



Chapter 5

Control Strategy



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Chapter 5: Control Strategy

The District's strategy for attaining the 2006 PM_{2.5} standard is a multifaceted approach that utilizes a combination of conventional and innovative control strategies. This comprehensive strategy includes regulatory actions; incentive programs; technology advancement programs; policy and legislative platforms; public outreach, participation and communication; and additional strategies. Not only does this strategy consist of conventional and innovative strategies, but it also builds off of existing strategies, thus making this plan a fusion of existing and new measures.

This chapter focuses on regulatory control actions and additional strategies while incentives, technology advancement, and the legislative platform and community outreach efforts are discussed in Chapters 6, 7, and 8, respectively.

5.1 COMPREHENSIVE REGULATORY CONTROL STRATEGY

The San Joaquin Valley Air Pollution Control District has implemented a comprehensive regulatory control strategy over the past couple of decades. Since 1992, the District has adopted over 500 new rules and amendments to implement this aggressive control strategy. Many current rules are fourth or fifth generation, meaning that they have been revised and emission limits have been lowered, as new emission control technology has become available and cost-effective.

Air quality improvements in the Valley document the success of the District's innovative and effective rules. Previously adopted *2012 PM_{2.5} Plan* regulatory control measures are achieving 247.8 tons per day (tpd) of NO_x reductions and 15.7 tpd of PM_{2.5} reductions; these measures include both stationary and area source control measures as well as ARB rules for mobile sources (see Section 5.1.2 for a listing of ARB rules and a brief discussion). The District's regulatory authority is centered on stationary sources and some area-wide sources, and the District's stringent and innovative rules on these sources, such as those for residential fireplaces, glass manufacturing, and agricultural burning, have set benchmarks for California and the nation. States and the federal government—but not regional agencies like the District—can directly regulate tailpipe emissions from mobile sources. ARB has adopted tough regulations for heavy-duty trucks, off-road equipment, and other mobile sources. However, the District has also adopted innovative regulations such as Indirect Source Review and Employer-based Trip Reduction to reduce emissions from mobile sources within the District's limited jurisdiction over these sources.

These and other District and ARB rules already guarantee that emissions will continue to be reduced over the coming years. New rules and rule amendments identified in this plan combined with other control strategies discussed in Chapters 6 through 8 will provide necessary emissions reductions to complement those already being achieved and contribute to PM_{2.5} air quality improvements in the Valley.

5.1.1 District Regulations Contributing to Continued PM_{2.5} Improvement

The District's current rules and regulations reflect technologies and methods that are far beyond minimum required control levels. In December 2010, the California Air Resources Board (ARB) determined that, based on the District's State Implementation Plans (SIP) and the evaluation of control feasibility in all rulemaking actions, the District has undertaken *all feasible measures* to reduce nonattainment air pollutants from sources within the District's jurisdiction and regulatory control.¹ This determination considered all air pollution controls and standards applicable to all source categories under the District's authority based on maximum reductions achievable as well as technological, social, environmental, energy and economic factors, including cost-effectiveness.²

The aggressive regulations already adopted under previous attainment plans also serve as control measures for the *2012 PM_{2.5} Plan*. These adopted regulations will dramatically reduce directly emitted PM_{2.5} and PM_{2.5} precursors (NO_x and SO_x) as they are fully implemented over the next few years, greatly contributing to the Valley's progress toward the 2006 PM_{2.5} standard. EPA prefers reliance on control measures that have already been adopted over ones that have yet to be approved. EPA has gone so far as to disapprove attainment plans that demonstrated an over-reliance on unapproved measures. As such, the recognition of recently adopted and implemented District and ARB control measures is an important component of this plan.

Table 5-1 and the discussion that follows summarize adopted District rules achieving new emissions reductions after 2007, the base year for this plan. However, even pre-2007 emissions reductions, such as those achieved through the District's Conservation Management Practices (CMP) rule (Rule 4550) and Regulation VIII (Fugitive PM₁₀ Prohibitions), are contributing and will continue to contribute to the Valley's progress toward the 2006 PM_{2.5} standard.

¹ ARB Executive Order G-10-126. (2010, December 10), required under California Health and Safety Code §40612.

² California Administrative Code, Title 17 §70600(a)(1). (2012)

Table 5-1 Adopted District Rules

District Rule	Adoption/ Amendment Date(s)	Emissions Reduced ¹ (tons per day)
Rule 4103 Open Burning	05/19/2005 05/17/2007 04/15/2010	0.12 tpd NOx 0.34 tpd PM2.5
Rule 4106 Prescribed Burning and Hazard Reduction Burning	1/21/2001	NQ ⁴
Rule 4204 Cotton Gins	2/17/2005	0.79 tpd PM
Rule 4307 Boilers, Steam Generators, and Process Heaters 2 to 5 MMBtu/hr	12/15/2005 04/20/2006 10/16/2008 05/19/2011	3.36 tpd NOx
Rule 4308 Boilers, Steam Generators, and Process Heaters 0.075 to <2 MMBtu/hr	10/20/2005 12/17/2009	3.30 tpd NOx
Rule 4309 Dryers, Dehydrators, and Ovens	12/15/2005	0.65 tpd NOx
Rule 4311 Flares	06/15/2006 06/18/2009	0.06 tpd SOx
Rules 4306 & 4320 Boilers, Steam Generators, and Process Heaters >5 MMBtu/hr	03/17/2005 10/16/2008	3.50 tpd NOx 3.60 tpd SOx
Rule 4352 Solid Fuel Fired Boilers, Steam Generators and Process Heaters	05/18/2006 12/15/2011	NQ ⁴
Rule 4354 Glass Melting Furnaces	08/17/2006 10/16/2008 09/16/2010 05/19/2011	3.37 tpd NOx 1.70 tpd SOx 0.11 tpd PM2.5
Rule 4550 Conservation Management Practices	08/19/2004	34.2 tpd PM
Rule 4692 Commercial Charbroiling	09/17/2009	0.08 tpd PM2.5
Rule 4702 Internal Combustion Engines	6/16/2005 04/20/2006 01/18/2007 08/18/2011	22.43 tpd NOx
Rule 4703 Stationary Gas Turbines	08/17/2006 09/20/2007	2.20 tpd NOx
Rule 4901 Wood Burning Fireplaces and Wood Burning Heaters	10/16/2008	2.40 tpd PM2.5 ²
Rule 4902 Residential Water Heaters	03/19/2009	1.03 tpd NOx
Rule 4905 Natural Gas-Fired, Fan-Type Residential Central Furnaces	10/20/2005	2.6 tpd NOx
Regulation VIII Rules Fugitive PM10 Prohibitions	08/19/2004	20.4 tpd PM
Rule 9310 School Bus Fleets	09/21/2006	0.8 tpd NOx 0.03 tpd of PM2.5
Rule 9410 Employer-based Trip Reduction	12/17/2009	0.6 tpd NOx
Rule 9510 Indirect Source Review	12/12/2005	2.2 tpd NOx ³ 1.4 tpd PM

1. Total emissions reduced upon full implementation of all listed rule amendments.

2. As an average for November – April; the reductions on any given “No Burn” day are much higher.

3. Though ISR is achieving real emissions reductions, these reductions are not credited in the State Implementation Plan, per EPA's May 9, 2011 approval of the ISR rule. <http://www.gpo.gov/fdsys/pkg/FR-2011-05-09/pdf/2011-11133.pdf>. As such, the emissions reductions from ISR are not incorporated in this plan's emissions inventories, nor are these emissions reductions credited in this plan's Reasonable Further Progress (RFP) or the attainment demonstrations.

4. NQ = not quantified

Rule 4103 Open Burning

The provisions of Rule 4103 apply to open burning conducted in the Valley and, in conjunction with the District's Smoke Management System (SMS), have reduced the total acreage of agricultural materials burned in the Valley by 80% since 2002. After working extensively with stakeholders to understand viable alternatives to burning and associated costs, the District provided recommendations for allowing or prohibiting the open burning of agricultural material categories in the District's *2010 Final Staff Report and Recommendations on Agricultural Burning*. The April 2010 amendments to Rule 4103 incorporate California Health and Safety Code requirements and require the District to review its determinations for any postponed crops and materials at least once every five years. The recommendations adopted as a result of the *2010 Final Staff Report and Recommendations on Agricultural Burning* result in a reduction of 0.12 tons per day (tpd) of NO_x and 0.34 tpd of PM_{2.5} emissions.

Rule 4106 Prescribed Burning and Hazard Reduction Burning

Since the adoption of Rule 4106, the District has developed cooperative relationships with land management agencies (LMAs), which are the agencies that regularly conduct prescribed burning operations. The District advises LMAs on which days would be the most conducive for igniting a burn project, based on air quality and meteorological conditions. This collaborative effort ensures that the ignition of burn projects occurs when air quality and dispersion conditions are favorable, thus lessening the health impacts on Valley citizens and on air quality in the Valley. The adoption of Rule 4106 was not aimed at reducing the total emissions from this category, as the District recognizes the importance of both prescribed burning and hazard reduction burning; rather, the adoption of Rule 4106 established tools that the District could use to manage smoke emissions in the Valley.

