment During Periods with Predicted High PM Levels		
2.	***Mandatory*** a) Restricts use of wood-burning fireplaces and heaters during periods when atmospheric conditions and the level of wood burning activity are predicted to result in high PM concentrations. Exempts households that use wood as primary sole source of heat and households in areas where natural gas service is not available.	Existing	SJVAPCD Rule 4901 7/17/03
	b) Prohibits use of wood-burning appliances during periods when atmospheric conditions and the level of wood burning activity are predicted to result in high PM concentrations. Exempts U.S. EPA certified wood-burning appliances. A secondary source of heat is required in all dwellings.	Existing	GBUAPCD for the Town of Mammoth Lakes Rule 431 12/7/90
3.	***Voluntary*** Informs the public about periods predicted to have high PM concentrations and encourages public to refrain from using wood-burning fireplaces and heaters during such periods. Some air districts exempt U.S. EPA certified wood-burning appliances from curtailment.	Existing	SCAQMD, YSAQMD SLOAPCD Programs

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Require All Specified Wood-Burning Devices Installed be U.S. EPA-Certified, Phase II or Equivalent		
4.	***Wood-Burning Heaters*** Prevents the sale and installation of wood-burning heaters that are not U.S. EPA-certified or equivalent. These wood-burning heaters must meet Phase II standards established in Subpart AAA of Part 60 of Title 40 of the Code of Federal Regulations. Phase II devices are designed to achieve more efficient combustion and lower particulate emissions than conventional devices.	New and modified	SJVAPCD Rule 4901 7/17/03
5.	***Wood-Burning Heaters and Wood-Burning Fireplaces*** Prevents the sale and installation of wood-burning heaters and wood-burning fireplaces that emit PM in higher concentrations than specified for U.S. EPA certified Phase II wood heaters. Allowable wood-burning appliances must be air district or U.S. EPA certified. The requirement also applies to masonry fireplaces.	New and modified	NSoCAPCD Reg. 4-1-400 2/2/93 and SLOAPCD Rule 504 10/19/93
6.	***Prohibits the Installation of Non-EPA Certified Wood-Burning Appliances & Wood-Burning Fireplaces (except pellet stoves)*** Prohibits the installation of any non-U.S. EPA certified wood-burning appliance in dwellings, except for pellet stoves. Prohibits the installation of wood-burning fireplaces, including low emission fireplaces that are exempt from U.S. EPA testing.	New and modified	GBUAPCD for the Town of Mammoth Lakes Rule 431 12/7/90
	Number of Units		
7.	***New Residential Developments*** Limits the number of wood-burning fireplaces and wood-burning heaters that may be installed in new residential developments.	New	SJVAPCD Rule 4901 7/17/03
8.	***New Nonresidential Properties*** Limits the number of wood-burning appliances that may be installed in new nonresidential properties.	New	GBUAPCD for the Town of Mammoth Lakes Rule 431 12/7/90

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
9.	**Number of Units (continuation)** **Additional Units in Existing Properties** Limits the number of additional wood-burning appliances that may be installed in existing residential and nonresidential properties.	New	GBUAPCD for the Town of Mammoth Lakes Rule 431 12/7/90
10.	**Replacement of Non-Certified Appliances Upon Sale of Property** a) Assures that each wood-burning heater included in real property upon sale or transfer is U.S. EPA Phase II certified or equivalent. Non-complying devices must be removed or rendered inoperable. b) Requires replacing, removing or rendering inoperable any non-U.S. EPA certified wood-burning appliance upon sale of a dwelling (excluding pellet stoves, but including fireplaces).	Existing Existing	SJVAPCD Rule 4901 7/17/03 GBUAPCD for the Town of Mammoth Lakes Rule 431 12/07/90
11.	**Control of Wood Moisture Content** Sets moisture standard for “seasoned wood” offered for sale, since burning dry wood increases heating performance.	New, existing, and modified	SJVAPCD Rule 4901 7/17/03
12.	**Prohibit Fuel Types** Prohibits the burning of materials not intended for use in wood-burning fireplaces and wood-burning heaters (e.g., garbage, treated wood, and plastic products).	New, existing, and modified	SJVAPCD Rule 4901 7/17/03

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

B. Non-Agricultural Open Burning

Measures reduce directly emitted PM10 and PM2.5, and as an added benefit reduce VOC, NOx, CO, and air toxic emissions.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Prohibition of Residential Open Burning		
13.	***Of All Outdoor Residential Open Burning*** Prohibits outdoor residential open burning. Limits open burning to permitted activities (e.g., agricultural burning, infectious disease, wildland vegetation management) or exempted activities (ceremonial fires, recreational fires, cooking fires, etc.)	Existing	SJVAPCD Rules 4103 & 4106 6/21/01
14.	***Where Waste Service is Available*** Prohibits burning of greenwaste if served by an organized waste disposal service. No other residential waste may be burned anywhere.	Existing	MBUAPCD Rule 438 4/16/03
15.	***In Specified Highly Populated Areas*** Prohibits outdoor burning of green waste in populated areas in specified geographical locations.	Existing	SMAQMD Rule 407 6/4/98
16.	***Within Small Lots and Setbacks*** Prohibits outdoor burning of natural vegetation from the premises on lots smaller than one acre in size, where the burn pile is less than 100 feet from neighboring residence, or where greenwaste collection is offered by a franchise hauler.	Existing	LCAQMD Rule 433 10/15/02
	Mandatory Curtailment of Non-Agricultural Open Burning		
17.	***During Periods with Predicted High PM or Ozone Levels*** Prohibits planned burning or further ignitions during days when atmospheric conditions and the level of open burning are predicted to result in high PM or ozone concentrations (can prohibit additional burns on burn days.	Existing	MBUAPCD Rule 438 4/16/03

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Control Smoke Production		
18.	***Limits during Burn Days in Smoke Sensitive Areas*** Requires Fire Chief to grant permit and limit burns to 25 per day in specific Smoke Sensitive Area (defined by rule); permit is only valid with daily authorization number.	Existing	MBUAPCD Rule 438 4/16/03
19.	***Emission Limits for Mechanized Burners*** Sets emission limits for mechanized burners not to equal or exceed No. 1 on Ringelmann Chart published by the U.S. Bureau of Mines for periods aggregating more than 30 minutes in any eight-hour period. Requires burning permit.	Existing	ShCAQMD Rule 2.6 9/24/02
	Performance Standards for Allowed Burns		
20.	***Drying Times*** Establishes minimum drying times for any green waste to be burned and pile size limits. Sets bounds on time of day for ignition and completion.	Existing	BAAQMD Regulation V 11/2/94
21.	***Burn Duration*** Restricts ignition hours and requires smoldering fires to be extinguished.	Existing	LCAQMD Rules 431-433.5 10/15/02
22.	***Preparation of Fuels & Management of Burns*** a) Sets requirements for burn piles (e.g. stack to ignite quickly, burn with minimum of smoke, ignite only for burn within same day, avoid public nuisance) prior and during burning.	Existing	MaCAPCD Rule 300 et. seq. 7/19/88
	b) Sets requirements for burns on land to be cleared for residential or commercial development. APCO can restrict or prohibit the burning of poison oak	Existing	MBUAPCD Rule 438 4/16/03
23.	***Permits Required*** Requires permits for all types of outdoor burning.	Existing	NCUAQMD Regulation 2 7/18/02

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

C. Fugitive Dust

Measures reduce directly emitted PM10.

	Strategy	Source Type	District, Rule, and Adoption Date*
24.	**Construction: Earthmoving**		
	a) Requires water or chemical stabilizers/dust suppressants be applied, in conjunction with optional wind barriers, to limit visible dust emissions (VDE) to 20% opacity. Specifies that a Dust Control Plan must be submitted for areas of 40 acres or larger where earth movement of 2500 cubic yards or more on at least 3 days is intended. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8021 11/15/01
	b) Prohibits VDE beyond property line and an upwind/downwind PM10 differential of more than 50 µg/m^3. Requires implementation of Best Available Control Measures (BACM) for all sources such that visible emissions do not exceed this limit 100 feet from the point of origin of earth-moving activities. List of BACM is contained in the Rule 403 Implementation Handbook. Specifies that a Dust Control Plan or a commitment to implement Table 1 and 2 control measures through a large operation notification (LON) is required for large operations projects with a disturbed surface area 100 acres or larger, or projects with daily earth movement of 10,000 cubic yards or more. Note: This rule was amended April 2, 2004. The amendments incorporate a new list of BACM and implements new requirements (project signage, dust control supervisor) for large operations (now defined as 50 acres or 5,000 cubic yards of daily earth-movement).	Existing	SCAQMD Rule 403 2/14/97
25.	**Construction: Demolition**		
	a) Requires application of dust suppressants to limit VDE to not more than 20% opacity. Sets bulk material and track-out requirements. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8021 11/15/01
	b) Prohibits VDE beyond property line. Requires application of BACM. Specifies that upwind-downwind PM10 levels must not exceed 50 ug/m^3. Sets track-out requirements. Note: This rule was amended April 2, 2004. The amendments require track-out control device for projects greater than 5 acres or 100 cubic yards of daily	Existing	SCAQMD Rule 403 2/14/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Construction: Demolition (continuation) import/export and lowers track-out clean-up prohibitions from 50 to 25 feet.		
26.	**Construction: Grading Operations** a) Requires pre-watering to limit VDE to 20% opacity. Requires phasing of work to reduce disturbed soil. Note: This rule was amended August 19, 2004. b) Requires water application to increase moisture content to proposed cut, and grading each phase separately to coincide with the construction phase. Specifies that chemical stabilizers are to be applied to graded areas where construction will not begin for more than 60 days after grading. Note: This rule was amended April 2, 2004. The amendments require new Table 1 BACM (e.g., pre-application of water to depth of proposed cuts, reapplication of water as necessary to ensure that visible emissions do not extend more than 100 feet from the sources, and stabilization of soils once earth-moving is complete).	Existing Existing	SJVAPCD Rule 8021 11/15/01 SCAQMD Rule 403 2/14/97
27.	**Inactive Disturbed Land** a) Requires restricting vehicle access. Specifies that water/dust suppressants must be applied to meet stabilized surface definition; if area is greater than 0.5 acres and the area is inactive more than 7 days, must comply with stabilized soil definition. Note: This rule was amended August 19, 2004 b) Prohibits VDE beyond property line and an upwind/downwind PM10 differential of more than 50 µg/m^3. Requires BACM (e.g., chemical stabilization, frequent watering, and revegetation) at all times and high wind measures (e.g., chemical stabilization to maintain a stabilized surface or watering three times per day) under high wind conditions. Note: This rule was amended April 2, 2004. The amendments clarify new Table 1 BACM.	Existing Existing	SJVAPCD Rule 8021 11/15/01 SCAQMD Rule 403 2/14/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
28.	**Bulk Materials: Handling/Storage** a) Establishes wind barrier and watering or stabilization requirements to limit VDE to 20% opacity. Specifies bulk materials must be stored in accordance with the definition for stabilized surface. Requires outdoor materials be covered with tarps, plastic, etc. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8031 11/15/01
	b) Prohibits VDE beyond property line and an upwind/downwind PM10 differential of more than 50 µg/m^3. Requires use of BACM (e.g., wind sheltering, watering, chemical stabilizers, altering load-in/load-out procedures, or coverings). Note: This rule was amended April 2, 2004. The amendments establish new Table 1 BACM (control measures 09-1 though 09-5) for importing/exporting of bulk materials.	Existing	SCAQMD Rule 403 2/14/97
29.	**Storage, Handling, and Transport of Petroleum Coke, Coal, and Sulfur** Limits opacity from operations to ½ Ringelmann; ensures enclosure of all coke piles including compliance schedule; requires District approved plan or Best Available Control Measures (BACM) for any open piles of coal or sulfur; requires street-sweeping or limits silt loading on roads and truck exteriors with quarterly testing; requires paving and maintenance of roads; requires covers or slot-tops for transport trucks.	New, existing, and modified	SCAQMD Rule 1158 6/11/99
30.	**Carryout and Track-out** a) Requires track-out removal at the end of the workday, if the track-out is less than 50 feet; or removal as soon as possible if the track-out exceeds 50 feet. Specifies a track-out control device must be installed at all access points to public roads. Requires maintaining sufficient length of paved interior roads to allow dirt/mud to drop off before leaving site and mud/dirt removal from interior paved roads with sufficient frequency to prevent track-out Note: This rule was amended August 19, 2004. (continued on next page)	Existing	SJVAPCD Rule 8041 11/15/01