Rule 4204 Cotton Gins

Rule 4204 is among the most stringent rules in the nation for cotton gins and cotton ginning operations. Agricultural stakeholders and interested groups participated extensively throughout the rule development process in 2005. The rule requires the installation of 1D-3D cyclones, a PM control device, onto each cotton gin which has significantly reduced PM emissions from this source category. The final compliance deadline for these units came into effect in 2008. This rule results in 0.79 tpd of PM emissions reductions.

Rule 4307 Boilers, Steam Generators, and Process Heaters 2 to 5 MMBtu/hr

Rule 4307 is the most stringent rule in the country for controlling emissions from fuel combustion-producing heat and energy for manufacturing and processing purposes. Emissions from these units are generally controlled through either combustion modification or exhaust gas treatment. Recent amendments strengthened the rule by removing some exemptions, imposing NO_x limits of 9 or 12 ppmv for new and

replacement units, and adding a menu approach for particulate matter control that includes SOx controls. While offering affected businesses cost-effective compliance options, this rule will generate 3.36 tpd of NOx reductions by the final compliance deadline in 2015.

Rule 4308 Boilers, Steam Generators, and Process Heaters 0.075 to < 2 MMBtu/hr

Adopted in 2005 and amended in 2009 to enforce lower NOx limits, Rule 4308 controls emissions from boilers, steam generators, and process heaters in the size range of 0.075 to less than 2 MMBtu/hr. The District amended this rule through an extensive public process involving the public and other air districts to receive feedback on what emissions limits were feasible and could achieve the greatest emissions reductions. As a point-of-sale rule, and not a rule forcing replacement by a particular date, emissions are reduced when consumers replace older units with newer, low-NOx units as of the January 1, 2011, compliance date. The District will achieve 1.64 tpd of NOx reductions by 2019 and 3.30 tpd of NOx reductions by full implementation in 2031, based on an average equipment life of 20 years.

Rule 4309 Dryers, Dehydrators, and Ovens

The District adopted Rule 4309 in 2005 to enforce NOx emission limits between 3.5-12 ppmv for four categories of equipment. Representatives of affected industries and interested groups participated extensively throughout the rule development process. The rule requirements limit combustion NOx emissions from dryers, dehydrators, and ovens. These sources generally use either combustion modification technologies or post combustion flue gas clean-up to achieve the NOx limits in the rule. The final compliance deadline for these units came into effect in 2009. This rule results in 0.65 tpd of NOx emissions reductions.

Rule 4311 Flares

Amended on June 18, 2009, Rule 4311 controls emissions from industrial flares used at oil and gas production facilities, sewage treatment plants, waste incineration and petroleum refining operations. The 2009 amendments require flare operators to submit flare minimization plans, perform additional monitoring and record keeping, submit reports of planned and unplanned flaring activities to the District, and meet petroleum refinery SO2 performance targets. When fully implemented in 2017, this rule is expected to reduce SOx emissions by 0.06 tpd.

Rule 4320 Boilers, Steam Generators, and Process Heaters > 5 MMBtu/hr

The District adopted Rule 4320 in 2008, with multiple generations of Rules 4305 and 4306 preceding this rule to regulate this source category. This rule is the most stringent rule in the nation for controlling emissions from fuel combustion-producing heat and energy for manufacturing and processing purposes, and it is equivalent to BACT standards for this source category. Facilities generally control emissions from these sources through combustion modification or exhaust gas treatment. This rule and the 2005 amendment of Rule 4306 will generate 3.5 tpd of NOx reductions and 3.6 tpd of SOx reductions upon full implementation in 2014. Rule 4306 generated 0.2 tpd of NOx reductions with the 2005 rule amendment, assuming 25% of the food industry took

advantage of the enhanced NO_x limits option put into the rule. The remaining 3.3 tpd of NO_x reductions and 3.6 tpd of SO_x reductions come from the 2008 adoption of Rule 4320. However, per EPA's approval of Rule 4320, Rule 4320 emission reductions cannot be directly credited in the District's SIP because a portion of the reductions result from an emissions fee compliance option.³

Rule 4352 Solid Fuel Fired Boilers, Steam Generators, and Process Heaters

Rule 4352 was adopted in 1994 and has since been amended three times. It is one of the most stringent rules in the country for this source category. Facilities subject to this rule have invested millions of dollars to implement innovative control technologies and have significantly reduced emissions from solid fuel fired boilers. Previous rule-amending projects for Rule 4352 have not quantified specific emissions reductions because the rule amendments were meant to satisfy EPA RACT requirements and all units were determined to be operating at or below the proposed emission limits. However, the increased presence of biomass facilities in the Valley, from either new facilities or other solid fuel fired boilers that have converted to biomass, continues to significantly reduce NO_x and PM emissions from open burning practices. To date, agricultural burning has been reduced by 70% and approximately 90% of agricultural burning is projected to be eliminated in the coming years. In addition, the NO_x limits in Rule 4352 have continually been revised to ensure that facilities are complying with the most stringent NO_x limits possible, and that new facilities would also be required to implement effective emission control technologies to comply with the stringent emissions limits.

Rule 4354 Glass Melting Furnaces

District Rule 4354, adopted in 1994 and subsequently amended six times, is one of the most stringent rules in the nation for controlling NO_x, SO_x, and PM emissions from industrial glass manufacturing plants that make flat glass (window and automotive windshields), container glass (bottles and jars), and fiberglass (insulation). Recent amendments include more stringent NO_x emission limits based on BACT level controls for container glass, fiberglass, and flat glass. The rule gives special consideration to container glass and fiberglass manufacturers who use 30% post-consumer materials under the state glass recycling regulations. The rule also includes a technology forcing limit for flat glass furnaces. As a result of this stringent prohibitory rule and continuing efforts on behalf of this industry to reduce emissions, the Valley's glass melting furnaces use low-NO_x firing technology. With compliance deadlines through January 1, 2014, this rule is expected to reduce an additional 3.28 tpd of NO_x emissions, 1.12 tpd of SO_x emissions, and 0.11 tpd of PM_{2.5} emissions when fully implemented.

Rule 4550 Conservation Management Plans

Rule 4550 was adopted to help bring the Valley into attainment of federal PM₁₀ standards, and applies to on-field farming and agricultural operation sites located within the Valley. Rule 4550 was the first rule of its kind in the nation to target fugitive

³ Revisions to the California State Implementation Plan (SJVUAPCD Rule 4320); Proposed and Final Rules. 75 Fed. Reg. 214, pp. 68294–68296. (2010, November 5). Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2010-11-05/pdf/2010-28019.pdf>. And 76 Fed. Reg. 58. (2011, March 25). Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2011-03-25/pdf/2011-7090.pdf>.

particulate emissions from agricultural operations, and it has served as a model for other regions. The District worked extensively with numerous stakeholders, growers, and the Agricultural Technical Committee for the San Joaquin Valleywide Air Pollution Study Agency (AgTech) for two years prior to developing the Conservation Management Practices (CMP) Rule. The District also worked with agricultural stakeholders and other agencies, such as the Natural Resources Conservation Service (NRCS), following rule adoption to ensure affected sources were assisted as much as possible in understanding and complying with the requirements of Rule 4550. Through this rule, PM emissions have been reduced by 35.3 tons per day. Similarly, implementation of Rule 4550 by agricultural operations has resulted in the reduction of PM_{2.5} emissions through the reduction of passes of agricultural equipment and implementation of other conservation practices.

Rule 4692 Commercial Charbroiling

District Rule 4692 reduces PM emissions by requiring catalytic oxidizers for chain-driven charbroilers, including those used in many typical fast-food restaurants. Rule 4692 is among the most stringent rules in the nation for controlling emissions from commercial charbroiling operations. The original rule, adopted in March 2002, reduced PM_{2.5} emissions from chain-driven charbroilers by 84%. The September 2009 rule amendment expanded rule applicability to more chain-driven charbroilers. Rule 4692 has been fully implemented since 2011, reducing PM_{2.5} emissions by 0.018 tpd. The District also created a \$500,000 pilot Charbroiler Incentive Program (CHIP) to fund the installation of PM_{2.5} controls on under-fired charbroilers and further investigate the economic feasibility and availability of such controls.

Rule 4702 Internal Combustion Engines

The District has amended Rule 4702 four times since 2005 to implement NO_x limits for agricultural operations engines, implement more stringent NO_x limit for non-agricultural operations (non-AO) engines, and to extend rule applicability to units 25–50 brake horsepower (bhp). With multiple generations of rule amendments, Rule 4702 is the most stringent rule in the nation for this source category. Facilities generally control NO_x emissions that result from the fuel combustion of internal combustion engines with advanced technologies, such as selective non-catalytic reduction and selective catalytic reduction. The most recent rule amendments in 2011 lowered NO_x limits for non-AO engines and will achieve an additional 1.43 tpd in NO_x reductions by the final compliance deadlines in 2018.

Rule 4703 Stationary Gas Turbines

The District most recently amended Rule 4703 in September 2007 to reduce the NO_x limits for existing stationary gas turbines that are 10 megawatts (MW) or less. This amendment achieved additional NO_x emissions reductions from turbines used for cogeneration of electrical energy and steam for thermally enhanced oil recovery operations in the Valley. This rule equals or exceeds the most stringent source control of any air district in California by requiring BACT at these facilities. The District designed compliance schedules to allow reasonable time for completing modification and retrofit actions during scheduled overhauls of the gas turbines. The most recent

rule amendment achieves an additional 2.2 tpd of NO_x reductions upon full implementation and compliance deadline of January 1, 2012.

Rule 4901 Wood-Burning Fireplaces and Wood-Burning Heaters

The District amended Rule 4901 on October 16, 2008 nearly one year ahead of the deadline in the corresponding plan commitment to reduce the wood-burning curtailment threshold. Through this rule and the District's corresponding Check-Before-You-Burn program, the District prohibits use of wood-burning fireplaces and wood-burning heaters in areas with natural gas service when air quality is forecast to be above 30 µg/m³ of PM_{2.5}. Rule amendments have reduced PM_{2.5} emissions by an average 2.4 tpd, as averaged over the months of November through April; reductions on any given No-Burn day are much higher.

Rule 4902 Residential Water Heaters

The District adopted Rule 4902 on July 17, 1993 to control NO_x emissions from natural gas-fired residential water heaters with heat input rates less than or equal to 75,000 Btu/hr by enforcing NO_x emissions limit of 40 nanograms of NO_x per Joule of heat output (ng/J). The District amended Rule 4902 in 2009 to strengthen the rule by lowering the limit to 10 ng/J for new or replacement water heaters and to a limit of 14 ng/J for instantaneous water heaters. Retailer compliance dates ranged from 2010 to 2012, depending on the unit type. On and after the applicable compliance date, retailers have been required to sell only units complying with the new limits. As a point-of-sale rule, complying units are installed as pre-existing units require normal replacement and as other new units are needed. The rule has controlled NO_x emissions by approximately 88% for this source category. The 2009 amendments reduced an additional 0.5 tpd of NO_x.

Rule 4905 Natural Gas-Fired, Fan-Type Residential Central Furnaces

Rule 4905 was adopted in 2005 to establish NO_x limits for residential central furnaces supplied, sold, or installed in the Valley with a rated heat input capacity of less than 175,000 Btu/hour. The rule set a NO_x emission limit of 0.093 pounds per million Btu of heat output (lb/MMBtu) for all units. As a point-of-sale rule, and not a rule forcing replacement by a particular date, emissions are reduced when consumers replace older units with newer, low-NO_x units as of the January 1, 2007 compliance date. The current rule will achieve 2.6 tpd of NO_x reductions. The District has committed to amending Rule 4905 in 2014, which will lower NO_x emission limits for these units even further and create additional NO_x emissions reductions for this source category.

Rule 9310 School Bus Fleets

The District adopted Rule 9310 in September 2006 to limit NO_x, PM, and diesel toxic air contaminants from school bus fleets. Diesel-fueled school bus fleet operators must replace or retrofit all of their school buses to meet the applicable ARB and EPA emission standards for engines by 2016. The rule also requires all existing gasoline or alternative-fueled school buses and any diesel school buses manufactured after October 1, 2002 to be operated according to manufacturer specifications and, if replaced, shall meet all applicable ARB and EPA current-year emissions standards for the year of delivery of that school bus engine and fuel type.

Rule 9410 Employer-Based Trip Reduction (eTRIP Rule)

Although the District does not have authority to regulate tailpipe emissions, the District can adopt regulatory approaches to promote the reduction of vehicle miles traveled. The goal of the eTRIP Rule is to reduce single-occupancy-vehicle work commutes. The eTRIP Rule requires the Valley's larger employers, representing a wide range of locales and sectors, to select and implement workplace measures that make it easier for their employees to choose ridesharing and alternative transportation. Because of the diversity of employers covered by the eTRIP Rule, the rule was built with a flexible, menu-based approach. Using the Employer Trip Reduction Implementation Plan (eTRIP), employers choose from a list of measures, each contributing to a workplace that encourages employees to reduce their dependence on single-occupancy vehicles. Each eTRIP measure has a point value, and employer eTRIPs must reach specified point targets for each strategy over a phased-in compliance schedule (2010 – 2015). The District has continually provided employer assistance through training, guidance materials, promotional information, and online reporting options. Upon full implementation, the eTRIP Rule will reduce NOx and VOC emissions from passenger vehicle commute trips by approximately 1.2 ton per day. See www.valleyair.org/tripreduction.htm for further information about the eTRIP Rule.

Rule 9510 Indirect Source Review (ISR)

The District's adoption of Rule 9510 in 2005 was the first time in the nation that an air agency used regulation to control emissions from indirect sources. Clean Air Act Section 110(a)(5)(C) defines an indirect source as a "facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution." The District's ISR rule reduces mobile source emissions from new development projects. ISR's on-site mitigation component encourages beneficial changes in land development patterns and practices. The off-site mitigation option applies assessed ISR fees to the District's cost-effective emissions reductions incentive programs. The District conducts extensive outreach on ISR and prepares an annual report on ISR implementation. The District's 2010, 5-year evaluation of ISR implementation noted that, in spite of economic downturn in the construction industry, ISR has achieved emission reductions and has resulted in positive changes in land development practices and processes in the Valley. No other air district has a rule quite like the District's ISR rule. As such, the District's rule is the most stringent and effective ISR rule.

Regulation VIII Fugitive PM10 Prohibitions

In 2004, the District adopted amendments to Regulation VIII to upgrade existing RACM level rules to meet the more stringent BACM level required in serious PM10 nonattainment areas. These regulations are just as stringent if not more stringent than fugitive dust regulations at other air districts and comparable federal regulations. Regulation VIII prohibitory standards are performance based, whereby the operators are allowed to determine the control technique sufficient to limit visible dust emissions to 20 percent opacity and, in certain instances, to implement requirements for a stabilized surface. Dust control plans, test methods and standards, and recordkeeping requirements are the major provisions required under Regulation VIII. The 2004 amendments to Regulation VIII achieved approximately 20.4 tons per day of PM

reductions and were critical in the District's attainment of the National Ambient Air Quality Standard for PM10.

5.1.2 ARB Regulations Contributing to Continued PM2.5 Improvement

Since 1989, ARB has adopted and amended a number of regulations aimed at reducing exposure to diesel PM and NOx from fuel sources, freight transport sources like heavy-duty diesel trucks, transportation sources like passenger cars and buses, and off-road sources like large construction equipment. These regulations have significantly reduced PM2.5 precursors and direct PM2.5 emissions throughout the Valley.

Table 5-2 below includes a list of all the regulations adopted or amended by ARB from 2000 to 2011. Phased implementation of these regulations are producing increasing emission reduction benefits until 2019 and beyond as the regulated fleets are retrofitted, and as older and dirtier fleet units are replaced with newer and cleaner models at an accelerated pace. Several rules in particular; including Cleaner In-Use Heavy Duty Trucks, Cleaner In-Use Off-Road Equipment, Advanced Clean Car Program, Enhanced Fleet Modernization Program, and the Enhanced Smog Check Program, will be achieving significant emissions reductions critically needed to attain the standard under this plan.

In addition, ARB and District staff are working closely to identify and distribute incentive funds to accelerate dirty engine replacement. Key programs include the Carl Moyer Program, the Goods Movement Program, the Lower-Emission School Bus Program, and the Air Quality Improvement Program (AQIP). These incentive-based programs work in tandem with regulations to accelerate deployment of cleaner technology.

Table 5-2 Adopted ARB Regulations

ARB Regulation	Adoption Date	Category
Advanced Clean Car Program	1/27/2012	On-road
Expanded Off-Road Recreational Vehicle Emission Standards	12/16/2011	Off-road
Cleaner In-Use Off-Road Equipment	12/17/2010	Off-road
Port Truck Modernization	12/17/2010	Off-road
Cleaner In-Use Heavy-Duty Trucks	12/16/2010	On-road
Accelerated Introduction of Cleaner Line-Haul Locomotives	06/24/2010	Other
Enhanced Fleet Modernization Program (formerly called the Expanded Vehicle Retirement Program)	06/24/2010	On-road
Smog Check Improvements	08/31/2009	On-road
Portable Outboard Marine Tanks	09/25/2008	Off-road
Clean Up Existing Harbor Craft	11/15/2007	Other
Voluntary Accelerated Retirement Regulation	12/07/2006	On-road
Emergency Regulation for Portable Equipment Registration Program, Airborne Toxic Control Measures and Portable and Stationary diesel-Fueled Engines	12/06/2006	Off-road
Airborne Toxic Control Measure for Stationary Compression Ignition Engines (Agricultural Eng. Exemption removal)	11/16/2006	Other
Distributed Generation Guidelines and Regulations	10/19/2006	Other