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Carryout and Track-out (continuation) b) Requires removing any track-out within one hour; or selecting a Table 3 track-out prevention option and removing track-out at the end of the workday, if the track-out is less than 50 feet, and removing track-out as soon as possible, if it exceeds 50 feet. Table 3 track-out options include road surface paved or chemically stabilized from point of intersection with a public paved road to distance of at least 100 feet by 20 feet, or installation of track-out control device from point of intersection with a public paved road to a distance of at least 25 feet by 20 feet. Note: This rule was amended April 2, 2004. Beginning January 1, 2005, the amendments require sites greater than five acres or those with more than 100 cubic yards of daily import/export to install a track-out control device (four options provided) and prohibits material from .extending more than 25 feet from a site entrance	Existing	SCAQMD Rule 403 2/14/97
31.	**Carryout and Track-out: Clean-Up Methods** Requires manual sweeping; sweeping with a rotary brush/broom with sufficient wetting to limit VDE to 20% opacity; or operating a PM10 street sweeper with 80% efficiency per SCAQMD Rule 1186. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8041 11/15/01
32.	**Disturbed Open Areas** a) Applies to non-agricultural areas of 3 acres or larger which have been unused for 7 days or more. Requires water/dust suppressants application to unvegetated areas sufficient to limit VDE to 20% opacity. Specifies vegetation must be established to limit VDE to 20% opacity. Requires paving, applying gravel, or applying stabilizers to limit VDE to 20% opacity. Upon evidence of trespass, requires posting of “no trespass” signs or installing barriers to prevent access to area. Note: This rule was amended August 19, 2004. (continued on next page)	Existing	SJVAPCD Rule 8051 11/15/01

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Disturbed Open Areas (continuation) b) Applies to non-agricultural areas of one-half acre or larger for residential use; and all non-residential areas. Requires application of chemical stabilizers; watering with sufficient frequency to establish a surface crust, or establishing drought-resistant vegetation as quickly as possible. Note: This rule was amended April 2, 2004. The amendments clarify new Table 1 BACM and remove exemption for residential properties less than one-half acre.	Existing	SCAQMD Rule 403 2/14/97
33.	**Paved Road Dust: New/Modified Public and Private Roads** a) Requires paved shoulders for all roads with average daily vehicle trips (ADVT) of 500 or more. If ADVT is 500-3000, then average shoulder width is at least 4 feet. If ADVT is greater than 3000, then average shoulder width is at least 8 feet. Curbing adjacent to and contiguous with a paved lane or shoulder can be used in lieu of shoulder width requirements. Intersections, auxiliary entry and exit lanes may be constructed adjacent to and contiguous with a paved roadway in lieu of shoulder requirements. Specifies if ADVT is 500 or greater, and medians are part of the roadway, then medians are to be constructed with minimum 4-foot shoulder widths adjacent to traffic lanes. Where speed limits are below 45 mph, medians are to be constructed with curbing. Specifies medians are to be landscaped to meet stabilized surface requirements. As an option to shoulder paving or vegetation requirements, oils or chemical dust suppressants can be used, according to the specified widths, and must be maintained to limit VDE to 20% opacity. Specifies requirements for contingency notification. Note: This rule was amended August 19, 2004. b) Establishes curbing or paved shoulder requirements in the event of a contingency notification: For ADVT of 500 or more, curbing or paved shoulders are required, for ADVT of 500-3000, shoulder widths shall be at least 4 feet, for ADVT greater than 3000, shoulder widths shall be at least 8 feet. Establishes median requirements in the event of a contingency notification. For medians with ADVT of 500 or more, must pave median area with	Existing Existing	SJVAPCD Rule 8061 11/15/01 SCAQMD Rule 1186 2/14/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Paved Road Dust: New/Modified Public and Private Roads (continuation) typical roadway materials, unless speed limits less than 45 mph, or medians are landscaped with ground cover and there is curbing, or medians are treated with chemical stabilizers to maintain stabilized surface. Note: This rule was amended April 2, 2004. The amendments invoke contingency requirements for new / widened roads, beginning January 1, 2006.		
34.	**Paved Road Dust: Street Sweeping** Requires use of certified PM10 efficient street sweepers by governmental agencies or their street sweeping contractors where the contract date, purchase date, or lease date is after January 1, 2000. Specifies certified sweepers are to be used for all routine street sweeping except roads with curbs, paved road shoulders greater than 4 feet width, within 1000 feet of an unpaved road, and provided documentation of such is provided. Certified sweepers are to be maintained according to manufacturer's specifications. Note: This rule was amended April 2, 2004. The amendments remove certified equipment exemption.	Existing	SCAQMD Rule 1186 9/10/99
35.	**Paved Road Dust: Street Sweeping Sand & Cinders Used for Anti-skid Material on Icy Roads, VMT Limit, & Free Bus** Requires vacuum-street sweeping on roads to remove sand and cinders that were placed on the road during winter storms as an anti-skid material. Street sweeping is required after the roads dry sufficiently for the street sweepers to remove the material. This rule also limits the peak daily VMT (vehicle miles traveled) projected with future development, and encourages the use of a free bus system to reduce VMT.	Existing	GBUAPCD for the Town of Mammoth Lakes Rule 431 12/7/90

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
36.	**Unpaved Parking Lots/Staging Areas** Requires, for days with 75 or more vehicle trips, limiting VDE to 20% opacity and implementing at least one of the following control measures: 1) applying water, 2) applying uniform layer of washed gravel, 3) applying chemical/organic dust suppressant, 4) using vegetative materials, 5) paving, 6) using any other method to limit VDE to 20% opacity. Requires, for days with 100 or more vehicle trips, limiting VDE to 20% opacity, complying with requirements for stabilized surface, or implementing at least one of the following control measures: 1) applying water, 2) applying chemical/organic dust suppressant, 3) applying road mix, 4) paving, 5) using any other method that results in a stabilized surface. Sets as an option to the above, obtaining a Fugitive PM10 Management Plan that: 1) achieves at least 50% control efficiency, 2) describes location, length, and area of unpaved traffic areas, 3) describes traffic conditions (vehicle trips per unit time, types of vehicles), 4) describes control measures used and application details, and 5) describes expected results of road surface condition. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8061 11/15/01
37.	**Unpaved Roads: Control Requirements** a) Requires, for days with 75 or more vehicle trips, limiting VDE to 20% opacity and implementing at least one of the following control measures: 1) applying water, 2) applying uniform layer of washed gravel, 3) applying chemical/organic dust suppressant, 4) using vegetative materials, 5) paving, or 6) using any other method to limit VDE to 20% opacity. Requires, for days with 100 or more vehicle trips, limiting VDE to 20% opacity, complying with requirements for stabilized surface, or implementing at least one of the following control measures: (continued on next page)	Existing	SJVAPCD Rule 8061 11/15/01

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Unpaved Roads: Control Requirements (continuation) 1) applying water, 2) applying chemical/organic dust suppressant, 3) applying roadmix, 4) paving, or 5) using any other method that results in stabilized surface. Sets as option to above, obtaining a Fugitive PM10 Management Plan that: 1) achieves at least 50% control efficiency, 2) describes location, length, and area of unpaved traffic areas, 3) describes traffic conditions (vehicle trips per unit time, vehicle types), 4) describes controls measures used and application details, and 5) describes expected results of road surface condition. Note: This rule was amended August 19, 2004. b) Sets applicability standard: unpaved road must be more than 50 feet wide at all points or must not be within 25 feet of property line, or have more than 20 vehicle trips per day. Specifies all roads with ADT greater than the average ADT of all unpaved roads within its jurisdiction must be treated. Requires annual treatment of unpaved public roads beginning in 1998 and continuing for each of 8 years thereafter by implementing one of the following: 1) paving at least one mile with typical roadway material, 2) applying chemical stabilizers to at least two miles to maintain stabilized surface, 3) implementing at least one of the following on at least three miles of road surface: a) installing signage at ¼ mile intervals limiting speed to 15 mph, b) installing speed control devices every 500 feet, or c) maintaining roadway in a manner which limits speed to 15 mph. Note: This rule was amended April 2, 2004. The amendments clarify 20% opacity standard that was previously in the definition of a stabilized surface and reference test methods in Rule 403 Implementation Handbook.	Existing	SCAQMD Rule 1186 2/14/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
38.	**Weed Abatement Activities** a) Sets pre-activity requirements: 1) pre-watering to limit VDE to 20% opacity, or 2) phasing work to reduce amount of disturbed surface area. Requires, during active operations, applying water to limit VDE to 20% opacity. Sets stabilization requirements during periods of inactivity: 1) restricting vehicle access to area, or 2) applying water or chemical stabilizers to meet conditions of a stabilized surface. Note: This rule was amended August 19, 2004.	Existing	SJVAPCD Rule 8021 11/15/01
	b) Specifies weed abatement activities are subject to standards of Rule 403, unless: 1) mowing or cutting is used, instead of discing, and stubble is maintained at least three inches above the soil, or 2) if discing is used, there is a determination of a potential fire hazard. Specifies that after discing, the requirement for taking action on disturbed surface areas applies. Note: This rule was amended April 2, 2004. The amendments require pre-application of watering if disking for weed abatement.	Existing	SCAQMD Rule 403 7/9/93
39.	**Windblown Dust: Definitions** Defines windblown dust as any visible emissions from any disturbed surface area which is generated by wind action alone. Specifies wind gusts as maximum instantaneous wind speed. Note: This rule was amended April 2, 2004 to specify that high wind conditions are when instantaneous wind speeds exceed 25 mph.	Existing	SCAQMD Rule 403 7/9/93
40.	**Windblown Dust: Construction/Earth Moving** Requires, for earthmoving, ceasing all active operations, applying water to soil not more than 15 minutes prior to moving such soil if subject to large operation requirements or if seeking an exemption from property line or upwind/downwind standard. Requires, for unpaved roads at construction sites, applying chemical stabilizers prior to a wind event, applying water twice per hour during active operations, stopping all vehicular traffic if subject to large operation requirements or if seeking an exemption from property line or upwind/downwind standard. Note: This rule was amended April 2, 2004.	Existing	SCAQMD Rule 403 2/14/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
41.	**Windblown Dust: Disturbed Areas** Requires, if operations remain inactive for not more than 4 consecutive days, application of water and chemical stabilizers in sufficient concentrations to maintain a stabilized surface for 6 months traffic if subject to large operation requirements or if seeking an exemption from property line or upwind/downwind standard. Requires application of chemical stabilizers prior to wind event; applying water 3 times per day; if evidence of wind driven fugitive dust, increasing watering to 4 times per day; or establish vegetative ground cover within 21 days after active operations have ceased traffic if subject to large operation requirements or if seeking an exemption from property line or upwind/downwind standard. Note: This rule was amended April 2, 2004.	Existing	SCAQMD Rule 403 2/14/97
42.	**Windblown Dust: Bulk Materials/Storage Piles** a) Requires application of water twice per hour or installation of temporary coverings if subject to large operation requirements or if seeking an exemption from property line or upwind/downwind standard. Note: This rule was amended April 2, 2004.	Existing	SCAQMD Rule 403 2/14/97
	b) Additional bulk material control requirements for Coachella Valley sources. Note: This rule was amended April 2, 2004.	Existing	SCAQMD Rule 403.1 1/15/93
43.	**Wind Blown Dust: Open Areas** Requires 50% vegetation cover, or 75% wet or saturated water cover, or 4-inch deep gravel on open areas that may cause or contribute to an exceedance of the federal PM-10 standard.	Existing	GBUAPCD for Owens Lake Board Order #981116-01 11/16/98