ARB Regulation	Adoption Date	Category
Zero Emission Bus Regulation	10/19/2006	On-road
Heavy-Duty In-Use Compliance Regulation	09/28/2006	On-road
On-Board Diagnostic II	09/28/2006	On-road
Off-Highway Recreational Vehicles and Engines	07/20/2006	Off-road
California Motor Vehicle Service Information Rule	06/22/2006	On-road
Portable Equipment Registration Program	06/22/2006	Off-road
Fork Lifts and Other Industrial Equipment (Large Off-Road Spark Ignition Engines > 1 liter)	05/26/2006	Off-road
Technical Amendments to Evaporative Exhaust and Evaporative Emissions Test Procedures	05/25/2006	On-road
Diesel Verification Procedure, Warranty & In-Use	03/23/2006	On-road
AB1009 Heavy-Duty Vehicle Smoke Inspection Program	01/26/2006	On-road
Diesel Particulate Matter Control Measure for On-Road Heavy-Duty Diesel-Fueled Vehicles Owned or Operated by Public Agencies and Utilities	12/08/2005	On-road
Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards	12/08/2005	Off-road
Marine Inboard Sterndrive Engines	11/17/2005	Off-road
Requirements to Reduce Idling Emissions from New and In-Use Trucks, Beginning in 2008	10/20/2005	On-road
2007-2009 Model-Year Heavy Duty Urban Bus Engines and the Fleet Rule for Transit Agencies	09/15/2005	On-road
Portable Fuel Containers (PFC) [Part 1 of 2]	09/15/2005	Off road
Portable Fuel Containers (PFC) [Part 2 of 2]	09/15/2005	Off road
On-Board Diagnostic System Requirements for 2010 and Subsequent Model-Year Heavy-Duty Engines (HD OBD)	07/21/2005	On-road
Airborne Toxic Control Measure for Stationary Compression Ignition Engines amendments	05/26/2005	Other
Transit Fleet Rule	02/24/2005	On-road
Off-Road Compression Ignition Engines	12/09/2004	Off-road
Emergency Regulation for Temporary Delay of Diesel Fuel Lubricity Standard	11/24/2004	Fuels
Diesel Fuel Standards for Harbor Craft & Locomotives	11/18/2004	Fuels
Greenhouse Gas	09/23/2004	On-road
Airborne Toxic Control Measure for Diesel Particulate from Diesel Fueled Commercial Vehicle Idling	07/22/2004	On-road
Urban Bus Engines/Fleet Rule for Transit Agencies	06/24/2004	On-road
Engine Manufacturer Diagnostic System Requirements for 2007 and Subsequent Model Heavy Duty Engines	05/20/2004	On-road
Heavy Duty Diesel Engine-Chip Reflash	03/27/2004	On-road
Airborne Toxic Control Measure for Diesel-Fueled Portable Engines	02/26/2004	Off-road
Modifications to the Statewide Portable Equipment Registration Program (PERP) Regulations	02/26/2004	Off-road
CA Motor Vehicle Service Information Rule	01/22/2004	On-road
Airborne Toxic Control Measure for Diesel Particulate for Transport Refrigeration Units	12/11/2003	On-road
Airborne Toxic Control Measure for Stationary Compression Ignition Engines	12/11/2003	Other
Diesel Retrofit Verification Procedure, Warranty and In-Use Compliance Requirements Amendments	12/11/2003	On-road
Small Off-Road Engines (SORE)	09/25/2003	Off-road
Solid Waste Collection Vehicles	09/24/2003	On-road
Off-Highway Recreation Vehicles	07/24/2003	Off-road

ARB Regulation	Adoption Date	Category
Specifications for Motor Vehicle Diesel Fuel	07/24/2003	Fuels
Zero Emission Vehicle Amendments for 2003	03/25/2003	On-road
Airborne Toxic Control Measure for Diesel Particulate from School Bus Idling	12/12/2002	On-road
Low Emission Vehicles II. Align Heavy Duty Gas Engine Standards with Federal Standards; minor administrative changes	12/12/2002	On-road
Revision to Transit Bus Regulations Amendments	10/24/2002	On-road
Diesel Retrofit Verification Procedure, Warranty and In-Use Compliance Requirements	05/16/2002	On-road
On-Board Diagnostic II Review Amendments	04/25/2002	On-road
Airborne Toxic Control Measure for Outdoor Residential Waste Burning	02/21/2002	Other
Voluntary Accelerated Light Duty Vehicle Retirement Regulations	02/21/2002	On-road
California Motor Vehicle Service Information Rule	12/13/2001	On-road
Distributed Generation Guidelines and Regulations	11/15/2001	Other
Low Emission Vehicle Regulations	11/15/2001	On-road
Heavy Duty Diesel Engine Standards for 2007 and Later	10/25/2001	On-road
Marine Inboard Engines	07/26/2001	Off-road
Zero Emission Vehicle Infrastructure and Standardization of Electric Vehicle Charging Equipment	06/28/2001	On-road
Zero Emission Vehicle Regulation Update	01/25/2001	On-road
Heavy Duty Diesel Engines "Not-to-Exceed (NTE)" Test Procedures	12/07/2000	On-road
Light-and Medium Duty Low Emission Vehicle Alignment with Federal Standards. Exhaust Emission Standards for Heavy Duty Gas Engines	12/07/2000	On-road
Air Toxic Control Measure for Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Facilities	04/27/2000	Other
Transit Bus Standards	02/24/2000	On-road
Off-Road Compression Ignition Engines	01/27/2000	Off-road

Some of the most significant regulations adopted by ARB in recent years, such as the Truck and Bus Regulation and the Off-Road Regulation, depend on truck and equipment owners playing a key role in implementation. Accordingly, ARB's approach to ensuring compliance is based on a comprehensive outreach and education effort. ARB staff develops regulatory assistance tools, conducts and coordinates compliance assistance and outreach activities, administers incentive programs, and actively enforces the entire suite of diesel regulations. ARB's goal is to provide readily accessible and clear information for all diesel rules and incentive programs.

ARB compliance assistance and outreach activities also include the following:

- Training and implementation classes conducted by ARB staff in classroom settings throughout the State, including at community colleges
- Participation at business events throughout California, giving presentations, displaying materials, providing handouts, and responding to questions
- Marketing efforts such as advertisements, press releases, a television presence, and radio spots, including public service announcements statewide
- Websites for ARB's multiple programs

Complementing these efforts, ARB and District enforcement actively provide a level playing field for the regulated entities and ensure the emission reduction benefits are achieved.

The following summaries highlight ARB's most recent key regulations, the roll out of their phased implementation deadlines and corresponding emission reduction schedule, and supporting outreach and enforcement efforts.

Cleaner In-Use Heavy-Duty Trucks (Truck and Bus Regulation)

One of the most significant rules adopted by ARB within the past five years is the Truck and Bus Regulation, adopted in December 2008. In December 2010, ARB revised specific provisions of the in-use heavy-duty truck rule, in recognition of the deep economic effects of the recession on these businesses and the corresponding decline in their emissions. This rule represents a multi-year effort to turn over the legacy fleet of engines and replace them with the cleanest technology available.

Starting in 2012, the Truck and Bus Regulation phases in requirements applicable to an increasingly larger percentage of the truck and bus fleet over time, so that by 2023, nearly all older vehicles will need to be upgraded to have exhaust emissions meeting 2010 model year engine emissions levels. Replacing older, dirtier trucks sooner than they otherwise would have been retired results in lower NOx and PM2.5 emissions in 2019.

The regulation applies to nearly all privately and federally owned diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds, including on-road and off-road agricultural yard goats, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases, or rents affected vehicles. The regulation also establishes requirements for any in-state or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation's potential applicability to buyers of the vehicles. Approximately 170,000 businesses in nearly all industry sectors in California, and almost a million vehicles that operate on California roads each year, are affected. Some common industry sectors that operate vehicles subject to the regulation include for-hire transportation, construction, manufacturing, retail and wholesale trade, vehicle leasing and rental, bus lines, and agriculture.

In addition to the Truck and Bus Regulation, separate regulations reduce emissions from other public fleets, solid waste collection trucks, and transit buses. Trucks that transport marine containers must comply with the drayage truck regulation.

ARB compliance assistance and outreach activities in support of the Truck and Bus Regulation include the following:

- The Truck Regulations Upload and Compliance Reporting System, an online reporting tool developed and maintained by ARB staff
- The Truck and Bus regulation's fleet calculator, a tool designed to assist fleet owners in evaluating various compliance strategies
- Targeted training sessions all over the State
- Out-of-state training sessions conducted by a contractor

January 1, 2012 was the first deadline for trucks to install diesel particulate filters, with reporting required by the end of March 2012. Over 200,000 trucks reported by the required deadline. To ensure the success of these requirements, in the three-month period before the compliance deadline, ARB staff spoke with over 16,000 people by phone and sent notification postcards to over 200,000 people in California and neighboring states.

ARB and District enforcement provides a level playing field for the regulated entities and ensures the emission reduction benefits are achieved. ARB staff enforce diesel regulations addressing idling, transport refrigeration units (TRU) and drayage trucks, and recently began enforcing the Truck and Bus regulation as it came up to its first compliance deadline in 2012.

In general, enforcement is conducted by doing unscheduled roadside inspections. An inspection team may typically focus on truck stops, rest stops, industrial areas, ports, environmental justice areas, and cold storage facilities. Vehicles are audited for all applicable requirements, including smoke, emission control labels, and diesel particulate filters. To expand enforcement capabilities, ARB contracts with the District and the Bay Area Air Quality Management District to conduct inspections in their respective jurisdictions.

Cleaner In-Use Off-Road Equipment (Off-Road Regulation)

Another significant rule adopted by ARB within the past five years is the Off-Road Regulation, which was first approved in 2007 and amended in 2010 in response to the economic recession. These off-road vehicles are used in construction, manufacturing, the rental industry, road maintenance, airport ground support, and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NOx from the over 150,000 in-use off-road diesel vehicles that operate in California by requiring their owners to modernize their fleets and install exhaust retrofits. The regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize their fleets by replacing older engines or vehicles with newer, cleaner models; retiring older vehicles or using them less often; or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The regulation also requires that all vehicles be reported to ARB and labeled; restricts the addition of older vehicles into fleets; and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Once ARB receives authorization from EPA, fleets will be subject to increasingly more stringent restrictions on adding older vehicles. The regulation also sets performance requirements. While the regulation has many specific provisions, in general, by each compliance deadline, a fleet must demonstrate that it has either met the fleet average target for that year, or has completed BACT requirements. The performance requirements of the Off-Road Regulation will be phased in from January 1, 2014, through January 1, 2019. The combined impact of the performance requirements results in steady declines in NO_x and PM_{2.5} emissions from 2014 to 2019 and beyond.

Compliance assistance and outreach activities in support of the Off-Road Regulation include the following:

- The Diesel Off-Road On-Line Reporting System, an online reporting tool developed and maintained by ARB staff
- The Diesel Hotline (866-6DIESEL), which provides regulated operators with answers (in English, Spanish, and Punjabi) about the regulations and access to ARB staff
- The Off-road Listserv, providing equipment owners and dealerships with timely announcement of regulatory changes, regulatory assistance documents, and reminders for deadlines

ARB staff began compliance outreach in 2008 in preparation for the initial 2010 deadline. Staff is again ramping up outreach efforts in preparation for the 2014 deadline. ARB staff has sent over 50,000 postcards with compliance information to equipment owners. ARB staff began planning outreach efforts for owners of on-road trucks with two diesel engines in spring of 2012.

In general, enforcement is conducted through unscheduled fleet audits. Fleet audits are conducted when inspectors notice a trend of violations occurring for a given business. Vehicles are audited for all applicable requirements, including smoke, emission control labels, and diesel particulate filters.

Advanced Clean Cars (ACC)

Many gasoline engines now emit at near-zero emission levels of smog-forming emissions. Conventional hybrid electric vehicles have been commercialized, and the number of models offered for sale is quickly expanding. Recently, battery-electric vehicles and plug-in hybrid-electric vehicles have been introduced for sale, and fuel cell electric vehicles are expected to be sold beginning in 2015. This movement towards commercialization of advanced clean cars has occurred because of ARB's Zero Emission Vehicle (ZEV) regulation, which affects passenger cars and light-duty trucks.

Continuing its leadership role in developing innovative and ground-breaking emission control programs, ARB's ACC Program, approved in January 2012, is a pioneering *package* of regulations, that although separate in construction, each regulation is related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot-causing pollutants, and greenhouse gas emissions into a single, coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect.

The ACC program approved by ARB in January 2012 included amendments affecting the current ZEV regulation through the 2017 model year in order to enable manufacturers to successfully meet 2018 and subsequent model-year requirements. The ZEV amendments for 2018 and subsequent model years in the ACC program approved by ARB in January 2012 are intended to achieve commercialization through simplifying the regulation and pushing technology to higher volume production in order to achieve cost reductions.

The ACC Program will produce increasing benefits over time as new cleaner cars enter the fleet displacing older and dirtier vehicles. In this manner, the benefits in 2019 will be realized through the cumulative reduction in emissions achieved by new cars entering the fleet in 2017 through 2019. This program will continue to provide benefits well after 2025 as vehicles meeting the new standards replace older, higher-emitting vehicles.

Expanded Passenger Vehicle Retirement

Voluntary accelerated vehicle retirement or car scrap programs provide monetary incentives to vehicle owners to retire older, more polluting vehicles. The purpose of these programs is to reduce fleet emissions by accelerating the turnover of the existing fleet and subsequent replacement with newer, cleaner vehicles. Reducing emissions from the existing fleet is a component of California's SIP, which outlines the State's strategy for meeting health-based ambient air quality standards. Both State and local vehicle retirement programs are available.

California's updated voluntary vehicle retirement program is administered by the Bureau of Automotive Repair (BAR) and provides \$1,000 per vehicle, and \$1,500 for low-income consumers, for unwanted vehicles that have either failed or passed their last Smog Check Test and that meet certain eligibility guidelines. This program is referred to as the Consumer Assistance Program.

The Enhanced Fleet Modernization Program (EFMP) was approved by the AB 118 legislation to augment the State's existing vehicle retirement program. Approximately \$30 million is available annually through 2015 to fund the EFMP via a \$1 increase in vehicle registration fees. ARB developed the program in consultation with BAR. The program is jointly administered by both BAR (for vehicle retirement) and local air districts (for vehicle replacement).

Other programs, in addition to vehicle retirement programs, help to clean up the light-duty fleet. The AQIP, established by AB 118, is an ARB voluntary incentive program to fund clean vehicle and equipment projects. The Clean Vehicle Rebate Project (CVRP) is one of the current projects under AQIP. CVRP, started in 2009, is designed to accelerate widespread commercialization of zero-emission vehicles and plug-in hybrid electric vehicles by providing consumer rebates up to \$2,500 to partially offset the higher cost of these advanced technologies. These vehicles are a key element of California's strategy for meeting health based air quality standards and climate change goals.

The CVRP is administered statewide by the California Center for Sustainable Energy (CCSE). In fiscal years 2009–2012, \$26.1 million, including \$2 million provided by the California Energy Commission, funded approximately 2,000 rebates. In June 2012, the ARB allocated \$15–21 million to the CVRP as outlined in the AQIP FY2012–2013 Funding Plan.

Improvements and Enhancements to California's Smog Check Program

The following requirements were added to improve and enhance the Smog Check Program, making it more inclusive of motor vehicles and effective on smog reductions:

- Low pressure evaporative test;
- More stringent pass/fail cutpoints;
- Visible smoke test; and
- Inspection of light- and medium-duty diesel vehicles.

AB 2289, adopted in October 2010, is a new law restructuring California's Smog Check Program, streamlining and strengthening inspections, increasing penalties for misconduct, and reducing costs to motorists. This new law, sponsored by ARB and BAR, promises faster and less expensive Smog Checks by taking advantage of diagnostic software installed on all vehicles since 2000. The new law also directs vehicles without this equipment to high-performing stations, helping to ensure that these cars comply with current emission standards.

This program will reduce consumer costs by having stations take advantage of diagnostic software that monitors pollution-reduction components and tailpipe emissions. This technology, known as On-Board Diagnostics (OBD), has been required on all new vehicles since 1996. Under the new law, testing of passenger vehicles using OBD will begin mid-2013 on all vehicles model years 2000 or newer. This should result in reduced consumer costs by up to \$180 million annually.

5.1.3 District VOC Regulations

The rules identified in Section 5.1.1 are adopted District rules that reduce directly emitted PM_{2.5} and PM_{2.5} precursors (NO_x and SO_x). As discussed in detail in Chapter 4 (Scientific Foundation and PM_{2.5} Modeling Results), VOCs have the potential to contribute to the formation of two different PM_{2.5} components: secondary organic aerosols (SOAs) and ammonium nitrate (nitrate). Recent research and

modeling shows that the contribution of these components to the Valley's total observed PM_{2.5} concentrations is minimal, as is the contribution of anthropogenic VOCs (those not from biogenic sources) to the formation of these PM_{2.5} components. As such, a VOC-centric control strategy is much less effective for reducing PM_{2.5} concentrations than are primary PM_{2.5} controls or NO_x controls.

Although reducing VOC emissions does not contribute to attainment of the PM_{2.5} standard, it does contribute to improved ozone air quality in the Valley. The District has successfully reduced VOC emissions through numerous rules adopted or amended under the *2007 Ozone Plan*. For a detailed discussion on VOC rules and emissions reduced, refer to the *2007 Ozone Plan* and the *2009 RACT SIP Demonstration* report. Two examples of VOC reducing rules include:

- **Rule 4570 Confined Animal Facilities**
Amended on October 21, 2010, uses a best management practices approach to reduce emissions from confined animal facilities. The 2010 amendment relied on the latest scientific research and reduced 31.8 tpd VOC emissions.
- **Rule 4566 Organic Material Composting Operations**
Adopted August 18, 2011, Rule 4566 is the result of collaborative efforts with affected stakeholders and the utilization of the best scientific information available; the rule reduces emissions through the use of watering systems or compost cover, reducing 19 tpd of VOC emissions.

5.1.4 District Ammonia Regulations

Although ammonia is among the chemical precursors that can form secondary PM_{2.5}, research shows that ammonia controls are not effective for reducing ammonium nitrate in the Valley (see Chapter 4). Additionally, as the modeling sensitivity analysis has shown in Appendix G, reductions in ammonia emissions achieve insignificant reductions in the 2019 PM_{2.5} design value mass compared to reductions of direct PM_{2.5} and NO_x emissions.