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
44.	**Agricultural Operations**		
	a) Limits fugitive dust from off-field agricultural sources such as unpaved roads with more than 75 trips/day and bulk materials handling by requiring producers to draft and implement a Fugitive Dust Management Plan with district approved control methods. Note: This rule was amended September 16, 2004.	Existing	SJVAPCD Rule 8081 11/15/01
	b) Producers that voluntarily implement district approved conservation practices and complete and maintain the self-monitoring plan can maintain an exemption from the Rule 403 general requirements. Note: This rule was amended April 2, 2004, extending applicability to the Coachella Valley.	Existing	SCAQMD Rule 403 2/14/97
	c) Cease tilling/mulching activities when wind speeds are greater than 25 mph (Coachella Valley). Note: This rule was amended April 2, 2004. The program is implemented through Rule 403.	Existing	SCAQMD Rule 403.1 1/5/93
	d) Limits fugitive dust from paved and unpaved roads and livestock operations by requiring: 1) ceasing all hay grinding activities between 2 and 5 p.m. if visible emissions extend more than 50 feet from a hay grinding source, and 2) treating all unpaved access connections to livestock operations and unpaved feed lane access areas with either pavement, gravel (maintained to a depth of 4 inches), or asphaltic road-base. Note: This rule was amended April 2, 2004.	Existing	SCAQMD Rule 1186 2/14/97
	e) Reduces fugitive dust from livestock feed yards by requiring a dust plan that contains procedures assuring moisture factor between 20% and 40% for manure in the top three inches of occupied pens and outlines manure management practices, including removal.	Existing	ICAPCD Rule 420 8/13/02

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

D. Combustion Sources

Measures reduce NOx, SOx, VOC, CO, or PM10 and PM2.5.

	Strategy	Source Type	District, Rule, and Adoption Date*
45.	**Boilers, Steam Generators, and Process Heaters** (NOx)		
	a) Limits NOx emissions from gaseous fuel or liquid fuel fired boilers, steam generators, or process heaters with a total rated heat input greater than 5 million Btu/hr to between 5-40 ppmv depending on fuel type, use, and burner capacity.	New, existing and modified	SJVAPCD Rule 4306 9/18/03
	b) Limits NOx emissions from any petroleum refinery boiler or process heater with a maximum rated capacity greater than 40 million Btu/hr to 0.03 pound per million BTU of heat input (25 ppmv) when firing at the maximum rated capacity. Alternative Emission Control Plans allowed which result in equivalent emissions. All units subject to this rule are now under the SCAQMD's RECLAIM Program.	New and existing	SCAQMD Rule 1109 3/12/84
	c) Limits NOx emissions from gaseous fuel or liquid fuel fired boilers, steam generators, or process heaters with a total rated heat input greater than 5 million Btu/hr to between 30-40 ppmv depending on fuel type.	New, existing and modified	SMAQMD Rule 411 7/22/99 and SCAQMD Rule 1146 11/17/00
	d) Limits NOx emissions from gaseous, liquid, or solid fossil fuel fired boilers, steam generators, or process heaters with a total rated heat input starting at 2 million Btu/hr up to 5 million Btu/hr used in any industrial, institutional, or commercial operation to 30 ppmv or 0.037 pounds per million Btu of heat input.	New, existing and modified	SCAQMD Rule 1146.1 5/13/94
	e) Limits NOx emissions from any boilers, steam generators, or process heater with a total rated heat input starting at 1 million Btu/hr up to 5 million Btu/hr to 30 ppmv.	New, existing and modified	VCAPCD Rule 74.15.1 6/13/00
	(continued on next page)		

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Boilers, Steam Generators, and Process Heaters (continuation)		
	f) Limits NOx emissions from new and existing natural gas-fired large (commercial) water heaters, small (industrial) boilers, and process heaters that have a rated heat input starting at 75,000 Btu/hr up to and including 2 million Btu/hr to between 30-55 ppmv depending on burner size. Exempts residential and low use units.	New, existing and modified	SCAQMD Rule 1146.2 1/9/98
	g) Limits NOx emissions from new natural gas-fired large (commercial) water heaters, small (industrial) boilers, and process heaters that have a rated heat input starting at 75,000 Btu/hr up to and including 2 million Btu/hr to between 30-55 ppmv depending on burner size. Exempts residential and low use units.	New	SBAPCD Rule 360 10/17/02 and VCAPCD Rule 74.11.1 9/14/99
46.	**Turbines** (NOx)		
	a) Limits NOx emissions to the atmosphere from the operation of stationary gas turbines to between 9-65 ppmv depending on turbine operating capacity, yearly run time, and fuel type. Exemptions include emergency standby and laboratory units.	New, existing and modified	SMAQMD Rule 413 5/1/97
	b) Limits NOx emissions to the atmosphere from the operation of stationary gas turbines to between 3-65 ppmv depending on turbine operating capacity, yearly run time, and fuel type. Exemptions include emergency standby and laboratory units.	New, existing and modified	SJVAPCD Rule 4703 4/25/02
	c) Limits NOx emissions from the operation of gas turbines to 9-25 ppm for turbines in size range of 2.9 to 10 MW. Note: Ammonia slip limits for gas turbines in power plants are listed in: 1) ARB's May 2004 Report to the Legislature on Gas-Fired Power Plant NOx Emission Controls and Related Environmental Impacts Reference: http://www.arb.ca.gov/energy/noxlegrpt.htm 2) ARB's September 1999 Guidance for Power Plant Siting and Best Available Control Technology Reference: http://www.arb.ca.gov/energy/powerpl/guidocfi.pdf	New and existing	SCAQMD Rule 1134 8/8/97

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
47.	**IC Engines** (NOx, VOC)		
	a) Limits NOx emissions from gaseous- and liquid-fueled stationary and portable engines over 50 bhp to 36 ppm or higher and VOC to 250 ppm or higher depending on use category of engine (i.e. portable, stationary, oil field, fired by sewage digester gas, etc.)	New, existing and modified	SCAQMD Rule 1110.2 11/14/97
	b) Limits NOx emissions from spark ignited internal combustion engines over 50 bhp to 25-75 ppmv, VOC emissions to 250-750 ppmv, and CO emissions to 2000 ppmv depending on engine type and size.	New, existing and modified	SJVAPCD Rule 4702 8/21/03
	c) Limits NOx emissions from spark ignited internal combustion engines over 50 bhp from 25-125 ppmv depending on engine type and size and NMHC to 250-750 ppmv depending on engine size.	New, existing and modified	SMAQMD Rule 412 6/1/95
48.	**Lime Kilns** (NOx)		
	Limits NOx emissions from lime kilns to between 0.10-0.20 lbs/MM Btu depending on fuel type.	New, existing and modified	SJVAPCD Rule 4313 3/27/03
49.	**Cement Kilns** (NOx, PM10, PM2.5)		
	a) Limits NOx emissions from cement kilns during periods of operation other than start-up or shut-down to between 6.4-7.2 lb/ton clinker produced averaged over a 30 day period depending on kiln type. Additional limits are specified for start-up and shut-down periods.	New, existing, and modified	MDAQMD Rule 1161 3/25/02
	b) Limits NOx emissions from cement kilns to 11.6 lbs/ton of clinker produced averaged over any 24 consecutive hour period and to 6.4 lbs/ton of clinker produced averaged over a 30 day period.	New and existing	KCAPCD Rule 425-3 10/13/94
	c) Limits PM emissions to 30 pounds per hour for kiln feed rates of 75 tons per hour or greater. Limits PM emissions to 0.40 pound per ton of kiln feed for kiln feed rates less than 75 tons per hour.	New and existing	SCAQMD Rule 1112.1 2/7/86

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
50.	**Petroleum Coke Calcining Operations** (SOx) Does not allow operation of petroleum coke calcining equipment unless the uncontrolled emissions of oxides of sulfur from such basic equipment, expressed as sulfur dioxide (SO2), are reduced by at least 80 percent.	New, existing, and modified	SCAQMD Rule 1119 3/2/79
51.	**Furnaces** (NOx) a) Glass Melting Furnaces Sets NOx emission limits of 4.0 pounds per ton of glass pulled for glass melting furnaces. Sets NOx emission limits of 5.5 pounds per ton of glass pulled for glass melting furnaces. b) Central Furnaces Sets a NOx emission limit of 40 ng/joule for gas fired residential units with rating less than 175,000 Btu/hr.	New and existing New and existing New and existing	SCAQMD Rule 1117 1/6/84 BAAQMD Rule 9-12 1/19/94 SCAQMD Rule 1111 7/8/83 and SDAPCD Rule 69.6 6/17/98
52.	**Residential Water Heaters** (NOx) a) Limits NOx emissions from water heaters with heat input rates equal to or less than 75,000 Btu per hour to 20 ng/joule of heat output and sets future limit to 10 ng/joule of heat output. b) Limits NOx emissions from water heaters with heat input rates equal to or less than 75,000 Btu per hour to 40 ng/joule of heat output.	New New	SCAQMD Rule 1121 12/10/99 SJVAPCD Rule 4902 6/17/93

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
53.	**Commercial Charbroiling Operations** (VOC, PM10, PM2.5) Requires new and existing chain driven charbroilers to be equipped with a catalytic oxidizer control device.	New and existing	SJVAPCD Rule 4692 3/21/02 and SCAQMD Rule 1138 11/14/97
E. Composting and Related Operations Measures reduce ammonia and VOC.			
54.	**General Administrative Requirements** Requires composting and chipping and grinding facilities to register and provide facility and throughput information including, general facility information, type and amount of feedstock, products generated and process description. Annual updates also required.	New, existing, and modified	SCAQMD Rule 1133 1/10/03
55.	**Chipping and Grinding Operations** (Ammonia, VOC) Prevents inadvertent decomposition associated with stockpiling of green and/or food wastes by establishing holding or processing time requirements for chipping and grinding activities.	New, existing, and modified	SCAQMD Rule 1133.1 1/10/03
56.	**Composting** (Ammonia, VOC) Requires co-composting operations (biosolids and/or manure combined with bulking agents) to reduce VOC and ammonia emissions by 80% by conducting active composting within a total permanent enclosure and conducting curing using an aeration system that operates under negative pressure for a least 90% of its operating cycle and venting of VOC and ammonia emissions to a control device (biofilter). As an alternative, facilities subject to this rule may also submit a compliance plan that presents and demonstrates an alternative method of compliance. The rule requires recordkeeping and source testing which includes the submittal of a testing protocol. Exemptions are also provided for facilities that meet certain specific requirements.	New, existing, and modified	SCAQMD Rule 1133.2 1/10/03

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
F. Storage, Transfer, and Dispensing Operations Measures reduce VOC.			
57.	**Gasoline Transfer and Dispensing Facilities** Limits emissions of VOC from gasoline dispensing facilities through equipment and operational requirements. For equipment and testing requirements see ARB Executive Orders.	New, existing and modified	BAAQMD Rule 8-7 11/6/02
58.	**Organic Liquid Storage** a) Limits VOC emissions from storage tanks with a capacity of 264 gallons and greater through operational and equipment requirements.	New, existing and modified	BAAQMD Rule 8-5 11/27/02
	b) Limits VOC emissions from any above-ground stationary tank with a capacity of 75,00 liters (19,815 gallons) or greater used for storage of organic liquids, and any above-ground tank with a capacity between 950 liters (251 gallons) and 75,000 liter (19,815 gallons) used for storage of gasoline by setting tank roof, other performance, and self-inspection requirements. Sets forth conditions for the cleaning and degassing of aboveground and underground stationary tanks, reservoirs, or other containers storing or last used to store VOC.	New, existing, and modified	SCAQMD Rule 463 3/11/94 in combination with SCAQMD Rule 1149 7/14/95
G. Leaks and Releases Measures reduce VOC			
59.	**Equipment Leaks (Valves and Flanges)** a) Limits VOC and methane emissions from leaking equipment at petroleum refineries, chemical plants, bulk plants, and bulk terminals including, but not limited to: valves, connectors, pumps, compressors, pressure relief devices, diaphragms, hatches, sight-glasses, fittings, sampling ports, meters, pipes, vessels, and refinery wastewater collection system components to between 100-500 ppm depending on equipment type. Note: This rule was amended January 21, 2004.	New, existing and modified	BAAQMD Rule 8-18 11/27/02

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Equipment Leaks (Valves and Flanges) (continuation) b) Limits VOC emissions from leaking equipment at petroleum facilities and chemical plants by setting forth leak standards and requirements for component identification, operator inspection, maintenance, and atmospheric pressure relief devices.	New, existing and modified	BAQQMD Rule 1173 12/6/02
H. Product Manufacturing Measures reduce VOC.			
60.	**Coatings and Ink Manufacturing** Sets forth operational and "housekeeping" requirements for coatings and ink manufacturing.	New, existing and modified	SCAQMD Rule 1141.1 11/17/00
61.	**Fiberboard Manufacturing** Limits VOC emissions from fiberboard manufacturing by requiring use of capture and control systems with specified efficiencies	New, existing, and modified	PCAPCD Rule 229 6/28/94
62.	**Food Product Manufacturing and Processing** Limits VOC emissions from solvents used in food product manufacturing and processing operations by limiting the VOC content of products used to between 120-400 g/l depending on product, or by the use of a control device.	New, existing and modified	SCAQMD Rule 1131 6/6/03
63.	**Pharmaceuticals and Cosmetics Manufacturing Operations** Sets forth equipment and operational requirements for pharmaceuticals and cosmetic manufacturing.	New, existing and modified	SCAQMD Rule 1103 3/12/99

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
64.	**Polyester Resin Operations** Limits VOC emissions from all polyester resin operations that fabricate, rework, repair, or touch-up products through operational controls and by limiting the monomer content of products to between 28%-50% depending on product type.	New, existing and modified	SCAQMD Rule 1162 11/9/01
65.	**Polymeric Cellular Products (Foam)** a) Sets forth emission limits for polymeric cellular products manufacturing operations. All steps of the manufacturing operation and the storage of the final product for a maximum of 48 hours are subject to the requirements of this rule. b) Limits VOC emissions from the manufacture of foam products composed of polystyrene, polyethylene or polypropylene to between 2.4-2.8 lbs of VOC emissions per 100 lbs of product produced and by requiring emission abatement devices. A control device with at least 98% efficiency may be used in lieu of the above emissions requirements.	New, existing, and modified New, existing, and modified	SCAQMD Rule 1175 5/13/94 BAAQMD Rule 8-52 7/7/99
66.	**Surfactant Manufacturing** Requires the total emissions of VOC from the surfactant manufacturing equipment, before being vented to the atmosphere, be reduced to 0.5 pound per 1000 pounds of surfactant produced or by 95 percent (wt) or more; and all ports used for inspection, taking samples, or adding ingredients must be closed when not in use.	New, existing and modified	SCAQMD Rule 1141.2 1/11/02

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

I. Coating Operations

Measures reduce VOC.

	Strategy	Source Type	District, Rule, and Adoption Date*
67.	**Adhesives and Sealants** a) Reduces VOC emissions from the application of adhesives, adhesive primers, sealants, sealant primers, or any other primers through operational controls and by limiting the VOC content of products to between 30-850 g/l depending on product type. Emission control equipment can be used in lieu of meeting VOC limits.	New, existing and modified	VCAPCD Rule 74.20 9/9/03
	b) Reduces VOC emissions from the application of adhesives, adhesive primers, sealants, sealant primers, or any other primers through operational controls and by limiting the VOC content of products to between 30-850 g/l depending on product type. Emission control equipment can be used in lieu of meeting VOC limits. This rule has more stringent standards for a few categories than the rule above.	New, existing and modified	SCAQMD Rule 1168 10/23/03
68.	**Architectural Coatings** Several districts have adopted regulations consistent with ARB's Suggested Control Measure (SCM) which limits the content of VOC in architectural coatings to between 100-730 g/l. ARB's SCM was adopted in June 22, 2000. For example see rules adopted by SJVAPCD, SDAPCD, SMAQMD, SBAPCD, TeCAPCD, MDAQMD, and AVAQMD. Note: The SCAQMD rule 1113 includes additional significantly more stringent future VOC limits.	New, existing and modified	AVAQMD Rule 1113 3/18/03
69.	**Glass Coatings** Limits VOC emissions from the coating of glass products by limiting the VOC content of coating products to between 2.3-6.7 lbs/gal, depending on the product, or installing control equipment.	New, existing and modified	SJVAPCD Rule 4610 4/17/03

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
70.	**Graphic Arts** Limits VOC emissions from graphic arts operations by limiting the VOC content of products to between 150-300 g/l or by installing a control device.	New, existing and modified	SCAQMD Rule 1130 10/8/99
71.	**Magnet Wire Coating Operations** This rule applies to all coating operations on magnet wire, where the wire is continuously drawn through a coating applicator. Under this rule, any person shall not use or apply any magnet wire coating which contains more than 200 grams VOC per liter (1.67 lb/gal) of coating, less water and exempt compounds. The rule also provides for use of approved emission control systems.	New, existing and modified	SCAQMD Rule 1126 1/13/95
72.	**Marine Coating Operations** Applies to coating operations of marine and fresh water vessels, oil drilling platforms, navigational aids and component parts; and structures intended for exposure to a marine environment. Limits VOC emissions from marine coatings by limiting VOC content of coatings to between 275-650 g/l depending on product. Requires use of non-VOC materials for surface preparation and equipment cleaning. Allows use of specified air pollution control equipment which captures VOC emissions associated with coating, cleaning , and surface preparation, in lieu of use of low-VOC coatings and non-VOC materials used in cleaning and surface preparation.	New, existing and modified	SDAPCD Rule 67.18 5/15/96
73.	**Metal Container, Closure, and Coil Coating Operations** Limits VOC emissions from metal container, metal closure and metal coil coating operations through operational controls and by limiting the VOC content of products up to 660 g/l depending on product type.	New, existing and modified	SCAQMD Rule 1125 1/13/95

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
74.	**Metal Parts and Products Coatings** Limits VOC emissions from the coating of metal parts and products not regulated by other specific regulations by limiting coating VOC content to between 2.3-3.5 lbs/gal depending on process and coating type.	New, existing and modified	SCAQMD Rule 1107 11/9/01
75.	**Motor Vehicle Assembly Line Coating Operations** Sets forth VOC emission limits and VOC content of motor vehicle coatings. This rule applies to all assembly line coating operations conducted during the manufacturing of new motor vehicles.	New, existing and modified	SCAQMD Rule 1115 5/12/95
76.	**Paper, Fabric, and Film Coating Operations** This rule applies to all persons applying coatings or wash primers to paper, fabric, or film substrates. The drying and curing processes covered under this rule include, but are not limited to, heated, forced-air dried, and non-heated processes. The rule specifies VOC content of applicable coatings and sets forth application method and cleaning requirements.	New, existing and modified	SCAQMD Rule 1128 3/8/96
77.	**Plastic, Rubber, and Glass Coatings** Specifies VOC content of coatings used on plastic, rubber, and glass and sets forth transfer efficiency requirements. The rule allows for use of an approved emission control system in lieu of VOC content limits.	New, existing and modified	SCAQMD Rule 1145 2/14/97
78.	**Screen Printing Operations** Specifies VOC content of screen printing materials and applies to persons performing screen printing operations or who sell, distribute, or require the use of screen printing materials.	New, existing and modified	SCAQMD Rule 1130.1 12/13/96

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
79.	**Spray Booth Facilities** Further reduces VOC emissions from spray coating or laminating operations in high VOC-emitting facilities. This rule applies to any spray booth facility, except petroleum industry facilities, that uses VOC-containing materials that amount to more than 40,000 pounds (20 tons) per year of VOC emissions in any emission inventory year and requires that emissions be reduced by 65% beyond applicable rule requirements through the use of a control device or low VOC product.	New, existing and modified	SCAQMD Rule 1132 1/19/01
80.	**Vehicle Refinishing** Limits VOC emissions from coatings applied on Group I vehicles and equipment and Group II vehicles through operating requirements and by limiting VOC content of products to between 2.8-7.0 lbs/gal.	New, existing and modified	SCAQMD Rule 1151 12/11/98
81.	**Wood Flat Stock Coatings** Limits VOC content of coatings, inks, and adhesives applied to wood flat stock for the purpose of manufacturing a finished wood panel intended for attachment to the inside walls of buildings, including, but not limited to, homes and office buildings, mobile homes, trailers, prefabricated buildings and similar structures, boats and ships, or a finished exterior wood siding intended for use in construction to 250 g/l. A control device may be installed in lieu of the VOC requirement.	New, existing and modified	SCAQMD Rule 1104 8/13/99
82.	**Wood Products Coatings** Specifies VOC content of wood products coatings between 275-760 g/l depending on product. Requires wood strippers to have a maximum VOC content of 350 g/l or a maximum vapor pressure of 2mm Hg. The rule allows for use of an approved emission control system in lieu of VOC content limits and also includes an averaging provision. Exempts facilities that use less than one gallon of coatings per day.	New, existing and modified	SCAQMD Rule 1136 6/14/96

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

J. Solvent Cleaning and Degreasing

Measures reduce VOC.