The District has already achieved significant ammonia emissions reductions through several amendments of Rule 4570, Confined Animal Facilities, which has required best management practices for manure management and other areas to reduce VOC and ammonia emissions. Despite the insignificant contribution of ammonia reductions towards attainment of the PM_{2.5} standard, the District has evaluated the feasibility of obtaining additional ammonia emissions reductions and has been unable to identify any additional reasonable measures. As discussed in Section 5.3.3 below, the District explored the possibility of requiring the application of sodium bisulfate (SBS), as included as a potential control measure in the South Coast Air Quality Management District's (SCAQMD) 2012 Air Quality Management Plan (AQMP), and determined that this control strategy would be ineffective, extremely costly, has potential detrimental unintended consequences, and is likely infeasible for dairies within the San Joaquin Valley. While reducing ammonia is not an effective strategy for reducing PM_{2.5}

concentrations in the San Joaquin Valley, the District commits to continue to analyze and support studies regarding ammonia emissions at confined animal facilities, for the purpose of evaluating the potential effectiveness of additional ammonia controls on confined animal facilities in reducing PM_{2.5} concentrations in the Valley (discussed in more detail in Section 5.3.3, Further Study Measures).

5.2 Evaluating Control Measures for New Control Strategy Opportunities

For this plan, the District thoroughly analyzed opportunities to further reduce emissions of directly-emitted PM_{2.5}, NO_x, and SO_x.⁴ Appendices C and D of this plan present this analysis, organized by practice or equipment type. The control strategy resulting from this analysis reflects a multi-faceted approach to implementing emissions control technologies and practices.

While the adopted regulations noted above are achieving significant emissions reductions, more emissions reductions are needed to meet current EPA air quality standards. The District and ARB must continue to consider new control measure opportunities to ensure expeditious attainment of the 2006 PM_{2.5} standard.

5.2.1 Evaluation of Control Measures

The District has evaluated all sectors and equipment types for additional emission reduction opportunities. This analysis is presented in Appendices C and D of this plan. In particular, Appendix D (Stationary and Area Source Control Strategy Evaluation) focuses on sources under the District's regulatory control. The District has used the following key factors to evaluate potential emission reduction opportunities:

- **Technological Feasibility.** The District looked for any control technologies not already required that might be available to further reduce emissions from sources of air pollution in the Valley. This includes new technologies and technologies that may not have been cost-effective in the past. The technologies used in BACT guidelines; permits; and other air districts' rules, regulations, guidelines, and studies were reviewed for their feasibility, including how commercially available the technology currently is and whether the technology has been used in practice.
- **Cost-Effectiveness.** Cost-effectiveness is the cost of emissions controls compared to the amount of emissions reductions that would be achieved by those controls. The District does not have a pre-determined cost-effectiveness threshold, but control options with extremely high cost-effectiveness (high dollars per ton of pollutant reduction) can be deemed unreasonable and inappropriate for regulation.
- **Risk-based Strategy.** Through its Risk-based Strategy (RBS), the District is maximizing public health improvements resulting from the District's attainment

⁴ As noted in Chapter 4 and other areas of this plan, VOC and ammonia reductions do not significantly contribute to the Valley's attainment of the 2006 PM_{2.5} standard.

strategies and related initiatives. As described in Chapter 2 of this plan, the District uses a five-factor exposure assessment methodology to evaluate the PM_{2.5} attainment strategy under the RBS and prioritize control measures that maximize public health.

Embedded in the technological feasibility and cost-effectiveness analysis is the District's evaluation of RACT and RACM. A PM_{2.5} plan must demonstrate that RACT and RACM are in place for direct PM_{2.5} and the area's relevant precursors.⁵

- **Reasonably Available Control Technology (RACT).** RACT is the lowest reasonable emissions limit that a particular source is capable of meeting, considering technological and economic feasibility of the technology. RACT changes over time as new technologies become feasible and cost-effective, thus making them reasonable to require. Therefore, the District focuses its review on changes in technologies since the last RACT demonstration. The District has conducted comprehensive reviews of all NO_x and VOC rules for compliance with federal RACT requirements. For these reviews, the District evaluates all District rules against federal rules, regulations, and technology guidelines, as well as any comparable rules from California's most technologically progressive air districts. In response to the District's *2009 RACT Demonstration for Ozone State Implementation Plans* (2009 RACT SIP) and related rule amending projects, EPA has issued federal actions documenting their approval of District rules and their concurrence that District rules are at least as stringent as RACT. These efforts show that many District rules are more stringent than established RACT standards. RACT is the minimum level of control that nonattainment areas must achieve for existing sources, but because of the Valley's extensive air quality challenges, the District must continuously look beyond RACT.
- **Reasonably Available Control Measures (RACM).** Whereas RACT is specific to an emissions source, RACM is a collection of measures that, taken as a group, advance attainment of an air quality standard by at least one year.

RACT and RACM are, by definition, reasonable. Although air quality attainment plans must include a thorough analysis of reasonably available measures, it need not analyze every conceivable measure; reasonableness must drive the analysis. The District would not require any measure that is absurd, unenforceable, impractical, or that would cause severely disruptive socioeconomic impacts (e.g., gas rationing and mandatory source shutdowns). RACT is discussed throughout Appendix D. Chapter 9 of this plan synthesizes how this plan's control strategy meets RACM requirements.

⁵ Clean Air Fine Particle Implementation Rule [PM_{2.5} Rule], 72 Fed. Reg. 79, pp. 20610-20612. (2007, April 25). Available at <http://www.gpo.gov/fdsys/pkg/FR-2007-04-25/pdf/E7-6347.pdf>

5.2.2 Control Strategy Commitments

The District's thorough evaluation of control measures for potential opportunities to further reduce emissions, as discussed in Section 5.2.1, resulted in numerous commitments for future actions on the part of the District, not all of which are regulatory actions. As noted at the beginning of this chapter, the District is using a multi-faceted emissions control approach to reach beyond traditional regulations with innovative approaches. Some control measure opportunities are not appropriate for regulatory commitments at the time of plan adoption. Reasons for this include limits on the District's regulatory authority, costs, a need for additional information, the need for technology development, and the need to demonstrate the technology in practice. The opportunities that are better suited for incentive programs, technology demonstration, and other approaches are discussed in Chapters 6, 7, and 8. These combined efforts expedite emissions reductions and pave the way for future regulatory measures that might be needed under upcoming attainment plans for future EPA air quality standards.

5.3 NEW CONTROL MEASURES

The District is committing to five rule projects, including one new rule and four amendments to existing rules. The District evaluated these control measures based on the review criteria described in Section 5.2 and will develop the rule projects using a public rule development process as described in Section 5.3.2.

5.3.1 Regulatory Control Measure Commitments

Based on the control measure analyses in Appendices C and D, and the attainment needs identified through the photochemical modeling and other air quality analyses of this plan, the District proposes the regulatory control measures shown in Table 5-3, and as discussed in further detail below.

Table 5-3 Regulatory Control Measure Commitments

Rule	Amendment Date	Compliance Date	Emissions reductions*
Rule 4308 Boilers, Steam Generators, and Process Heaters 0.075 to <2 MMBtu/hr	2013	2015	TBD
Rule 4692 Commercial Charbroiling	2016	2017	0.4 tpd PM2.5
Rule 4901 Wood Burning Fireplaces and Wood Burning Heaters	2016	2016/2017	1.5 tpd of PM2.5
Rule 4905 Natural Gas-Fired, Fan-Type Residential Central Furnaces	2014	2015	TBD
Rule 9610 SIP-Creditability of Incentives	2013	2013	TBD

* Based on full implementation and best available information as of this plan. A more thorough evaluation of control techniques and feasibility will be conducted at the time of rule development.

Rule 4308 Boilers, Steam Generators, and Process Heaters 0.075 to <2 MMBtu/hr

Analysis for this *2012 PM_{2.5} Plan* indicates that lowering the NO_x emission limit for instantaneous water heaters in the size range of 0.075–0.4 MMBtu/hr is technologically feasible and cost-effective. The District therefore commits to amend Rule 4308 in 2013 to lower the NO_x emission limit for instantaneous water heaters in the size range of 0.075–0.4 MMBtu/hr from the current level of 55 ppmv to 20 ppmv with an anticipated compliance date of 2015.

Rule 4692 Commercial Charbroiling

Existing Rule 4692 achieves significant emissions reductions from chain-driven charbroilers; however, the rule does not require emissions controls for under-fired charbroilers. Analysis for the *2012 PM_{2.5} Plan* indicates that extending the applicability of the rule to under-fired units could further reduce PM_{2.5} emissions by 20% (0.4 tpd PM_{2.5}) from the baseline inventory for under-fired charbroilers upon implementation in 2017. The modeling conducted for this plan shows that reducing emissions from under-fired charbroiling by 20% in Kern County is necessary for attainment; thus, by reducing emissions 20% Valley-wide, the District achieves significant health benefits Valley-wide per the District's Risk-based Strategy. Research and demonstration projects are underway to evaluate emission control technologies for under-fired charbroilers in support of this measure. Therefore, the District commits to amend Rule 4692 in 2016 to add requirements for under-fired charbroilers, with an anticipated compliance date of 2017.