	Strategy	Source Type	District, Rule, and Adoption Date*
83.	**Cleaning Operations**		
	a) Limits VOC emissions from solvent cleaning operations and activities by reducing VOC content of cleaning products to between 25 g/l-900 g/l depending on process.	New, existing, and modified	SCAQMD Rule 1171 11/7/03
	b) Limits VOC emissions from solvent cleaning operations and activities by reducing VOC content of cleaning products to between 50 g/l-900 g/l depending on process.	New, existing and modified	SMAQMD Rule 466 5/23/03 and SJVAPCD 4663 12/20/01
84.	**Degreasing Operations**		
	a) Limits VOC emissions from cold cleaners and vapor degreasers by limiting product VOC content to 25 g/l. Air-tight and airless cleaning systems can be used in lieu of meeting the VOC limit.	New, existing and modified	SCAQMD Rule 1122 12/6/02
	b) Limits VOC emissions from cold cleaners by limiting product VOC content to 25 g/l for (900g/l for exempted categories.)	New, existing, and modified	VCAPCD Rule 74.6 11/11/03
	c) Limits VOC emissions from batch-loaded vapor degreasers by setting equipment and operating requirements.	New, existing, and modified	VCAPCD Rule 74.6.1 11/11/03
	d) Limits VOC emissions from cold cleaners to 50 g/l. Limits VOC emissions from vapor degreasers by setting equipment requirements. Air-tight and airless cleaning systems can be used in lieu of meeting the VOC limit.	New, existing, and modified	SMAQMD Rule 454 5/23/02

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
85.	**Use of Solvents** (VOC) Limits VOC emissions from VOC containing materials or equipment not subject to VOC limits in any other, specific district regulation to no more than 833 lbs/month. A control device may be used in lieu of the monthly throughput limit.	New, existing and modified	SCAQMD Rule 442 12/15/00
K. Miscellaneous Measures reduce VOC, SOX, ammonia, or PM10 and PM2.5.			
86.	**Soil Decontamination** (VOC) a) Limits the emissions of organic compounds from soil that has been contaminated by organic chemical or petroleum chemical leaks or spills, and requires description of an acceptable procedure for controlling emissions from underground storage tanks during removal or replacement through the use of operational requirements and by limiting the amount of soil to be processed daily.	New, existing and modified	BAAQMD Rule 8-40 12/15/99
	b) Limits VOC emissions from excavating, grading, handling and treating VOC contaminated soil as a result of leakage from storage or transfer operations, accidental spillage, or other deposition by requiring that soil with VOC concentrations above 1000 ppm be containerized, sealed, and shipped away for disposal.	New, existing and modified	SCAQMD Rule 1166 5/11/01
87.	**Solid Waste Landfills** (VOC**)** a) Limits VOC emissions from municipal solid waste landfills through installation of gas collection and control systems.	New, existing, and modified	SCAQMD Rule 1150.1 3/17/00
	b) Limits VOC emissions from the waste decomposition process at solid waste disposal sites through requirements for gas collection and control systems.	New, existing, and modified	BAAQMD Rule 8-34 10/6/99

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
88.	**Woodworking Operations** (PM10) Requires any woodworking facility that uses a pneumatic conveyance system connected to woodworking equipment to vent sawdust emissions to a PM10 emissions control device, such that there are no visible emissions; to cover sawdust storage bins at all times; and to take measures to prevent visible emissions from waste disposal activities from crossing any property line.	New, existing, and modified	SCAQMD Rule 1137 2/1/02
L. General Rules to Reduce Directly Emitted PM from Stationary and Area Sources These rules are generic and apply to sources that may not be regulated through a specific rule or permit requirement. The rules are intended to reduce directly emitted PM10 and PM2.5.			
89.	**Visible Emission Limits** (PM10, PM2.5) Prohibits discharges into the atmosphere from any single source of emission of any air contaminant for a period or periods aggregating more than 3 minutes in any 1 hour which is: 1) as dark or darker in shade as that designated as No. 1 on the Ringlemann Chart (20% opacity), as published by the United States Bureau of Mines, or 2) of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in 1). Provides the option of exempting permitted outdoor residential burns. Note: Several districts have adopted similar rules (e.g., SMAQMD, BAAQMD, SCAQMD, SDAPCD).	New, existing and modified	MaCAPCD Rule 202 9/17/74
90.	**Combustion Contaminants** (PM10, PM2.5) Prohibits discharges into the atmosphere from the burning of fuel of combustion contaminants exceeding 0.23 gram per cubic meter (0.1 grain per cubic foot) of gas calculated to 12% of carbon dioxide at standard conditions averaged over a minimum of 25 consecutive minutes.	New, existing and modified	MDAQMD Rule 409 5/7/76

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
91.	**Grain Loading** (PM10) Prohibits release or discharge into the atmosphere from any source or single processing unit, exclusive of sources emitting combustion contaminants only, PM emissions in excess of 0.1 grains per cubic foot of dry exhaust gas at standard conditions.	New, existing and modified	MaCAPCD Rule 207 11/9/76
M. Programs that Reduce PM Emissions from Mobile Sources Measures primarily reduce directly emitted PM10, PM2.5, NOx, and VOC.			
	Incentive Programs (PM10, PM2.5, NOx) A funding source is needed in order to rely on incentives programs.		
92.	***DMV Funds (AB 2766 Funds): Motor Vehicle Registration Fee Program (Many districts implement this program)*** State law authorizes air districts to assess motor vehicle registration fees of between $2-$4 (MV Fees) to reduce air pollution from motor vehicles and for related planning, monitoring, enforcement, and technical studies necessary for the implementation of the California Clean Air Act. Twenty-six air districts have implemented a motor vehicle registration fee program. ARB's guidance stresses funding cost-effective projects that help implement clean air plans and that reduce the most emissions per dollar spent. Example: SCAQMD's Mobile Source Air Pollution Reduction Review Committee; BAAQMD's Transportation Fund for Clean Air (vehicle buy-back clean school buses, vehicle incentives, etc.); SJVAPCD's REMOVE Program. Note: Legislation effective January 1, 2005, allows air districts to increase the fee to $6. Spending of the additional $2 is limited to four programs: 1) Carl Moyer, 2) Lower Emission School Buses, 3) accelerated vehicle retirement or repair program, and 4) previously unregulated agricultural sources. (continued on next page)	New or modified	SCAQMD BAAQMD SJVAPCD Programs

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Incentive Programs (continuation)		
93.	***Heavy-Duty Engine Incentive Program*** a) Helps fleets pay for new lower emission heavy-duty engines, lower emission retrofits, and engine replacements. Public and private fleets are eligible if they use medium or heavy-duty on-road gas or diesel vehicles over 14,000 pounds gross weight or off-road commercial equipment including construction, agricultural, stationary agricultural water pump, commercial marine vessels, locomotives, forklifts, or airport ground support equipment. The program is funded by the air district and by the Carl Moyer Incentive Program sponsored by ARB. (continued on next page)	New or modified	SMAQMD Program
	b) Provides incentive funds for the differential cost associated with the reduced emission technology as compared with the cost of conventional technology. Eligible funding categories include heavy-duty on-road vehicles, off-road vehicles, locomotives, marine vessels, electric forklifts, electric airport ground support equipment and stationary agricultural irrigation pump engines. The SJVAPCD received $25 million in State transportation funds from special legislation for the Valley Emergency Clean Air Program (VECAP). The air district added the VECAP funds to the Heavy Duty Engine Incentive Program.	New or modified	SJVAPCD Program
94.	***Lower Emission School Bus Program*** The Lower-Emission School Bus Program provides financial incentives to school districts to replace older school buses using both air district and ARB grant funding.	New or modified	BAAQMD VCAPCD SCAQMD Programs
95.	***Moyer Program*** The Carl Moyer Memorial Air Quality Standards Attainment Program provides funds on an incentive-basis for the incremental cost of cleaner than required engines and equipment. Eligible projects include cleaner on-road, off-road, marine, locomotive and stationary agricultural pump engines, as well as forklifts, airport ground support equipment, and auxiliary power units. The program achieves near-term reductions in NOx and PM emissions. Most districts currently implement this program.	New or modified	Most Districts

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Incentive Programs (continuation)		
96.	***Sacramento Emergency Clean Air Transportation (SECAT) Program*** Encourages cleanup of the existing HDD truck fleet by providing funds to pay for the cost of retrofitting existing engines with newer, cleaner engines or paying a significant amount of the cost of a newer vehicle. The goal is to reduce NOx emissions from HDD trucks by 3 tons per day by 2005 by upgrading 3,000 to 6,000 trucks. The program will disperse a total of $70 million by 2005 (from State transportation funds under special legislation plus funds from the federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program.	New or modified	SMAQMD Program
97.	***Light and Medium Duty Vehicle Program*** Provides incentives for certain new on-road original equipment manufacturer (OEM) alternative fuel vehicles with a Gross Vehicle Weight Rating (GVWR) up to 14,000 pounds, including passenger cars, pick-up trucks, small buses, and vans. Vehicles must be certified by the ARB as achieving standards for ULEV, SULEV, or ZEV vehicles. With the exception of hybrid electric vehicles, no vehicles with the ability to operate on gasoline or diesel fuel are funded.	New	SJVAPCD Program
98.	***Lawn Mower Buy Back Program*** Encourages trading of gasoline-powered mowers, by providing funds to offset the purchase cost of electric mowers (e.g., in early 2004, the SMAQMD participated in a program that paid 50% of the purchase price for 700 mowers).	Existing	BAAQMD SJVAPCD SMAQMD SCAQMD Programs

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Transportation Related Programs (PM10, PM2.5, NOx, VOC, CO)		
99.	***On-Road Motor Vehicle Mitigation Options*** Requires employers who employ 250 or more employees to implement a program to reduce mobile source emissions generated from employee commutes and meet an annual emission reduction target (ERT) for their worksite. Provides employers with a menu of emission reduction options including: old-vehicle scrapping, clean on-road vehicles, clean off-road vehicles, pilot credit generation program, and other specified credit programs. As an alternative to meeting a worksite ERT, allows employers to implement an employee commute reduction program. This is the only program of this type with emission reduction mandates. Other districts programs are in place that require reporting of average vehicle ridership, but they have no emission reduction mandates. Note: This rule was amended February 6, 2004.	New, existing, and modified	SCAQMD Rule 2202 1/1/02
100.	***Transportation Outreach Program*** Requires employers with 100 or more employees to register with the air district annually and collect survey data on their employee's commute distances and ridesharing participation every two years. This rule allows the air district to devote resources and efforts in assisting employers with their voluntary trip reduction efforts.	New, existing, and modified	VCAPCD Rule 211 8/11/98
101.	***Spare the Air Program*** Many air districts have implemented public outreach programs to encourage the general public and employers to take actions to reduce transportation related emissions. SMAQMD, SJVAPCD, and BAAQMD have implemented Spare the Air Programs. Spare the Air is a voluntary, summertime effort aimed at reducing air pollution (specifically, ground-level ozone). (continued on next page)	New, existing, and modified	SMAQMD, SJVAPCD, BAAQMD Programs

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

	Strategy	Source Type	District, Rule, and Adoption Date*
	Transportation Related Programs (continuation)		
102.	***Public Awareness Programs*** Some air districts have implemented public awareness programs that: 1) support voluntary employer based trip reduction programs, 2) encourage alternative modes of transportation, 3) encourage cities and counties to incorporate air quality beneficial policies into local planning and development activities, 4) promote demonstrations of low emission vehicles and refueling infrastructure, and/or 5) continue public education by informing residents about air quality status, air pollutant health effects, sources of pollution, and actions individuals and communities can take to help improve air quality.	Existing and modified	BAAQMD SCAQMD SMAQMD SJVAPCD Programs
103.	***Leveraging Other Sources for Transportation Funding*** Some air districts apply for and receive money for transportation-related projects from federal, state, and local funding sources, the most notable being the federal Congestion Mitigation and Air Quality Improvement (CMAQ) program. The projects funded are usually small scale and include incentives, facilities, support services, and public awareness for carpools, vanpools, telecommuting, public transit, biking and walking.	New, existing, and modified	BAAQMD SCAQMD SMAQMD SJVAPCD SDAPCD Programs

Reference: *District rules and regulations can be obtained at http://www.arb.ca.gov/drdb/drdb.htm*

*Date when rule was adopted or last amended

Note: The specific air district rules included on the list represent guidance or appropriate example measures in terms of scope and level of emission control. There may be other district rules which may also represent similar, suitable levels of control.

APPENDIX D

Reported Cost-Effectiveness Numbers for Air District Measures

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
1	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Public Awareness Program	7/17/03	Amended (Adopted 7/15/93)	Program already in place when rule was updated	$0 (emission reductions cannot be quantified)
2 a	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Curtailment - Mandatory	7/17/03	Amended (Adopted 7/15/93)	Voluntary program already in place when rule was updated	$0 (emission reductions cannot be quantified)
2 b	Wood Burning Fireplaces and Heaters	GBVAPCD for Mammoth Lakes	431	Curtailment - Mandatory	12/7/90	Adopted		Not estimated
3	Wood Burning Fireplaces and Heaters	SCAQMD, YSAQMD, SLOAPCD		Curtailment - Voluntary				$0 (emission reductions cannot be quantified)
4	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Installed Wood-Burning Heaters must be U.S. EPA Phase II certified	7/17/03	Amended (Adopted 7/15/93)	Provision in previous rule version (Note: all new heaters produced in the U.S. now are U.S. EPA Phase II certified)	$0
5	Wood Burning Fireplaces and Heaters	NSoCAPCD	4-1-400	Wood-Burning Heaters and Wood-Burning Fireplaces must meet U.S. EPA Phase II certification	2/2/93	Adopted		Not available
5	Wood Burning Fireplaces and Heaters	SLOAPCD	504	Wood-Burning Heaters and Wood-Burning Fireplaces must meet U.S. EPA Phase II certification	10/19/93	Adopted	• Installation in new homes. • Reduces PM10, NOx, and ROG by retrofitting existing stove or fireplace w/compliant appliance at point of home sale. (Clean Air Plan, Dec 1991, Appendix C)	• Very small • $3,095 to $5,216 (1991$)
6	Wood Burning Fireplaces and Heaters	GBUAPCD for Mammoth Lakes	431	Prohibits Installation of Non-EPA Appliances	12/7/90	Adopted	Non-certified woodstoves are less efficient and would cost more to operate. Gas fireplaces are encouraged as they are more energy efficient.	Cost savings to $0

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
7	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Limits Number of Units in New Residential Developments	7/17/03	Amended		$0 to $1,719 (2003$)
8	Wood Burning Fireplaces and Heaters	GBUAPCD for Mammoth Lakes	431	Limits the Number of Units in New Non-Residential Properties	12/7/90	Adopted	No basis for cost provided	$0
9	Wood Burning Fireplaces and Heaters	GBUAPCD for Mammoth Lakes	431	Limits Number of Additional Units in Existing Properties	12/7/90	Adopted	No basis for cost provided	$0
10 a	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Replacement of Non-Certified Appliances	7/17/03	Amended		$8,680 to $12,060 (2003$)
10 b	Wood Burning Fireplaces and Heaters	GBUAPCD for Mammoth Lakes	431	Replacement of Non-Certified Appliances	12/7/90	Adopted	Cost to change out stoves without regard to savings ($1,500 per stove, 20 year life, 5,946 stoves, $1,865 lbs/day emission reduction). Woodstoves used for heating will result in savings after 5-12 years.	Cost savings to cost of $5,240 (2003$)
11	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Control of Wood Moisture Content	7/17/03	Amended (Adopted 7/15/93)	Provision in previous rule version	$0
12	Wood Burning Fireplaces and Heaters	SJVAPCD	4901	Prohibit Fuel Types	7/17/03	Amended (Adopted 7/15/93)	Provision in previous rule version	$0
13	Non-Agricultural Open Burning	SJVAPCD	4103 4106	Prohibit All Outdoor Residential Open Burning	6/21/01	Amended (Adopted 6/18/92)	6/21/01 amendment: No significant costs associated w/rule implementation	Not estimated
14	Non-Agricultural Open Burning	MBUAPCD	438	Prohit Burning Where Waste Service is Available	4/16/03	Adopted		Not estimated
15	Non-Agricultural Open Burning	SMAQMD	407	Prohibit Burning in Specified Highly Populated Areas	6/4/98	Amended		$4,600 to $19,800 (1996$)
16	Non-Agricultural Open Burning	LCAQMD	433	Prohibit Burning within Small Lots and Setbacks	10/15/02	Amended		Not estimated