Rule 4901 Wood Burning Fireplaces and Wood Burning Heaters

Since 2003, District Rule 4901 and the associated Check-Before-You-Burn program have reduced harmful species of PM_{2.5} when and where those reductions are most needed—in urbanized areas when the local weather conditions are forecast to inhibit PM dispersion. Analysis for this *2012 PM_{2.5} Plan* indicates that lowering the threshold level for calling wood-burning curtailments could further reduce emissions from this source category by 1.5 tpd of PM_{2.5}. The amended rule would also include a new contingency provision (see Chapter 9). The District commits to amend Rule 4901 in 2016 with enforcement to begin the 2016/2017 winter season. This is a four-part commitment (refer to Appendix D for more details):

1. Lower the threshold level for calling wood-burning curtailments from the current 30 µg/m³ to ≥20 µg/m³
2. Review the meteorological conditions that lead to elevated PM_{2.5}, to prevent the buildup of PM_{2.5} that may lead to a potential exceedance day
3. Consider expanding the wood burning season to include October and/or March
4. Analyze the feasibility of allowing the use of the cleanest certified wood burning devices at specified curtailment levels. Enforcing this added flexibility would be difficult given the challenge in distinguishing wood smoke emissions from various wood burning devices, and the District would explore various options during the rule development process for ensuring that this issue is addressed.

Rule 4905 Natural Gas-Fired, Fan-Type Residential Central Furnaces

In the 2008 *PM2.5 Plan*, the District committed to amend Rule 4905 in 2014 to establish more stringent NOx emission limits for new and replacement natural gas-fired, fan-type residential central furnaces. Based on the preliminary results of a SCAQMD study of emissions control technologies for furnaces, the technology required to meet new NOx standards will be available by 2015. Analysis for this 2012 *PM2.5 Plan* also suggests that emissions may be reduced by extending the applicability of the rule to include commercial units, though additional analysis is needed to confirm the technological feasibility and cost-effectiveness of incorporating commercial units into Rule 4905. This will be further evaluated during the rule-amending project. The District commits to amend Rule 4905 in 2014 to lower the NOx emission limits for residential furnaces and to examine the possibility of incorporating NOx limits for natural gas-fired, fan-type, commercial central furnaces into the rule, with an anticipated compliance date of 2015.

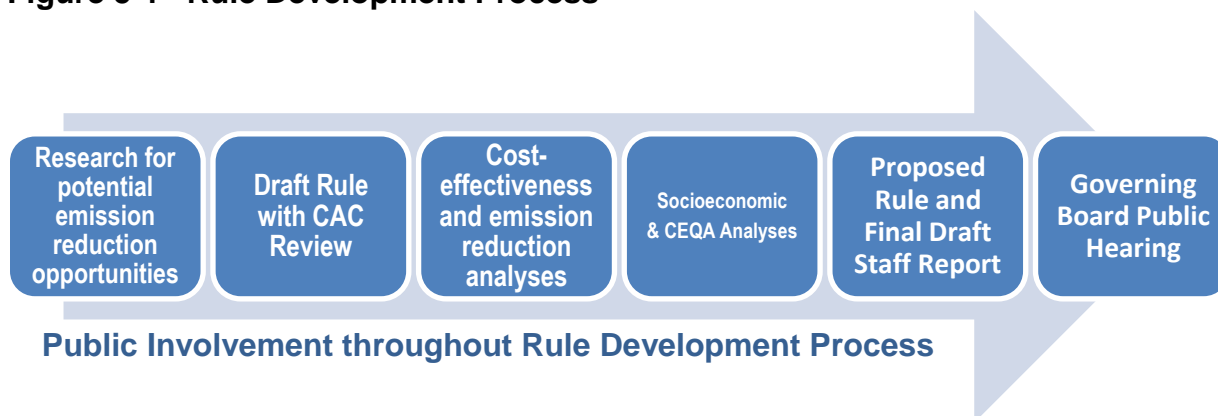
Rule 9610 SIP Creditability of Incentives

The District's successful incentive-based measures have been reducing pollutant emissions above and beyond reductions being achieved through traditional regulations. Historically, EPA has not granted credit for incentive-based reductions for use in SIPs to meet Clean Air Act obligations. This new District rule will establish appropriate mechanisms for the District to take SIP credit for eligible incentive programs. Once given credit, SIP-creditable, incentive-based emissions reductions will be used alongside regulatory measures to meet federal Clean Air Act requirements, such as requirements for contingency reductions and reasonable further progress (see Chapter 6 for more information).

5.3.2 Rule Development Process

After plan adoption, the District adopts or amends rules per the plan's regulatory control measure commitments. In these efforts, the District is committed to a transparent public process that includes stakeholder, industry, and other-agency input at every step possible.

Figure 5-1 Rule Development Process



Contrasting the broader plan development effort, the rule development process allows greater focus on a single sector or technology area. Early in the rule development process, prior to preparing a draft rule, staff researches technologies and explores options for emissions reductions, gathering preliminary data and performing literature reviews of relevant studies. Through a series of public workshops and focus group meetings, staff presents draft rule concepts and receives feedback on specific technology costs, technical insight, and general public comments. Staff uses this information gathering and discussion to refine the rule throughout the rule development process. Using this iterative process of gathering the most up-to-date cost and technical information, staff analyzes cost-effectiveness and potential emissions reductions. These analyses are shared with the public throughout the rule development process.

During the ongoing public workshop process, the District enlists the services of an economic consultant to analyze the proposed rule's socioeconomic impact, pursuant to California Health and Safety Code Section 40728.5. As with draft versions of the rule, the District gives the public and stakeholders the opportunity to review the analysis and provide further feedback. To the extent possible, the District minimizes significant economic and socioeconomic impacts by evaluating viable alternatives, adjusting proposed limits, or extending compliance schedules.

Staff presents the final draft version of the staff report and proposed rule, including the cost-effectiveness analysis, socioeconomic impact report, emissions reductions analysis, RACT analysis, and California Environmental Quality Assessment (CEQA), to the Governing Board during a public hearing. The Governing Board ultimately determines the balance between air quality improvement and rule impacts when adopting proposed rules.

Once adopted, the District forwards the rule through ARB to EPA for inclusion into the SIP, as appropriate. EPA evaluates the rule, determines if the rule meets federal requirements, and provides an opportunity for further public comment. After this review and comment period, EPA will amend the SIP to include the new rule, as appropriate.

Beyond the rule development and adoption process, District staff will continue to engage the public and affected source operators throughout implementation and compliance. Additionally, District staff continues public outreach and education through notifications to stakeholders of the rule adoption, issuance of compliance bulletins, and assistance through the District's Small Business Assistance program.

5.3.3 Further Study Measures

As discussed in this chapter and Appendices C and D, the District thoroughly reviewed the Valley's current emissions sources and emissions control measures to search for additional control measure opportunities. Chapters 5, 6, 7, and 8 outline a number of specific actions that are being taken to reduce emissions for this plan. In some cases, though, additional information is needed regarding the current emissions inventory, the effectiveness of current controls, and the potential of additional controls. The District

will continue to review these areas as *further study measures*, summarized in Table 5-4. These analyses can provide the foundation for related control measure commitments in future attainment plans.

Table 5-4 Further Study Measures

Control Measure	Description	Completion Date
Rule 4103 Open Burning	Evaluate the feasibility of postponed burning activities every 5 years, as outlined in the current rule.	2015
Rule 4106 Prescribed Burning	Examine the feasibility of implementing a biomass removal program similar to one in Placer County.	2013
Rule 4311 Flares	Review flare minimization plans and annual reports for further emission reduction opportunities.	2013
Rule 4550 Conservation Management Plans	Analyze existing studies and support new studies to establish a more accurate inventory of PM _{2.5} emissions and identify potential additional emission reduction opportunities.	2014
Rule 4570 Confined Animal Facilities	Analyze existing studies on ammonia at confined animal facilities and evaluate potential ammonia controls for their effectiveness in reducing PM _{2.5} concentrations in the Valley.	2017
SC 001 Lawn Care Equipment	Evaluate emissions inventory and technology demonstration efforts to identify potential emission reduction opportunities.	2013
SC 005 Asphalt/Concrete Operations	Examine feasibility of warm-mix asphalt as a potential emission reduction opportunity.	2013

Rule 4103 Open Burning

The District recently re-evaluated the *2010 Final Staff Report and Recommendations on Agricultural Burning* in May 2012 and found there were no significant changes in the economic feasibility of various alternatives to agricultural burning. Annually, the District evaluates each crop category still allowed to burn and determines a cost threshold based on the economic feasibility of alternatives to burning. The District carefully manages the remaining agricultural burning under its Smoke Management System to ensure that burning is only allowed on days when the amount burned would not cause or contribute to an exceedance of any air quality standard, and to ensure that there are no cost-effective alternatives available. The District will continue to consider the economic feasibility of burning alternatives on a case-by-case basis and continue with the five-year evaluation period outlined in Rule 4103.

Rule 4106 Prescribed Burning

Placer County Air Pollution Control District has implemented a successful program for reducing emissions from hazard reduction burning by removing biomass from the area and sending it for combustion at a biomass plant. The District has considered the

feasibility of implementing a similar program in the Valley; however, the unique Valley geography presents several challenges in implementing a comparable program. Such challenges need to be evaluated before determining whether a biomass removal program could be implemented successfully and result in cost-effective emissions reductions for the Valley. The District commits to further evaluating these challenges and the potential for such a program in the future.

Rule 4311 Flares

Effective July 1, 2012, facilities subject to the flare minimization plans (FMPs) provision in Rule 4311 are required to submit annual reports to the District with *reportable flaring event* and *annual monitoring report* data. The information in these annual reports could potentially provide insight for further emissions reduction opportunities for this source category. The first reports under this Rule 4311 provision were not due to the District until July 31, 2012. Given the time necessary to thoroughly analyze the FMPs, reportable flaring event reports, and annual monitoring reports, the District commits to analyzing these documents in the future.