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
17	Non-Agricultural Open Burning	MBUAPCD	438	Prohibit Burning during Periods with Predicted High PM or Ozone Levels	4/16/03	Adopted		Not estimated
18	Non-Agricultural Open Burning	MBUAPCD	438	Control Smoke Production Limits During Burn Days in Smoke Sensitive Areas	4/16/03	Adopted		Not estimated
19	Non-Agricultural Open Burning	ShCAQMD	2.6	Control Smoke Production - Emission Limits for Mechanized Burners	9/24/02	Amended (also on 3/9/04)		Not estimated
20	Non-Agricultural Open Burning	BAAQMD	Reg. 5	Drying Times	11/2/94	Amended	Socioeconomic analysis found cost below level of significance (total cost from $2,400/year to $10,600/year)	Not estimated
21	Non-Agricultural Open Burning	LCAQMD	431 - 433.5	Burn Duration	10/15/02	Amended		Not estimated
22 a	Non-Agricultural Open Burning	MaCAPCD	300	Preparation of Fuels & Management of Burns	7/19/88	Amended		Not estimated
22 b	Non-Agricultural Open Burning	MBUAPCD	438	Preparation of Fuels & Management of Burns	4/16/03	Adopted		Not estimated
23	Non-Agricultural Open Burning	NCUAQMD	Reg 2	Permits Required	7/18/02	Amended	Permit fee for: • Residential burn = $12/year • Non-residential burn depends on acreage burned	Not applicable (emission reductions cannot be quantified)
24 a	Fugitive Dust	SJVAPCD	8021	Construction: Earthmoving	11/15/01	Adopted	Watering (240 acre-month; 629 gal/acre) (Draft Report 9/27/01)	$304 (2001$)
24 b	Fugitive Dust	SCAQMD	403	Construction: Earthmoving	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
25 a	Fugitive Dust	SJVAPCD	8021	Construction: Demolition	11/15/01	Adopted		Not estimated
25 b	Fugitive Dust	SCAQMD	403	Construction: Demolition	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
26 a	Fugitive Dust	SJVAPCD	8021	Construction: Grading Operations	11/15/01	Adopted	Pre-watering (Draft Report 9/27/01)	Not estimated
26 b	Fugitive Dust	SCAQMD	403	Construction: Grading Operations	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
27 a	Fugitive Dust	SJVAPCD	8021	Inactive Disturbed Land	11/15/01	Adopted		Not estimated
27 b	Fugitive Dust	SCAQMD	403	Inactive Disturbed Land	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
28 a	Fugitive Dust	SJVAPCD	8031	Bulk Materials: Handling/Storage	11/15/01	Adopted	Watering (estimated emission reductions from handling >> storage) (Draft Report 9/27/01)	$1,151(handling) to $28,293 (storage) (2001$)
28 b	Fugitive Dust	SCAQMD	403	Bulk Materials: Handling/Storage	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
29	Fugitive Dust	SCAQMD	1158	Storage, Handling, and Transport of Petroleum Coke, Coal, and Sulfur	6/11/99	Adopted		$10,000
30 a	Fugitive Dust	SJVAPCD	8041	Carryout and Track-out	11/15/01	Adopted	(From Draft Report 9/27/01): • By manual sweeping (From 2003 SIP) : • Purchase 1 efficient sweeper • Sweep once per month • Control devices installed at access points to public roads • Length of paved interior roads	• $3,541 (2001$) • $792 • $1,070 • $13,700 to $322,000 • $7,930 to $186,000
30 b	Fugitive Dust	SCAQMD	403	Carryout and Track-out	2/14/97	Amended	By construction, aggregate facilities, and landfills (Final Report 2/14/97)	< $100 (1996$)
31	Fugitive Dust	SJVAPCD	8041	Carryout and Track-out: Clean-up Methods	11/15/01	Adopted		Not estimated
32 a	Fugitive Dust	SJVAPCD	8051	Disturbed Open Areas	11/15/01	Adopted	Water application (5 acres)	$7,020 (2001$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
32 b	Fugitive Dust	SCAQMD	403	Disturbed Open Areas	2/14/97	Amended	RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
33 a	Fugitive Dust	SJVAPCD	8061	Paved Road Dust: New/Modified Public and Private Roads	11/15/01	Adopted	Paved shoulders (4 ft on 50% of highest ADVT existing roads) (From 2003 SIP)	$7,290 to $11,300 (2003$)
34 b	Fugitive Dust	SCAQMD	1186	Paved Road Dust: New/Modified Public and Private Roads	2/14/97	Adopted	Curb & gutter road shoulder (Final Report 2/14/97)	$5,577 (1996$)
35	Fugitive Dust	SCAQMD	1186	Paved Road Dust: Street Sweeping	2/14/97	Amended	• Price of PM10-efficient sweeper is $37,000 over previous sweeper • Street sweeping • Post-event cleaning (Final Report 2/14/97)	• $1,119 • < $100 (Both in 1996$)
35	Fugitive Dust	GBUAPCD for Mammoth Lakes	431	Paved Road Dust: Street Sweeping Sand & Cinders	12/7/90	Adopted	Capital cost = $240,000; 10 year life time; $15,000/year for O&M, cost is $427/winter-day; 2,429 lb/day PM10 emission reductions at 34% control efficiency.	$350 (1996$)
36	Fugitive Dust	SJVAPCD	8061	Unpaved Parking Lots/Staging Areas	11/15/01	Adopted	Unpaved traffic areas: apply water, gravel, chemical or dust suppressant, or pave (150 trips/day; use 220 or 60 days/year)	$344 to $12,293 (2001$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
37 b	Fugitive Dust	SCAQMD	1186	Unpaved Roads: Control Requirements	2/14/97	Amended	(Final Report 2/14/97)	$958 (1996$)
37a	Fugitive Dust	SJVAPCD	8061	Unpaved Roads: Control Requirements	11/15/01	Adopted	• Apply water, dust suppressant, gravel, pave (150 trips/day; use 220 or 60 days/year) • Paving (2003 SIP)	• $56 to $1,481 (2001$) • $2,160 to $5,920 (2003$)
38 a	Fugitive Dust	SJVAPCD	8021	Weed Abatement Activities	11/15/01	Amended		Not estimated
38 b	Fugitive Dust	SCAQMD	403	Weed Abatement Activities	7/9/93	Amended		Not estimated
39	Fugitive Dust	SCAQMD	403	Windblown Dust: Definitions	2/14/97	Amended		Not applicable
40	Fugitive Dust	SCAQMD	403	Windblown Dust: Construction/Earthmoving	2/14/97	Amended	• RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
41	Fugitive Dust	SCAQMD	403	Windblown Dust: Disturbed Areas	2/14/97	Amended	• RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
42 a	Fugitive Dust	SCAQMD	403	Windblown Dust: Bulk Materials/Storage Piles	2/14/97	Amended	• RACM to BACM upgrade (Final Report 2/14/97)	$197 (1996$)
42 b		SCAQMD	403.1	Windblown Dust: Bulk Materials/Storage Piles	1/15/93	Adopted	Dft Staff Report 12/92	$325 to $462 (1992$)
43	Fugitive Dust	GBUAPCD for Owens Lake	Board Order 981116-01	Windblown Dust: Open Areas	11/16/98	Adopted	Annualized capital cost over 25 years = $29 MM; O&M = $27MM; annual cost = $56MM; annual emission reductions = 80,400 tons of PM10. (Owens Valley PM10 SIP 2003).	$697 (2003$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
44 a	Fugitive Dust	SJVAPCD	8081	Agricultural Operations	11/15/01	Adopted		Not estimated
44 b	Fugitive Dust	SCAQMD	403	Agricultural Operations	2/14/97	Amended	12/11/98 amendment: High wind tilling prohibition & stabilization of fallow fields	$134 (1996$)
44 c	Fugitive Dust	SCAQMD	403.1	Agricultural Operations	1/15/93	Adopted	Dft Staff Report 12/92	$8 (1992$)
44 d	Fugitive Dust	SCAQMD	1186	Agricultural Operations	2/14/97	Amended	Livestock operations - unpaved roads (Final Report 2/14/97)	$958 (1996$)
44 e	Fugitive Dust	ICAPCD	420	Agricultural Operations	8/13/02	Amended		Data pending
45 a	Combustion Sources	SJVAPCD	4306	Boilers, Steam Generators, and Process Heaters	9/18/03	Amended	(NOx) W/ultra low NOx burners • Small gas-fuel burners 30 ppmv • 20MM Btu/hr or less (reduce from 30 to 15 ppmv, 100% to 25% capacity factor (C.F.) • Steam generators (reduce 30 to 15 ppmv, 100% to 25% C.F.) • Greater than 20 MMBtu/hr (reduce from 30 to 9 ppmv, 100% to 5%C.F.) • Refinery units >110MM Btu/hr (to 5 ppmv w/SCR) (Final Report 9/18/93)	• $2,807 to $8,070 • $9,531 to $178,235 • savings of $770 to cost of $49,029 • $5,712 to $23,277 • $4,177 to $10,381 (All in 2003$)
45	Combustion Sources	SCAQMD	1109	Boilers, Steam Generators, and Process Heaters	3/12/84	Amended (Adopted 8/5/88)		$8,400

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
45 b	Combustion Sources	SMAQMD	411	Boilers, Steam Generators, and Process Heaters	7/22/99	Amended (Adopted 2/2/95)	(NOx)	$1,300 to $11,260 (1995$)
45 b	Combustion Sources	SCAQMD	1146	Boilers, Steam Generators, and Process Heaters	11/17/00	Amended	Amended 40 ppmv to 30 ppmv	$7,000
45 c	Combustion Sources	SCAQMD	1146.1	Boilers, Steam Generators, and Process Heaters	10/5/90	Adopted	(NOx)	$11,100
45 d	Combustion Sources	VCAPCD	74.15.1	Boilers, Steam Generators, and Process Heaters	6/13/00	Amended (Adopted 5/11/93)	(NOx) • Overall CE = $3.20/lb • Range of cost savings to cost of $10.53/lb	• Overall $6,400 • Range of cost savings to cost of $21,060 (1993$)
45 e	Combustion Sources	SCAQMD	1146.2	Boilers, Steam Generators, and Process Heaters	1/9/98	Adopted	(NOx) Uncontrolled to 30 or 55 ppmv	Savings of $2,900 to cost of $8,400
45 e	Combustion Sources	SBAPCD	360	Boilers, Steam Generators, and Process Heaters	10/17/02	Adopted	(NOx) Gas-fired equipment (VCAPCD's Report for Rule 74.11.1)	$5,333 to $13,393 (1999$)
45 e	Combustion Sources	VCAPCD	74.11.1	Boilers, Steam Generators, and Process Heaters	8/31/99	Adopted	(NOx) Gas-fired equipment	$5,333 to $13,393 (1999$)
46 a	Combustion Sources	SMAQMD	413	Turbines	5/1/97	Amended	(NOx)	$3,600 to $8,600 (1997$)
46 a	Combustion Sources	SJVAPCD	4703	Turbines	4/25/02	Adopted	(NOx) Depending on turbine size (3.5-75 MW), control method, and level of use	$4,296 to $18,032 (2002$)
46 b	Combustion Sources	SCAQMD	1134	Turbines	8/4/89	Adopted	(NOx) • Non-SCR • SCR (1989 Report)	• $3,500 to $11,500 $20,000

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
47 a	Combustion Sources	SCAQMD	1110.2	IC Engines	11/14/97	Amended (Adopted 8/13/90)	(NOx) • 8/90 • 11/97	• 2,600 to $7,900 • $4,800 to $9,500
47 b	Combustion Sources	SJVAPCD	4702	IC Engines	8/21/03	Adopted	(NOx) • Rich Burn (from 50 to 25 ppmv) • Rich Burn (from 640 to 25 ppmv) • Rich Burn (from 300 to 50 ppmv) • Lean Burn (from 75 to 65 ppmv) • Lean Burn (from 740 to 65 ppmv) Also depends on horsepower, capacity factor, and on type of control used	• $497 to $14,470 • $262 to $8,415 • $394 to $20,702 • $2,093 to $50,494 • $1,467 to $24,593
47 c	Combustion Sources	SMAQMD	412	IC Engines	6/1/95	Adopted	(NOx)	$19,400 (1995$)
48	Combustion Sources	SJVAPCD	4313	Lime Kilns	3/27/03	Adopted	(NOx) (Final Draft Report 2/10/93)	$423 (2003$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
49 a	Combustion Sources	MDAQMD	1161	Cement Kilns	3/25/02	Amended (Adopted 6/28/95)	(NOx) Depends on kiln type: • Low NOx burner • Mid-kiln firing	• $830 to $1,330 • $470 to $610 (Both in 1995$)
49 b	Combustion Sources	KCAPCD	425-3	Cement Kilns	10/13/94	Adopted	(NOx) Low NOx Burner	$830 to $1,330 (1994$)
49 c	Combustion Sources	SCAQMD	1112.1	Cement Kilns	2/7/86	Adopted	(NOx)	Not estimated
50	Combustion Sources	SCAMQD	1119	Petroleum Coke Calcining Operations	3/2/79`	Adopted	(SO2)	$590
51 a	Combustion Sources	SCAQMD	1117	Furnaces (glass melting)	1/6/84	Adopted 2/5/82	(NOx)	$5,500
51 b	Combustion Sources	BAAQMD	9.12	Furnaces (glass melting)	1/19/94	Adopted	(NOx) For SCR	$1,800 to $2,400 (1994$)
51 c	Combustion Sources	SCAQMD	1111	Furnaces (central)	7/8/83	Adopted 12/1/78	(NOx)	Not available
51 c	Combustion Sources	SDAPCD	69.6	Furnaces (central)	6/17/98	Adopted 6/17/98	(NOx) $6,800/ton is for worst case scenario (Socioeconomic Impact Report 6/17/98)	From minimal cost to $6,800 (1998$)
50 a	Combustion Sources	SCAQMD	1121	Residential Water Heaters	12/10/99	Amended	(NOx) • For 20 ng/joule • For 10 ng/joule (based on ceramic burner, expected to be closer to the lower end)	• $2,000 to $5,400 (2002$) • $4,400 to $16,000 (2005$)
52 b	Combustion Sources	SJVAPCD	4902	Residential Water Heaters	6/17/93	Adopted	(NOx)	Not available
53	Combustion Sources	SJVAPCD	4692	Commercial Charbroiling Operations	3/21/02	Adopted	(PM10 and VOC combined) Use of Flameless Catalytic Oxidizer	$3,017 (2002$)
53	Combustion Sources	SCAQMD	1138	Commercial Charbroiling Operations	11/14/02	Adopted	(PM10 and VOC combined)	$1,680 to $2,500 (Both in 1997$)

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
54	Composting and Related Operations	SCAQMD	1133	General Administrative Requirements	1/10/03	Adopted	(VOC and NH3 combined)	$8,700 to $10,000
55	Composting and Related Operations	SCAQMD	1133.1	Chipping and Grinding Operations	1/10/03	Adopted		
56	Composting and Related Operations	SCAQMD	1133.2	Composting	1/10/03	Adopted		
57	Storage, Transfer, and Dispensing Operations	BAAQMD	8.7	Gasoline Transfer and Dispensing Facilities	11/6/02	Amended	(VOC) Requires testing to ensure compliance w/ARB's vapor recovery program	Not applicable
58 a	Storage, Transfer, and Dispensing Operations	BAAQMD	8.5	Organic Liquid Storage	11/27/02	Amended	(VOC) • 2002: Increase monitoring of seals and filters on floating roof tanks • 1999: Requirements for slotted guidepoles and seals on internal roof tanks • 1993: Requirements for other equipment	• $11,600 (2002$) • $1,250 • $13,000 to $15,700
58 b	Storage, Transfer, and Dispensing Operations	SCAQMD	463	Organic Liquid Storage	3/11/94	Amended	(VOC)	Data pending
58 b	Storage, Transfer, and Dispensing Operations	SCAQMD	1149	Storage Tank Degassing	7/14/95	Amended	(VOC)	Data pending

*Date when rule was adopted or last amended.

Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
59 a	Leaks and Releases	BAAQMD	8.18	Equipment Leaks (Valves and Flanges)	11/27/02	Amended	(VOC) • 2003: Valve requirements • 1998: Other equipment requirements	• $320 to $1,600 (2003$) • $1,600 (1998$)
59 b	Leaks and Releases	SCAQMD	1173	Equipment Leaks (Valves and Flanges)	12/6/02	Amended	(VOC) Implementation or enhancement of leak detection and repair programs	$48 to $10,712 average = $157
60	Product Manufacturing	SCAQMD	1141.1	Coatings and Ink Manufacturing	11/17/00	Amended	(VOC)	Data pending
61	Product Manufacturing	PCAPCD	229	Fiberboard Manufacturing	6/28/94	Adopted	(VOC) For fiber dryers and fiberboard press vents, depending on level of VOC control achieved	$4,000 to $6,000 (1994$)
62	Product Manufacturing	SCAQMD	1131	Food Product Manufacturing and Processing	6/6/03	Adopted 9/15/00	(VOC)	$4,732 (2000$)
63	Product Manufacturing	SCAQMD	1103	Pharmaceuticals and Cosmetics Manufacturing Operations	3/12/1999	Amended	(VOC)	Data pending
64	Product Manufacturing	SCAQMD	1162	Polyester Resin Operations	11/9/01	Amended	(VOC)	Cost savings to cost of $719
65 a	Product Manufacturing	SCAQMD	1175	Polymeric Cellular Products	5/13/94	Amended	(VOC)	Data pending
65 b	Product Manufacturing	BAAQMD	8.52	Polymeric Cellular Products	7/7/99	Adopted	(VOC)	$8,000 to $11,000
66	Product Manufacturing	SCAQMD	1141.2	Surfactant Manufacturing	1/11/02	Amended (Adopted 7/6/84)	(VOC)	Data pending
67	Coating Operations	VCAPCD	74.20	Adhesives and Sealants	9/9/03	Amended	(VOC)	Cost savings of $1,060 to $0
67	Coating Operations	SCAQMD	1168	Adhesives and Sealants	10/23/03	Amended	(VOC)	Data pending

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Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
68	Coating Operations	AVAQMD	1113	Architectural Coatings	3/18/03	Adopted	(VOC) Referenced ARB's 6/6/00 SCM Staff Report: $2.70/lb to $3.90/lb; average = $3.20/lb	$5,400 to $7,800 Average = $6,4000 (All in 2000)
69	Coating Operations	SJVAPCD	4610	Glass Coatings	4/17/03	Amended	(VOC) - 2002 amendment	$1,050 to $2,900
70	Coating Operations	SCAQMD	1130	Graphic Arts	10/8/99	Amended	(VOC)	$8,600
71	Coating Operations	SCAQMD	1126	Magnet Wire Coating Operations	1/13/95	Amended	(VOC)	Data pending
72	Coating Operations	SDAPCD	67.18	Marine Coating Operations	5/15/96	Amended (Effective 7/3/90)	(VOC)	Not available
73	Coating Operations	SCAQMD	1125	Metal Container, Closure, and Coil Coating Operations	1/13/95	Amended	(VOC)	Data pending
74	Coating Operations	SCAQMD	1107	Metal Parts and Products Coatings	11/9/2001	Amended (Adopted 6/1/79)	(VOC)	Data pending
75	Coating Operations	SCAQMD	1115	Motor Vehicle Assembly Line Coating Operations	5/12/95	Amended	(VOC)	Data pending
76	Coating Operations	SCAQMD	1128	Paper, Fabric, and Film Coating Operations	3/8/96	Amended (Adopted 5/4/79)	(VOC)	Data pending
77	Coating Operations	SCAQMD	1145	Plastic, Rubber, and Glass Coating	2/14/97	Amended (Adopted 7/8/83)	(VOC)	Data pending
78	Coating Operations	SCAQMD	1130.1	Screen Printing Operations	12/13/96	Amended (Adopted 8/2/91)	(VOC)	Data pending

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Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
79	Coating Operations	SCAQMD	1132	Spray Booth Facilities	1/19/01	Adopted	(VOC)	$5,484
80	Coating Operations	SCAQMD	1151	Vehicle Refinishing	12/11/98	Amended (Adopted 1988)	(VOC	Data pending
81	Coating Operations	SCAQMD	1104	Wood Flat Stock Coatings	8/13/99	Amended	(VOC)	$1,800 (1999$)
82	Coating Operations	SCAQMD	1136	Wood Products Coatings	6/14/96	Amended	(VOC) • Waterborne • Acetone	 • $1,933 to $2,972 • $1,600
83 a	Solvent Cleaning and Degreasing	SCAQMD	1171	Cleaning Operations	11/7/03	Amended (also 10/8/99)	(VOC)	$264 to $2,570
83 b	Solvent Cleaning and Degreasing	SMAQMD	466	Cleaning Operations	5/23/02	Amended (Adopted 5/23/02)	(VOC) • 2004 Ozone Plan for Sac Metro Region (Rules 454 and 466) • 5/23/03 Staff Report	• $0 to $4,200 • Cost savings
83 b	Solvent Cleaning and Degreasing	SJVAPCD	4663	Cleaning Operations	12/20/01	Adopted	(VOC) Draft Report 12/6/01 • Scenario 1 • Scenario 2	 • Savings of $990 to • Cost of $2,167 (Both in 2000$)
84 a	Solvent Cleaning and Degreasing	SCAQMD	1122	Degreasing Operations	12/6/02	Amended (Adopted 1979)	(VOC) Dft Report 12/6/01	$92 (2000$)
84 b	Solvent Cleaning and Degreasing	VCAPCD	74.6	Degreasing Operations	11/11/03	Amended	(VOC) Cold Cleaners	Cost savings of $3,320 to cost of $12,940
84 c	Solvent Cleaning and Degreasing	VCAPCD	74.6.1	Degreasing Operations	11/11/03	Adopted	(VOC) • Retrofit w/automated parts • Chillers	 • $500 to $103,140 • $3,100 to $10,040 •

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Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
84 d	Solvent Cleaning and Degreasing	SMAQMD	454	Degreasing Operations	5/23/02	Amended (Adopted 6/5/79)	(VOC) • 2004 Ozone Plan for Sac Metro Region) (Rules 454 and 466) • 5/23/03 amendment	• $0 to $4,200 • Cost savings
85	Solvent Cleaning and Degreasing	SCAQMD	442	Use of Solvents	12/15/00	Amended	(VOC)	$7,050
86 a	Miscellaneous	BAAQMD	8.40	Soil Decontamination	12/15/99	Amended	(VOC) Depends on soil disposition method (off-site treatment has lowest CE; in-situ vapor extraction has highest CE)	$7,100 to $86,900
86 b	Miscellaneous	SCAQMD	1166	Soil Decontamination	5/11/01	Amended (Adopted 1988)	(VOC)	Data pending
87 a	Miscellaneous	SCAQMD	1150.1	Solid Waste Landfills	3/17/00	Amended (Adopted 4/5/85)	(VOC)	Data pending
87 b	Miscellaneous	BAAQMD	8.34	Solid Waste Landfills	10/6/99	Amended	(VOC) 1996 amendment	Cost savings
88	Miscellaneous	SCAQMD	1137	Woodworking Operations	2/1/02	Adopted	(PM10)	$3,200 (2001$)
89	General Rules to Reduce Directly Emitted PM from Stationary and Area Sources	MaCAPCD	202	Visible Emission Limits	9/17/74	Adopted	(PM10, PM2.5)	Not applicable (emission reductions cannot be quantified)
90	General Rules to Reduce Directly Emitted PM from Stationary and Area Sources	MDAQMD	409	Combustion Contaminants	5/7/76	Adopted	(PM10, PM2.5)	Not applicable (emission reductions cannot be quantified)

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Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
91	General Rules to Reduce Directly Emitted PM from Stationary and Area Sources	MaCAPCD	207	Grain Loading	11/9/76	Adopted	(PM10)	Not Applicable (emission reductions cannot be quantified)
92	Programs that Reduce PM Emissions from Mobile Sources	SCAQMD, BAAQMD, SJVAPCD		Incentive Programs - DMV Funds (AB 2766 Funds)				Not applicable
93 a	Programs that Reduce PM Emissions from Mobile Sources	SMAQMD		Incentive Programs - Heavy Duty Engine Incentive Programs				Not applicable
93 b	Programs that Reduce PM Emissions from Mobile Sources	SJVAPCD		Incentive Programs - Heavy Duty Engine Incentive Programs				Not applicable
94	Programs that Reduce PM Emissions from Mobile Sources	SCAQMD, BAAQMD, VCAPCD		Incentive Programs - Lower Emission School Bus Program				Not applicable
95	Programs that Reduce PM Emissions from Mobile Sources	Most		Incentive Programs - Moyer Program				Not applicable
96	Programs that Reduce PM Emissions from Mobile Sources	SMAQMD		Incentive Programs - Sacramento Emergency Clean Air Transportation (SECAT)				Not applicable
97	Programs that Reduce PM Emissions from Mobile Sources	SJVAPCD		Incentive Programs - Light and Medium Duty Vehicle Program				Not applicable

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Reported Cost-Effectiveness Numbers for Air District Measures

No.	Category	District	Rule #	Title	Date*	Date Notes	C.E. Notes	C.E. ($/ton reduced)
98	Programs that Reduce PM Emissions from Mobile Sources	SJVAPCD, SMAQMD, BAAQMD, SCAQMD		Incentive Programs - Lawn Mower Buy Back Program				Not applicable
99	Programs that Reduce PM Emissions from Mobile Sources	SCAQMD	2202	Transportation Related - On-Road Motor Vehicle Mitigation Options	1/11/02	Amended (Adopted 12/18/95)		Data pending
100	Programs that Reduce PM Emissions from Mobile Sources	VCAPCD	211	Transportation Related - Transportation Outreach Program	8/11/98			Not applicable
101	Programs that Reduce PM Emissions from Mobile Sources	SMAQMD, SJVAPCD, BAAQMD		Transportation Related - Spare the Air Program				Not applicable
102	Programs that Reduce PM Emissions from Mobile Sources	SJVAPCD, SMAQMD, BAAQMD, SCAQMD		Transportation Related - Public Awareness Programs				Not applicable
103	Programs that Reduce PM Emissions from Mobile Sources	SJVAPCD, SMAQMD, BAAQMD, SCAQMD, SDAPCD		Transportation Related - Leveraging Other Sources for Transportation Funding				Not applicable

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