Rule 4550 Conservation Management Practices (CMPs)

The District will continue to look for opportunities to reduce fugitive dust and emissions from agricultural operations through its Technology Advancement Program and through its collaboration with other agencies, such as the Natural Resources Conservation Service (NRCS), and other agricultural stakeholders. Collaborative research, such as the District's involvement with EPA's Regional Applied Research Effort (RARE), is investigating the effectiveness of CMPs on the PM_{2.5} fraction of fugitive dust and evaluating particulate emissions related to conventional tilling methods versus CMP tillage methods using new technology.

Rule 4570 Confined Animal Facilities

District Rule 4570 is among the most stringent rules in the nation for confined animal facilities (CAF). Rule 4570 uses a menu-based approach to require the implementation of best management practices to reduce emissions from confined animal facilities. As a part of the 2010 rule-amendment process, the District devoted extensive resources to evaluating and furthering science in the area of CAF-related emissions and potential mitigation measures. The combined efforts of the District, researchers, and agricultural stakeholders yielded profound new information that was used to develop the 2010 amendments. In particular, scientific research shed new light on dairy silage emissions and potential mitigation measures. As a result of these collaborations and efforts, Rule 4570 is expected to reduce 100 tpd of ammonia emissions in the Valley⁶.

In ongoing efforts to further reduce CAF-related emissions in the Valley, the District continues to work closely with researchers, other agencies, and ag stakeholders to seek out new technologies, work practices, and other methods. That said, no achieved-in-practice controls have been identified that could potentially further reduce CAF emissions beyond current controls. The District has explored the possibility of

⁶ (2010). *Final Draft Staff Report for Revised Proposed Amendments to Rule 4570 (Confined Animal Facilities)*.

Fresno, CA: San Joaquin Valley Air Pollution Control District.

http://valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2010/October/Agenda_Item_7_Oct_21_2010.pdf

implementing ammonia controls during periods of high PM_{2.5} concentrations; however, the available information indicates that this control strategy would not be feasible or effective in the Valley. The limited amount of nitric acid and sulfuric acid available in the atmosphere to react with the large quantities of ammonia present in the Valley generally renders ammonia emissions controls as ineffective in reducing PM_{2.5}.

Recent studies have cited the episodic application of sodium bisulfate (SBS) onto manure at dairies as a potential control strategy to reduce ammonia emissions. The South Coast Air Quality Management District identified this episodic application of SBS as a potential control measure within their 2012 Air Quality Management Plan. The District also evaluated this option and determined that for a variety of reasons, as discussed in this chapter, this control strategy is infeasible and ineffective for the Valley.

Most dairies in the Valley utilize a freestall design and generally restrict the cows' access to corrals during the winter months, since the corrals are wet and muddy. As a result, there would be very little or no fresh manure excreted in corrals during the winter. In addition, once wet conditions set in, it is not feasible to utilize tractors in the corrals to apply SBS, since the tractors would tend to get stuck. Application by hand at large dairies would be labor intensive, time consuming, and expensive, and would potentially pose health and safety risks to the workers.

Although SBS is generally safe in small quantities, excessive loading of salts is a major water quality concern in the central and southern regions of the Valley, where many dairies are located. Applying large quantities of SBS to manure that will eventually be applied to land may not be practical or feasible. A dairy would need to work with the Regional Water Quality Control Board to determine if this would be allowed, and a dairy's nutrient management plan would need to be revised. It may require hauling manure a significant distance to areas without the same salinity concerns and possibly increasing mobile emissions from hauling.

There are also significant costs associated with the application of SBS. Iowa State University Extension estimates the costs of SBS to be \$660/ton. District estimates show that 1,304 lb-1,955 lb/cow-yr of SBS would be needed for application to one entire corral area, costing \$430 - \$645/cow-yr. Using the District's corral ammonia emission factor for milk cows and assuming the 50% reduction in ammonia, the cost of the ammonia reductions would be at least \$41,067/ton to \$61,601/ton. Information from Iowa State lists reduced costs of \$129 - \$193/cow-yr for only treating heavy use areas, such as feed bunks and water troughs. It is not clear how much manure is excreted in heavy use areas, but even if the resulting cost per ton of reduction was cut in half, the costs would still be significant. Given the insignificant PM_{2.5} reduction achieved per ton of ammonia reduction, this cost-effectiveness translates to a much higher relative cost-effectiveness when compared to other, more effective strategies, such as NO_x reductions. Also, because flush dairies are common in the Valley, the heavy use areas will generally be paved, and the flushing of the freestall or corral lanes already significantly reduces ammonia emissions; therefore, application of SBS to only these areas would not benefit the Valley. It would be flushed to a lagoon or pond where the high buffering capacity would render it ineffective and possibly increase H₂S emissions.

Due to the ineffectiveness during the peak PM_{2.5} season, feasibility issues with potential controls, potential environmental impacts, cost effectiveness issues, and the insignificant contribution of ammonia reductions to improvements in PM_{2.5} concentrations, ammonia control strategies will not further assist the Valley's PM_{2.5} attainment goals at this time. However, as previously mentioned, the District intends to continue ongoing efforts to evaluate additional potential strategies for reducing CAF-related emissions in the Valley. Therefore, the District commits to continue to analyze and support studies regarding confined animal facility ammonia emissions, for the purpose of evaluating the potential effectiveness of additional ammonia controls on confined animal facilities in reducing PM_{2.5} concentrations in the Valley.

SC 001 Lawn Care Equipment

The District's Governing Board approved funding for District-sponsored research to quantify Valley-specific lawn care activity levels. The survey results will allow review and improvement of the emissions inventory for this source category.

The District is also actively demonstrating zero-emission lawn-care equipment technology through the recent launch of the Zero-Emission Commercial Lawn and Garden Equipment Demonstration Program. This program is funded with State Air Quality Improvement Program funds and will provide eligible cordless zero-emission commercial lawn and garden equipment to commercial landscape professionals who conduct business within the Valley. The District will continue its work with commercial operators to address the concerns with commercial viability through the implementation of this program. Based on findings and feedback from program participants, the District commits to developing more incentive program options for commercial operators to assist in deploying zero-emissions lawn and garden technologies.

SC 005 Asphalt and Concrete Operations

Warm-mix asphalt shows promise for reducing emissions associated with the production of asphalt for paving projects, when compared to hot-mix asphalt, because lower temperatures result in lower levels of criteria pollutant emissions. The cost, unfamiliarity with potential implementation issues, and uncertainty in the exact percentages of potential emissions reductions are potential barriers to the technology's use in the Valley. District staff commits to further evaluate the cost, effectiveness, and feasibility of this technology for Valley sources in the future.

5.4 ADDITIONAL CONTROL STRATEGIES

Non-regulatory strategies help accelerate attainment and have been an important part of recent District plans. For example, through the District's Fast Track strategy, the District and its Fast Track task force have evaluated several innovative and collaborative emissions-reducing measures, complementing the more traditional measures included in the *2007 Ozone Plan* and *2008 PM_{2.5} Plan*. These Fast Track efforts have resulted in increased incentive funding being brought to the Valley, expanded public outreach through Healthy Air Living (see Chapter 8), and guidance documents and model policies, such as the District's "Green Contracting" guidance and policy. Along these lines, the following strategies are under close evaluation by District staff for potential PM_{2.5} benefits.

5.4.1 Energy Efficiency

California has been on the forefront of developing renewable energy sources, and has implemented regulations to ensure cleaner non-renewable energy. The District's involvement in energy efficiency and renewable energy is guided by its Regional Energy Efficiency Strategy (REES), which was adopted in January 2010.⁷ This policy identifies the District's commitment to fostering energy efficiency and clean energy alternatives as opportunities for emissions reductions. Consistent with the District's 2012 Legislative Platform, the District continues to work with stakeholders and state agencies to expand net metering and feed-in tariffs for use of solar and other renewable energy sources, promote energy efficiency programs for energy end users that will result in lower emissions and a more stable electrical distribution system, and develop measures that incentivize and encourage low-emission technologies for use of waste gas as an alternative to waste-gas venting or flaring.

5.4.2 Eco-driving

Given that mobile source emissions now represent approximately 81% of the NO_x emissions in the Valley, and that mobile sources are essentially outside the regulatory control of the District, finding ways through education and outreach to reduce such emissions in the Valley is critical to future attainment. One such program in development is Eco-Driving. Eco-Driving refers to everyday techniques that drivers can do to maximize the fuel economy of their vehicles. These include observing good operating maintenance, such as proper tire pressure, wheel alignment, and oil viscosity; improving aerodynamics; traveling at efficient speeds; choosing the appropriate gear for manual transmissions; driving defensively to avoid unnecessary braking; accelerating at a constant pace; and other simple, yet often forgotten, driving techniques. As with other informational activities conducted by the District, an Eco-Driving program could be encompassed under the Healthy Air Living umbrella.

⁷ San Joaquin Valley Air Pollution Control District. (2010). *Approval of the District's Regional Energy Efficiency Strategy*. Memorandum to the SJVAPCD Governing Board. Public Hearing, January 21, 2010. http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2010/January/Agenda_Item_7_Jan_21_2010.pdf

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